iRun:
a situational, neo-assemblage perspective of information and records in running

Lee Jonathan Pretlove

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

The University of Sheffield
Faculty of Social Science
Information School

April 2022

Abstract

Running is a popular leisure activity, and there is great interest and use of data and information amongst its participants. Researching information about running has attracted scholarly attention in human-computer interaction (HCI) and digital sociology through self-tracking studies. There has also been limited attention in research on information behaviour upon embodied representations in short-term information use. Archival science has not considered long term running data practices despite some runners keeping information about their leisure pursuits for a long time. Both information behaviour and archival science have attempted to understand personal information and record creation contexts outside of running.

This study provides a new lens to understand the interconnected complexity between people who run, technology and information environments. It uses the concept of the *neo-assemblage* to achieve this understanding. The research also gives a renewed understanding of the types of information runners collect and use, whether they value their running information, and to what extent runners are concerned about its long-term existence and third party involvement with their data.

An innovative mobile method using a 360-degree action camera collected data whilst the researcher ran with four participants asking them questions. The four participants then participated in virtual interviews to understand how they used information created during their running. A virtual interview method collected data from four more participants about their information use in their running activities. The researcher applied *situational analysis* and a complementary *neo-assemblage theory analysis* to the collected data.

Runners use both embodied information and information derived from devices when running. Both types of information are valuable to a runner's short-term running goals. Most participants gave little thought to their represented information in the distant future. There is evidence that such information can have emotional meaning for some participants because it is central to their running identity. There was very little concern about how third parties held their personal information, such as running watch companies. Underscoring this is using the *neo-assemblage theory* lens to understand the interrelated complexity of the human, information and technology in these findings.

The originality of this work is drawing together the study of information behaviour and archival science in a poststructural perspective using *situational analysis* and *neo-assemblage theory*. The result contributes a new perspective on the complex relationships between embodied and recorded forms of information, including records, people, and technology. This thesis makes an empirical contribution by documenting the creation and use of information during and after physical activity. This thesis contributes to data collection methods by considering the ethical implications and practicalities of recording data with a 360-degree camera. This data capture method led to a further contribution in using a virtual reality viewer as an immersive technology for data analysis.

Funder acknowledgement

Acknowledgements

To Mum. You gave me the gift of reading, curiosity and criticality. You wanted a better education for me than you had growing up. You endured chronic rheumatoid arthritis with unwavering bravery and stoicism for all of your life. You passed away unexpectedly whilst I was writing up this thesis, so you never saw me complete this. I dedicate this work to you as a part of your enduring legacy and memory. I love you and miss you every day.

To my Dad. Like Mum, you wanted to give me the best start in life through education. Thank you also for the inherited ability to attend to the smallest detail. I hope that this thesis makes you proud.

To my partner Katie, I am placing my deepest gratitude for your enduring patience, support and love during this process. I love you. I could not have completed this without you. You can now photocopy this acknowledgement and wear it as a hat as a mark of recognition should you choose to do so.

To my supervisors, Dr Andrew Cox, Dr Laura Sbaffi and Dr Frank Hopfgartner. Thank you for giving me the freedom to allow this research to develop organically, indulging me in unconventional ideas, reining me back in and keeping me on track. Your concern and support over the closing months of this project have also been hugely appreciated.

To my generous participants. Thank you so much for volunteering your free time to help with this research. This work would not have been possible without you.

To Dr Susan Oman and the virtual writing retreat colleagues of late 2020 and 2021. The perfect combination of productivity and much needed virtual social contact in the confusing days of Covid-19 lockdowns and social distancing restrictions.

To the Digital Societies Research Group and the Health Information Research Group. Thank you for the intellectual and informal discussions that have contributed to research ideas and kept me sane during lockdowns.

To Beryl, Poppy and Puff, the past cavy crew, and Ginny and Ziggy, the present cavy crew. My constant and unquestioning companions. You have all kept me company during the working day.

Table of contents

List of tables

List of figures

Declaration

I, the author, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not previously been presented for an award at this, or any other, university.

The following publication arising from the thesis is acknowledged:

Pretlove, L. J., Cox, A. M., Sbaffi, L., and Hopfgartner, F., (2020). Using a 360-degree camera as a mobile data collection method towards understanding information types and use in running. *Proceedings of the Association of Information and Science Technology. 57*, e390. Wiley. doi:10.1002/pra2.390.

Glossary

Assemblage

An assemblage consists of components held in relations of exteriority from which an entity emerges. Assemblages are at a single level of scale. An assemblage is not a whole nor a sum of its parts. See also *components, level(s) of scale,* and *relations of exteriority*.

Capacity

A *neo-assemblage theory* term. The interaction between components in an assemblage results in the realisation of an assemblage's capacity to do or be something. The result of the capacity of an assemblage will depend upon its relations with other components in a given assemblage. See 3.7.2.6. See also *property*.

Coded, coding

A *neo-assemblage theory* term. A territorialised linguistic component or assemblage. It is said to be stable and in a reasonably fixed state. See 3.7.2.5. See also *decoded, decoding* and *expressive linguistic component*.

Components

A *neo-assemblage theory* term. A component is one of many sub-parts of a given assemblage. A component can be an assemblage when examined at the appropriate level of scale. See 3.7.2.2. See also *assemblages, level(s) of scale*.

Decoded, decoding

A *neo-assemblage theory* term. A decoded linguistic component or assemblage is said to be unstable and in flux. See 3.7.2.5. See also *decoded, decoding* and *expressive linguistic component*.

Deterritorialisation, deterritorialised

A *neo-assemblage theory* term. A component or assemblage that is deterritorialised is said to be unstable and in flux. See 3.7.2.5. See also *territorialisation, territorialised*.

Double determination causality

A *neo-assemblage theory* term. Causality in neo-assemblage theory can examine both the upward and downward causal effects of a given component or assemblage. An analyst can examine the relations of exteriority between components, the emergent assemblage and the relations' effects upon capacities within the appropriate level of scale. See 3.7.2.7. See also *assemblage, capacities, components, level(s) of scale, relations of exteriority*.

Embodied information

Embodied information is information derived from a human or biological entity through internal and external sensory perception of the body or organism. See 2.5.6., 5.3.2, and 5.3.3.

Experienced runner(s)

An experienced runner is a person who has been running for several years. They usually are a running club member who runs in events and races. See also *those who run*.

Expressive component

A *neo-assemblage theory* term. An expressive component materially exists but requires interpretation from a human or sentient mind to understand what the component is expressing. See 3.7.2.3. See also *component, material component* and *property*.

Expressive linguistic component

A *neo-assemblage theory* term. An expressive linguistic component is a particular class of an *expressive component.* It describes language across *levels of scale* as either a social variable, parameter or a given language. See 3.7.2.4. See also *component* and *expressive component*.

Levels of scale

A *neo-assemblage theory* term. The levels of scale determine the level of analysis. For example, if a person is an assemblage, the person's components will be the next level of analysis. If a social group is an assemblage, then a person will be one of many

components in the social assemblage. See 3.7.2.1 and 3.7.2.4. See also *assemblage* and *component*.

Material component

A *neo-assemblage theory* term. A purely material component is physical and exists in reality. See 3.7.2.3. See also *component*, *expressive component* and *property*.

Neo-assemblage theory

This thesis refers to Manuel DeLanda's exegesis and development of *assemblage theory* as neo-assemblage theory, as suggested by Manuel DeLanda. An alternative term is assemblage theory 2.0.

Parametric variability

A *neo-assemblage theory* term. It relates to the observed and potential variability of the parameters of territorialising and deterritorialsing of components in an assemblage and an assemblage itself. See 3.7.2.5. See also *causality*, *coded, coding*, *decoded, decoding, territorialisation, territorialised*, and *deterritorialistion, deterritorialised*.

Property

A *neo-assemblage theory* term. A property or properties result from the emergence of the components of a given assemblage entity. The properties of an assemblage relate to the assemblage's capacities to do or be something. See 3.7.2.6. See also *capacity* and *component*.

Represented information

Using Bates' (2018) 'Fundamental Forms of Information', represented information is a "subclass" of natural information encoded and then embodied. Represented information is tangible and perceptible to a human mind. See 2.5.6.

Record(s) of a run

A record of a run is when a person makes tangible a collection of represented information that reflects their run and their experience of a run. The record is a

linguistic expression, and either a machine or a person can record it onto a medium that can be understood and used by a human mind. See 5.3.1, 5.3.2, and 5.4.

Relations of exteriority

A *neo-assemblage theory* term. Relations of exteriority are the relations between components in a given assemblage and the assemblage itself. The relations are always held in exteriority because the suggestion of interior relations within an assemblage suggests an entity being a totality. See 3.7.2.1. and 3.7.2.6. See also *assemblage, components*.

Run, a

A physical activity a person undertakes in a physical environment by a human where they move their bodies faster than walking to complete a measured route within a particular environment with a particular goal, such as a certain distance in a specific time, or just time or just distance. See 5.2 and 5.3.

Territorialisation, territorialised

A *neo-assemblage theory* term. A territorialised component or assemblage is said to be stable and in a reasonably fixed state. See 3.7.2.5. See also deterritorialisation, deterritorialised.

Those who run

This term describes a person who is either new to running or runs for personal fitness. They are not usually a running club member and seldom compete in running events and races, if at all. See also *experienced runner(s).*

Chapter 1. Introduction.

1.1   Background to the research

This section describes the research background of the human experience of running and self-tracking information within the immediate context of creation and use. In particular, it describes self-tracking wearables (1.1.1), the lived experience of the research participants (1.1.2), long-term use of data and likely third parties concerned with its maintenance (1.1.3).

1.1.1   Wearables and the lived experience

The practice of self-tracking has grown markedly to monitor and improve the health and wellbeing of an individual, especially in the global North (Lupton, 2016; Nafus & Sherman, 2014; Neff & Nafus, 2016; Sharon & Zandbergen, 2017). People monitor and improve themselves by tracking their activities with a wearable device through an application (app) on a smartphone. Individuals can view and analyse data to understand or change their behaviour (Hartel, Cox, & Griffin, 2016; Hull, 2018; Major, 2001; Williams, 2013). The commercial market of self-tracking wearable devices (or wearables) has contributed to the uptake of personal activity tracking. People can quantify themselves and create large volumes of personal data. Individuals can track, analyse and store their data through the wearable devices themselves, through offline systems or third party cloud-based applications, such as Garmin Connect (Garmin, 2022), Runkeeper (2022) and Strava (2022). Access to third-party cloud-based applications is through desktop computing or mobile devices.

1.1.2   Runners and wearables

Lupton (2016) has identified the running community as one of the most significant users of self-tracking devices. The parkrun [sic] movement (parkrun, 2022) embodies the rise of running as a leisure activity. It does not just cater for those seeking high-level performance and competition. General Practitioners (GPs) in the UK's National Health Service (NHS) can prescribe parkrun to improve health (McGuinness, 2019). As of 2022, parkrun has 1,919 global events and over 3,000,000 registered runners (parkrun, 2022). It started in 2004 with 13 participants at one event in Bushey Park, London, and by January 2022, it had 742 events with 2,493,640 registered finishers in the UK (parkrun UK, 2022). The parkrun events do not have a competitive aim. The aim of parkrun is as an entry-level weekly event that encourages people to be active. People

do not have to run, they can walk, and accessible courses are available for those with physical disabilities (parkrun, 2022).

There is a potential to understand a broad lived experience of information amongst many people who run. This potential arises from the self-tracking technology market, parkrun as a free, weekly health and wellbeing initiative for all (parkrun, 2022), and the already established UK club running scene (United Kingdom Athletics, 2022). Those engaged in running have the potential to provide researchers with empirical data to understand the experience of running with information. Firstly, we can look at the type of person running and secondly, how information concerning running is used by, understood and valued at different points in time by a person who runs.

1.1.3   Personal data use over time and third party providers

Device manufacturers and application developers provide hardware and software to create and analyse data (Garmin, 2022; Runkeeper, 2022; Strava, 2022). People interact with their data through visual, audio and haptic alerts on their devices during an activity. After the exercise, they can analyse data and information on their computers or mobile devices (Kuru, 2016; Pink, Samartojo, Lupton, & Heyes La Bond, 2017). Users have little thought about the ongoing use of those data and information long into the future. People create data and evaluate information about themselves to get fitter through meeting short-term goals (Clawson, Pater, Mynatt, & Mamykina, 2015; Rooksby, Rost, Morrison, & Chalmers, 2014). There does not seem to be a clear understanding among device users about where data and information go and who looks after it (Lupton & Michael, 2017). There is no understanding of whether data and information are kept in perpetuity or only within the capacity of third-party servers for a finite amount of time.

1.2   Research problem

Runners have the potential to create large amounts of data about themselves through their devices. The data can be uploaded to an application so that runners can evaluate their training and performances. The evaluation of self-tracking data seems relevant to a runner's 'knowledge base' (Gorichanaz, 2015). This knowledge base consists of a runner's collection of acquired knowledge from social interaction and sensory and embodied knowledge. Research is emerging in everyday digital self-tracking amongst cyclists (Pink, Samartojo, Lupton, & Heyes La Bond, 2017) into uses, habits and

attitudes towards self-tracking data. There is some understanding of the value they place upon data as information throughout the time they engage in these activities. Understanding how runners collect, use and store their self-tracking data is gradually emerging concerning an individual's motivation to run (Esmonde, 2020; Karahanoğlu, Gouveia, Reenalda, & Ludden, 2021). However, it is unknown how runners consider self-tracking data valuable throughout their lives whilst engaged in running. The question of understanding if there is any value beyond the short-term use of data is whether this value derives from contributing to their running' knowledge base' or from other yet unexplored reasons.

To reframe this problem and clarify it further, it is unknown whether runners attach long-term value to their self-tracking data and visualisations. It is unknown if runners have expectations to retain their self-tracking data in perpetuity through their actions or actions of a third party. Potential future use could be for a runner wanting to refer to their past activities and training patterns (Hull, 2018; Lupton, 2016), yet we do not know the extent of the length of time that a runner refers to their past activities. Online applications allow users to download their data in plain text files or proprietary activity tracking data formats, for example, .FIT or .GPX (Garmin, 2022). Only the Human-Computer Interaction (HCI) perspectives of Elsden, Kirk and Durrant (2016) and Rapp and Tirassa (2017) have considered the long-term use of self-tracking data.

While there has been a move toward understanding how digital self-tracking embeds into everyday life, there is very little attention to its secondary use beyond its relationship to physical activity. Whether the creating individual or third parties have secondary long-term uses of self-tracking data is unknown. There has been some research on the digital collections of individuals over the last decade but not on self-tracking. For example, personal digital possessions (Cushing, 2013; Odom, Zimmerman, & Forlizzi, 2014; Petrelli & Whittaker, 2010); personal digital archives (Marshall, 2018; Redwine, 2015); personal information management (Bergman & Whittaker, 2016; Jones & Teevan, 2007); and the lived experience of self-tracking habits (Choe, Lee, Lee, Pratt, & Kientz, 2014; Rooksby, Rost, Morrison, & Chalmers, 2014) addressed long-term use of digital 'material'. These have addressed the difference between finding sentimental value in physical objects and digital materials and the difficulty individuals have in managing and storing their data. No published research has focussed in-depth on the

long-term use and management of an individual's digital possessions, only to suggest that it is a concern without fully addressing why it is a concern. The concept of *benign neglect* (Marshall, 2008a; 2008b) indicates that individuals have good intentions to store their personal digital information but leave the digital materials unmanaged. *Benign neglect* suggests a potential risk to long-term personal digital materials. Whether such a potential risk is a concern amongst individuals who track their activities is unknown.

To mitigate this risk, archives services (and, by extension, archivists) need to engage with their communities and actively educate individuals to look after their treasured digital possessions (Cook, 2013; Cushing, 2013). The involvement of a supposed trusted, neutral third party managing self-tracking data raises the question of whether device manufacturers, application developers or other institutions interested in social fitness data will fulfil this need for self-trackers. If the responsibility of digital archives remains unexplored, there is the potential loss of an individual's personal information, should an individual wish to retain it for whatever reason. Collectively, this could represent cultural and historical loss (Sinn & Syn, 2014). Its potential preservation could fall through the gaps of those responsible for creating data, those providing the means to make data, and those accountable for preserving society's memory. Archival science could offer insights into the value attribution and management of personal self-tracking data.

The main problem is understanding the complex relationship and derived value that types of running information have to a person. This understanding can determine what information is considered and identified for meaningful long-term retention. The level of value questions whether individuals or third parties plan to maintain running information for a long time measured over an adult's life span or beyond. It is unknown what constitutes a long time when discussing running information.

1.3   Research aim and questions

The research aimed to understand the complexity of people, technology and information in the activity of running through an assemblage lens. In particular, it sought to understand the types of information used, the value placed on information

by runners about the running activity over time and the role of third parties concerning certain types of information.

1.3.1 Research questions

The following five research questions were asked, based upon the literature review synthesis:

RQ1. What types of embodied and represented information do runners collect and use when running?

RQ2. In what ways do runners consider their embodied and represented running information valuable?

RQ3. To what extent are runners aware of third parties in relation to their represented running information?

RQ4. To what extent are runners concerned about the long-term existence of their represented running information?

RQ5. Can the concept of the assemblage give an overarching alternative explanation of the interconnected complexity and contexts of people, technology and information environments in the situation of running?

1.3.2 Proposed contribution of new knowledge and understanding

This research intends to give new understandings of societal attitudes toward keeping types of long-term personal information. This research plans to understand how types of information they use and value is managed and stored, assuming that people have essential personal information to collect and keep. This research intends to understand the importance people place on their types of information and whether they have considered the implications of its retention over a long time. This research intends to contribute to helping people break down language barriers and meanings used by information professionals. Breaking down these barriers will help more people understand and communicate problems with managing information and information technology in an understandable language instead of reserved languages for specific social or professional groups.

Missing from most of the literature reviewed is long-term storage and access considerations of people's information collected by third parties and whether the

third parties derive any power from it. This research intends to empower people to make choices about managing their personal information through learning how people understand where and how their valuable information is stored. Finding a mechanism for people to manage their information in their way could turn the tide of commercial third parties controlling, managing and maintaining people's personal information.

This researcher believes that this is a novel study that brings the topics of the sociology of running, digital sociology, information behaviour and archival science and recordkeeping theory and practice together. It intends to enhance understanding of how people value a strand of their personal information and their understanding of third parties where they may be involved. It wants to understand knowledge about keeping types of information, especially digital information, for a long time amongst people that use and value information.

The possibilities of the assemblage described in digital sociology literature will be applied to bring these intentions together. This research will use the digital assemblage to think about people, technology and information. This research intends to contribute a new lens toward understanding their interconnected complexities.

1.4 Thesis outline

The thesis consists of nine chapters.

The first chapter provides an introduction to this research. It describes the background of the research and contextualises the specific concerns of this thesis' focus. The chapter then presents the research aim and five research questions.

The second chapter presents the literature review that clarifies the research topic and questions through existing literature. The chapter begins with a description of the review method, meta-ethnography, and how it forms a literature synthesis. The chapter presents the main fields as a precursor to the literature synthesis. These fields are literature concerning running, focusing on the sociology of running and information behaviour studies, literature concerning self-tracking in sociology and human-computer interaction and archival science literature focusing on personal and digital archives. A synthesis of the reviewed literature clarified the research topic and the formation of the research questions. The literature review chapter concludes with a reflection on how the research intends to contribute to existing knowledge.

The third chapter provides an in-depth exploration and explanation of the researcher's philosophical development during the research. The chapter then explains the researcher's philosophical belief, its relationship to the chosen *situational analysis* methodology and a novel analytical, visual method based upon DeLanda's (DeLanda, 2006; 2016) *neo-assemblage theory* and other research methodologies considered during the research. The third chapter argues for the complementary nature of *situational analysis* and *neo-assemblage theory*. There is a detailed description of both *situational analysis* and neo-assemblage methods, including a novel 360-degree camera data collection method used during a run and the method of virtual interviews. Research quality is also addressed, such as credibility, reliability and limitations of the methods. The chapter then describes the implementation of the research design by defining the participants and the sequence of data collection and analysis.

The fourth chapter presents the foundational analysis through the initial category and concept development of *grounded theory* and subsequent *situational analysis*. It describes *situational analysis* results of the abstract situational mapping, relational mapping and social world mapping.

The fifth chapter describes the analysis results through an interpreted description of the participants' data.

The sixth chapter describes the *situational analysis* positional maps and accompanying explanations.

The seventh chapter presents the novel *neo-assemblage theory analysis* findings, illustrated with *neo-assemblage* maps with accompanying analytical explanations.

The eighth chapter provides an in-depth discussion of the findings of the fourth, fifth, sixth and seventh chapters compared with notable works in the fields identified in the literature review. Before engaging with the core discussion, the discussion first considers the types of runners and their reasons to run. The core discussion first addresses the types of information and information used during an activity of a run. It then addresses a record of a run used after a running activity. The final section discusses reframing the terms information and records in running activities related to the novel possibilities that *neo-assemblage theory analysis* presents.

The ninth chapter is the concluding chapter. It evaluates how the research addresses the five research questions. As a result of this evaluation, the chapter then describes how this research has contributed to researchers' current knowledge, theory, methodology, method, and implications. There is a further discussion of the research's implications for archival practitioners and individual members of society who self-track. The chapter concludes with four recommendations for further investigation.

1.5 Conclusion

This opening chapter introduces the thesis by outlining the contextual information concerning the activity of running, self-tracking data and information, and concerns over the temporal use and value of information. This chapter introduced the research problem and the resulting questions, which help address the research aim. The chapter then provided a descriptive outline of the thesis. With the thesis introduced, the next chapter reports upon the literature review and its resulting synthesis to refine the basis of the research problem.

Chapter 2. Literature review

2.1   Introduction

The literature reviewed spanned archival science, digital sociology, human-computer interaction (HCI), leisure studies and information science related to self-tracking and running. The review sought to build a cross-disciplinary understanding of the extent of scholarship addressing the value and use of self-tracking data to an individual over time and the role third parties have with personal digital information.

The chapter begins with a justification of the literature review method (2.2). Then, there is a review of archival science literature for value attribution to records and the management of personal information (2.3). The review considers short-term relationships with information, records, and people within archival literature. The treatment of long-term records and their value received a more significant consideration within archival literature due to the long-term nature of archives. It sought archival scholarship's thoughts on the long-term retention of records, personal archives, digital archives and personal digital archives that have potential application to personal self-tracking data collections. It also reviewed the role of the archival community as a third party body amongst society and personal collections.

Secondly, there is a review of digital sociology and human-computer interaction literature (2.4). This review sought to understand the extent of published work into the use and value over time of individual self-tracking information and the presence of third parties.

Thirdly, there is a review of information experience literature on runners and their relationship to short-term and long-term information (2.5). The review sought to understand research undertaken into the use and value of self-tracking information to runners. The review also explored whether runners had concerns about third-party involvement with their running data. The review also sought to understand whether running communities had appeared in the literature related to research concerns.

Consulting leisure studies and information behaviour literature led to understanding whether there was any further research in a leisure context that could apply to runners.

Overall, the review sought to determine the extent of literature that described the relationship between human and self-tracking information, its use and value over time and technologies. The review also sought considerations of third parties and involvement with personal self-tracking data. A synthesis of the literature review (2.6) leads to a clarification of the research topic (2.7) and research questions (2.8).

2.2   Literature review method

The research adopted Noblit and Hare's (1988) meta-ethnography for reviewing and synthesising literature after reviewing introductory literature review methods (Cooper, 1988; Grant & Booth, 2009; Jaidka, Khoo, & Na, 2013; Randolph, 2009). A trial implementation of literature review methods followed this. The trial included systematic reviewing, mixed methods research (Heyvaert, Hannes, & Onghena, 2017) with a particular investigation into screening methods (Hong et al., 2019) and integrative approaches (Cooper, 1984). The meta-ethnographic method developed was intuitive and aligned with the researcher's developing pragmatism (3.2).

Using meta-ethnography for a literature review that seeks thematic saturation may be considered weak without a systematic underpinning. However, the richness of meta-ethnography allows an immersion into the literature to derive a deep understanding of it. Noblit and Hare (1988) argue that relevancy is a natural filter for gathering literature, producing generalisable results. In favouring meta-ethnography and not using a systematic review, the literature review process provided an imaginative encounter with the new ideas through connections made when reading literature. Forming ideas in this enriching way breaks categorical impositions of using search terms and search results in bibliographic databases. Meta-ethnography is not reducible to a search strategy. Instead, meta-ethnography follows seven principles which result in a written synthesis. The seven principles in the following paragraph are from Noblit and Hare (pp.26-29).

Noblit and Hare explain that the phases are not distinct and can be concurrent as the review develops (p. 27). The first phase requires the researcher to understand the research topic and gather literature worthy of synthesis. Reviewing more literature can lead to the research topic changing. The second phase concerns screening for the relevancy of the literature first gathered on the topic. The review process is not an

exhaustive one; indeed, the tendency for such a type of review to generalise can generate "trite conclusions" (Noblit and Hare, 1988, p. 28). Literature was first screened for relevancy to the research problem before reading and absorbing it into the following meta-ethnographic phases. The third phase is reading the literature repeatedly to find notable "interpretative metaphors" (p. 28) related to the primary concerns of this research area and those which arise from reading the literature. The *inductive* reading process was concurrent with searching for literature. When encountering a new phrase or concept, a search was carried out with that phrase or concept through Web of Science and Library & Information Science Abstracts (LISA) to determine the extent of the concept. NVivo12 software stored the literature. The fourth phase determines the relationships between the metaphors or concepts, using a lines-of-argument translation framework (pp. 62-75) to synthesise studies as parts into a broader topic. A series of reflective memoranda (memos) achieved this and further conceptual development in meta-ethnography. The fifth phase sees another level of abstraction where the conceptual metaphors are examined for integration, resulting in the sixth phase, which makes an overall literature synthesis. The seventh phase presents the results of the literature reviewed and the synthesis. The synthesis forms a basis for presenting a case for the research topic and questions.

The following sections present the constituent parts of the literature reviewed before a literature synthesis and rationale and presentation of the research questions. The researcher carried out this review before data collection and analysis. Due to the qualitative nature of this research through grounded theorising, more literature is reviewed and analysed in discussing the research findings (Chapter 8). The inclusion of more literature in Chapter 8 is because of the overall grounded theorising approach, which requires a reflection on the findings generated against the literature first reviewed. Reviewing more literature demonstrates engagement with the broader literature related to the research findings. The researcher consulted relevant literature to determine the originality and contribution of the findings. The literature reviewed in this chapter, being meta-ethnography, is a qualitative exploration based on a subjective criterion of relevancy and does not claim completeness. Revisiting and including literature in the discussion (Chapter 8) not included in this chapter aims to show how the researcher engaged with literature throughout research.

2.3   The sociology of leisure and leisure information behaviour

This section on leisure aims to review the information experience in leisure and, where possible, identify running experiences. Literature was reviewed for use and value over time of information in the experience of leisure and, more specifically, in the activity running. The review sought information behaviour research into self-tracking and leisure. The review also wanted to understand whether running communities had appeared in leisure literature and whether they mapped to research concerns.

2.3.1   The serious leisure perspective

Stebbins' (1992; 2009; 2018) serious leisure perspective is a crucial influence on leisure sociology, developed since the 1970s within the leisure pursuits of Western middle-class societies (Atkinson, 2008). The serious leisure perspective describes the ideas of "serious pursuits," "casual leisure", and "project-based leisure" (Stebbins, 2018). Within serious leisure, Stebbins has identified six qualities which participants should strongly display, namely: "perseverance"; a "leisure career"; "significant personal effort" in acquiring "skills, knowledge, training, and experience"; "durable benefits to the individual"; "a unique ethos and social world" of the serious pursuit; and "identity" within the leisure pursuit. Stebbins contends that achieving the final quality of identity is only possible if the preceding five serious leisure qualities are present (Stebbins, 2005, pp. 33-35; 2018, pp. 19-22). Casual leisure does not afford a career, and the leisure qualities are scarcely discernible. Project-based leisure is a profound, time-bound commitment to leisure and shares some of the qualities of serious leisure but not all (Stebbins, 2005).

Long-distance running literature since the late 1990s has focused upon the serious leisure component of Stebbins' perspective.

Areas of scholarship that have engaged with Stebbins' perspective include:

- a focus on the role of social identity as a motivation for leisure tourism (Green & Jones, 2005; Lee, Brown, King, & Shipway, 2016; Shipway, 2010; Shipway & Jones, 2007; 2008);
- the development of an embodied sporting sociology (Allen Collinson, 2008; Allen Collinson & Hockey, 2011);
- the costs and benefits of running (Major, 2001);

- ageing and veteran participants in running (Tulle, 2007); and

- the justification of running as a personal health response to tackling government health policy (Shipway & Holloway, 2010).

Green and Jones (2005) and Shipway and Jones (2007, 2008) have mainly engaged with the concept of serious leisure. Their research has concluded that Stebbins' contention that the final quality of identity does not depend upon attaining the other five serious leisure qualities. Instead, they contend that pursuing a leisure identity motivates the individual to fulfil the other five serious leisure qualities.

2.3.2 Running typologies

Yair (1992) described runners in their approaches to training and dedication as professional, semi-professional and amateur. These reflected upon the level of commitment and expected results of the running participant. Professional is at the highest level. Semi-professional demonstrate similar levels of training to professionals but do not attain the same results. The amateur participates for the pleasure of the activity.

Smith (1998; 2000) has described different types of UK long-distance runners as athletes, runners and joggers based upon qualitative research in South Wales (UK). Athletes train like professionals and are likely to win or rank very high in races. They consist of a small percentage of those in races. Runners train similarly to athletes but are not expected to win or place at races and accept this. They form most of the running field in a race or event, especially the middle of the pack. Joggers are those who do not usually participate in races. Joggers run either for fun, social reasons, or general fitness without a serious commitment. They do not race at all or are participating to get around. Smith's jogger typology is similar to those researched by Hitchings and Latham (2017), who identify "casual runners" as "non-runner runners".

Table 1 reports the typologies encountered in leisure literature. There is a sliding scale of commitment levels from high to low.

Author	High	← Commitment level →		Low
Yair (1992)	Professional	Semi-professional		Amateur
Stebbins (1992)		Serious leisure amateur		Casual leisure

Smith (1998)	Athlete	Runner	Jogger
Hitchings & Latham (2016)		Non-runner runner	

Table 1: *A summary description of leisure typologies in the literature based upon commitment levels.*

2.3.3 Individualisation of leisure and casual leisure

Hitchings and Latham (2017) have observed that until their study in a UK city, the focus on running has been within the serious leisure and social contexts. They argue that there has been little observation about individuals who are not part of leisure social worlds but are exercising for personal benefit. Although they acknowledge Stebbins' serious leisure concept, they do not accept that his casual leisure definition applies to their casual leisure participants. Hitchings and Latham reject the idea of the importance of the leisure social world to the "non-runner runner" (p. 340). Hitchings and Latham have shifted the focus away from the serious leisure runner towards the research of those who do not meet the serious leisure criteria.

2.3.4 Community running and well-being

Studies into parkrun since 2017 have focussed on health and well-being (Grunseit, Richards, & Merom, 2018); responses to healthism and personal body projects in a social environment (Wiltshire, Fullagar, & Stevinson, 2018); as a communal leisure space (Hindley, 2018); and a place for earning social capital (Wiltshire & Stevinson, 2018).

The concept of healthism and the onus upon citizens to take personal responsibility for their health within the backdrop of a western, neoliberal agenda has emerged in leisure literature (Bridel, 2010; Greer, 2001; Lamont & Kennelly, 2012; Shipway & Holloway, 2010; 2013; Tulle, 2007; Wiltshire, et al., 2018). Healthism is a concept that conveys visual information that can determine whether our bodies are valued in society or conform to societal expectations (Wiltshire et al., 2018). Body culture contributes to serious leisure identity through the durable benefit quality. Motivation drives individuals to train, perform, and achieve a socially acceptable body physique (Abbas, 2000; 2004; Lamont & Kennelly, 2012). In a move away from individualisation, parkrun seems to encompass athletes and runners and those who think of themselves as casual runners, joggers, "non-runner runners". It introduces them to social aspects

of leisure. Through parkrun, participants can benefit from physical exercise and foster a sense of mental well-being (parkrun Ltd, 2018; Wiltshire, Fullagar, & Stevinson, 2018).

2.3.5   Information behaviour and leisure

Information in leisure from a Library and Information Science (LIS) context has gained attention since the millennium. Hartel, Cox and Griffin (2016) have published a comprehensive review of information behaviour in everyday life within Information Science since Marcia Bates' observations in 1974, including topics relevant to this research leisure and the serious leisure perspective.

Using the serious leisure perspective in LIS, Hartel (2003) observed that serious leisure was a fertile ground for information study. Hartel (2010) continued to develop Hjørland's (2002) domain analysis and SLP methods and frameworks to study the information habits of hobby cooks. This paper also proposed the concept of the lay information professional (Hartel, 2010). This concept reinforced the idea that LIS practice needs to move outside of the academy to help those organising and managing their home collections. Members of society perhaps need professional LIS help with their collections.

There is still "no comprehensive theory of information behaviour in serious leisure" (Hartel, Cox, & Griffin, 2016, para 13). Gorichanaz (2015; 2017; 2018; 2020) has researched information and leisure from an ultrarunning perspective. He applied Hartel et al.'s (2016) application of Hektor's human information behaviour model within everyday life and leisure and considered non-traditional sources of information such as embodiment. Ultrarunning is a part of human life and actions within which an organic relationship between humans and information is found (Bates, 2018). Gorichanaz (2018) describes Bates' fundamental forms of information when he considers the information constellations of an ultrarunner.

Most notably within LIS studies, Gorichanaz has focussed on ultrarunning and the role of information within it. The significance of Gorichanaz's work on this research study is worth noting. He has collected data using autophenomenological (Gorichanaz, 2015) and participant interview methods (2018).

Arguing towards a holistic, complete information environment and away from the separation of traditional, recorded information from its intended user, Gorichanaz

explains the differences between gnostic and pathic knowledge within information experience. Gorichanaz suggests that the idea of information experience legitimises both emotive and intuitive (pathic) knowledge as a "way of knowing" compared to more traditional views that only recognise the procedural and conceptual (gnostic) knowledge (p. 332). Gorichanaz proposes information constellations to conceptualise information in a lived environment. A single point in a constellation consists of an activity (Hektor, 2001) and an information type (Bates, 2018) which are linked together (Gorichanaz, 2018, pp. 344-345). Gorichanaz suggests that ultrarunning is an activity immersed in information augmented through the arrival of self-tracking devices (p. 344). He argues that even the separation of the documentary and the physical are merging. He considered constellations with ultrarunners as an "embodied-recorded" constellation, but there was no deliberate focus on this particular constellation, and the presented research data of participants only mentioned self-tracking devices as the information once.

The information constellation model develops upon his work of an "information on the run" system (Gorichanaz, 2015, para 28). Gorichanaz's "information on the run" model concerns only corporeal information, focussing upon the human and its perceived running environment as befits a phenomenological study. Within his autophenomenographical research, Gorichanaz (2015) proposed an "on the run information experience" system that acted as a perpetual feedback loop linking current bodily experience with calling upon past information from the knowledge base. Gorichanaz describes the development of an ultrarunner's "knowledge base through training, collecting lore and planning" (para. 36). Lore is "a suite of information sources" that contain "books, podcasts, articles, films," which have been produced by those in the ultrarunning world (para. 36). Ultrarunning oral culture is also of importance. The model views the living experience and the ultrarunning environment, which calls upon former experience and memory of training, lore and planning.

Gorichanaz's "information on the run" model emphasises human, corporeal information in running, specifically ultrarunning. Ultrarunning is where people can run all day, often for longer, covering distances over 30 miles, usually around 60 to 100 miles. He suggests a model of how corporeal, embodied information is used whilst on an ultrarun. This information includes internal and external perceptions. For internal

information, this also included mental states predominately related to the embodied performance and suffering of the human body during an ultramarathon. For Gorichanaz, past experiences in an ultrarunner's memory were a source of information whilst running that could direct the outcome of the run. These experiences are a part of the runner's information resources, as well as the embodied experience of the run that created an embodied feedback loop.

Gorichanaz observes but does not seem to explain ongoing perception during a run. He does draw attention to a difference or an extraordinary event, such as a threat to the person running. He also noted that ultrarunners often externalised internal information to seek or encounter information about running through ultrarunners talking with each other with their stories or ultrarunning lore. Gorichanaz (2015) and Lloyd (Lloyd, 2010; Lloyd & Olsson, 2019) have suggested that represented and embodied information should be equal rather than just emphasising the represented.

2.3.6   Embodied information

Cox (2018) and Cox, Griffin and Hartel (2017) also focused on embodied information within serious leisure, which considered the body an information source. They claimed that traditional senses (visual, haptic, aural, olfactory, and gustatory) and visceral senses are information sources that are evaluated and acted upon for performance or to avoid danger or injury. Cox et al. (2017) observed information as a living and not a static experience mentioning Lupton's (2014) work on self-tracking of the body as encoding the body. Self-tracking mixes the live, subjective experience with an objective bodily activity quantification. The work on the embodied turn in information science resulted in a special two-part edition of Library Trends in 2018. Hartel (2019) has since argued caution against, amongst other turns, the embodied turn in information behaviour.

Returning to those exploring the notion of the embodied turn, Bates (2018) restated her work on Fundamental Forms of Information. Bates defines baseline information as natural information as it occurs in the material world. Represented information is a "subclass" of natural information encoded and then embodied (p. 242). For Bates (2018), information appears more complex than just recorded information. Scholars

need to consider the entire context of information within society as people live their lives (p. 247).

2.3.7 Types of represented information in running

Returning to recorded information, Hull (2018) considers the types of metrics (information) that runners use from wearables. The study was sampled (n=10) from a UK running club. The findings are a valuable platform for further research. Hull found that pace and distance were the dominant metrics used, with time, heart rate and cadence used to a lesser extent. Types of metrics can be found in the running leisure literature starting from Nash's (1979) study of long-distance runners that do not directly address self-tracking nor include the innovative and conceptual field of embodied information. The metrics are namely pace (Allen Collinson, 2008; Gorichanaz, 2015; Hockey, 2009; Ronkainen, Harrison, & Ryba, 2013; Shipway & Jones, 2008; Smith, 1998) or speed (Abbas, 2004); time (Nash, 1979), in the form as a personal best (Abbas, 2004; Smith, 2000; Tulle, 2007); a timed element (Wiltshire et al., 2018); distance (Abbas, 2004; Goodsell & Harris, 2011; Ronkainen, Harrison, & Ryba, 2013; Smith, 2000; Tulle, 2007); heart rate (Abbas, 2004; Ronkainen et al., 2013); training plans (Ronkainen et al., 2013) and training dairies (Allen Collinson, 2008; Cox, Griffin, & Hartel, 2017). Within the parkrun context, the parkrun profile and personal barcode that can track runners' participation and time is another source of running information (Hindley, 2018).

2.3.8 Summary

The serious leisure perspective suggests that those in serious leisure make a significant effort to pursue knowledge and information to improve and attain goals. The effort is usually long-term. An understanding of a runner's information environment that seemingly straddles the short and the long-term is Gorichanaz's (2015) information on-the-run model based upon embodied and traditional information sources. The model chiefly focuses upon embodied information used during an ultrarun but does, to some extent, recognise the inclusion of external, tangible forms of information such as race reports and running literature. It has not yet included the use of wearables in that environment. The concept of embodied information is also integral to value and use as self-tracking data could be considered an additional sense as a part of a runners' information environment.

Hartel (2003, 2010) has shown that a serious leisure hobbyist acquires and stores much information. The limited self-tracking literature that studied runners seemed to suggest this trait. More recently, studies looking at those not involved in serious leisure running pursuits do not exhibit the same data habits or concern about their data. It seems that these are related to short-term use. The following section will look more closely at the literature concerning recent studies in self-tracking.

2.4   The sociology of self-tracking

A review of self-tracking sociology and relevant human-computer interaction (HCI) literature sought to understand research into individuals' value and short-term and long-term use of personal self-tracking data. The review also considered the awareness or influence of third parties.

Three recent key works in self-tracking or quantified-self sociology (Ajana, 2018; Lupton, 2016; Neff & Nafus, 2016) encapsulate the central debates around self-tracking or the quantified self. Quantified Self, quantified self and self-tracking are interchangeable. Lupton and Ajana separate the 'Quantified Self' from the 'quantified self'. The Quantified Self refers to the Quantified Self (2022) group established by Gary Wolf and Kevin Kelly in 2007. It consists of enthusiasts that share experiences and methods of tracking their bodily functions so that they can analyse their metrics and then act to optimise themselves. The movement's motto is "self-knowledge through numbers" (Quantified Self, 2022). The quantified self refers to those not a part of that movement but use tracking devices to quantify and track their physical routines. Neff and Nafus (2016) use less ambiguous terms, reserving the term Quantified Self solely for the Quantified Self movement and self-tracking for those not a part of the movement. Self-trackers have various levels of commitment to tracking their activities. This research follows Neff and Nafus' terminologies.

Lupton (2014; 2016) developed self-tracking sociology in response to a lack of sociology in self-tracking Human-Computer Interaction (HCI) literature. The main themes identified in Lupton's (2014, 2016) self-tracking sociology are agency, the technological/human hybrid and socialising in self-tracking cultures against dataveillance and third party surveillance concerns.

2.4.1 Messiness

A key theme in self-tracking sociology is the subjective individual against the objectivity and lure of numbers (Sharon & Zandbergen, 2017). The opposite of quantified self data is "qualified self" data (p. 1705). Quantified self data are "impoverished" compared to the rich, embodied experience of the qualified self (Lupton, 2016, p. 104). Messiness represents subjectivity or agency. The LIX art project drew attention to self-tracking messiness (Lupton, 2016). Self-tracking in HCI literature has "messy practices" when the quantitative tool of self-tracking meets the intricacy of various "social environments" (Clawson, Pater, Mynatt, & Mamykina, 2015, p. 648). HCI literature observes that self-trackers do not stay with the same device but change them with their data requirements depending upon their circumstances (Epstein, Ping, Fogarty, & Munson, 2015; Rooksby, Rost, Morrison, & Chalmers, 2014). Epstein et al. (2015) found that runners are no exception, suggesting tools for data migration when their data needs change. Ruckenstein and Pantzar (2017) link the subjectivity of self-tracking to unpredictable and spontaneous human behaviour. This behaviour results in idiosyncratic ways of building self-knowledge.

2.4.2 Abandonment

Literature on abandonment delves further into Lupton's questions of who abandons their self-tracking habits and whether self-tracking is a short-term concern to the self only when short-term goals are considered (Lupton, 2016). Barbour, Rintamaki, Ramsey and Brashers (2012) noted that participants avoided information about their health once they had specific health goals. When they had enough information at their disposal to manage their conditions, they would no longer seek more. Some would actively avoid it. Karapanos, Gouveia, Hassenzahl, and Forlizzi (2016) found that people stopped tracking when they had reached their health goals. In Clawson et al.'s (2015) study of self-tracking devices for sale on Craigslist, there were a variety of unconnected reasons as to why people abandon their devices. These ranged from just reaching their goals to a change in activity that the device could not provide or could not reach the users' expectations. Yang, Shin, Newman, and Ackerman (2015) assert that questions over accuracy lead to the abandonment of self-tracking devices. People do not always fit into the normal curve of device design and expectation (Nafus & Sherman, 2014).

2.4.3   Soft resistance

Another means of asserting agency is through "soft resistance" against device manufacturers and data collectors. The act of resistance takes data away from a central point and aims to disperse data or use data in ways that the designer or manufacturer had not intended (Nafus & Sherman, 2014). Soft resistance is a way for the individual in a Quantified Self culture to assert their agency or "n=1" (p. 1789). Within this culture, statistical language describes individuals and their differences: "[t]he difference cannot be thought of as a standard deviation from a norm; rather, they are not on the same curve" (p. 1791). Harrison, Marshall, Bianchi-Berthouze and Bird (2015) noted how self-trackers find barriers in technology, so they devise "workarounds" (pp. 618-619) to customise the devices. They also wanted a platform that shared their aggregated data within a social setting (p. 620) which a single platform did not provide.

2.4.4   Self-tracking sociality

Neff and Nafus (2016) and Lupton (2016) reported using a community health self-tracking app that brought a community together to better understand a medical condition despite not meeting US regulatory standards. Breton, Fuemmeler, and Abroms (2011) were also concerned that apps did not meet medical standards or evidence-based practice but did not acknowledge the positive online sociality. People were happy to share and watch each other in these health self-tracking apps related to specific medical conditions. Panoptic surveillance can be of benefit in a community data-sharing platform hosted by a trusted partner (Lupton, 2016, pp. 86-87). The literature in this respect points toward the potential benefit of using a third-party provider with sensitive data if the host is trusted. Crawford, Lingel and Karppi (2015) have argued the community aspects of self-tracking data as a "collective" endeavour when looking to make sense of data when comparing against other people's interpretations (p. 494).

In contrast, Lomborg et al. (2018) found that hard-core self-trackers did not use the social aspects of self-tracking platforms. A serious leisure athlete was a notable exception. Communities formed in self-tracking digital platforms were generally small.

2.4.5   Modes of surveillance and personal data control

The previous section introduced panoptic surveillance. This section reviews modes of surveillance and personal data control. Dataveillance "is the systematic use of personal data systems in the investigation or monitoring of the actions or communications of one or more persons" (Clarke, 1988, p. 499). This definition remains relevant as it describes what self-tracking in leisure involves. It does not give the rationale behind the motivations for dataveillance by either an individual or a corporation.

Lupton (2016) unpacks the suite of -veillance definitions. For the individual, "self-veillance" would be more appropriate. When it is twinned with consensual data, sharing with others is termed "panoptic surveillance". Panoptic surveillance is where individuals knowingly submit their data inviting others to surveil them by browsing or commenting on their self-tracking data (p. 59). Panoptic surveillance is suggestive of self-tracking sociality (see 2.4.1.5).

Lupton's (2016) idea of informed personal data flow is where the self-tracker knows where personal data is collected and from where it flows. boyd's (boyd, 2012) concept of "networked privacy" sees users of personal information in a network deliberately having their information spread across networks instead of in a singular place. Networked privacy is similar to Clarke's (1988) concept of data dispersion, a privacy measure against placing data in one data centre that would invite mass surveillance and control. The more data resides with a single organisation, the more it removes safeguarding. If the organisation collapses with a mass of personal data, then digital life and memory aspects are lost. Data dispersed across servers, and non-networked hard drives are possibly the best privacy solution to meet security and privacy requirements. Should a person want to piece together their digital lives through various sources, it becomes difficult because data may not be in their control, or the hardware is at risk of obsolescence.

Lupton refers to personal data analytics produced in self-tracking as "small data". This term equates to the difference between corporate and institutional archives with a big *A* (Archives) and personal archives, which could be with a small *a* (archives). Lupton perceives the individual's small data as being aggregated into a digital data economy. This economic concept opens up a line of questioning about data security, politics and privacy (Lupton, 2016, p. 114).

Lupton and Michael (2017) explored issues of dataveillance through a cultural probe method. They did not use the term dataveillance. They found that dataveillance "was almost exclusively understood as undertaken for commercial, security or government-related purposes". They also found that dataveillance was separate from social or sousveillance (p. 262). Continuing the investigation of digital assemblage and the lived experience, Lupton felt that further research in poorly educated, socially disadvantaged and older demographics was required (p. 267). Vitak, Liao, Kumar, Zimmer, and Kritikos's (2018) quantitative study on the privacy habits and concerns of self-trackers found that users were deficient in "privacy policy knowledge" (p. 236). Their research confirmed the "privacy paradox" (p. 236), where online users care about their privacy but do not want to go to the effort to protect themselves. Hull (2018) found this apathy in his qualitative study of self-tracking users in a running group. Both Hull and Vitak et al. (2018) recommended the "need for greater education and outreach to users" (p. 236) in terms of using fitness trackers.

2.4.6   Self-tracking typologies

According to Ruckenstein & Pantzar (2017), Quantified Selfers (or QS-ers) exhibit extreme self-tracking behaviour. They are more likely to modify self-tracking devices because they reject the standard measurements provided, and they can create more self-knowledge. QS-ers prefer to recognise that everyone is different, so they devise idiosyncratic solutions. These solutions can affect the way they think about their corporal behaviour. Linking this observed extreme behaviour was a hypothesis of keeping and looking after self-tracking data for the long-term (Pink et al., 2017). Much of the self-tracking literature tends to look at QS-ers specifically, arguing to apply the behaviour of these devotees to the general conduct of all those who use self-tracking devices (Choe, Lee, Lee, Pratt, & Kientz, 2014). Didžiokaitė et al. (2018) have concluded against this generalisation.

Those who are likely to keep their self-tracking data for the short term are those who complete a specific body project to better their health. Some are curious about themselves but have no desire to improve or monitor their habits, "biohack", or find that it is an extension of their identity (Dallinga, Mennes, Alpay, Bijwaard, & de la Faille-Deutokom, 2015; Didžiokaitė, Saukko, & Greiffenhagen, 2018; Lomborg, Thylstrup, & Schwartz, 2018; Rooksby, Rost, Morrison, & Chalmers, 2014). In reviewing articles on

behaviours, Epstein et al. (2015) noted that some did not perceive the benefit of long-term tracking data whilst others did. Pink et al. (2017) observed that committed cyclists had a sense of retaining personal data for the long-term should it accrue another use or value (p. 8). However, they did not consider themselves exhibiting QS-er behaviour because they had longer-term concerns.

The engagement of self-tracking can map to short-term and long-term use of data. QS-ers seem likely to retain data for the long-term future. People outside that group are more likely to have short-term uses for it. Epstein et al. (2015) and Pink et al. (2017) suggest that this neat characterisation of behaviour may not be so clear-cut.

2.4.7   Self-tracking memory

There is an awareness of memory and long-term use of self-tracking data in sociology, but it has received limited attention. Lupton has remarked that the quantified self is vital for memory (2016, p. 111) and can act as a "powerful" resource for an individual (pp. 91-92). Epstein et al. (2015) found that the upkeep of data for some long-term trackers was too much to manage.

From an HCI perspective, Elsden, Kirk, and Durrant (2016) and Rapp and Tirassa (2017) are aware of the work of self-tracking sociology. Their work on quantified pasts and the shifting values of the self bridge HCI and self-tracking sociology. The digital assemblage is relevant in these works. The assemblage is not only considered in the present but also in future dimensions to reflect upon the past. Memory in the digital assemblage is not a fixed notion. Rapp and Tirassa (2017) reinforce this fluidity. They recognise the "interconnected self", where quantified-self data have meaning through online social connections, which would be lost if divorced from them.

Prasopoulou (2017) also sees the reflective value of self-tracking data and memory. Representations of self-tracking data afford reflection upon both recent activities and activities of the past. Allied to reflection, constructing a personal narrative must not be overlooked when related to memory. Rettberg (2014) and Sharon and Zandbergen (2017) observe that creating stories about the self is just as important as learning about oneself in the present.

2.4.8   Running in self-tracking

Running appears in HCI self-tracking research, although it focuses on designing for real-time applications in performative contexts (Tholander & Nylander, 2015; Nylander & Tholander, 2016). Mapping the adoption of self-tracking technologies, Janssen, Scheerder, Thibault, Brombacher, and Vos (2017) researched a European city marathon to determine who uses running applications and running wearables. They found that younger and inexperienced runners used running applications whilst older and more experienced runners, usually part of a club, used wearables. Kuru (2016) developed a model that mapped the correlation between the stages of runners' careers (from beginner to regular) and their self-tracking data needs. Kuru's (2016) model relates to Janssen et al. (2017) in that those who are more engaged in running require more data through the mastery of their device and their running.

2.4.9   Summary

Practising agency through self-tracking messiness, abandonment and soft resistance seem to have short-term use and value attached to them. It is unclear whether these agentic practices are deliberate attempts to react to third party uses. Soft resistance seems to explain people's reactions against a device created for an average person rather than being tailored to an individual. Messiness and abandonment are not deliberate reactions against third party manufacturers and platform providers. Instead, it seems to be a short-term purpose for self-improvement. The value of data derives from achieving a short-term project.

Self-tracking data have a social aspect. Others trying to achieve similar goals or experiences can share their data and reflect upon their group and themselves. Individuals attach an apparent social value to self-tracking data. Social use can also be a reaction against private third parties controlling data. Social groups are empowered to have the means and devices to control their data and their community. They can watch others, and others can watch them with their consent rather than have data use dictated by state or organisational interference.

Most of the self-tracking literature relates to short-term projects, but there is evidence of long-term use in memory. Self-tracking literature suggests that self-tracking data have a reflective value. Data aid a self-narrative and act as a documented

source for private recall to help memory. Data can also have long-term value for social reflection and narrative.

It is not clear how much third party control of self-tracking data could affect the ability for future recall, reflection and narrative creation in self-tracking literature. The third party in some self-tracking literature is concerned with governmental or corporate control. The assertion of agency is trying to wrest back control to the individual or social group. The third party's role in the digital assemblage is relevant to the value and use of self-tracking data in the short term and the long term. The digital assemblage is perhaps the most pervasive concept that can help explain the relationship between humans and the digital. It seems to be the lynchpin between the short-term and the long-term. The extent of the digital assemblage in self-tracking is not fully known as it is a fluid concept and is not always fully understood by the human who comprises a part of the assemblage. Tentative self-tracking typology and cultures demonstrate the fluidity and variation of digital assemblages. Those like QS-ers who exemplify dedication to self-tracking have long-term use and attach value to personal data. There is the suggestion that club runners and those further in their running careers may have a long-term relationship with their data. Those who only have short-term use attach little value to their data. A review of archival science literature concerning personal archives, use, and value will help further understand long-term concerns about personal collections of information.

2.5   Archival science, the personal and the digital

This section emphasises the use and value of personal archives within archival institutions and archival science's observations of their use in society. Reviewing private archives (Fisher, 2009), digital archives, and personal digital archives (Marshall, 2018) determined the extent of archival science's views of both use and the value of records over time within personal collections of paper and digital forms.

2.5.1   Archival theorists on the personal

Jenkinson (1922) and Schellenberg's (1956) work concerning the 'personal' in archives provides a basis for considering subsequent theoretical works in personal archives. Jenkinson posited that archives were the official record of a state or institution where archivists should passively receive archives for the creating organisation to use. The

historical value of archives is not immediate upon their creation. The value should occur organically from business or government activity over time (Jenkinson, 1922; 1984). The archival document and its context are inextricably linked. The organisational context, the unbroken chain of custody and the need to preserve the record precisely as the creators intended it when given to the institutional archival authority have influenced European archival practice (Jenkinson, 1984). The archive must relate to an official purpose or business and avoid personality. If personal correspondence is necessary for official use, the individual renounces privacy and protection rights in favour of the personal letter becoming the organisation's property (Jenkinson, 1922).

Schellenberg (1956) also prioritised the institution above the individual. Schellenberg's (1984) appraisal theory differentiated between two values in public records: its primary use of evidential value and its secondary use as informational value. Schellenberg (1956) considered private archives "spontaneous" in nature. Manuscripts that were born out of "organised activity" in the private domain acquired the epithet of "archives" (p. 18). These were not to be confused with public records. Schellenberg accepted that records about people could feature in public archives, but they were usually of people of importance or concerning many people for State and administrative purposes. The influential ideas of Jenkinson and Schellenberg prevail in Shepherd and Yeo's (2003) *Managing Records* for organisations nearly eighty and fifty years, respectively, after their first publication.

The private individual should not appear in institutional archives. Schellenberg (1956) makes an exception by including notable figures. Institutional records have evidential and informational value. Value judgements, or appraisal, differ with each archival theorist. Jenkinson's (1922) passive approach suggests that the institutional creator of the record creates the value, whereas Schellenberg (1956) indicates that the archivist as a third party can appraise the evidential and informational value of a record. For informational value – the secondary use – it is the role of other parties, such as the future employees of an organisation or historians, to make value judgements. Jenkinson (1922) posits that institutional employees should appraise secondary value, not an archivist.

Daniels and Walch's (1984) *A Modern Archives Reader* represents an essential juncture in archival theory and practice incorporating personal papers, institutional records and digital. Recognising the historical difference between personal papers and records:

> ...these distinctions cannot be made so clearly. Personal papers may be both voluminous and carefully organized and records may be small in quantity and disordered. Furthermore, manuscript repositories are likely to hold some institutional records and archival institutions are likely to include personal papers. Equally important, both records and personal papers can be increasingly created and stored in computers. With this convergence of trends, archivists increasingly view their profession as a unified whole, without absolute distinction between records and personal papers (Daniels & Walch, 1984, p. xiii).

Quite how this unification happened is not relevant to this research. What is noteworthy is the likely dating of when the personal archive or "personal papers" became an accepted part of archival thought, and electronic records entered the archival fray. Daniels and Walch (1984) introduce "papers" stored in a computer. The reification of computing design and user interface (UI) metaphors has influenced how archivists have thought about computing (Blackwell, 2006). It seems symptomatic of accepting skeuomorphic computer design and language in society. It is unclear whether design reification has influenced how digital materials are used and valued in the short-term and the long term. Insights into how archival science has addressed digital for the long-term future could assist in determining the depth of understanding of the impact of reification of computing design. The insights will be the focus of the next section.

2.5.2   Digital archives and recordkeeping

Dollar (1984) applies physical records appraisal practice with magnetic tape data (or information) in machine-readable records. Despite its short life, a crucial determination upfront is retaining a machine-readable text if it has value or disposed of if it does not. The value judgements of evidence and information Dollar describes are archival values. Dollar makes a clear point about machine-readable preservation and software environments. Dollar (1984) describes a NARA policy that may have

influenced future thinking about digital files and the files' environment. Files are "software dependent", but NARA policy was to "preserve files in a software independent state" (p. 76). This policy required high costs to convert files for reading when needed. Software environments have implications in a personal digital context, especially in self-tracking data. Independent files do not always reflect what the user sees and interacts with on the vendor software-as-a-service (SaaS) platform. Examples of SaaS in the activity of running are GarminConnect (Garmin, 2022), Strava (2022), and Runkeeper (2022). The files have a dependency upon the SaaS for viewing. When saved independently of the SaaS, they lose the accustomed visualisation for human-computer interaction.

Bantin (1998) noted the split that electronic records brought to the archival profession. Bantin reported Dollar's call for a change in archival practice to address the electronic records rather than use outdated methods on new media. The University of British Columbia's approach through the InterPARES project attempted to refresh the definition and understanding of an electronic record (Duranti & Thibodeau, 2006). Bantin (1998) called upon a holistic approach, encouraging archivists to try institution-specific, electronic archiving methods for themselves, working with allied professions such as information technology specialists rather than waiting for a profession-wide solution.

Tschan (2002) compared Jenkinson's (1922) and Schellenberg's (1956) approaches to appraisal and value within electronic records. Tschan agreed with Booms' (1991) relevant argument that value derives from those creating the records and not those placing secondary value judgements upon them (Tschan, 2002). Nevertheless, Jenkinsonian passivity presents problems in the digital environment. Tschan (2002) argued that the digital source might be lost forever without early archival intervention. Tschan (2002) noted that just after the turn of the millennium, the post-custodial shift in recordkeeping encouraged archivists to become facilitators and advisors for the benefit of society in the new digital age.

Digital preservation focuses on solving the problem of long-term digital materials. It focuses on either technical computer science aspects, as exemplified by Giaretta (2011) or corporate advice for digital archives and libraries professionals (Brown, 2013; Myntti

& Zoom, 2019). Only Redwine (2015) has published a report on personal digital archiving. A review of iPres conference papers available through its conference repository from its inception in 2003 to 2021 has revealed a notable dearth of content related to personal digital preservation for individual citizens (Derrot, Fauduet, Oury, & Peyrard, 2012; Johnston, 2011; John, 2008; Kroski, 2010; LeFurgy, 2010; Lunghi, Tibbo, & Lee, 2016; Meister, 2014). Digital preservation literature tends to be technical literature. It comprises International Standards Organisation (ISO) documents such as ISO 14721:2012 (International Organisation for Standardisation, 2012a), ISO 16363:2012 (International Organisation for Standardisation, 2012b) and metadata standards promoted by National Libraries and Archives (EAD, PREMIS, MADS, METS, MODS, for example). The US Library of Congress has an accessible program in providing digital preservation advice services to the public (see 2.3.6). There seems to be a marked difference in the literature between digital preservation practice for the individual and institutional practitioners.

There is tension in archival theory and practice over the advent of digital records. Short-term software environments have clashed with long-term concerns, calling for professional reskilling to understand the digital environments so that digital records can be kept long-term. The digital preservation field has advanced these concerns by bridging archival and computer science approaches, predominantly for institutions. Tschan (2002) suggests that the creator of the record and not the archivist should be making appraisal decisions in the digital environment. The creator is in a better place to make judgements about their digital collections. The professional concerns of appraisal and responsibility seem to be shifting outside of the archival domain back towards its creative context.

2.5.3   Community and participatory archives

Inspired by Kuhn's (Kuhn & Hacking, 2012) paradigm shifts, Cook (2001; 2013) argued for four changes in archival thought over 150 years. The last change was a democratising one where archivists worked with communities. The first archival paradigm began with archivists as unbiased curators of legal materials for evidential purposes, which by the 1930s, had shifted towards cultural memory curation (Cook, 2013). From the 1970s, Cook classed the archival postmodern era as "identity" (p. 113), where archivists began to find their professional identity and society recognised

archives as a source of social identity. It was within this paradigm that the professional sought "rigid" practice and rules for both paper and digital archives, which resulted in archival "tensions" (p. 111) between those seeking to preserve evidential value against those seeking to preserve memory. Here, Cook observed archives shifting from a cultural and historical resource for academics to a societal resource for social justice and community identity.

The community paradigm moved archives towards a "participatory process" instead of viewing archives as a "product" (Cook, 2013, p. 114). Cook (2013) described the most recent paradigm, community, as "a democratizing of archives suitable for the social ethos, communication patterns, and community requirements of the digital age" (p. 116). Cook (2001) had earlier identified records as "dynamic virtual concepts" (p. 4) and not fixed. Records are active in human memory construction. Cook saw the community paradigm as the professional's salvation.

Archival records for community memory and identity have become more prominent. Bastian (2013) has explored the use of postcolonial representation in archives. Jacobsen, Punzalan and Hedstrom (2013) call on archivists to work beyond their experience and field limits, to work with other disciplines when working on collective memory. Yaco and Hardy (2013) describe the impact of archivists and historians when they work in their communities as activists, increasing the visibility of the archives. Cumming and Picot (2014) have suggested "community engagement" as a means of integrating archival work with its communities, often referring to displaced peoples or minority groups (p. 142). Wood, Carbone, Cifor, Gilliland and Punzalan (2014) saw archives as support for human rights work, seeing the archive move outside its walls. Evans, McKemmish, Daniels and McCarthy (2015) explored the archive in its supporting role in espousing the rights of vulnerable children. Evans, McKemmish, Daniels and McCarthy (2021) examined the role of social media information in animal activist communities and their enduring use through time as framed through the Continuum Records Model. These works combine Cook's third paradigm shift of identity and contribution to social justice and the fourth paradigm of working with communities and their collections. However, as there is positive third party involvement in this fourth paradigm shift, a similar question should be asked to

individuals. Exploring literature in private and personal digital archives could determine the extent of archival involvement. The following section will outline this.

2.5.4   Private archives

Fisher (2009) used Jenkinson's (1922) and Schellenberg's (1956) institutional archival thought to contribute to a theory of private archives. Fisher (2009) noted that it was not until 1996 that attempts to theorise personal archives appeared in a "landmark" (p. 4) issue of Archives and Manuscripts. Hobbs (2001) advanced this theory in 2001, being critical of the translation of appraisal theory of administrative records onto personal archives, which she argued do not correspond.

Fisher (2009) defines private archives "as records created by individuals and corporate entities (including non-profit organizations) outside of the public sphere of governments, governmental agencies, and departments." (p. 6). Fisher's private archives have three qualities, with the first quality being creation. This quality is creating a private archive without administrative order or contextual relationship. The second is custody or ownership, where a transfer from the private to the archival institution breaks the chain of custody. The third is the motive for acquisition by an archival institution, acquired for informational, not evidential, value (pp. 11, 17-19). Fisher (2009) observes that in Canada, the "total archives" idea of collecting both governmental and private archives has created a schism between evidential value as "accountability" and information value as "heritage" (2009).

Only Wells (2012) has given Fisher's publication scholarly attention. Literature in this area remains sparse, but it is developing. Douglas (2018) has written on the creative aspects of personal archives. Douglas (2018) addresses the concept of the "archiving I" (p. 35), which considers the active use of public figures' records by the public figures themselves to curate a personal yet public archival persona. Self-curation is a biased, idiomatic process. Douglas (2018) notes that active self-image management breaks the traditional conventions of archival science in that it abandons procedure and impartiality. Douglas (Douglas, Alisauskas, & Mordell, 2019; Huvila, Douglas, Gorichanaz, Koh, & Suorsa, 2020) has also worked on recasting the idea of a record in the personal emotional context of grief work and archival care. Douglas argued for the record-like qualities of a tattoo on human skin as records of the body.

Despite the gradual development of literature in personal archives since Hobbs (2001), Cox (2008) argued that citizens were now archivists and record-keepers with personal digital archives. Archivists must positively react to people collecting and curating their digital archives by helping them with their collections (Cox, 2008). They should share their knowledge instead of "protecting the secrets of a guild" (p. 198). He recognised personal information management (PIM) as an evolving field and called for archivists to "dig into and to influence" it (p. 196). Cox (2008) felt that PIM at the time was unaware of archival scholarship and practice, conceding that archival scholarship has never been far-reaching. Cox (2008) saw personal digital archives as an opportunity for the profession to raise its profile to act in a public, advisory role and make interventions for rare personal archives that archivists appraised as being at risk. This role requires novel approaches in appraisal and standards for personal digital archives, which are research and practice opportunities. Cox saw digital preservation, which is the long-term consideration of digital materials, within the professional context of personal digital archives.

Hobbs (2001) and Fisher (2009) recognised that private archives differed from institutional archives. Other approaches have included both the institutional and the private that incorporate all archival thinking in appraising records and applying institutional, systematic control to the individual. Douglas (2018) has noted that the character of personal archives reflects the creator. The creators derive the meaning of their collections in the act of personal curation. Having a third party appraise personal records independently cannot capture their full context. The creating agency needs to be involved.

Nevertheless, Cox (2008) has called for archivists to become advisors in personal digital collections because archivists cannot hope to catalogue and manage all collections that people create in a digital world. The existence of private archives theory suggests that there is long-term value for archive institutions and individuals in personal collections. Within private archive thought, the concept of creation is relevant to this research. From Fisher's (2009) personal archival standpoint, creation is creating a private archive without administrative order or contextual relationship. Further understanding of the lived private contexts and organisational systems are needed. As Cox (2008) has noted, personal information management (PIM) could help

advance this stage of understanding. The following section will review how archival science has used PIM.

2.5.5 Personal information management in archives

Cushing (2010; 2013) realised the potential of PIM in understanding personal digital contexts and has responded to Cox's call for archival practitioners to work in society as advisors. Cushing (2010) investigated why archives and records management literature had been largely ignored by PIM, using Marshall's (2007) work on the term personal digital archiving within the PIM context. Cushing acknowledged that Marshall saw personal digital archiving as a separate concern from institutional archives. Cushing's comparison of terms between archival literature and personal digital archiving literature showed that including archive and records management literature would help to inform discussion (Cushing, 2010). Cushing's (2013) contextual work used PIM to understand an individual and their relationship with digital items as the "individual-digital item relationship" (p. 1723) has perhaps advanced the creation phase of Fisher's (2009) private archive theory. Labelling digital items of value to an individual, Cushing proposed four characteristics of personal digital possessions. These are: "(a) providing evidence of the individual, (b) representing the individual's identity, (c) being recognized as having value, and (d) exhibiting a sense of bounded control" (pp. 1729-1732). Cushing acknowledged the role of other information professions and suggested that digital possession work could feed into new directions for archival services. Cushing explored the concept of "self-extension" of digital possessions (pp. 1724-1725) within behaviour studies in which a digital object as a personal possession can contribute to the self. Cushing responded to Cox's call to understand the value of personal digital possessions to individuals so professionals could better advise individuals and have a renewed professional role in society. Cushing also advanced Fisher's initial private archive theory to explore how individuals can form relationships with digital items.

Bass (2013) observed that personal digital contexts could use PIM. Bass' archive-centric approach sees PIM research concepts of "sentimental value" and "utility" in digital objects as a means of appraisal (p. 65). Bass proposed a "value folksonomy" of personal archives (pp. 66-67), showing how PIM and archival values align or show differences. Bass recognised that PIM could help understand the contexts and

organisation of people's personal information in a digital environment (p. 73). Marshall's (2007) concept of *benign neglect* of digital materials also appears. *Benign neglect* is where the best intentions to steward personal collections often result in the neglect of the digital archive, as it is not a simple task (p. 72). Bass reflects Marshall's (2007) and Hobbs' (2001) contention that traditional archival thought and personal archives are not complementary.

PIM in archival literature shows that some scholars are beginning to look beyond the immediate professional literature to understand personal digital contexts. PIM gives insight into immediate contexts to understand the value that is not just evidential and informational. These values apply to personal and individual collections. They emphasise sentimentality as a value.

2.5.6   Personal digital archives in the institution

Thomas and Martin (2006) collected the personal digital archive of a notable person to explore digital preservation techniques within hybrid personal archives. They suggest that archivists need to try to do something to effect change in digital archives, even if it is not the ultimate solution, much like Bantin's (1998) observations. Bailey (2007) also asked archive and records management professionals to react to the digital age to try new methods instead of sticking to the tried and tested means of theory and practice. Bailey (2007) saw appraisal as the unique selling point of the profession. From Bantin (1998) to Bailey (2007), there was a movement in both the UK and the USA for the profession to adapt and change to the digital recordkeeping challenge, which included challenging archival theory and practice. Digital records, hence digital archives, signalled new opportunities for institutions. The growth of archival literature on addressing digital materials, such as born-digital acquisition, access, cataloguing and sensitivity reviewing (Carroll, Farr, Hornsby, & Ranker, 2011; Langdon, 2016; Pledge & Dickens, 2018; Sloyan, 2016; Waugh, Roke, & Farr, 2016) are witness to these new opportunities.

The Library of Congress led the US government's investment in the National Digital Information Infrastructure and Preservation Program (NDIIPP) in 2000 (Ashenfelder, 2013). Hawkins' (2013) *Personal Archiving*, one of the earliest edited works on personal digital archives, published the culmination of the Library of Congress' specialist work

on personal digital archives. Ashenfelder (2013) described the Library of Congress' personal digital archiving steps of "locate", "decide what to keep", "organise", and "storage" through the "3-2-1 method" (pp. 34-37). Hawkins' (2013) edition contains many early practitioners and researchers in the personal digital archive domain. It set the groundwork for work and research in this area from an institutional perspective. Marshall's (2018) edited work *Personal Digital Archiving* is a practical edition describing the work that predominantly Library professionals have carried out within personal digital archiving. Marshall's work contains reflections on community work with digital archives, demonstrating Cook's (2013) archival paradigm shift to the community through personal archives and responding to Cox's (2008) call for practitioners to help society. However, library and not archival professionals lead this. Marshall's (2018) edition also discusses the ethics and social issues of personal digital archives, including the relationship of applications within a social context, their third party dependency and the risk that personal archives are not owned by the individual but by a third party (Schultz, 2018).

2.5.7   Personal digital archives in society

Copeland (2011) researched the emotional effects and preservation of digital artefacts amongst users from a Library perspective. Copeland was aware of Catherine Marshall's digital *benign neglect* (Cushing, 2013; Marshall, 2007; 2008a). Copeland's research found that in short-term use, the value was derived from communication and in the long-term, it was emotional responses "motivated by the documentation of life events." (Copeland, 2011, p. 1296). Copeland recommended that users store their personal information with third-party cloud services. The recommendation afforded an easier way to store personal information in personal storage devices than in personal storage hardware.

Acker and Brubaker (2014) and Sinn and Syn (2014) have both examined online archival contexts of personal archives. Acker and Brubaker (2014) coined the term "platform perspective" when considering personal digital archives (p. 4). They emphasised that the connectivity within social media platforms needed a redesign to accommodate archival concerns (p. 9). Sinn and Syn (2014) similarly found the interconnected nature of social media platforms an archival problem to solve, placing a secondary value on social media materials as "great potential" for the historical and social record (p. 120).

Öhman & Aggarwal (2020) posed what would happen if such platforms were lost, suggesting a mechanism such as a United Nations Educational, Scientific and Cultural Organization (UNESCO) designation to counter the risk of loss. Acker and Brubaker (2014) describe "cyber-sociology" (p. 11), where the virtual world is an extension of the self and self-presentation. Sinn and Syn (2014) have similar concerns about self-presentation, identity and extensions of the self when examining Facebook as a means of personal documentation. They found that users were aware of the privacy trade-off with social media organisations but forewent personal privacy to use the service. Participants did not view their Facebook data as a record of their daily lives. Consequently, they did not seem concerned with looking after the information, although they expressed sadness if it was lost. They observed that "the Cloud" meant that users did not look after their digital materials, which they also explained through "benign neglect" (p. 119).

Their research highlights that people create and use digital materials for short-term uses but do not seem concerned about their use beyond that, only to express sadness at its potential loss. An archival perspective wants to see the potential long-term informational value of social websites for cultural heritage, except the user places short-term value upon the materials. For the user, they are a site for socialising with short-term conversational benefits and digital extensions of physical selves. If people are concerned about their digital records, the considerable time required to manage results in abandoning such well-intended management practice. The two platform perspectives suggest that third party social media organisations ultimately control digital personal data, an acknowledged problem from a digital cultural heritage perspective.

2.5.8   Summary

The archival discipline has evolved since Jenkinson (1922) and Schellenberg (1956) effectively excluded personal archives from archival work. Jenkinson gave the archivist the passivity to guard materials under their charge and to make no value judgement on the materials. Schellenberg provided appraisal value, with evidential use as its primary value. Informational value was a secondary value acquired over time that the creator did not initially imagine. As the practice evolved, personal records entered working archival practice (Daniels & Walch, 1984), resulting in a movement towards

theories of private archives, seemingly rooted in traditional thoughts of appraisal (value). Fisher's (2009) first step of the apparent lack of administration and order of personal contexts defined the character of a private archive. These personal contexts are little known. The arrival of digital records (archives) also changed archival thinking, creating an interest in immediate digital contexts of digital materials required for their potential long-term informational value. Digital was bringing appraisal forward before the materials had acquired their secondary value. Archivists researching digital contexts and platforms were doing the same thing, observing that people gave little thought to their digital materials' longevity, as it had not occurred to them in their short-term use and value. Some archival researchers concluded that social and personal digital materials would have informational value without fully understanding how people attach value to their materials. Some have started to understand these contexts. Cushing (2010, 2013) used PIM as a means to understand the context of private archives and Bass (2013) and Tschan (2002) have suggested that perhaps the creators are best placed to attribute value to their personal (digital) archives. In this view, archivists should perhaps now become facilitators for people wanting to look after their materials instead of placing third party value judgements on personal digital materials.

2.6   Assemblages

This section reviews the concept of assemblages in the sociology of self-tracking where the researcher was first made aware of it. The section then describes the origins of the assemblage concept back to Deleuze and Guattari and reviews its scholarly use in information studies.

2.6.1   Digital assemblage

Within the self-tracking mix of subjectivity and supposed objectivity, the ideas of messiness (2.4.1.1), abandonment (2.4.1.2) and soft resistance (2.4.13.) support the concept of agency. Sociomateriality as a "digital assemblage" describes a blend of technology and human agency (Lupton, 2016, p. 40; p. 71). A whole hybrid experience assembles the human, technology, various supporting materials, and digital representations. Digital assemblages are fluid, "fragile" (p. 75) and are "never stable or contained" (p. 84) in their nature. A human can be a part of a network of assemblages depending upon the technology they are using or when interacting with others online

which emphasises fluidity. Each time a human enters an assemblage, it changes and alters its makeup. The digital assemblage suggests that humans and their data have a close relationship. There should be a concern about where people's data lives through informed consent (pp. 44-45). The practice of agency within self-tracking bucks against the ideal "neoliberal entrepreneurial citizen" (p. 69) or "uncritical reproducers of neoliberal tropes of citizen activation" (Sharon & Zandbergen, 2017, p. 1706). When an individual submits to or resists neoliberal encouragement of personal body responsibility, where citizens are encouraged to work towards an "ethical" body image through health and fitness (Lupton, 2016, p. 46), Neville (2013) suggests that it becomes a political act.

The "affective dimensions" (Lupton, 2016, p. 72) of the digital assemblage are where the device informs a human about how they feel instead of using embodied feedback (pp. 93-94). Pink, Samartojo, Lupton, and Heyes La Bond (2017) observed committed cyclists, noting that the affective dimensions of self-tracking data extend beyond physical activity. They grow into data visualisation that enables them to analyse their activity and derive a sense of accomplishment (p. 8). Within a "theoreticalethnographic dialogue", Pink et al. (p. 2) concluded that technology and humans are inextricably bound together with "numbers and graphs...invested with personal meaning and affective status" (p. 10) that direct life. Until this relationship is fully understood, it can feed into more significant data politics and power concerns. Ruckenstein and Pantzar (2017) recognised the incompatibility of agency against the backdrop of data politics that favours governments and commercial organisations. Self-tracking literature has found that people are perhaps apathetic about the third party use of their data (Hull, 2018; Lupton & Michael, 2017). Instead, the literature focuses on people's activities and being "a sensing human" in "new forms of mediated sociality" (Lomborg, Thylstrup, & Schwartz, 2018, p. 15).

Ruckenstein and Pantzar's (2015) concept of technoanthropology is a cross-disciplinary approach from philosophical, methodological, and research outputs stretching across technology, science, and anthropology. When considered alongside the digital assemblage, this new viewpoint describes and acknowledges a new quantitative and qualitative mix and the interrelationship between the device and the human. Ruckenstein and Schüll (2017) also continue this cross-disciplinary argument

for an intricate understanding of self-tracking and self-care. Pink et al. (2017) see the digital assemblage within digital materiality as a part of the ongoing shifting and evolving human experience. They characterise digital materiality as "leaky" (pp. 3-4).

The digital assemblage could relate to Greiner's cyborg (2014), who argues that external devices such as wearables and smartphones restructure how humans think. The human brain processes information, and humans are "outsourcing" to servers other aspects of information that humans process biologically (p. 301). In effect, technology is an extension of the human. Literature on the lived experience has also seen a development from computing environments, arguing for and researching in the holistic, ethnographic and phenomenological (Ayobi, Cox, & Marshall, 2016; Bødker, Gimpel, & Hedman, 2014; Didžiokaitė, Saukko, & Greiffenhagen, 2018; Pink, Samartojo, Lupton, & Heyes La Bond, 2017; Prasopoulou, 2017; Williams, 2013; Yoo, 2010). The next section traces this work back to its origins and other works that have subsequently used it.

2.6.2   Assemblage theory

Assemblage theory has its genesis in Deleuze and Guattari's (1988) assemblage work in *A Thousand Plateaus*. DeLanda (2006, 2016) presented an exegesis of Deleuze and Guattari's assemblage theory thought in his *A New Philosophy of Society* and *Assemblage Theory*. DeLanda (2006) himself describes his version as *neo-assemblage theory*. DeLanda's version of the theory attempts to explain the fluid, dynamic workings of an assemblage and its effects on each other through a work-in-progress, abstract template that have the potential to result in visual diagrams of the components and assemblages in a given situation inquiry.

The following section will review known uses of assemblage models inspired by these three philosophers before presenting *neo-assemblage theory analysis* based upon an extrapolation of DeLanda's work.

In dovetailing *situational analysis* and *assemblage theory*, Clarke and Friese (2007) wrote about the analytical possibilities of assemblage theory based on Deleuze and Guattari, which then appeared in the second edition of *Situational Analysis* (Clarke, Friese and Washburn, 2018). Friese (2009) described an assemblage analysis of biological animal clones and an assemblage's potential in examining and analysing

nonhuman actants. Just before Clarke and Friese wrote about assemblages in *situational analysis*, Marcus and Saka (2006) described the analytical possibilities of Deleuze and Guattari's assemblage. The assemblage works best "as an evocation of emergence and heterogeneity...without rigidifying into the thingness of final or stable states that besets the working terms of classic social theory" (p. 106)—in other words thinking of things in terms of essences and totalities. They cite a limited number of examples from 2003 to 2006. They also hint at DeLanda's (2002) exegesis of Deleuze and Guattari's assemblage theory. Chen (2011) has also used assemblages as a descriptive tool in a *situational analysis* of a harm reduction policy office. Chen acknowledged Keane's (2003) "depiction" (Chen, 2011, p. 472) of practices and technologies in policy-making as an assemblage.

Keane's depiction is not visual; it is not central to their paper, nor does it refer to Deleuze and Guattari as Chen does. Outside of *situational analysis* and towards other forms of critical theory, scholars have cited assemblage theory as a tool in disability and archives (Brilmyer, 2018) to conceptualise the library (Gerolami, 2015) and in critical data studies relating to data friction within a meteorological data setting (Bates, Goodale, Lin, & Andrews, 2019). A publication of assemblages in diagrammatic form appeared during the research (Hoffman & Novak, 2018). The cited examples using assemblage theory all refer to Deleuze and Guattari's *assemblage theory* and some to DeLanda's version. There has not been any sustained engagement with DeLanda's assemblage theory (*neo-assemblage theory*) that has attempted to use it as an analytical *assemblage theory* framework.

The review of assemblages concludes the literature review structured through concepts in the gathered literature. The next section provides a synthesis of the literature presented.

2.7 Synthesis

The theme of blurring subjectivity and objectivity runs throughout the reviewed literature. The supposed objectivity of information science and archival science aims to bring order to collections through classification, arrangement, and description. This objectivity gives users and researchers access to find materials to develop personal or societal knowledge or for accountability. There is objectivity in the design of wearable

devices where biometric and sensor derived data about human beings can fit into a normal curve. What a self-tracking device offers its user cannot possibly be entirely objective. HCI turned away from objective design through Elsden, Kirk and Durrant (2016) and Rapp and Tirassa (2017). They recognised that subjectivity is perhaps the future of HCI design for self-tracking platforms. This recognition has resulted in adopting qualitative approaches, which other HCI proponents have suggested (Prasopoulou, 2017; Williams, 2013).

HCI subjective design for a quantified past realises that humans not only exist in the present (present self), but their past selves inform them, which can also influence their future selves. This reflection and recollection of memory are present in archival science literature. Archival science understands that there is a change in the value of information over time. The first is immediate or evidential value, which is close to making the record. The second is the informational value that the record accrues over time that differs from its original purpose. According to the literature reviewed, the archival record should be an objective account of the activity. Its inclusion in an official organisational archive heightens its objectivity. Jenkinson (1922) did not want the subjective within the archive. It is the objective underpinnings for why archival science struggles to grapple with the idea of digital and private archives. It uses objective theories and practice that try to describe personal collections with procedure yet tries to convey the personality of the personal archive under description. Tschan (2002) has been brave to suggest that the creating society or culture should adjudge the value within private archives and not the institutional archival professional.

It would have been interesting to see how Jenkinson (1922) or Schellenberg (1956) would consider digital archives. Digital self-tracking materials are fluid and shifting (Lupton, 2016). This characterisation is appropriate when considering self-tracking within sociomaterialism and the digital assemblage. The digital assemblage as a term encapsulates the emerging human in a digital society. It is not yet a fully understood mix of qualitative human experience and quantitative measuring as a means of understanding oneself. Information empowers humans that supposedly enables the individual to know or optimise themselves for those that subscribe to the idea of a neoliberal agenda of body and health responsibilisation.

Self-tracking data are ostensibly objective, despite the claim that objective numbers can give insights into human activity. However, there is a tension between dimensions of subjectivity and objectivity in self-tracking. Self-tracking practice is "messy", which is appropriate given that it relates to human beings. In a computing environment, a mess is perhaps something that should be understood better. Yoo (2010) argued that experiential (or lived) computing needs to consider the device's contexts. This argument opened up research avenues into the lived experience of devices, data and humans' relationships with them (Bødker, Gimpel, & Hedman, 2014). These relationships are similar to keeping a diary (Ajana, 2018; Rettberg, 2014). However, diary keeping is a habit, whereas a device that passively records personal data can lead to mindless creation, let alone thoughts about its curation. Mindless creation with devices is perhaps why self-tracking is messy. The neat idea of Quantified Self design makes contact with messy human beings resulting in unintended uses not imagined by the manufacturer. Research into the lived experience shows that those in the Quantified Self movement customise devices for personal means. It also shows that those who self-track use standard device settings. There is a defined self-tracking culture amongst the Quantified Self community. They have become the exemplar to generalise self-tracking habits. However, other researchers have realised that not all share the same behaviours and attitudes as the Quantified Self movement, suggesting that self-tracking cultures need further exploration.

Within self-tracking literature, the inherent messiness of humanity restores a sense of agency away from the neoliberal body, health and fitness agenda to which many self-tracking sociologists are attuned. When a person is a creator of small data, they have agency over those data. This agency no longer makes those data just an anonymous crop to harvest for Big Data. Perfect data are not possible when humans are messy with their data practices. It seems that practising agency with self-tracking devices is likely. Asserting a right to privacy and softly resisting the machine can be achieved through using multi-platforms and self-tracking abandonment. The question remains that people practising resistance to regain control of personal data need to know what instruments of capitalism they are resisting. If they did know, it should then become an opportunity to teach people how to practice soft resistance or put their trust in those that can teach them how to do this. Library and archive professionals have

suggested that they can help society with their self-tracking devices and data (Copeland, 2011; Cox, 2008; Cushing, 2013; Hartel, 2003, 2010;(Hoy, 2016; Marshall, 2018), but they do not consider this help as a mode of soft resistance. The quality of the advice depends upon whether people continue to feed Big Data capitalism or whether they can make their own choices to track and store data.

Self-tracking is nothing new (Crawford, Lingel, & Karppi, 2015), but the digital aspect of self-knowledge and optimisation has created the idea of a hybrid human. Questions of hybridity aside, self-tracking is undoubtedly something a runner can use to their advantage in the twenty-first century. They can rely upon their embodied knowledge, a seemingly overlooked but now cautiously emerging source of information in information science and well established in the sociology of the body (Allen Collinson, 2008). Humans can know when something hurts, and when they are in their flow (Csikszentmihalyi, 1990; Naumer, 2005), they can use the full range of their sensorium to understand their surroundings. They can hear, smell and feel their place in the world. They can also call upon their running knowledge base of experience to help them understand their current run, to help them unfold their running constellations of information or call upon their information on the run system (Cox, Griffin, & Hartel, 2017; Gorichanaz, 2015, 2018). A human has another sense or embodied source to use with a self-tracking device.

The digital assemblage (Lupton, 2016) is a tamer description than cyborg (Greiner, 2014). However, the fusion of digital technology and the human to affect performance is seemingly prevalent in digital societies. Studies into the lived experience of wearable self-tracking devices show that they affect habits and performance in mundane settings. The digital assemblage is a bio-digital ecosystem that a human inhabits. The assemblage is not a fixed entity. It consists of the human, its wearable device, other computing devices, and cloud infrastructure that can disperse the resulting data across different servers should there be multiple devices and apps in a bio-digital environment. Jones and Teevan's (2007) PIM concepts of the Personal Sea of Information (PSI) and the Personal Information Collection (PIC) can be applied and modified to the digital assemblage. The digital assemblage is vast, and the personal seas are mingled in with the collections of others, creating a fluid ocean of information. This fluid metaphor is in stark opposition to archival thoughts of digital. Fixing the

assemblage would only give a snapshot of that particular context in time. In the pursuit of fixing a digital object and looking to add value in capturing its context at the time, it loses its quality and meaning as living, lively, or leaky data (Lupton, 2016). As seen in self-tracking literature, fixing data is not how digital behaves (at the risk of anthropomorphising the digital).

Concerning the assemblage, there is a fourth self-tracking self, the "interconnected self" (Rapp & Tirassa, 2017), that is, a social self. This social self challenges digital archival thought addressing the challenges of social media and the other networked digital sources. These digital sources are becoming the personal archives of the future. Archival literature has suggested a fix through divorcing socially networked records from the whole so that there is a personal archive of the individual (Acker & Brubaker, 2014; Bass, 2013; Sinn & Syn, 2014). Archival literature seems to unpick the social nature of social media, whilst self-tracking literature sees the idea of fluid digital assemblage. Rapp and Tirassa have acknowledged that social aspects in wilfully sharing self-tracking cannot be divorced from their social contexts. Some archival science literature seeks to view social media as a resource that needs to be captured for personal archives and separated from its network. Others who do not have archival schooling suggest that everything should be captured or designated special international heritage status to avoid a disaster (Öhman & Aggarwal, 2020). As a result, it creates a needless problem.

Archives are in a fourth Kuhnian paradigm shift of community (Cook, 2013) or moving towards a fifth called information (Yeo, 2018). The interconnectedness of society is in the fourth shift of archival work in its communities. The interconnectedness of social data enables people to have a social persona that extends into the digital world. This interconnectedness should remain instead of fixing and freezing the social record in perpetuity.

There appears to be a correlation in the literature's social groups. As Hitchings and Latham (2017) have observed, runners at the serious and performance-driven running end may exhibit extreme running behaviour. Whilst Hitchings and Latham researched those who do not identify as runners but use running as a part of an exercise regime, there is seemingly a paucity of literature about broader running habits in the general

population. Most literature on self-trackers congregates around the Quantified Self movement - an extreme self-tracking culture. Research that has examined self-trackers shows that they do not have the same concerns, knowledge or enthusiasm as Quantified Self-ers. Kuru (2016) has perhaps come closest in suggesting the relationship between participation in running and the need to have more self-tracking data (or mastery). Kuru shows the relationship between the development of a new runner and data as a relationship that needs data for continuous improvement. There could be a relationship between serious leisure runners who have the same extreme approach to their data analysis as committed Quantified Selfers exhibit.

The literature also suggests short-term and long-term uses of self-tracking data, which could map people's extreme and ordinary behaviours. Some literature suggests digital materials are temporary and short-term, used merely to achieve short-term goals and then discarded. There does not seem to be any development of a relationship between the self-tracking device and the resulting data. For those that do form a long-term relationship with the device and resulting data, it is not clear what they do with those data. Behind these uses and values lies a not fully understood presence of known and unknown third parties. Connecting all of this uncertainty are complicated interconnected contexts and relationships where an assemblage could assist with such an understanding.

2.8   From literature synthesis to research questions

The potential of Lupton's (2016) sociomaterialist digital assemblage requires further exploration and development as a framework to understand the relationship between technology, humans and information. This potential creates a need for further exploration of the application of the assemblage as a lens to the fields examined in the literature reviewed, which revealed a complex, interconnected picture of the relationships between people, technology and their information environment. Developing the assemblage idea can further understand the following complex issues identified in the literature synthesis.

There is a need further to examine the value of information in running activities. To do this, we first need to understand the types of information before addressing them. Where value is understood, we can address the concern that there is no consideration

for long-term storage or preservation of self-tracking data outside of archival literature. Elsden et al. (2016) and Rapp and Tirassa (2016) have come the closest in considering longer-term uses of self-tracking data. However, they do not address the longevity of data in a digital archive and technical preservation concerns of those digital data.

In private and personal archival literature, there is no research into self-tracking data and the potential avenues of research that it can provide to challenge current private archives and personal digital archive thinking concerning the value of self-tracking data. Within the sociology of leisure and information behaviour information literature, there is very little work on the effects of self-tracking data within personal leisure and information environments.

The final concern is furthering understanding in the literature of where self-tracking data goes when it resides on a third-party cloud. Rettberg (2014) has suggested that when you stop self-tracking for a while and then revisit a site through authentication, those data are still there. It creates the impression that data will always be there, but there does not seem to be an understanding in self-tracking literature amongst people about where those data go. Archival science suggests that it can help with personal digital collections by attempting to harvest and save personal social media accounts. However, it seems to lose the interconnectedness of the nature of social data. Instead, it inadvertently causes an archival individualisation of those data. It is unclear what people understand about self-tracking data platforms and their use of those data.

This research intends to understand the types of information that different types of runners collect, if at all. In the literature reviewed, there is no understanding of whether there is a gradual change in the value of certain types of information over time from its short-term use to its possible as yet specified longer-term use. The research also intends to understand how runners are a part of a community that shares their information and their information practices. If there are concerns amongst runners about the long-term use or loss of their valued types of information, then the research will bring new understanding to these concerns. There is limited knowledge concerning the extent of apathy towards third party storage. This research intends to understand how both individuals and third-party organisations collect their

information and how they prepare for its long-term management. This research also wants to understand perceived gaps in running social groups and those currently not represented in the reviewed literature.

2.9   Research questions

The first research question addresses the suitability of an assemblage as an alternative lens to understand the complexities of people, technology and information environments within running. The following three research questions iteratively build upon the relationship between the runner and their information. The questions seek to understand who is running, how they use different types of information and whether there are vital types of information that the runner collects. The questions develop further understanding of how types of value attach themselves to the types of information, whether in personal, social or both contexts. We do not yet have a complete understanding of this. Supposing there is a value or runners have long-term collections of personal information, in that case, the questions seek to understand what mechanisms runners use to manage their information over a long, unspecified time. The final research question seeks to understand what third parties are involved with the participants' information from the participants' perspectives.

To further understand the research problem, the five research questions are as follows:

RQ1. What types of embodied and represented information do runners collect and use when running?

This question will consider the range of data collected, such as mileage, pace, heart rate, GPS data, ascent, cadence, performance measuring, weight and daily steps (Hull, 2018). It will consider information collected across various devices and observe their use and interaction with technology. It will include their data collection, analyses and relationship to their activity (Pink, Samartojo, Lupton, & Heyes La Bond, 2017; Rooksby, Rost, Morrison, & Chalmers, 2014), their bodies and environment (Allen Collinson, 2008; Cox, Griffin and Hartel, 2017).

RQ2. In what ways do runners consider their embodied and represented running information valuable?

This question will address Gorichanaz's (2015) *knowledge base* to see what types of information contribute to this concept. The question will also consider the value of individual information within private and social contexts.

RQ3. To what extent are runners aware of third parties in relation to their represented running information?

This question examines whom the participants perceive as involved in collecting runners' information, the context and reasons for doing this, and how long they expect to keep it (Neff & Nafus, 2016).

The next chapter will describe the overall research philosophy, the chosen research methodology, and the research design's implementation through its data collection methods and analysis.

RQ4. To what extent are runners concerned about the long-term existence of their represented running information?

This question will address runners' private and personal long-term access concerns about their running information. It will establish the use and value of types of long-term information. This question will address the potential concerns runners may have about accessing their information in the future, whether they store their information privately on their devices or hardware or more socially through online platforms. It will understand whether they manage their information, such as making backups, and whether they have concerns about its loss (Copeland, 2011; Sinn & Syn, 2014).

RQ5. Can the concept of the assemblage give an overarching alternative explanation of the interconnected complexity and contexts of people, technology and information environments in the situation of running?

This question will investigate the suitability of the digital assemblage described in Lupton's (2016) sociomaterialist thought. It will examine the idea of the assemblage to develop an alternative lens to consider the complexity of people, technology and information environments.

Chapter 3: Methodology

3.1   Introduction

Chapter 2 reviewed the literature concerning archival and personal archival thought, self-tracking digital sociology, sociology of leisure and information behaviour research that has considered running. A synthesis of the literature reviewed led to asking five research questions. This chapter explains how the methodological approach, research design and methods are appropriate to address the research questions. This chapter will first discuss the research philosophy with an outline of the development of the researcher's philosophical viewpoint and how that aligns with the chosen research methodology (3.2). The chapter will then further discuss the development of the resulting research methodology (3.3). The chapter then discusses the methodologies considered, such as mixed methods research (3.4) and *grounded theory* (3.5). An explanation of *situational analysis* methodology is then provided (3.6). A discussion and description of a novel *neo-assemblage theory analysis* are then presented (3.7). The chapter then describes and justifies the research design. It provides an overview of research actions, sampling and recruitment, describes ethical considerations, data collection and implementation planning, and analysis methods of the resulting data (3.8). The chapter concludes by discussing research quality (3.9) and a summary of the description and explanation of the chapter (3.10).

3.2   Research philosophy

This section presents the development of the researcher's philosophy applied to this research. Grix (2002) has argued that a solid foundation in research philosophy should drive the methods and not the other way around. The researcher had come into the research project wanting to use a *grounded theory* methodology without any prior appreciation for its underlying research philosophy. It has been argued within information behaviour research that employing research philosophy is a mechanical, obligatory step in the research design and implementation process (Case & Given, 2016). Fredriksson (2003) attempted to update archival science by bringing postmodern philosophical thinking into archival science. Lusting (2020) has also applied a rigorous epistemological approach to archival research and practice. Had a research philosophy been chosen merely to satisfy data collection and analytical

methods preferred by the researcher or the research field, the resulting research would not have adequately reflected an understanding of the underlying research assumptions. Grix's argument was perhaps one of the most critical lessons understood early on in this research process and the researcher's personal philosophical development.

The researcher took this lesson exceptionally seriously. The researcher sought social science philosophies to understand the range of philosophies and accompanying assumptions as a preparatory springboard for further deeper reading (Benton & Craib, 2011). Benton and Craib's work provides an understanding of philosophical assumptions and allied research paradigms. The researcher consulted philosophical works in depth when there were aspects of methodology that did not always seem entirely aligned with the researcher's developing philosophy.

In developing the researcher's own philosophical beliefs during this research, there were points in the research where the researcher understood that a chosen methodology and its methods no longer aligned with seemingly prescriptive methodologies that required particular philosophical approaches. In applying Grix's argument fairly rigidly, the researcher's developing philosophy guided the development of the research methodology. The researcher challenged their initial understanding of underlying philosophical assumptions in methodologies during the research. As a result, the researcher made further investigations and further understood their philosophy which informed their research and methodology. The researcher does not have a fixed philosophy. Instead, the researcher accepts that they apply their understanding of their developing philosophical worldview in future research. The researcher now understands their current beliefs, enabling them to follow and engage in philosophical debate, which they could not do at the beginning of this research. The following sub-section describes the fundamental paradigms and thinkers that have been influential in both this research and the researcher's developing philosophical beliefs.

3.2.1   Interpretivism

Based upon Benton and Craib's (2011) introductory work, Weber's interpretivism first caught the researcher's imagination. Benton and Craib argue against positivist

approaches. They give a solid argument against the idea that natural science alone is the origin of knowledge and can be used to examine human sociality. As Benton and Craib (2011) glossed, Weber's arguments provided an alternative platform to consider social science. They then considered phenomenology as a foundation for instrumental rationality. In presenting alternative lenses, pragmatism and symbolic interactionism were instrumental variations where instrumental rationality inspired their approach and linked to Weber's ontology of individualism and the pragmatic idea of truth. If the subjects under examination consider the existence of the notion of society, then society exists (Benton & Craib, 2011, p. 88).

Similarly, symbolic interactionism is where an individual constantly interprets the world around them through processes where understanding and change happen through a continual process. Benton and Craib (2011) suggest that social constructionism recognises the constant construction of meaning through engaging with other people in society. The following subsection addresses social constructionism. The link to Weber is somewhat subtle in that rationality in one situation will be different in another situation (p. 89). For Benton and Craib, pragmatism and symbolic interactionism help understand "meaningful human action, and society", which is about following practical goals in the world of the people in reality. This approach made sense of a personal worldview, and it was something that the researcher was keen to develop to carry out meaningful and philosophically engaged research.

3.2.2 Interpretivism and social constructionism

Pragmatism is a broadly interpretivist approach. Interpretivism aligns with those who have "emphasised the importance of interpretation and understanding as the only legitimate ways of gaining understanding" in "the study of social life" (McLaughlin, 2012, p. 28). McLaughlin (2012) goes on to suggest that:

> For the interpretivist, reality cannot be identified apart from the language in which it is embedded. Social realities are constructed, reconstructed, negotiated and renegotiated in and through meanings. Meaning is thus not only about grammatical rules, but also about social interaction. Language and the importance of

> language is critical in this tradition...meanings are therefore not finitely specific, but achieve meaning from their background, context and the interpretations of the language speaker and receivers (p. 30).

Within social constructionism, reality is a construct of our minds. Our mind interprets the world around us through the accepted known senses. There is the existence of society to enrich our experiences. Our understanding of life should not be limited to specific ideas and objects. Shotter (2014) has noted that some social constructionism has tended to reification. Social constructionists have forgotten that we live in an "ineradicable immersion in the unceasing flow of language-intertwined social activities" (p.706). We must understand that socially constructed terms are fluid, and communities need to reassess their use of language to find commonalities.

Furthermore, communities must also realise that as we are in an "unceasing flow of language-intertwined social activities" (Shotter, 2014, p. 706), they must be aware of both the language and the social activity they are engaged. To question the construction of reality in our present is to ask whether we should be thinking about understanding past flows to understand our future. This question is a social constructionism idea. The notion of unceasing flows is rooted in symbolic interactionism and pragmatism. The following two subsections will discuss symbolic interactionism and pragmatism.

3.2.3   Pragmatism

Pragmatism has two precepts that concern epistemology and ontology, respectively. Pragmatists do not accept the inseparability of knowledge as an accurate representation and reality having an intrinsic nature. This rejection then overrides the problem of the realist and anti-realist debate and the correspondence of truth between reality and knowledge (Rorty, 2005, p. 841). The most celebrated pragmatists are Dewey, James, Mead and Pierce (Rorty, 2005). However, Rorty's pragmatism is perhaps the most recent description of this anti-correspondence of truth between reality and knowledge.

Rorty is an anti-ism pragmatic philosopher because he explains his philosophical outlooks against outlooks he rejects. He disagrees with foundationalism,

representationalism, essentialism, realism, and anti-realism (Rohr, 2005). Rorty sees thinking and language as tools for managing everyday life, not for reflecting representations of reality (p. 913). For Rorty, pragmatism affords new perspectives in thinking to make practical differences.

Rorty's (1982) defence of pragmatism against the Platonists and positivists and philosophy, in general, is encapsulated as follows:

> The pragmatist tries to defend himself by saying that one can be a philosopher precisely by being anti-Philosophical, that the best way to make things hang together is to step back from the issues between Platonists and positivists, and thereby give up the presuppositions of Philosophy." (p. xvii).

Rorty suggests that pragmatists "are saying that the best hope for philosophy is not to practice Philosophy" (Rorty, 1982, p. xv). Rorty's capitalisation of philosophy in the quoted sentence is the second of Rorty's meaning of philosophy, which he terms the "dubious" art of philosophy that tries to seek a universal truth which for Rorty is a ridiculous, impossible notion. The idea of making "things hang together" is an often-repeated motif in Rorty's *The Consequences of Pragmatism* (Rorty, 1982: pp. xiv, xvii, 168). It concerns the idea of how an individual understands the world around them to fit their context and their circumstances rather than taking preconceived, *a priori* ideas of others to explain their context and place in the world fully.

Rorty acknowledges James and Dewey as two of the most prominent "founders" of pragmatism (Rorty, 1982, p. 160). Rorty's acknowledgement is at the expense of Peirce. Rorty believed Pierce received an "undeserved apotheosis" for his "general theory of signs" amongst logical empiricists (Rorty, 1982, 161). For Rorty, Peirce was a Kantian-like catalyst for James and Dewey's ideas on pragmatism, where they did not view the idea of philosophy as "a foundation discipline" (Rorty, 1982, p. 160) as others did around them. As defended by Rorty, James and Dewey's vision of pragmatism was seemingly aphilosophical. It rejected "the Kantian project of grounding thought or culture in a permanent ahistorical matrix." (Rorty, 1982, p. 161).

Rorty describes pragmatic principles in "three brief sloganistic characterizations." (Rorty, 1982, p. 162). The first is the application of anti-essentialism to the notions of "'truth'," 'knowledge,' 'language,' 'morality,' and similar objects of philosophical theorizing" (Rorty, 1982, p. 162).

The second is that "there is no epistemological difference between truth about what ought to be and truth about what is, nor any metaphysical difference between facts and values, nor any methodological difference between morality and science." (Rorty, 1982, p. 163). For Rorty, it is troubling when somebody starts to ask questions that seek to find the essence (a truth) rather than accept the current, ordinary situation as it is understood (as the understanding of the situation at the time of inquiry) how things are.

Rorty's final characterisation is that "the only constraints on inquiry are conversational constraints from the remarks of other researchers" (Rorty, 1982, p. 165). It is Rorty's favoured characterisation of the three, and it is two observations he makes in this context that this researcher believes are central ideas that drive this research.

The first observation is that accepting starting points accepts that only humans can be relied upon to guide inquiry (Rorty, 1982, 166). Researchers should not be searching for an *a priori* grand design where they arrive at a universal truth of things. Instead, they should understand reality through knowledge by working out how "things hang together." Humans need to interact with others, and Rorty observes that "[o]ur identification with our community...is heightened when we see this community as ours rather than nature's, shaped rather than found, one amongst many which we have made." (Rorty, 1982, p. 166). What Rorty suggests are useful are "narratives and vocabularies" instead of objective "laws and theories" (Rorty, 1982, p. 195).

As described above in Rorty's pragmatism, inquiry should not seek universal truths or ahistorical permanent theories. Pragmatic research should engage with people. It will reflect a particular group of people, an understanding of the world around them at a specific time, seeking to provide a practical examination that can help find out what is needed to reduce adverse effects on the human condition (Rohr, 2005).

3.2.4   Symbolic interactionism

From the original proponents of pragmatism, Mead's work influenced symbolic interactionism and its use in sociology (Joas, 2005), which influenced Blumer. Rock (1979) built upon Blumer's (1969 in Rock, 1979) symbolic interactionism. His approach to this particular brand of sociology portrayed the social as being both fluid and unstructured (Rock, 1979, p. xii). However, this is not to say that there cannot be elements of structure around which research can hang together (to borrow from Rorty) to understand the fluid nature of social groups under consideration.

Accordingly, this makes the researcher aware that their experience and interaction with the participants are part of the continuous flow of interaction and an ongoing understanding of the world around us (Benton and Craib, 2011, p. 88). Any attempts to try and separate this and create conscious impartiality will defeat the object of the research and contradict the underlying Rortyian pragmatic research philosophy. The strength of this research lies in the combining of experiences to create potential new insights. Secondly, through reading and understanding literature about the research process and the literature perceived to be about the topics under research, the narrative and presentation of this research intend for the reader to be "sufficiently caught up" in the flow and development of the research process. It will give the reader a concrete understanding of how and why this researcher has developed and reached the findings and evaluations contained within this research.

For Rock, formalism and pragmatism combine the following ideas of "the evolutionary and embedded character of enquiry; the unreliability of axiomatic thinking; and the central importance of the thinking and observing self." (Rock, 1979, p. 59). For the pragmatists, Rock observes, "[m]ind defined nature just as nature defined mind." (Rock, 1979, p. 67). Reality is a constant interplay between an individual's mind and the world around them. As described in Rorty's thinking, pragmatism "is attentive to the mundane world, not to the sphere of metaphysics" (Rock, 1979, 69). Any ideas of knowledge are formed through practice and action, not through a preconceived understanding of the world around us. Rock qualifies knowledge as authentic (rather than, as observed by Benton and Craib (2011: p. 88) as objective or true) as it is the individual's experience. "The most authentic appreciation of the world is lodged in an

immediate confrontation with it" (Rock, 1979, p. 70). In other words, the idea of authentic knowledge. The further an individual distances themselves from experience, either through interpretation or it being recorded or written, the further the individual is from authentic knowledge. It would seem that being one person removed from a direct experience in a conversation dampens the idea of that person's experience as there are interactions of selves at play. It is essential to try and preserve this form of authenticity as much as possible in the research process.

The idea of the self is vital in symbolic interactionism. Rock describes that "[s]elves are always in the making. They cannot be construed as static, fixed entities which manifest themselves in different settings" (Rock 1979, p. 74). It is a continual "social construct" (Rock, 1979, p. 75). The construct of the self and its *I* is a symbol that interacts with other *I*'s in society and is constantly changing and evolving with every interaction. "A self is a socially-accomplished process, produced by the forms and shaped by the responses of others" (Rock, 1979, p. 129). Rock writes of the idea of the generalised other, which "becomes a permanent albeit changing, companion" (Rock, 1979, p. 144) that assists the self in understanding its reality.

3.2.5   Postmodernism

To reject Philosophy in favour of philosophy is not only subscribing to Rorty's flavour of pragmatism, but it is in tune with postmodern thinking. Rorty posits that James and Dewey had already argued for Foucault and Deleuze's "analytic philosophy" (Rorty, 1982, p. xviii). Hence, the basis behind their thinking is not too removed from their brand of pragmatism. Rorty thought that Dewey and Foucault aligned in their rejection of the philosophical pursuits of seeking "ahistorical structures" (Rorty, 1982, p. 204). Dewey and Foucault were "saying the same thing but putting a different spin on it" (Rorty, 1982, p. 205), with Foucault taking a downbeat, pessimistic view of the world over the relationship between knowledge and power (Rorty, 1982). For Rorty, Dewey was a positive proponent "because his vocabulary allows room for unjustifiable hope, and an ungroundable but vital sense of human solidarity" (Rorty, 1982, p. 208).

Related to Foucault's preoccupation with power and knowledge, Benton and Craib (2011) observe that Jean-Francoise Lyotard saw that "the rapid growth of information" drives a social change, where:

> power now derives from the possession of information or knowledge rather than possession of capital and because there is so much knowledge available, we cannot any longer claim that any one is in possession of the truth (p. 172).

Rorty also sees philosophical discourse in a post-philosophical world as a modern view of the past which concords with Hegel that "philosophy is 'its own time apprehended in thoughts'" (Hegel in Rorty, 1982, pp. xl, 174). The time we are in now and how we understand it and all that had gone before in understanding our reality and knowledge is just a reflection of the current time in constant motion. There is no reducible truth. Instead, we are in a continuous interpretation cycle. Mixed in with the thinking of Lyotard and the still apt observation that we are in an exponential era of having vast amounts of information at our disposal, truth is very much a variable concept in today's society, depending on an individual's experiences.

3.2.5.1   Deleuze and Guattari

Following the introduction of the concept of digital assemblages in the work of Lupton (2016), the researcher traced Deleuze and Guattari's (1988) *A Thousand Plateaus* as the origin of assemblage thought. *A Thousand Plateaus* is a critical philosophy against representational thought and the idea of "State philosophy" (Massumi, 2013, p. ix). The arguments against representational thought followed an understanding of pragmatism. They added a renewed consideration of identity against the symbolic interactionist viewpoint. Expressed through the assemblage, Deleuze and Guattari contribute to postmodern theories of identity. The assemblage is an idea that expresses materials that are inseparable from their expression and are constantly shifting in a fluid state. Such materials and their expressions constantly move and interact with other materials that are always shifting and changing. They also contribute to the rhizome, where the idea of a multiplicity can join and leave and break away again in fluid forms (Olkowski, 2005). *A Thousand Plateaus* moves away from arborescent thought,

instead favouring nomadic thought (Massumi, 2013, p. x). It is against the idea of static. Anything can start from anywhere, much like Rorty argued against starting points in inquiry as prescribed by the conventional philosophy of science. Deleuze and Guattari's *A Thousand Plateaus* is a complex work of critical philosophy that encapsulates the philosophical ideas of the assemblage and the rhizome.

3.2.5.2   DeLanda

Manuel DeLanda (2006, 2016) developed more than a gloss on assemblage theory, developing his line of thought on assemblage thinking. This thinking is first explained in *A New Philosophy of Society: Assemblage Theory and Social Complexity*. This work explained his interpretation of Deleuze's assemblage ideas and applied them to examples encountered in the idea of society, such as social networks, towns, and governments. In this work, DeLanda is against essences and totalities, instead underscoring the dynamic nature of societies through an assemblage lens of his development, which he calls "assemblage theory 2.0" (DeLanda, 2006, p. 3). This work developed into *Assemblage Theory* (DeLanda, 2016).

DeLanda is a speculative realist (Harman, 2016, p. x). He does not favour reified generalities such as "Power, Resistance, Capital, Labour" (p. ix). Instead, the path to change is to understand the complexities within the relations of assemblages. DeLanda prefers Braudel over Marx through the ideas of the *level of scale* in markets enmeshed in multi-level assemblages that are not so simple to unpick. Hence, DeLanda does not favour totalities and essences, which are crucial to assemblage theory 2.0 thinking. DeLanda offers a lucid explanation of assemblages and how they operate in a complex society. Assemblage thinking allows for understanding the dynamic, fluid nature of relationships and offers causal explanations of how and why. Furthermore, he incorporates planes of immanence into his thought rather than convergence, which allows his realism to be speculative. This speculative element analyses a given situation and the potential to analyse and hypothesise future possibilities of a given assemblage.

3.2.6   Summary

This research in pragmatic thought incorporates symbolic interactionism. These lines of thought are within the interpretivist paradigm. They are dependent upon the idea

of fluidity, ahistoricism and a practical understanding of truth contingent upon human interaction with other symbolic elements in its environment.

Digital assemblages first inspired the researcher. Further investigation of assemblages found DeLanda's speculative realist version of *assemblage theory*. DeLanda's *assemblage theory* influences this research. DeLanda questions the centring of the human in research but provides a theory to help understand the complexities of a given idea of society and explanations to help uncover and solve problems of concern to people and other entities in reality under examination. This research's underlying worldview is the search for practical, valuable insights into given groups of people and entities using available tools at the researcher's disposal.

This philosophical background is significant to the methodology and its methods and analysis. Without an informed philosophical background, the rationale of the choice of methodology is not only perfunctory, but it also cannot give a deep understanding of its underlying principles. That is to say, the philosophical background of the researcher directs the methodological choice. The philosophical background enables new insights and development. Without understanding the researcher's philosophical beliefs and the choices and methodology that align with them, they may not entirely fulfil the potential for criticality and innovation.

3.3   Methodology development

This section describes and justifies how the final research methodology developed during the research process. As an overview, mixed methods research (MMR) was the first research design. Due to unforeseen time constraints in seeking permission to research a particular population quantitively, research focussed on qualitative research only. The qualitative strand of MMR used Corbin and Strauss' (2015) *grounded theory method* for data collection and analysis for the first four participants. The methodological move towards *situational analysis* resulted from the researcher's development of their philosophy, rooted in pragmatism and symbolic interactionism. A re-appraisal was allowed due to the suspension of face-to-face data collection throughout most of 2020 because of the Covid-19 pandemic. The researcher first conducted a deep analysis of data with *the grounded theory method*. As described in 3.5, the change in social distancing and the suspension of face-to-face data collection

allowed a deeper exploration of other *grounded theory* methods more aligned with their philosophical belief. Adopting *situational analysis* also led to the development of *neo-assemblage theory* analysis. This development combined the researcher's awareness of digital assemblage from the literature review, the continued understanding of assemblages in philosophy through Deleuze and Guattari and DeLanda and the reconciliation of *assemblage theory* with *situational analysis*.

Data were collected from January 2020 to December 2020 and analysed with the developing methodology before the start of writing up the thesis. Figure 1 presents the overall project timeline.

Confirmation Review

- October 2019

Ethics approval

- November 2019

Phase 1

- Data collection, 18 January 2020 - 8 March 2020
- Transcription and analysis, 20 January 2020 - 28 April 2020
- Writing up, 29 April 2020 - 2 June 2020
- Code integration and situational analysis, 29 April 2020 - 2 June 2020

Phase 2

- Iterative writing up, 3 June 2020 - 22 June 2020
- Situational analysis mapping, 3 June 2020 - 1 July 2020
- Virtual data collection, 3 June 2020 - 7 July 2020
- Transcription and analysis, 3 June 2020 - 7 July 2020
- Neo-assemblage theory philosophy, 2 July 2020
- Resume iterative writing up, 5 August 2020 - 17 August 2020

Phase 3

- Continuation of analysis, 18 August 2020
- Data collection, 18 August 2020 - 2 December 2020
- Analytical phase 1 & 2 write up, 19 August 2020 - 26 Octoeber 2020
- Transcription, 27 October 2020 - 4 December 2020
- Iterative writing up 28 October 2020 - 7 December 2020

Thesis writing begins

- 7 December 2020

Figure 1: *A timeline depicting research implementation.*

The remainder of this chapter will first provide a further detailed discussion of the move from mixed methods research (MMR) to *situational analysis*. It will discuss the philosophical underpinnings of the *situational analysis* methodology and its methods. The chapter will then present the novel *neo-assemblage theory analysis* mapping method. Following this presentation, the chapter will describe the preparation for data collection, which includes a consideration of research ethics, the data collection itself

and its analysis. The chapter concludes with a reflection upon problems encountered during data collection, research quality and a closing summary.

3.4 Mixed methods research

Mixed methods research was the first research methodology considered using Plano Clark and Ivankova (2016) and suitable with pragmatic philosophy (Alise & Teddlie, 2010; Curry & Nunez-Smith, 2015). The first research design consisted of one quantitative method component and two qualitative method components. The quantitative method developed a survey instrument which would be first piloted and then launched amongst a large running population in the UK. The survey results would have then informed the line of enquiry amongst the first qualitative method of collecting data with a sample of people running. The second line of enquiry would have then used the same sample to view their uses of information within a home setting. Due to the limited time of the research project, collecting data through qualitative methods first would help to move the project forward practically. This decision was due to the unforeseen time constraints in applying for and gaining access to an intended running population. To this end, the mixed method research design changed to the qualitative design.

3.5 Grounded theory methods

Corbin and Strauss' (2015) *grounded theory* was the first chosen qualitative method. The method appealed to the researcher's developing pragmatic and symbolic interactionist understanding of the world. The method also appealed through its immersion into the research data and the idea of reflecting upon emerging concepts (pp. 3-16). Strauss' theoretical foundation in his "worldview", as described by Corbin, had similar pragmatic roots, although he subscribed to Dewey and Mead. His worldview position showed the interactive nature and position of the researcher and how it is impossible to separate the two from the participants (pp. 17-27).

Corbin and Strauss' method requires the researcher to collect data and begin analysing those data to build codes, concepts, and categories. The aim is to build a substantive theory through *inductive* and *deductive* processes until it develops into a *grounded theory* of a given research context. Analytical *grounded theory method* guidance in Corbin and Strauss (2015, pp. 64-152) was used to understand the data

collected, its key concepts and categories. The guidance charts analysis from the first pieces of data collected through theoretical sampling. The methods involve: reviewing source materials such as reading the transcripts (p. 86); interpretative coding transcribed data into concepts; considering comparisons of the conceptual coding once more participants were involved in the study (pp. 93-94); considering words and techniques such as a "flip-flop" consideration of the derived concepts that emerged (p. 97), and even introducing the researcher's experience into the analysis to ask further questions and develop an understanding (pp. 97-98). Memos and diagrams were also a product of the analytical process (pp. 106-133). Corbin and Strauss also describe a theoretical sampling method to direct any investigative leads uncovered during analytical coding and development (pp. 134-152).

Straussian *grounded theory method* suggests the encouragement of building "theoretical frameworks" (p. 52) grounded in the data. This encouragement was one of the first junctures that the researcher found somewhat unresolved tension between the method and their developing beliefs, despite the appeal of the underlying worldview of Strauss and his "interactionist philosophical orientation" (p. 52). It was at this point that questioning of the method began. The first data collection used Corbin and Strauss' theoretical development method of collecting data and coding.

The first four participants provided data with verbatim transcriptions of spoken audio and other types of audio and visual actions. After this, the research had started to submerge into the data with Corbin and Strauss' *grounded theory method*. The researcher wanted a deep, rich understanding of data collected from the first four participants and abided by the slow and gradual early generative data collection and analysis of the *grounded theory method* (Corbin & Strauss, 2015, pp. 57-102). Not rushing data collection analysis was a key *grounded theory method* concern. Corbin and Strauss stress that forming many concepts and ideas is a process that takes time. "Microanalysis", as an early analytical technique, was used selectively at the beginning of a project to understand the nuances of the data (p. 71).

The start of questioning the method began in greater depth when considering analysis beyond the concepts of context (pp. 153-171) and process (pp. 172-186). To help describe context, Corbin and Strauss call upon the "condition/consequential matrix",

which reminds the researcher of the micro and macro influences relating to action and interaction (p. 160). The model uses the "paradigm" of conditions (reasons), actions-interactions and consequences of the action-interaction. This use allows for a multi-level framing of particular contexts from micro to macro levels. When trying to analyse the context, the researcher found something in this framing unsettling and uncomfortable. The researcher could not at first adequately describe why it was analytically problematic. It felt that it was prescriptive. It did not seem to sufficiently explain the context of research data without making what the researcher felt were systematic and contrived categories of levels of society. It also suggested that the research context had indirect causality on the running process. The link between the two with the multi-levels of context in the condition/consequential matrix seemed to make too distinct, almost seemingly tenuous connections across these levels. The researcher did not feel that Corbin and Strauss' matrix was an appropriate framework to analyse the idea of context.

Corbin and Strauss' *grounded theory* also had an analytical requirement to understand process. The idea of process analysis in *grounded theory* (pp. 172-186) was also questionable. The analytical process seemed to be reasonably rigid. It seemed too rigid in looking at ordinary, routine processes within the data. Despite the analytical requisite to seek and understand *process* in the research data, the analytical approach seemed artificial and restrictive. It raised the possibilities of what would happen if a process under analysis was interrupted or changed. However, this basis would be grounded in a repeated observable pattern. Finding the process first and its relationship to other possibilities become a concern. It was unclear how this analytical method would find a repeated processual pattern without feeling that the analysis was being forced. Corbin and Strauss' *grounded theory method* suggests that there is the possibility of a set or recurring pattern of a situation and associated behaviour. This observed pattern should become the normal to compare and contrast with other possibilities.

The ideas of action/interaction made the researcher consider where running fits into the runners' overall life and the contexts (on a run and away from a run) of the two proposed qualitative data collection methods. There was an issue of interaction which seemed to term concepts together where a broader concept subsumes them. The

idea of relationships and linkages between concepts instead of looking to subsume them into higher categories appealed to the researcher. The researcher did not yet understand that *situational analysis* would resolve this issue as a post interpretive *grounded theory* development.

The researcher developed codes and categories with participant data collected from the mobile method within Corbin and Strauss' *grounded theory method*. The analysis was intense. The collection of memos and diagrammatic iterations documented reflective work towards conceptual saturation and charted reflections and developments in thought along the way. During this first data analysis phase collected from the first four participants, the researcher developed concepts using Corbin and Strauss' (2015) *grounded theory method*. When writing descriptions to prepare for contextual and processual analysis, the researcher felt too much systematic development of the concepts and categories. As the concepts and categories were evolving, the properties of the concepts had axial dimensions that were relatively fluid and dependent upon other concepts. For those concepts that did not fit as properties and were not perhaps fully-fledged concepts and categories, it was the opportunity to step away from the analysis. There was a re-appraisal of what was happening in the analysis. It was an opportunity to review other *grounded theory* methodologies available in the hope that it would resolve the methodological problem the researcher faced. The researcher found *situational analysis* as an appropriate solution.

The *grounded theory method* and *situational analysis* are not incompatible (Clarke, Friese, & Washburn, 2018). Clarke et al. (2018) allow for two types of analytical methods to be used, providing that they are "epistemologically compatible" (p. 365). *Situational analysis* is "an extension of Straussian GT [grounded theory], it can, of course, be used with Straussian (1987) and constructivist (e.g., Charmaz 2014) GT [grounded theory]" (Clarke et al., 2018, p. 366). A *situational analysis* also has a "grounded processual analysis" use which this research seeks elsewhere in Deleuze and DeLanda's assemblages. The *grounded theory method* of "thematic coding mechanisms [...] in conjunction with situational maps, analysing interviews." (p. 366) is also permissible (p. 107). The *grounded theory method* and *situational analysis* argued in Clarke et al. (2018) have an analytical relationship. However, it is the focus of "relationality" that appeals to this researcher, which also "fits" with DeLanda's

assemblage theory thinking (p. 108). Clarke et al. (2018) suggest that the constructivist *grounded theory method* works well with a *situational analysis* and includes Strauss' *grounded theory method* in this approach. It is also *abductive* and far from an *inductive* Glaserian approach. The critical point is that they "are two different kinds of analysis pursued separately. They are to be done one at a time, not blended together" (p. 109). This quotation is perhaps an unequivocal justification in the published works that permits a change in analytical direction whilst sharing a philosophical basis.

The analytical work on the conceptual development of the first data set had not been in vain. The researcher decided to pause, understand and compare the two methods. After this consideration, analysis began integrating fully towards *situational analysis* and *neo-assemblage theory analysis*. The second edition of Clarke et al. (2018) includes a section on Deleuze and Guattari's rhizomes and assemblages. As theoretical thought was drifting towards assemblage thinking at the time and developing an allied analytical method, it was time for a complete re-appraisal before further work. The researcher preferred to have a compatible and suitable method reconciled to their developing philosophical beliefs, resulting in more transparent and credible findings rather than following a seemingly prescriptive method that would not yield as transparent or credible results. A critical re-appraisal of a type of *grounded theory method* and *assemblage theory* through reading Deleuze and Guattari (1988) and DeLanda (2006, 2016) led to the development of the *neo-assemblage theory analysis* to synthesise *neo-assemblage theory* and *situational analysis* methods.

3.6 Situational analysis

The researcher developed *neo-assemblage theory analysis* using *situational analysis* methods during the research. The developing philosophical groundwork influenced the choice of the methodology. The section that follows this will introduce *neo-assemblage theory analysis* (3.7). This immediate section will explain *situational analysis* through its background, intended outcomes, and requisite methods.

3.6.1 Interpretive turn

Situational analysis is a "theory/methods package" (Clarke, Friese, & Washburn, 2018, pp. 7). The theoretical origins of *situational analysis* are concisely coherently explained in Clarke et al. (2018, pp. 61-97) as:

> [A] theory/methods package, situational analysis is clearly and deeply
> rooted in the epistemologies and ontologies of symbolic
> interactionism, pragmatic philosophy, Foucaultian discourse analysis,
> and Deleuze and Guattari's rhizomatic assemblages..." (p. 367)

Clarke et al. (2018) locate *situational analysis* within a materialist social constructivism instead of social constructionism (p. 26). This materialist location of *situational analysis* acknowledges a physical, material world in which sentient beings, such as humans and animals, interpret and give meaning to material objects they perceive in their environment. Therefore, this materialist approach departs from social constructionism, which they argue is concerned with reality's transitory and ideological construction.

Clarke et al. (2018) place *situational analysis* within the established interpretative paradigm, postmodernism, and poststructuralism (p. 9). Postmodernism embraces complexity. It is fragmentary and includes thinkers such as Deleuze and Guattari as described in developing this researcher's philosophy. Poststructuralism includes thinkers such as Foucault and Derrida, who described the instability of language and structures, where language as discourse can become an oppressive or controlling tool. These approaches raise an epistemological question that locates knowledge production to particular groups of people, where the knowledge is situated instead of being universal (p. 10). This situatedness makes *situational analysis* interpretive because it rejects, like the pragmatists, representations and instead embraces productive insights for improving situations (p. 11).

3.6.2 A situation

Clarke et al. (2018) do not define a situation as a unit, such as an event as something temporal or spatial. They define a situation as concerning:

> a somewhat enduring arrangement of relations of many different kinds
> and categories of elements that has its own ecology. It usually includes

a number of events over at least a short period of time, and can endure considerably longer (p. 17).

This definition suggests that a situation is challenging to define precisely. The suggestion of an enduring arrangement indicates that the elements within it are reasonably stable and contained within the idea of an ecology over a measurable time. It is tempting to see this definition of a situation within DeLanda's *neo-assemblage theory*. A situation is an assemblage where it holds components in stable relations of exteriority. The components or elements could include a person, an environment and other objects encountered in a given reality. A situation is specific to a particular set of relations. A set of relations could mean a particular group of people located in a specific time and place (p. 10).

The focus on a situation differentiates *situational analysis* further from Corbin and Strauss' (2015) *grounded theory method* because the *grounded theory method* looks at specific social processes (Clarke et al., 2018, p. 27) within situations the researcher considers similar. Situations are not synonymous with context but are constitutive of other related elements in a given situation. In *situational analysis*, "context clearly denotes that which surrounds something, but assuredly is not part of it" (p. 15).

3.6.3   Abductive analysis

Situational analysis is *abductive* (Clarke, Friese, & Washburn, 2018, p. 28) instead of *inductive* or *deductive*. *Abduction* in *situational analysis* is where analysis moves between empirical data and concept development. Data and concept development inextricably inform each other. It is not easy to disentangle the two once the analytical process has begun. Within the *grounded theory method*, the process of *induction* is what grounds the development of a theory through an analytical process. The *deductive* nature of the *grounded theory method* stresses the relationship between the researcher and empirical data, where the researcher derives the *deduction* of concepts (Corbin and Strauss, 2016, pp. 382-383). *Situational analysis* is *abductive*, where the researcher uses both *induction* and *deduction* to work between the empirical. *Abduction* in *situational analysis* works towards "a gestalt" (p. 29). *Abduction* also anchors the *deductive* process to data through the *inductive* process,

preventing *deduction* from being too abstractly removed from the empirical data collected and analysed.

The drift toward *abduction* understands a rift between Glaser and Strauss's approaches. Glaser has argued that *grounded theory* is entirely *inductive* (Glaser, 2006), which he refers to as a formal *grounded theory*. This formal theory removes the role of the researcher and their *deductive* analysis. For Strauss, the role of the researcher and their experience is crucial to the *inductive* process because it informs how the researcher engages with the empirical data (Strauss, 1987). Without *deduction*, there cannot be any *induction* and vice-versa. *Grounded theory* is an *abductive* process that Strauss reportedly revealed (Charmaz, 2014). Whatever is developed in the *abductive* process, developing substantive theories should be accepted on a trial basis and must be constantly revisited and modified to maintain their usefulness (Clarke et al., 2018).

As a part of interpretation tools within a *situational analysis*, conceptual metaphors and categories are used to describe phenomena. They are open to further interpretation as a part of the *abductive* process toward abstract concepts that develop substantive insights (Clarke et al., 2018, p. 28). Metaphors and categories are not reifications of what they represent (like gender or race). However, they are a part of an analytical process toward conceptual abstraction. A *situational analysis* allows for deconstructive analysis through methods that permit multi-faceted analyses of a perceived single situation. There is no one correct interpretation of a situation under analysis.

The research design will attest to this. *Abduction* also accounts for and incorporates the researcher's own life experience into the analytical development. This incorporation means that *situational analysis* rejects the Glaserian "positive recalcitrance" (Clarke et al., 2018, p. 33) approach of the research as a *tabula rasa* or blank slate when approaching a research problem. Instead of trying to suppress any prior assumptions, incorporating the knowledge and life experience of the researcher into the research becomes a strength. *A priori* assumptions and considerations in a *situational analysis* are integral. A *situational analysis* tests *a priori* assumptions as a part of the *abductive* process, which results in new explanations and insights. These

new insights and explanations result in a pragmatic "usefulness" of the resulting explanations (Clarke et al., 2018, p. 32), which are the intended outcomes of *situational analysis*.

The reader should be made aware that the researcher runs regularly and competes in events. The *a priori* experience is in the research. S*ituational analysis* embraces this positionality. The researcher's position enriches the data collection and analysis process bringing a social insider's insight and *a priori* experience to the *abductive* research.

3.6.4 Situational analysis methods

Clarke et al. (2018) describe three main analytical tools to develop valuable new insights and explanations. These are situation and relational maps (p. 130), social worlds/arena maps (pp. 157-160) and positional maps (p. 172). Additional methods include writing up results derived from the three main analytical tools listed and reflective memoing of analysis to make sense of the analytical process.

3.6.4.1 Situational mapping

Situational analysis advises mapping the various elements in the situation in a way that does not acknowledge hierarchy, process or any particular order. This mapping is an abstract situational map. There are two types of abstract situational maps: messy maps (Clarke et al., 2018, p. 128) and ordered maps (p. 130).

The first type of situational map is a messy map. Messy maps should consider "human, and nonhuman, material, and symbolic/discursive" elements in the analytical situation (p. 128). A messy map should be a word map of the extent of the situation as the researcher understands it. Clarke et al. (2018) recommend that the researcher includes themselves in the mapping. The messy map should develop the implied or "taken for granted" elements such as infrastructure like electricity or broadband, if appropriate in the situation (p. 129). This direction explicitly brings the *a priori* experience of the researcher into the analytical process.

The representative codes or elements are then mapped upon a page to overview the situation. The maps are messy in appearance (p. 130), so the researcher can add, refine and consider the messy maps to better understand them within the maps. The overall map can provide the basis for further magnifications of the situation. For those used

to considering macro, meso and micro levels of study, abstract mapping appears messy. Elements seemingly at a micro level can appear next to macro-level elements. This juxtaposition is the "poststructural" approach (p. 132). In this approach, the researcher maps as much of the entire situation as possible to understand potential research directions, the elements at play, and their relationships.

The codes generated from the *grounded theory method* derive the messy maps. However, it must be made clear that the maps are also "not intended to be conceptual or analytical maps based upon GT codes" (p. 132). Once the researcher has developed *grounded theory method* codes, the researcher should not use situation maps as another way of expressing codes. Instead, the maps allow for an appreciation and consideration of the situation. The maps depart from *grounded theory method* codes because they are a part of a generative process that allows for multi-faceted views of interpretations of a given situation. Allowing for multiple interpretations is in the spirit of deconstructive open coding (p. 27). The researcher argues that initial coding allows for an interpretative grounding for more profound *situational analysis* output.

Ordered maps are the second type of situational map. Ordered maps are a tabulation of the elements found in a messy map. Clarke et al. (2018, pp. 130-131) provide a template for an ordered map with suggested categories. The "situation of inquiry" (p. 130) is the basis for the ordered maps. Clarke et al.'s templates of the ordered maps are not prescriptive, and the researcher can tailor the design for their own ordered situational maps. Clarke et al. (2018) suggest that the researcher "should at least err on the side of inclusivity" in the ordered maps (p. 130). They see it preferable to contain as much as possible to allow more significant analysis.

The *situational analysis* method does not advise fixing messy and ordered situational maps. Poststructuralist maps benefit the researcher from their fluidity and deconstructed appearance, especially the messy map. They are visual analytical tools that can be revisited and reconsidered during research as analysis and interpretative understanding develops. The researcher should reflect upon the development of the maps in memos and analytical write-ups. The following two subsections describe these two methods.

3.6.4.2   Situational analysis memos

The researcher should make *situational analysis* memos from the beginning of the research (Clarke et al., 2018, p. 106). Memos chart the development of the maps as the analysis develops. Memos are written reflections of analysis thoughts and keep the analytical flow going. The importance of memoing should already be apparent from its pervasive presence in the sections on the situation, relational, social world/arena and positional mapping. Whilst this subsection is short, making reflective memos is an integral part of the analytical process.

3.6.4.3   Writing up findings as a part of analytical development

The memos combine with analytical maps to assist in writing (Clarke et al., 2018, p. 197). Writing up does not seek analytic closure but is used to explore and synthesise the developing analysis. Due to the time constraints of a doctoral research project, the iterative writing up process assists with transforming the analytical memos into embryonic chapters (p. 198). Whilst *situational analysis* ultimately seeks a thoroughly analysed process (p. 198), it is also somewhat contradictory in that deep analysis of a given situation is never finished due to the potential of unlimited multi-faceted interpretations of the research data. However, the writing process provides a method of drawing and reflecting upon the developing analysis in the mapping and memoing methods (pp. 200 – 202).

3.6.4.4   Relational mapping

Relational maps are entirely dependent upon the creation of messy situational maps. The relational maps identify relationships between the elements in the messy map. Attending to one element at a time, the researcher considers the relations between the other elements to understand if there are any potential relationships. Whilst not always the case, "sub-sets" of relations can provide further avenues of research (p. 139). Relational mapping techniques are not prescriptive. Clarke et al. (2018) advise that the method "can be personalised to suit your ways of working" (p. 140).

The relational mapping process draws on similar *grounded theory* processes of analysing "word by word, line by line" coding. The critical difference is that it focuses on relations between each element on the messy situational map (p. 140). The closure of the process is "saturation" (p. 144) when there has been a significant temporal gap

in substantial changes to the maps. The possibilities in relational mapping "are dense and multiple – kaleidoscope-like. With one twist, the situation is different" (p. 144), which continues the deconstructive, multi-faceted nature of the numerous interpretations of the situation under analysis. Like situation and relational mapping, the research should reflect upon the development of interpretative analysis in memos and analytical write-ups.

3.6.4.5   Social world/arena mapping

"Interactionist concepts of social worlds and arenas" are the basis for the social world/arena mapping tool. The social world maps contain ideas not too dissimilar to DeLanda's social assemblages. An overview of social worlds and arenas in a *situational analysis* allows for the overall "ecology" of the relationships found in a relational and positional mapping (p. 147). The social/arena maps provide a framework that works against a "closed-systems feel of traditional approaches to organizations [sic]" (p. 73). Instead, the maps visualise interrelated discourses and reciprocated influences (p. 73). A vital requirement of the social worlds/arena map is to identify the broader social worlds and their arena(s) (p. 160).

The researcher maps social world/arenas as "emergent and fluid entities" which see the idea of the whole of a society broken down and thought about in layers and fragmentary pieces that relate to each other. The researcher visually represents these to complete a bigger picture in a relevant arena (p. 148). They assume individuals are within a collective identity (pp. 149, 155) and intend to provide a "big-picture analysis of social action" (p. 150). It is not collectives as wholes that the researcher uses but the nuanced difference of "interactions of collectivities [sic]" (pp. 150, 160). The analytical focus is upon "the social words and arena(s) present in the situation" as units of action as opposed to the *grounded theory method* of "action as process". As a result, social world/arena mapping can describe the broad, "big-picture" (p. 150).

The maps are drawn with the worlds and arenas with dotted lines for fluidity because their boundaries are porous (p. 151). They intend to capture a short temporal slice of a historical occurrence (p. 151) and provide a vehicle to describe the broader situation of the research instead of a microscopic focus (p. 154). The method involves questioning "collective commitment" and "groups of shared interest" and recognises

organisations found in the research (p. 155). The maps enable a more comprehensive circumstantial understanding of the research location (p. 155) and represent the site of social views (p. 156). Clarke et al. (2018) note that "some situations of inquiry may not fit smoothly into doing the social worlds/arenas map" (p. 157). During analysis, Clarke et al. (2018) suggest that having an initial social world/arena map will help "to decide, sooner or later, how far you want to go in developing these maps, and further additional data as needed – or not" (p. 159). Like relational mapping, its analytical saturation point is when no "new major social worlds appear" (p. 162). Reflection concerning the development of these uses both memos and writing up of analysis.

3.6.4.6   Positional mapping

Positional maps have a "discursive" focus (Clarke et al., 2018, p. 165). Clarke et al.'s interpretation of Foucault's "discursive practices" is the basis of their positional maps, where the idea of dominant human discourses forms human ontological understandings of the world. These discourses form people and groups to frame a social context and as a means of power through disciplining practices derived from dominant discourse (p. 80). Positional maps are a further stage of *abductive* development based upon earlier abstract situational maps and relational maps. The researcher uses positional maps to develop pragmatism's usefulness in a situation of enquiry for consideration in other situations where the analytical results may be helpful to similar groups under examination.

The researcher plots positional maps of the main issues that the researcher has interpreted as salient and re-emerging within the situational and relational maps. The researcher plots issues on vertical and horizontal axes with an axial dimension to the main emerging issues. As well as plotting the positions of these issues, the maps also reveal silences and differences. The varied positions plotted on the map (if at all varied) should not, ideally, be associated with participants in the spirit of "a post structural move" (p. 166). Despite this recommended disarticulation from people, if the researcher makes "explicit linkages" with participants, the researcher should not equate and present a person with an exemplar of a generalised whole (p. 193).

The researcher constructs maps based on analytical development from situational and relational mapping, reflective memos and iterative writing-up of the ongoing findings.

This prior analytical immersion in the situation allows the researcher to develop discursive elements found in situational maps. These elements suggest areas of concern or debate related to the research problem. For a deeper understanding of discursive elements, the researcher must plot two axes of the core issues that create positions in an *L* shaped diagram. The x-axis contains one discursive element along an axial continuum of negative or low relevance or value through to positive or higher relevance or value. The y-axis also has a discursive element with a similar axial scale.

Finally, the researcher places elements onto the map corresponding to the positional axes (p. 167). The map should reveal "contentious issues" (p. 168) and articulate what is and is not in the data (p. 172). Although there is a focus on contentious issues, Clarke et al. concede that positional maps can also help draw out low-key considerations (p. 171). The researcher makes multiple iterations of the positional maps until the analysis becomes more apparent to the researcher. These iterations are recorded and reflected upon through the memoing process. The researcher can measure progress through the feeling of a growing sense of working through an articulation of positions on issues found in the inquiry (p. 172). Where positions do not appear on the maps, this can be a trigger for further questions and a driver for theoretical sampling (p. 172), depending upon the constraints of the research project. Saturation is also a signpost for producing enough maps. The process should stop once all issues and positions are exhausted, so the researcher cannot make more maps. The researcher should descriptively present the maps' positions with interpretations of the data used to reflect the positions (p. 174).

3.7   Neo-assemblage theory analysis

A *situational analysis* differs from the *grounded theory method* because it is post-interpretive. Clarke, Friese and Washburn (2018) include Deleuze and Foucault as a part of the theoretical grounding of *situational analysis*. When Clarke et al. (2018) consider Deleuze (pp. 91-96) and Foucault (pp. 77-85), they see them as a continuation of the pragmatic line of travel which Rorty (1982) himself recognised as aligning with the early pragmatists. In particular, Clarke et al. (2018) realise the contribution of Deleuze and Guattari's rhizomes and assemblages in *situational analysis* through their post-structural analytical potential with situational mapping. However, they do not fully explore the potential of DeLanda's expansion of the assemblage concept, despite

noting the potency of the assemblage as an analytical metaphor. Once the researcher has constructed an assemblage, the researcher must "go further analytically and try to specify how it is working" in the analytical situation (p. 95). Clarke et al. (2018) do not describe a method to assist the researcher in how an assemblage works. As a result, the researcher intends to use the methodology of this research to demonstrate how DeLanda's *neo-assemblage theory* explains how assemblages work.

Neo-assemblage theory analysis in this research has its roots in symbolic interactionism and the idea of constant interactions contingent upon what precedes the actions and what follows them (Rock, 1979). Constant interactions also follow Corbin and Strauss' (2015) *grounded theory* in the recommendation of looking at the process, but it is not concerned with context. Instead, Clarke et al.'s (2018) strong argument against Corbin and Strauss' consequential matrix proposes a situational matrix that views the idea of broader contexts, for example, organisations or countries, in a flat, rather than hierarchical, relation to the situation the researcher is a part. *Neo-assemblage theory* similarly deconstructs totalities and organisations. Instead, it presents social constructions in a constant state of flux and fluidity instead of a fixed object. This thinking allows the challenging of the ideas of structure so that the researcher can deconstruct - or excavate to acknowledge Foucault's archaeology (Foucault, 1972) – and reconstruct structures or discourse in new forms or assemblages. This research will produce *neo-assemblage theory analysis* maps for each of the main areas of the descriptive findings. The researcher emphasises that these maps are not attempts to generalise or represent the participants' responses. They are attempts to begin a novel analysis of types of information and information use based upon data of a limited number of participants and information used in their running activities. The maps can begin to form the basis for further discussion and engagement with current apposite scholarship (Chapter 8).

3.7.1   A review of the assemblage as an analytical method

The following section will describe the novel template of a visual *neo-assemblage theory analysis* (*neo-assemblage theory analysis*) to show how assemblages work. Clarke et al.'s (2018) social world/arena mapping and abstract messy situational maps and relational maps influence the analysis and presentation of *neo-assemblage theory analysis* maps. Instead of using social worlds and organisations represented in fluid

boundary ellipses, the researcher represents socially understood objects derived from the findings of people who run in the situations of running itself and after a run with fluid boundaries. The objects or components are mapped in a reasonably messy way as a word map but are then drawn together through bi-directional relations. In line with DeLanda's (2006) *neo-assemblage theory*, the maps aim to illustrate fluid and flat ontologies. A description of the developing method behind *neo-assemblage theory analysis* map construction follows.

3.7.2   Introduction to the analytical template

Nowhere in DeLanda's work is an overt analytical method for *neo-assemblage theory*. However, DeLanda's (2006) clear explanations of *neo-assemblage theory* applied to society facilitate the development of a *neo-assemblage theory* analytical framework. DeLanda advocated *neo-assemblage theory* as an ontologically flat speculative realist theory. DeLanda's (2006; 2016) *neo-assemblage theory* is compatible with *situational analysis*, where *situational analysis* flattens the micro, meso and macro to one level (Clarke, Friese, & Washburn, 2018, pp. 122-123).

The sub-sections of this section describe in detail the components of the novel template for analysis based upon *A New Philosophy of Society* (DeLanda, 2006) and his refinement of the approach in *Assemblage Theory* (2016). The novel template concerns assemblage construction. This section describes the assemblage's components that have material and expressive properties and the effect of the capacities of the components that are dependent upon the relations between the components in the assemblages. It addresses the *parametric variability* of the components, which concerns the variability of two parameters that DeLanda ascribes to the properties of assemblages. The first parameter is territorialisation and deterritorialisation. These terms relate to stabilised and destabilised components in an assemblage, respectively. The second parameter is coding and decoding. This parameter relates to the expressive component of an assemblage that codifies other components, such as a linguistic component like a document that codifies behaviours. *Parametric variability* also introduces how causal relations between the components of an assemblage affect an assemblage's stability as an entity.

These elements of the visual template are explained further in the sub-sections that follow. The elements provide the basis for a mapping tool to consider how assemblages worked based upon the analysis of observed phenomena and give a speculation framework based on hypothetical changes in the components' parameters. These analytical tools have been developed as visual aids to provide a platform for *neo-assemblage theory analysis*. What is described in the following sub-sections is the analytical method the researcher attempted in this research. The analytical method is the researcher's visual vocabulary developed for mapping assemblages.

3.7.2.1　The assemblage

An assemblage is an entity that consists of components. An assemblage as an entity is described at a single *level of scale* when compared to other assemblages. It can have a *relation of exteriority* with any other assemblage, in line with *neo-assemblage theory's* flat ontological approach. The *neo-assemblage theory* does not see totalities (wholes) or essences, meaning that it does not see wholes such as The State or Society. Reality is far more complex than such generalised reifications suggested. To visualise an assemblage as a concept, the researcher suggests representing it as a circle with a label and an outline base colour. The colour is irrelevant, but this explanation will use blue. This explanation could depict the assemblage as a visual interpretation of an entity in its apparent physical object form in a moment in time. A person or a document could be such examples of visual representation. However, for ease of explanation, a simple, single lined circle entity will be used in this section for introductory purposes. The abundance of space in the diagram (Figure 2) is deliberate because it anticipates additions. The line will also change depending on its fluidity and stability as an assemblage. This change is a *parametric variable* described in 3.7.2.5.

Assemblage entity label
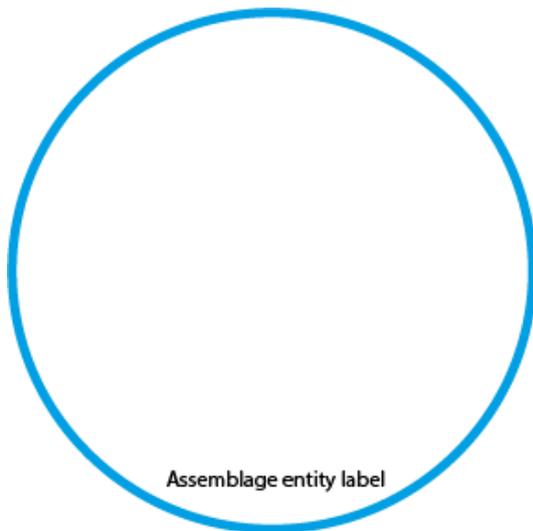
Figure 2: *A simple assemblage entity representation.*

3.7.2.2   Components

An assemblage consists of components in a given moment in time. The components within an assemblage are given a different colour (yellow) to the assemblage entity that emerges from the components. Figure 3 depicts this description.
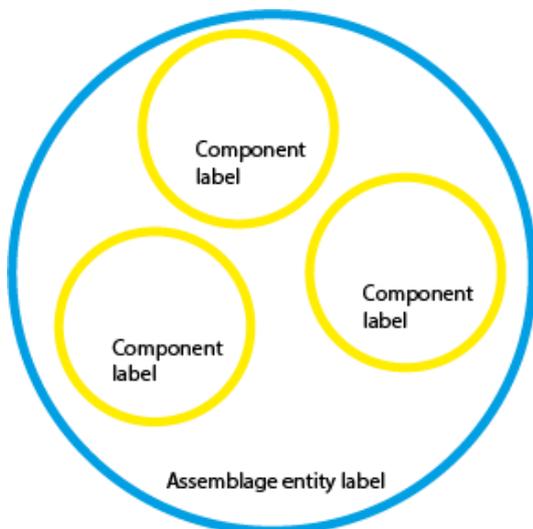
Figure 3: *A visualised assemblage with components.*

Each component relates with other components in various intensity levels, depending on the specific relations in time. The analyst can describe these relations and number each relationship to aid analysis. Thinking about the relations between two components is not dissimilar to relational mapping analysis in *situational analysis*. Each of these relations is said to be a *relation of exteriority*. These are represented in red arrows and numbered for analytical purposes.
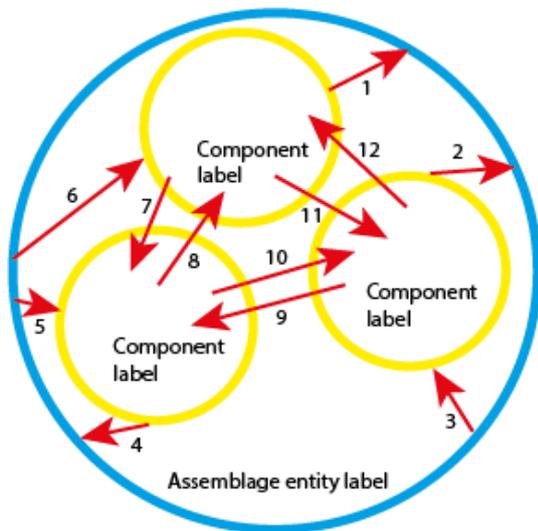
Figure 4: *A visualised assemblage with components and relations of exteriority.*

In Figure 4, relations 7 to 12 inclusive may appear as interior relations from which the assemblage emerges. However, the emergent whole is not a fixed entity and does not reduce to the components and their relations signified through relations 1 to 6 inclusive. These relations depict the causal effects that a component within an emergent assemblage exerts on the assemblage and the emergent assemblage exerts upon the components. Components can leave to form other assemblages or be an assemblage in their own right. Each component within an emergent assemblage is an assemblage in its own right. It will have its subcomponents.

This relational complexity makes it difficult for potential analysis, so analysis should represent the appropriate *level of scale*. When analysing a person as an assemblage, DeLanda (2006) calls the components that make up this assemblage "subpersonal" components (p. 47). The assemblage is irreducible to its components. Therefore, one component could leave the assemblage and have no other relations of exteriority with that assemblage entity (Figure 5). This leaving does not preclude a component from joining another assemblage. The emergent assemblage that it was once part of remains but in a different form with a change in relations.
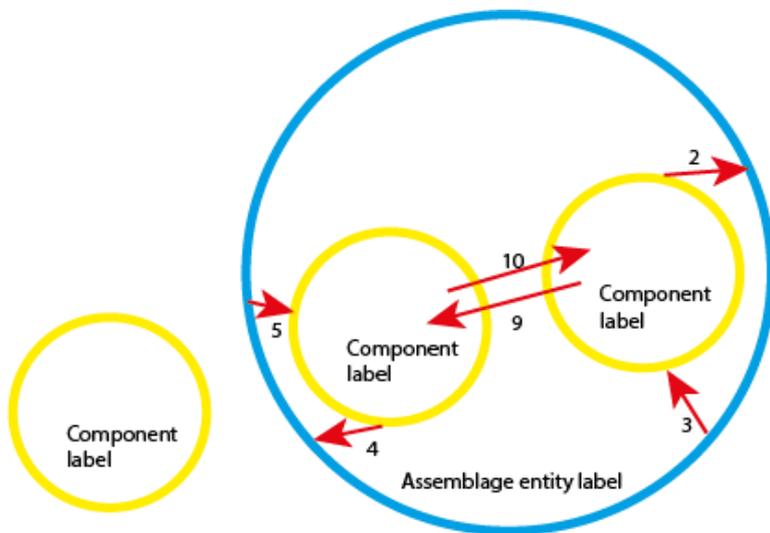
Figure 5: A component that has left assemblage entity and *relations of exteriority*.

This movement demonstrates that an assemblage is not a whole, a sum of its parts (i.e., it is irreducible). It can still be an assemblage entity, but it is not fixed or homogeneous and is liable to change. Whatever the assemblage is, the analyst describes an assemblage in a snapshot of time. We seek to establish a visual representation of an assemblage, its components (which can also be assemblages) and relations of exteriority that can form the basis of descriptive analysis of an assemblage entity. Assemblages can change, and this method provides a platform to analyse change over time and speculate on the effect of changes. This method description will discuss such changes concerning the stability or instability of assemblages. Before introducing this discussion on changes in assemblages, one further requirement is to describe the components and their representation.

3.7.2.3   Material and expressive components

DeLanda (2006) describes components as material and expressive. A material component is something tangible and physical that exists in reality. An expressive component can be something that materially exists but through interpretation, such as the human mind, ideas of language, and an object's interpretation. An example of an expressive component can be a label for a given observable phenomenon, such as an object or a sound. The following section explains expressive linguistic components in further detail.

The analyst places the quality of the components along a continuum of approximate opposites between expressive and material. Descriptions are not fixed qualities. A

component can be a mixture of these qualities. The assemblage's quality depends upon the relations of exteriority and the point in time of analysis. For analysis, the analytical method proposes that the outline colour of a component/assemblage represents the mix of material to expressive components along a colour continuum. The outline for mainly material entities can be a bold solid line. The outline for a mainly expressive entity can be a much fainter line. Figure 6 represents these descriptions.

Expressive
entity
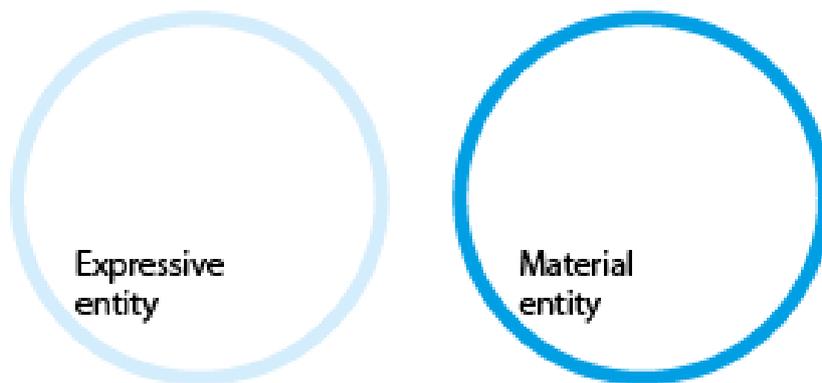
Material
entity

Figure 6: Expressive and material entity colour continuum scales.

3.7.2.4   Expressive linguistic components

DeLanda (2006) notes that genetic and linguistic assemblages are remarkable yet have normal relations of exteriority as other components in the assemblage (p. 45). For language, this challenges the idea of meaning when words become essences which DeLanda describes as the thesis of the linguisticality of experience. In DeLanda's (2006) words:

> that is, the idea that an otherwise undifferentiated phenomenological field is cut up into discrete entities by the meanings of general terms. Since in many cases the meaning of general categories is highly stereotyped (particularly when they are categories applying to groups of people, as in gender or race categories) [p. 46] the thesis of the *linguisticality of experience* implies that perception is socially constructed (pp. 45-46).

Such generalisations are a reification. DeLanda suggests that social constructivism acknowledges that categories are a form of stereotyping. However, the perception remains "intrinsically linguistic" when twinned with a linguistic ontology where "only the contents of experience really exist" (p. 46). DeLanda terms this "social

essentialism" (p. 46). DeLanda shows that linguistic assemblages are only part of how an individual emerges from subpersonal components, of which language is only a tiny part.

It is perhaps ambitious to visualise DeLanda's linguistic entities. Within *assemblage theory* thinking, DeLanda (2016) admits that studying languages "is a difficult task" (p. 51). For DeLanda, linguistic assemblages operate at multiple *levels of scale* "simultaneously" (p. 52), which he describes as three interrelated levels. The levels are:

> a language as a variable of a social assemblage; a language as a parameter of a social assemblage; and a given language as an assemblage (p. 52).

As a variable of a social assemblage, these include "words and sentences" that also interact with material and non-linguistic expressive components (p. 51). As a parameter of a social assemblage, this could roughly equate to discourse or written laws. These laws can "code all the components of a given assemblage" (p. 51). As a given language, the assemblage can be examined as expressive aural or semiotic representations of sounds or letters as distinct semantic properties or joined together to form words and sentences, the "tone, stress, rhythm, rhyme" (p. 52). Of relevance to this study in examining information, material components can compose of "acoustic matter" or "physical inscriptions, like carvings on stone, ink on paper, or the ones and zeroes that code language into electricity flows on the Internet" (p. 52). This material description of language is relevant and very important to the information focus in *neo-assemblage theory analysis* because it combines the material and the expressive.

As expressive linguistic entities have a special status, the analyst can depict expressive entities with a second circle with the faint colour of the expressive entity in the colour continuum of Figure 7. The analyst can consider whether language is a variable, a parameter, or an assemblage in its own right and how it fits within its simultaneous *level of scale*. An analyst can denote these entities as variable, parameter or given language within the visual representation.

Expressive linguistic
entity
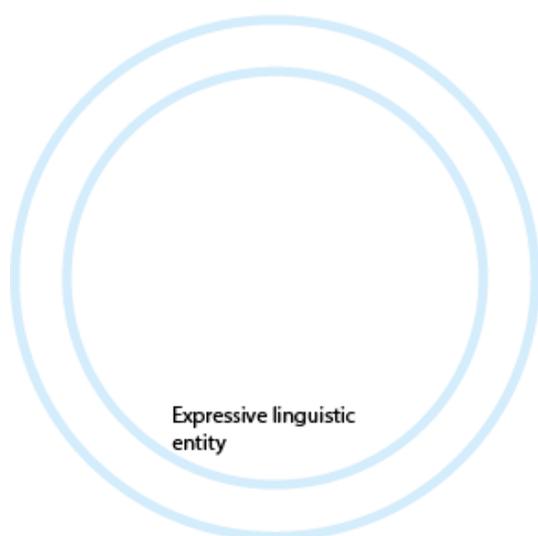
Figure 7: *A representation of an expressive linguistic component.*

3.7.2.5   Parametric variability: (de)territorialising and (de)coding components

When a component leaves an assemblage, in *neo-assemblage theory*, this is called deterritorialising. The relations have changed, and the assemblage will need to adjust to its new component deconstruction. It is no longer in its frozen state. An abrupt leaving is quite a sudden change. Change can happen slowly, but it does not serve as so dramatic an example. Figure 5 assumed the construction of a very stable entity that is territorialised and coded in its material and expressive components. Such total stability is said to be a stratification. Until this point, this analytic method description has represented components as solid lines with no analytical purpose. The purpose of the outlines will be changed to reflect the stability of a component.

First to be explained are the states of territorialisation and deterritorialisation. Similar to material and expressive components, DeLanda describes territorialising processes through the idea of a variable parametric control that has upper and lower limits (parameters). Something highly territorialised means that a component is in a reasonably fixed state. Expressive components have a parametric control of coding and decoding, similar to territorialising and deterritorialising. A coded entity is a stable expressive entity in an assemblage. It could be a linguistic component, perhaps in a written form, such as laws that seem to have a codifying effect upon other components. When components are highly territorialised and coded, they are at the highest level of the parametric control. As a result, an assemblage is stratified. However, there is always the risk of deterritorialising and decoding, which can

threaten such a stratification. DeLanda has provided the terms for analysis, and now it is the task to give a visual representation of an assemblage for analysis. Entities (assemblages) represented with solid lines are stratified. Entities given very close dotted lines are highly territorialised or coded. Entities depicted with more distant dotted lines are deterritorialised or decoded. The closer or more distant the dotted lines represent the extent of territorialising and coding. Figure 8 shows a decoded expressive entity and a highly territorialised material entity.
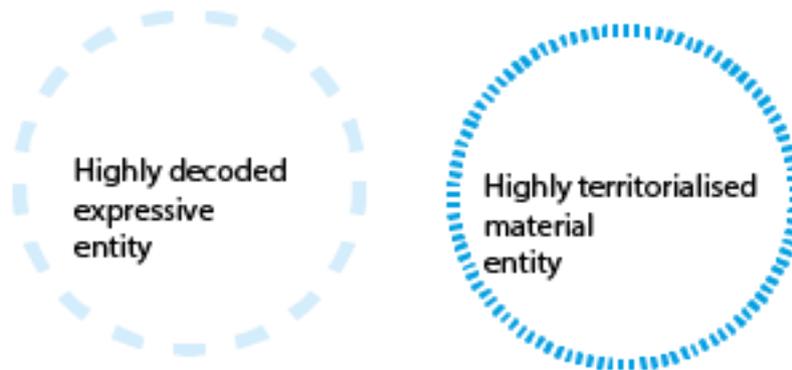
Figure 8: *Representations of a highly decoded expressive entity and a highly territorialised material entity.*

3.7.2.6   Properties and capacity

Assemblage components have properties and capacities that DeLanda explains using "technical objects". He uses a knife as an example (2016, p. 73). The properties of a knife can "include its length, weight, and sharpness" (p. 73) but it will have more depending upon the knife. These properties themselves are the result of the emergence of the components of the knife. DeLanda uses the example property of a knife's sharpness. The sharpness first emerges from "a geometric property of the cross-section of the blade", which itself "emerges from a particular arrangement of its component crystals" (p. 73). Properties are "finite and may be put on a closed list" (p. 73). The properties of a component or assemblage can be grounds for descriptive analysis. Compiling a closed list may not be necessary; it may be suitable to describe what the analyst observes in the object. As long as it is recognised that the description of the properties is not a complete one, this should not be a barrier to analysis, especially when moving on to analyse capacities. An analyst can depict such a component visualisation with some further amendments given the development of the visual analysis using DeLanda's example of a knife. Figure 9 is just a partial depiction of

the components within the assemblage, with the coloured hues of the outlines suggesting a stratified entity and components that are mainly material. However, lightened colours represent possible expressive elements in the knife blade.
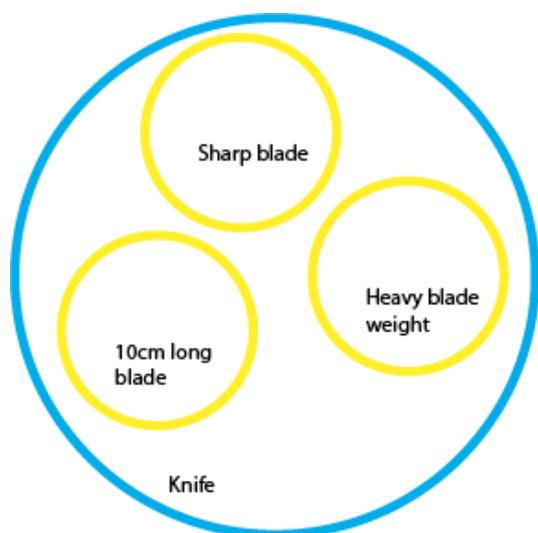
Figure 9: *A knife assemblage and its partial components.*

A larger assemblage that realises the capacities of a knife do not determine its properties (p. 74). As a part of a larger assemblage, DeLanda (2016) states that realising the capacities of the knife is:

> never as an enduring state but as an event. Moreover, this event is always double, *to cut-to be cut,* because a capacity to affect must always be coupled with a capacity to be affected. (p. 74)

As a site of analysis, an event in the assemblage realises capacities. Affective capacities are "potentially infinite", thus indescribable or unsolvable. Thinking about the knife, if it is in a "kitchen assemblage", its capacity is as a tool to cut with to prepare food. In an "army assemblage", it could be used as a weapon to kill a person (p. 73). As a summary of thoughts about properties and capacities, DeLanda calls upon John Austin's idea of speech acts when considering linguistic entities. What a linguistic entity is and what it can do are distinct (p. 52). That is, what its properties are and what its realised capacities can do are not the same. To examine capacity, we will need to look at the interactions with other components in an assemblage that help realise these capacities.
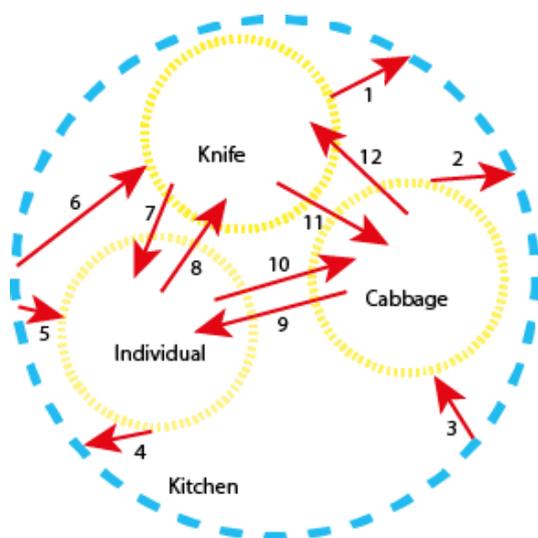
Figure 10: *Kitchen assemblage and causal effects.*

Let us focus on the capacities of the knife where a knife cuts a cabbage. An individual holds the cabbage and imparts a downward force on it with the knife. An explanation is as follows. With its relations with the components in the assemblage, the individual uses the knife to cut cabbage. Hence, the knife relates to the cabbage, and the individual realises its capacity to cut. The knife is affecting the cabbage.

Similarly, the cabbage also affects the knife's cutting capacity, causing resistance through its structure. The cabbage forms relations with the knife whilst in the act of cutting and being cut. The individual is holding the knife, and the knife is held by the individual, realising the double affective capacity. The components are also affected in their relation to the kitchen assemblage. There is a territorialisation and coding in the kitchen assemblage that the individual, knife and cabbage will exercise culinary capacities befitting a kitchen. The emergence of the kitchen assemblage at this point cannot occur without the individual, knife and cabbage. Figure 10 analytically visualises these effects and resultant capacities.

Within the kitchen assemblage, the relations between the individual and the cabbage help realise the knife's capacity. Relations and the realisation of capacities are also related to causal effects. To conclude, this section considered properties and capacities and how to visualise them for analytical purposes. The following section examines the idea of causality and double determination through the causal effects of relations of exteriority upon the assemblage entity.

3.7.2.7   Causality

A researcher can analyse relations of exteriority and their effects upon each other in assemblage for either historical analysis (as in the previous example) or potential speculation. We also need to consider *levels of scale*, first introduced through linguistic assemblages that can simultaneously operate at different levels. As mentioned above, the examination was on a relatively large scale. Suppose we concern ourselves with an assemblage and its components (which can also be assemblages themselves). In that case, we can begin to understand through analysis upward and downward causality that causes components to change or have their capacities realised at certain times. The example of the emergent kitchen assemblage described this change. As a larger assemblage, the kitchen assemblage influences the components, such as an individual. This influence could be in the expectation of certain types of behaviour in that assemblage, such as using other components to fulfil tasks in the assemblage through realising specific capacities with the given properties.

Similarly, the particular kitchen assemblage would not emerge if it were not for its components. Through observing or speculating changes in parametric controls of the components or through realising capacities in events in the kitchen, assemblage changes could affect the other components or the assemblage itself. In this way, causality in assemblage theory works in two directions called double determination causality.

As a means of analysis, this can be visualised based upon the relations of exteriority as numbered in the kitchen assemblage diagram. All relations are equally important as they all have relevant relations to the components and the assemblage.

3.7.3   Summary

The explanation of *neo-assemblage theory analysis* in the previous section is greater than the cursory description of *situational analysis* analytical tools because they have already published methods (Clarke et al., 2018). The extrapolation of DeLanda's (2006, 2016) work into a visual, analytical method completes the introduction and explanation of this research's *situational analysis* and *neo-assemblage theory analysis*. The following section will describe how *situational analysis*, with the addition of *neo-*

assemblage theory analysis, was incorporated into the design and implementation of the research process.

3.8 Research design

This section describes how the research was undertaken based on the developing methodology. The researcher implemented the design through the early analytical processes of the *grounded theory method*. The researcher then incorporated these processes into the methods/theory package of Clarke et al.'s (2018) *situational analysis* with the later addition of *neo-assemblage theory analysis* derived from DeLanda's (2006, 2016) *neo-assemblage theory*.

3.8.1 Design overview

Three phases of qualitative data collection implemented the research. The first phase oversaw the planning and implementation of data collection with four purposively sampled participants through a novel, mobile audio-visual data collection method. These data were *abductively* analysed concurrently using the *grounded theory method* introduced and discussed before using *situational analysis*. The second phase saw the preparation and implementation of virtual online interviews with the same purposively sampled four participants. Data analysis continued with *situational analysis* and the integration of *neo-assemblage theory analysis* mapping. Planning to implement data collection with a new group of four participants heralded the beginning of the third phase. Data were collected through virtual online interviews whilst concurrently analysing *abductively* through *situational analysis* and *neo-assemblage theory analysis* methods. Figure 11 illustrates the phases and the *abductive* nature of analysis throughout the research process.

Phase 1
Mobile method
Analysis

Analysis

Researcher and *a priori* experience

Analysis

Phase 3
Online method
Analysis

Analysis

Phase 2
Online method
Analysis
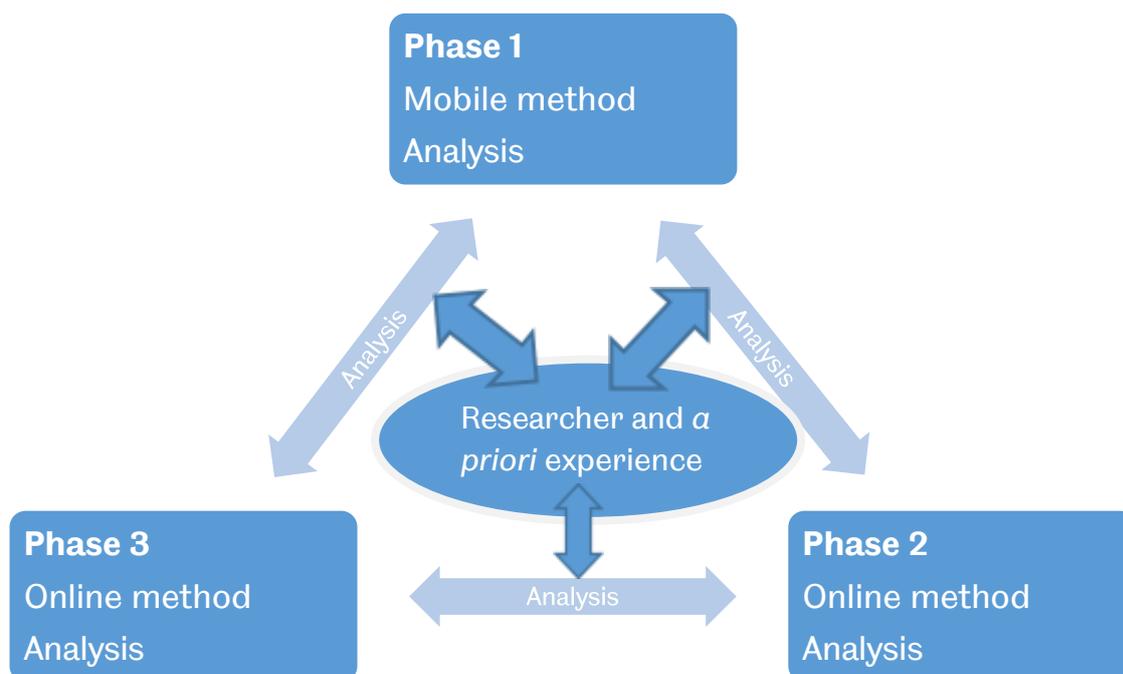
Figure 11: *The three phases of the research design, including abductive analysis throughout.*

3.8.1.1   Situations as data collection sites

To understand the types of information people running use, how they use it and its value, it was decided to have two data collection situations. The first situation was during the act of running. The second situation was whilst discussing participants' information sources about running. The *a priori* experience of the researcher was the basis for the data collection phases of the proposed phenomenon under examination: information used in leisure activity. The *a priori* experience of the researcher was further reinforced and explored during the literature review. The researcher was aware of their presence in the research and did not intend to "dominate the research" (Clarke, Friese, & Washburn, 2018, p. 107). As a co-producer of research data, *situational analysis* clarifies that researchers are not neutral, unbiased instruments. As Clarke et al. (2018) summarise it: "our own experiences – our lives – cannot be left outside the door of our research" (p. 107). The design overview diagram incorporated the *a priori* experience of the researcher (Figure 11).

3.8.1.2   Sampling

This research's sampling strategy use Daniel's (2012) non-probability sampling for the first phase before using theoretical sampling recommended in the *grounded theory method* (Corbin & Strauss, 2015) and *situational analysis* (Clarke, Friese, & Washburn,

2018). Specifically, this research used purposive sampling as non-probability sampling to begin data collection in the first phase before using theoretical sampling. This section explains the purposive sampling criteria in the first phase below. The researcher rejected availability sampling (Daniel, 2012, pp. 81-86) because it was not a rigorous sampling strategy.

The researcher built their purposive sampling strategy upon their *a priori* understanding of the research situation and what the researcher learned in the first literature review. As a result, the first part of purposive sampling was subjective sampling. People from running clubs were selected first as the researcher thought they would provide rich data about the research situation. Daniel (2012) describes subjective sampling as an imprecise yet convenient method for identifying likely participants. Subjective sampling does have limitations in that it can frame participants as a homogeneous social group. The researcher intended to use this specific type of purposive sampling to gather data on a previously under-researched topic.

The research addressed an existing research gap by focussing on runners outside of running groups. An alternative sampling method sought to add heterogeneity to the initial subjective participant sample. Diversity sampling and snowball sampling were used to drive theoretical sampling where the researcher considered it appropriate to recruit more participants. The research used diversity sampling to enrich the capacity to find differences (Daniel, 2012, p. 119) in the data collected from the first group subjectively sampled. Snowball sampling - a type of respondent-assisted sampling (p. 121) - was used to help recruit participants in otherwise "hard-to-reach populations" (p. 120) that run and is a suitable method for broader inclusivity (p. 109). Short links in the sampling chains were preferred over longer chains because this was likely to encourage greater diversity in the sample. Snowball sampling and theoretical sampling have a precedent in *grounded theory* research sampling and recruitment (Yingling & McClain, 2015). Using subjective and diversity sampling is a new development in *grounded theory* and *situational analysis* methodologies to this researcher's knowledge. Figure 12 describes the flow of the sampling and recruitment process.

First phase sampling and recruitment

- Subjective sampling (purposive)

Subsequent sampling and recruitment

- Theoretical sampling (purposive)
- Diversity sampling (purposive)
- Snowball sampling (respondent-assisted)
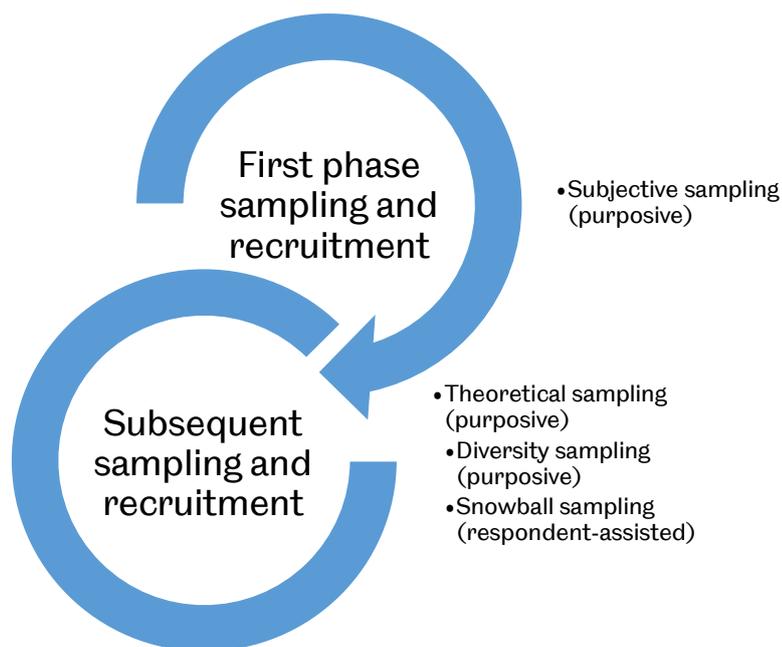
Figure 12: *Diagram of sampling and recruitment process.*

The first and second research phases used subjective sampling with four participants. The researcher theoretically sampled the following four participants for the third phase through both diversity sampling by advertising online amongst the social networks of the researcher and snowball sampling. Depending upon analytical development, the researcher anticipated the number of participants to be around 20, ranging from 15 to 30 (Daniel, 2012, p. 243). The total number of participants in this research was eight.

The low number of participants was due to the opportunity for deep-level analysis that the cessation of face-to-face data afforded the researcher through a collection caused by coronavirus restrictions. At the end of the *grounded theory method* coding, analysis and reflection upon the third participant's data, there was a strong indication that significant concepts and relationships were developing. After analysing the fourth participant's data, the researcher added no new concepts or saw no new investigative directions. The analysis reinforced what was emerging. The researcher felt they already had reached a saturation point amongst club runners.

The second phase was with the same four participants but in a different situation – away from a run. Data collected in this phase added a deeper understanding of existing concepts relating to recorded forms of information that emerged during the first

phase. The second phase reinforced the researcher's feeling that data analysis delivered broadly the same concepts and that nothing new emerged. This saturation prompted the integration of the analytical work to this point with a view toward *situational analysis* mapping methods.

After the first interview with the first participant in the second group of four participants, the researcher was surprised that the participant's responses reinforced what had emerged from the previous analysis of committed runners. At this point, the researcher devoted more time to writing up the analytical findings, which was in itself a reflective, analytical process, before returning to data collection and analysis of the remaining three participants in the second group.

In summary, the deep level of analysis resulted in an emerging understanding of how people use different types of information related to their running activity. Analysis used the *grounded theory method*, *situational analysis*, and *neo-assemblage theory analysis* based on just eight participants' audio and visual data. Whilst trends in information behaviour have moved almost entirely to understanding small groups undertaking niche activities and then making claims of generalisability (Case and Given, 2016), this research does not claim to do this upon the basis of eight participants. Instead, the eight participants and analysis of their data yielded findings helpful in understanding how people use and value different types of information in their running activity (see Chapters 4 to 7 for findings and discussion). Such a utility adds to the transferability of the findings for the researcher to consider with a new research project with other participants not used in this research. This transferability can then build upon this research's findings, established upon a small sample, concerning the use and value of types of running information. Nevertheless, due to the multi-faceted analytical possibilities of *situational analysis* and *neo-assemblage theory analysis*, the data can be considered in a myriad of possibilities, consistent with the deconstructive nature of the analysis.

3.8.1.3   Recruitment

It was an intentional decision first to sample a selection of runners purposively, recognising leisure sociology typologies amongst runners. The Covid-19 pandemic led to a restriction on face-to-face data collection after collecting data with four

participants. The researcher recruited four more participants for data collection using an online instead of the face-to-face data collection method. What resulted was two groups of participants, with eight participants in total. The first group consisted of four participants, and the second group also consisted of four participants.

The researcher arbitrarily viewed the first group of four participants as having a lot of running experience and perceived high use of information concerning their running, particularly with quantified information. There was a perception that they pursued running seriously and an expectation that they would adhere to Stebbins' suggested serious leisure characteristics, especially those related to effort and durable benefits (Stebbins, 1992; 2018). The first group, hereafter Group 1, would provide seed data to direct theoretical development and further sampling. Table 2 and Table 3 provide demographic information of Group 1 participants. This information was collected for transparency before the interview recordings with the participant pack (Appendix 2). The questionnaire monitored participants' sociodemographic responses, especially to prepare to accept the limitations of participant diversity in this time-bound project. The researcher acknowledges that the following sociodemographic table seems to reinforce existing studies of runners in that they are of white ethnicity (Pederson, Pedersen, & Thing, 2018) with middle-class incomes that can afford, for example, leisure tourism (Lee, Brown, King, & Shipway, 2016).

Pseudonym	A1: Age	A2: Sex	A3: Ethnic group	A4: Work	A5: Highest qualification level
Adam	40-49	Male	White – English/ Welsh/ Scottish/ Northern Irish/ British	Technical and craft occupations	GCSEs or equivalent
Becky	50-59	Female	White – English/ Welsh/ Scottish/ Northern Irish/ British	Modern professional occupations	First degree
Chris	18-29	Male	White – Any other White background	Technical and craft occupations	A-Levels or equivalent
David	60-74	Male	White – English/ Welsh/ Scottish/ Northern Irish/ British	Traditional professional occupations	Postgraduate degree

Table 2: *Group 1 participant responses to pre-recording questions section A.*

Pseudonym	B1: How long running?	B2: 5km personal best time	B3: Average weekly mileage	B4: Average weekly time running	B5: Average days a week running
Adam	10 years 0 months	19 minutes 0 seconds	35 miles	6 hours	5 days
Becky	17 years 0 months	24 minutes 0 seconds	22 miles	4 hours	4 days
Chris	4 years 6 months	17 minutes 52	46 miles	6 hours	6 days
David	54 years 0 months	18 minutes 0 seconds	15 miles	3 hours	3 days

Table 3: *Group 1 participant responses to pre-recording questionnaire section B.*

The researcher theoretically sampled Group 2 (Table 4 and Table 5) from concept development and integration, sampling participants through diversity and snowball sampling. The researcher then sampled four participants from outside of the club running social worlds to try and develop emerging analytical findings on types of information use. The researcher expected that Group 2 runners would exhibit characteristics that Stebbins (2018) has described as "casual leisure", where they lack the social interactions and intrinsic motivations to pursue an activity "seriously" in Stebbins' serious leisure perspective.

Pseudonym	A1: Age	A2: Sex	A3: Ethnic group	A4: Work	A5: Highest qualification level
Joy	40-49	Female	Asian/Asian British - Chinese	Modern professional occupations	Postgraduate degree
Faye	40-49	Female	White – English/ Welsh/ Scottish/ Northern Irish/ British	Modern professional occupations	First degree
Guy	30-39	Male	White – English/ Welsh/ Scottish/ Northern Irish/ British	Traditional professional occupations	Postgraduate degree
Helen	18-29	Female	White – English/ Welsh/ Scottish/ Northern Irish/ British	Traditional professional occupations	First degree

Table 4: *Group 2 participant responses to pre-recording questions section A.*

Pseudonym	B1: How long running?	B2: 5km personal best time	B3: Average weekly mileage	B4: Average weekly time running	B5: Average days a week running
Joy	0 years 2 months	47 minutes	10 miles	Don't know	4 days
Faye	2 years 6 months	33 minutes 36 seconds	6 miles	1 hour 45 minutes	2 days
Guy	2 years 5 months	Don't know	6.5 miles	55 minutes	2 days
Helen	0 years 6 months	31 minutes 56 seconds	4.3 miles	45 minutes	2 days

Table 5: *Group 2 participant responses to pre-recording questionnaire section B.*

Within the rest of this chapter and the findings (Chapter 4), Group 1 participants are characterised as club runners and Group 2 participants as non-club runners through

an interpretation of their appearance and discourse. These subjective typologies contribute to later explanations of research findings concerning information use. It must be made clear that the subjective typologies the researcher presents are not intended to be definitive or generalisable. They are used to help the reader understand the participants in the research and enrich the findings on information types and use.

3.8.2   Phase 1: on a run situation with Group 1

This section describes the first phase of the research activity. It will describe data collection preparation, data collection itself with the four participants of Group 1 and transcription and analysis. Due to the *abductive* nature of the research methodology, data collection, transcription and analysis overlapped each other.

Appendix 6 provides an overview of the data collection, transcription, and analysis tasks in Phase 1. It details the date and description of a particular event and the participant, including the researcher, related to it. It also includes a key for an overview diagram depicting the overlapping nature of the research activities. It does not include preparation tasks. In the early period of Phase 1, there was a long time of conceptual development. The most significant analytical development took place after the second data collection, lasting from the end of February until early April. Subsequent analyses were shorter with each following participant, based upon a sense of conceptual saturation. From 29th April 2020, the researcher consolidated initial conceptual coding through integration into concepts and categories. The researcher reconsidered both this analytical integration and previous analytical work with *situational analysis* methods of messy abstract mapping and relational mapping. The researcher combined this analysis with iterative writing up of the developing findings.

The following sections will describe further details of the preparation to collect data, data collection and analysis.

3.8.2.1   *Data collection preparation*

Within the *grounded theory method* and *situational analysis*, interviewing and observing participants are the most prevalent data collection methods (Corbin and Strauss, 2015, p.37). There are unstructured, semi-structured, and structured interview types for interviewing within the *grounded theory method*. Corbin and Strauss advise unstructured interviews for experienced researchers to ask questions

(p. 38). Semi-structured interviews allow for a mixture of topics for the participant and the researcher to discuss and further unstructured questions (p. 39). Structured interviews use a rigid question structure and do not allow for participant interaction or flexibility, which is incompatible with *grounded theory* methods (p. 39).

The researcher decided to prepare and use a semi-structured interview guide for the first participant instead of an unstructured interview format. After conducting the literature review, the researcher formed the research questions. In response to those questions, the researcher was looking to collect data that specifically addressed the questions that allowed for flexibility in questioning. The research questions had some structure that mirrored some structure in data collection. With hindsight and the benefit of a greater understanding and knowledge of the *grounded theory method* and *situational analysis* than at the beginning of the research process, the researcher would address research with a single, open problem. Such an approach would have allowed for an unstructured interview format where the resulting data would guide into the *abductive* research process. However, for this first research endeavour, the researcher considered semi-structured interviews to be an appropriate method. Using a semi-structured interview allowed the researcher and the participant to be flexible in uncovering further conversation on questions not in the semi-structured interview guide. After the initial analysis of the first participant's data, the researcher used a very loose semi-structured interview format to ask participants subsequent questions. Figure 13 plots the overall interview format taken throughout the research on a representative axis.
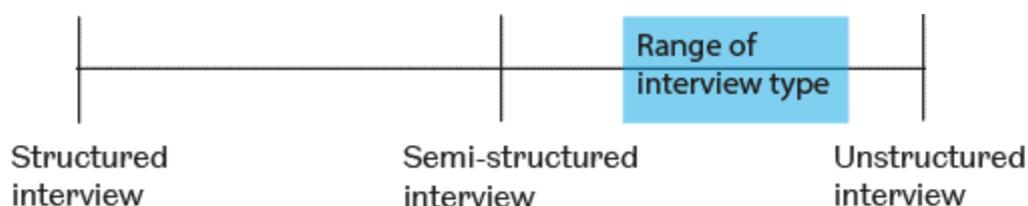
Figure 13: *Axial illustration of research interview types within this research.*

Appendix 3 presents the semi-structured interview guide. After the first recording, the participant transcripts show the development of these questions, where participants gave consent to publish them in a research data set.

Observation in *grounded theory* methods is a rich form of data collection that captures more than just verbal responses. It places the researcher in the middle of the research situation. Patton (2002) suggested that this centrally active role was essential for developing original insight. The relationship between what a participant says and what they do can provide a rich seam of investigation (Corbin and Strauss, 2015). Having the researcher within the research situation adds to understanding the situation under research. Using the 360-degree camera and running with the participants aimed to place the researcher in the middle of the situation to develop original insight. Related and similar to the spectrum of structured and unstructured interviews, the researcher will now explain a researcher's position with participant observation and non-participant observation. In non-participant observation, the researcher detaches from the situation under observation, does not participate in the research setting, and does not attempt to engage with any understanding of the research subjects (Handley, 2008). From the introduction of this paragraph, there is an inference that this research favours participant observation over non-participant observation. The observation of the participants occurs during data collection, where the researcher interacts and reacts to observations of the actions made by participants within a particular, discrete situation. Participant observation also leads to interpretative analysis, which is suitable for *deductive* analysis (Corbin & Strauss, 2015; Guest, Namey, & Mitchell, 2013, p. 79). Using interviews during a run was thought to dampen any element of formality that asking questions from a semi-structured interview would have. Such a formation of a relationship between the researcher and the participant would then help to reduce any behavioural change between the researcher and participant in any follow-up interview situations when not running (p. 80). Appraising this research using Guest et al.'s participant observation matrix diagram, a greater understanding of participant observation can be derived (p. 89). It is perhaps not as straightforward to say that research methods are purely observational or participatory. Guest et al.'s participant observation matrix in Figure 14 demonstrates this.

Figure 14: *Guest et al.'s (2013, p .89) participant observation matrix.*

Data collection is highly participatory where the researcher runs with participants and makes the researcher less visible to the participant and more like a co-runner. The loosely structured interview method used while running lessened the highly participatory nature and made the researcher more visible. The researcher recorded participants with a 360-degree action camera during a run, which would make the data collection highly observational and further increase the researcher's role in data collection. However, the researcher argues that by running with participants with an action camera held by the researcher, the researcher's visibility is reduced and makes data collection both highly participatory and highly observational. Using Guest et al.'s matrix, Figure 15 depicts the plotting of these three facets of data collection.

Figure 15: *Illustration of the observational and participatory character of the first data collection method.*

Using a 360-degree audio-visual recording to maximise data collected whilst on the run, from audio responses to audio and observations of the participants missed during the live recording, would best combine participant observation and a broadly semi-structured interview. An audio-visual recording is an often ethnographic and phenomenological method used in social research (Heath, Hindmarsh, & Luff, 2010). An audio-visual method using a recording camera observes participants and captures audio and visual data that the researcher may not have heard or seen during the recording. The 360-degree camera ensures that the researcher captures as much as possible in the visual and audio environment, such as the researcher, the participant running, actions and objects, sights and sounds captured during the recording.

The use of a 360-degree camera intended to reveal more observations that the researcher may have missed if the camera lens was in a fixed position and only captured in one direction. The qualitative mobile method was a video ethnographic method used in geographical studies (Cook, Shaw, & Simpson, 2016). The researcher developed a 360-degree capture of audio and visual data in innovation. 360-degree

capture intends to overcome traditional 180-degree action cameras' difficulties in mobile data collection, as noted in human-computer interaction (HCI) research (Temir, O'Kane, Marshall, & Blandford, 2016). Such challenges included reacting to and recording participants' use of mobile devices whilst trying to run and ask questions. A 360-degree camera maximised data collected from the participants' responses to semi-structured interview questions and observed their behaviour during the running situations. It allowed the researcher to worry less about trying to record and watch all notable participant movements whilst asking interview questions and running. The method created an immersive, novel audio-visual data environment for analysis. A researcher can view 360-degree audio-visual data in a virtual reality headset and use it as a means of visual data sharing of the situation and analysing data. Depending upon participant consent, the resulting data could be re-used for other research purposes if deposited into a research data repository with appropriate access controls.

For running recordings, researcher and participant interaction was reasonably neutral and amicable, despite the presence of a camera and the use of a loosely-structured interview. Running at a reasonable pace with another person whilst talking is a normal social practice in the researcher's experience as a runner. Using an action camera to record runs is also something that is another, if infrequent, practice amongst runners. As a result of these understood practices in running with experienced runners, the researcher was not concerned that it would significantly affect participant behaviour. The presence of the researcher as a runner would normalise the running situation.

Before ethical approval, the researcher undertook trial and testing to find a suitable data collection method to tackle the noted difficulties above of existing running with a camera method to record participants and their use of information. The researcher tested three methods for this before data collection and ethical approval. The first method used a short handgrip to mount a Garmin VIRB 360-degree action camera for the experimental setup. A 64GB memory card was formatted and loaded to test whether it was the correct capacity for data capture.

The researcher found a suitably quiet place to run in good weather during the day for around fifteen minutes, running to test, turning the device on and off for recording and the video quality playback with a focus on image stability and talking to themselves to

test the audio quality. From a physical point of view, running with a camera for fifteen minutes with the arm held out was physically tiring. The testing considered the issues concerning the matrix of researcher visibility and the participatory and observational qualities. The researcher found that the method was relatively unobtrusive and would make them less visible in the highly participatory and observational process. After the field trial, the researcher examined technological requirements, focusing on data transfer from the 360-degree camera device to a secure device for playback and storage. When the researcher played back footage, there were minor issues with sound where the wind would be heard on the microphone across voice recordings, although voice recordings were generally clear. The 360-playback worked very well. However, the camera could only capture the researcher when using the short handgrip, and there was no room for capturing other running participants running at their side. The camera was around the researcher's chest height and near the researcher's body at arm's length. Holding the camera did not seem entirely natural when running. As a result, the researcher undertook further experimentation to find a method that would make running easier for the researcher without getting tired.

The second trial method mounted the camera on a pole with cable ties and attached the pole to a running bag to make the running effort more natural for the researcher (Figure 16).

Figure 16: *Pole-mounted camera attached to a running bag with cable ties used for the second trial method.*

The researcher found that the pole slipped down the bag during the field trial, and the camera mount was not stable, causing an imbalance. The researcher felt that it caused worry and problems for the researcher and would detract from the running experience. The camera had swayed from side to side during playback, which did not reflect the researcher's view of the run. This method would capture another runner behind the researcher, providing the researcher resolved camera stability issues. A participant running behind would lose potential interaction between the researcher and participant as co-runners. Such loss would be facial expressions and non-verbal reactions to actions and environmental conditions. This method increased the

researcher's visibility and observational aspects, despite affording the participatory potential to run with participants.

An old baseball cap was modified with a platform to mount a camera more securely to counteract stability issues (Figure 17).

Figure 17: *A modification of the pole-mounted camera modifying an old baseball cap with a camera mount.*

However, this was just as uncomfortable to run with despite increased image stability. The advanced method still kept the researcher visible in the process. The observational nature of data collection remained high, reducing the potential for a highly participatory recording that reflected the experience of a run as close as possible.

The researcher devised a third trial that revisited the first trialled method with a short handgrip camera mount. The handgrip method did not raise the researcher's visibility as much as the hands-free method. It did not seem as observational as using a mounted camera pack or a modified baseball cap and limited the participatory nature of the research. Despite the physical tiring of the researcher's arm that held out the camera, the handgrip method was preferred over hands-free methods because it made the researcher less visible. It was a less visible means of observation, and it would increase

the researcher's participation because they could run alongside the participant, similar to an informal run. The third trial addressed the problems of physical tiredness in the researcher's arm from an unnaturally still arm in holding the camera, the height of the camera above the hand and lower arm height and more comprehensive video capture to include the participant and the researcher running side by side. The researcher addressed the problems with an extendable handgrip (GoPro 3-Way), allowing the researcher to hold their arm at a lower, more natural running position, thus alleviating physical tiredness. The extendable handgrip raised the camera lens to near face height and further held the lens away from the researcher. This trialled method also captured more of the researcher's body. As a result of these trials, the researcher settled the experimental setup for running and developed a technology guide recording the requirements of the method before testing and seeking ethical approval.

For data collection whilst running, the researcher would use a Garmin VIRB 360-degree action camera loaded with a 64GB memory card to record and transfer recorded data and a camera mount compatible with a GoPro 3-Way extendable handgrip. During data collection in the field, the researcher would use a GoPro 3-Way extendable handgrip to mount the camera and turn on the camera at the agreed start of the recording and switch it off at the end to save the recording. The researcher would ask questions and converse with the participant whilst running and holding the camera. Pretlove, Cox, Sbaffi and Hopfgartner (2020) describe this final experimental process.

3.8.2.2   Research ethics

The participants were central to this research. Interactions with the participants immediately affect the participants and their relationship with the research process. It is a complicated relationship (Plano Clark & Ivankova, 2016, p. 219). Care of the participants and their engagement was crucial to collecting useful, quality data (Corbin & Strauss, 2015, p. 13; Clarke, Friese, & Washburn, 2018, pp. 113-114).

This research conforms to ethical standards for research with human participants (Plano Clark & Ivankova, 2016; Clarke, Friese & Washburn, 2018; Corbin and Strauss, 2015). Before research activities, the researcher sought approval from the University

of Sheffield's Information School Ethics Committee as a single approval covering qualitative data collection. A supplemental ethical approval was granted in April 2020 to collect data through virtual interviews, a change that responded to the global pandemic (see Appendix 1). The researcher collected the participant's personal data under the General Data Protection Regulations (GDPR) and the UK Data Protection Act 2018 (DPA 2018). The research sought informed consent from the study participants in all strands for both methods. The participants were informed of the Codes of Conduct that the researcher is subject to at the University of Sheffield and from the funding organisation White Rose College and the Arts and Humanities (WRoCAH). The researcher provided participants with contact details for redress or complaint.

The researcher also produced pictorial guides with captions of data collection, data storage and levels of anonymity. These visual guides supplemented the standard participant information and consent forms (Appendix 2). The pictorial guide for data collection ensured that the participant was not only fully informed about the data collection process but also ensured that they were comfortable with the process and were made aware of the potential risks encountered in running whilst making a recording. As the researcher was aware that running and making a recording may not be a normal process, the pictorial guides explained the process in a step-by-step way. The guide enabled the participant to understand each step in the recording process, and it also reminded them that they could stop the recording process at any time they wanted to. The guide was a means of visually informing the participant and allowing the researcher to clearly and concisely explain data collection processes through visual prompts to aid mutual participant and researcher understanding.

The researcher produced another pictorial guide to explain how the researcher would transfer and store the participant's audio-visual captured data. The guide helped to ensure compliance with GDPR and fully inform participants about how and where the researcher would store their data for the duration of the doctoral project. It gave them options beyond that, such as depositing the research data into an institutional or national data repository.

The researcher produced a pictorial guide for explaining levels of participant anonymity, depicting three choices of heavy, light and custom levels of anonymity. The

heavy level afforded participants complete anonymity, including a pseudonym of their name and complete masking of their image. Light anonymity meant that the participant was happy to leave their facial identity unmasked, but the researcher would still use a pseudonym. Given these two choices, the final custom option allowed the participant to discuss their preferences for anonymity further, tailoring their anonymity requirements to a comfortable level. Response to such levels resulted in the participants choosing varying levels, including a discussion with some for customised requirements. Whatever the level chosen, the researcher kept all participants informed of any image or data use beyond the purpose of the thesis, such as for presentation and publication purposes. The result of the toolkit pictorial guides would be helpful for other audio-visual research methods to help with the participant's cooperation in the research process. The guides helped make the participants feel less intimidated by the research process. It informed the participants about their participation to the extent that they were very cooperative during data collection, especially the four participants with whom the researcher ran.

The forms and pictorial guides helped inform the research participants of their requirements in the research process and the researcher's obligations towards them. The guides aimed to elicit questions that the participants may have had about the process. The guides ensured that the researcher had discharged their responsibilities considerately and gave the participants as much duty of care as possible. Immediately before data collection, the researcher gave participants a verbal presentation to re-inform them of research procedures, data confidentiality, data security, and data retention. It was also another opportunity for the participants to ask questions about the process.

3.8.2.3   360-degree recording ethics

Visual method data collection is also ethically complex. The ethical code of conduct in wearable cameras (Mok, Cornish, & Tarr, 2015), virtual reality (Mandary & Metzinger, 2016), and immersive technologies in journalism (Sánchez Laws & Utne, 2019) informed this research method. In particular, the researcher considered data collection ethics that includes the perspective of a person when using a 360-degree camera. Mok et al. (2015) have suggested that such recordings should be held ethically accountable:

1. A researcher can achieve ethical accountability by limiting the amount of data captured and the time they keep it.

2. Accountability can improve through the participant's confidence and right to anonymity in the research process through continuous consent engagement during the research context.

3. The participants should be engaged in developing research ethics guidelines. As a part of this, Mok et al. (2015) noted that social researchers often developed methods to satisfy research ethics committee requirements and enable them to do their research.

4. Mok et al. (2015) recommended that research ethics regulations that develop and use wearable recording devices outside of the academy should be made more substantial.

This research has addressed these concerns by limiting the amount of data captured by having short as possible recordings. Unless the participants agreed to further retention of the recorded data or for use in presentations and publications, it was made clear that the research would keep data for the duration of the doctoral project. The deletion of their data at the end of the project addressed data protection concerns. Within the participant information and consent process, the researcher gave the option of customised anonymity alongside very open and very closed anonymity. This customisation engaged the participant with the presentation of their data and consent to its use.

Secondly, the researcher developed pictorial guides to foster accountability between the researcher and the participant. The visual guides demonstrate the participants' rights as a means of engagement and participation in the research ethics process. The guides reinforced asking participants about anonymity levels, despite having agreed consent to the researcher's data use at the project's outset. While this research did not engage participants in developing research ethics guidelines as Mok et al. (2015) recommended in their third point, the use of a 360-degree camera and the developed customised anonymity options have opened up awareness of the rights of the participant. Future research using a 360-degree camera would involve the participants more before data collection to enhance the participatory process and give the participants equal ownership in the data collection process. Mok et al.'s (2015) fourth

point concerned the lack of regulations outside the academy from first-hand perspectives. They noted how recording cameras in public was more socially acceptable to both participants and third parties in the recordings. There was little hesitation amongst the participants in using a camera whilst running within this research. Filming took place in public places within the UK, and the public never challenged the researcher and the participant about the recording. Recordings were done in less populated areas to avoid third parties as much as possible. If the research included any footage or image stills with non-consenting participants, they would be blurred. The researcher would destroy data at the end of the doctoral project to limit non-consenting participant recordings further. However, if participants had agreed to store their footage in a repository, non-consenting participants would be blurred out to retain anonymity.

Mandary and Metzinger (2016) discuss ethical issues of virtual reality from a psychological and philosophy of technology approach. They focus on digitally created virtual realities, essentially where a person can fully interact in a virtual environment by moving their bodies and interacting with other avatars in a virtual reality setting. However, their arguments relate to any reality along the "reality-virtuality continuum" (p .2). They argue for considering novel ethical issues with the broader use of VR and provide recommendations to address such ethical issues. Mandary and Metzinger's (2016) focus is primarily on the participants' psychological states, where a researcher must undertake careful reflection and justification of the use of VR before implementation. They view VR research considerations to consider the traditional participant ethical issue of causing no harm.

The ethical issues Mandary and Metzinger (2016) mention are perhaps applicable to the researchers using VR devices and their relation to their own embodied experience. In particular, VR can cause motion sickness, and a post VR adjustment is needed when leaving the VR viewer (Behr, Nosper, Klimmt, & Hartmann, 2005). The researcher planned to allow the participants to view their recordings in a VR environment. However, Covid-19 restrictions prevented this. For both the researcher and the proposed participant use, VR was a viewing experience only. There was no experimentation with the participants within the virtual world that would have psychological effects on them. However, considering the participants' use would have

to include such disorientating effects. There would also have to be a disclaimer for its use as VR may invoke a reaction such as somebody with undiagnosed epilepsy. In some respects, the researcher risked ill effects on their health, and it was avoided entirely with the participants. This research did not significantly contribute to the use of VR in research because it was only using VR as a 360-degree viewing experience. However, this use has addressed the mitigation of maleficence where a researcher should outline potential health risks when viewing a virtual environment. Participants did not use the VR device, but the researcher found its use to be an intense experience which underscored the potential risk of physical harm to a participant immersed in a VR environment.

Whilst the field of journalism is not related to research, what Sánchez Laws and Utne (2019) discuss concerning the ethical issues of immersive technologies in journalism applies to this research. For Sánchez Laws and Utne (2019), immersive technologies include total immersion of the body. A 360-degree viewing experience would be what they term pseudo-immersive. Sánchez Laws and Utne (2019) reviewed existing ethics in journalism applicable to audio-visual content. Most notable were issues of deliberate image manipulation and how that affects the use of 360-degree recordings to give the audience a possible close representation of the recording without altering images. Sánchez Laws and Utne (2019) are concerned with audiences of immersive journalism and the principle of doing no harm, significantly extending the principle to no psychological harm. Mandary and Metzinger (2016) also saw this and suggested explicitly conveying such risks to audiences. Similarly, Mok et al. (2015) suggest including intended audiences in developing ethical guidelines. As Sánchez Laws and Utne (2019) recommend having communication channels between the audience and the journalist signals responsibility and fosters credibility and trustworthiness in the news source.

Concerning the issue of doing no harm and participant involvement in the process, Mok et al. (2015) and Mandary and Metzinger (2016) have addressed this. In addition to these issues, Sánchez Laws and Utne (2019) raise the difference between immersive and pseudo-immersive technology. They consider 360-degree recordings to be pseudo-immersive, even with VR, because the participant can only move their head to change their view. In this sense, the mind is more engaged than the body's physical

movement, head movement aside. In attending to concerns of image manipulation, it was chosen not to use any additional overlays from the software (Garmin VIRB 360) to hide the stitch point at the bottom of the image. Instead, the researcher reviewed the recordings captured by the device and processed by the software only using augmented reality overlays in a presentation where appropriate and with appropriate notice to the audience.

There are further ethical concerns when using interactive audio-visual technology to collect and review data about participants. In particular, the concern of doing no harm must be explicitly attended to when considering potential psychological effects on the participants. Within this research, such practice was avoided, with the researcher bearing the risk of the VR technology. Using a 360-degree recording device also requires greater cooperation and contribution between the researcher and the participant, discussing where and for how long their data will be stored and exploring and developing how they would like their data anonymised and used in the future. The researcher sought participant consent again when participant data was considered helpful for further research project use, such as presentations. Seeking consent also kept the participant engaged with the project and the use of their data. However, the development and use of the additional pictorial guides aimed to engage the participants in the research process concerning their data rights and demonstrate a duty of care to the participants whilst using an innovative data collection method.

3.8.2.4 *Collecting data with participants*

Data collection could start with the technology guide and ethical approval in place. The researcher first invited participants by email to gauge whether they wanted to participate before sending them participant information packs to inform their consent to engage in the research. Four participants contributed data collected with a 360-degree action camera whilst running. Interviews lasted between 14 and 25 minutes. Participants were interviewed one at a time whilst the researcher asked them questions based on the semi-structured interview guide. The researcher asked questions that addressed the types of information and how they used their running watches or devices; what the devices were that they used; whether they valued any types of information derived from a run, and how they would respond to losing information about their running. The participants chose a familiar route, which

mitigated any potential risks of physical harm to the participant on unfamiliar routes. As described in the data collection preparation above, the final experimental setup was used (Pretlove, Cox, Sbaffi & Hopfgartner, 2020). The recording began at the start of a run and finished at the end of the run. The researcher saved data to a memory card in the camera. The researcher subsequently transferred those data to the University of Sheffield's secure X Drive for analysis and deleted them from the memory card. The researcher also kept a physical fieldwork notebook. The researcher made reflections and notes in these after each data collection activity.

3.8.2.5   Transcription of collected data

From the collected audio-visual data, the words of the participants and the researcher were transcribed in Microsoft Excel first by watching and listening to the recording on a laptop computer. The researcher transcribed verbatim (Heath, Hindmarsh, & Luff, 2010), enabling the researcher to begin further analysis and reflection upon the data collected. The researcher transcribed audio-visual materials further for salient participant actions related to the running and types of information in subsequent rounds of transcription, engaging with the audio-visual data using a virtual reality headset.

3.8.2.6   Virtual reality immersion into the data

The virtual reality (VR) headset, an Oculus Go, was used to interactively observe the researcher, the participant, their interaction with elements in the situation, and any notable events in the recording. The positive use of the virtual reality headset was that it could convey a first-person forward view, immersing the researcher back into the data collection experience closer than watching audio-visual data on a laptop computer screen. The researcher could pause the video and view a particular moment of the recording to explore all possibilities of the situation, interactively as if they were back in the situation to develop transcription. The purpose and relevance of this interactivity to the research was to primarily view an observation that the researcher may have missed during the run whilst collecting data. Using a conventional 180 camera, the researcher may have missed actions that the participant made or references to an object in the environment. Using a 360-degree camera capture enabled such actions and references to be reviewed. Using the VR headset can only be enabled through 360-degree capture, allowing for a more interactive review of the

environment. Such a viewing with a 360-degree camera allowed for a greater contextual understanding of a particular action in the research. The viewing gave a greater understanding of context and an ability to observe the participant and the researcher from a third-person perspective which would not have been possible from the single data collection experience relying upon audio-only recording and field notes. Using a VR enables further development of the *abductive* process. The researcher can intuitively and naturally observe a recording to reflect upon and consider new analytical possibilities they may have missed in early viewings.

The vast amount of potential analytical possibilities every split second of recording can offer is a drawback to such a tool, presenting a risk of diverting from addressing the original research problem. To counteract this possibility, the researcher referred to the research questions to maintain the focus of the inquiry. VR headsets also pose health and safety risks in that they can only be used for a maximum of thirty minutes and can cause motion sickness.

Alongside transcriptions, the VR headset was used during *abductive* analysis to test and confirm development to refer back to the situation of the audio-visual data after notable analytical developments. The researcher found the VR headset complementary to written transcripts in generating rich, deep interpretations of the collected data.

3.8.2.7   Coding the data

The researcher wrote initial codes against each transcription line using Microsoft Excel as manual coding. Codes were generated line by line in Microsoft Excel, where the researcher interpreted them using the tools of the *grounded theory method* to question the content. The researcher developed and reflected on codes generated from the first recording into an early code set. These code sets were used and iteratively developed with subsequent transcriptions.

The researcher developed codes in Inspiration 9.2.3 IE software (Figure 18).
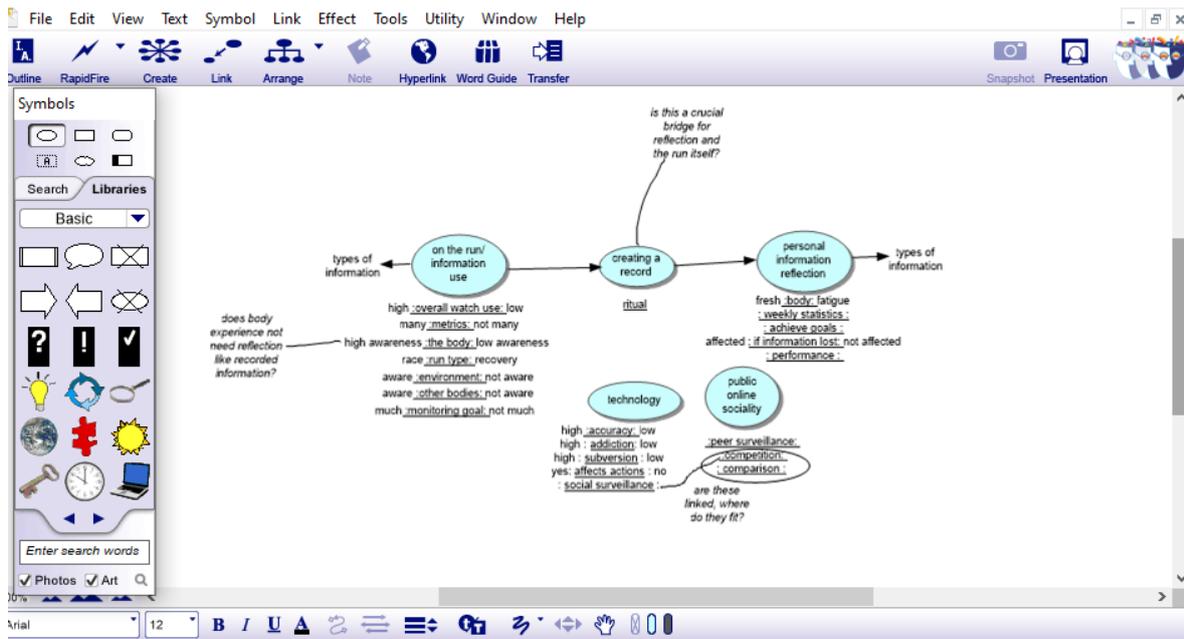
Figure 18: *A screenshot of Inspiration 9.2.3 IE software.*

The Inspiration software was interactive. Codes could be moved around on the screen, and relationships can be attached to them through arrowed lines. The lines move with the word used to represent an object in reality. The codes were plotted on the page and then considered using analytical *grounded theory* methods, providing an enhanced understanding of the codes which led to the development of the codes into higher-level concepts. Throughout these analytical processes, the researcher made memos of such analytical developments.

There was more time spent on analysing the data of the first two participants using the constant comparison method (Corbin and Strauss, 2015) when compared to the following two participants after that. The considerable amount of time spent provided a solid basis for understanding and interpreting subsequent data. With the third and fourth participants in Group 1, whom the researcher sampled as club runners, their responses and observations were not uncovering any new insights.

3.8.2.8   Code integration

At the end of the data collection and analysis of the fourth participant, the researcher attempted a conceptual integration (Corbin & Strauss, 2015) by writing up memos to further analysis. The researcher developed codes into concepts and categories above them, which first integrated the data into a conceptual and categorical understanding that addressed the research questions. After this integration, the researcher revised

the analysis through abstract situational maps and relational analysis techniques. This integration and shift toward *situational analysis* methods signalled the end of the first phase of the research activity.

3.8.2.9   *Writing up as an analytical process*

Iterative writing up at this stage consisted of reflective memos based upon each analytical session. Where there were analytical developments and changes, the researcher made reflective memos. The memos developed the analysis to understand what was emerging from the data and what insights the researcher could draw from them. The reflective memos allowed for the first development of integration, resulting in the deep integration of the codes into five categories and their concepts. The findings (Chapter 4) present these categories and concepts. The reflective memos and diagrams also charted early *grounded theory* analysis development towards *situational analysis* methods.

3.8.3   Phase 2: away from a run situation with Group 1

This section describes the second phase of the research activity. It will describe the preparation to collect data through virtual interviews, the second round of data collection with the four participants of Group 1, transcription and analysis. As in Phase 1, research activities overlapped each other.

Appendix 6 provides an overview of the continuing overlapping nature of data collection and analytical activities in Phase 2. It details the date and description of a particular event and the participant, including the researcher, related to it. It also includes a key for an overview diagram depicting the overlapping nature of the research activities. It does not include preparation tasks.

The early period of Phase 2 continued the iterative writing up of the emerging analysis and the analysis itself. A new round of data collection with the four Group 1 participants further enhanced this analysis. Analytical development and reflectivity largely dominated Phase 2. The period of reflection, which included a consideration of the underlying philosophies of Clarke et al.'s (2018) *situational analysis*, led to an ultimate methodological change to amend *situational analysis* with *neo-assemblage theory analysis* mapping. This change led to a renewed period of analysis using both

situational analysis and *neo-assemblage theory analysis* mapping, which resulted in the writing up of Phase 1 and Phase 2 data analysis.

The following sections will describe preparations to collect data through virtual methods, data collection itself and subsequent analytical methods.

3.8.3.1 Interview preparation

The researcher sought supplemental ethical approval from the University of Sheffield's Information School Ethics Committee to adapt research data collection to virtual methods. The researcher changed this method because of the suspension of face-to-face research activities due to the coronavirus pandemic. Technical procedures based upon trialled methods for the second data collection phase were adapted to record virtual, online meetings. The virtual meetings replaced planned data collection that would use a dual recording of a 360-degree camera and screen recording where appropriate. The planned data collection was within people's homes or alternative venues where they interacted with types of running information away from a run.

The researcher reviewed Phase 1 recordings and analysis to direct questions and produced revised semi-structured interview guides for Phase 2. The researcher based the interview guide upon reflections and conceptual directions derived from the analysis of data collected with the mobile method. The interview guide also included questions about their running during the coronavirus pandemic and restrictions (Appendix 4).

The researcher also considered a second data collection method using online interviews, with participant observation and participation concerns. The researcher emphasised a loose, semi-structured interview approach when using online recording tools. During the Covid-19 pandemic, video calling online was becoming a socially acceptable way to conduct conversations with people outside of their households (Howlett, 2021). Therefore, interview questions remind the participants of the researcher's visibility over the otherwise participatory nature of the recordings. At the time of data collection, online meetings became a social norm for the participants. The interview medium through an online tool (GoogleMeet) was less observational and more for participation as a part of conducting a loosely structured interview. However, virtual meetings reduced the participatory nature, and researcher visibility increased

compared to the first method, as illustrated in Figure 19. The researcher characterises this method as participatory with higher researcher visibility.
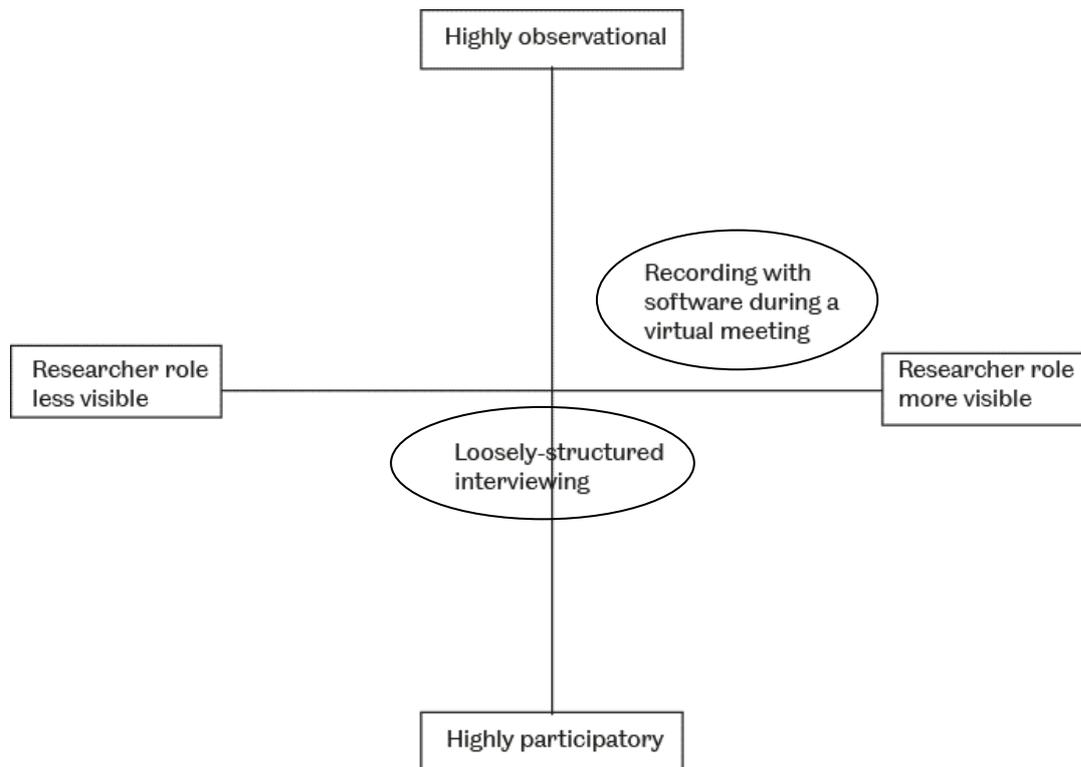
Figure 19: *Illustration of the observational and participatory character of the second data collection method.*

3.8.3.2 Performing the interviews

There were four virtual interviews with the four Group 1 participants from whom the researcher collected data in the information on a run situation. The virtual interviews kept the data collection process going instead of having an unintended hiatus due to uncertainty caused by the coronavirus pandemic.

Interviews lasted between 26 and 39 minutes. Data collection was conducted through virtual interviews using GoogleMeet through the University of Sheffield's contracted service agreement with Google. The interviews were recorded through OBS Studio open-source software and saved as .mp4 files. The researcher saved the .mp4 files to the University of Sheffield's secure X drive for storage and analysis. Participants used a screen sharing facility to share their online running records. They also shared information referred to in the interviews through email as links to online running records or copies of their offline records.

Unlike the first data collection method, there is nothing innovative to report. The researcher based the method on an acknowledged interview procedure using online technology (Deakin & Wakefield, 2014; Howlett, 2021; Johnson, Scheitle, & Ecklund, 2019; Sullivan, 2012). The researcher did not intend for virtual interviews as the first preference for the second tranche of data collection. There are questions concerning the validity and quality of virtual interviews, which Howlett (2021) addresses. The interview quality is not the same because virtual interview curtails the intended highly participatory nature of the data collection through interacting with the participant's sources of information. Therefore, the researcher could not discover potential avenues of questions and observations. However, virtual interviews were the only option to continue collecting data because of the suspension of face-to-face data collection. As Howlett (2021) has described, virtual interviews have advantages in that participants can be more relaxed in their setting, thus decreasing the researcher's visibility during the interview.

3.8.3.3   Transcription

Verbatim transcription in Microsoft Excel was used in Phase 2 to record the participants' verbal responses. Compared to the immersive, multimedia transcription in Phase 1, verbatim transcription was simpler and relatively faster, resulting in faster transcription, which could be quickly made available for analysis.

During the data collection and transcription process, it became apparent that no new main ideas were developing. The collected data seemed to contribute depth to the emerging concepts.

3.8.3.4   Situational analysis and neo-assemblage theory analysis

Analysis of the transcriptions and review recordings from Phase 2 and the transcriptions and immersive virtual reality (VR) data from Phase 1 continued throughout Phase 2 as a part of the *abductive* analysis. During this phase, a philosophical reconsideration affected the analytical method. The philosophical reconsideration remained with *situational analysis* but developed the *neo-assemblage theory analysis* visual method. In particular, it was the potency of the messy and relational maps in *situational analysis* that developed the *neo-assemblage theory analysis* maps. These experimental maps better described and analysed the

complexity of the situations, axial dimensions, relationships, and their effects upon each of the elements or entities mapped in the situation. The *grounded theory method*, messy abstract situational maps, and relational maps for analysis formed the first development of the *neo-assemblage theory analysis* diagrams.

After the philosophical reconsideration in early July 2020, it was time to begin developing positional maps for analysis to move the *abductive* process from being more grounded in the data toward slightly more abstract ideas. The researcher recorded all analytical developments in written memos and diagrammatic memos.

3.8.3.5 Iterative writing up

Iterative writing up from Phase 1 continued during the first part of Phase 2. Writing up stopped soon after data were collected from the four Group 1 participants to concentrate upon conceptual development and a philosophical reflection that developed *neo-assemblage theory analysis*. Analytical writing up recommenced on 5th August until 17th August when the researcher planned to collect data for Phase 3 with a new group of participants.

3.8.4 Phase 3: second away from a run situation with Group 2

This section describes the third phase of the research activity. It will describe the preparation to collect data through virtual interviews with a new group of participants called Group 2, the third phase of data collection with Group 2 participants, transcription and analysis. As in Phases 1 and 2, research activities continued to overlap. Appendix 6 provides an overview of the tasks in Phase 3 except preparation tasks and a visual overview of the continuing overlapping nature of data collection and analytical activities. The researcher collected data with the first of the four Group 2 participants in mid-August. However, data was not transcribed and analysed until October because even with a new diversely sampled participant, the participant did not reveal any new insights developed through Group 1 participants. As a result, the researcher wrote up Phases 1 and 2 into a draft findings chapter. When data collection resumed in late October with the remaining three participants in Group 3, data collection, analysis through *situational analysis*, *neo-assemblage theory analysis* and writing up became a constantly iterative, comparative, *abductive* process.

The following sections will describe preparations to collect data through virtual data collection methods and subsequent analysis.

3.8.4.1 Preparing for the interviews

Once the researcher had recruited new participants, they were approached by email to confirm their interest and sent the participant information pack for their informed consent. The participant information packs were revised to reflect only the virtual, online nature of the data collection.

As a result of *abductive situational analysis* and *neo-assemblage theory analysis* of the data from the first four participants in Phases 1 and 2, the researcher asked questions related to emerging analytical findings. The semi-structured interview guide was also adapted to ask participants to describe a regular or preferred running route. This adaptation was an alternative because going for a run with participants was a face-to-face research activity that remained suspended due to Covid-19. Whilst a semi-structured interview was conducted, the researcher also departed from the interview guide where new or deeper lines of inquiry were perceived. The researcher could depart from the interview guide because they had a much firmer grasp and understanding of the subject based on preceding analytical work.

3.8.4.2 Performing the interviews

There were four virtual interviews with the four Group 2 participants. Interviews lasted between 31 and 38 minutes. The method and its justification are the same as described for Phase 2 (3.8.3.2).

3.8.4.3 Transcription

The transcription method and justification were the same as described in Phase 2 (3.8.3.3), with transcription produced in Microsoft Excel.

3.8.4.4 Analysis

During the third phase of the data collection and transcription process, it remained apparent that there were no further developments through *situational analysis* tools of messy maps, relational analysis and social world/arena maps. The *situational analysis* developed the plotting of positional maps that began at the end of Phase 2. The positional maps aided understanding of the main issues of the research situation, as understood from messy and relational mapping.

New and speculative analytical possibilities emerged from *neo-assemblage theory analysis* mapping concerning causality, ideas surrounding stability and instability and the situations themselves.

3.8.4.5   Writing up as an analytical process

The researcher continued recording and reflecting on analytical development in memos. New data collection and subsequent analysis developed the findings chapters. The new participant data enriched existing findings, suggesting that perhaps an understanding of the types, uses, and value of information in running activities cuts across a range of participants. The analytical process had to be left to produce findings (Chapters 4, 5, 6 and 7) and to begin the final stage of the research project to consider the implication of the findings with existing scholarship (Chapter 8) and the conclusions (Chapter 9) of the research.

3.8.5   Problems encountered

This section describes problems in the research process and how the researcher overcomes them.

3.8.5.1   Data collection method change

It cannot be ignored that the coronavirus pandemic introduced unplanned changes in data collection methods. The scheduled participant recordings with the 360-degree camera were cancelled after 16th March 2020 due to moves towards social distancing requirements. The first four participants, whom the researcher deliberately sampled as club runners to open up the data from a shared experience of the research, were the only recordings made but it afforded an opportunity to deeply analyse the data. The cessation of face-to-face data collection did present an opportunity to critically re-appraise the research methodology and develop a novel analysis method (see 3.3 and 3.5).

The final four participants recruited were people that ran but were not members of clubs. The researcher made no running recordings of these participants. Instead, the researcher changed the data collection method from a run to a virtual meeting interview, with renewed ethical approval. The researcher asked the participants to recall and describe a familiar, regular run of theirs to address the problem of replacing the run. This was the best way that data could be collected during social movement

restrictions that could be compared against the first four participants. It was also an opportunity to try data collection through virtual methods which had not been previously planned and attracted participants from wider parts of the UK.

3.8.5.2   Data collection failure

During a recording with one participant in extreme weather conditions, the camera battery failed due to temperature extremities in extreme weather (Storm Jorge on 1st March 2020). The camera captured only eight minutes of footage, and the wind severely drowned out the audio. The researcher only noticed battery failure when the running interview finished. As a part of a note-taking process, the researcher made field notes after the recordings and made an extensive note of the recording that captured what the participant said in this case. The researcher also made notes of salient movements during the run to overcome this failure.

Concerning the poor sound recording, the audio captured was cleaned and edited with sound editing software (Audacity) to transcribe the participant's words. The researcher took a spare battery for the next recording and paid more attention to the device's power light. The researcher recommends further recordings using a lavaliere microphone to capture the participant's audio, although this may detract from the experience of the run.

3.9   Research quality

Within information behaviour, Case and Given (2016) suggest that *grounded theory* methods are somewhat limited in their transferability because it "is difficult to achieve when one is studying people or their creations" (p. 225). A rigorous process through ensuring that the data quality and analyses "are the best they can be" (p. 226) creates trustworthiness. However, they contradict the limits of transferability. They state that "in qualitative studies, elements of trustworthiness are necessary to ensure the transferability of results" (p. 226). They suggest that perhaps *grounded theory* does not have transferability when people and their experiences are under examination. This research accepts this as a potential limitation. However, the limitation of transferability is also considered a strength. The research concerns the participants. It is grounded in their data and the situation. However, this questions the trustworthiness of *grounded theory* derived research. The researcher will consider

mixed methods research (the original design of this study), *grounded theory* methods, and *situational analysis* to examine what constitutes trustworthiness and credibility in other research methodologies.

Corbin and Strauss draw on Flick's observation that the assessment of "qualitative research has not yet been solved" (Flick, 2002, p. 218 cited in Corbin & Strauss, 2015, p. 341). Corbin and Strauss discuss validity, rigour, truthfulness, goodness and integrity. (Corbin & Strauss, 2015, p. 341). A discussion of the properties of quality (p. 346-7) is "research that resonates with readers' and participants' life experiences" (p. 347). Corbin and Strauss offer a more comprehensive view of quality that does not just consider methodological concerns such as consistency (p. 347), awareness of potential methodological criticism (p. 349) and a clear research purpose (p. 348). They also draw upon the researcher's personal qualities, such as the drive to do research, work ethic and creativity (p. 349).

There is nothing explicit about research quality within Clarke, Friese and Washburn's (2018) *situational analysis*. However, the theory/methods package itself is very clear about the role of the researcher as a part of the situation under examination. Clarke et al. (2018) reject the researcher as a *tabula rasa* in their life experience, knowledge before a literature review and theoretical approaches (pp. 35-37). An acknowledged contribution within the research analysis (p. 107) should include the researcher. Clarke et al. suggest that a clear exposition and explanation of the research theory and the intended methods builds trustworthiness and credibility into the research design.

Mixed methods research (Plano Clark & Ivankova, 2016) sees trustworthiness in qualitative elements achieved through credibility (p. 167). Outlining a qualitative process that allows scrutiny and demonstrates rigour should foster trustworthiness in the research (pp. 166-167). There is an issue of a duty of care to the participants, too, related to their consent wishes and confidentiality when it is impossible to share or examine the original data collected due to privacy wishes. However, through memos and diaries, the process can be scrutinised, adding an element of dependability to the research.

3.10 Summary

This chapter has provided a detailed account of the researcher's philosophical viewpoint development during this research project. The pragmatism of Rorty (1982) and the symbolic interactionism of Rock (1979) were the researcher's initial beliefs. The researcher's beliefs developed further into postmodernism and poststructuralism. The researcher then considered the concept of the assemblage, first through Deleuze and Guattari (1988) and then DeLanda (2006, 2016). This development informed the research methodology, which began as mixed method research before developing into Clarke et al.'s (2018) *situational analysis* from an initial implementation of Corbin and Strauss' (2015) *grounded theory method*. A novel *neo-assemblage theory* mapping method further implemented a *situational analysis* that sought to understand the complexities of a given, constitutive situation. This chapter describes the justification of using the *grounded theory method*, the move towards *situational analysis* and the development of *neo-assemblage theory analysis*. The chapter also describes the methods undertaken from the *grounded theory method*, *situational analysis* and *neo-assemblage theory analysis*.

The research design describes three phases of research. Each phase broadly collected data and *abductively* analysed the resulting transcribed data. The analytical tools worked towards an iterative writing up as an additional part of the analysis. The researcher described and justified the resulting research design from ethical and practical perspectives of data collection. There were two data collection methods. The first method in Phase 1 was an innovative mobile data collection method that used a 360-degree camera. This method captured responses to the researcher's question and a means to engage with issues of participant observation and researcher visibility. The first phase changed from the *grounded theory method* to *situational analysis*. The second data collection method was a pragmatic response to the Covid-19 pandemic, where virtual interviews were the means of continuing data collection used in Phases 2 and 3 of the research. The end of the second research phase saw another methodological change with developing and implementing a novel *neo-assemblage theory analysis*.

The chapter concluded with a short consideration of problems encountered in the research and issues concerning research quality in an interpretive, postmodern and

poststructural research paradigm. The following four chapters will present the findings of the data analysis.

Chapter 4: Foundational analytical findings

4.1 Introduction

The following four chapters present the analytical findings ordered to reflect the stages of the development of the analysis. This chapter (Chapter 4) presents early conceptual development using *grounded theory* and *situational analysis* methods. Specific *situational analysis* methods are abstract maps, social world/arena maps and relational analysis maps. Chapter 5 will present descriptive findings based upon early conceptual development described in the present chapter, and Chapter 6 will provide a higher level of analytical abstraction, presenting eight positional maps. These maps examine the concepts found in the participants' data and illustrate potential areas for new lines of inquiry. Chapter 7 presents a *neo-assemblage theory analysis.* This method is a complementary mode of analysis based on the research data. It maps the components and assemblages in the research situation and offers an analytical method of how assemblages and their components work in both observed and speculative situations. The four findings chapters combine to provide a renewed engagement with relevant literature in the discussion chapter (Chapter 8). Each chapter's introduction will also show how they contribute to the discussion.

This chapter will present analytical development to demonstrate how the resulting focus of the descriptive and analytical findings was determined based on data collected from the 360-degree camera and virtual interview methods. The analytical work described in this chapter does not directly contribute to the discussion chapter. It provides a foundation for the analytical direction, predominantly through abstract and relational mapping, presented in Chapter 5.

4.2 Early conceptual development

The researcher iteratively mapped coding and recorded memos as the initial concepts and categories developed in the *grounded theory method*. At the end of data collection from the first four participants – curtailed due to the suspension of face-to-face data collection due to the coronavirus pandemic – early category and concept development resulted in five main categories with various concepts, including axial concepts within

them (Table 6 and Figure 20). This early development helped the researcher understand the critical ideas grounded in the overall research situation, which formed the basis for further *situational analysis*.

Category	Concept
The runner	Type of embodied information
	Using information
	Expressing emotion
	Understanding technologies
	Personal reason for running
	Type of information value
Participating in society	Interacting with others
	Running social constructions
Being within a physical environment	Type of environmental information
	Visual type of information
	Aural type of information
Category (continued)	Concept (continued)
	Haptic type of information
Incorporating technology	Type of technology
	Using technology
Incorporating represented information	Type of represented information
	Using represented information

Table 6: *Summary table of categories and concepts.*
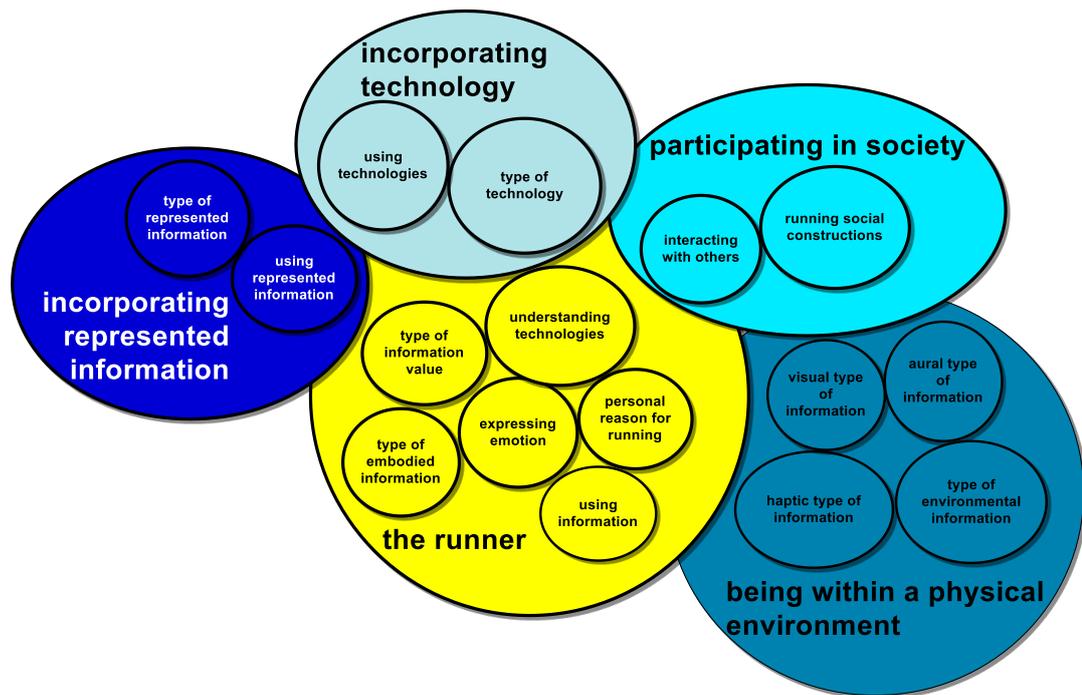
Figure 20: *Overview of the category and concept framework.*

Whilst this reporting of the conceptual development is short, the depth and output of reflective memos demonstrate immersion into the research data until the researcher established five category areas:

- the person running;
- their embodied information;
- their device technology which affords represented information;
- environmental information in which the run is taking place and;
- the surrounding society in which the person running situates themselves and understands the world around them.

4.3   Abstract situational mapping

Figure 21 presents the last iteration of the abstract situational messy map.
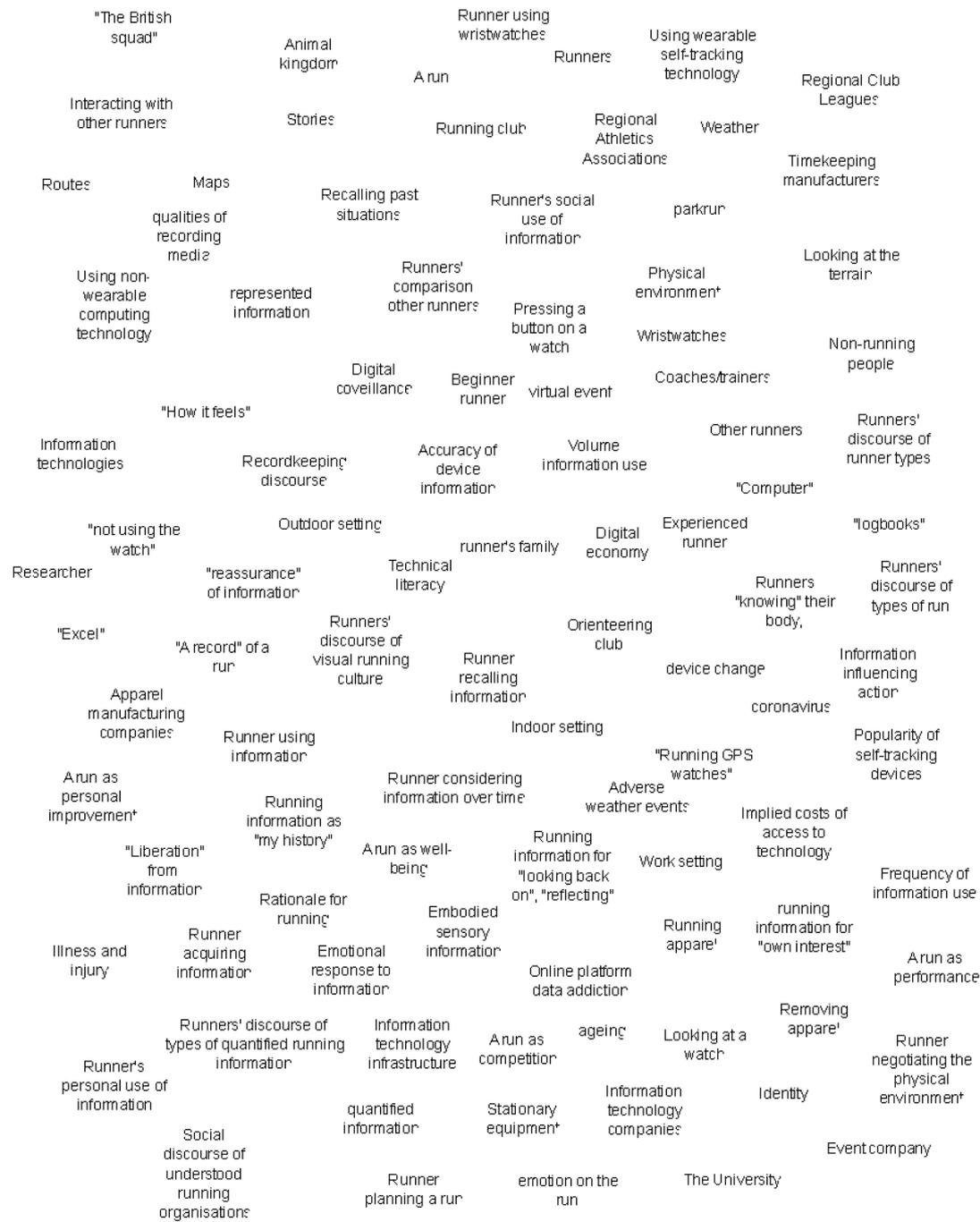
Figure 21: *Abstract situational messy map of the research situation*

The ordered abstract map is presented below in Table 7. The researcher has grouped the elements according to Clarke et al.'s (2018) suggested headings for ordered abstract maps. The researcher has added headings of *information use elements* and *events* as Clarke et al. allows modifications to the template to suit specific research projects (p. 130). This ordered abstract map is a highly subjective ordering. The researcher bases the ordering on the elements in the messy abstract map. The

researcher has developed the groupings of the elements following Clarke et al.'s (2018) method for ordered abstract maps.

Individual human elements/actors	Nonhuman elements/actors
Researcher	A run
Runners	"A record" of a run
	Quantified information
	Information technologies
	Stationary equipment
	Running apparel
	Weather
	Animal kingdom
	Represented information
	Virtual event
	Coronavirus
	Wristwatches
	Maps
	"Running GPS watches"
Referred collective human elements/actors	**Implicated/silent human actors/actants**
Running club	Coaches/trainers
Information technology companies	Other runners
Orienteering club	Non-running people
"The British Squad"	Information technology infrastructure
Regional Athletics Associations	The University
Parkrun	Apparel manufacturing companies
Regional Club Leagues	
Timekeeping manufacturers	
Event company	
Runner's family	

Discursive constructions of individual and/or collective human actors	Discursive construction of nonhuman actants
Runners' discourse of runner types	Runners' discourse of types of run
Illness and injury	Runners' discourse of types of quantified running information
"How it feels"	"Reassurance" of information
Runners "knowing" their body	A run as competition
Runner's discourse of visual running culture	A run as personal improvement
Social discourse of understood running organisations	A run as performance
Beginner runner	A run as well-being
Experienced runner	Running information as "my history"
Emotion on the run	"Computer"
Ageing	"Excel"
	"logbooks"
	Running information for "looking back on", "reflecting"
	"not using the watch"
	Running information for "own interest"
	"Liberation" from information
	Routes
	Qualities of recording media
Political/economic elements	**Sociocultural/symbolic elements**
Implied costs of access to technology	Identity
Digital economy	Popularity of self-tracking devices
Technical literacy	Stories
Device change	Digital coveillance
	Interacting with other runners

Temporal elements	Spatial elements
Recalling past situations	Outdoor setting
Runner planning a run	Indoor setting
	Work setting
	Physical environment
Major issues/debates (usually contested)	**Related discourses (historical, narrative, and/or visual)**
Emotional response to information	Recordkeeping discourse
Rationale for running	
Runner's personal use of information	
Runner's social use of information	
Frequency of information use	
Volume of information use	
Accuracy of device information	
Information influencing action	
Online platform data addiction	
Information use elements	**Events**
Runner using information	Removing apparel
Runner using wearable self-tracking technology	Looking at a watch
Runner using non-wearable technology	Looking at the terrain
Embodied sensory information	Adverse weather events
Runner negotiating the environment	Pressing a button on a watch
Runner's consideration of information over time	
Runner recalling information	
Runner's comparison with other runners	
Runner acquiring information	
Runner using wristwatches	

Table 7: Abstract situational ordered map based on participant data collection

Both messy and ordered abstract maps provide an overall picture of the enquiry situation. They show the complexity, breadth and depth of the situation. These overall maps intend to demonstrate the multiple potential directions that the research situation can take in line with the multifaceted nature of a *situational analysis*.

The maps portray a general sense of the situation of this inquiry lies with the idea of a runner as the critical human actant. Information of varying senses is the crucial non-human actant in the situation, and other non-humans seem to be related to the core idea of information. There is also a solid social, discursive element centred on certain discourses in running activity. These discourses relate to how the actants use terms to understand information derived from their body and how they understand the information in running activities and the enabling technology. The elements in information use combine both the representative and embodied information used in running activities. Specific events are related to these uses as notable observations found during a run that describe the participant's use of devices or their environment.

4.4   Social worlds/arena mapping

4.4.1   The running arena context

Figure 22 presents the running arena as the site of study understood from participant data.
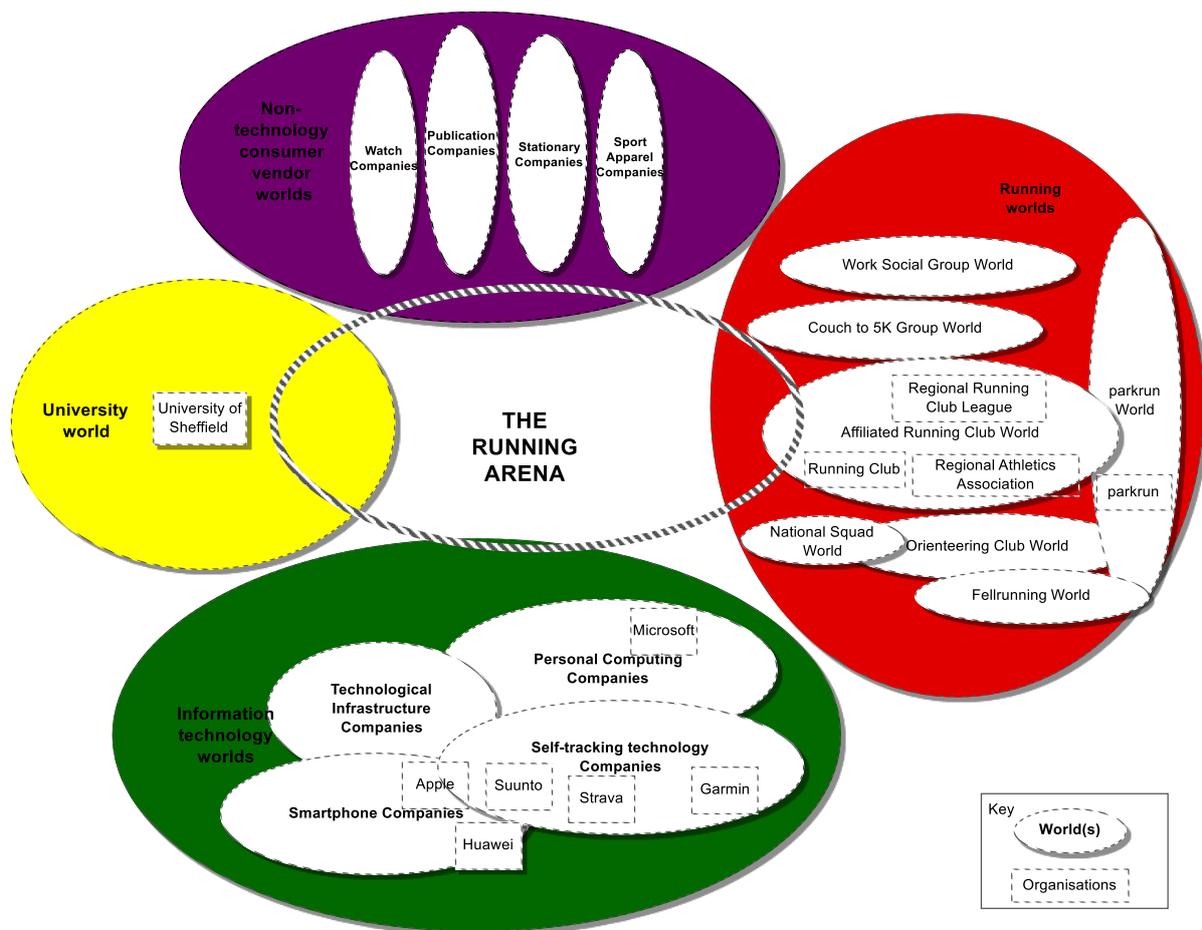
Figure 22: *The running arena with four social worlds of the running world, information technology world, non-technology consumer vendor world, the University world and each of their sub-worlds abducted in the research project.*

The running arena consists of the University world, the non-technology consumer vendor worlds, information technology worlds and running worlds. The diagram is not definitive because it is something that the researcher can develop beyond this research project as pragmatic usefulness. The diagram intends to present a representation of the worlds that seem to appear in the running arena of this research situation. The sections below will describe each world based on each world map.

4.4.2   Running worlds

The running world seen in the research contains complex, interrelated sub-worlds that seem to have their own cultures and often related organisations. The mapping is not exhaustive, merely an illustration to demonstrate the worlds mentioned and implied by the participants through *abduction*. The parkrun world contains parkrun as an organisation and a social world. The affiliated running club world also includes

links to more organisations related to competition and the clubs themselves. Those in one running world can also be members of other running worlds; they are not mutually exclusive, hence the use of dotted lines to represent porosity and the overlapping of the social worlds rather than a distinct boundary.

4.4.3   Information technology world

The information technology world seen in the research refers to Companies as sub-worlds. There are the Personal Computing Companies as personified by Microsoft, who provide personal computing hardware and software (such as Excel) and yet unidentified computing companies that provide tablets. These companies also blur the idea of self-tracking technology companies that primarily represent the wearable device market and online software platforms. These companies are also smartphone companies that provide the hardware to host self-tracking software and contain components to track individuals' activity. The technological infrastructure companies provide infrastructures, such as server storage capacity and telecommunications, like data networks and fibre optic data cabling.

4.4.4   University world

The running world arena map represented the university world as a minor concern through the University of Sheffield. The university is included in the running world arena because the researcher interacted with the participants from running social worlds during the research situation.

4.4.5   Non-technology consumer vendor world

Non-technology consumer vendor world relates to Companies as sub-worlds that provide consumer products related to running and information in running activity. The organisations have not been portrayed as overlapping because they are not understood to have close relationships. However, just because they appear within the loose boundary of the non-technology consumer vendor world does not exclude this possibility. The watch companies represent those that manufacture wristwatches that do not contain digital displays but rely on mechanical movements. The publication companies relate to those that publish materials such as physical maps and perhaps books or magazines related to running. Stationary companies relate to those that produce materials for participants to write with and record their running information

if they are using analogue materials. The sport apparel companies provide goods that also provide information for visual discourses related to running through clothing and footwear.

These sub-worlds were a surprise in the running arena that was not at first thought to be relevant to the enquiry situation. However, there would not be running information recorded by hand in diaries and logbooks without these companies in the running arena. There would not be information sources to consult, clothes and trainers, or wristwatches to wear to acknowledge the run time. All of these inform social discourse and information used in the running world.

4.4.6   Limitations of the social arena/world map

It is a reasonable assertion that the map is incomplete and underdeveloped as it acts as a primary instrument to explain the locus of the research. It is not an instrument for further analytical thought into types of information use and perceived values in running activity. However, its usefulness may become more apparent through future development of the research's substantive findings. The researcher is aware that the social arena/world map does pose some interesting questions and further avenues of thought. These include, but are not limited to:

- what other running social worlds are there?
- can the running social world map be expanded?
- what are the similarities and differences between the running social worlds?
- are running worlds connected to any other worlds?
- should this be the running arena instead of world?
- could 'information technology worlds' be considered an arena in its own right?
- what else could appear in the information technology worlds or arena?
- are the information technology worlds interlinked through their products and services greater than suggested here?
- could the non-technology consumer vendor worlds contain more worlds, or is this another arena in its own right?
- could this map uncover a broader connection of social arenas not connected to the boundary object of running information?

These questions provide insight into potential directions and future developments. However exciting new lines of inquiry could be, the researcher focussed on the types and uses of information in running activity within this research. From the list of questions above, the sociological question of similarities and differences between running social worlds in understanding types of information in running and their use of it is of interest to this research.

4.5   Relational analysis

Using the abstract situational messy map, the researcher conducted a relational analysis of each element. This process first produced 88 relational analysis maps (Appendix 5). Relational mapping centres on a single element and considers the relationships with other elements on the messy map (Clarke, Friese, & Washburn, 2018, pp. 138-141). This deep consideration of the critical relationships between the concepts revealed the research focus grounded in the data. During the relational analysis mapping, there seemed to be a recurring relational pattern.

Elements were related to how participants perceived themselves within a running social world, linked to their rationale for running. These related elements about a person running informed the frequency and volume of information use. These frequencies and volumes relate to the run's elements, planning and reflection. Relationships were drawn between the types and use of embodied information and represented information connected to both personal and social uses of information. It seemed that the person who wanted to run and their corresponding running rationales at a particular time determined information use related to influencing their running actions.

After making minor changes to the abstract situational messy map to consolidate elements that seemed to represent similar elements, the researcher redrew a relational map to show the complexity of the situation of a runner using information. The elements related to a runner using information resulted in a smaller situational messy map presented in Figure 23 to further relational analyses.

Interacting with
other runners

Stories

A run

Runners

Running
information as
"my history"

Routes

Maps

Recalling past
situations

Runner's social
use of
information

Looking at the
terrain

Physical
environment

represented
information

Runners'
comparison
other runners

Volume
information use

Runners'
discourse of
runner types

"How it feels"

Other runners

Runner
planning a run

Accuracy of
device
information

"logbooks"

"reassurance"
of information

Outdoor setting

Frequency of
information use

Runners'
discourse of
types of run

Runner
recalling
information

Runners
"knowing" their
body,

"Excel"

"A record" of a
run

Runners'
discourse of
visual running
culture

Indoor setting

A run as
personal
improvement

Rationale for
running

Runner considering
information over time

A run as
performance

Information
influencing
action

A run as well-
being

Work setting

Runner
acquiring
information

"Liberation"
from
information

Embodied
sensory
information

running
information for
"own interest"

Emotional
response to
information

Runners' discourse of types
of quantified running
information

A run as
competitor

Running
information for
"looking back
on", "reflecting"

Identity

Runner
negotiating the
physical
environment

Runner's
personal use of
information

quantified
information

Figure 23: *Abridged abstract situational messy map based upon a relational analysis of a runner using information.*

From this abridged messy map, relational analysis was performed on the element of a run to understand its relationship with information in a run situation. Also of interest were the elements of reflecting upon running information as well as planning a run. Whilst the same abstract situational messy maps were used, Clarke et al. (2018) liken the focussing on different elements in the map to turning a "kaleidoscope" on the situation under analysis: the same elements are there, but they may result in different

views of the situation (p. 144). Figure 24 and Figure 25 present the focussed relational analyses from the different views of a run, reflecting and planning.
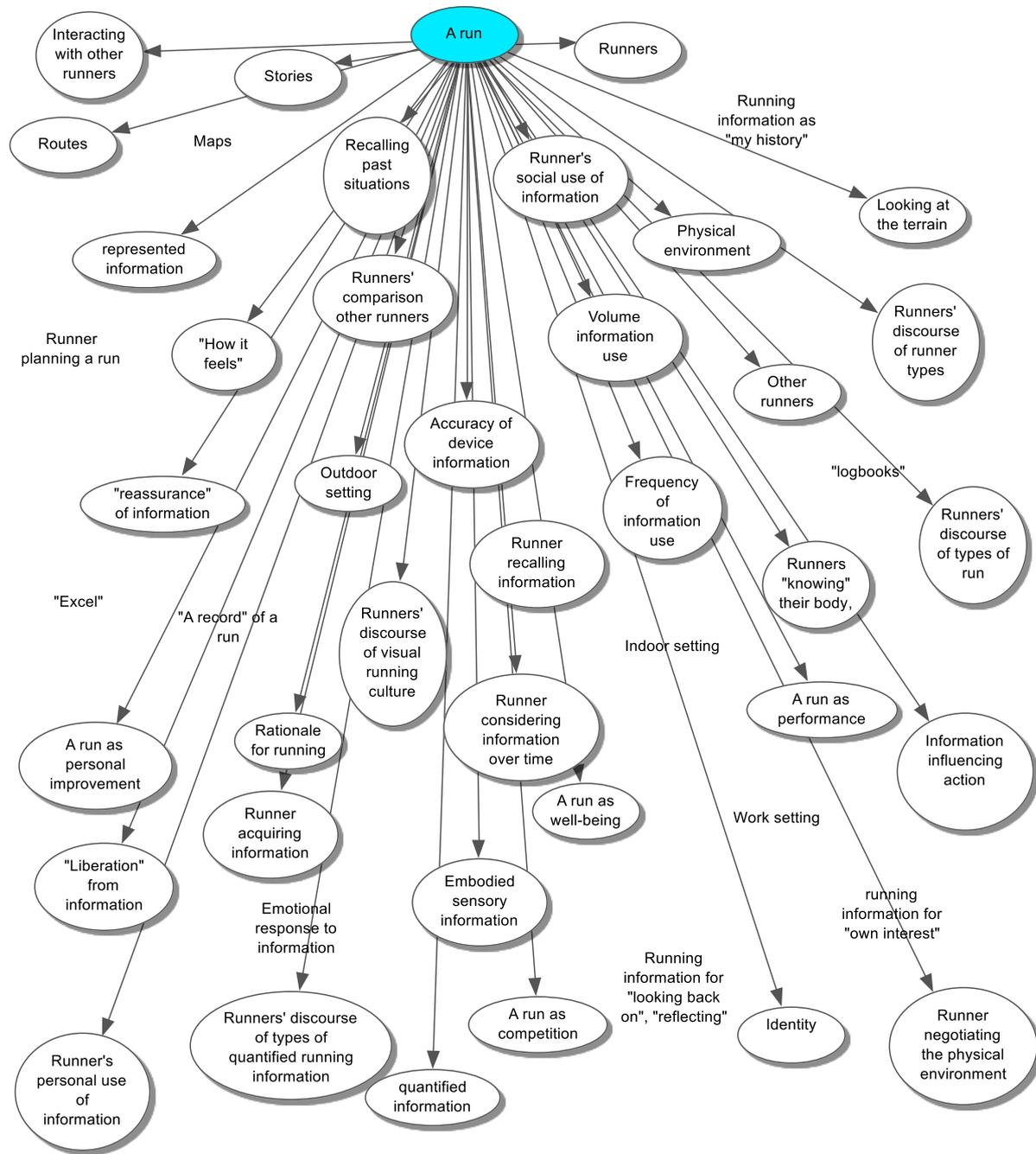
Figure 24: *Relational analysis of a run based upon runner using information situational map. The map analysis centres upon a run. The arrows connect to an element that is related to a run in the messy map. The researcher circles the connecting element to demonstrate the connection.*

Figure 25: *Relational analysis of running information for looking back on, reflecting, and planning a run. It is based on a runner using information situational map. The relational analysis is based on runner planning a run which links to lightly shaded elements. Running information for looking back on and reflecting form the basis of analysis and are shaded blue. Shaded in red are elements that relate to both elements.*

Due to the multifaceted nature of the analytical method, the analytical focus changes when using running information for reflecting and planning a run when compared to a run. There are marginally more relationships concerning a run. The relationships that a run did not make within the map reflected elements that, like embodied information, required information access through technology or physical materials like logbooks which seem to be related to more indoor settings. The reflective element of looking back on information seemed to confirm this, where the reflective use is rooted in reviewing information. The reflective element also seemed to be more of a personal use rather than a social use, which a run seems to share in both uses. The reflective process also did not relate to information acquisition. However, it did have relationships with considering information over time, recalling information, and emotional response. The researcher produced a separate relational map for planning a run but incorporated it into Figure 25 as reflecting upon a run because of significant overlaps. These overlaps suggest that perhaps the two elements are part of the same situation. The main difference between reflection and planning is that planning for a run seems to include acquiring information related to social elements instead of personal ones.

4.6   Conclusion

The relational analysis process led the research towards two sites of investigation, which mirror the research recordings during a run and virtual recordings in a non-running situation. There are strong information relationships between the two situations themselves, suggesting that the overall site of information in running is more of a cerebral notion than one based on a physical situation that flows between the run itself and its reflection and planning. The relational analysis allowed the researcher to understand the analytical path and appropriately direct the rich data presentation towards understanding how the participants use types of information in their running situations. Presenting the descriptive findings in the following chapter will allow an enhanced understanding of the remaining analytical tools, namely the recommended positional analysis and the novel *neo-assemblage theory analysis*. The descriptive findings also demonstrate the iterative analytical writing up process undertaken during this research's data collection and analytical phases.

Chapter 5: Descriptive findings.

5.1   Introduction

This chapter builds on the early conceptual development described in Chapter 4. This chapter describes findings based on the types of information the participants used in the two data collection situations and abducted from the participants' data through *situational analysis*. The descriptive findings foreground research data relevant to the research questions. These findings will contribute to the discussion (Chapter 8) of how the findings contribute to the literature in information behaviour, self-tracking sociology and archival science. An abridged abstract situational map built the foundations for relational mapping analysis. The reader will encounter elements from the broader abstract situational map because attempting a more comprehensive focus would only provide a superficial understanding of the situation. The types of information, its uses and even the data collection situations can be at best described as interconnected. The following participant vignettes aim to introduce and represent the complexity and interconnectedness of the situations under analysis.

The following is Adam's response when asked about the running watch that he used:

> *I just got a new Suunto. It's the Suunto 9, which I've literally had maybe two months? So I use that when I'm on a run, and on that, I have total time, distance and pace and that's pace as I'm running now, not average pace, but pace. Then I upload that to Strava, then I have a cup of tea on a night and look back at how it has gone. But I think, because I've been running a few years now, sometimes I will run without looking at my watch just because I know my body and try and tell how if I'm running too hard or not. So, I've not got a heart monitor, this has got a wrist heart monitor but it's not that accurate. So on my recovery runs, I will try not to look at my watch because sometimes it will make you want to go too quick and then you have that thinking "ah people are going to see this on Strava". So what I do to spin that around is just run on my physical lungs and how I can feel my heart.*

Adam's perspective describes the initial ground upon which analysis was built. The response captures the richness and complexity of a runner's information world. It is

an information world that is personal and social, situated during a run and away from it. Adam introduces the combination of embodied information ("as I feel, physical lungs and how I can feel my heart") and information derived from his wearable devices used during a run. Adam also describes a situation away from a run to "look back at how it [the run] has gone", "analysis", or planning. Becky elaborates upon this away from a run information situation below:

> *I suppose I like to see what I've run particular things at so it gives me an idea. If I've done, I don't know – for example, [race name], for example – before I go and do that I go and look at what I did last year and think right, that's what I'm aiming for trying to equal that or beat it if I can […] that sort of thing. Or, if I'm doing something, I might look at my average. If it's [League name] and it is more of a road type thing, I might look at it say OK you need to try and keep around 'here'. It doesn't work with cross country so much because the conditions can vary so much, can't they? I like to see, for example, on Friday I'm going to run a route that I saw [Person A] and [Person B] had posted, right off road. Thought, I've not done that before, fancy that one, so, contacted them, and [Person A] sent me a copy of it for downloading. So, I think that's nice too […] so I could download it, and have that on my phone. It's good to see where other people are running. So it's not so much from a stats point of view, I would never think of going for a run looking to see who's got a segment and think to myself "I'm going to go for that segment" whereas I know other people that definitely do think that way. I think that as you get older as well, for me, I just want to be able to keep running, for as long as possible.*

These two vignettes provide participant introductions of information types and use amongst the eight participants. The researcher intended that runners who were members of running clubs would first provide complex, rich insights into information used during a run. Other people who run outside of running clubs were also sampled during research to develop the findings found in club runners. Before presenting the further descriptive analysis, this chapter will first describe the participants and their identity and discourse found within running. The chapter will then describe the

information types and use during and away from a run. The chapter then concludes with a description of third party use of the participants' records, the participants' perceptions and understandings of third party online platforms and observed effects on the participants.

5.2   Types of runners, rationales and runs

The terms club runners, running clubs, runners and people who run outside of running clubs were presented in the introduction with no explanation. This section describes the social identity and discourse found amongst the participants. The description is required because it enriches understanding of the findings of the types of information used within running activities. This research is not a sociological enquiry into the types of runners, nor does it intend to propose new typologies already established through sociological enquiry (Stebbins, 2018; Green & Jones, 2005; Shipway & Jones, 2007). However, this research does require an introduction and understanding of running discourse which sociological scholarship has already acknowledged with suggested typologies. As previously discussed in the literature review, there were three types of runners identified, "athlete," "runner", and "jogger" (Smith, 1998). The elite and runners seemingly took a "serious approach" to their leisure as opposed to "joggers" who are more "casual" in their approach to running (Stebbins, 2018). This research's description of runner types and associated discourse encountered during data collection demonstrate the subjective, small worlds within running (Chatman, 1998, Gorichanaz, 2015). Within this research, the idea of varying runner typologies is of interest because typologies have the potential to introduce potential wider analytical dimensions when developing an understanding of information used in the running activity.

5.2.1 Group 1 participants' visual appearance

Figure 26 visually presents Group 1 participants. The researcher invites the reader to examine each participant's image before engaging with the researcher's interpretation.

Figure 26: *The visual appearance of participants Adam, Becky, Chris and David and their running environments.*

Group 1 participants are running in pre-agreed, familiar environments where they felt comfortable. The participants are running on either grassy or woodland trails in semi-rural and rural areas. The parked cars in Chris' image suggest a semi-rural environment. The recordings took place between January and early March 2020. The weather conditions were generally cold, and the UK was in the midst of storms (such as Storm Jorge), as noted in the fieldwork notebooks. At a minimum, the participants wore jackets to suggest that the conditions were cold, despite the appearance of sunshine in three of the four images. Adam's recording took place in January. His choice of a woollen hat, a buff around his neck, jacket but the inclusion of sunglasses – to reflect the low sun – reflect the environmental conditions. Becky and David's clothing reflect cold and windy conditions, and there seems to be a choice of more clothing to cover the torso, perhaps to keep the torso area warm. Adam, Becky and Chris wore shorts or short leggings and watches on their left wrists. David's watch is absent in this image due to his clothing, but he wore his device on his right wrist. David's choice of apparel of a jacket and leggings suggests overcast conditions. David's running environment appears very rural and markedly different from other participants. All of the participants' appearances are of a "lean" physique.

5.2.2   Group 2 participants' visual appearance

Due to the suspension of face-to-face data collection because of coronavirus restrictions, the intended Group 2 running recordings were not carried out, so there are no data to introduce Group 2's visual appearances and compare them to Group 1.

5.2.3   Group 1 participants: club runner types

This section introduces Group 1's observed shared discourse about running activities, information, and environments as club runner types. Adam, Becky and Chris refer to other people in their clubs as "teammates", "clubmates", or refer to names of members of their running club. They use similar words to describe certain races, such as cross-country races. A cross country race is running with other club runners across countryside terrain, including hills, slopes, grass, and mud, usually contested over autumn and winter (English Cross-Country Association, 2020). Adam, Becky and Chris referred to this as "a" or "the cross-country". They refer to "leagues", "parkrun", and names of events that relate to distances, such as "half marathons" and "marathons", referring to a road running league as the "Midweek Leagues" (England Athletics, 2020). They also spoke about a particular training session club night as "a Tuesday night". There is a reference to "Parliament Hill" for those who compete at a higher club level, where the UK's regional or national cross-country race is run (South of England Athletic Association, 2020). David, who trained with the "National Squad" for orienteering, as well as being a fell runner (somebody who runs in UK mountainous terrain), also spoke of races and "events" and the training for them. Group 1 expressed differences between the ideas of "road running" and "off-road" running, where running on the road was associated with races, such as road leagues and time goals, compared to "off-road" running. "Off-road" running seemed to be reflected in cross country running (running in rural, parkland and woodlands) and fell-running (running in UK mountainous areas) like the environments in which the recordings took place. There is also shared discourse relating to information types in running activities, such as "pace", "distance", and "time".

5.2.4   Group 2 participants: non-club runner types

This section compares Group 2 participants' discourse with club runner types. The Group 2 participants described themselves as "beginners", "newbies", "plodders", and not "athletic" or "serious" in their activity. They would not describe themselves as

"runners" and often drew comparisons with those perceived to be "experienced runners" who competed regularly. Running seemed to be a small social endeavour and a private experience with little evidence of regular competition and associated training.

Joy and Faye exhibited low confidence in their running abilities, either feeling "embarrassed" about running outside in public spaces or not being "very confident" about their running skills. Guy, by comparison, seemed to be comfortable with his running abilities and his reasons for maintaining general fitness. Group 2 did not seem to have many other runners, if any, within their social circle. Joy shared her running information online with "family" and "friends". Helen and Faye had small online social circles on one of their online running platforms, but they considered all of their friends who ran "runners", which they did not think they were. Guy did not have an online presence for running but ran with a small select group of work colleagues.

Group 2 participants did not seem to train constantly to compete in races and events. Instead, they focused more on a goal or achievement, such as running for twenty minutes or five kilometres without stopping or aiming to run at least twice a week for five or six kilometres. Group 2 participants seemed to share very similar discourse used by Group 1 around information types from their devices and media, such as an awareness of pace, distance and time. The participants did not seem to be central to running social worlds, although Faye and Helen were aware of "parkrun", and Guy described an event he once took part in as a "half marathon".

5.2.5 The stigma of running in public during Covid-19 lockdown restrictions

There was further evidence of perceived social group identity from the non-running public against those that did run. During the Covid-19 lockdown, there was a division between those who ran and those that did not run. In Group 1 recordings, the participants ignored the public or briefly acknowledged them with thanks if they held their dogs or moved out of the way whilst running by. There was no evidence of any overt division. By the time of Covid-19 restrictions, in the virtual recordings, Adam and Helen spoke of overt adverse reactions of the public towards runners despite social distancing. Such reactions included the public avoiding them, thinking they would pass on Covid-19. To avoid the people and the feeling of social stigma, finding new routes away from crowds and busier public spaces was a mechanism for some participants to avoid the non-running public.

5.2.6   Group 1 rationales for a run

The discourse around events and competitions seems to relate to the club runner's primary rationale to run: to compete as best as possible. This section discusses competitive rationales for running with a deliberate attempt to minimise the inclusion of types of information in the discourse because it is not the purpose of this section. However, the rationale and the types of information seem connected. It should become apparent in the explanations below that it is difficult to exclude in consideration of running rationales the talk of information in running activities, especially quantified information such as times, pace, PBs, metrics and distances.

There is the idea of competing against other runners. Adam describes this where:

> *I was just racing people in front, trying to catch them. And I was thinking, well, if I can keep hold of that pack, that would be great.*

Chris competed against other runners to win or finish high up in races.

> *Yeah, I've been tempted recently to start going to [Placename] parkrun, just so that I can have a bit more competition, in a way [...]. I just know- like, been wanting to run quicker, you can only push yourself so much on your own, when you take the lead you sort of relax, when I was much slower I was always looking up, I was always, like, running quicker so I can hold onto them on the last bit to see who's around...*

Like Adam, Chris was aware of faster runners ahead of him and used them in race situations to try and run faster. Chris mentioned participating in a high-level cross-country running event and wanted to run at another parkrun event course from his regular event for more competition. His current field of competition perhaps did not meet his current running goals.

Club runners are not only competitive with others but also themselves. As Adam continued to run over the years, he found that "the times tumble and the PBs come," interpreted as meaning that as times took in the distance measured, races and events got faster over time it resulted in personal best times or "PBs". Chris retold a story of how he achieved his "personal best" five-kilometre time, something which he seems to want to improve through going to other events for more competition. When Becky was

running well, and in a competitive state, she remarked that she: "was getting PBs and whatever", indicating that the personal best is a time metric benchmark for reaching goals over specific distances. The idea of personal bests reinforces the idea of meeting goals when not competing against others. Instead, they compete against themselves to continue to best themselves. However, there comes the point where the participants can no longer do this, and they have to accept, like Adam, that they have achieved their "good for life" and focus on age-graded events. Older Group 1 participants recognised that they perhaps could not attain their personal best times anymore and sought other rationales for running, including just getting out or meeting their own readjusted goals and competing with themselves.

Becky and David revealed former states of competition of running in events and against themselves, which seem similar to Adam and Chris' rationales in the recordings. Having once trained with the British Orienteering Squad, David acknowledged his competitive nature using the past tense "when I was running much more, much more competitively". David does not compete to those levels now. However, he does not seem to exclude the possibility of competition. Whilst Becky seemed to have a competitive nature still, her transition from running in road races to off-road settings was recounted in the following, which opens about the woodland outdoor environment of the recording run:

> *I think it's so much prettier, isn't it? Much nicer than being on the road or on a pavement, with the traffic, er, you get out, and you see such lovely places, and also, I think probably for me, it takes that pressure of the pace away which, a few years ago was more important, I think, when I was running well.*

There was a positive effect for Becky where being able to run was pleasing, and off-road running became "liberating" because she was free of performance in not having to:

> *really think about having the pace cos you couldn't, it wasn't worth it because you didn't know what you were aiming for.*

The recalibration of Becky's goals seems to be the acceptance of the removal of a timed goal. The timed goal was also compared to other runners doing better than her in races that she used to beat but found that she did not "like to see yourself going backwards."

When David recounted his past performances and best times over two repeated circuits, it was the times he competed against:

> *The key times, well, I remember them even now, I knew what I should be doing,[...] I'd do a combination of the two by going down the valley and a steep track at the back, and that was thirty-four minute run on a good day, it'd take me an hour now.*

David was also aware of his bodily limitations during the recording. He commented on a downhill section at the start of the recording run where his legs needed to "free up", and the "warm up" took longer than it used to as he could not "gallop down here as I'd like to". The freeing up of the legs implies a level of body stiffness, and galloping seems to relate to the idea of a fast past. David's rationale to run is a challenge to be able to run and enjoy running whilst accepting his limitations. His main challenge remains related to his activity diary that, seemingly adorned in the language of acceptance of his current running ability, is reflected in a single metric:

> *[N]ow I'm not running as much as or as well as I used to as two years ago, er, the main metric now is continuous days, so the Excel spreadsheet counts how many days since I've had nothing to record, which is my motivator.*

Having run for many years, David and Becky were aware of their fastest performances and abilities in races. They seem to have started to accept that they may not meet their high-level running goals again. Whilst no longer competing and meeting competitive goals like they used to, acceptance has been made possible through recalibrating their rationales for running. They either adjusted their competitive achievements or moved their rationales for running away from competitive events entirely.

5.2.7 Group 2 rationales for a run

The attainment and maintenance of personal fitness goals summarise Group 2 participants' running rationales. The emphasis is on personal goals such as training for and completing a single running event, learning to get fit and then maintaining an obtained baseline fitness level. It seems that the participants need to continue their running activities because if they stopped, they would quickly lose the benefit of their fitness work or, as Faye summarised:

> *If I don't run for very long, then I probably wouldn't run again because I don't find it easy.*

Beyond these rationales, there does not seem to be a competitive scope to train and compete on a yearly race cycle, push themselves further or aim for competitions. There seems to be some cross over with Group 1. There is an element of improvement in their physical selves. Evidence of improvement includes wanting to get fit to attain goals like being able to run a five-kilometre distance, "lose weight", or "maintain cardiovascular fitness", as well as for "a bit of relaxation and a bit of stress relief" in which Guy found as a well-being mechanism:

> *It's not just about physical well-being there's an element of mental well-being as well…when you're doing exercise in general, it kind of takes your mind off stuff.*

Guy was "not looking for continuous improvement" in his running. His rationale was physical maintenance, mental well-being and socialising. For Guy running "started as a bit of a social thing" because a social running group at his workplace asked him to join. He had realised its social importance during its absence due to Covid-19 social distancing restrictions. As well as personal rationales to run, initial encouragement does seem to stem from social relations. Joy used a book on starting to run that her friend had given her, which had a beginners training plan. Faye was already surrounded by runners because "all my friends run".

In comparison to Group 1 participants, there was little evidence to suggest that non-club runners recalibrate or readjust their running goals. Group 2 participants had not considered themselves to have been running very long or did not regularly train to compete in events. They seem to run less frequently than Group 1 participants. If they

readjusted their goals, it was to increase their running activity from none at all or a little running.

5.2.8 Covid-19 and rationales for a run

Covid-19 lockdowns seemed to change running rationales. Like Adam, those with competitive goals felt a liberating effect that Becky described when she stopped running on roads competitively. Adam compared his liberation to removing the "shackles" of training. Adam was free of training plans because of cancelled planned events due to Covid-19 measures. The "pressure" of the metrics when just running was gone, and he tended to run more on bodily "feel". Chris did not seem to fare as well in lockdown measures. Having found that when he wanted to train hard, the "passion" was no longer there because there was no training goal. He could not train to get "into the pain mode" as the rationale had gone. Instead, Chris learned to adapt to just running without any specific goals. However, when just running and not competing during the pandemic made, Chris realised an element of emotion in running activities. Living in a remote location, David was not affected by the lockdown "in terms of running". The only difference was that the idea of a long run seemed to have replaced the idea of an "event or race", thereby continuing a form of competitive rationale.

Becky found that she changed her behaviour in that she decided to chase a segment during the lockdown because she had lost a "crown", which "normally, you know, doesn't bother me." Becky's competitive rationale had resurfaced when Strava informed her of losing a "crown" on Strava, but she reverted to just running when the "pressure" resurfaced. Interestingly, there was a slight change in Becky, who continued to explore routes and paths free of events. Becky eschewed a "virtual race" because she did not want to engage in a competitive rationale, despite reverting to a competitive nature in chasing Strava "segments". Becky attempted to complete interval training, which requires closer attention to running information and learning the technology and digital skills. She raised a good example of when an interval time was programmed wrong, so she soon gave up. When she felt "pressure" in this instance, she stopped and reverted to "new things", which correlated with positive emotion.

The idea of "trying new things" and "exploration" seemed to become a new rationale for running for both groups of participants. The researcher observed this in those usually tied to training plans for events and competitions before lockdown. Adam

started to use an external "heart rate monitor", so he had a new metric to understand and use when running during the pandemic. Becky introduced new technology through listening to podcasts whilst running. Becky also explored her area by diverting down new, unexplored paths that looked interesting. Chris had also noted that other people were seemingly exploring new routes from their usual training runs and then posting them onto their online platforms. These posts inspired others to choose new routes, which perhaps would not have happened without the Covid-19 lockdown restrictions. Chris commented how runners stopped their runs (and their recording devices) to talk to each other during social limitations. This exception is because they discussed how runners usually keep running when they see each other. Chris and Adam also took part in virtual events and races for the first time. For the participants in Group 2, the advent of Covid-19 lockdowns seemed to be an incentive for those new to running to begin running, such as Joy and Helen. Those that had tried running in the past started to run again or more frequently. Running during the lockdown gave some Group 2 participants "structure" in which they could build into their day, whereas it seemed as if some of the Group 1 participants had lost their routines.

5.2.9 Types of runs

When the researcher explained to Chris the purpose of the 360-degree camera - to observe unseen actions during the run without pointing the camera at the participant for specific actions - Chris clearly distinguished between types of runs. He did not seem to agree with the premise of a single run capturing types of information used on runs:

> *OK. I suppose in one way it's like, how I might behave just when I'm running like this compared to how I'm running going for a session, speedwork or in a race, it's gonna be so different.*

Chris suggests that "running like this" refers to the recorded run, a run without a link to training, a run that was just a run. The idea of "speedwork" or a "race" suggests that the way that he would use his device and body would be different. Chris seemed to be suggesting that the idea of a run type would create different uses of information whilst running. Becky differentiated between different types of runs when asked whether she used their watch device during a run:

> *It depends on the type of run I'm on, yeah, so yes, if I've been training for a particular marathon or a half marathon or something, then I watch it for pace, um, I might look at it to see- how- what the mileage is or how far I've done, um, but more and more I'm not doing that sort of running and I'm just, you know, I'm just, I don't tend to use it so much during the run.*

For Becky, the idea of a training run was for an event or race (such as a marathon). Becky did not link the concept of just running to a training regime with an event or race goal. Chris mentioned a specific type of training as "speedwork," which involves running at fast speeds for a short time, usually with timed rests between the runs. Joy described her running within the idea of training, based upon running to "training programmes". These programmes, over some time, prescribe types and lengths of running exercise for learning how to run for twenty minutes from previously no running. Another programme offered the goal of completing a five-kilometre distance in one run. Joy understood different types of runs in training rather than running for enjoyment or an event or race. Joy was aware of "speed intervals", "intensive runs," a "gentle run", "longer runs", as well as a "rest day". Using the plans introduced Joy to different training runs, but Joy perceived running overall as hard, never for pleasure or well-being. When Joy described her running environment, she described it as "a nice experience itself, apart from running". Faye and Guy did not have multi-paced training runs. They both had a single running route and a single pace. Guy had one type of run where he tried to run at "a fairly consistent pace". For Faye, her pace was also consistent — "a chug" — that she habitually performed on all of her runs, and she described her running as "Groundhog Day [...] really dull", but she found it comfortable. Faye was aware of an event and race and recalled the only one she had ever run.

The researcher used a part of running discourse when referring to a recording run as "a plod" to convey the idea that the recording run was a run with no particular purpose. The researcher used it because it seemed that Adam was not actively using his device in the recording. Adam recognised the term "plod" by agreeing with it ("absolutely"), and the researcher asked when they were more likely to use their watch more:

> *Yeah, so it would be like a Tuesday night session with the running club, so if we're doing a timed session or a pace session, umm, I'd be looking at it then.*

Adam used his watch more in training, where he would run fast; in "recovery runs", a slow run to recover from a previous training effort, and less frequently in a race where tracking time or pace did not matter. David described different types of runs linked to other external environments rather than different types of running sessions. This description may be explained through his association with the orienteering and fell running worlds:

> *If you've got a race or a series of races coming up, I will tailor me running to the terrain, so when I was orienteering seriously, I'd be training in the forest and the rougher fell away from paths, if, uh, on the rare occasions I had a road race coming up I'd be on the road, and so on, so yeah, the general training philosophy is train for what you want to do well at.*

"What you want to do well at" suggests a competitive rationale. It would seem that the type of run as understood by all participants, irrespective of their rationales for running, has a bearing on the frequency and volume of information use.

To summarise, the types of runs are, broadly:

(i)   *training runs that seem to rely upon more information more frequently,*

(ii) *races or events which use fewer types of information less frequently,*

(iii) *slow-paced runs, either recovery runs or just runs, seem to have the lowest volume and frequency of device derived information use.*

The reader should consider these types of runs as a variable related to the types of information participants use in the following sections.

The sections that follow report on the analysis of recorded runs of Group 1 and the retelling of running situations from both Group 1 and Group 2 participants in online recordings. The Group 1 recording runs could be considered slow-paced runs and form the basis to describe information types and use when running. Recalled running

situations from all the participants will then incorporate reflections of training runs or races and events.

5.2.9.1   Covid-19 and the virtual run

The use of the word "virtual" before a run, race or event emerged from the recordings undertaken after the introduction of lockdown through the participants talking of "virtual ultras", "virtual road relay 5ks", and "virtual runs". Due to social distancing requirements, these virtual runs seemed to have blended online platforms that provided both social interaction and a representation of an event with an individual's solo embodied running performance. Running sociality moved into an online environment.

5.3   Types of information used during a run

This section describes the findings of types of information used during a run through transcriptions of the participant's responses and image stills from the recordings.

Group 1 participants are club runners. The reason for running in the recording run is to participate in a doctoral research project considered just a run as a type of run. The run is not a training run or a race or event. The researcher and participant moderately paced the run to conduct a conversation. There were no mobile data collected for Group 2 participants due to the suspension of face-to-face data collection during Covid-19 social restrictions. Instead, the researcher asked Group 2 participants to describe a typical run of their choosing, with the researcher asking questions derived from the preliminary analysis of Group 1 participants.

5.3.1   Using device information

When the researcher asked if the Group 1 participants were happy to record and happy to start running, each participant reached for their wearable devices to begin a recording of the run (Figure 27). In David and Adam's examples, accompanying the button press was a short, audible electronic chime from their Suunto branded watches (Suunto 9 and Suunto Ambit Peak). Becky and Chris wore Garmin branded watches (Garmin Forerunner 235 and Garmin Forerunner 45) which did not make sounds when they pressed the buttons on their devices.

Figure 27: *A composite image of image stills of each Group 1 participant. The image shows the understood start of a run, with each participant reaching for their devices on their wrists.*

It would seem that they were using their devices to anticipate acquiring forms of represented information about the anticipated run. The starting of the GPS watches would ensure that a GPS signal was available before starting. Faye showed her Garmin Forerunner 45 to the researcher in a virtual meeting recording that would be used similarly to Chris' device. Helen also had a Garmin "GPS watch". There were other means of recording a run for those who did not have GPS running watches if they chose to. After Joy achieved her twenty-minute running goal and started to want to run more, she used her Huawei phone and Huawei Health software application to make "recordings" of her runs (Figure 28).
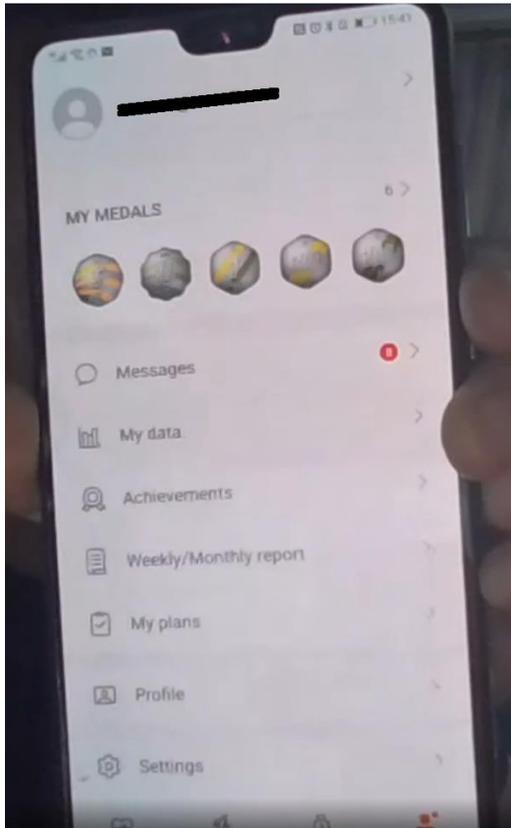
Figure 28: *An image of Joy's Huawei smartphone and Huawei Health application.*

Guy did not use a smartwatch or smartphone device during a run. Instead, he usually wore an MP3 player to listen to music whilst running. Guy also looked at a "digital clock" in his home at the start and end of his run to roughly work out how long, in time, his run took.

It would seem that the participants using a device had some form of metrics, or "read outs", as Faye called them, for the acquisition of represented information. The metrics used seemed to be distance, run time, and pace. Adam used his Suunto to display,

> *...total time, distance and pace, um, and that's, that's pace as I'm running now, not average pace, but pace.*

Becky had distance, total time and running pace displayed on her watch (Figure 29). Chris seemed to have pace, and whilst David's was not observable, he mentioned that it was for pace when he did use watch metrics more recently for training for competitions. Faye summarised the "basic" metrics of distance, pace and time as "how far I've run", which was essential to her, "how fast...how slow", and "how long I've been running for." Guy used an MP3 music player and headphones, where the "music helps

me keep tempo". Guy suggested that perhaps he would use a device if he changed his running patterns and started to run longer distances, where he "would probably invest in a second-hand Fitbit or something or try and record some metrics."

Figure 29: *A magnification of Becky's Garmin Forerunner 235 screen of "read outs" during a run.*

The use of embodied information and slow-paced runs like the recording run seem to see a low represented information use amongst Group 1 participants. David was perhaps the best example of this because there is no visual evidence of him glancing at his device during the recording, seemingly demonstrating his statement that he does not tend to look at his device during a run.

Figure 30: *Chris, Becky and Adam looking at their devices during the recording run.*

Chris' device use was a salient example. It was a single event, early into the recording, where his Garmin Forerunner 45 made a beeping noise. Chris sensed this acoustic signal which prompted him to visually consider the represented information on his device – numerals and text – representing his current pace. He did not make any

spoken comment to the researcher, which seemingly bound this as personal consideration of information. The alert could have informed Chris that he was running too fast and needed to slow down and adjust his pace accordingly. Chris recalled that pace informs much of his running and had alerts set to fast and slow paces. The alert did not cause concern as he made no actions concerning the device. Becky's use seemed to be prompted by the change in the environmental surroundings where the running route was about to stop by a metal fence, which resulted in a break from the running stride, making Becky look like she was standing still in Figure 30. This glance seemed to look at a combination or single metric of either distance, time or pace, and it was not prompted by a signal but by the environmental surroundings. It seemed to be personal use of represented information on Becky's Forerunner 235. Adam did not look at his Suunto 9 device the same way as Chris or Becky. It seemed to be a subconscious action related to talking about leading training sessions (a "type of run"). The image shows the point when he says the word "pace" in the following comment:

> *when the interval is up, or if we've set ourselves a pace, I'll be constantly looking at it.*

Adam's action seemed to be a form of embodied recall where the association of the word pace seemed to make Adam demonstrate his act of looking at his device. Although not used like Chris and Becky, the action recalls what he does when using the device for represented information in a training run. Given that the duration of the runs varied between 1.5 and 3 miles, these observations are only tiny moments in runs amongst participants who tended to use their embodied information more than their represented information on slow-paced runs. However, the examples seem to demonstrate that there was some form of a need to acquire and personally consider represented information. The three examples demonstrate tacit embodied use that intersects with represented information use where runners can acquire, consider and even recall how they use represented information whilst running.

The uses here, whilst tacit observations, can perhaps be deduced from Chris's use of his watch. He is the least experienced runner in the Group 1 participants, although he has over four years of running experience. He used his wearable device for "pace", which seemed to alert him during the recording. Chris had gained running experience,

but he was still learning his bodily information concerning running speeds. Chris later commented away from the observed event that the watch provided "reassurance" between his running pace and his physical feeling that he was running "just right". Having run for over fifty years, David did not use his watch, perhaps because he had a heightened understanding of his body. Becky's use, whilst not known, could be explained as "reassurance" to see how long, how far or fast the run has been at the point of turning around based upon the metrics on display on her device. The idea of "reassurance" introduces emotional information into the run where represented information "reassures" the person running that their body is performing as it should be in line with the run's intentions. Group 2 participants seemed to describe behaviours of reassurance in their devices. When Joy started out running on her eight-week training programme, she used stopwatch information for time to see how long she had left to run, especially when doing speedwork intervals. It was the "only thing" she needed, which she described as her "lifeline" for knowing when to stop running. Faye looked at the represented information on her device every few minutes and then checked the haptic alert set for every mile run "just to make sure that I'm on a schedule where I should be."

It is not only represented information used during a run, and it has been challenging to describe represented information use without introducing some ideas of embodied information. Before discussing embodied information in the next section as a type of information used during a run, there is the seeming closure of a run related to using a device. At the end of a run, the person running presses a button on their device, acting as a recording mechanism of represented information from the run. The significance of this will be discussed more fully in 5.4. Whilst not captured in every recording either due to technical failure or extreme environmental conditions, Adam and Becky represent this act in Figure 31 which closes the idea of a run situation.

Figure 31: *Adam and Becky press a button on their watches to stop and record the running information.*

5.3.2   Using the body

Group 1 participants felt their use of the device on the run had lessened to varying degrees in favour of information derived from their bodies.

> [B]ecause I've been running a few years now, it kind of, sometimes I, will run without looking at my watch? Just because I know my body and try and tell how- if I'm running too hard or not?

Adam seems to be introducing "knowing the body" as a form of knowledge relating to the internal senses that his body conveys to him. He does not need his watch to reassure him how his body feels when running. The following quotation charts his embodied knowledge development during his time running:

> I think over time, you do get to be a little bit metronomic, and you just know your body, and I think, absolutely, like, two years ago, I'd have been looking at my watch, constantly, but I think over time, you just

> *know where you are [...] I think it's a lung thing and a heart thing. So you know when you are pushing yourself...*

It would seem that the experienced club runner uses embodied information acquired from their experience of running to understand their bodily feelings. Their embodied information directs their running performance rather than relying on represented information to prompt them to go faster or slower. The idea of "knowing the body" is a type of embodied information on the run that feeds into the required physical performance needed to meet the reason for running. Adam has reached a point where his body has become metronomic and can run mile after mile at a consistent pace on a flat course.

Adam appears to be an actively competitive runner in training. "Pushing yourself" is suggestive of training that uses an understanding of body information that pushes the understood bodily norms. As Chris suggested, he could not get "into the pain zone" during lockdown as he had lost his competitive rationale. Chris also raised the issue of iron deficiency in which having a diagnosis and having tackled it in a physical sense made Chris know what pain felt like when he was ill. He knows he can use more effort, knowing that the feeling of pain could be any worse than when he was running undiagnosed with iron deficiency. Adam and Chris suggest having acquired embodied information by experience to recall and consider whilst running through "knowing" bodily pain, the feeling of the heart and lungs and how their bodies can perform without having to consider represented information on his device. David tended to run "as I feel rather than to the numbers on the watch", which succinctly captures the embodied information using the term feel. The idea of running on feel is a term that relates to how the person's body feels, which could be understood to be another term associated with an intimate, visceral type of embodied information. Having over half a century of running experience, the researcher asked David about the idea of feel in running terminology and how long it had been around. David replied: "Well, I think forever. Depending on your preferences." David was aware of body limitations when running downhill at the start of the recording. He knew that his legs needed to warm up before he felt he would have a better range of feelings, acknowledging that his body did not run as fast as it once did. David found that represented information for runs was no longer of any use, instead preferring to run entirely on the feel of his body

during the run. He used the recorded information from his wearable device for analysis after the run.

Chris seemed to be developing an understanding of his body and his running speeds and was aware of "pain" in training. Chris used his watch for "reassurance" that he was running at the right pace, which confirmed his bodily feeling of running "just right". The "reassurance" seemed to suggest that he was using his device for represented forms of information less frequently, similar to Adam, who used his "constantly" when he first started running more seriously "two years ago". Those early in their running experience do not have as much experience as the other participants who seemed to "know their bodies" and knew how to run a specific type of run without referring to represented information on their watch. This inexperience was evident in their lack of device usage in the slow-paced run type, which will be examined further in the following sections. However, Becky did not mention the idea of information from the body whilst running. Becky mentioned injuries which meant that she could not run to train for events, but there was no mention of embodied "knowing" or running on "feel".

Most of the Group 2 runners seemed to be at the start of a body understanding path that Chris seemed to be advancing down. They seemed to demonstrate Group 1's early recall of device use, where they used their devices a lot more to compare with their bodily information. Those who started running do not yet know their bodies. They have higher use of represented information to understand and learn what their bodies do. Joy described using a pace metric to learn what pace her body could manage. Both Joy and Faye felt that they did not yet have control over their bodies whilst running when compared to those they considered experienced runners. Faye rhetorically asked, "when doesn't it hurt?" about running and controlling their breathing, which induced panic if it did get out of control. Joy also relayed that when she first started running, she learned to understand her "breathing" and the "hurt" of her body. After eight weeks of running, she did not hurt as much as she started. Recognising what "experienced runners", like Group 1, can do, Joy noted:

> I just have to, er, work out the pace my body can cope other than, like, experienced runners, they probably can control their pace quite well. I think that's probably different.

Guy was the exception in Group 2, who had a seemingly developed understanding of his bodily information. He was aware of his running pace and of his body knowing, without a measuring device where he was running at a pace "that's slightly slower or slightly faster than you're comfortable with". An understanding of his breathing demonstrates this awareness: "breathing in rhythm is one thing I'm conscious of," as well as other "factors" such as tiredness, lack of sleep or food, which can "affect the breathing rate." He also noticed that if his breathing rate did become irregular, it was due to an increase in physical effort and understood how to remedy this bodily information. "Foot placement" and "gait" were other information that he had learned from other runners, which he was made aware of during his run. Just after a long run, he also mentioned feeling where "different parts of your leg or foot are aching depending on, you know, the surface you run on."

During a run, the person running uses an internal body information system with information derived from their internal organs such as their heart and lungs or their limbs such as their legs and related muscles. The participants use sources of information in the body, such as the organs that derive ideas where they seem to "feel" and "know" their bodies. Therefore, over some time, measured in years, the use of represented information decreases in favour of bodily information to meet the demands of the running rationale.

5.3.3   Using senses in an environment

The running environment seems to contain external sensory information used by the person running. The following sections describe this information through the participants' sensory experiences. For the remainder of this section, statements related to the senses may read as obvious, such as rain being wet (p. 199). The researcher has written statements this way because the researcher has analysed these words to explore senses that are not immediately observable but inferred from the participants' words. The deep data analysis conveys these findings in what might be considered an obvious way. This way of writing shows how analysis related to bodily sensations that may not be immediately observable.

5.3.3.1　Hearing

This section attempts to describe the soundscapes of the audio-visual recordings and the recall of sounds through virtual meeting recordings. Assuming that the participants did not hear the sounds the same way, the recordings capture a shared aural experience between the participants and the researcher. The recordings captured the sound and the rhythm of running footsteps upon the various terrains, from the crunch upon loose gravel to the soft pad upon short grass and the occasional splash when running through a puddle. The sound of the run through the rhythmic footsteps was sometimes complemented by the subtle audible breath of the participants when they were not talking. In suburban areas, the participants mentioned the sounds of "traffic and things" and "other people". Where the recordings were semi-rural, there was the occasional 'whoosh' sound of a car passing by on the road in various degrees of volume. There was the background sound of wildlife in more rural runs, such as the twittering and clucking of birds and the bleating of sheep.

The description above is just a textual, descriptive snapshot of the soundscapes encountered during the runs. The reader should know that sounds happen during the run situations under examination. These sounds are probably a sensory experience of the person running who acquires them, considers, and perhaps even recalls them as a part of personal sensory information during a run. There was no communication of aural information with the researcher where the participants commented upon these sensations. These are tacit, sensory considerations that help the participants understand and negotiate their running environment. It can also contribute to running discourse by determining the type of run environment.

5.3.3.2　Seeing

This section describes visual observations of acquiring, considering and recalling external sensory information. The following examples show how the participants look around and scan the running environment to negotiate it as smoothly and quickly as possible without stopping unless necessary. The participants look at established paths and seek to recognise obstacles to find the quickest and most efficient way of

negotiating a specific route without causing themselves danger. It seems to be a constant cycle of action based on scanning the environment in front of them.

Figure 32 shows a simple representation of seeing the environment with constant visual scanning, where there is an understood single choice of path forming from an area of open grass surrounded by molehills. An image still from a moving image cannot do the visual scanning action justice. The image captures Chris at the point of looking down at the ground around him, acquiring the visual information to consider and perhaps recall external sensory information to complete the running action.

Figure 32: Chris scans the ground in front of him.

Adam and David seem to anticipate route choice with two route options available to them in Figure 33 and Figure 34 below. Adam seems to be looking very clearly to his left at the path, which would change the direction of his running route, the direction in which his torso points. Figure 34 is an exaggerated body movement of scanning the environment but represents how the person looks around them for environmental information they seem to use to negotiate the run. Adam seems to be visually acquiring this information and then perhaps recalling where each of the paths takes him to consider the running environment associated with each path to negotiate the chosen path. David seems to have recognised that he does not want to run on the path or track ahead. He takes a gradual ascent towards the right of the image. David had run this

route for over fifty years, and there was no discernible path where this personal route seemed to diverge.

The researcher had not realised the start of the ascent and continued to run on the path. It was only in playing back the recording that the researcher noted the divergence from the path. David seemed to be acquiring visual information of the route and combining it with recalling previously acquired information that the course diverges away from a path. His experience in acquiring information on how to ascend efficiently enabled him to consider the point at which he will diverge from the path and begin ascent for an efficient negotiation of the environment.

Figure 33: *Adam is looking to his left at the upcoming route choice.*

Figure 34: *David's route choices, using the footpath or beginning veering off to the right to negotiate an ascent.*

Figure 35: *The fallen tree obstacle on Becky's running path.*

As a part of scanning a stony path, Figure 35 shows what Becky appeared to be visually scanning, a fallen tree branch on the path. Through the visual scanning, Becky is acquiring sensory information, then considers potential options by using recall drawing on the experience of the best way of negotiating the obstacle, such as either jumping over it or running around it on the terrain outside of the path. The recall and

consideration phase then led to a negotiation of the environment to continue the run, where Becky moved to the left of the path to avoid the obstacle and then re-joined the path.

Whilst there was no run recording with Group 2 participants, they described the environment they ran. Joy was aware of the features of a canal and footpath, noting its quality as follows:

> *it's really nice er place, where I live is not far from the canal, there's a really, very well laid out footpath so I can just run along the canal.*

Joy noted that it was quiet, not busy, and not related to sounds. Although it was a public space,

> *it's not used by cars or anything just by people and cyclists and, it tends to be quiet in the time I run and also see lots of people doing all sorts of different things (laughs) I'm sorry, they walk, they jogging, they run, they cycling, and so it doesn't really matter much.*

Joy was also aware of paths and fields, especially where animals grazed where "you had to be very careful what you step into", implying animal waste on the paths. Understanding an environment meant that Joy understood the difference between running on a street and in a quieter outside area. As she was a beginner and seemingly conscious of her development, she commented upon the importance of the environment:

> *... the environment I think quite important, I think, where you run, where you share with, for example somebody, er, is on the pavement, that's a little bit uncomfortable for me. I did try to feel at times to run on the street, the experience was not that good.*

Helen provided an in-depth description of her regular running route of the visual stimulus, which involved running to a park from her home in a major UK city. The transition from suburban to parkland was similar to Guy. Guy was aware of visual "waypoints" on his regular route, which related as a marker during his run, which, when combined with his music, made him feel as if his run was performing well. His running

environment, described as "suburban", consisted of "pavements," a "bridleway", and a short area of fields which "is probably the nicest bit of them", with fewer people. He was also aware of visual "obstacles or hazards", such as more people and traffic when running on the pavements. He wore headphones and relied more on his "eyesight and vision when running."

Faye, Helen and Guy recounted the difference between running on pavements and upon the grass and recognising "gradients" and undulations through "uphill and downhill" sections in running terrains. Helen and Faye recognised the existence of hills on their routes. When Faye recalled running on grass in winter (January), she appreciated the effect of the weather on the ground turning into the "muddy stuff". Grass, for Faye, was equated with being "out of my comfort zone". Faye also noted that she ran in the dark by streetlight, suggesting night-time running. There was not an exploration of the sensory impact of night running. However, Guy also commented after the recording, which was noted in the fieldwork book, that he preferred to run at night as there were not so many people, and he liked the look of the suburban streetlight environment.

Guy was also aware of visual information of other people where the visual external embodied information of other runners when "running as a group you kind of try and match the pace of the group, so you can see if you are in the group or being left behind". He also would notice the upright posture of other "serious runners" as well as "the movement of the arms [...] to help them maintain pace." There is a recognition that environments provide visual information that the person running considers as a part of the suitability of their running.

Parts of this section are highly conjectural as there is no verbal information to support the Group 1 audio-visual data interpretations. Written work cannot embed moving visual data, so the researcher has attempted to provide snapshots that represent the constant sensory use of information in the external environment in which a run takes place. Analysis has tried to understand and explain the tacit, personal uses of the rich visual sensory information of the environment understood during a run.

5.3.3.3 Feeling

Feeling or touch, like sound, is a personal sensory experience that is difficult to convey from audio-visual data. Participants could say what they sensed through touch such as Chris suggesting that a run he did before the recording was slippery in the mud, which described the feeling of ground conditions underfoot. However, the researcher made two recordings in reasonably windy conditions. Feeling the wind seemed to be sensory information used as a part of information during a run.

Figure 36: *An approximate view of what Chris was looking towards, with the woods for shelter in the background.*

Chris' recording was during Storm Jorge which meant that the running conditions were extremely windy. When the direction of the run changed, the researcher commented that the conditions were no better, implying that the wind was still quite strong. Chris replied, looking up from his apparent habitual path scanning, "I'll look forward to getting into those woods" (Figure 36). Chris was aware that the running situation was windy, which he acquired through embodied sensory information on his body. When Chris looked up and scanned further on the horizon, he acquired and considered further visual sensory information that he recalled and described as

"woods". The woods enabled him to consider how they could help his run become easy. Chris seemed to recall, perhaps through previously acquired information, that running in woods afforded shelter where the wind would not be so strong, hence the comment of looking forward to running in the woods.

Figure 37: *"It's in an unusual direction today." David surveying the surrounding environment for weather conditions and an approximate view of what David seems to be surveying in the external environment.*

Like Chris's weather conditions, a section of the run seemed particularly windy, which both David and the researcher seemed to experience. The researcher noted that the strong wind might affect the quality of the recording, which appeared to prompt David to explore the external environment to acquire sensory information. Whilst these actions were happening, David commented:

> *Yeah, we might get a, a bit more wind out from the back [...] although I'm not sure. It's in an unusual direction today.*

David used previously acquired information about wind directions in the specific external environment to consider the wind conditions when David and the researcher would run "out from the back." This acquired knowledge considers the idea of the known route that David would run with the researcher. He is recalling previously acquired information about the route and the wind direction concerning the route to

consider the wind conditions' effect on the route in the situation of the run. Saying that "...although I'm not sure. It's in an unusual direction today" suggests that David has acquired sensory information through feeling the wind. Like Chris and the woods, he looked up to his left at the horizon using his visual senses. This look was perhaps to consider the direction of cloud travel or how the trees were moving in the wind, which seemed contrary to what David understands as usual wind directions (Figure 37). All of the above factors, such as cloud movement and trees moving, are recalling information so that David can consider the current situation in how the different wind directions will affect the running situation.

Whilst Group 2 participants relied upon recalling their running experiences, the weather seemed to relate to haptic sensations. For example, when Joy went running once, she recalled that:

> *I had a run in the rain yesterday! That was (laughs)... I was...I was soaked wet...*

The haptic sensation of the rain meant that Joy could sense the "wet" sensation because of the rain. Faye recounted when she first started to run through a Couch to 5K programme and how muddy it was where she felt the feel of the mud on the ground was slippery like "Bambi on ice", not dissimilar to Chris' comment about his muddy run before the recording. Guy recalled how he used "touch as a sensory perception" in his run, which related to how he felt the ground surfaces through his feet and confirmed how cool weather affected his clothing choice and muscles where "definitely temperature plays a part". Temperature is something that cannot be seen or heard. The weather was not a type of environmental information mentioned by Helen.

The idea of feeling environmental information cannot be described in isolation without some form of reference to another sense, in these two cases, visual (seeing) information. In both recording examples, the researcher's presence as another person running cannot be ignored as they become a means for the person running to communicate the sensory information.

5.3.4   Using the combined device and embodied information

Such is the difficulty in explaining interconnectivity in a linear format that the explanation of visual sensory information included feeling sensory information. This

section expands upon this interconnectivity to bring together the information elements introduced thus far. This section shows how two types of runs, training and races or events, illustrate combined uses of represented and embodied types of information.

5.3.4.1 Training

This section interprets information used in a training type of run. Examples of training runs add to a richer understanding of the already encountered types of information used when running. The section aims to demonstrate how participants use represented and embodied information types during training runs.

When the researcher asked David how he would use his watch in the past when he trained with the British Orienteering Squad, David recalled:

> *Er, I had me little Timex, which I did basically this run right from the early years, er, cos I lived just the other side of the fell, and certainly, by the time I was twenty-ish, I was always timing myself on this loop, and seventeen was the number to go for, but that was from the gate, the forest gate at the far end, so yep, those times were important to me. But that was just a very basic analogue wristwatch because digital watches and displays hadn't been invented then.*

The researcher asked whether the metric used was time. David confirmed this by "peering at the minute hand." During a training run, David would:

> *just look at it, run and look at it again. But, the times were important to me, I was training to compete at a high level then, so I needed that for training and reassurance whether I was running fast enough.*

Using the recalling and sharing of a type of training with a simple wristwatch will assist whether any represented information derived from technologies, irrespective of era applies during a running situation. What is of interest in the situation that David recalls is that "I was always timing myself on this loop, and seventeen was the number to go for." To ensure he was on track with this time, he would "just look at it, run and look at it again." He was acquiring embodied information on the run through negotiating the route whilst also understanding how his body felt to run his loop in seventeen minutes.

He used represented information in his training, the time metric from his watch, to ascertain whether he would finish his running route in seventeen minutes. There is an increased use of looking at his device through the repeated action of looking at the watch, running and then looking at it again. The reason for looking was "reassurance" so that he could run "fast enough" for his high-level performance. David suggests that the resulting times "were important" to him as it was a gauge of his performance, a comment which David stressed twice. Whilst this could be an extreme example, it suggests that when a person is running for a particular goal, they use their represented information, such as a time metric, more often than if the run was a slow purposeless run or in a race or event situation. More recently, David still used a GPS wearable device during 'training' to get "an even pace and not going too fast" when training for ultramarathons. The GPS device still seemed to have a reassuring effect when in a training run.

Chris' experience of using a device seemed to reflect David's spoken experience. When Chris undertook interval training, he also used represented information from his wearable device. The pace metric would emotionally "reassure" Chris that he was running at the correct speed or "pace". Becky did not describe in as much detail the use of information whilst on a training run because she wanted to express that she did not do that running anymore. However, when she was training for events, such as a marathon or half marathon, she would use her device to "watch it for pace, um, I might look at it to see how- what the mileage is or how far I've done". Watching for pace and distance could be interpreted as a way of reassurance by informing the runner that they are running at the predetermined training pace and distance. It seems that represented information is used much more in training runs, and for Becky, the idea of "constantly looking at your pace" became "stressful". Hence, she reduced her use of represented information to train in aesthetically pleasing environments.

Compared to Group 1, Group 2 participants who used devices with visual represented information seemed to have broadly similar increased usage during their training. When the researcher asked Joy if she used represented information more than her body whilst running, she suggested that both were equally important:

> *I think both, 'cos as I'm a beginner, and my own body [...] there's a limit [to] the pace that I want to achieve.*

Faye used her watch to try and keep her pacing on track during her runs, using it more than relying on her body. The two types of information seemed to be working together to understand her body's physical capacity. Faye suggested that she had to use the information on her watch quite frequently because:

> *my pacing is pants...I have to keep an eye on it because I just can't judge my own pace...I would have no idea unless I look.*

Faye used her device to understand why her body was performing in a certain way. When she discussed breathing, she used the watch to check her pace so that the breathing effort matched the pace. If the pace were higher or lower than expected, that would explain why her breathing was either difficult or too easy. She found that if she did not wear the device, "you'd be feeling really out of control." Faye's device was seemingly described as an indispensable personal assistant when running "because it's kind of my help."

Helen expressed a similar combined relationship between noticing changes in her physical effort which she checked with her device. Faye used her timing information to interact with visual points on her route to ensure she ran at the right speed. Guy reported a similar habit which he called "waypoints". However, because he did not wear a timing device, he usually listened to music, knowing through the timing of the music tracks roughly where he should be on the course of his run.

It would seem that represented information was acquired from devices and then considered to recall what the pace was with the bodily feeling (embodied information) so that they could run "fast" or to the predetermined "pace" for the training purpose. Training suggests doing something new to improve the body to ultimately run faster and run or compete at a chosen level. Training seems to be a personal information use that creates an understanding of how to combine represented information and embodied information to negotiate the running environment as efficiently as possible.

Adam described a social use of increased represented information during an example of training that he leads at his running club:

> *[S]o if we're doing a timed session or a pace session, I'd be looking at it then [...] when the interval is up or if we've set ourselves a pace, I'll be constantly looking at it, and I'd be going, right, pace, and because I'm one of the team captains on a Tuesday, if I'm running a session, I really need that to shout out times.*

It would seem that represented information from a device to inform other runners of pre-set goals or targets is similar to personal uses described with the addition of verbal communication. In a training session, the use is constant because Adam has a responsibility to let others know when to stop running for an interval (a short period running fast) or whether people are running at the correct predetermined pace ("if we've set ourselves a pace"). He uses represented information to communicate to other club runners ("shout out times") that the timed interval session has finished so that they can stop running or slow down or speed up for the specific training. Information used in a social training session acquires represented information for the session. Represented information includes time or pace metrics whilst running to consider the represented information conveyed on the device. The runner then uses the information to recall either the predetermined time or pace of the interval, which is then 'communicated' with the other runners to achieve the goals of the training session.

'Training runs' seem to use 'represented information' far more than 'slow-paced' or 'easy' runs. The training runs are where effort is put into a run to achieve goals, such as becoming and staying fit, running faster, competing at an international level, national level, or completing an event in a particular time.

5.3.4.2 Races or events

This section focuses on using types of information during a race or event run. David does not feature in the discussion because there was no mention of race or event situations related to types of information use.

Adam recalled two situations of race and event situations.

Well, it's like today, on parkrun today, didn't look at my watch either, and my first mile and my second mile were exactly the same. Couldn't believe it.

In this revisited example, looking at the watch is interpreted using represented information such as distance, pace and time shown on Adam's watch display. In an event situation, the use of the watch is relatively minimal because training runs were the situations to understand the body and its limits concerning metrics.

And in a race situation, say for a cross country, I ran a cross country race last weekend, I did not look at my watch once. I was just racing people in front, trying to catch them.

When it comes to a competitive race, it seems that the embodied information of other runners is acquired through seeing them and knowing their paces and times (recall) and then considering an action to try to catch them. External embodied information lets Adam negotiate the external environment by overtaking as many people as possible and finishing in a position as high as possible. During the race, his represented information was to acquire it for looking at it after the run because Adam acknowledged that he was "recording it [the race] but I wasn't using it to give me data on the run." This reflective element seen in all participants will be explored separately in 5.4. This lack of represented data during the race was later amended to minimal use when Adam considered his most valuable pieces of information (distance and average pace). He said that:

Pace is probably the one I use a lot because I think if I'm in a race, and I want a certain goal, or certain time [...] I will work out the pace I need so I think, 'cos I don't wanna, in a race, I think, my head doesn't want too many stats in it. I wanna be at basic. So for me, if my pace is where it should be, my total time will work out.

It would seem that the subtle change of wanting a goal in a race also changes represented information use. Use remains at a minimum where Adam's "head doesn't want too many stats in it." The researcher interpreted this to mean that he probably has embodied information to acquire, consider and recall during a race which is

enough to contend and does not need to use a lot of represented information. Adam needs his head to have fewer sources of information to concentrate on his race time. Chris echoed Adam's use of embodied information from other runners. Whilst this section repeats excerpts related to the rationale to run and competition, Chris used other runners not to "catch up" with them like Adam but to "hold on" to them:

> *...when I was much slower, I was always looking up. I was always like, running quicker so I can hold onto them on the last bit to see who's around.*

Chris used other runners in the recalled situation to acquire their embodied information, recall and consider the information before deciding to "hold onto them". "Holding on" is not meant literally, but it is interpreted as a physical effort with its own associated embodied feelings, usually discomfort. When Chris refers to the "last bit," he is likely referring to the last section of a race route or distance. Chris acquires information about the runners around him, especially those that may be familiar to him. This recognition leads him to recall and consider the person concerning their known speeds and times so that he could negotiate his race environment faster. When Chris set his five-kilometre personal best time, he recalled how he had the help of another runner to set his first mile for him (5 minutes and 38 seconds), and he then tried to keep that pace going for as long as possible, which seems to be an example of "holding on".

Group 2 participants did not run with other people in a competitive running environment, as has been described amongst some Group 1 participants. Group 2 participants felt that other runners they considered experienced seemed more at ease with their running and running with others than them. Faye felt as if such runners seemed to be "near enough walking" and having a "massive chat" when they were running with her compared to trying to catch her breath. Helen noticed a change from when she ran with her boyfriend, an experienced runner, for the first time from when they had a break from running together. The first time, she could not talk and breathe, whereas the second time, she noticed an improvement because they both could chat along the way. Guy noticed the ease of experienced runners leading a social running group who would "absolutely leg it" past them, meaning that they would run faster than

the current pace or seem to be talking when he was "maybe struggling a little bit more." Faye did mention that the only time she did a race event, she appreciated that she was running with people of a similar standard. This appreciation is a similar recognition that those in competitive race situations seem to understand, with an apparent difference in that Faye did not try to move up through the field.

Chris used represented information differently from Adam in a cross-country race situation. Adam relied more on other runners and his body. Chris was still using his device for represented information, albeit minimally compared to his training runs where his pace could be reliably measured. In a particular cross-country race, "Parliament Hill", Chris noted that his watch was not used because the cross-country course was "hilly" and "up and down" and had muddy sections. The cross-country terrain seemed to suggest that off-road running, such as cross-country, lowers represented information use because of the introduction of the variability of the terrain. However, Chris still found a different use for his metrics where, over a repeated course, he used his watch to be alerted to mile splits but not as a means of comparison but to see the time "difference" and the effort he was putting in. He compared this to his usual mile time or pace against off-road conditions and how his body feels – his effort – despite differences in his mile time. Chris uses his device more than Adam as he still learns about his body information whilst running. Chris is still acquiring, recalling and considering information from embodied and represented sources to negotiate a competitive cross-country run.

When Becky moved to off-road running, the Beachy Head marathon changed how she used information during a run. Becky's "mindset" changed because the off-road terrain of challenging hills deemed walking acceptable, so she did not have to run the entire distance. This change in wanting challenges but differently seemed to have shown Becky the possibilities of running without relying on a device to assiduously observe "pace" as when she trained and ran in competition. It would seem that the event moved Becky away from preparing for races and participating in them without incorporating represented information and pressure. This change meant that she felt liberated and that she

> *...didn't look at my watch at all during it. Deliberately [...] maybe the odd time to look at miles how many miles we'd done I didn't really think about having the pace, 'cos you couldn't, it wasn't worth it because you didn't know what you were aiming for, so, I quite liked that.*

This new way of using information during a run where the negotiation of the run in the event is for sensory experience and enjoyment instead of the emotional pressure induced in "road things" she "found a bit stressful [...] especially when you run in a club." Off-road running events afford an emotional liberation from not using the represented information on a device. Becky has moved from using represented information and embodied information from runners in a race towards a more emotionally rewarding negotiation of the embodied information of the environment in an event such as Beachy Head.

Off-road running reduced the number of metrics related to quantified information on the device. The amount of embodied information types has been increased, including sensing the embodied information of other runners present. External environment information use also increases, with a higher consideration of the terrain than training runs.

5.3.5   Emotion towards information during a run

The participants seemed to demonstrate emotions towards their running information. Acknowledging that this research is not a psychological study, this section will outline what the participants seem to suggest about the emotions they encounter during different types of runs. This section presents these findings because they emerged from responses to the loosely structured interview questions. Emotion was a concept that emerged during initial conceptual analysis and became a crucial relational mapping element when considering types of information on a run. The significance of emotions was not fully understood during data collection until analyses developed with an increased number of participants. The sections below present the findings of various types of emotions that the participants describe between them.

5.3.5.1   *Positive well-being*

Becky prefers running "off-road" because of the external sensory stimuli.

> *I love this and I love getting outside. I love the elements. And the off-road running is what I really love.*

"This" is the point that Becky gestured to the woodland surroundings. The sensory, embodied information derived from the off-road environment is a pleasant, enjoyable positive emotional experience for Becky that she loves. Whilst her device displays pace, the time elapsed, and distance travelled metrics, Becky seldom considered them during the run. Instead, she focused on external environmental information, which seemed to foster emotional positivity and enjoyment, linking back to her rationale for running. David described fell (UK mountain) running environments compared to road running as "more fun". Guy, who did not use a device during a run, found that running was for mental well-being because "it kind of takes your mind off stuff", where the activity becomes the single focus. Helen also found that running allowed her to take her mind into a different focus for two reasons. The first reason was that she had a sedentary desktop job, and the second reason was that she moved to homeworking due to Covid-19 restrictions.

5.3.5.2   Thrill of the race

Chris's "virtual race" did not seem to be a replacement for a race. There was an observed absence of emotions in the race. The feeling that "beating people wasn't the same thrill" in a virtual race. He likened finishing well in a virtual race to "winning a segment" in Strava. It did not have the same impact on his positive emotions.

5.3.5.3   Pressure

Becky used "pressure" to describe running to set paces in road races, which took the enjoyment away from her running. Adam, Chris and David did not seem to use this word or mention such thoughts during a run. Adam did acknowledge in lockdown that not having a set training routine meant that he was free of "pressure", which suggests that perhaps there is a lesser stated presence of pressure during a run.

5.3.5.4   Reassurance

Most of the participants seemed to use pace for "reassurance". Adam, Chris and David seemed to demonstrate that their device with metric read-outs provided them with reassurance that made sure that they were running at the right speed. This reassurance ensured that what they know of their body seemed correct with a pace

metric. Becky described, and Adam acknowledged that reassurance could tilt into pressure through a pace metric. Joy, Faye and Helen also used their devices in this reassuring way but with a higher frequency of reassurance seeking.

5.3.5.5 Frustration

Faye mentioned the word "frustration" as an instant reaction to the device and then mollified it by saying that it is "just a tool to try and keep me steady." This frustration links to a form of pressure felt perhaps when her device was informing her that she was not running steady enough.

5.3.5.6 Embarrassment

Joy described where she felt "embarrassed" when running as a beginner, which linked to her running when in a more populated environment. She did not want to run on a street or track as she felt that it was not a quiet environment because she sensed other people. She seemed to be self-conscious of her running and running speed and felt more comfortable when she felt she was running independently.

5.3.5.7 Low confidence

Faye mentioned low confidence about her running when she suggested that "I'm not very confident about my, er, my running skills yet." This low confidence could contribute to her not considering herself a runner but a beginner. Low confidence seems to be related to Faye not knowing her body, continuing to run the same route and using her device as her "helper" during a run. Joy described embarrassment when running in public which may also relate to low confidence. However, the other participants did not seem to admit to low or no confidence in their running abilities. Helen did not display this lack of confidence because she also participated in team sports.

5.3.5.8 Emotions during a run

It would seem that the four male participants did not overtly mention any negative emotions concerning their running and types of information. However, one participant did suggest that when in a training schedule, there is an element of pressure. Three of the four female runners associated some negative emotions with running and types of information. One female participant from Group 1 explicitly mentioned pressure, and two Group 2 participants discussed frustration and embarrassment with their running.

Across the participants, reassurance from represented information as a metric was a common emotion with varying frequency depending upon the type of person running, whether in Group 1 or Group 2.

5.4 Using records between a run

Attention to the idea of the record and related activities was first drawn in the first phase of recordings with Group 1 participants and explored in more detail in the second and third phases. The previous section described the participants' watch use during a run. One of the key findings was that those who kept track made a recording of a run's information through timekeeping or wearable devices. The records suggest a "looking back" or reflection. This reflection introduces an information type that seems crucial to using running information outside of the physical activity itself: the idea of a record of a run—pressing a button on a device at the start and end of a run 'records' information and metrics of running activity. The resulting recording opened up questions around what the participants understood as a record of a run, where they kept and accessed these records, what types of storage they used, how they used them and valued them. After Adam described his device use for information during a run, he explained what he did after a run with the recorded device information:

> *...I upload that to Strava, then I have a cup of tea on a night and look back at how it has gone.*

Adam suggests a situation away from the run where he implies he is in an indoor setting, not running, where he can "have a cup of tea". Reflecting on the run in its recorded form is suggested by looking "back at how it has gone". Under examination is the "that" Adam refers to in "then I upload that to Strava". An interpretation of this example is the represented information recorded by the wearable device transferred to some form of storage and visual representation, understood as "Strava". The participants' use and understanding of a record will be first explained before describing the ideas of activities surrounding the specific information type of a record through transcriptions of the participant's responses, image stills, and information provided after the recordings.

5.4.1 Participant perspectives of records

This section describes findings seen through the lens of the participants in what they understand and use with the record or records. The uses of records that appear in both paper and digital media then describe the participants' observations between the two media.

5.4.1.1 *Use of the word record or records*

The participants' understanding of a record seems to derive from the idea of recording a run. All participants, except for Chris, spoke of variously "recording" runs or "records" related to runs. Adam saw the accumulation of these recordings stored on Strava, a third party software platform, as "a record […] of my journey in running". Becky felt that it was "nice to keep a record" for personal reflection of her running activities and routes for her "own interest". Becky noted about Strava that if Strava could no longer provide its service, "you wouldn't have any record, would you really, of it?" because she did not have it "recorded anywhere else now". David had a clear idea of his recordings, which he described as "three records" types: his Strava, which was not his "prime record", his "electronic diary", which was his "prime record", and his "paper records" which were his "past records" in the form of "a diary". Faye and Helen mentioned their online running accounts as "personal records". Although Guy did not keep records of his runs, if he did purchase a wearable device, he would "record some metrics". Chris, the youngest participant, did not use the word record. However, he suggested a form of documentation in taking down in a diary his online platform (Strava) information:

> *Strava's such a good diary in a way […] I'd be gutted if the information ever did disappear that, that's why it would be good to take it all down and put it in a sort of diary and that sort of thing.*

When the participants spoke about "looking back" to reflect on their running for one reason or another, they referred to "a record", whether digital or paper. The participants offered screenshots demonstrating these records. The records of the participants range from the dynamic and static visualisations presented in Strava (Figure 38) to handwritten diaries (Figure 39).

In Figure 38, a part of the visualisation seems to show the title of the run, a comment by the participant below it – "concentrating on Heart [sic] rate," – the date of the run,

distance, moving time, pace, elapsed time, the watch type, calories used and splits of the run over the mile. When scrolling down, the webpage presented a map with a route overlay. There are further options on the left of the screen for further analysis such as pace analysis, pace distribution, heart rate, segments and laps. In Adam's case, the metrics derived from his Suunto 9 device form the basis of the idea of "a record." Similarly, Becky, Chris, David, Faye and Helen also used Strava and would have their running information presented as a record through the Strava platform. Joy used the Huawei Health app, which had visualisations distinct from Strava, but the presentation of the metrics seemed to be a similar principle.

© 2020 Strava
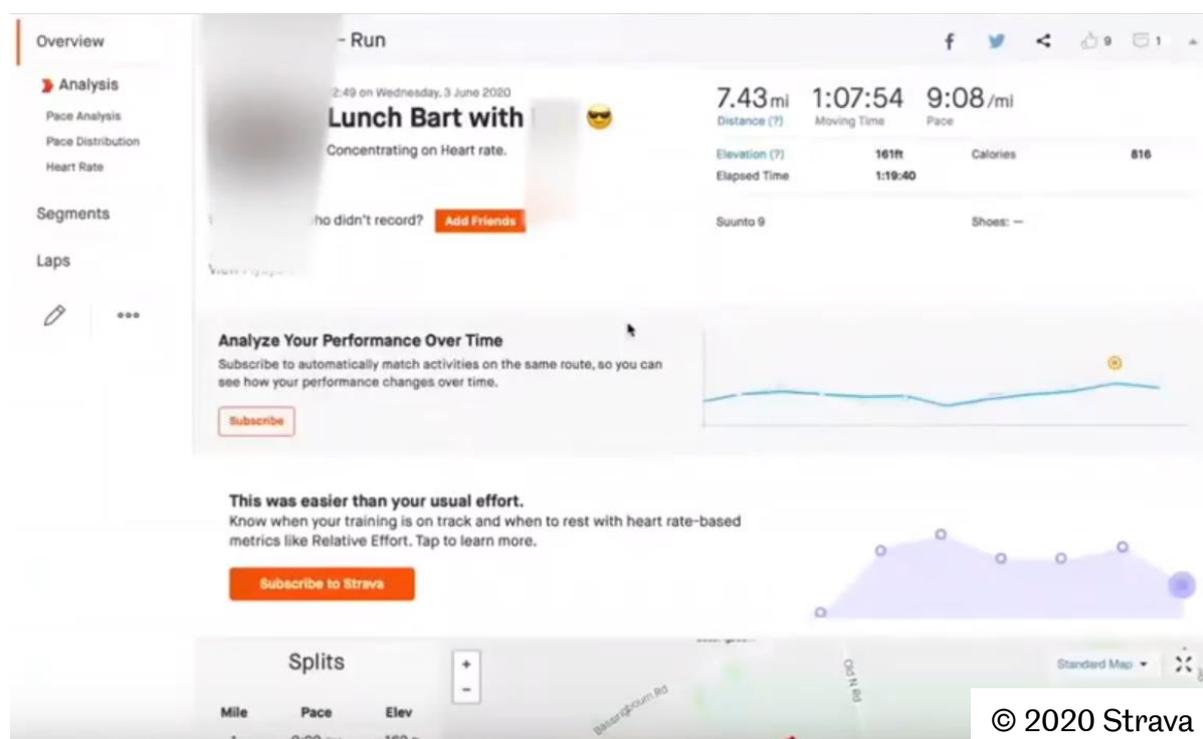
Figure 38: *An example of part of data visualisation in Strava of one of Adam's runs, considered a record of a run.*
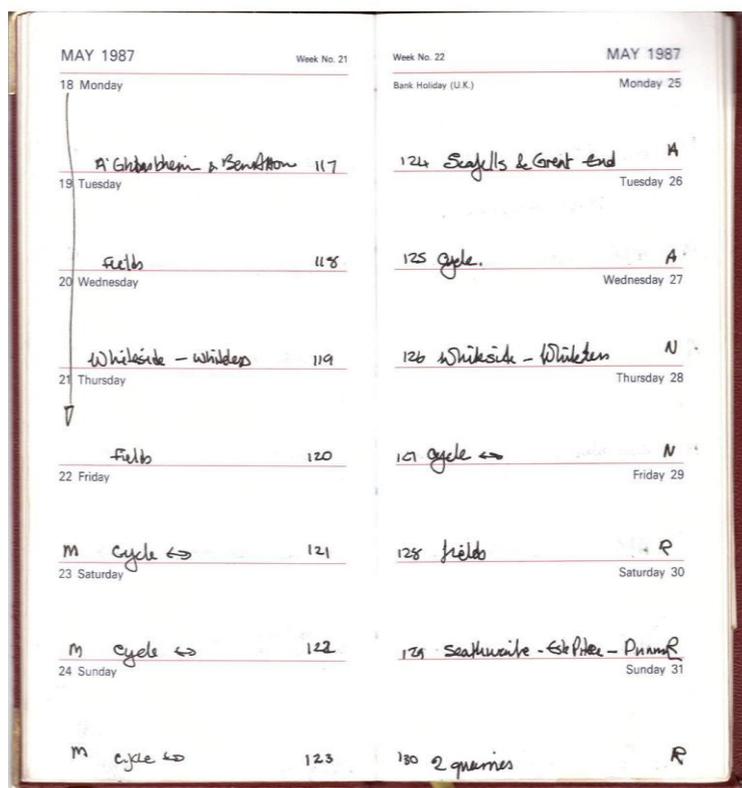
Figure 39: *An example from David's handwritten records as "paper diaries".*

David kept his types of records long before the development of Strava. Adam recalled that the older runners at his club used to keep running diaries or logbooks before wearable devices and platforms such as Strava were popular. David noted that this was the only way to record running information before home computing. Figure 39 contrasts the Strava "record", where the person running decides what information goes into their record. In David's example, there are no metrics, only names, a letter code and a number recording the consecutive days of exercise.

5.4.1.2   Qualities of recording media

Group 1 participants explored and expressed perceived qualities of digital and paper records, recognising the difference between the media. Paper records seem to be associated with handwritten records. The participants said that paper allowed for more significant consideration over the construction of the record, noting that investing "time" adds a "personal" quality to paper records. Paper records could be "tailored" to what information the individual wanted to record without a social element that could stalk them, so anything could be recorded by the individual knowing that others will not be able to see them. Paper seemed to be a "personal record", which "in terms of a reminder" is "quite a nice thing" that invokes a sense of nostalgia. For David,

a paper medium is better to reflect upon a "long time series". The participants seemed to find that paper-based records related to permanence and more time extended accessibility beyond their current use. However, it was not a medium that leant towards easy "searching" for records.

Perceived as easy to search, other qualities of digital records, especially within online platforms, were the available volume, depth, and richness of information. As Adam said, "there is so much data there, isn't there?" and Chris opined that Strava provides "a deep level of information". The digital platforms seem to afford "searching" when used for current and near-future running activities. Becky suggested that paper was "not as instantly clickable" as digital records. Chris went as far as to say that "nothing could possibly replace it", which indicates the representation of digital records is somewhat irreplaceable. David portrays the suggested effort needed to maintain the digital file with his digital recordkeeping practices over thirty years of the same file. Chris raised the danger of the impermanence of digital records.

Faye noted how devices were "fallible", implying the information that goes with them in a case of failure (or replacement in Joy's case). Despite David's efforts in maintaining his digital information, he commented that digital records have "greater value" when linked to his current running activity so he can reflect upon "how I'm doing this year." Chris, the youngest participant, was aware of MySpace and early discussion boards as examples of digital platforms used across society. Then another online platform came along and replaced it. Chris seemed to accept that perhaps his Strava would go the way of MySpace, and runners would move on to the following recording and sharing information development.

5.4.1.3   Selecting information

The participants who used manufacturer wearable devices and applications such as Suunto, Garmin and Huawei did not appear to customise represented information that the devices recorded and presented through a third party application on a smartphone or laptop. A tentative suggestion is that the choice of the device is a decision to select the information that the participants wanted about their running activity. For Helen, using these devices afforded "minimal effort" in creating and storing records because somebody made the decisions for her. Strava introduced a

subscription option to access previously available information for no cost during the data collection period. As a result, the participants using Strava chose to pay for the service or remained with the "basic package".

The types of information could be pre-selected by the device manufacturer and the software platform. Figure 39 of David's handwritten diary suggests that David could determine the information to include in his records – the place of the run, a code for the activity and the consecutive days of activity.

When he chose to set up his electronic diary, he similarly exercised control over the metrics he wanted to record instead of having a third party decide for him:

> *For me own electronic diary didn't record miles because I reckoned it was more relevant to record hours or time so on me graphs over the last thirty years are based on time out, whether it's running or cycling or canoeing or whatever so because that gave a loosely transferable measure week on week of the different activities.*

It would seem that David has control over the information in his diary, and third party design did not lead to what he could record. His understanding of his activities led him to design his diary based on time rather than distances. He wanted "a loosely transferable measure" of his weekly activities, which enabled him to include more activities than just running, such as cycling or canoeing. David seemed to suggest differences between fell (mountain) running and road running where the "average speeds don't match". Measuring these runs in time provided David with a better comparison than a distance or pace metric. The measurements were also quite simple for comparison and were not particularly "rich" compared to Strava. David even selected the information he wanted to record over recommended to him in his early running days. His coaches would:

> *...encourage you to write down like weather and feeling. But I never did. I just put miles and time, height gain was done by counting contours on a paper map.*

In David's case, the simplicity of the recorded information in the records seemed to affect when reflecting upon longer-term data compared to complex information

contained in the records. Guy went one further step surrounding the choice of making records. He did not choose to record his running at all because he felt that:

> *...we live in such a data-intensive information environment it's nice to be able to do an activity where we can get something out of it without having to track data...*

Guy has effectively excluded himself from the activities and concerns related to running records that follow this section because he chose not to make any records about his running, either from a wearable device or through a diary.

5.4.2   Storing

Introduced – but not discussed – within the above sections is the implied idea of the storage media of the records. Whilst a consideration when constructing information assemblages in running activity, considering where the information is stored so that it can be used and made accessible is perhaps a lesser concern amongst the participants that make records. This section predicates what participants told the researcher about where they use and access information. The researcher analysed this use and access to present where running records are stored. This section does not attempt to describe how the participants use the information, which is the task of the following section.

5.4.2.1   Strava

Strava (Strava, 2022) is an example of an online platform where tracking data from a smartphone or GPS watch can be synched with a device to the Strava server infrastructure to view the data for personal and social use. Strava suggests that these uses include performance measurement, social networking, real-time activity tracking, finding new routes, and competing against others virtually through "segments" and "leaderboards" through a free or subscription account. Claiming to have "millions of athletes all over the world", Strava seems to be a leading online platform. Six participants used Strava.

When the six participants upload their records to the platform, there is generally an unquestioned technical process about the data transfer. Most of the participants did not seem to understand the technicalities of the process. They did know that the process works. The participants are aware of the entities involved in the data transfer

about a running activity from their wearable devices to the Strava platform first via their manufacturer's platforms. Becky described where her device uploads the data from her device to Garmin Connect, which "then pings straight onto Strava."

5.4.2.2   Garmin Connect

Garmin Connect is Garmin's online software which can be used with the Garmin Forerunner models that Becky, Chris, Faye and Helen used. All were aware that their running data were stored with Garmin and accessed through the Garmin Connect online software application. Becky preferred to use Strava only to access their running data and records. Chris, Faye and Helen, who also used Strava, also used Garmin Connect to access running information after their runs for analysis or reflection.

5.4.2.3   Movescount

Movescount is Suunto's online software application used with the Suunto 9 and Suunto's Ambit Peak wearable models that Adam and David use, respectively. Both Adam and David were aware that their running data were stored with Suunto and could be accessed through Suunto's Movescount online software application, although they used Strava. Adam identified his Movescount as a potential backup store of his running records.

5.4.2.4   Huawei Smartphone and Huawei Health

The Huawei Health application is "built-in" software in Huawei smartphones. The smartphones' hardware and sensors are programmed to track physical activity such as running. Joy used this application on her Huawei smartphone. Joy thought that her Huawei Health information was stored only on her phone, so the storage of her records had more stability. Joy was aware of the option of having a HUAWEI ID which connected all applications built-in to her Huawei device through synching to Huawei's third-party storage. However, Joy did not do this due to private data security concerns.

5.4.2.5   Other digital applications

Becky and David also mentioned other applications for other activities. Becky used MyFitnessPal to log food and activity when she was "trying to just drop a bit of weight." David used RideWithGPS for cycling, which he found especially useful for elevation profiles when riding on unfamiliar routes and wanted to understand how to best use his body to tackle climbs.

Adam, Becky, Chris, Joy, Faye and Helen also mentioned social media sites such as Facebook, Twitter, Instagram and WeChat in the context of social uses of information related to their broader activities in their lives. Whilst participants did not explicitly consider these "records" (nor was this questioned further), it does raise the possibility of the broader storage of information about the participants in other third-party digital storage infrastructures, thus widening their information assemblages.

5.4.2.6   Offline digital storage

Only David stored information offline in electronic storage outside of online digital applications and infrastructure. David maintained his "own electronic diary" in which

> **...**we're going back before fitness apps and things. It started when I had access to Excel at work, and it's still the same file. It's been the, I think the continuous runs of thirty years, I was using it well before then...

It also suggests that David input the information manually from his recording device into the offline software on his personal computer (PC) at work and then at home. For an insight into how David had been able to maintain "the same file" for thirty years, David recounted the following:

> I still back everything up three times as a sort of daily file history backup, there's a monthly backup to hard disk and a three-monthly in me fire safe. Not just that, it's more for professional stuff as well, but I've never actually backed up my Strava data because that's not me prime record, it's interesting.

It would seem that designating his "Strava data" not as his "prime record" (noting that it is just "interesting") and not backing up his "Strava data" was a deliberate choice. Using "data" and "record" suggests a linguistic difference in the same material. He seems to value the data in the Excel file that he has used for over thirty years. As the above excerpt details, David backs it up three times amongst his "professional stuff". It suggests that this participant has a strong understanding of offline computing storage, which the other participants did not raise, either because they did not do this or did not know how to. Becky went as far as to suggest that she was not a "techie",

interpreted that she is not a person who claims to have a deep understanding of technology beyond that which is helpful to her in her everyday life.

5.4.2.7 Analogue storage

When asked about other means of keeping her information recorded, Becky recalled:

> *Before I had Strava and everything and that sort of watch, I just used to sort of write it down, um, particularly when I was training for a triathlon, I would write down my rides and my swims, I think one of the children bought me a log, you know, a book…*

We had already seen an example of one of David's handwritten running diaries, which he started at least when he was training at a national level in his early twenties. From electronic technologies to privately stored, handwritten information, information storage sites have extended through these insights. Adam had a past training activity for "scuba diving" recorded in a handwritten diary. Chris projected that perhaps a handwritten diary could help record his Strava running records from digital to paper. In these instances, transferring the information from the run or activity becomes an act of recording of writing down information in a non-digital format. Joy used a handwritten diary where she mentioned her running and reflections, but the diary was not a specific store of running records. Faye had none of her running information stored in analogue sources ("what, pieces of paper and everything?"). She said that she once had a general day handwritten diary, but even that is all on her iPhone now.

5.4.3 Accessing

There seemed to be an implicit perception for running records stored with online storage platforms that the online records would always be available to the participants. There were also no explanations regarding access to and use of technology where there seemed to be an assumption that this was a normal part of everyday life. The technological access and use ranged from literacy skills to handwriting in a diary through uploading, accessing, and reading their online running records. Raising the issue of access with Faye, she said, "would expect always to be able to have it". She had not considered whether the records could not be accessible in the future. Faye only accessed her running records on the Garmin Connect application through her Apple iPhone smartphone. Helen expressed similar sentiments as Faye.

Instead of an absence of technology, participants seemed to have a choice of technology devices through which they could access their running records. Some accessed their running records for "deeper analysis" with a second technological device. Participants often did this when a smartphone version of an application and its associated data presentation did not provide the information from their record that they wanted to see. As a result, participants accessed the online records through another technological device such as a laptop or a desktop personal computer—David, who had offline digital records, accessed those through his personal computer only. The following sections will discuss using participants' running records for analysis.

For running records stored in a device, only Joy was aware of ongoing accessibility issues. If she got a new phone, she felt that she would lose the running records. However, this seemed to be a deliberate trade-off for not using third party storage. It meant more "stability" in accessing the records for her immediate needs.

> *I think [...] the information [...] up to the point when I need to change to a new phone, to be honest, that's more of the issue...*

5.4.4   Reflecting on recent personal records

Irrespective of storage medium and data presentation recorded from a run, reflecting upon records within a relatively short time since a run seem to relate to personal running rationales. As introduced in the section above, a particular type of reflection Group 1 participants use is analysis. The reason why Adam reflected upon his "stats" was that:

> *it's as the times tumble and the PBs come, I think then, I'm kind of then, I'm more analysing runs? [...] So, I think for me personally, what made me look at my stats more was personal goals, getting the times down.*

Stats suggests the aggregated nature that the online platforms can present information from running records. Adam still made a recording at the start and end of a race even when he did not need metrics during it. He made a recording to "look back at the stats." After a race, Becky also liked to look at her race information on Strava, especially if she had done the race the year before, she would "go back and compare, and that sort of thing, I like to do that." There also seems to be an element of reflection

after a training run, which seems to convey, in Becky's case, a cursory analysis in the online platform Strava:

> *I look to see what the time is, the overall time, and I might look at the sort of the average pace and things like that, but I don't do any more than that. I don't very often find that I've got a crown or a whatever, but on one of the few occasions that I have, it's nice.*

The mention of "a crown" is a gamification tool in the Strava platform which awards a "crown" to somebody's account to denote that they have run a particular designated segment faster than anybody else. Becky notes the reflection and the acknowledgement of a crown awarded as being "nice", which seems to be a mild form of positive emotion.

David knew he had done a good run or not when training at a high level by using the finishing time as the criterion for a good run. He explicitly rejected the idea of feel as a criterion for performative reflection:

> *I'd never use, as you're encouraged to now, I'd never use how it felt unless I was ill. Otherwise, it was just a straight time recording.*

When he recorded in his handwritten diaries distance and time, he also recorded the height gained. Unless he had already run that route, he worked it out again afterwards "by counting contours on a paper map," suggesting that he needed a map of where he had run and counted the contour lines ("contours") on it. Contour lines represent the height of a position on a map. Using contemporary technology at the first recording, David reflected upon his runs with records of his previous performances.

> *Well, that's only really since Strava came along and, of course, GPS watches because pre-GPS, all you had was a start time and a finish time. And you'd think, well, maybe I did go a bit slower uphill or downhill, but you wouldn't know. But now, with the Strava trace and the segments, I know exactly where I'm doing better and worse.*

David reflects upon his initial thoughts during a run, whether he completed an uphill or downhill section in a certain way, which he used to do before using Strava. As David

now has records to reflect upon after a run, he can better understand where his performance is "better and worse". He also called this type of reflection "analysis".

David's mixture of using records of past runs to reflect upon current runs suggests he does not reflect upon records of runs just as isolated records of activity. In "looking back on the stats", there is an aggregated sense of reflection over time, usually within a training cycle that becomes an integrated part of the planning process for the next run. Adam exemplifies this:

> *Yes, so I think over the course of the week, I like to look at my weekly miles target, especially if I'm again training long-term for a race, so I like to, I know kind of, what I need now, miles per week to be where I need to be. So I look at that and also look at how hard I've been training as well during that week. To know, also, to back off a little bit or to go on, so, then, if like, I am getting a bit fatigued or a bit tired, I'll look back at the total mileage, and also the efforts which again for me, goes back to the pace and the average pace.*

Adam includes embodied information in this weekly reflection, particularly bodily sensations of fatigue or tiredness, compared to the represented information in the records. David uses the online platform Strava to track his times against previous years. It seems that data confirmation has a slightly positive emotion ("pleasing") (Figure 40).

> *It's interesting to compare your own fast efforts, what you're doing this year and the average against last year. That's quite pleasing if you feel like you've had a good run and the data confirms it. The comparison really shows up your strengths and weaknesses.*

Your Recent Efforts
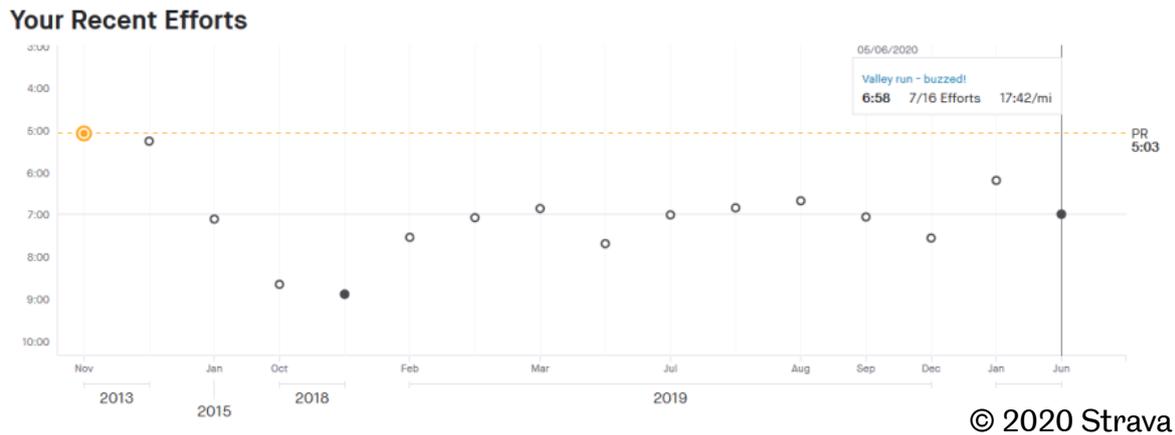
Figure 40: *An example of David's longer-term trends of running a particular route presented by Strava.*

Chris used both Strava and Garmin Connect online platforms. He used Garmin Connect for a deep analysis of his data. After completing a session, he would look back at an interval training session. Chris was particularly interested in cadence analysis. From the data on Garmin Connect, which Strava did not provide to him, he could see that his cadence (the number of steps taken in a minute) was lower than the perceived optimum of 180 steps a minute. Chris wanted to try and take steps to increase it by listening to music running ("drum and bass") that had a tempo of around 180 beats a minute.

Participants within Group 2 were similarly analytical in their reflections on their recorded running information. For Joy, the reflection upon the recorded information presented on her Huawei Health application linked to her personal improvement goals:

> *I don't think I can make progress without information on the app [...] because it's more, it's a way you can reflect and see your progress, [a] result of information from the app. It would be difficult for me to measure what I have done and the way I am going, it's more of like, you are just, now you kind of run in a way you know how well you do or how badly (laughs). Those kinds of feedback are important.*

Joy also described similar language to Group 1 participants when reflecting on whether she was doing well or poorly. Joy was in no doubt of the importance of the records presented in the Huawei Health application as it was:

> *more of a practical use than anything else, it's helped me improve my running progress.*

For Helen, the gamified challenges in Strava were a means of charting her progress. She would prefer to analyse summary information rather than her records on a run-by-run basis. Faye used her records on Garmin Connect to reflect on her progress. She analysed her "pacing" to ensure that it was consistent during a run. She analysed the distance she ran, which is usually similar given that she runs the same route nearly all the time, her heart rate and looked for "PBs" (personal bests") on sections of her run. This analysis was all done within a private reflection. Faye notes that Garmin Connect has more information, although Strava always makes her look faster. Faye found that she looks back at a maximum of a month's worth of records but no more than a month, as "that's plenty".

Reflecting upon running records seems to incorporate some embodied information, but the reflection was primarily on the participants' running records. The participants use records to inform their current running activities. Adam reflected that single Strava records are "only important for that moment." This single-use suggests that the records are related to primary rationales and not over a significant time. Joy's experience seemingly supports this in that she can map her progress by reflecting on her past activities' records. Guy did not have a device, but if he were to use one if he changed his running habits, he "would probably invest in a device to try and measure progress." Guy's suggestion seems strikingly similar to the observations of using a self-tracking device amongst the other participants. Guy did not make records of his running, but he suggested the idea of measuring progress as a reason to use a device to track and record his running activities. He also recognised that it would, potentially, "change my lifestyle a bit", where he would probably be driven more by understanding the resulting records related to this progress. This data-driven lifestyle seems to be what the other participants do in reflecting their records. However, Guy seemed to be happy without having to track his runs because he uses and understands his embodied information and does not have a need to measure progress. As a comment on reflective use of information in running activities:

> *I definitely think there is a potential for people to focus too much on capturing data. Obviously, it can tell you a lot [...], but also, I guess potentially you could become a little bit obsessed with it.*

5.4.5   Reflecting on longer-term personal records

This section examines how participants seemingly use the information they recorded further away from their recent running activity. These records are 'longer-term records' to differentiate from the previous findings,

David had over thirty years' worth of running records, which he still reflected upon to inform his current experiences. This reflective use brought currency and a "greater value" to his records in his electronic recordkeeping systems. David based his thirty-year graphical representations on the simple "time out" metric that he had collected for running and other activities such as walking, cycling, canoeing, and orienteering. Figure 41 represents these metrics.
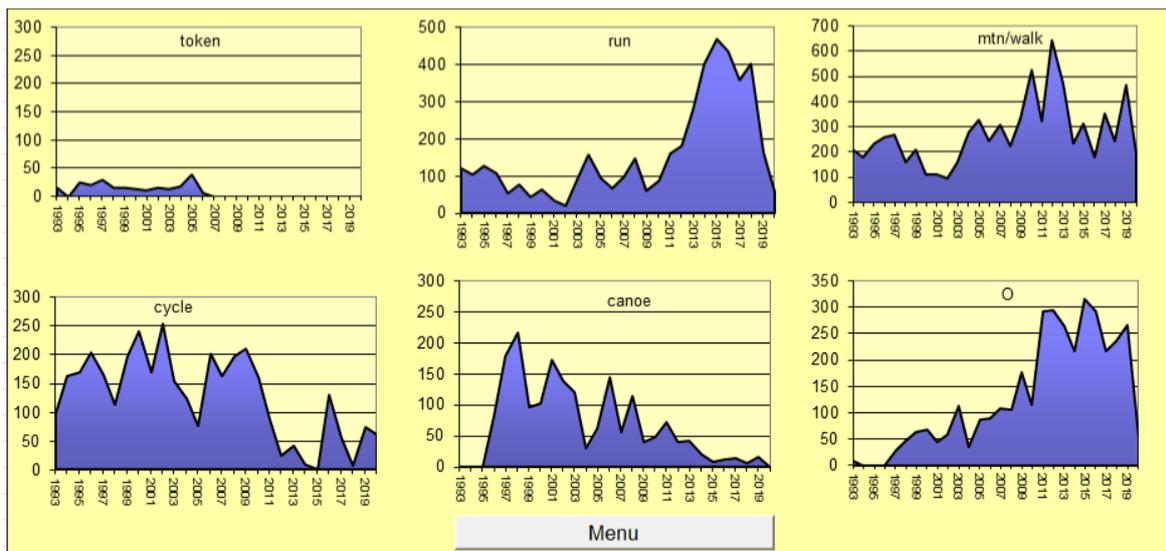
Figure 41: *David's graphical representation of thirty years' activities measured in hours.*

The simplicity allowed his recent running experience to focus on not breaking the activity recording in his electronic diary for over twenty-five years. Figure 42 is an excerpt from David's electronic diary where he records "days" as a metric, amongst other metrics. These "days" refer to the consecutive days of exercise undertaken. David explains his electronic diary as follows:

> *...so the Excel spreadsheet counts how many days since I've had nothing to record, which is me motivator. I've just passed twenty-five*

years of not missing a day, but the spreadsheet facilitates that, you know, that knowledge, you know. I know it was the twenty-first of December 1994 when I just couldn't be bothered to go out, and I've managed ever since […] I've got me boots on, I've got out the door, every day since.

ID	Date	day	week	year	days	token_	run_ho	mtn/walk	cycle	canoe	ski_hr	'o'_hr	other	text
1	01-Jan-93	Friday	1	1993		0	0	4	0	0	0	0	0	
2	02-Jan-93	Saturday								Menu				
9985	03-May-20	Sunday	19	2020	9266			1					2	
9986	04-May-20	Monday	19	2020	9267			2	0.75					
9987	05-May-20	Tuesday	19	2020	9268		2.5	1						
9988	06-May-20	Wednesday	19	2020	9269			1.75						
9989	07-May-20	Thursday	19	2020	9270			0.75	3.5					
9990	08-May-20	Friday	19	2020	9271			1.5					2	
9991	09-May-20	Saturday	19	2020	9272		1.5	0.75						
9992	10-May-20	Sunday	20	2020	9273			0.75					2.5	
9993	11-May-20	Monday	20	2020	9274			1.75	0.5					
9994	12-May-20	Tuesday	20	2020	9275			2.25						
9995	13-May-20	Wednesday	20	2020	9276		2.5	0.75						
9996	14-May-20	Thursday	20	2020	9277			1.5						
9997	15-May-20	Friday	20	2020	9278			0.75	2.75					
9998	16-May-20	Saturday	20	2020	9279			1.5						
9999	17-May-20	Sunday	21	2020	9280			2.5						
0000	18-May-20	Monday	21	2020	9281		1.5	0.5						
0001	19-May-20	Tuesday	21	2020	9282			1.5						
0002	20-May-20	Wednesday	21	2020	9283			0.5	3					
0003	21-May-20	Thursday	21	2020	9284			1.75						
0004	22-May-20	Friday	21	2020	9285		2.5	0.75						
0005	23-May-20	Saturday	21	2020	9286			2.5						
0006	24-May-20	Sunday	22	2020	9287			3.5						
0007	25-May-20	Monday	22	2020	9288		1	0.75						
0008	26-May-20	Tuesday	22	2020	9289			1.5						
0009	27-May-20	Wednesday	22	2020	9290			0.5	1					
0010	28-May-20	Thursday	22	2020	9291			1.5						
0011	29-May-20	Friday	22	2020	9292		1.5							
0012	30-May-20	Saturday	22	2020	9293			1.5						
0013	31-May-20	Sunday	23	2020	9294								2.5	
0014	01-Jun-20	Monday	23	2020	9295		1.5	0.5						
0015	02-Jun-20	Tuesday	23	2020	9296			2						
0016	03-Jun-20	Wednesday	23	2020	9297			0.75						
0017	04-Jun-20	Thursday	23	2020	9298			1.5					0.75	
0018	05-Jun-20	Friday	23	2020	9299									
0019	06-Jun-20	Saturday	23	2020	9300									
0020	07-Jun-20	Sunday	24	2020	9301									
0021	08-Jun-20	Monday	24	2020	9302									
0022	09-Jun-20	Tuesday	24	2020	9303									
0023	10-Jun-20	Wednesday	24	2020	9304									
0024	11-Jun-20	Thursday	24	2020	9305									

(note on ID 0018 / 9299: "days since last day missed")

Figure 42: *An excerpt of David's electronic diary record.*

When David was highly competitive, he suggested that gaps in his handwritten diaries kept before his electronic diary were permissible because he was "doing big stuff and having proper rests". He could still remember the times in the records within his

handwritten diaries and refers to them regarding his current activities. For a particular route:

> *I'd do a combination of the two by going down the valley and a steep track at the back and that was a thirty four-minute run on a good day, it'd take me an hour now.*

Chris also suggested the idea of longer-term reflection. When Chris was diagnosed with iron deficiency in the past, he used Strava and Garmin Connect to look back on what he was doing before his diagnosis. It gave Chris a "sense of achievement" because he could look back on what he was doing. Through looking back, Chris could identify records where his running activities were demanding on his body. These records reminded him that he could get through tough times and a renewed mental fortitude to do even better now. Related to the body's physical condition, Adam suggested that there can be a "changing the goalposts" of performance in age as the body seems to lose performance over time. However, he can readjust his goals accordingly. Adam suggested using longer-term records to reflect upon the "good years", especially when beginning to age. Adam seemed to be resigned that his running records would record his "good for life" times, accepting that as his body ages, it will not be capable of high-level performances, so he needs to find new goalposts. David already used "age-graded" information to move his running goals in line with others of his age. The question of past and future records was a problematic issue for David because his running records in various media seemed to chart his performative decline, which seemed to be emotionally challenging. David could see a potential long-term use when reflecting upon the period of Covid-19 restrictions. David thought that perhaps in ten years, the long run would be viewed as a bit more of an event to replace the idea of the race, which seems to relate to the idea of renewing competitive running rationales for running.

Becky's reflections on her records do not seem to link to a sense of achievement or reinforce her running mentality. Instead, they seem to represent a muted, personal sense of satisfaction:

> *[I[t is nice, nice to keep a record, I think, that's more for me of what I've done and look back at routes and times.*

Becky has an awareness of a personal collection of records. The word "nice" suggests that records over a more extended period do not have as important a role in Becky's running information compared to Chris and David. Some Group 2 participants seemed to share this shorter-term importance over longer-term records. Participants in Group 2 whose running experiences did not exceed two and a half years expressed longer-term as perhaps no longer than a year rather than years or decades. Faye felt that a month was "enough". However, Helen thought that the social media sites and Strava could provide a "memory bank" that she could dip in and out of when she felt the need. The length of time was not an issue because the information should be available. During the research recording, Joy checked her past activities on her Huawei device to reflect upon the records so that she could answer a question about her running. Joy had some running records from around twelve months before when she first attempted to run, although she only considered herself as new to running in the year of the recording. Joy referred to her long-term records to compare her current activity to understand her baseline fitness level, why she started running then, and her previous progress.

> *Now, if I compare what I did last year with what I have done this year, I can see the big difference from last year and this year because this year, I have done it in a more structured way. That's really kind of helped me to build up. But last year, I just did it spontaneously.*

The idea of reflecting upon longer-term records away from immediate running activities and performances conversely links to the participants' present performance of running irrespective of the participant group.

5.4.6   Reflecting on collective running records

Using social running platforms such as Strava sees a collective use of running records. Joy did not mention reflecting upon the records of others because Joy did not use Strava or any other application where she followed other application users, and other users followed her. As Guy actively chose not to record running information, he cannot contribute to this observation.

Strava allows users to create an account, upload their running records, and have other account users follow them to view other people's running records. The account user

can also follow other account users. It would seem that when considering other people's records, there is a personal reflection. Reflecting upon other people's records invites a comparative element. Within Strava, Adam found himself "comparing, as well yourself, to others" because "you can't help but look at how your teammates are doing." David also reflectively compares the records of others against his performance:

> *Yeah, the comparisons I would do use Strava segments, but against the people, I'm following. These days I'm consistently and relatively much worse on the downhills with my sore knees than on the uphills, where I'm still reasonably strong but if I glance at my following list, usually confirms this.*

He recognises his strengths and weaknesses and uses the records of others to confirm his understanding of his strengths and weaknesses. Becky also used comparison when considering her training efforts. Comparisons made Becky feel like others had done more, so she would initially "panic" but then reflect further and reason that others are probably doing too much running and "should be taking it a bit more easy [sic]". Chris did not seem to be concerned about the running records of other people. Chris used Garmin Connect to analyse his running activities, and he used Strava as a social networking site where he could be "more of a joker". This outwardly social use of information seemed to be an exception amongst the limited sample.

Faye did not comment upon comparisons with other users on Strava and, like Chris, commented more upon the social uses of Strava. However, Chris and Faye independently labelled the collective, comparative use of records in Strava for personal reflection described in this section as "stalking" or being "Strava stalked". Before Faye had a Strava account, she originally shared her running records with her trainer through Garmin Connect of her own choice. Now, Faye's trainer can see the records of her runs on Strava automatically. In Strava, followers can instantly see all runs uploaded to the person's account, although Faye had deliberately chosen "just a few people" to follow her. It seems to have negative connotations. Chris observed these negative connotations. He felt that this silent online "stalking" had a detrimental effect on face-to-face society because the conventional social conversation was lost.

People already knew what other people were doing in their running even if they had not seen them. Chris thought that it was:

> *bad because if you always know what people are up to then, you go to have a conversation with them face-to-face [...] you don't have anything to say to them because you're like, oh, "I've seen you've been doing this, this and this" and you're like, "yeah, I have". And that's the end of the conversation. In the past, it's been like, oh, what have you been up to, and then they tell you, so that's the downside.*

Whilst Chris felt that online social "stalking" has been detrimental to conversion, Becky described that her followers had used her records in Strava to form the basis of a conversation outside of the digital world.

> *...I'm not one of these ones who tends to look at, you know, every segment, and every split and every-, people often might say to me, 'ooh gosh look you've got a so and so on that bit' and I'm like 'ooh have I?' 'cause they've looked at my data more than I have.*

Perhaps because she does not analyse her Strava records as attentively as Chris, her surprise lies in the interest that somebody else has given to her records without her knowing. Overall, "stalking" does seem to blur social conversation in face-to-face and virtual environments where former social conventions of conversation have been either lost or altered due to the sharing of records in a collaborative online platform.

For those who use social running platforms, collective running records are a means of personal comparison with other users to compare a participant's running performances against their records. These comparisons seem to have an element of emotion attached to them (see 5.3.5). The private comparisons and reflections of other people's records can also form the basis of conversations or curtail their content with people outside of the online environment.

5.4.7   Online socialising

Within online applications, sociality seems to be expressed in the Strava application rather than in other applications such as Suunto's Movescount and Garmin's Connect. Using Strava over these other applications seems to be because of its "social element,"

as David noted. Adam, Becky, Chris and Faye all noted similar reasons in that Strava has all their friends on it. Strava was a space for online socialising. When Strava introduced a subscription that restricted access to some analytical information, Chris complained that Strava had become even more of an online "social app rather than a data app." While Chris saw the detrimental effects of social network applications in face-to-face conversation, Chris's complaint suggests that socialising online emphasises Strava's free subscription model more than the paid subscription, which has more analytical data. Viewing the Strava app as a "social app" is not interpreted as being a positive comment, reinforced when Chris said that Strava was "like Facebook, isn't it, for runners?". Some participants who used Strava noted that when they "posted" their running records onto Strava, they received recognition from other runners, resulting in positive responses. Recognition took the form of either "kudos" or "comments" (Figure 43). Kudos is the equivalent of a like on Facebook. Chris described other people's use of and reaction to kudos on his activities as:

> *not like everyone gives you kudos all the time, do they, they'll only give it if you do something special.*

Becky noted how recognition from others results in a positive feeling – "anyone likes praise, don't they?" – which also included comments. Comments are something that Adam reflected upon in his example of a run which included a comment from a follower. Further comments feature in one of Chris' records in Figure 44.

© 2020 Strava
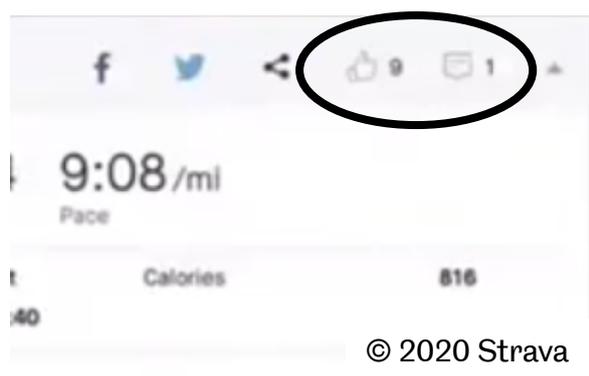
Figure 43: A focus on one of Adam's Strava records with kudos and comments icons circled.

© 2020 Strava

Figure 44: *A public-facing Strava record of one of Chris' runs includes comments.*

In a more limited way, Faye first used Garmin Connect to share runs with her trainer for instructive comments and feedback. When she got a Strava account, her social contacts were "small" in number, similar to Helen's reported experience. Of Group 2 participants who created running records, not all used their records within a dedicated social running platform. However, they did share the records through leveraging other social platforms and technologies. For example, Joy seemed to share her information with her immediate family and friends who did not run where she shared a route or a photograph from her run record on the WeChat platform.

> *I do share my data sometimes with my family in China, so that's quite useful for me, especially my husband is not here, my husband is working in China, so can tell, I can tell him OK, I run 4k today, what time and what pace, you know sometimes I even took a photo of the route of where I run.*

> *...occasionally, I share my running routes on WeChat as well for my family and my friends' circle.*

The sharing of collective records and information changed during the Covid-19 pandemic lockdown when there was a restricted movement to one form of exercise a day (UK Government, 2020). Online socialising seems to have increased during the "lockdown" in the Covid-19 pandemic. Adam's description of a "virtual ultra" showed that sociality seemed to move online and extend beyond Strava to event organiser websites and other social media sites such as Facebook and Twitter, which "everyone" seemed to be doing. Using online platforms blended with a running activity attempted to recreate the race event experience in virtual environments. Central to this was posting the "record" onto Strava to verify that the activity occurred. Chris also had to use his run record, in the same way, to verify a 5km virtual race that he did for a third party platform run that was organising the event. David found that he participated in an orienteering "virtual event" and a charity 2.6-mile event.

5.4.8 Planning

This section describes how participants used personal and collective records in planning runs. There is no sharp distinction between reflecting and planning. Some of the examples already presented contain elements of planning in reflective uses. This section offers examples where planning appears to be a more critical use than a reflection upon running performance using personal and collective records. A small comment Becky made at the end of her run encapsulates personal planning and reflection:

> *[...] when I got to the end of my run yesterday, I thought, oh god, I just did 9 miles, and I thought I'll struggle tomorrow (laughs).*

It seems as if there is an element of reflection about the distance information from her running record. Her embodied information triggers a part of planning the next run, where she understands her body may be tired. This understanding results in the suggestion of a potentially struggling running performance. Becky also encapsulates the use of records in preparing for races:

> *You know, before I go and do that [race name], I go and look at what I did last year and think, right, that's what I'm aiming for, trying to equal that or beat it if I can [...]*

Becky uses her running records so that she can consider the represented information such as pace to plan for her races, where she seems to refer to pace to aim for and voicing a thought that with a pace in mind for road races, "you need to try and keep around 'here'". There is a reflection to plan the times and pace over a repeated route. Adam had a strikingly similar use when using the information to plan for a race target time, where he "will work out the pace I need". The information from the record, the "pace", is seen as a simple metric to consider whilst racing, as explained by Adam: "my head doesn't want too many stats in it," which seems to be similar to Becky's thought keeping around a certain pace number. When David trained with his wristwatch, David also knew the repeated routes and the corresponding times where he trained. These seem to be reflections of the information that he had during a run, which he then planned to run at certain times on a specific loop: "seventeen was the number to go for." Group 2 participants seemed to plan their runs, but they did not seem to use records. They described using other sources of information to plan training goal metrics or the routes they wanted to run. Joy used an introductory book that had training plans in it. Guy consulted Google Maps to find out the proposed distance of his intended run the first time he ran that route. Faye did not demonstrate using other information sources because she had a familiar running route at a similar pace.

Becky used collective records on Strava to see other users' paces so she could plan and understand what to expect from a planned group training run:

> *[w]hen I haven't been out with Group [x] for a while, and see their pace, and I think ooh crickey, [...] that's gonna hurt...that's gonna hurt the*

> *next time I go out with them, you know, you get a bit concerned, but*
> *in the end, you think, oh well, it will be what it will be.*

This quotation evokes anticipated embodied information responses in a forecast of pain - "that's gonna hurt". It demonstrates the consideration and recall of what a pace metric means in terms of body effort understood through embodied information which seemed to be central to the combination of represented and embodied information during a run.

It was not just an anticipation of paces in group running but also responses to online competition and route finding. Whilst Becky described how she did not use records from a "stats point of view", she described a mindset that she encounters in social interaction, where people "think of going for a run looking to see who's got a segment." Becky would not "think to myself", I'm going to go for that segment" whereas I know other people that definitely do think that way." During the Covid-19 lockdown, Becky did start to think this way. She planned a run because she had received a notification in Strava telling her that she had lost a crown on a segment. As a response to this, she went out and planned a run so that she could regain the crown. However, this was an exception as a part of her change in running rationale during the lockdown. Becky usually used collective records for inspiration for new routes, as exemplified here:

> *I like to see, for example, on Friday, I'm going to run a route that I saw*
> *[Person A] and [Person B] had posted, right off-road, thought I've not*
> *done that before, fancy that one. So, contacted them, and [Person A]*
> *sent me a copy of it for downloading, so I think that's nice too, [...] It's*
> *good to see where other people are running.*

Becky actively acquired information from two people on her social network, the route she later revealed she had on her smartphone with a mapping application. This example also blurs into social interaction based upon records within the online platform but is also an example of using collective records to plan runs.

5.5   Records and the participant

This section outlines the effects and meanings of running records on the participants, describing their curatorial efforts, the extent of personal meaning, such as a sense of personal history and their emotions towards the records.

5.5.1   Curation

This section outlines curatorial efforts that participants undertook with their records either before they were placed in storage or afterwards when they accessed them for personal or collective reflection.

Chris seemed to work behind the scenes before using the Strava platform to create titles for his activity in addition to the running performance and recording:

> *It was one of them runs where I had already planned the title whilst I was work [...] we were doing that three two one minute hill session, um, up [...] [placename] so I just put, um, "I've got the skills on the hills to pay the bills", and I don't know why but I just like that [...] sometimes it can be one thing that you say on a certain run, um, and just the way you're feeling...*

Chris put a certain amount of personal effort into the titles of his runs, which reflect the exercise and convey an aspect of his personality. Adam gave his records descriptive titles based upon what he did and then acted as a means of recalling the events to remind him of that particular run, like "Urban Event". Whilst not using titles, Becky seemed to suggest an element of curation about what she uploaded and presented on Strava. Becky did not use Strava just for running but also for cycling:

> *and, if I swim, I mean like today I went to the gym, and I did actually put that on, and I don't tend to do that as a rule [...] It does tend to be more something that I feel is, you know, [...] active. I don't tend to put my dog walks on. Unless, again, when I was injured, and I did a really good walk.*

There is selectiveness in presenting activity records on Strava. It would seem that Becky has her own rules about what she posts and does not. Her rules are not rigidly adhered to but seem to be related to whether the activities demonstrate an element

of progress, a reflection of her current fitness or training at the time. If Becky had something that seemed worthy of a particular effort she wanted to "post" and perhaps share, she would add it to her Strava platform. David put effort into maintaining offline electronic files relevant and valuable to him. The effort seems to demonstrate his care for the electronic records to ensure that they do not fail and that he can still access them. The deliberate choice of what electronic records David maintains with effort also demonstrates his care. David's offline records that he maintained were for personal viewing. Faye and Joy used their records for personal viewing or limited social circulation. They made little effort in creating titles or ensuring continued access to the records.

5.5.2   A personal history

Raising the possibility of a loss of their records presented the opportunity for participants who kept records to explore the affective nature of their running records over a long time. Adam encapsulates two emerging values of running records, use and personal history. Adam's excerpt seems to describe the second value:

> *It's a record, isn't it, [...] of my journey in running I suppose isn't it? [...] it's nice sometimes to sort of look back, and especially when you said you've got a race coming up and you want to compare to how you ran last time, or last year, you can then kind of look at your splits and your times and then it's quite nice as a, it's like a keepsake isn't it, you know, of your history.*

The idea of personal history and attachment to the records suggests an element of affective attachment. Questioning participants on the imagined total loss of their running records resulted in a small range of responses. Adam responded with eviscerating disbelief that such a loss could happen:

> *So what, all of my history? On Strava? Yeah, I'd be gutted. I really, but I do look back on it and um, it is nice to see your progress [...]*

Given the strength of the reaction in calling it "my history", it suggests a solid attachment to the records "on Strava". Pursuing his response in a second recording, the researcher asked Adam whether he had any means of mitigating the loss, such as

another storage system. He answered first that he had not, "not at all". Questioning the idea of losing his Strava records, he constructed its severity in comparison with the Covid-19 pandemic.

> *Yeah. Oh my god. Can you imagine? Would that be worse than Covid-19 if Strava went down?*

This response drove Adam to suggest that Strava had the "monopoly" on his running diary. He was concerned when he realised that he had stored his records in one place. Adam could not imagine the Strava platform suddenly not being available with his running information. While he considered his Suunto Movescount a backup, it did not seem to have the same effect as the potential loss of the Strava platform. Adam's comments upon possible loss emphasise the magnitude of the impact of losing the records as someone training and competing competitively. Chris referred to running records and provided reasonably good details relating to runs he recalled. However, what seemed to be notable with memory was when he referred to his Strava records as his "history" of running. The Strava platform and not Garmin Connect represented his complete running history since he started running (four and a half years ago). He would be "annoyed" if his personal history were lost. Annoyance was the same expression Chris used when Strava put specific visualisations and features behind a paywall. As competitive runners in training, Chris and Adam seemed to have been most affected by the suggestion of loss, given the sense of personal history attached to their records.

Perhaps because he is, in terms of time, further away from his competitive running peak, David responded that he would be "bothered" more rather than "annoyed" or "gutted" about losing his running records. He could temper his reaction because he made backups of his electronic information and had kept his handwritten training diaries. At the time of the first recording, his attitude towards not backing up his records on Strava elsewhere because he had already made provisions to back up the records that had a greater attachment to him was as follows:

> *Yeah, I've been thinking about it, but I've only been on Strava for ten years. It's nowt.*

David seemed prepared for any loss of his Strava records because he already had existing processes in place, possibly twinned that his rationale to run was not as competitive as in the past. However, he considered both dairies and the records that he made an effort to back up electronically a "big part of my personal history", which was a similar sentiment Adam and Chris expressed. Although Chris had four and a half years' worth of records and information on Strava, he considered the platform to contain the "story of his life" in a diary-like form. He suggested that

> *...it would be good to take all that down and like put it in a sort of diary.*

Chris did seem amenable to doing this, but he did not think it would "be the same" as the Strava platform offers such a "deep level of information".

Becky did not seem to have an immediate, strong reaction to the thought of losing her running information. When considering both her handwritten logbooks and her Strava records, she reflected that when she was competing in triathlons "over ten years ago," she had not looked at her logbooks since, nor even knew where she kept them. Becky concluded that "it's obviously not that important". In respect of her records on Strava:

> *I'd be disappointed to lose Strava, but I don't think it would be the end of the world for me. I don't know really.*

Her second recording reinforced these initial responses, justifying that she used to run and exercise without Strava in the past, and she could cope then she could cope with a potential loss of records. Becky would not have a strong emotional response to losing Strava records, nor did she seem overly concerned about not being able to find her logbooks which she did look for ahead of the second recording. It would seem that Becky attaches more value to the use of the records related to her immediate and near-immediate records. Unlike Adam, Chris and David, there did not seem to be any deep personal history bound up in the records. Faye expressed a similar use in that all the records were the same and recorded the same thing, and she did not have any attachment to them. Faye expressed mild disappointment that if she lost her Strava records - "I'd be fed up" – but she would just start afresh because she was not "invested in it". Instead of recording a journey and having a deep sense of personal history in the records, Faye noted that the records of the few runs she was "really, really proud of",

like her completion of a 10k race, would result in a more robust emotional response. Faye would "be gutted if they disappeared" and "really upset" if these exceptional runs were lost because it seemed that they represented a heightened sense of personal value. Joy did not express any particular attachment to her years' worth of running records. She could perceive a future use for them in:

> *I would like to have a personal trainer. I would like the personal trainer to look at the data, how I run.*

However, this was related to the rationale to run as an improvement within their current use of records. Amongst Becky, Faye, Joy and Helen, running records seemed to have value in their everyday use to track their progress and share records socially at various levels. There appeared to be a lesser sense of "personal history". However, Faye did single out her 10K race record as something that she had a personal attachment to instead of a chronological series of records over many months.

The idea of keeping running records for a specific time rather than allowing them to accrue and take on a "historical value" was explored with Group 1 participants. The researcher asked Group 1 participants this question because they had been using running records longer than Group 2 participants and did not seem to express any strong emotion about a long-term chronology of their running records. There was also an apparent difference between Adam, Chris and David's responses compared to Becky. Adam, Chris and David seemed to have their "history" bound up with a form of their running records, whereas Becky did not. The male participants were more attached to their records and were more affected by their loss than the female participants.

The researcher questioned the participants so that they could settle upon a time boundary, after which they would be happy not to have access to their records anymore. David was not concerned about his ten years' worth of records in Strava, which he would not have access to, although he had thought about backing up those records. David was more concerned with losing his electronic diary of thirty years as the time that he had invested in maintaining it was linked to his "personal history" and had a "greater value" because it gave him his rationale to run. Chris would be bothered about losing his titles and saw his Strava records as a diary that documented the "story"

of his running. He would try to prioritise keeping his titles if he did have to lose his records.

If someone told Adam that the records would be deleted and made inaccessible after a set time, this would prepare him for such an eventuality. Adam never seemed convinced about a proposed deletion of his records because they were essential to him. He suggested that he usually refers back to around three years of his past running records, so that could be a helpful point in time from which they would not be accessible to him if given a choice. Becky suggested that she would be happy to have around five to six years, which she considered would be "useful" in looking back for planning races and finding routes to run on. Beyond that time, she was not too concerned about the records as she "could live without Strava". Becky never referred to her handwritten triathlon records of over ten years beyond their use. Becky and Adam seemed to suggest a period of usefulness of between three and six years. After this time, the records are not relatable to the participants' current activities, and they seem to either accrue a personal historical value or no additional value at all.

5.5.3   Memory and storytelling

Within the virtual meeting recordings, participants seemed to use their running records as aide-memoire to tell a story or an event related to their running. For Adam and Chris, the memory prompt was in the title of their runs. When Adam participated in a virtual ultra during the lockdown, he named one run "Urban Event." This record acted as the prompt to describe his particular run during the virtual ultra, retelling the shops that he stopped at for refreshments as "a pit stop" in the local villages as well as using it as the basis to explain a "virtual ultra" event during the lockdown in more detail. Similarly, Chris named a run on Strava "A bit further than intended", which prompted him to describe a run during the lockdown and the key events, such as whom he met, in its entirety. During this second recording, he had his laptop open with the Strava platform on the screen so he could use his records to prompt his memory. Outside of the lockdown experience, but using the memory of a record, David was still able to recall when he last did not go out for exercise:

> *But er, for twenty-five years I've got out there and done it, er, I do know,*
> *I remember the day on the twenty-first of December 1994 I was just*

> *wrecked, I'd been busy at work, I was tired, it was pouring down, and I just couldn't be bothered to go out.*

David's recollection and short story associated with the start of the unbroken record of nine thousand two hundred and ninety-nine days of daily exercise, introduced with a temporal phrase. Joy used her comparatively short amount of running records to confirm metrics relating to her monthly distance totals to the researcher. Joy also remembered sharing a running record with her friends and family, which prompted her to remember the rainy conditions of the run, which was a surprise to her friends as they thought she only ran in fair conditions.

Guy did not keep any running records, so he could not relate to specific runs, although he could recall episodes from his social runs with his work colleagues in the way that the more experienced runners behaved. Faye, Helen and Becky could remember specific runs and events without referring to running records and could provide reasonably good details relating to runs they recalled. However, what seemed to be notable with memory and storytelling was the level of detail that Adam, Chris and David could elicit when they used their running records to tell stories about specific runs. It suggests that records are a tool to prompt a memory in telling stories and anecdotes that the participants may not remember without consulting any records. Notably, the records that aid stories and memory are more substantial in three of the eight participants, all experienced male runners who seem to imbue their records with their sense of personal history.

5.5.4 Emotion towards running records

This research is not a psychological study. However, this section describes what the participants who kept running records in some form suggested about the emotions associated with the records. The findings of types of runners also discussed some of the emotions mentioned in this section.

5.5.4.1 Addiction

Adam, Chris and Helen noted that reflecting records in Strava can be "addictive". There seems to be an expectation that the running improvement has to stay in line with visualised trends on Strava. Adam describes this as "chasing it", that is, keeping up a higher level of performance in training when embodied information suggests a period

of rest or decreased intensity. Whilst running, Adam has learned to "kick back" from the reflection of the records and listen to his body not run as fast when he does not need to. Whilst not a user of devices, Guy noted the potential obsession that collecting and analysing has, which Adam, Chris and Helen seem to have said.

5.5.4.2 Annoyance

Annoyance with records seemed to be either related to the loss of records information or comparison with collective records of other Strava users. Chris and Helen expressed that they would be "annoyed" if Strava lost their records. Chris used the same word to describe Strava putting specific visualisations and other information features they provide behind a paywall. Becky seemed to get annoyed "from a personal point of view" by looking at other people's records online, which showed them being able to run when she could not run. This annoyance also seemed to be a frustration that she wanted to be able to run at the time.

5.5.4.3 Pressure

Becky seems to reveal further uses and the corresponding emotional responses to the idea of comparing with others. During "lockdown", Becky felt pressure because other people seemed to be training a lot, and she tried to engage in that way. Feeling competitive, despite her restricted movement, Becky backed away and started to concentrate on enjoying running again like in the first recording. She seemed to be experiencing the pressure that she did not have in the first recording when she was running to enjoy the external environment and senses. Adam mentioned that the lockdown removed training plans because of cancelled events. Thus, it removed "pressure" from information used in looking at records and training, which he did not mention in the first recording.

5.5.4.4 Avoidance

Whilst not discussed by Adam, Chris or David, Becky seemed to avoid her running records when she was injured because she found it "hard".

> *It's interesting that you know when you're not running, but when you are injured, I definitely didn't go on Strava very much because you don't want to see what everyone else is doing. That's really hard. I think. [...] Yeah, I don't think I went on it. I might have done it once a*

> *week, or even less than that, I think, when I was out for quite a long time because what you see is what everyone else is doing, and it's just hard because you want to be doing it. And you can't*

Becky's words need no further explanation of the reasons for avoidance of the Strava platform.

5.5.4.5 Feeling good

When Becky was working towards being able to just run again after an injury, there was a positive emotional response when using and posting to Strava after an activity made her "feel a bit better". Each post meant that she could, over time, reflect upon her gradual process that made her feel optimistic about her activity and recovery. Similarly, Joy noted that she could see that she was improving when she looked back on her "records". She said that having run 75km and then approaching 80km for the current month visible in the records reflected her feeling of being "quite pleased how my body had been kind of adjusted to that long- that much of work."

Faye noted that when she immediately reflected upon a completed run on her device, it made her feel "amazing" or "proud" when the run was good. Faye also attached pride to her 10k race record, a personal achievement.

When the participants received recognition on their records, either as "kudos" or "comments," this elicited positive emotions. Chris felt positive when he received kudos from people who do not usually provide it to runners, and Becky found it "nice to get comments".

5.5.4.6 Nostalgia

David's paper records, which had only small amounts of information such as a place and a personal code, found that he could recall memories associated with the runs he revisited in his diaries (prompted by the research process):

> *Bowness Knott to Scarth Gap and back, just under three hours, yeah it's a good run, I still do it, so, yeah[...] nostalgia."*

David's positive sense of nostalgia is quite pertinent because David had been running for much longer than the other participants. While not using the word nostalgia, Adam suggested that the records with photographs provide "a snapshot of those good times".

The records seem to give a positive response when looking back on them. In his shorter period of online records, even Chris felt that his Strava acted as a diary: "I love to look back on this period when I was in Australia". There seems to be a positive association with looking back into records that are perceived to represent a distant past.

5.5.4.7   Records and emotion

Participants in Group 2 who kept running records did not seem to suggest negative emotions such as pressure, annoyance, and avoidance like Group 1 participants did. Becky, Faye, Joy and Helen did not derive any sense of 'nostalgia' from their running records, although Faye did feel pride towards a standout record relating to her completion of a 10K event. The participants seemed to derive a sense of "feeling good" when they shared their records and received some social recognition for their effort. Introducing emotions with records introduces agency and identity. The records, irrespective of medium, spark identity in personal reflection of past actions or within a more recent state of collective records comparison that includes other people. The inclusion of emotions demonstrates the difficulty in viewing the human, their associated records and their shifting thoughts around them into some form of permanence. The records are there as a reminder and create positive and negative feelings. Over time, the same record can create different responses to the individual who created them. Whilst the substance of the personal records may remain stable and unchanged over time, the human interaction with them triggers different meanings based upon the culmination of life experiences.

5.6   Third parties using records

The researcher asked participants who kept running records if they could think of anyone else who would want to use or find an interest in their running records. The participants could only see the use of their information for their running in their everyday lives and seemed tentative in their responses for other potential third party uses.

Adam suggested that his records could be used in longitudinal medical studies looking at the long-term effects of running through his records. Helen suggested that the government could use aggregated records to direct health and activity policy. There

was some awareness about online advertising discussed by Becky, David and Helen. David was happy to pay for Strava's subscription service because it did not use "targeted advertising", unlike other online platforms. Becky was aware of "targeted advertising" on other platforms but was unaware of it within Strava.

When the idea of "targeted advertising" was mentioned, Becky also introduced the concept of online privacy online in general, not related to Strava. Becky suggested that online privacy would be an issue "if you think about it too much," and:

> *once you go down that road, you wouldn't be on the Internet at all, would you, and be on any social media.*

Conversely, Joy was aware of some privacy issues and the interconnectivity of applications on a smartphone. Joy did not want online synchronisation of her Huawei Health application to external third-party servers because that would mean that all of her HUAWEI ID would share information across the applications. She did not want to do that. Having her activities only on her phone meant that she had a choice with whom she could share her running records. Such a choice would include giving her records to a personal trainer or an online coach so that they could see her "foundation" of data that charted her progress. Like Becky's observation, Faye was not worried about third party privacy issues as it was "part of the life we live". When the question arose, Faye and Helen immediately considered whether the researcher was asking about harmful third party use such as selling data. Faye did not worry about third parties. She opined that the "stuff that's in your phone is yours but of course it is someone else's." Helen described her use of location privacy zones within Strava as a means of privacy within the Strava application. Guy had a somewhat balanced consideration of his interpretation of third party use of personal information. He thought it could have both positive and negative uses depending upon its use. A positive example can be online recommendations that users would consider helpful in their lives. However, through not using devices in running activities, which could signal the ultimate act of agency in denying third party use in the first place, Guy recognised that:

> *We live in such a data-intensive information environment. It's nice to be able to do an activity where we can get something out of it without having to track data...*

Whilst not wholly withdrawing from online running platforms, participants who used Strava observed third party intervention within the platform. The Strava online platform restricted participants' use and access to aspects of their running records behind a subscription paywall. The first participant recorded, Adam, mentioned this change, and then other participants who used Strava subsequently raised it. Most Group 1 participants were generally in favour of paying a monthly subscription fee of £4 because, for David, Strava was an integral "part of our athletic experience", something that all the participants regularly used, ranging from three times a week to "daily". The cash price of £4 was considered "cheap" to Adam, Becky and David, given how much they used the service. Adam equated it with what he would "spend in a café, no problems". Whilst David was willing to pay, he felt that the block to the data visualisations of the running records appeared to be somewhat of a ransom. He paid reluctantly, "I was forced into it, really", because Strava placed some information behind a paywall that he used, which was the "matched runs" feature. The "matched runs" feature allowed the participants to compare the information from previous records on runs on a route with their most recent to indicate their form. Becky realised that when Strava hid this feature, she would pay as it was something that she used. When presented with a choice of paying a fee of £4 a month to continue having access to an information feature of "matched runs" and "leaderboards" or lose it, most of the participants would pay the £4 a month fee for continued access.

It was only Chris who found it was "not worth it for me" as he felt that it did not "contribute" anything for him, seeing £48 (the price for a year) as something that "I could get two races in for that instead". As a result, Chris felt that Strava had become a "social app" rather than a "data app" but still lamented the loss of:

> *...segments and PRs [...] which Strava has now annoyingly, you can't compare yourself against the [clubname] leaderboard, which I used to quite like doing.*

The online platform collating uploaded running records of other runners seems to be lost. The platform presents gamified leader boards of segments and cumulative metrics, which enhance the social yet competitive aspects of running through the information in the running records held online.

5.7 Summary

This chapter described findings based on the *abduction* of the eight participants' data through *situational analysis* methods. The chapter is the result of iterative analytical writing up. The chapter focussed on the abridged relational analysis presented in Chapter 4. Despite this abridgement, the richness of the findings demonstrates the interconnectedness and complexity of the situations under analysis. The researcher analysed data from eight participants and twelve interviews that resulted in these rich descriptive findings.

Two data collection situations divided the chapter structure, but the situations are far from divided. They are interconnected. Forms of embodied and represented information persist whilst the participants run and after their run. This chapter has described the complex information story that an experienced or not runner encounters in their running activity whilst they are engaged in running throughout their lives.

The next chapter will move to a higher level of analytical abstraction to understand the complex relationships that types of information have with people running. Using positional analysis, it will plot the main elements of information in its various forms into positions found in the data. This positional analysis will provide further analytical findings beyond the descriptive findings.

Chapter 6: Positional mapping findings

6.1 Positional analysis

Having presented the early conceptual development in Chapter 4, which provided the basis for the descriptive findings in Chapter 5, this chapter (Chapter 6), provides the next level of analytical abstraction. It does this using positional mapping as an analysis that moves towards more abstract thinking away from the collected data. It results from the initial analysis and is grounded in the data. This section uses positional analysis to examine and understand concepts found in participant data and where perceived gaps could reveal further lines of questioning. There are eight positional analyses explained in this section. Whilst the methodology thoroughly explains positional maps (see 3.6.4.6), the shapes in the maps result from interpreted findings plotted against the axes. The positional map findings will contribute to discussing existing literature on information behaviour, data studies and archival science in Chapter 8.

As befits *situational analysis* methods, positional mapping is highly subjective despite its quantitative appearance of x and y axes. It is a higher level of analytical abstraction from the interpreted findings. Whilst the researcher devised the positional maps, they form the basis for further discussion and questioning by other interested parties. The research accepts and reminds the reader that they are not definitive. The positional maps are pragmatically useful. As the maps are a mechanism for interpretation, the research accepts that the maps will have more than one way of developing due to the unique *a priori* experience of the analyst.

6.1.1 Represented information use and emotional response
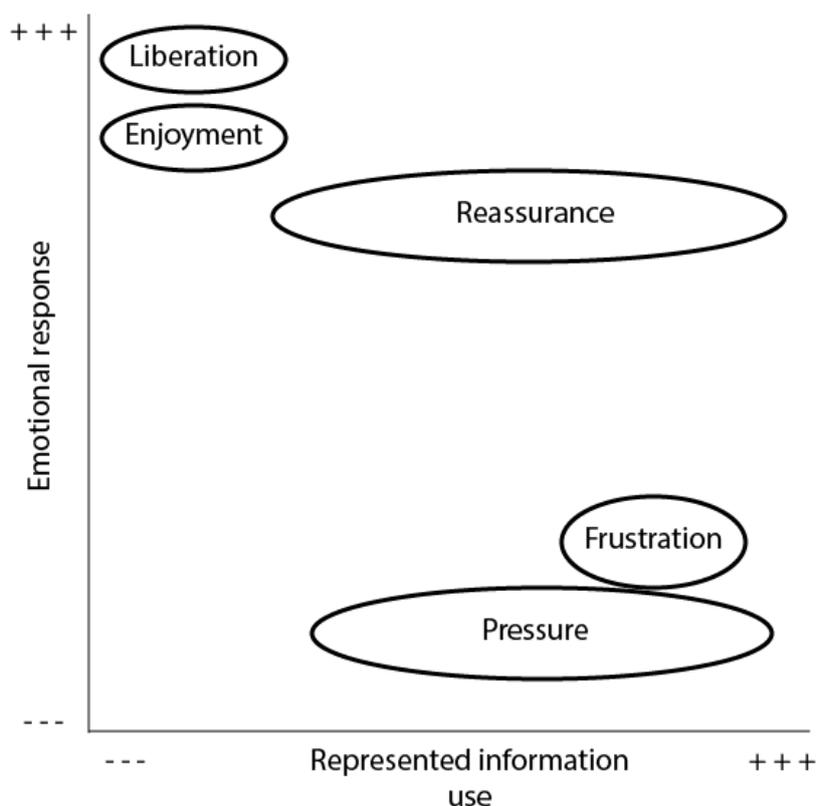
Figure 45: *Positional mapping of frequency of represented information use and emotional response.*

The positional analysis in Figure 45 explores the positions of represented information used in the entire situation of running and the emotional responses. The horizontal scale represents low to high represented information use. The vertical scale represents emotional responses ranging from negative to positive.

Where represented information use seems to be low, there seem to be highly positive emotional responses such as liberation and enjoyment in the running experience. Where there is a smaller amount of represented information use introduced into the running experience through to a higher, increased use, there is a positive emotional response of reassurance to represented information use in the run. Whilst reassurance has been observed, a correlated use produces a negative emotional reaction, such as pressure. The data exemplified this as the "pressure of a pace metric whilst on a run" or through the pressure felt in other people's information sharing of their runs on activity social media platforms. A higher level of represented information use can also negatively increase an emotion of frustration.

There does not yet seem to be evidence for low represented information use which results in a negative emotional response. Whilst there is negativity in higher represented use, such as pressure and frustration, a reduction in represented information use results in the positive responses of liberation and enjoyment. In the absence of an example of very high represented information use and emotional response – the highest positive emotion of reassurance could be reversed similarly to a negative emotion when removing the represented information use. There are no positions for mild levels of emotions. The emotions encountered in the data seem to be on the end of the scale. Reassurance could feature as a more neutral emotional response. Most of the participants did seem to find that reassurance was a very positive emotion elicited when they used represented information in their running experience.

6.1.2   Embodied information and emotional response
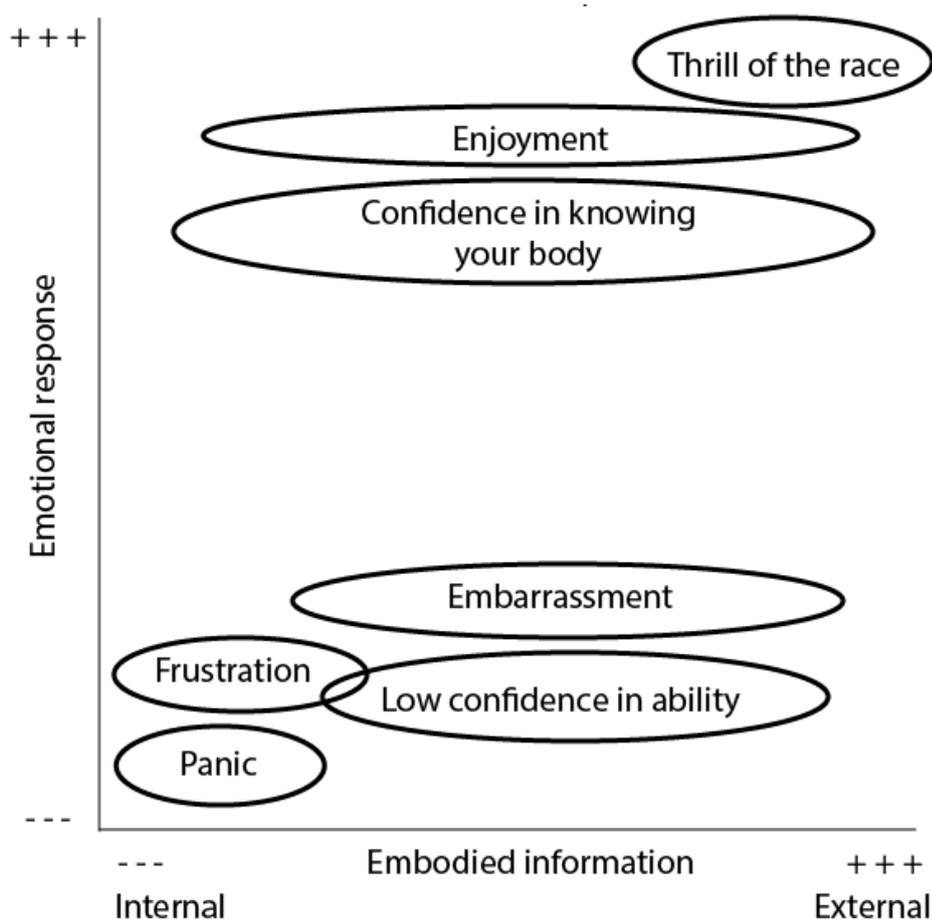
Figure 46: *Positional mapping of frequency of represented information use and emotional response.*

The emotions felt towards represented information use alone presented in the findings do not complete all of the emotions encountered in the running experience of the participants. Embodied information also needs to be examined to complete the general picture of information used in the situation. As was found in represented information use and emotion, there are no neutral emotions felt about embodied information. The emotional responses seem to be distinctly positive or negative. A direct comparison should not be drawn with the previous section because the horizontal scale differs. In this positional map (Figure 46), the use of solely embodied information derived internally from the runner contrasts at the other end of the scale with external stimuli.

Embarrassment and low confidence in ability are adverse emotional reactions spanning internal and external embodied information. It suggests that the responses are towards the general use of the combined embodied information. Panic is an adverse reaction to internal embodied information, such as running out of breath and not understanding how to control it. It seems to be a very negative response in which a person may also have low confidence in their running ability. Despite these negativities, embodied information in running activities can elicit positive responses. Enjoyment and confidence in knowing your body reflect the wide range of internal and external embodied information evoking the corresponding negative emotions. Seemingly allied to these positive emotions is a more specific running race situation where the high external embodied information such as beating other runners in a race elicits a very high emotional response.

There is the suggestion in this positional analysis that there is a semblance of progression. Those that perceive the low of a bodily panic, have low confidence in running abilities or find themselves embarrassed by their running efforts in the perceived external environment (such as people around them) can graduate towards emotional positivity in enjoyment and a confidence in knowing the body. The ultimate step from that is then, when participating in races, is forgoing the negative aspects and

feeling the thrill of the race. The positive aspects seem to arise from the ongoing acquisition of knowledge.

6.1.3   Embodied knowledge and represented information use during a run

Plotting the participants onto a positional map that combined represented information and embodied knowledge presents the idea of running progression in information use (Figure 47). The positional map suggests a path to learning how the body works when running, which one participant referred to as "knowing the body". There is a potential correlation between those that are comfortable and understand their bodily information during running and those that feel they are not as "skilled" or knowledgeable and feel uncomfortable or "embarrassed". As a result, they use more represented information during a run than those who understand their embodied knowledge better.
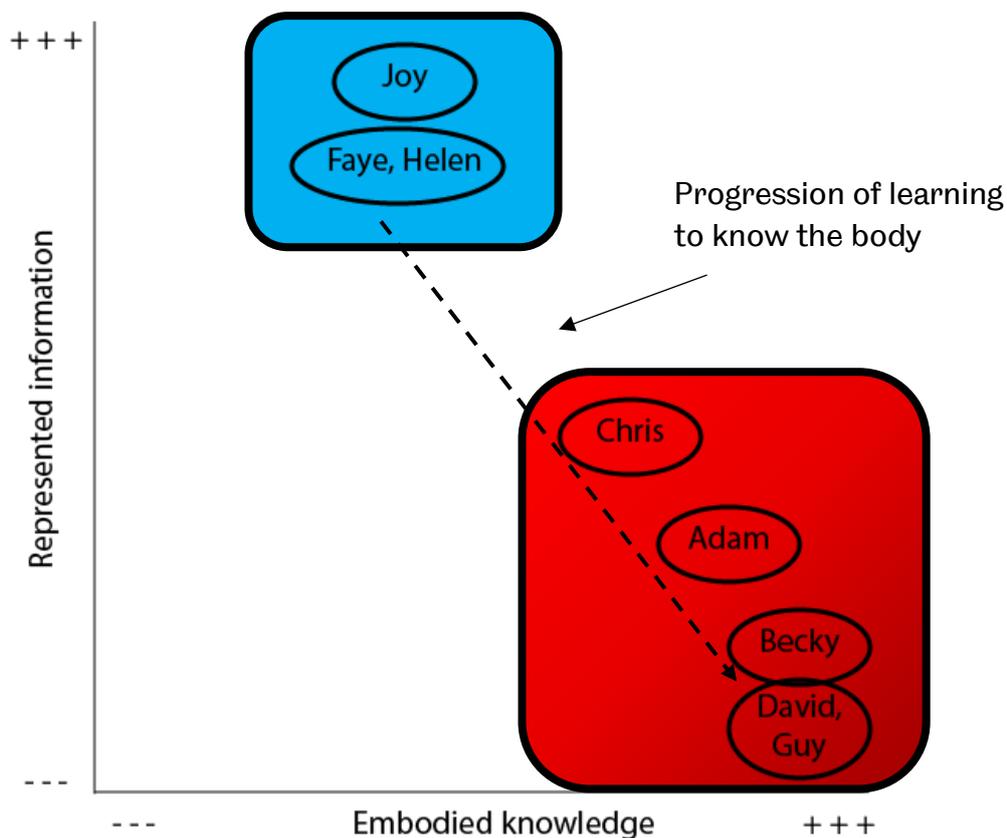
Figure 47: *Positional mapping of represented information and embodied knowledge use.*

Those who have not been running for very long start out in the high represented information use-low embodied knowledge group. They have a high use of represented information. However, they have a low embodied knowledge system because they have not been running long enough to understand their body's capabilities and how a

certain pace feels. Those that have acquired this specialist embodied knowledge through running for longer have higher use of their embodied knowledge and lower use of their devices, if any, which produce represented information. These are in a group of low represented information use-high embodied knowledge during a run.

There is a gap in the positional map around those running that may have a low represented information-low embodied knowledge. A runner in this gap could be new to running who has not yet developed a high embodied knowledge and does not have, for as yet unknown reasons, a device or a means of using represented information during a run that develops them as a part of the knowledge acquisition and learning process. Conversely, there is a gap for those that may have high represented information-high embodied knowledge use during their run or is representative of a particular type of, as yet known, run. The following section investigates and maps this gap further, examining the frequency and volume of run information and the types of running rationales.

This positional map indicates that represented information used in learning physical activities about the body is higher when in the learning phase of running before the runners start to understand and know embodied information. As the runner begins to acquire more embodied knowledge, the represented information use seems to decrease. This positional map is not explicitly referring to the represented information that smartwatches produce and their related volume of information. It looks at the higher or lower amounts of represented information used during a run compared to embodied knowledge. Once the runner understands and advances their bodily knowledge, the idea of the run and the reasons for running become varied. The following positional map will explore running rationales, frequency and volume of information use.

6.1.4   Running rationales and frequency of information use and volume
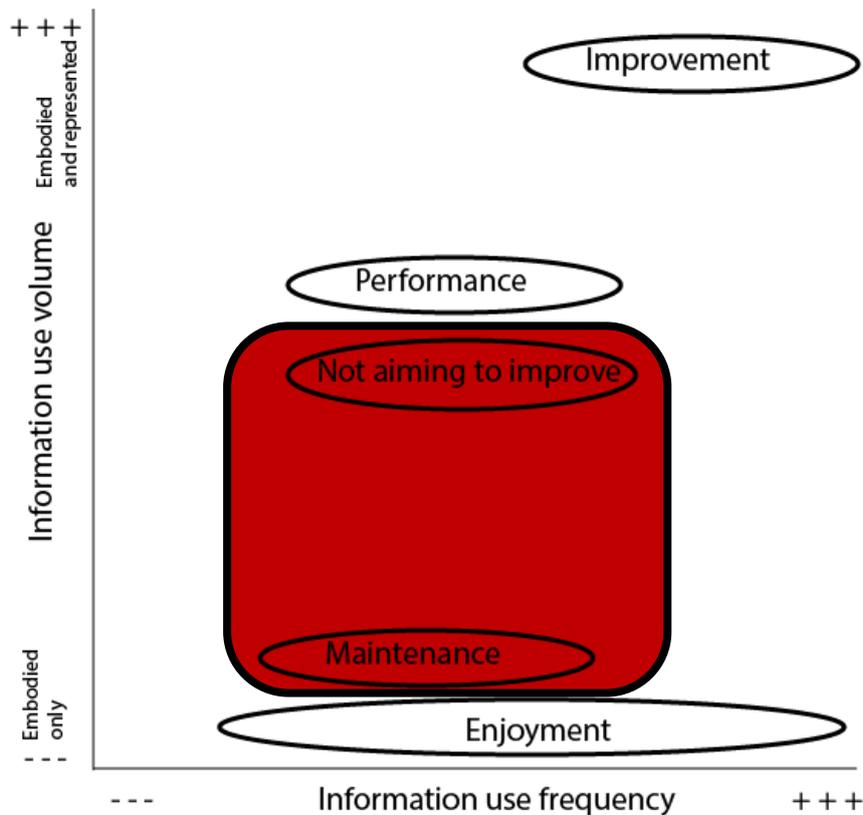
Figure 48: *Positional mapping of running rationales plotted against information use frequency and volume.*

The positional map in Figure 48 shows information use frequency on the horizontal axis against the volume of information used on the vertical axis. The scale of information use volume on the vertical axis ranges from small amounts of embodied information used only as default to how a person reacts to their body and the perception of the external environment. The scale increases through a gradually combined volume of represented and embodied information use, with the higher end of the scale seeing a very high volume use.

The improvement rationale is within high information frequency use-high embodied and represented volume which seems to attend to both embodied and represented information the most. Improvement is where the person running wants to fully understand how their body performs if they try to improve their current form or condition when they run. When improving, the person has a high use of the embodied information that their body produces, such as the effort of breathing, the soreness of the muscles, the perceived speed that their body moves, and how it moves within

certain terrains in the external environment. Concerning this higher embodied use, there is a higher use of represented information such as pace, heart rate, time and distance to measure how much the body can cope with stopping or understanding better how a certain speed or pace feels.

Once a certain level of improvement has been achieved, either as a fitness goal or a particular ability to run a certain distance in a specific time and feels that it is easy, the person running may then want to perform. Performing may be setting out to run a certain distance without stopping or competing in an event at a national or international level. There seems to be a decreased use of represented and internal embodied information. Other runners around them, for example, become embodied information sources against which they can then decide to race against, or they can feel how their body performs after a period of training towards a goal. There seems to be some combined embodied and represented information used during a performance but not as much during training.

There seems to be a larger area that covers the rationales of just going for a run where the runner is not aiming to improve through to physical maintenance where a person runs to maintain their body condition. The idea of not aiming to improve seems to come from those who have sought improvement and do not want to aim to improve. Maintenance may seem like a similar idea and appeals to those who may have a fitness level that they want to maintain. The volume of greater embodied information use and represented information use varies between runners. However, there seems to be a vast area where there appears to be an accepted medium between the frequency and volume of information use. With increased represented information use, this medium can move into either a performance run from the basis of maintenance or decreased or absent represented information use, resulting in a run for enjoyment that spans high and low uses of embodied information derived internally or externally. A missing position of those armed with a high volume of embodied and represented information but with a low frequency of using information suggests that such a rationale could exist.

The descriptive findings classed runs as training, race or events and slow-paced. This positional map seeks to explain types of runs through the rationales of running, which may have their names in specific running discourse (such as "speedwork", "training

run", "race") and could be related to the rationales presented. However, a race for one person running may be a maintenance run for another runner. Therefore, explaining personal rationales with information use and frequency through positional mapping may be more applicable than applying a typology of runs.

6.1.5   Information sharing and social network size
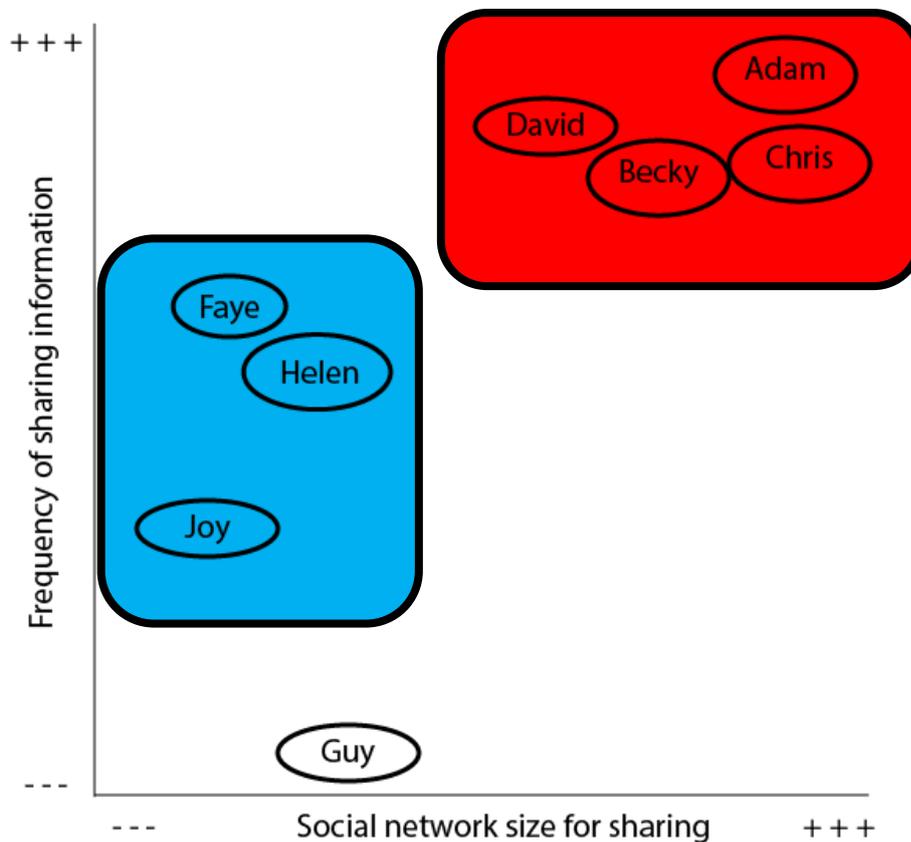
Figure 49: *Positional mapping of participant social network sizes and frequency of sharing information.*

The positional map in Figure 49 illustrates those with a more extensive social network for sharing information through their uses of running social media sites against those who said they did not have large social networks. Faye and Helen used Strava, but they did not have many followers compared to Adam, Becky, Chris and David, who run for clubs and organisations. Joy did not have Strava nor used a self-tracking site to share to her networks but infrequently used WeChat and emails to convey her runs that she elected to. Guy did not record his runs and did not share his represented information with others, although he did have a social network available in his work running group.

There are two gaps in the positional map, one of which seems more sizeable than the other. The first smaller gap raises the question of those with a small social network for sharing their running information and sharing frequency. For instance, there could be a possibility that somebody very frequently shares their information with a single or very few people. Faye did demonstrate this by sharing her running information with her trainer. Faye did not train as much as Adam, Becky, Chris and David within a week, so the frequency would not be as high. This low sharing frequency suggests that there could be runners who train between five and seven days a week and have a small social running network where they regularly share their information. There is also a more significant gap for those with more extensive social networks who share their information, similar to Faye, Helen and Joy. Those who run more regularly are likely to have larger social groups and share more frequently. Those that do not run as often in a group are less likely to have significant social groups and consequently will not share their running information as often. The positional map also suggests that some people are in large social networks but do not share their running information. However, this research did not encounter this social size and frequency of information sharing.

Those with an extensive social network are more likely to share their running information. Some participants used these networks to compare people's performances and social purposes. These uses seemingly had a range of emotional effects on the participants for personal and social purposes.

6.1.6 Sharing information use and emotional response
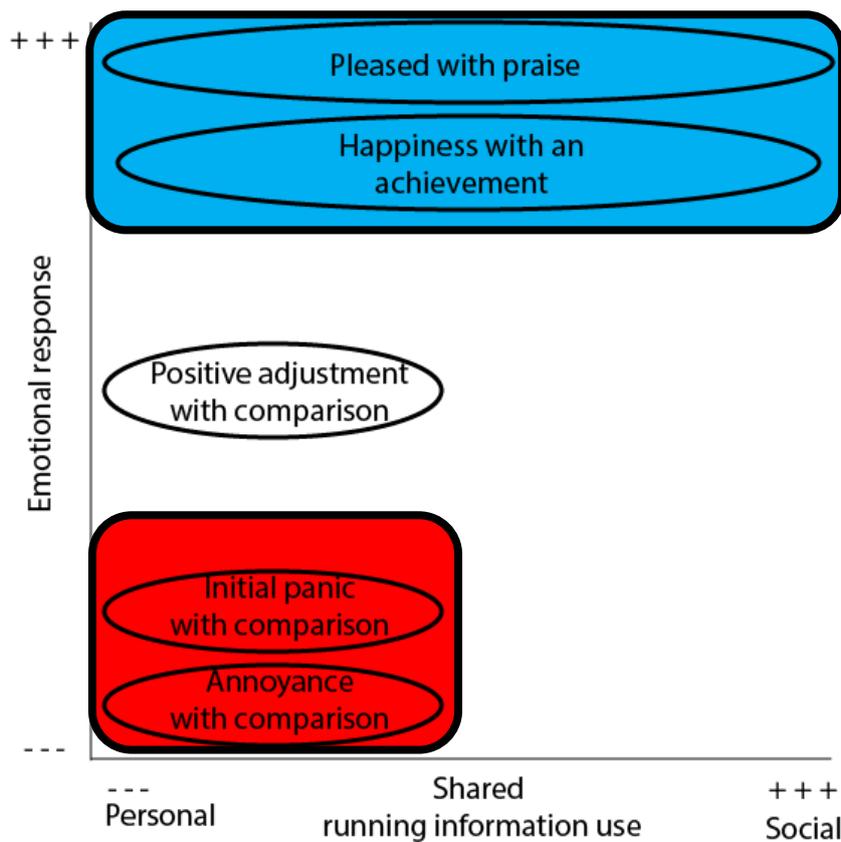
Figure 50: *Positional mapping of sharing information plotted against emotional response.*

The positional map in Figure 50 charts the personal and social uses of shared running information with emotional responses to the information. Along the horizontal axis is shared running information use. On one end of the horizontal axis is solely personal use, and on the other, it is exclusively social. In between these are mixed uses of personal and social information, which combine personal and social information—the emotional responses on the vertical axis range from negative emotions to positive ones.

Concerning positive emotional responses, this seems to span the range of personal and social uses. These seem to result in pleasant emotions to a person because somebody else has acknowledged their running activity through their shared running record. There is personal happiness with an achievement shared through their running record and is something that the runner wants to share personally. Negative emotions seem to occur within a personal reflective use when a person using social running information finds either annoyance or panic when making comparisons against other people's running records. Reacting to this, participants make an adjustment that lessens the negative response with some positivity. Their initial negative thoughts

about a shared record were considered further and reflected that perhaps there are mitigating reasons for their comparison. The positional map accounts for the gap between high social uses with negative responses. It does not exclude the possibility that negative reactions can be shared socially, although the participants did not evidence this.

This selected positional map concerning emotions and comparisons with socially shared information suggests that there is likely to be social sharing of the information and the associated positivity when there is a positive personal emotion. When there is a private, negative response, it is more likely to result in a personal reflection that is not shared socially. Instead, there seems to be a stage of cognitive adjustment that tries to make the initial negative thoughts more positive. The social elements under discussion contain a hint at personal reflective measures and have considered emotional responses. The remaining positional maps will investigate the personal uses of the records and the perceived value to the participants.

6.1.7   Using third-party records storage and intentional backup measures

The positional map in Figure 51 depicts the participants' use of third party storage for their digital running records about the amount of intent and measures taken into their backup and preservation of their records. The horizontal axis sees those using third party records storage only charted against the positive end of the scale. In contrast, the other end represents those that do not use third party records storage or even store records about their running. The vertical scale represents the level of intent to carry out measures to back up their records, whether held with third parties, their digital storage or not at all.

For those who used only third party providers that stored their running records in digital environments, there was a seemingly low intent, whether deliberate or not, to use measures to back up their running records against loss. The researcher observed unintentional backup where the participants had their records first uploaded to a manufacturers' data storage centre, then transferred to their preferred third-party platform. However, there was no intent amongst these participants to attempt or understand how to store these records outside of third parties, despite these stores providing a tacitly understood, constantly available "memory bank". Joy did not use

third party synchronisation to back up her running records in the Huawei cloud because of privacy and sharing concerns. Instead, she preferred to keep the running records in local digital storage within her smartphone. She realised that changing her phone meant that she would probably lose her records unless she could transfer them from device to device. However, there was little intent here as a part of scheduled backup and storage. Guy did not store any records, so his position on the map reflects him having no records to store because he did not create them. Thus, there is no intent to make backup storage measures.
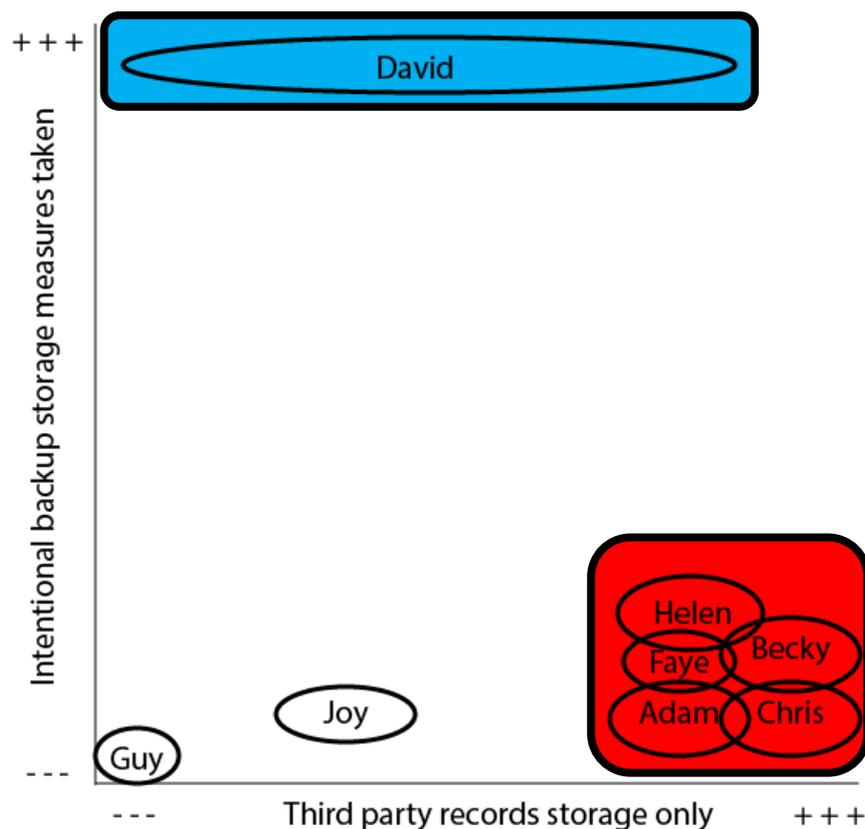
Figure 51: *Positional mapping of third party digital record storage use against backup storage measures taken.*

Only David kept their digital storage systems outside of third party storage and had taken considered measures to back up and preserve those data over three decades. David had also considered storing their records stored with third parties but decided against it because the records were "interesting" but not "vital". This broad use of storage explains why David's positional mapping spans the horizontal axis.

Whilst there appears to be a significant gap in the positional map, most participants do not backup their records intentionally whilst only one does. A position that could occupy the middle ground amongst those that keep their running records with third parties is those that have some intention to back up their records. However, this is not yet known. Most participants rely on third party providers to continually maintain and make the records accessible. When one of the third-party platforms decided to change its subscription model, some records and information were no longer available unless a payment was received. The introduction of such a payment model and the acceptance of a payment suggest that the third party controls these personal records. The positional map also demonstrates a lack of evidence of those who choose to store digital records in their systems and have some intent to back up their records but do not carry out their intent.

For participants like David, who are aware of the possibilities of digital storage measures, it would be interesting to understand further how he acquired and progressed knowledge in using digital storage for his running records through his continued backup storage measures. This understanding could become necessary for other participants because they seemed to have value over their running records stored solely with third parties.

6.1.8   Sense of personal achievement, history and reaction to loss

In Figure 52, the sense of personal value in their running records seems to be a sense of achievement and personal history. Except for Guy, who did not keep running records, it would seem that all participants had, in some form, a high sense of personal achievement in their running records. The running records represented the participants' improvements and achievements, irrespective of how long they ran. For those with a high sense of personal achievement, there was value in using the records over some time to reflect upon their records that charted their progress to see if their current performances were good or not so good against other runs that they had tracked.

The participants with a sense of achievement included shorter-term goals and those whose running is part of their history and identity. Consequently, their use and value were in being able to chart their achievements and progress in their physical

improvements. Those who seemed to have this short-term attitude did not seem too concerned about the complete loss of their records. They only displayed an initial disappointment and annoyance that the records had gone. The participants that expressed a sense of "personal history" in their running records also seemed to have a high sense of personal achievement bound up in them. However, there appeared to be another deep-seated sense of disappointment. When confronted with a hypothetical situation of losing records, there was a sense that a part of their selves (their "history") would be lost. Of Adam, Chris and David who expressed this sense of personal history, only David seemed to have intentional measures to back up his digital running records. He also had handwritten diaries. In the event of loss, Adam and Chris would lose their "personal history" entirely and had not, until this research, considered such a loss.
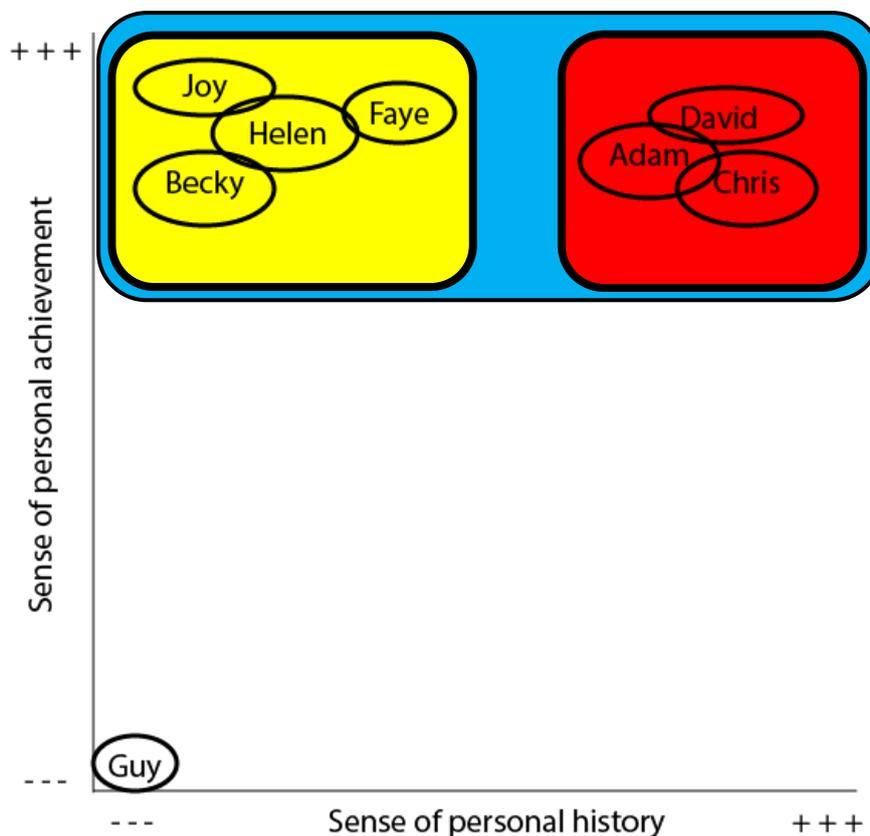
Figure 52: *Positional mapping of sense of personal achievement and personal history in records.*

Whilst there are limitations in the participant size, there is the suggestion that the combination of a high sense of personal achievement and history in running records is perhaps gendered. Short term progress and meeting goals foster a sense of

achievement. Faye is positioned just to the sense of achievement group's right because she has one record that gives her pride. The record represents something that she remembers from the past, but on the whole, she only found around a month's worth of her records were useful to chart her running progress. This analysis has not included an in-depth consideration of Guy's position because he does not keep records and has no sense of personal history or achievement in running records.

6.2   Summary

Positional mapping has moved the descriptive findings to a higher abstraction level. It has presented a greater insight into the complex relationships between people running and forms of information when running and reflecting upon it. Represented forms of information can complement embodied information to help develop knowledge for their running activity. However, it can also have adverse emotional effects. For some participants, represented information about their running offers not only a tangible form of achievement but is a part of their identity. Despite this importance for some, the positional mapping has revealed the dependency of personal data held by third parties.

The next chapter uses *neo-assemblage theory analysis* to provide a new, complementary abstract perspective to describe, demonstrate, explain and speculate on the complex relationships between types of information and people in a running situation.

Chapter 7: Neo-assemblage theory analysis findings.

7.1   Introduction

With the *grounded theory method* and *situational analysis* findings presented in Chapter 4 to Chapter 6 inclusive, this chapter presents a complementary mode of analysis based on the data. This chapter will not only map the situations as components and assemblages but also offer an analytical method of how assemblages work in both observed and speculative assemblages. The *neo-assemblage theory analysis* findings presented in this chapter will form the basis for the discussion in Chapter 8 of the novel analytical method in this chapter as an alternative lens to the concepts of information and records and the consequent implications of this lens on information behaviour, digital sociology and archival science literature. Relational analysis (4.5) and positional mapping (6.1) revealed complex information use amongst people who run. In the descriptive findings (5), there were two situations in using running information. These are described as during a run and away from a run. However, the two situations are not discrete. The person running is connected to both situations. Both the person and the situations influence the information types and use. The person, situation, and information types are all connected or interconnected in a running situation. The following section visually introduces elements involved in the situation, explained by *neo-assemblage theory analysis*.

The analysis constructs maps of entities incorporated into the various assemblages of the practical running information situations. Demonstrating the construction and sometimes deconstruction of assemblages intends to contribute to an understanding of the complex information world of somebody engaged in running. Elements found in the participant data form the basis of the analytical maps.

Neo-assemblage theory analysis mapping asks the reader to suspend notions of totalities and hierarchies proposed in *assemblage theory 2.0* thought (DeLanda, 2006). With an open mind, the reader is encouraged to immerse into the fluid, evolving and fleeting constructions of socially understood objects that form *neo-assemblage theory analysis* maps. This research is not intending to propose a universal claim of a definitive information *neo-assemblage* of a person engaged in the activity running. A single truth in human understanding would be both an impossibility and an

ahistoricism, and the maps are not definitive representations of reality (Rorty, 1982). Instead, the construction of *neo-assemblage theory analysis* maps will try to understand whether the participants' contemporaneous information worlds can help form an understanding of information amongst a selection of people who engage in running. The researcher concedes that these *neo-assemblage theory analysis* maps will be historical, a snapshot of information assemblages through time and human-centred. The assemblage constructions and maps are for developing work that should be revisited over time to remain useful (Clarke, Friese & Washburn, 2018). The neo-assemblages are also a part of an ongoing process in the participant's information use and valuing of the information.

The assemblage maps are distinct from process maps and models. They represent a specific moment based on a situation in the findings and are not repeatable, generalised processes. The maps explain changes through the mechanism of relations of exteriority and allow for speculation. The assemblage maps do not claim to show a repeatable process concerning humans and deemphasise the focus on a person. Any component or assemblage in the maps has equal standing. Due to the philosophical standpoint of this research (see 3.2), maps are abstract representations of a particular set of material objects and not socially constructed linguistic concepts that apply to humans, often seen in general process maps and models. Every situation mapped is different – even unique. Hence the analytical method accepts that the assemblage maps are momentary reflections rather than more definite illustrations of processes and models that concern humans and information. The assemblage maps attempt to describe as many material elements as possible identified in a given assemblage.

The maps represent complexity. The maps have a deliberate complex appearance to emphasise the complexity of relationships between components and assemblages. A single, definitive visualisation and explanation of a runner's information assemblage cannot wholly describe complexity. A single map cannot describe interconnectedness. It cannot represent the potential for change, the impermanence of a runners' information world and its supporting infrastructures over time. The *neo-assemblage theory analysis* maps and explanations are merely transitory and report upon a particular instance in time from the research. Despite the apparent permanence of a diagram and explanation, the maps are flat ontological explanations related to human

and non-human actants, social discourse and spatial elements. The maps are formless, shapeless, and without boundaries to reflect the interconnectedness of information, its dependent technologies and other sources of information such as internal and external sensory embodied information. It is perhaps an anathema to try and produce a general *neo-assemblage theory analysis* map. Instead, it is more appropriate to apply a model to each circumstance of each participant under study. Some form of interpretive representation can at least begin to convey the complexity of types of information encountered in society. This analytical chapter intends to build an analytical narrative starting from a person described as an assemblage, describing the types of information a person uses during their run and after it and examining the interactions through *neo-assemblage theory analysis* maps. The analytical narrative closes with a person's relationship with types of information related to their running activity.

The analytical narrative will reveal complexity from a *neo-assemblage theory analysis* perspective. The analysis will also show how complex relations between entities as an assemblage or as components are not homogenous entities but are held together to offer an appearance of stability but have the potential to change and alter the assemblage's capacities with the smallest of changes within an assemblage's properties. The analytical narrative will demonstrate how *neo-assemblage theory analysis* complements existing *situational analysis* methods with shared philosophical and theoretical origins.

7.2   The person running assemblage analytical map

Central to descriptive findings was the idea of the runner or the person running. This idea is a *neo-assemblage theory analysis* map (Figure 53) that portrays what a person consists of in terms of components. The person running assemblage consists of a human body with internal components such as a mind and organs, external sense organs and physical appearance. This research is not intending to address or discuss the question of what is human - this type of deep philosophical musing is not relevant to frame understanding of how a person uses information in the activity of running. Instead, this research presents a *neo-assemblage theory analysis* map outlining the components and subcomponents of a person running. This map allows an examination of relations of exteriority that seem to affect the stability of the assemblage.

The map represents a person in a running kit whilst running, similar to images of the runners in Chapter 5 findings, and labelled as a person running (Figure 53). This analysis represents a split second in time to understand the dynamic workings of the components that consist of a run. The first analytical explanation of a person running assemblage will be detailed because it lays a foundational understanding for subsequent analyses. After analysing the person running, further analyses will concentrate upon its notable points concerning the research questions rather than describing every possible analytical avenue.
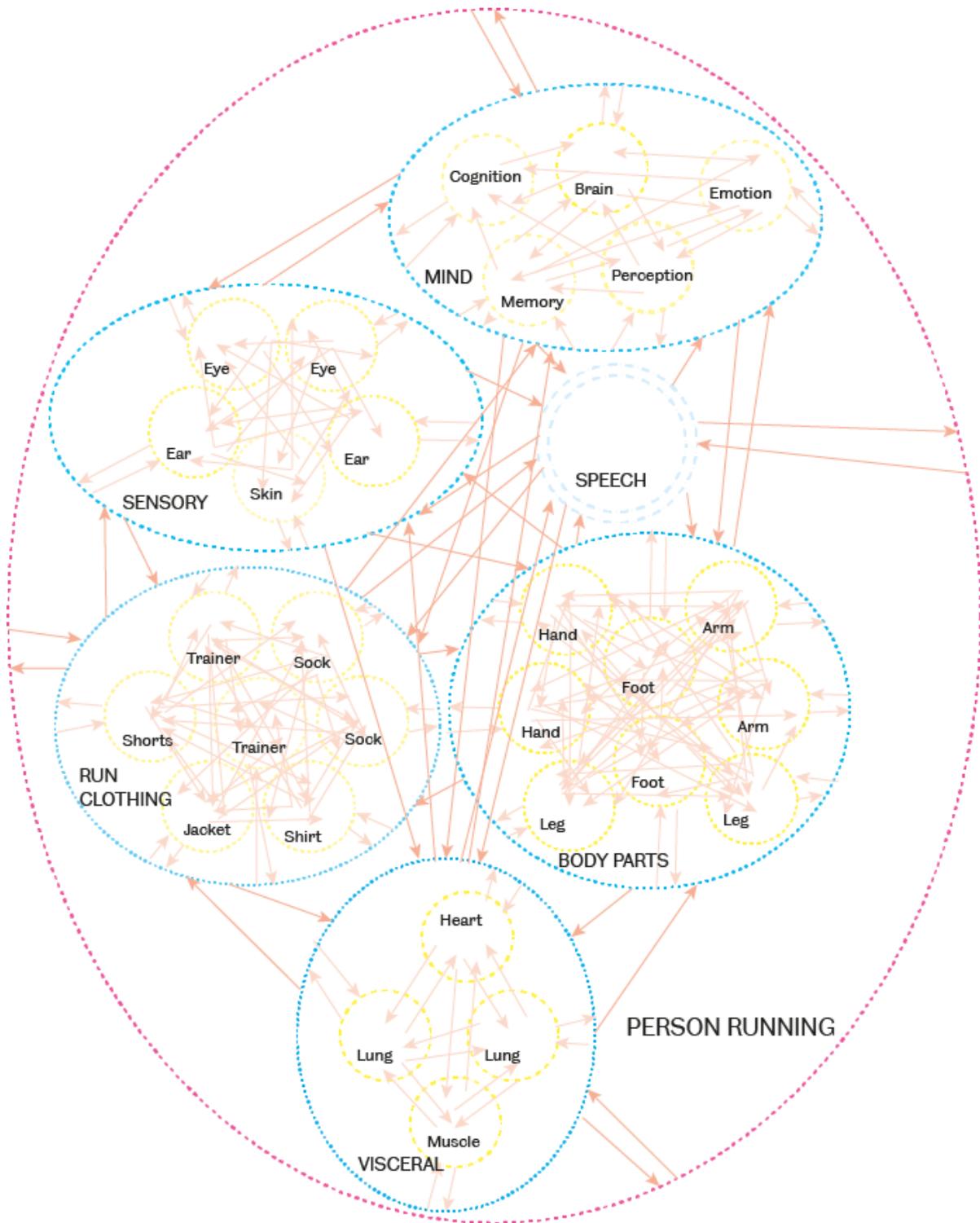
Figure 53: *A neo-assemblage theory analysis map of a person running.*

Firstly, a red boundary depicts the person running. The boundary delineates the idea of a *person neo-assemblage* only and does not denote a fixed entity. It represents the presence of a stable assemblage through the tight dotted lines. The shading of the lines is not entirely bold nor faded out red. The shading describes the assemblage's mixed

character, which contains a mixture of material components and expressive components. It is neither entirely material nor entirely expressive.

Within the outer dotted line are six components illustrated in blue. These components contribute to the construction of the assemblage. The components are not exhaustive but represent the data collected. These components are mind, sensory, speech, body parts, visceral and run clothing. Most of the components are more material than expressive, represented by the weaker strength of the blue shading. Body parts and sensory are more expressive than visceral because they can convey expressions outside of the assemblage, such as communicating with other person assemblages in a non-verbal way. Run clothing are material objects, but they can express words and colours and, therefore, are not entirely material components. Shaded in very pale blue, the speech component has a very expressive designation due to the almost wholly linguistic properties and capacity to communicate in the situation. The speech component does not have any sub-components illustrated because of the complexity of language, speech, and verbal and non-verbal sounds that a person running can use. Language itself could be subject to a *neo-assemblage theory analysis* map, but that is not the focus of this analytic presentation.

Mind as an assemblage has five suggested components, brain, cognition, perception, memory and emotion. The brain has heavier yellow shading because it is a material component within the mind assemblage. The other four components are more expressive and have material elements composed of electrical impulses and activity.

The components work together by joining in relations of exteriority that have causal effects on each other to form a mind assemblage. The arrows represent these relations. The mind assemblage emerges from the five components in relations of exteriority. As a result, the double determination effects are described as arrows pointing to the component's dotted boundary and back into the components. These arrows explain where the mind as an assemblage affects its components.

Similarly, the components of the mind also affect the mind assemblage as a whole. Components and assemblages work through emergence and causality by being joined in relations of exteriority. The other components will not include this explanation of their relations of exteriority because they work in the same way.

The sensory assemblage consists of eye, eye, ear, ear and skin. The body parts assemblage comprises of hand, hand, arm, arm, leg, leg, foot and foot. These components in both assemblages are mainly material but contain expressive properties, hence the slight lightening of their yellow shading. The visceral assemblage consists of lung, lung, heart, and muscle material components depicted with a darker shade of yellow due to their materiality. Run clothing consists of sock, sock, trainer, trainer, shorts, and jacket as an assemblage. As described for run clothing as a component in the person assemblage above, the components are primarily material, but they have elements of expressiveness through colour and words. The components are in a slightly lighter shade of yellow for this reason. These components can all be reduced further in scale to their constitutive components. However, this analysis is at a high *level of scale* for ease of explanation. All of the components described above are stable, hence their closely dotted boundaries.

The relations of exteriority between the components enable *neo-assemblage theory analysis* mapping to illustrate how an assemblage works between its constituent parts. The components described are not exhaustive, nor are they ever intended to be definitively representative. Every individual analysis will present different representations, given the pragmatic difficulty of the notion of representation. The maps provide us with an insight into the workings of a given assemblage. Therefore, working outwards from the six components and their sub-components, the components then have reciprocal relations of exteriority with the person assemblage. These reciprocal relations are the double determination effect where the capacities and stability of the person running assemblage have causal effects on the components in the assemblage. What the entire assemblage does at the time has a downward effect on the components. For example, the movement of the assemblage affects the body parts and visceral components. In return, what the components of body parts and visceral do is have an upwards effect on what the running assemblage can do. The sub-components also work similarly.

An example from the findings can illustrate the use of this map. An example is when Adam understood his body was running well through his "heart" and his "lungs". Any idea of a set starting point is redundant in these maps. It is entirely up to those encountering the map to choose their view of relationships within an assemblage.

Using Adam's idea of "heart", a heart sub-component in the map is related to the mind component. This relation enables further relations between perception, cognition, memory and emotions through the material brain. These subcomponents are also engaged with body parts and the sensory, enabling those sub-components to work. The run clothing will also affect the heart because of the run clothing's likely weight, such as the trainers and jacket. If the run clothing is suitable for running, it will minimally affect the heart. If clothing is unsuitable, the heart may have to work harder, affecting the relations with the mind and all other components. It is challenging to describe process and linearity, and this is precisely the point. The *neo-assemblage theory analysis* maps are better at illustrating complexity rather than providing a basis for processual description. In this example, the map shows the noted properties of the assemblage required for a person to become a *person running*. It shows how the assemblage properties work together to realise the person's capacities in a running assemblage. This analytical map also illustrates the background relations of exteriority of a person running, which will be implicit in all maps that follow. In this example, the components work well because they are all stable, as denoted by their close dotted lines. There is stability because the person can fulfil their capacity run.

The second analytical utility of the maps is their affordance of speculation. For example, what would happen if a person running did not have a trainer whilst running? The trainer sub-component would have detached from the run clothing component breaking those relations of exteriority and thus the existing person running assemblage. The run clothing component would be destabilised or deterritorialised. Its loss would have causal effects upon all of the other components in the assemblage to the extent that the person running could not fully realise their running capacities. The components and their sub-components would also become destabilised for an indeterminate time whilst the assemblage adjusts to a new form of stability to run without a trainer. Whilst this was not observed in the data, this particular speculative situation demonstrates the speculative analytical possibilities within an assemblage map. The assemblage presented works through the finely balanced relations of exteriority between the components. The speculative possibility shows how fragile such a balance is that can destabilise the assemblage and its ability to fulfil its capacity, in this case, as a person running.

This section concerning the person running presents the components in a person running assemblage. It shows the varying degrees of material and expressive mixtures of components in an assemblage and sub-components in an assemblage's component. Secondly, it gives importance to the relations of exteriority between every component in the assemblage. It shows how the relations of exteriority have double causal effects on the capacity of an assemblage and its components. Thirdly, it presents speculative analytical possibilities. The analytical map shows a person running as a stable assemblage or territorialised.

Nevertheless, it can also form the basis for asking questions about the effects of a single component change within an assemblage. It can question its effects on other components and upon the assemblage itself concerning its ability to fulfil its capacity. The following section will expand the person running assemblage by introducing an external environment, other people running and wearable devices.

7.3   Information during a run

This section presents analytical maps of a person running assemblage and how they are a part of a more comprehensive assemblage while running in an external environment and with another person. These maps relate to the idea of embodied information. The section also presents maps of a person running whilst wearing a wristwatch or smartwatch, which relate to forms of information derived from devices. The section will concentrate on significant relations of exteriority, which have causal effects upon particular components and assemblages in the analytical maps. It will also describe the properties of components but to a lesser extent than relations of exteriority.

7.3.1   Embodied information

A person running is captured in the data through filming or describing an external environment. Figure 54 provides an analytical map of an external environment as understood by the participants and the researcher.

Figure 54: *A detailed neo-assemblage theory analysis map of an external environment.*

The external environment assemblage emerges from its components of the weather, the terrain, built objects, natural objects and sound. All components are reasonably stable, hence their depiction with tight dotted lines. Except for sound and built objects, the components are mainly material rather than expressive. Sound comprises physical soundwaves, but it also has highly expressive properties. The same applies to built objects that constitute their material and expressive properties, such as words and images on signage and the designs and words found on vehicles.

Within the sound assemblage, the soundwave component consists of physical soundwaves and the expressive capacity of soundwaves. There is scope for other components within the assemblage structure upon further investigations. For analysis,

it is helpful to draw attention to sub-components of a given component. The terrain assemblage contains two components, surface and gradient. These are highly material components from which the topography of the external environment emerges as abducted from the collected data. The weather assemblage comprises temperature, wind speed, light and humidity components from which emerges the weather in an external environment. These have high material properties, but the light component has some expressive properties, depending upon its subcomponents and other exterior relations that affect the capacity for light or darkness. The natural object assemblage consists of stone, animal, tree, grass, hedge and flower. These components also have predominantly material properties, although there are also properties of expression such as colour and form. The components of the natural object assemblage are not exhaustive, merely illustrative of the collected data. The assemblage of built objects containing wall, signage, vehicle, fence, and building has mainly material properties. As they are products of human manufacturing, they also contain higher expressive properties, such as words, images, and design elements. The fence has a darker yellow shading due to having fewer expressive properties.

The mutual relations of exteriority show the complexity of the relationships between all sub-components within the components. The relations of exteriority then also show the relationships between the components and external environment assemblage. Together the external environment assemblage emerges.

Similarly, the emergence of the external environment assemblage has reciprocal causal effects on its components and sub-components. These effects can bring about environmental changes, changing how the external environment assemblage fulfils its capacities.

As a part of developing the effects of assemblages that join in relations of exteriority, the person assemblage joins the external environment assemblage. The result is Figure 55. Figure 55 is not legible, but it serves to illustrate two points. The first is the further complexity of the joining in relations of exteriority of two assemblages, where there will be relations between components across all *levels of scale*. The second is the analytical difficulty of attempting to describe every relation.
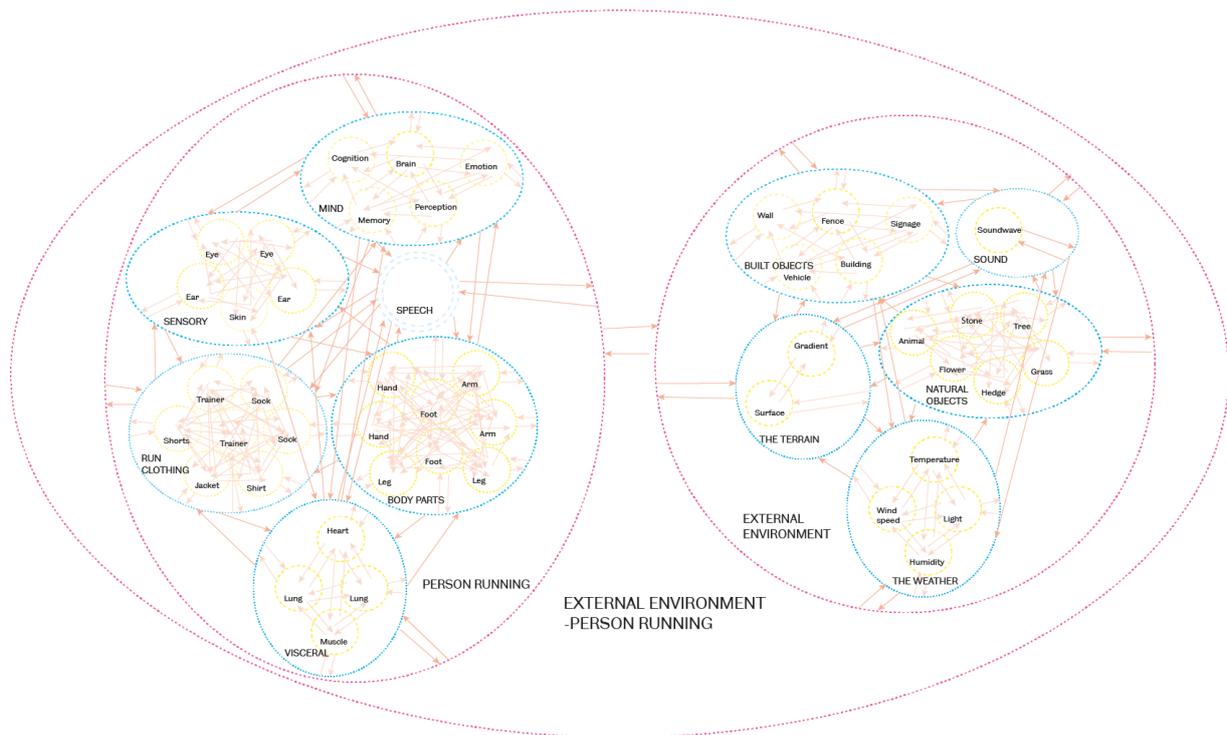
Figure 55: *A detailed neo-assemblage theory analysis map of a person running and an external environment gives an illustrative overview and is intentionally not legible. See Figure 56 for a readable view.*

This model can be presented at a higher *level of scale* to aid analytical presentation, as depicted in Figure 56, overleaf.
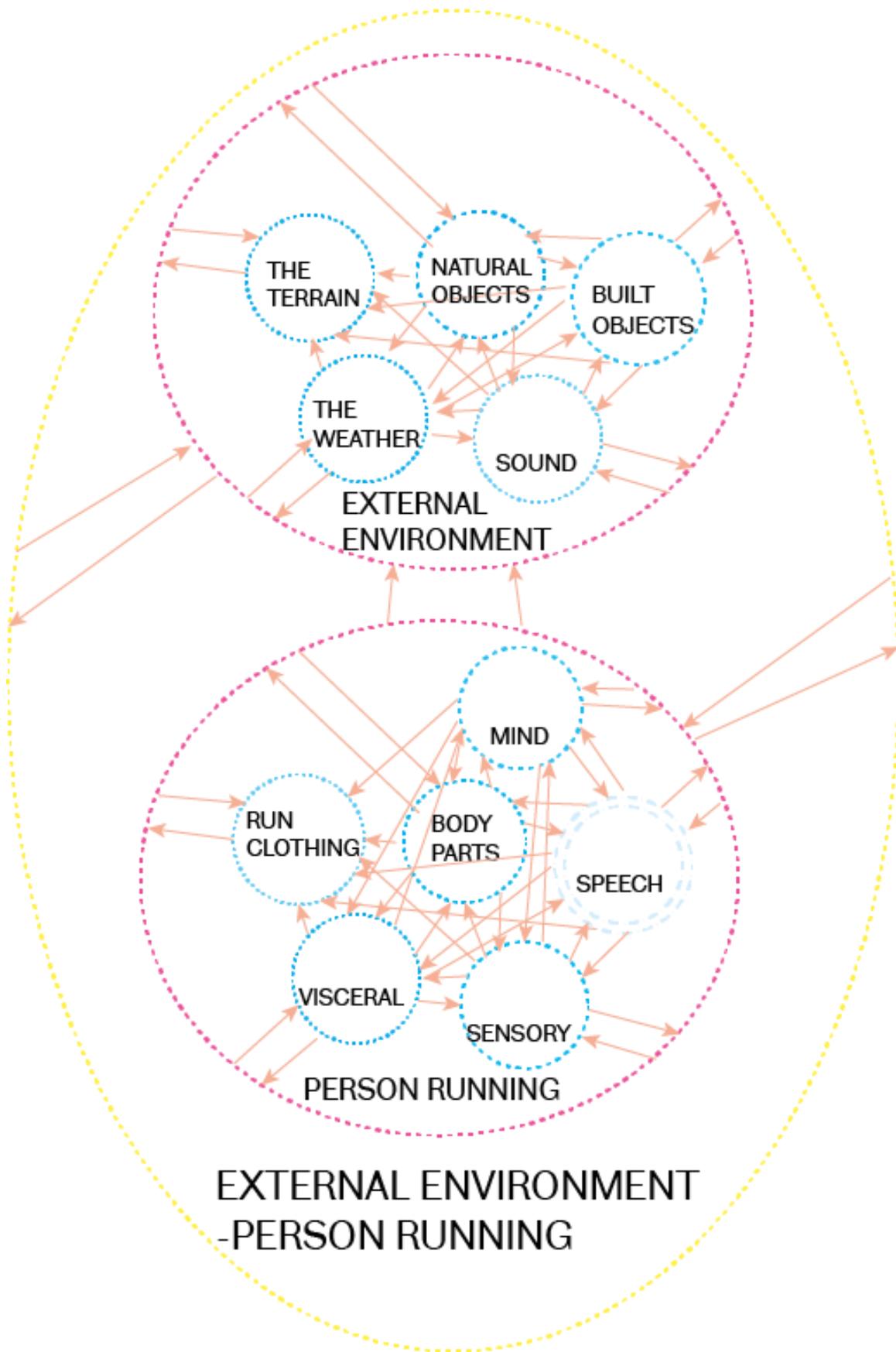
Figure 56: *A higher level of scale neo-assemblage theory analysis map of a person running and an external environment.*

Figure 56 maps the person running assemblage joined in relations of exteriority with an external environment assemblage. In other words, it is a person running in a given environment (or a given environment with a person running in it). A person running's mind's subcomponents focus on and engage with specific components in the external environment assemblage. A mind engages through the perception of sensory components, most notably the eye, ear and skin components, to sense terrain, feel the environment's weather components and hear sound derived from other external environmental assemblage components that have relations of exteriority to make soundwaves.

The person running is immersed in sensory information from the external environment. The analytic map (Figure 56) illustrates the complexity of simultaneous experiences. These are sound experiences such as birdsong, the noise of the runner's footwear (run clothing) making contact with the terrain in making a splashing noise in puddles or a squelching sound in the mud. There are visual experiences of seeing the ground (eye, eye, perception, the terrain), the woodlands and plants that birds perch in (natural objects), and the anticipation of puddles or muddy patches. There are haptic experiences of atmospheric weather conditions on their body, such as heat or cold (skin, temperature) and haptic perceptions of rain or wind on the body (skin, humidity, wind speed). There is an apparent barrage of sensory information that the person running seems to encounter. Through the components of the mind by cognitively acquiring, considering and perhaps even recalling sensory information, they filter forms of information that may be of use to them that are also related to their reason for running. Such filtering relates to the person running's moving components through time in the external environment.

The perceived cold weather can result in thermoregulation, which is evident when participants removed their gloves (run clothing) once their bodies were warmer (visceral). The person running can acquire and consider information such as obstacles in their path or mud to move their bodies into the better ground (natural environment, the terrain). The person running can also see features such as "waypoints" within the external environment to know they are in a familiar area or can see and interpret signage to move around the external environment. Whilst all this is happening, the person running is also keeping a bodily running motion going when all the sensory

components acquire information for the mind to consider. These all work together to ensure the person running in an external environment reaches the capacities of the person running-external environment assemblage.

There is a seeming flow between the perceived external environment and its bodily information through the senses within the person running. The person running pays particular attention to simultaneous physiological information. The researcher interpreted the idea of thermoregulation above through participant data through observation. When the participants explicitly suggested that their heart and their breathing through their lungs provided information on the progress of the run for the mind, it was usually when the body was working too hard, not working hard enough, or working just about right (visceral). Participants also commented on limbs (usually the legs) and feet as embodied information related to the perceived success of the desired run type, such as whether the legs are moving well or not compared to other running performances (body parts). The person running also considers internal information, such as whether the body is tired before a run or has not eaten enough food, which can explain a suboptimal performance in a run. Some participants also expressed the idea of pain or hurt of the body during a run (visceral, mind), which is perceived to get easier with more running activity. Understanding the external environment and the body's sensory information seems to develop amongst the complexity of assemblage components that participants described as "knowing your body" over time.

The *neo-assemblage theory* mapping also provides a different perspective upon presenting the formation of the complexity of relations. These relations are a form of knowing in the external environment, which affects how a person running reacts accordingly within the external environment as efficiently as possible to complete the run according to the required capacity of the given situation.

Affective aspects (emotions) derive from the person running considering their external senses and the external environment assemblage. Immersive sensory perception of the environment seems to promote feelings of either well-being or positivity, such as recognising and considering the enjoyment of running off-road in fields, trails and fell environments or the unpleasantness and necessity of running on

roads and pavements. Conversely, there was a reverse of the above where participants did not like running on grass and off-road environments, preferring to stick to streets and pavements because it made them comfortable with their running and learning to know how their bodies worked. The internal information acquired, considered, and often recalled (mind) through their visceral senses also elicits emotions. Emotions are "panic" when a person feels they do not have control of their breath through to feeling "metronomic" in having a deeper understanding of the information from their running bodies. The *neo-assemblage theory analysis* maps do not fully explore the properties of the sub-components of emotions. However, the sub-components have emergent properties that result in a type of emotion. This emotion has further causal effects upon the components and the overall assemblage of the person running, which in turn causes reciprocal effects upon the emergent nature of emotions. The presence of another person running can further develop the external environment-person running assemblage. The addition of another person running was observed both in the researcher's presence for the running recordings and participants mentioning other people running with them. Figure 57 illustrates the addition of another person running to the external environment-person running assemblage.
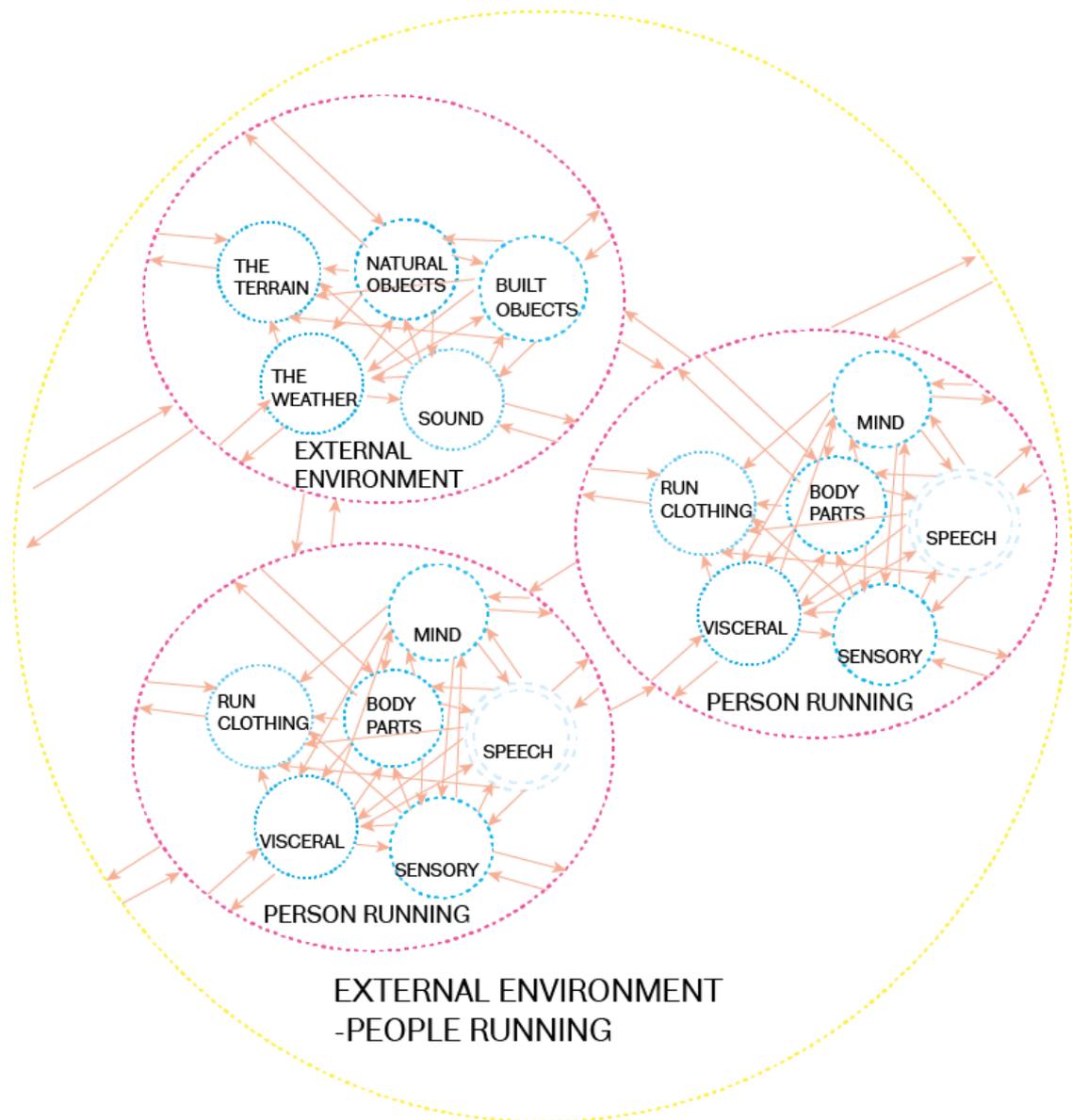
Figure 57: *A high-level neo-assemblage theory analysis map of two people running and an external environment.*

Figure 57 demonstrates the communicative aspects of using visual and aural sensory information to share considerations with other people running and recall internal and external sensory information acquired during the run. Sharing considerations can be talking to another person about running experiences, like the recording situation. Relations of exteriority explain the components in the assemblage in the situation. The two person running assemblages join with the external environment assemblage. All assemblages have reciprocal causal effects. What those effects are precisely is not fully known. However, each person running's assemblage experience will not be the same. Each person running will have different properties, especially within its sensory and

mind components. Whilst some components provide non-verbal expressions, there is the opportunity for speech components to form relations of exteriority. They are most prominent for communicating information about and within the external environment assemblage. As well as speech components, communication uses other components such as body parts and sensory and mind. For example, within the mind, there could be memory and cognition of discourse around club running and running metrics, in general, which the persons running share through communication. There is also the example of recalled situations in races. A person running sees other people running and uses their embodied information such as running pace or their identity (formed from the expressive properties of the person running) to try and catch up with them or beat them. This competition can result in the "thrill of the race" or "annoyance" with oneself if overtaken by others. A race fulfils these emotions and cognitive components to their capacity in a person running assemblage. Reaching this capacity then requires the person running as a component with the external environment-people running assemblage to be fully engaged to realise a race.

An interconnected interaction with the perceived external environment demonstrates the extraordinary complexity of just a part of the human information experience of a person running. This experience can also include another person running. Figure 57 is a snapshot of this particular moment of an external environment-people assemblage. When more people - or persons running - are in the external environment with a person running, the assemblage can grow its capacities, and the possibilities of the potential relations of exteriority become vastly complex.

Each person running in a large assemblage of people running in an external environment will also have different perceptions and perspectives of the external environment that various relations of exteriority hold them together. However, when a person running decides to run on their own, they are, at a minimum, most likely to be engaged in a seemingly simple assemblage depicted in Figure 56. Whilst it has been analysed as being a complex site of embodied information use, these are perhaps the critical non-technological elements that keep running, at its heart, "a simple sport". The relationship between the person running and the external environment realises the person running's capacity to perform a run in a manner that their mind components dictate to them. The external environment assemblage is only secondary in this

particular analysis. However, its presence and the mapping of its complexities and relationships with the person assemblage could quickly provide scope for further analysis of the capacities of the environment and how the person running affects it. This section does not describe the perspective of the environment because it is not the focus of this research.

7.3.2   Device information

Neo-assemblage theory analysis will move away from the "simple sport" of the embodied sensory experience of a person running in an external environment toward another type of sensor. Runners' wearable devices can provide feedback and represent information to the person running. It is the beginning of a move away from the simplicity of the activity.

Two of the participants, David and Joy, recalled in their early days of running that they used a simple wristwatch during a run to give them an idea of the time they checked for reassurance that they were running at the right pace and knew when to stop running. Another participant, Guy, did not use a watch during a run, but he sometimes used an MP3 music player. The time of the music tracks that he listened to indicated that he was running at about the right pace when combined with external environmental information. David called this checking "reassurance", which was something that all the participants described.

At the most superficial assemblage level, the external environment-person running assemblage can change to introduce a simple wristwatch assemblage such as David (Joy also used to record her early runs with a smartphone, not use it during the run). The wristwatch assemblage contains material properties such as hour hand, minute hand, second hand and casing. These also have expressive properties through the design and manufacture of the components. The fifth component, the watch face, is linguistically expressive because it contains numbers and markings that convey time expressions. The components and overall assemblage are stable, as the tight dotted lines denote. The components join in relations of exteriority to realise the capacity of the emergent wristwatch to express time to a person running assemblage. The wristwatch representation could be broken down into the constituent parts of the watch right back to the mechanical instruments of the device or even to an atomic

level of the elements contained within it. Figure 58 depicts the simple wristwatch assemblage.
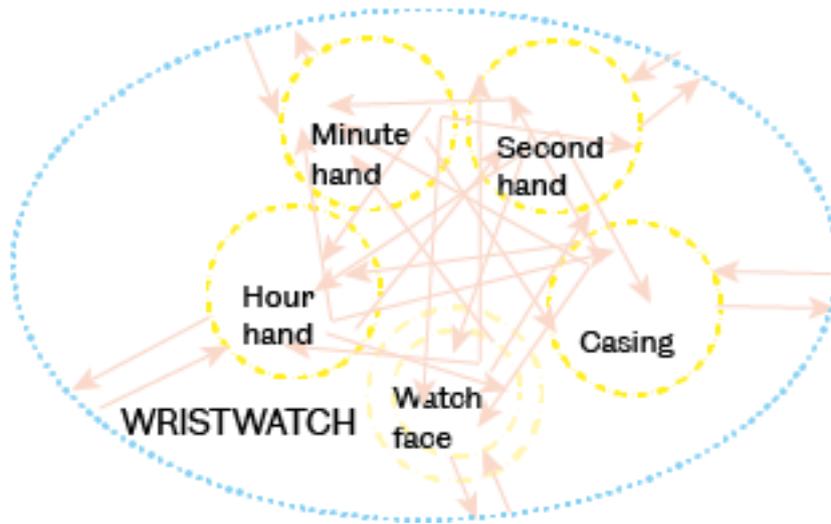
Figure 58: *The wristwatch information assemblage.*

Figure 59 presents a higher-level view where the wristwatch assemblage attaches to the external environment-person running assemblage as a component of the person running assemblage.

THE
TERRAIN

NATURAL
OBJECTS

BUILT
OBJECTS

THE
WEATHER

SOUND

EXTERNAL
ENVIRONMENT

MIND

RUN
CLOTHING

BODY
PARTS

SPEECH

WRIST-
WATCH

VISCERAL

SENSORY

PERSON RUNNING

Wristwatch
subcomponent
and new relations of
exteriority

EXTERNAL ENVIRONMENT
-PERSON RUNNING
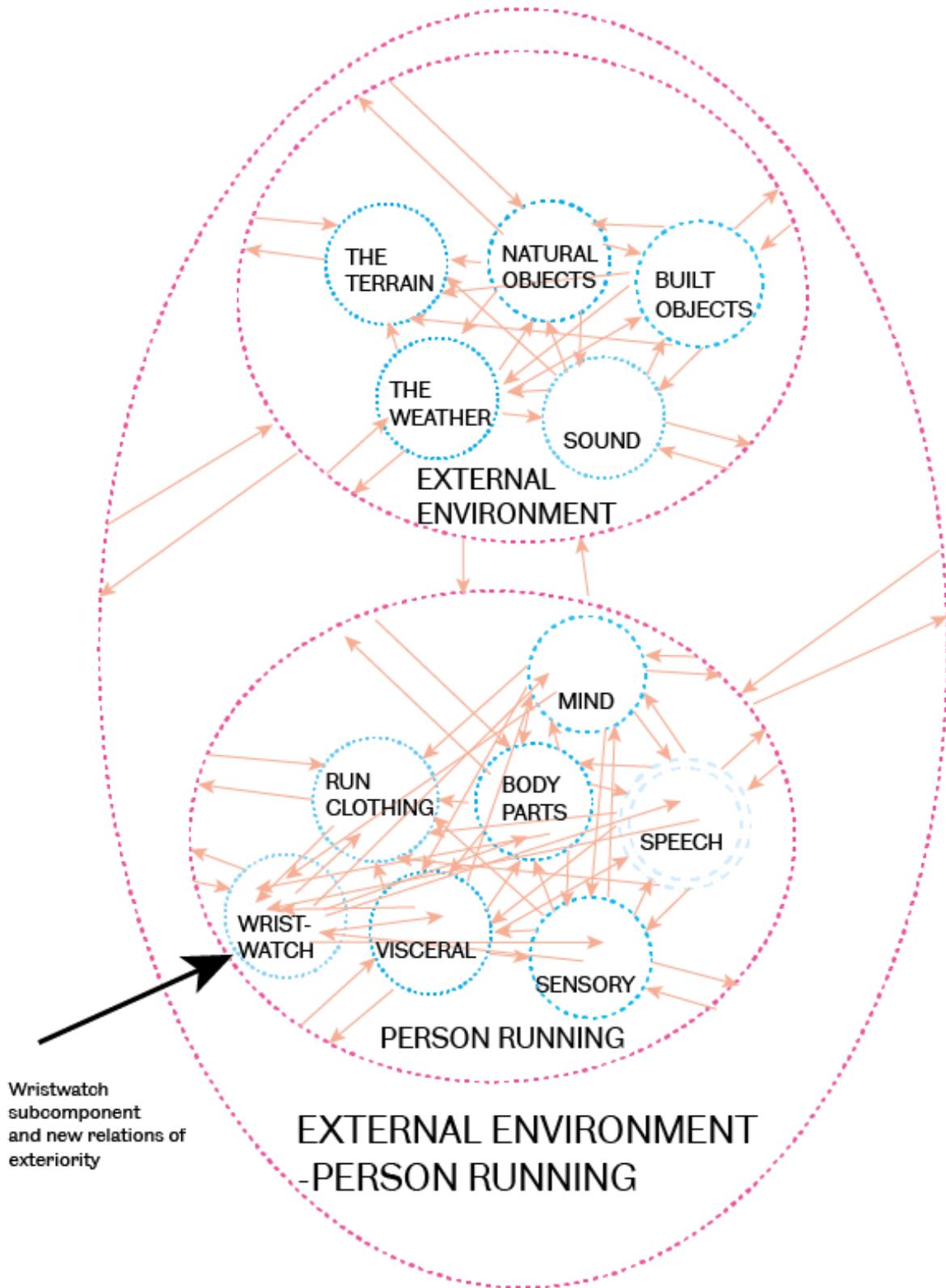
Figure 59: *A higher level neo-assemblage theory analysis map of a person running and an external environment with the inclusion of a wristwatch component.*

The wristwatch adds a component to the person running-external environment assemblage. The expressive properties of the wristwatch as a form of information are

the focus of analysis. In particular, it is the person running's entering of a *relation of exteriority* with the wristwatch and its watch face that contains quantified information of interest.

With the wristwatch, a single metric of time or time elapsed since starting the run keeps a person running reassured (mind, emotion) that they are on track on their chosen time or pace whilst running within the sensed external environment. The person running is acquiring a time metric as information. The person running can consider if they are on track in their run, perhaps recalling waypoints in the external environment (natural objects, built objects) that match their time. This consideration can result in emotional reassurance (mind, emotion). If they are not running as fast or too quick, they do not think (cognition) that they realise their desired capacity, then they adjust to speed up or slow down their running. The following section on running watches and devices will revisit the emotions of metrics and their consideration (cognition) during a run amongst wearable devices.

Even in a seemingly simple assemblage that introduces a form of represented information, there seems to be a further infusion of information use that the presence of a single quantified form of information introduces in addition to the external environment-person running assemblage. Introducing the wristwatch component has changed the assemblage, which has an overall effect on other components to how a run is. It seems to have a notable effect on the components of the mind, which in turn affect the person running's other components in their execution of the run to the total capacity of a person running assemblage. Despite the change of a property of the assemblage, there is a reasonably small effect upon the existing person running-external environment assemblage. Building upon a wristwatch, this section will examine more sophisticated devices. These are smartphones or wrist-worn devices referred to as their brand names (Suunto, Garmin, and Huawei) and relevant model number. A person running can wear these devices on the wrist, such as smartwatches, or carry them, such as smartphones.

A detailed *neo-assemblage theory analysis* map of a smartwatch assemblage and an accompanying technical atmosphere assemblage will demonstrate the greater complexity of a wristwatch component within a person running assemblage.
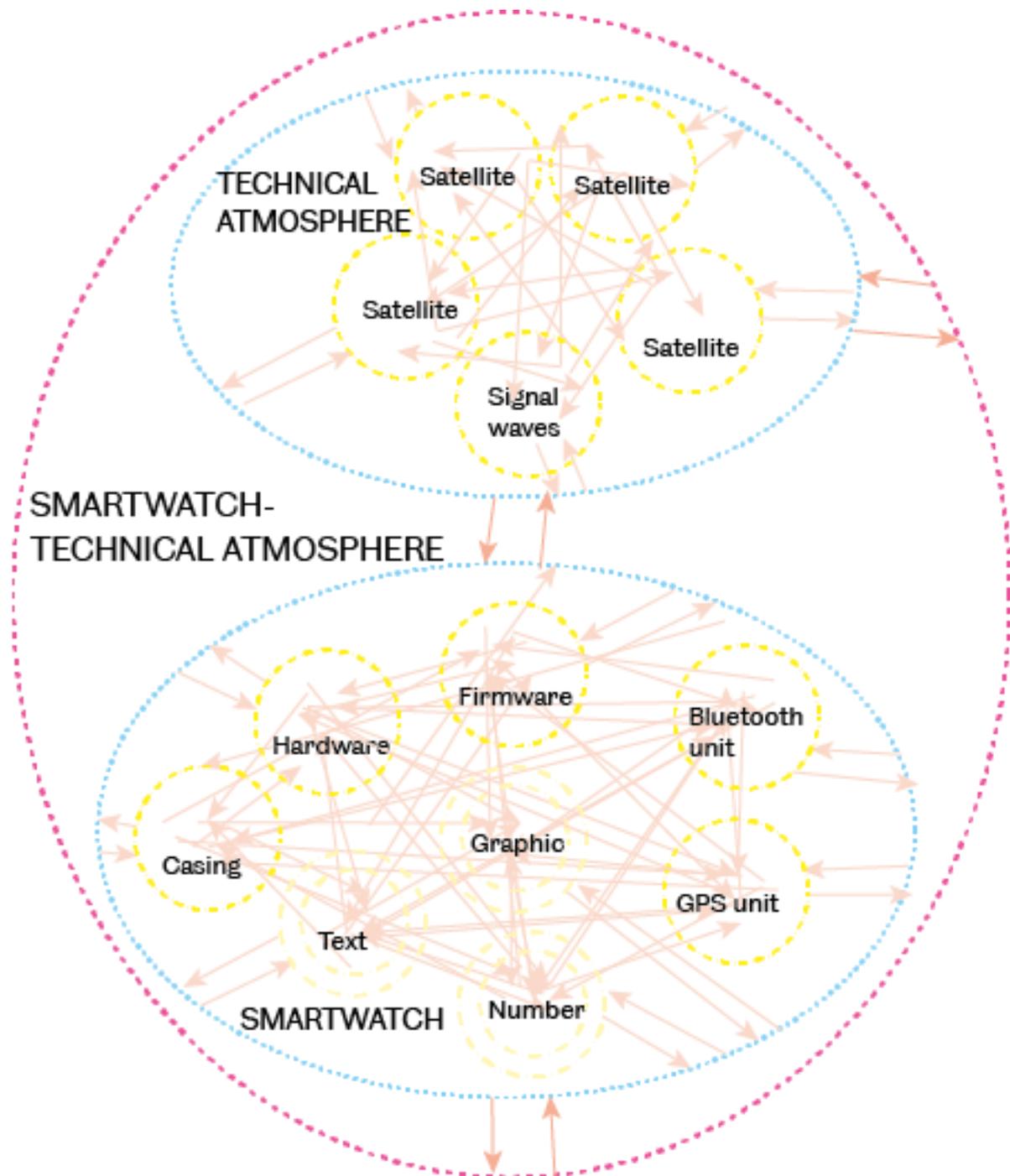
Figure 60: *A detailed neo-assemblage theory analysis map of a smartwatch and a technical atmosphere.*

Figure 60 depicts a smartwatch and a technical atmosphere. The smartwatch consists of casing, hardware, firmware, a Bluetooth unit, GPS unit and graphic, number and text components. Aside from the last three components, the components have mainly material properties with few expressive properties. The graphic, text and number components have expressive linguistic properties, hence the light yellow shading. All

components are relatively stable, resulting in tight dotted lines. The components join in relations of exteriority from which the smartwatch assemblage emerges, which has reciprocal effects on the components.

Accompanying the smartwatch assemblage is a technical atmosphere assemblage. This emerges from the components of four satellite components and signal waves, which all have high material properties and are stable, hence the deep shade of yellow and the tight dotted lines. The technical atmosphere joins in relations of exteriority with a smartwatch to fully realise the capacity of the smartwatch functionality.

As in the wristwatch, the focus of the represented information appears in the running watch. Running watches offer an increased display of text information, graphic information and numerical information. The device itself also has components such as a global positioning system (GPS) receiver. The device can have a Bluetooth Low Energy (BLE) transmitter and receiver. Depicted in the model are the four satellites of the GPS, which, whilst not observed directly in the research data, are crucial to the workings of the GPS watch so that the represented data can be used (National Coordination Office for Space-Based Positioning, Navigation, and Timing, 2020). The action of starting a recording on the watch can begin. Figure 61 depicts the components of this assemblage into a renewed assemblage of a person running-external environment. The technical atmosphere is a component of the external environment, and the smartwatch is a component of the person running.
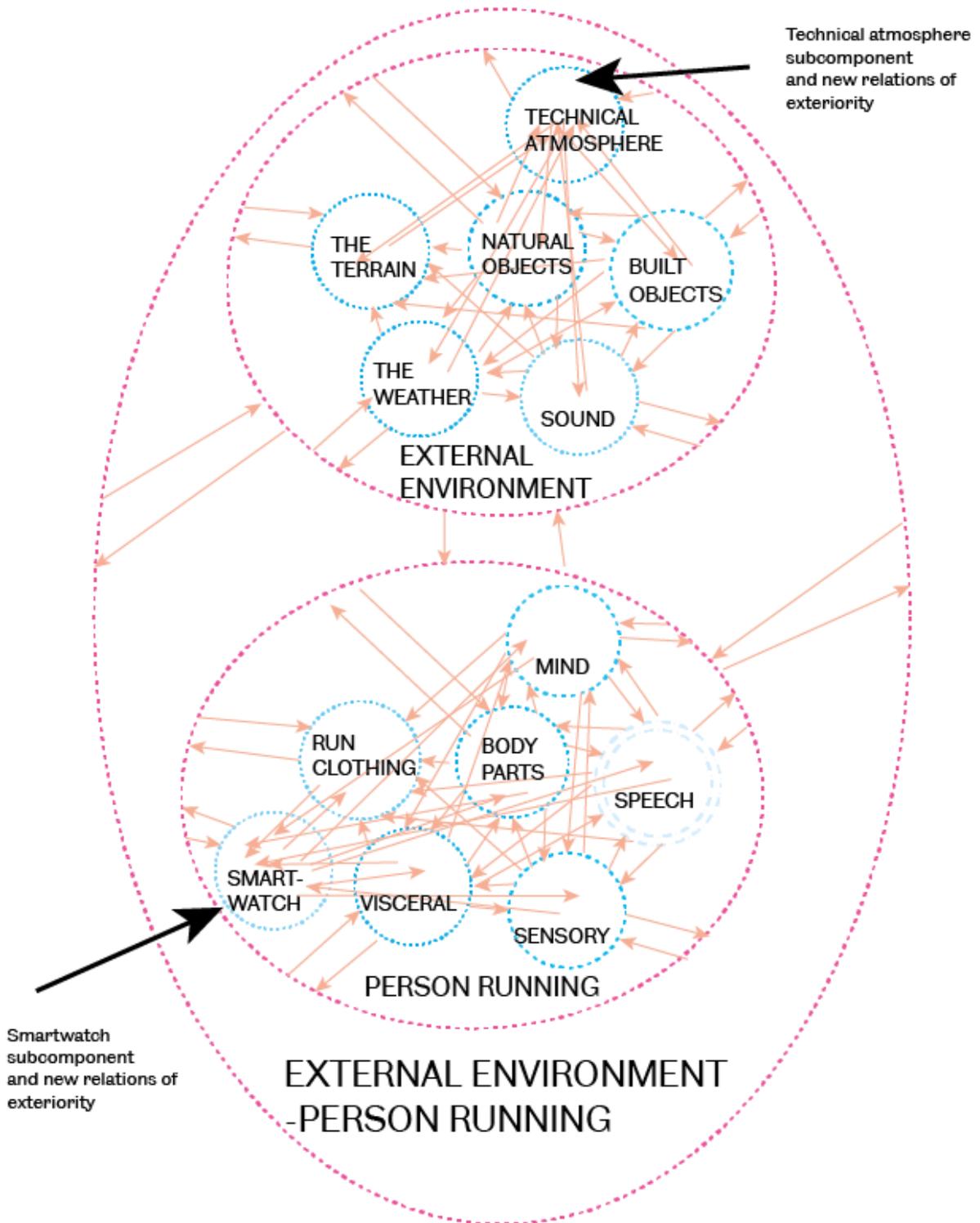
Figure 61: *A higher level neo-assemblage theory analysis map of a person running and an external environment that includes the components of a smartwatch and a technical atmosphere.*

A smartwatch joins in relations of exteriority to a person running to interact with their sensory and body parts components. The device can provide represented information from its many expressive components (text, number, graphic) through sensory

components, such as seeing (eye) the device interface. The person running hears (ear) a device that prompts them to look at their device for information or even provide auditory information. There is also touching (skin) where the device can buzz (casing, hardware) in a particular pattern. A person running uses all of this information to be interpreted (mind) for their running. The represented information seems to be acquired (perception) by the person running, who then seems to consider (cognition) the information (text, number, graphic). This cognition combines with recalled information (memory) that may be relevant to their running. This combination can trigger embodied responses to attain a certain capacity level within the person running assemblage.

Invoking seemingly embodied ideas of the sensory, cognition and memory are already suggestive that it is not as simple to consider represented information of text, numbers and graphics without the relationship of the person running. The metrics seem to appear in a combination of text and quantified information on the watch, which the participants would use for their sensory components to perceive (perception) the information whilst running. The perceived information can be used in the cognitive process, using memory as a form of information that can help the person running fulfil the capacities of their components.

The component of emotions for the person running joins into relations of exteriority with the smartwatch and represented information. The represented information can then feed into the components of the mind to result in the mental emotions of "reassurance" to the person running.

There is also the linguistically expressive component of speech. The person running can communicate either verbally or through gestures to another person running, where they are communicating a form of information instead of perceiving it. Within this analysis, communication is a part of the relations of exteriority that form between two persons running.

Whilst the assemblage is attempting to illustrate represented information, it should be clear that it requires the components of the person running's mind through the perception of the represented information (graphic, text, number) through the sensory components. Through relations of exteriority between perception and

cognition, there is a type of emotional response and possible action related to the expected capacities of the person running assemblage.

A smartwatch and a technical atmosphere within a person running-external environment assemblage adds to the already complex web of relations of the types of information used by a person running within a running situation. Therefore, forms of represented information from the smartwatch or a wristwatch add to forms of embodied information. These components all relate to the result of a person running, reaching various capacities of their assembled components, which relates to their desired running capacity.

7.4   Information away from a run

Neo-assemblage theory analysis will map the concept of "a record" based upon the participant's data. It will build upon the analytical narrative from the previous section on the person running whilst they were running in an external environment. A record can be something written down or recorded in a book or diary or something recorded in a computer file. In these examples, the components of records consist of material properties and highly expressive linguistic properties such as written language. They afford a form of representation that the person running, other persons running, or just persons can understand. For the participant who did not make any recordings or records of their running, the following section does not apply. Information use and value are limited to the fluid boundaries of the beginning and end of a run.

Running recordings captured the making of a recording of a run through a smartwatch or using information from a wristwatch. A wristwatch or a smartwatch provided and recorded information that formed the record. The text, numerical and graphic components are of interest in this section. Through *neo-assemblage theory* mapping, this section intends to demonstrate how these components can give a new perspective on concepts of information and records and how they relate to a person running assemblage.

First, this section will consider a physical record assemblage such as handwritten, recorded sources. With a wristwatch component, participants noted numerical information such as time was written down and thus recorded into a handwritten diary. The person running considered (cognition) quantified information of the run, such as

the time taken to run, as an "important" piece of information. They analyse and map how this importance arises using a record of running activity.

To illustrate this, Figure 62 presents a *neo-assemblage theory analysis* map of a person-diary. The diary assemblage consists of ink, binding, paper and information. The properties of the ink, binding and paper components are highly material. Hence, they are depicted in a bolder blue. They are also reasonably stable components.

On the other hand, the properties of the information components have highly expressive properties due to their linguistic nature. The sub-components of the information components are text and number and have highly expressive linguistic properties. Due to the relations of exteriority formed with the material components of paper, ink and binding and information as expressive components, it results in the diary assemblage. The diary assemblage is a tangible record of certain running activities. The information is in a coded form that can be understood when joined in relations of exteriority with a person running.

When a person running is writing down a record into a diary, they do it in a tangible form. A person running records metrics such as time, distance, heights climbed and information such as dates and places run. The writing technology component joins the person running assemblage to make the recording. In *neo-assemblage theory* thinking, recording information in a diary changes the exteriority of relations between the paper components of the diary and writing technology such as ink. The ink is transferred – a joining of relations of exteriority – to the diary assemblage paper. When the person running adds information to the diary, they engage the following components. From their mind, they use memory and cognition, engaging their body parts with the writing technology onto the paper of the diary assemblage. The person running creates and records a tangible form of information that consists of highly coded words and numbers that the person running can understand. The diary assemblage fulfils its capacity from a person running's perspective because they fill its paper pages with recorded forms of information. In this analysis, the capacity of the diary is from the perspective of the person running. It is not from the perspective of the diary, which is another analytical possibility.
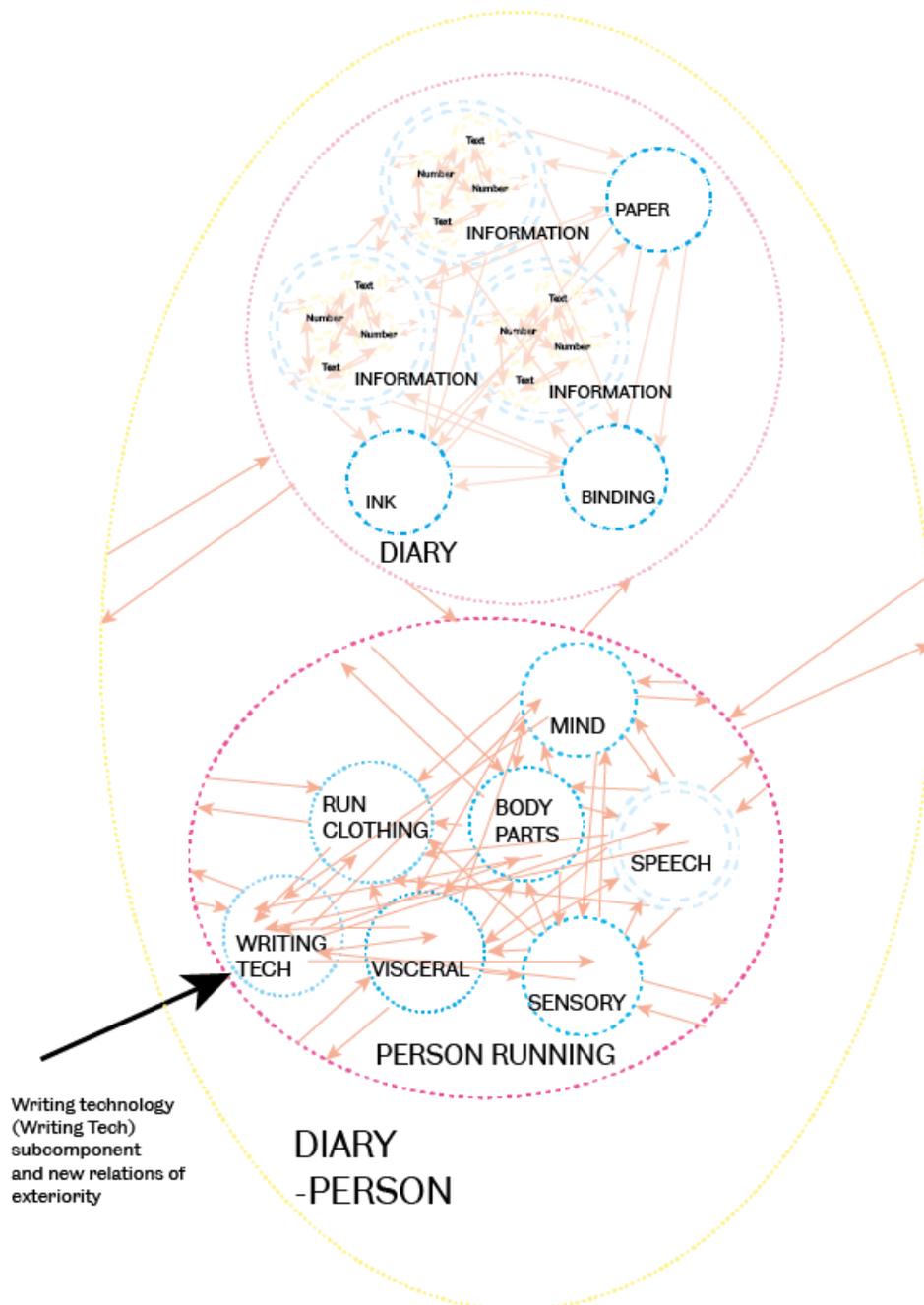
Figure 62: *A higher level neo-assemblage theory analysis map of a person and a diary with the added component of writing technology.*

The diary assemblage provided a means to store and access information related to the activity of running in a personal way. With handwritten diaries, the participants could choose the information they recorded and how they could store it. The records in a handwritten diary are a part of a personal process. Sharing the handwritten records in some form, either as copies or another person viewing the records in the diaries, removes the sense of privacy. Should the person running wish to consult their records

of a recent training series or make new records, they would get their diary and read and reflect or make new records. In *neo-assemblage theory analysis*, this is the diary assemblage and a person running assemblage joining in relations of exteriority. This new assemblage, a diary-person assemblage, has the immediate complexity of considering the causal effects of the components upon each other, providing that the diary is available for such an assemblage.

One participant who kept a diary or logbook could not locate it. They did not seem moved that they did not have them. It did not seem that there was a level of investment, nor did they seem to think it represented an achievement. In this case, the person running and the diary remained separate assemblages. As a result, there were no causal effects, such as effects of the person running's emotions. Another participant did keep diaries and was able to locate them. It would seem that they had not looked at them for some time. However, when the person running-diary assemblage formed, it evoked emotions. The participant called this "nostalgia", and the diary affected the participant's memory. It reminded them of how and where they ran and compared it to their present running form and physical state. Within *neo-assemblage theory analysis*, Figure 63 depicts the forming of the person running-diary assemblage.
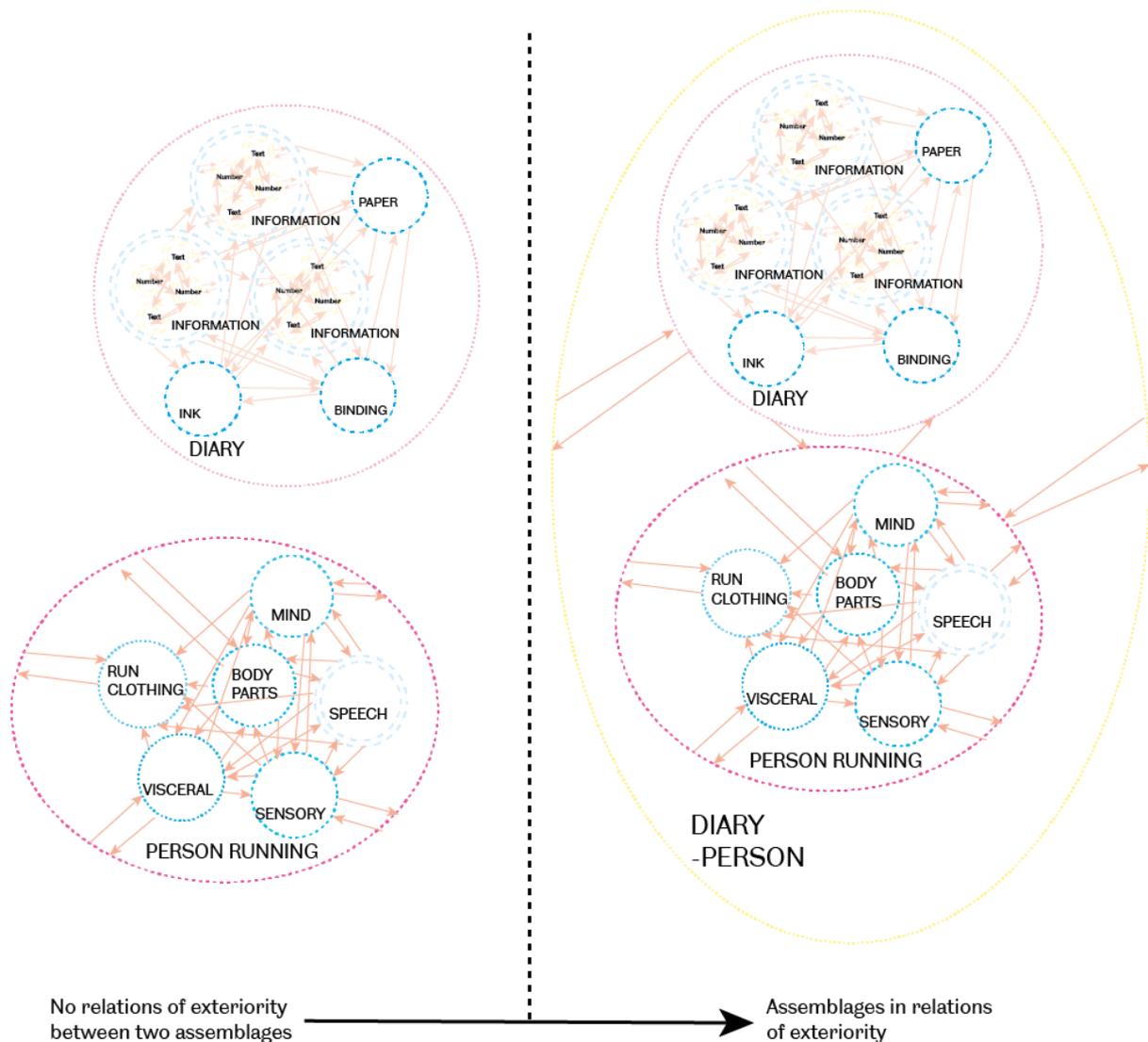
Figure 63: *A high-level neo-assemblage theory analysis map of a territorialised person and diary assemblage formed through relations of exteriority.*

Within Figure 63, the diary fulfils its capacity upon the *person running* in that its perceived (*mind, perception*) as a diary which contains records (*information, paper, ink*) that they coded in written language and interpret to read (*cognition*). The diary also engages their memory and evokes an emotion realised as a feeling of "nostalgia" and a recognition of the current state of their body (visceral, sensory, body parts). Whilst these relations are the focus, the map also reminds us of the ongoing simultaneous relations of exteriority that maintain the *person running* and *diary* assemblages.

A *neo-assemblage theory analysis* can construct a map for a person running who keeps their records on a personal computer. There is, first, an act of recording from

recalling (memory) the information from a wristwatch. Within this assemblage, the personal computing device becomes the means of a recording tool instead of a diary. The person running makes a record through hardware such as a keyboard (artefact) and software. The component of a computer file, such as a Microsoft Excel file format, enables the record creation. The information can consist of linguistically expressive components of text and numbers. It could even include graphics. This computer file is accessible by a person running through a computer application (software) such as Microsoft Excel. This application runs on a personal computer's operating system (software), such as Windows. When a person running updates a Microsoft Excel file with a new record, it is written to a storage device such as a hard drive or a solid-state drive built into the personal computing device (hardware).

The selection of the information to record and store is a choice made by the person running. The person running can continue to access the records privately, usually on a dedicated device that may or may not be mobile. Figure 64 visually represents this electronic personal computer and a person running assemblage. Aside from the linguistically expressive components of the file and its sub-components, the other components of the personal computer are relatively stable. The map depicts these components with tight dotted lines for this reason. They have mainly material properties, hence the bolder blue circles. The components work together so that the personal computer emerges as an assemblage where the person running can store their records.
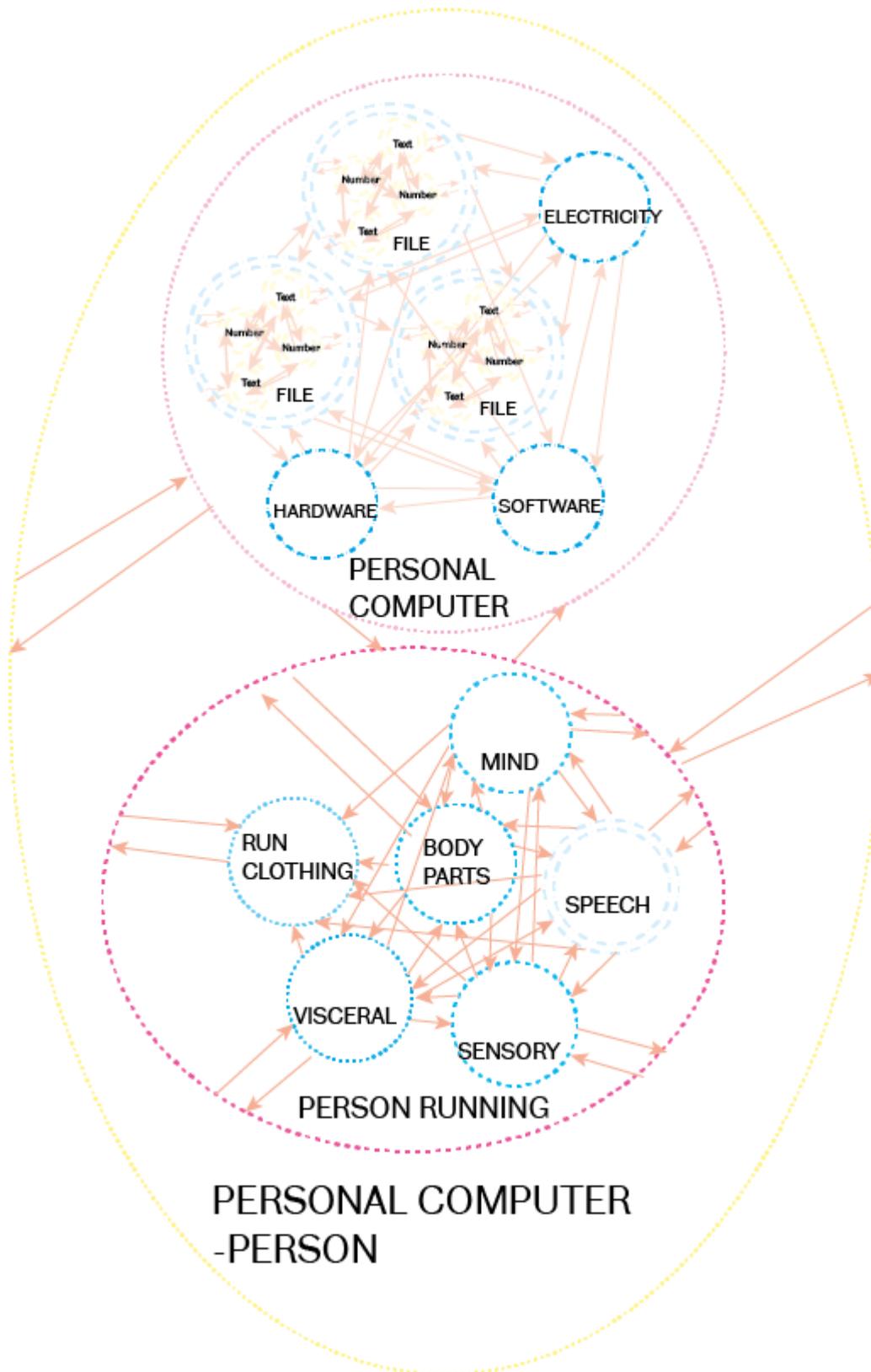
Figure 64: *A higher level neo-assemblage theory analysis map of a person and a personal computer.*

One of the participants kept a backup system with weekly and monthly backups of their vital records. These were held on two other storage devices (external hardware)

aside from the records maintained in files on their personal computer. Figure 65 maps such a backup system. In addition to a personal computer, it also contains two separate assemblages of an external hard drive. The files are highly expressive linguistic components combined with stable and primarily material hardware and software. The files are understood when the external hard drives come into relations of exteriority with a personal computer and a person running. The person running then uses their sense components to form relations of exteriority with the represented information on the personal computer screen. Within Figure 65, the person running joins in relations of exteriority with the hard drives primarily through their mind in remembering (memory) their existence. The personal computer would only be engaged with the external hard drives when they join in relations of exteriority with the device. For the person running, the external hard drives and the information recorded on them form additional sources of externally stored recorded information about their running.
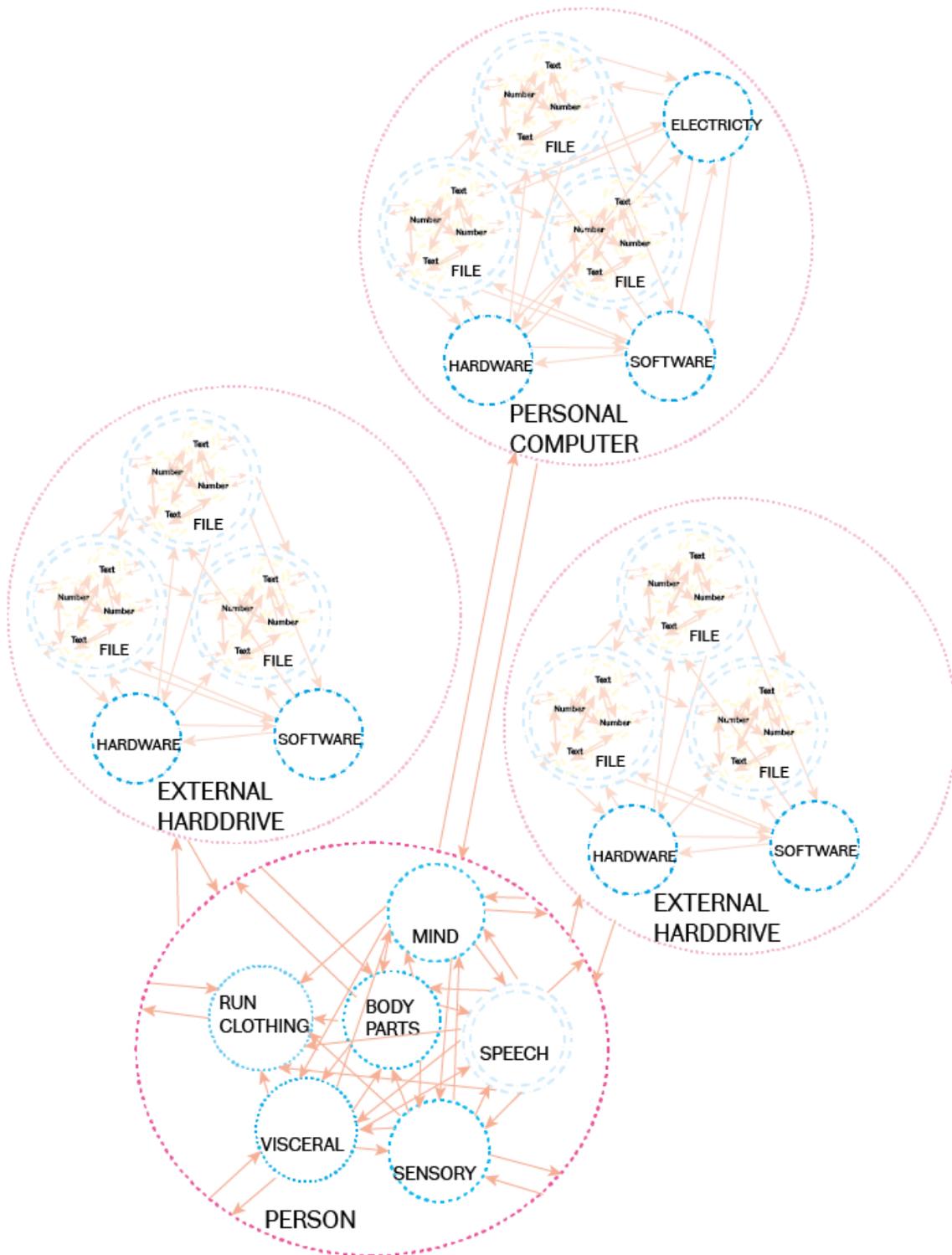
Figure 65: *A higher level neo-assemblage theory analysis map of a person assemblage engaged in relations of exteriority with external hard drive assemblage.*

Most of the participants used third party software to select the information types they recorded. Figure 66 depicts this *neo-assemblage theory analysis* map. These third parties also provided the storage infrastructure for the records and the online

platforms (software) to view the records and the aggregated statistics (information). The participant's technological devices, such as tablet computers, smartphones, and, to a lesser extent, laptops or personal computers, accessed online platforms. The use of the third party, cloud-based storage presents another assemblage in which records are stored and accessed. The act of transferring the recording of the run does not need a person running-wristwatch assemblage to record into a person running-diary assemblage. Instead, the first part of the records creation process occurs when the participant's smartwatch device synchronises, via Bluetooth, to a smartphone device. From the smartphone device, the record synchronises with the server of the smartwatch manufacturer. In analytical terms, the smartwatch component connects with a smartphone through joining in relations of exteriority with the technical atmosphere. It would also join in relations of exteriority with the third party infrastructure that contained software as a means of access to their records and statistics (information). The overall result is the emergence of a highly complex assemblage that a person running is just one component to record their information.

Most of the participants also use a third party application not associated with their device manufacturer. In this case, the records transfer through permission of the person running to the third party. This transfer is the process that the participants seem to understand as "pinging" records across various platforms. Once synchronisation occurs, the person running accesses the records through a smartphone with the relevant application or an authenticated URL on a different device. In this instance, a personal computer component can replace the smartphone component and removing the smartwatch component does not significantly destabilise the person running.

Figure 66: *A detailed neo-assemblage theory analysis map of a smartwatch, smartphone, technical atmosphere and technical infrastructures.*

The means of access across the *neo-assemblage theory analysis* maps presented seems to be through interaction with a form of technology. The technology could be as simple as a diary and writing equipment or more complex through a personal computer or a mobile computing device such as a smartphone, tablet or laptop. The experience of the person running when they access the records is either through these more complex technologies or devices. The participants seem to be aware of the third party involvement where that is the case. The presented assemblages convey the idea

of records combined with but not limited to text, number and graphic components of that form information. The build-up of these collections of information forms a record for the participants to engage with and reflect on. The assemblages present how records are accessed irrespective of the assemblages that afford the inscription of the record on paper or optical media (software). Access tends to be for personal reflection of the person running for the latest run, the latest series of runs or series spanning over several years for those who want to access longer-term trends of their records. These information components and sub-components join the person running assemblage.

Assemblages like Figure 66 should remain intact to access the records for the participant's use. It would seem that the greater use of technology that uses third party infrastructure has larger assemblages to store and access the running records when compared to a more straightforward assemblage such as a diary-person running assemblage. Participants commented that such records kept on paper were more stable and personal when compared to digital records. However, digital records were acknowledged to provide richer and deeper types of records and information that was pretty unique, including dynamic visualisations and the ability to search records through a search engine built into the applications.

Another aspect of online third party records is the affordance of collective records to reflect upon other people's records and socialise on the online platforms. The presence of another person running was noted in the during a run assemblage, and a similar construction maps the use of other people's running records. These collective records are for personal reflection as well as online socialising. Should a person running accept another person running into their online social network, they can have mutual access to their running records. The example assemblage presented in Figure 67 is of a network of three people based upon one record of running for each person.
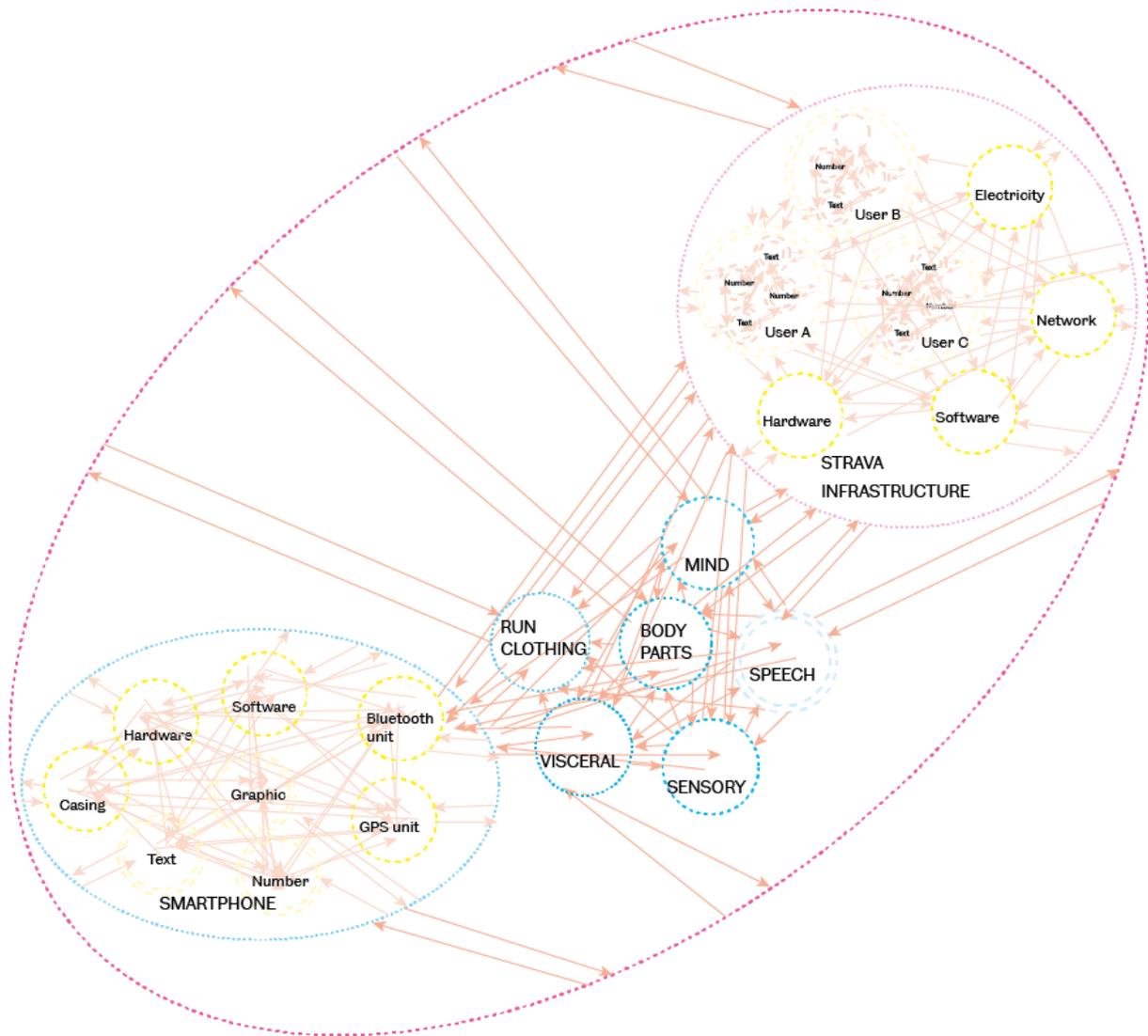
Figure 67: *A two-level neo-assemblage theory analysis map of the components of a person running with detailed level mapping of a smartphone and Strava infrastructure to view other people's records.*

The two-level *neo-assemblage theory analysis* map in Figure 67 demonstrates that collective reflection and online sociality can only occur when the people running are connected to the Strava cloud server (infrastructure). The infrastructure contains their records (information, User A, User B, User C). Their records and the records of others are accessible through a Strava application on their smartphones. The illustration also shows how only one person can access the records of other persons running that have been transferred to Strava if the person who made the record is not accessing Strava online.   When a person running is planning a run or looking at social interactions that others have left for them, such as kudos or comments, this representation also applies.

7.5   Records and emotions upon the person running

Neo-assemblage theory analysis maps have dealt with stable assemblages related to a person running. This section looks at the emotional aspects through mapping and analysing assemblage deconstruction. At perhaps the most superficial level, the core of the assemblages is the person running because they are the focus of this investigation. The person running uses their memory to recall information about their running and the subsequent effects upon the other components held in relations of exteriority. Let us consider a seemingly complex information assemblage with the person running as the core focus but with some notable differences in terms of relations of exteriority.

Through smartphone use, the person running can access their running records (information) presented to them via applications (software) such as Strava and Garmin. The third-party servers (infrastructure) store the records. The interaction between the person running and the smartphone enables access to the person running's records. The person running can reflect upon personal and collective records through the smartphone device and engage in online socialising such as comments and kudos. Sometimes the representation of other people running and their running records of activities undertaken produce annoyance (emotions), especially when the person running has an injury (body parts, cognition) and understands that they cannot run. In this instance, the connection with the infrastructure is kept as infrequent as possible by not accessing the Strava application and the personal and collective records (information). There was also the idea of "pressure" to perform to past performances or just through seeing other people running, thinking that perhaps the participant looking at the records should do the same activity. These negative responses seem to result in avoidance of the third party platform. Avoidance seems to be less a factor for those who just kept their records to themselves on a personal computer or diary.

This human-technological assemblage amongst some participants is also seemingly a part of their "personal history" or their life history. Participants put significant curatorial efforts into the Strava platform due to its enabling socialising and data presentation. Participants selected the uploaded records, and some made an effort to make titles for the activities. The reflection of these activities also provides a sense of

"reassurance" that they were meeting their improvement goals. There was also a noted "addiction" element with using Strava to analyse running records. Quite often, participants considered (cognition) the needs of the body (body parts, visceral) as well as what the platform suggests under the perceived surveillance of other persons running on the online platforms (infrastructure).

The suggestion of loss of running records to some participants elicited both strong and indifferent emotional responses. The positional analysis considered these axial responses (6.1.6). Figure 68 highlights a conceptualisation of infrastructure failure between devices and the third party server that keeps records.
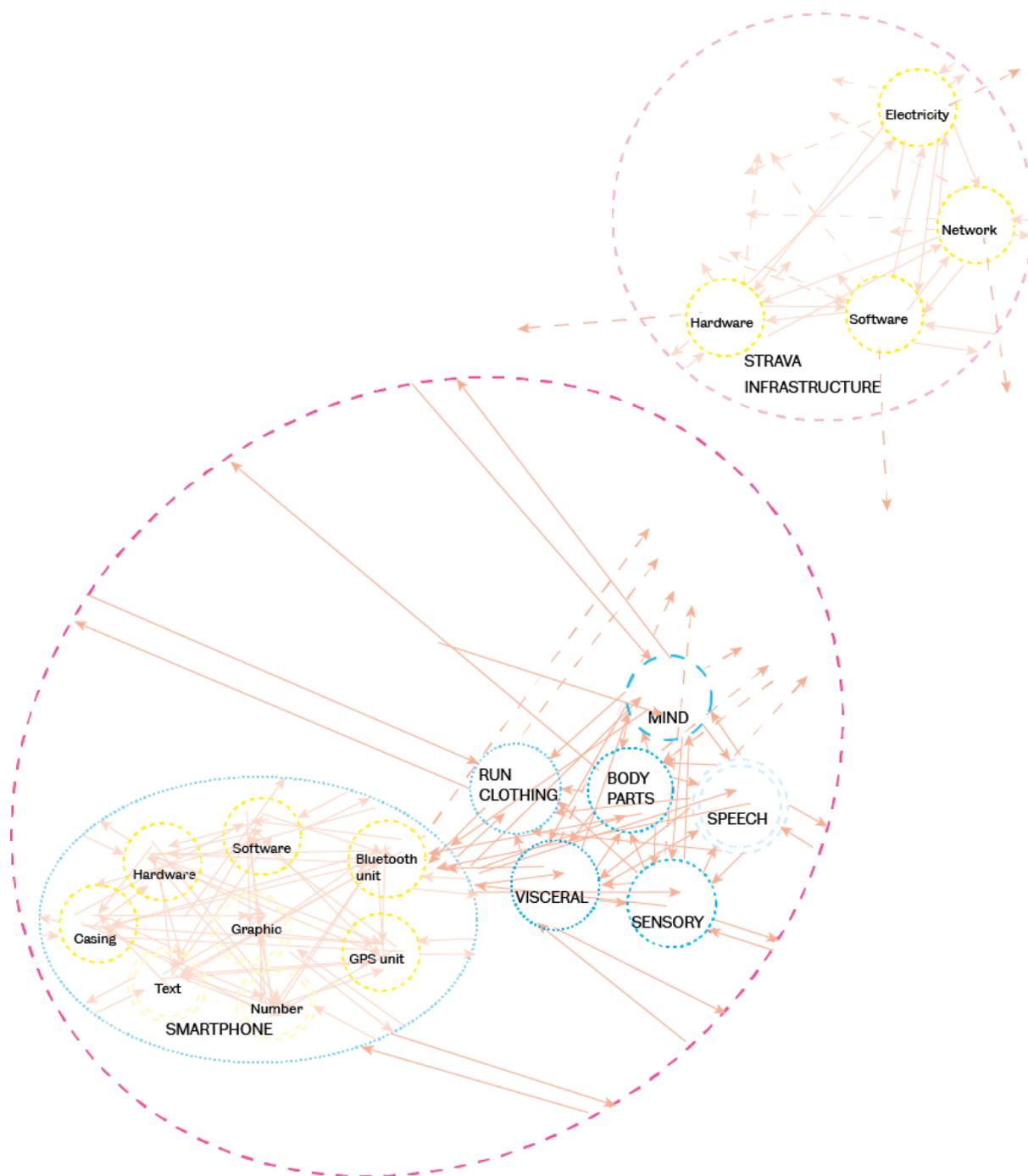
Figure 68: *A neo-assemblage theory analysis map depicting deterritorialisation of a person running and removing Strava infrastructure from an assemblage.*

Therefore, Figure 68 depicts a disruption in access to the records. The dotted lines usually denoting stability are widely spaced, meaning that the assemblages have become destabilised or deterritorialised. When the communication between infrastructure and the smartphone does not happen, one participant noted it results in incredible frustration. This frustration was related to trying to upload a walk which took a day because of a poor connection, meaning they could not see the record

straight away. Whilst this was not a run but a walk, the effect seemed to be very insightful into a potential destabilisation of the assemblage.

Mapping the breaking of relations of exteriority in assemblages visualises how third parties can prevent access to running records. It also visually highlights the importance of access to various storage media. The suggestion of total loss of the "history" wherever in Strava suggests that there is a rupture in the person's running accessible memory and knowledge that they can usually access the records as and when they want to use them for a forthcoming run or training for a particular goal. It is less likely that they would look back to remember nostalgically. Even when a person running has offline records, there are still opportunities for fracturing the records assemblages. The record can also be lost if the hard drive storage fails, or the computer file becomes corrupted. Therefore, a person running could make a significant effort to make further copies on other hard drives. However, they all need some maintenance to keep the assemblages together, whatever the strength of the relations of exteriority. Even if the storage medium is maintained, there could be problems with the application software that reads the files or the personal computer, and its operating system becomes obsolete. Due to the more significant number of personal computers and personal devices components, there are more significant opportunities to lose their capacities or disappear altogether. This loss would then result in further changes within the assemblage.

Maintaining such an assemblage through time should contain significant personal effort because it contains "personal history". This effort suggests that it has personal value to the person maintaining an offline system. When a participant made backups, it seemed that they valued their "prime record" of running in selecting and preserving the record. Another participant who did not keep a physical diary suggested that keeping a diary of his running titles may be a way to preserve the "story of his life" should Strava or Garmin Connect fail and delete his records. He also suggested that this would not be the same as the digital medium but said that the titles of his runs were the most important parts of his running records that he would aim to save.

The *neo-assemblage theory analysis* mapping of a speculative situation visualises a destabilising of a person running's assemblage when engaged with a smartphone and

a third-party infrastructure. The map also reveals the relations of exteriority affected by a potential change and leads to speculative questions. Such questions are: what effect, if any, does a destabilisation have upon the components of the mind, the visceral, the body parts, the speech and the sensory? What effect would it have upon the smartphone and its capacity to provide running information to the person running? Does it affect its other capacities? There were no data collected on such a destabilising event. However, when posing the question about the potential loss of the information on third-party infrastructure, responses seemed to show possible effects on the mind of the person running, ranging from strong to weak emotions. The loss of running information is a hypothetical problem, but *neo-assemblage theory analysis* can provide a framework to map and analyse such speculation.

7.6 Summary

The above explanations are constructions of *neo-assemblage theory analysis* maps based on collected and *abductively* analysed data. There may be many more constructions, reconstructions and deconstructions. These imagined *neo-assemblages theory analysis* maps could consider possible uses and emotional responses of the participants as persons running assemblages. The assemblages can be as large or as small as possible. At their core are the person running and their interaction with the objects or assemblages in a given situation. The assemblages presented are not exhaustive but provide an introduction for conceptualising significant elements considered in the running information situation. This section has given just a small offering of the potential of *neo-assemblage theory analysis*. This analysis has helped explain the complexity, the types of information in running activities, their uses, and their effect on the participants. It has provided a new lens for examining the relationship between information and people. This chapter has also provided the last set of findings before discussing the results with relevant literature.

Chapter 8. Discussion.

8.1   Introduction

The majority of this chapter will discuss the findings of the types of information during a run of both embodied and represented forms (8.4), *records of a run* (8.5), and *neo-assemblage theory analysis* maps concerning concepts of information and records (8.6). These sections will focus on the key factors that understand how people value and collect information about running. To provide a foundation for the core discussions outlined, a section discussing *types of runners* and *types of runs* within the sociology of running (8.2) will precede them.

The findings aimed to present a new direction in archival science that examined the very act of records creation and its context through the lens of situatedness. It is a significant finding to draw attention to as an information behaviour. Without the participants' actions of recording their running activities with their devices, a discussion concerning records is not possible. Before smart, wearable devices that record metrics with little effort, older participants' runs were made by recording their runs with simple metrics, such as time, derived from a wristwatch through their short-term memory and into a paper diary. Irrespective of the recording method, there seems to have been a long-held personal recordkeeping process built into the activity of running. Within the findings, pressing a button on a watch at the start and end of the run achieved record creation.

Within personal archives literature there is no known published research capturing the records creation process within a leisure activity, especially where the activity is central to the personal information collection of leisure activities. Within information behaviour, Hartel (2010) has studied how hobbyist gourmet cooks create records of their recipes and manage them in a home environment. However, these recipes as records would not satisfy the archival definition of a record as evidence of an activity. There is a current subfield within information behaviour literature concerning information making (Huvila, Sköld, & Börjesson, 2021) and creation (Huvila, Douglas, Gorichanaz, Koh, & Suorsa, 2020; Gorichanaz, 2019). The findings of this research will contribute to this subfield by discussing the significance of the participants' actions that captured the two points of represented information creation amongst participants in their run. As discussed further in 8.5, the context of creating the record

is under-researched, especially in personal archival science. In archival science, there is no known publishable data collected capturing the act of personal record creation. Therefore, the main focus of this discussion section concerns the observations related to the devices, device use and embodied information that the participants undertook between the action of making a record at the start and end of their run. This discussion in archival science concerns the context of creating records in archival science (Upward, 1996; 1997). The discussion will provide a context of records creation surrounding the recording devices and their use during a run through a further discussion with information behaviour and self-tracking sociology literature. However, first, there needs to be a further contextualisation through the sociology of running before the main discussion.

8.2   The sociology of running: types of runners and runs

This section discusses two key concepts crucial to understanding the types of information runners use, how they use it, and how they attach value to information. The concepts are the *types of runners* and the *types of runs* that the runners undertake. The first part will discuss ideas concerning different *types of runners* in information behaviour research and within the sociology of running. The second part is a shorter treatment discussing the concept of *types of runs*. Examining these two key concepts first lays the foundations for understanding the discussion sections that follow on information use.

8.2.1   Types of runners

In describing the two groups of running participants, the findings relate to the existing literature on the sociology of running and information behaviour in leisure.

The findings contribute to the sociology of running literature in describing two *types of runners*. The findings suggest *experienced runners* (Group 1) and *those who run* (Group 2). *Those who run* had either just started running, had not run for a long time, were not members of organised running clubs, or regularly competed in races or events. They considered themselves "inexperienced" or "not a runner" compared with those running for clubs or for a long time. *Experienced runners* was a term born out of a point of comparison by those in Group 2. *Experienced runners* ran for many years and were members of running clubs. Their running aesthetics captured in the visual findings demonstrated similar attire, suggesting social cohesion in running activities.

The *experienced runners* recognised their earlier running selves as *those who run* when they had not yet acquired running experience, were not a part of a running club or group and did not participate in races or events.

Earlier prevalent literature on the sociology of running noted typological hierarchies. Yair (1992) found professionals, semi-professional, amateurs and Smith (1998) described athletes, runners and joggers, particularly amongst long-distance runners. Hitchings and Latham (2017) had already made a binary distinction between those that were part of a club or racing social scene as runners and those that were not as non-runner runners who did not want to participate in the social aspects of running. Hitchings and Latham were somewhat critical of sociological studies of runners from running groups categorised as proponents of Stebbins' (2018) serious leisure perspective, where social identity becomes a core component of being a participant in serious leisure. This research's findings corroborate Hitchings and Latham's conclusions that runners to be researched should not be limited to club runners or elite runners, nor were the participants any less a runner than those in running clubs.

The findings raised questions about Stebbins' (2018) serious leisure perspective (SLP) concerning his categorisations of serious leisure, casual leisure and project-based leisure. Just because research participants did not meet all six serious leisure qualities, it did not mean that the participants did not take running as a leisure activity seriously. All of the participants seemed to focus upon defined achievements such as getting fitter, maintaining current levels of physical fitness or improving to compete. Irrespective of those intended achievements, both *those who run* and *experienced runners* exhibited similar approaches to their running. They did not seem to be seeking a career from their running, more an understanding of the capabilities of their bodies or an ongoing maintenance programme or a training programme where they saw personal progression. Rather than a career, it was an activity that was part of their everyday life where they defined their progress rather than approaching it like work.

The findings related to Stebbins' (2018) serious leisure perspective quality acquiring knowledge and experience in serious leisure. Participants from both groups discussed running metrics similarly. They also similarly described two-way relations with body sensations such as pain or the control of their breathing. Through their various efforts

and skills, both *types of runners* acquired knowledge and experience in their running. All of the participants persevered in some form with their running activity, chiefly to achieve durable benefits such as getting fit, maintaining fitness or performing well in events and competition, which relates to their type of run and *reasons to run*. Just because *those who run* did not have a shared ethos in leisure compared to those *experienced runners*, they still took their leisure activities seriously. Under Stebbins' definition, *those who run* or Hitchings and Latham's non-runner runners may not qualify as serious leisure participants. Neither would the participants qualify as project-based leisure adherents because their running is something that remains a part of their everyday lives. *Those who run* were also far from exhibiting traits of casual leisure. However, Stebbins can be used as a point of comparison where it would seem that *those who run* did not display a shared ethos in leisure compared to the *experienced runners* who were or had been members of clubs. The only feature that seemed to unify them was metrics and body sensations. There was a marked difference in their social leisure world. The social groups' findings of *those who run* and *experienced runners* seemed to reinforce Hitchings and Latham's observation that not all *those who run* are interested in the social leisure experience.

An alternative to Stebbins' view on social ethos and social environments that has a precedent in an information behaviour leisure context (Gorichanaz, 2015) is Chatman's (Chatman, 1999) "life in the round" theory. This theory moves information behaviour away from information needs toward information behaviour in social contexts (Fulton, 2005). The hallmarks of the theory are the ideas of a *small world*, *social norms*, *social types* and a *worldview* (Chatman, 1999). These hallmarks were more evident in the *experienced runners* than *those who run*. *Experienced runners*' lives in the round revolved around the small world of running clubs or organisations. These clubs or organisations dictated their expectations of social behaviours, types and worldviews. Except for information behaviour during a run, these hallmarks of life in the round could be seen in their clothing as running social norms, which were closely related to the worldview where the *experienced runners* seemed to share a language around *types of runs*, particularly competitive events. *Those who run* did not seem to inhabit or exhibit the club running life in the round. However, all the participants shared information behaviour whilst running, irrespective of belonging to a small world.

A few information behaviour publications feature running as a leisure activity. Gorichanaz (2015, 2018) has focussed on ultrarunners, Hull's (2018) unpublished MSc thesis concerns club runners and Cox, Griffin and Hartel (2017) have considered long-distance runners in discussing the body as a source of information. These runners would be likely to be considered a type of experienced runner. Moving away from *experienced runners*, information behaviour research in running has started to research the UK parkrun population concerning activity tracking (McKinney, Cox, & Sbaffi, 2019). The parkrun population contains a mixture of experienced and *those who run* and even those that walk (parkrun UK, 2022). This research adds to the so-far minimal but growing research into the information behaviour of *those who run* and expands focus upon those that are not long-distance runners, club runners or have years of experience running. This research builds upon Hitchings and Latham's identification of the non-runner runner by incorporating them into running research. This research identifies the broad group as *those who run* instead of non-runner runners.

Within the sociology of self-tracking, the running participants did not seem to be avid Quantified Self adherents as the Wolf and Kelly movement characterised. The participants did not seem to use all the metrics available to them or seek additional devices and platforms to quantify as much of themselves as possible. The participants used quantified information from their devices as a part of their activity. Neff and Nafus' (2016) concept of quantified self with no capitalisation could be better applied to the participants because they used devices where the participants chose to use them to choose what they wanted to quantify about their running. *Experienced runners* exhibited very long-term analysis of their represented running information compared to *those who run*, but none displayed any extreme quantified-self behaviours. However, such as possibility cannot be excluded.

The findings, due to the curtailment of further theoretical sampling through Covid-19 social distancing and research restrictions, have not provided alternative views from the predominant study of runners in Western, middle-class socio-economic settings (Atkinson, 2008; Lee et al., 2016; Pederson, Pederson & Thing, 2018). These concerns aside, the findings suggest that *those who run* compare themselves to *experienced runners*. It is not a typological hierarchy where one intends to progress to another as

means of a career. It is more a point of comparison against those recognised as a social group with a similar ethos compared to *those who run*. Stebbins' serious leisure perspective is perhaps too categorical to determine whether a person who runs is serious, casual or project-based in their approach. If making a distinction, it is upon the social world attached to their running, not their approach and endeavour level.

8.2.2   Run types

In understanding the activity of a run, the findings identified three different *types of runs*. These different run types can frame thinking around the frequency and volume of information used during a run. As a reminder, the three run types were:

1. a slow-paced run (such as "just a run" or a "recovery run")
2. a training run (such as "speedwork" or "terrain")
3. an event or race.

During the data collection process after the advent of the Covid-19 pandemic, the concept of a "virtual run" evolved as a way of continuing competition, such as "virtual races", participation in events "virtual events", or as a means to socially share running activities organised through clubs ("virtual run"). There is very little published literature concerning a "virtual run". The social aspects of virtual runs will be discussed further in 8.5.4.

Information behaviour and sociology of the running body literature acknowledge different *types of runs* yet has not made explicit the relationship between the *type of run* and information as perhaps it could. For example, Gorichanaz (2015, 2018) and Tulle (2007) have noted the difference between training and racing or events, where training primes the body for a race. However, they do not suggest how information use is different in these *types of runs*. They only indicate that training contributes towards a race to build a knowledge base to call upon in running activity. As a result, this research offers the typology of runs to consider when observing participant information behaviour. The idea of just a run for enjoyment is seemingly novel. Such a typological framework could inform research design to investigate further information behaviours better with a participant according to the *type of run*.

These findings concerning running do not apply to archival literature. The findings contribute a contextual understanding of why a person would want to retain a *record*

of a run based upon the *type of run* that reminded the individual of an event or a particular time in their life. The *type of run* is a concept that can contribute towards the personal value of the record of a specific run, seemingly an event or race. Within information behaviour and perhaps sociology of the body, the findings propose the concept of the *type of runs*. Further explorations of information behaviours within running could use the idea. Similarly, other studies into the sociology of the body concerning a *type of run* could also use the idea.

8.3   The psychology of running: the reasons to run

Investigating types of information and its uses found interpretative insights into the participants' *reasons to run*. A *situational analysis* positional mapping plotted *reasons to run* such as improvement, performance, enjoyment, and physical maintenance against two axes. The volume of information used ranged from embodied information to a combination of embodied and represented information and formed one axis. The other axis was information use frequency which ranged from very little to very high. Within *neo-assemblage theory analysis* mapping, ideas relating to cognition such as *reasons to run* are a part of the mental states as subpersonal components. Cognition is a component of the subpersonal component of the mind (which in itself deconstructs into other components). Cognition can interrelate with memory, perception and other components within a person running's assemblage map that can make the assemblage move in an environment in a certain way, such as running fast or slow.

Returning to the *situational analysis* positional map on *reasons to run*, for Group 1 or *experienced runner* participants, the *reasons to run* seem to support existing running literature. The *reasons to run* supported existing literature because competitiveness was the foremost reason for running among *experienced runners*. Competitiveness was either in competitive races against other people or competing against themselves to be the best they could be. Participants appraised this self-competition against the metric of a personal best time over a certain distance. The races also seemed to imply a form of body sociology of others in being able to compete against them through understanding their breathing patterns and the speed of their competitors. Through co-running, Allen Collinson (2008) with Hockey (Allen Collinson & Hockey, 2011)

extensively explored body sociology which 8.4.2.2 will revisit below. During the Covid-19 pandemic, "virtual races" were a means for some to continue competing against others. However, for some, this seemed to dampen the race experience, reducing it to less a thrilling experience of gaining a "Strava segment".

Amongst the *experienced runners* who had been running for some time and were ageing, the older runners seemed to readjust their competitive goals. They had run their "best for life" and sought alternative goals such as age-graded or age category results. These would partly agree with Tulle's (2007) findings amongst elite veteran runners where age category races and age-graded adjusted times (times that compare the best times for age against the fastest known time for that age) afforded the means for competing. However, changes did not solely occur for competitive reasons. Competitive reasons for running could change in favour of running for enjoyment. When it became apparent that participants could not obtain bests for life, reasons for running included freedom from the pressure of metrics and an appreciation of the external environment. This reduction in pressure was toward well-being and away from competitions. It changed the competitive outlooks of the participants by the second round of data collection, which occurred during the Covid-19 pandemic. Due to social distancing and the restriction of movement, the more competitive *experienced runners* found themselves with a reduced pressure of competition as they were suspended and found themselves appreciating the outdoors more. They had nothing to train for; therefore, their reasons for running were freedom, well-being and serendipitous socialising. There are no findings in running literature on change from competitive reasons for running towards running for enjoyment and the associated just a run *type of run*. These findings suggest, albeit speeded up by the unique circumstances of the Covid-19 pandemic, that *experienced runners* do not just chase personal bests and age-adjusted metrics. They can also step away from competitive *reasons to run* and instead run for well-being and freedom from device information and performance pressure. The need for a continuous performance trajectory even adjusted to befit their ageing body's ability (Tulle, 2007) can change. Instead, there is a period beyond a physical or mental peak where a person running will readjust their goals away from high performance towards enjoyment or general well-being.

For the *experienced runners*, there was freedom in their running brought on by the Covid-19 pandemic. *Those who run* used the advent of Covid-19 restrictions to add structure to their day. Most of *those who run* had run before Covid-19 restrictions. They had started to run again for health maintenance and improvement. They did not have any external competitive elements but were looking to achieve personal fitness goals, maintain their fitness or practice mental well-being. They also did not run for social aspects such as competitions or attend club training sessions. Only *those who run* intermittently ran in a social group at work for social benefit but did not share in the competitive, training nature of *experienced runners*. These findings were broadly in line with Hitchings and Latham's (2017) findings of non-runner runners where they ran on treadmills or had set periods in their day to run, structured on their timetable and not around running club training sessions.

There also did not seem to be any reasons to run that were driven by healthism (Wiltshire et al., 2018) or conforming to social body aesthetics (Abbas, 2000, 2004; Lamont & Kennelly, 2012). Ideas surrounding concerns of personal body responsibility as a political act, as proposed by Lupton (2016), Sharon and Zandbergen (2017) and Neville (2013), were not found in the collected data. However, this finding does not exclude such a possibility. Whilst not raised by the researcher in the data collection process, participants did not overtly express such sentiments. Findings did not address self-responsibilisation but suggest that reasons for running include getting fitter, getting healthier, and improving overall well-being. These findings may indicate a drive to attend to personal body responsibility, but it is not a definite conclusion. The findings suggested that the need for personal fitness originated with the participants themselves or because participants knew others that ran. It was likely that such personal and social factors contributed to their use of quantified devices. A part of the participants' information-related needs was met by purchasing a device or downloading an application to respond to the perceived need to acquire information for self-knowledge to achieve specific running goals. It was also a way of meeting social needs, where running metrics as represented information provided a gateway to socialise online on specific running platforms. Unlike self-tracking sociology literature, the focus on quantification for self-knowledge is not just limited to information derived from devices.

Motivation could be a better term to describe what the findings describe as the participants' reasons for a run, resulting in their use of information during a run and away from it. Amongst the participants, reasons for a run varied from enjoyment to improvement, with the reasons of personal maintenance and performance falling in between enjoyment and improvement. These *reasons to run* linked to the *type of run*, which was a related concept that relied upon the *reason to run*. The findings corroborate the idea of broader needs in a person's life rather than focussing upon a need for represented information that could respond to a particular problem or question.

However, within running, it has been shown in the findings that the reason for running can change over time. Within leisure sociology, Stebbins' (2018) serious leisure quality of a career has explained this. When engaging with Stebbins' serious leisure perspective within LIS studies, Hartel (2010) found that keen hobbyist cooks also developed their skills. Based on Stebbins' work, Hartel visualised this temporally through an overarching career arc under which are subject arcs and episode arcs. Ford (2015) has noted such changes over time. Drawing upon Dervin's (Foreman-Wernet & Lauterbach, 2003) highly subjective sense-making methodology, Ford notes that people's behaviour is messy and can change over time. The findings discerned such changes where older participants changed their reasons for a run. They saw their information uses correspondingly shift in response to their conscious, visceral, intangible thoughts (Taylor, 2015) but without the need to formalise or make tangible a process of deliberate information seeking. Scholars have tried to produce frameworks of intangible human thought that arise in information needs that manifest in an observed phenomenon such as an action or communication (Case & Given, 2016). It is difficult to observe a need that would initially reside in the visceral and the conscious (to borrow from Taylor). However, through a reason for a run, these findings provide reasons or motivations for *experienced runners* and *those who run* to use and value types of information related to their running activity. Concerning information needs, the research found that the participants did change their devices when their need for information changed. As a result, there was a change in technology or loss of a device for replacement, confirming Epstein et al. (2015) and Rooksby et al.'s (2014) observation that personal circumstances drive change in devices. Individual

needs seem to influence the change in the device, which amends Epstein et al.'s (2015) and Rooksby et al.'s (2014) observations. The findings revealed such personal needs as having the ongoing ability to make *records of a run*, continue accessing their records, or record different data about their run related to their need to perform as runners or socialise.

How the participants met their needs is subject to types of information during a run and *records of a run*. These show how information is used, sought or encountered in greater depth where the types, uses, and values of information are discussed, driven through the *reasons to run* to meet their needs.

There is also a contribution concerning the linearity of an individual's need and their behaviour surrounding information use. Ford (2015) suggests that "the need itself is not a constituent process of that behaviour" (p. 18). Case and Given (2016) present a contextual approach where:

> Information needs do not arise in a vacuum, but rather owe their existence to some history, purpose, and influence. The seeker – whether actively looking for information or receiving information through serendipity – exists in an environment that partially determines, constrains, and supports the types of needs and inquiries that arise. The seeker also has his or her own memories, predispositions, and motivations – an internal environment of influence (p. 48).

The *reasons for a run* positional map describe such "predispositions" or "motivations" within a given "environment" for a particular "purpose" within running.

This map provided a new insight, based upon the participants' data, about when more represented information sources would be needed and used when running against when running would have a more significant, if not an entire, emphasis upon sensory, embodied information. The reason for improvement would see both the most frequent and increased combination of sensory, embodied information with represented information against running for just enjoyment where sensory, embodied information was used only on a varying scale of frequency. Running for maintenance or not looking to improve had a broader but more middle-range coverage. This

coverage ranged from lower to not as widespread uses with a combination of some device information use through to not much use. Running for performance had a lower device information use frequency when compared to running for improvement, using fewer metrics, if at all, and greater attention paid to sensory embodied information. Within information behaviour, such an attempt to map the reason for running with types of information use is a novel application, something that has not been found in the literature but provides a non-linear but situational approach to the relationships between needs, motivations and the purpose of running. Kuru's (2016) attempt to describe the mastery of running and devices in self-tracking HCI literature plots a forward trajectory from beginner to mastery. Researching both *experienced runners* and *those who run* found interpreted reasons for why participants ran: improvement, maintenance, performance, and enjoyment. The findings have also described concepts for the volume and frequency of represented and sensory, embodied information used during a running activity, rather than focusing on onward performance with represented metrics.

Whilst it is not easy to make tangible the intangible individual thoughts of the participants, the findings contribute toward a complex understanding of personal needs (or information-related needs). The various reasons for a run drive these needs for the types of information needed on a particular run, including embodied and represented information and their volume and frequency of use depending on the *type of run*. Such a contribution can help frame an understanding of contexts for information, whether to examine the information behaviours themselves or to understand the context for a record created concerning a particular activity.

8.4   Types of information during a run

The previous two sections established the importance of two concepts. The first is a *reason to run* as an information-related need. The second is a *type of run* as a variable for the information behaviour of those running. These concepts related to information behaviour literature contributed to discussing the information-related needs of the person running and the introduction of a specific variable – a *type of run* – that seemed to govern the types of information used on a given run. This section will discuss findings of participant experiences of a run and how they use types of information during it. The findings will be related to existing theory and literature on information behaviour

concerning represented information use and embodied information. This section will also discuss HCI literature concerning running and quantifiable devices that have already suggested humans and technology's digital hybridity through wearables. The section will extend an understanding of the context of the experience of the activity in which personal records are created and form an interconnected part of the runners' knowledge base that consists of both embodied information and represented information. This discussion builds an understanding of the personal contexts of records that contribute to personal archives literature.

8.4.1   Using mobile devices for information

Findings concerning the types of represented information used during the run with mobile devices support broader scholarship in information behaviour concerning self-tracking devices and quantified-self literature in sociology. In particular, the findings address scholarly interest in the type of metrics used and the relationship between the device and the wearer.

Concerning the wearable devices themselves, the source of the represented information during a run and the *record of a run*, participants used only two wearable running watch device brands in this research: Garmin and Suunto. This finding corroborates existing literature concerning device use (Pobiruchin, Suledar, Zowalla, & Wiesner, 2017; Wiesner, Zowalla, Suledar, Westers, & Pobiruchin, 2018) and information behaviour research in running (Hull, 2018), concerning the dominance of these brands. Concerning information on running devices that runners seemed to be most concerned about and used most frequently, this research broadly corroborated the limited qualitative and quantitative research that addressed this question. There were only a small number of core metrics used from the devices: pace, distance, and time metrics. Used to a lesser extent were heart rate and cadence. These agreed with Hull (2018), Pobiruchin et al. (2017) and Wiesner et al. (2018). The findings add to the types of metric device use and the variability of metric use related to the *type of run* derived from the reason for a run. Participants chose fewer metrics for use in races and running for enjoyment. Participants used more metrics in runs for improvement, such as training. The *type of run* and reason for a run determines the device and its represented information use. The data collected with *experienced runners* considered the recording as just a run, so device information use was low. In recalling running

experiences, all the participants demonstrated an awareness of different *types of runs* and corresponding changes in device information use.

The research could not fully corroborate Janssen et al.'s (2017) findings on device use, where younger and inexperienced runners tended to use apps, and older, more experienced runners that belong to a club used wearables. Age did not seem to be a variable factor of concern. However, *those who run* used a combination of smartwatches and apps (n=2), a smartphone and app (n=1) or no device (n=1). The *experienced runners* all wore wearables and used apps (n=4). The findings did agree with Janssen et al. (2017) with the sociological typology in the previous section of perceived *experienced runners* and *those who run*.

The findings on device use during a run could relate to ideas in the information behaviour literature of uncertainty as a central decision-making process and the allied idea of cognitive overload (Case & Given, 2016). Uncertainty in information behaviour is one explanation for why people seek information. Forms of information can provide a person with a sense of certainty. Within information behaviour, cognitive overload concerns the idea that when presented with too much information, a person cannot complete a task such as decision making due to the high volume of information. Information is filtered and limited to prevent overload. Case and Given (2016) observed that such studies developing these two ideas were grounded in engineering, science and management and did not have applicability to "real-world contexts" (p. 101). The findings are grounded in a real-world context of running as an activity and provide an insight into reducing uncertainty and avoiding cognitive overload.

Regarding avoiding cognitive overload, this information behaviour concept could explain the deliberate limiting of the number of data fields that the participants had on display on their devices. The findings can develop this in variable real-world contexts according to the *type of run*, such as a race where information seeking was very limited compared to other runs. One participant explained that this was good for races because they did not want "too many stats" in their mind. The most data fields required for display in the just a run *type of run* recordings and garnered from virtual interviews seemed to be only three, given the potential myriad of data fields available on the running watches (Garmin, 2022).

In developing an intimate relationship with a device, discussions in information behaviour concerning uncertainty reduction (Case & Given, 2016) and findings concerning the participants' emotional responses to device use are relevant. The two primary forms of emotion seem to be the positive form of 'reassurance' and the negative reaction of pressure during a run. The device reassured most participants that their body was performing as they thought. Information behaviour understands this as information seeking to reduce the idea of uncertainty in a person. When participants felt their bodies were not behaving well, such as breathing excessively, they checked their smartwatches to confirm whether they ran too fast and adjusted their pace accordingly. Similarly, even when some participants felt they were running well, they would occasionally check their devices to confirm their positive feeling of what they felt. Reducing uncertainty seemed to support the usefulness of represented information in information behaviour through reassurance whilst running.

The devices and their information also modify Gorichanaz's (2015) on the run information experience model of ultrarunners. Represented information from a device can modify his idea of corporeal information and mental states that feed into the outcome of a particular run. A counterargument could suggest that the visual perception of the represented information on a device is corporeal information. Therefore, the inclusion of represented information from a device is a moot point. However, the use of represented information from an independent, technological device attached to the body is another stream of information experienced on the run. A device contributes to traditional forms of corporeal information, which for Gorichanaz are predominately visceral such as pain.

Running with a device also contributes to adverse mental outcomes, which Gorichanaz observed in ultrarunners, such as self-doubt or being overwhelmed based upon corporeal information sources on the run. Amongst the participants, the device information experienced whilst running and recalled about other runs demonstrated that the device could create a negative outcome of pressure when related to other types of information (which the sections below will explore). The pressure seemed to occur first when the device information did not reassure the individual and thus did not reduce uncertainty because the person wanted reassurance that they were running fast enough. However, the device told them they were running slowly. A sense

of pressure was twinned with irritation when the device information confirmed that they were running slow when they did not want to. The device reinforced negative emotions and added to the pressure the individual had already developed through the feeling of running slowly. Gorichanaz (2015) noted this with corporeal information that interacts with a person running's knowledge base through past training experiences, reflecting upon records and elements of socialising in their ultrarunning world. These findings develop the use of represented information from an external device. This device extends the runner's knowledge base, using and responding to corporeal information whilst running.

Lupton (2016) and Pink et al. (2017) also linked technology to human emotions in their idea of sociomaterialist digital assemblages. They demonstrated that technology could inform human feelings and be privileged over embodied or corporeal feedback. The technology is trusted more than their bodily feedback. Drawing upon the discussion of uncertainty reduction, reassurance and pressure through devices, research findings link to this self-tracking scholarship. However, they do not go as far as to say that the device information is privileged over embodied information. The researcher observed the participants' actions and explanation of device use, reassurance, and pressure towards a haptic prompt to view technologically derived information. A difference between the literature and these findings is that technology did not always drive such responses first (Lupton, 2016). In some participants, embodied information was used and attended to first before participants consulted technology which suggests that technology does not always lead people. That said, the devices of both *experienced runners* and *those who run* did seem to prompt emotional responses, which ubiquitous information technology may have caused. For example, *experienced runners*, when not using self-tracking devices as a source of reassurance, found devices could cause negative emotions where information could be compared over a repeated, measured distance in similar environments, such as running on roads. To find greater positivity than mere reassurance, they would seek off-road runs away from the pressure and annoyance of device metrics favouring embodied information over any device information.

The findings agreed with observations made in the sociology of self-tracking that the user forms an emotional relationship with a self-tracking device, irrespective of

whether the device prompts an emotion first or is used to reduce embodied information uncertainty. The findings further contribute to self-tracking literature. Prasopoulou (2017) has described how a tracking device can create a personal relationship with an individual by the intimacy of its wearing on the wrist and can act as a material prompt for the memory of experiences. Whilst there was no evidence to confirm that the material devices created memories, 8.5.3 argues that the resulting records from a device serve as prompts for personal memory. However, the findings agreed with Prasopoulou that the intimacy of the devices forged a relationship with the participants. Some participants even personified them, with one calling their devices their "little helper". These findings also corroborated physical activity self-tracking uses in cycling (Pink et al., 2017), where a self-tracking device can form a part of an individual's everyday, lived experience. The findings during a run do reinforce the idea of a hybrid human and technological entity which self-tracking sociology has described as a digital assemblage. Section 8.6 further discusses assemblages.

This section began the focus of discussion on device use in running. As the discussion progressed, it should have become clear that a discussion on the literature surrounding device use cannot be isolated from the embodied experience of the run itself, the *type of run*, the *type of runner*, and their *reasons to run*. Whilst the idea of corporeal information (embodied information) will be examined below in section 8.4.2 without considering devices, device information use and corporeal information are interconnected forms of information sources on a run that work together. Device information keeps the runner reassured about their embodied information and reduces uncertainty. Such use can spill into pressure and can mentally harm the person running. There is also the danger of cognitive overload of information from the device, which the person running is mindful of limiting. Whether the emotion is positive or negative, the interconnected relationship between a material self-tracking device, its represented information and a person running supports existing self-tracking literature in sociology in the movement toward human-digital hybrid entities.

8.4.2   Using visceral and external sensations

The discussion will move away from device derived forms of information and turn its attention to findings related to the use of embodied sensations perceived through the human body during a run. Information behaviour terms this as embodied information.

The discussion approaches internal and external processes separately below before both are then drawn together for a discussion with external mobile devices.

8.4.2.1   Using visceral sensations

Research findings into the use of internal embodied feelings and visceral sensations substantiate existing information behaviour literature that concerns the body as a source of information and ideas related to learning, experience, and knowledge. Within running, the findings agree with Gorichanaz (2015, 2018) that the body is an information source whilst running. The findings relate to knowledge derived from the body, termed as knowing the body and feeling. The concepts have implications for understanding how both *those who run* and *experienced runners* use and respond to their bodily information experience in physical running activities. Within the findings, such information concerned body feedback information based upon the feelings of internal organs such as the heart and breathing. Other forms of bodily feedback included foot placement with the external environment and how foot placement felt in terms of biomechanics such as balance. Participants described physical feedback as pain or hurt. These findings support the idea of types of embodied feedback as seen in Gorichanaz's (2015) on the run information experience model, where corporeal or embodied information feeds into an overall information system called upon during a run. Embodied feedback in running activity has been central to the sociology of the running body. These findings agree with Allen Collinson and Hockey's (Allen Collinson, 2008; Allen-Collinson & Hockey, 2011) diary studies that demonstrate the importance of the embodied nature of information from the running body that informs the person and those running with them.

Gorichanaz (2015) has suggested the idea of constant bodily perception as being "taken for granted" unless something goes wrong and then the person acts on that physical information. *Experienced runners* and *those who run* exhibited this, taking body information for granted. They were not necessarily ultrarunners, so Gorichanaz's idea seems to apply to a broader *type of runner*. The embodied information sensed and interpreted by the participants whilst running developed their knowledge about their capabilities and called upon their existing knowledge. It would seem that their running experience levels meant that the participants had developed an understanding of their body information. The *experienced runners* seemed to be able to run almost

entirely on feel or knowing the body and very rarely, if at all, consulted with the represented information on their devices. These participants seemed to take their visceral embodied information for granted. For them, like Gorichanaz's findings (2015, 2018), their bodies whilst running were their "primary" information source. It would seem that the device became a "secondary" source of information. *Those who run* did not have an advanced understanding of their body regarding how it felt and behaved.

Consequently, they used their bodily information and devices on a perhaps more equal standing. For *those who run*, there was a knowledge gap that device information filled to aid an understanding of their bodies to give them reassurance (see 8.4.1). This device information filling knowledge gaps amongst inexperienced runners is a new, broader perspective than just the experiences of *experienced runners* or serious leisure participants. This new perspective has been afforded by conceptualising and studying *those who run* instead of just *experienced runners*. There is continuous learning and knowledge development process in running activity concerning understanding embodied information.

Whilst so far implicit, the idea of the body as a source of information and knowing the body introduces the concept of knowledge. The findings relate to Ford's (2015) psychological, cognitive approach to the relationship between information and knowledge. For Ford, knowledge is "internal to a person, whereas information is external". Gorichanaz's (2015) ultrarunner's knowledge base processed internal body information before externalising information to seek information further. It is similar to Taylor's (2015) intangible and tangible information seeking. The participants in this research processed visceral information and integrated it into their existing knowledge through their running. When training as a *type of run*, participants paid more attention to learning visceral sensations when running in new environments, surfaces, and paces than just a run where visceral embodied information was a relatively untapped source of information.

Knowing the body and feel raises a question of value related to belief. Case and Given (2016) have noted that there are "many examples in which people value information that they know not to be entirely true" (p. 67). As a result, people do not address concerns about what information is true and false. The findings do not claim the truth

of what each participant knows about their visceral running sensations. However, participants hold beliefs about how their bodies behave through internal embodied information during a run.

Instead, the findings suggest that through knowing the body and feel, the participants have a valuable source of information during a run that directs them to complete their chosen *type of run* in line with their *reason to run*. Agreeing with the *corporeal information* and *knowledge base* concepts of Gorichanaz's (2015) on the run information experience model, there is some form of personal value in visceral embodied information that runners compare and contrast against their knowledge base during a run.

The findings concerning visceral information during a run largely agree with Gorichanaz (2015) and Lloyd's (Lloyd, 2010; Lloyd & Olsson, 2019) importance of embodied information as a source of information that is no less inferior to represented information. Hartel (2019) viewed the embodied turn in information behaviour as a paradigmatic trend (Hartel, 2019). However, the so-called embodied turn (Cox, Hartel & Griffin, 2017) is far more than a paradigmatic trend; it is fundamental to a better understanding of the role of different forms of information in the leisure activity of running. Embodied sources of information are crucial to information and activity. Specific to running, the findings have demonstrated that such internal, embodied information is essential in the knowledge development in learning and practising the skill of running. Widening the participant pool and including *those who run* into the research has augmented Gorichanaz's (2015) autophenomenological study as an ultrarunner because it has provided insights into the early stages of knowledge development and learning in less experienced runners. The variable concept of the *type of run* has also broadened the future scope to frame a discussion on the types of internal embodied information attended to whilst running. There is also a new contribution in terms of the value of information during a run. Internal embodied information through knowing the body is a valuable information source during a run that contributes to the satisfaction of a participant's *reason to run*. There is an emphasis on the complex interconnected nature of the runners' needs, their *reason to run*, the information needed for running, the body as a source of information and their knowledge. In particular, the participants used their eyes to scan and pay

attention to the terrain and environment around them. It seemed highly likely that most of it was unnoticed because they made no reaction to it. Such information source use and knowledge base meaning contribute to the context of the recording of the run whilst not recorded. Entangled further in these needs are externally sensed sources of embodied information and context, which will be the subject of the next section.

8.4.2.2   Using external sensations

The findings described the use of external sensory perceptions as types of perceived embodied information. Aural, visual and haptic sensation use were the most frequently observed types of embodied information encountered whilst running. Aural sensations framed the environment of the run. These were the presence of wildlife or cars and conversation between the participant and researcher. Haptic sensations related to the weather also framed the run. These sensations included the feel of rain, the wind on the face, or the ground's feeling through the feet. All these sensations impacted the possible outcome of a run or anticipation of the conditions of the run. The run's environment seemed to influence the route that the participants took or, in the case of *those who run*, a preferred route that they prescribed related to their perceived running ability or enjoyment. Visual sensations also framed the running environment. These sensations allowed the participant running to visually scan for the most efficient path, seeing other people and acting as a gateway to their memory and recall a specific route or features that a route afforded for an efficient run.

In introducing visual perceptions of participant interaction with the external environment whilst negotiating a run, the information behaviour concept of seeking will be discussed against such interaction. Information seeking is often debated in information behaviour (Case & Given, 2016; Ford, 2015). Seeking is strongly related to information needs (Case & Given, 2016) but also to the higher needs of the participants, as Ford (2015) describes as information-related needs. Section 8.3 explained the idea of the participants' *reasons to run*. Within this section, externally embodied information behaviour is under discussion. Returning to information seeking, Savolainen (2009) has suggested that information seeking is an under-defined term because seeking is an inevitable response to satisfy (Wilson, 1999) an information need. Literature on information seeking has often focused upon a reaction to a problem where somebody actively seeks out forms of information. These findings agree with

Case and Given (2016) and Ford (2015) that seeking is a limited term for the broader human uses and interactions with information behaviour, whatever the definition of information. This research has found that needs and information uses are complex. Within the activity of running, there does not seem to be the deliberate seeking of embodied information. Information seeking appears with actions concerning the mobile device for reassurance which section 8.4.1 discusses. Even in that situation, information seeking is not looking to fill a knowledge gap but to provide an emotional response to a need during a run. Using a *record of a run* (8.5) will examine the use of a record to fill a knowledge gap. Returning to information behaviour, participants used embodied information whilst running. It was not observed to be sought out but responded to via sensory perception.

These research findings are critical of scholarly observations concerning linear information behaviour. Ford (2015) questions the sequential, linear order of information seeking models that he describes as "a cycle of action" (p. 51) that often looks at represented information and the information profession. The research findings move away from traditional, linear processes of information behaviour (and information seeking) because they are not forms of information found in more conventional information settings of libraries and organisations. Instead, this research examines the leisure activity of running and people's behaviour in everyday life who are not information professionals or working professionals. The non-linearity of information behaviour is that we cannot predict or adequately describe a repeatable process. It would not be possible to predict or organise what information a person running may encounter and how they would use it.

The findings on externally sensed embodied information relates to the idea broadly described as information encountering and move away from the concept seeking. People can encounter information through browsing or serendipitous means (Foster & Ellis, 2014) and not with previous intent (Erdelez, 2005). Serendipitous encountering (Foster & Ellis, 2014; Ford, 2015) is when there is no intention to encounter information, but it affects a person when used. Concerning running, only Gorichanaz (2015) has contributed an idea related to information encountering where "our bodies are constantly receiving sensory input...[d]uring an ultrarunning event the athlete is constantly receiving corporeal information, most of which goes unnoticed. It is only

when this information has potentially threatening consequences that notice is taken". The findings of this research drew out a key moment instead of a threat. Externally sensed information resulted in bodily actions such as changing direction, running around an obstacle, and knowing how to open a gate. The participant potentially used external information about the weather to impact the physical execution of a *type of run*. The findings understand crucial moments in running that are not necessarily "potentially threatening consequences" but affect the running activity. In particular, the participants used their eyes to scan and pay attention to the terrain and environment around them. It seemed highly likely that most of the environment was unnoticed because they made no reaction to it. The idea of constantly scanning can be related to Bates' (2007) four stages of browsing whilst running in an environment and using externally perceived embodied information such as aural, haptic and visual information.

Bates' (2007) four stages of browsing are glimpsing, selecting, examining and acquiring. The descriptive findings used the term *scanning* to sense information within the external environment. However, *scanning* is similar to *glimpsing* as the gateway behaviour with externally perceived information. After glimpsing, this behaviour leads to Bates' sequential selection, examination, and acquisition process. Bates' four stages link to the exploratory behaviour of nature of humans or motile beings. The running recordings seem to describe these behaviours as constant scanning. The findings also tie into Gorichanaz's idea of constant sensory input. The runner would seem to constantly glimpse and engage the cycle of selecting, examining, and acquiring externally sensed information. When there are either problematic situations or key information moments glimpsed, then there is a selection of that externally sensed information which a person examines for its applicability that may affect the performance of the purpose of the run. A person could then perhaps acquire it as running knowledge. Through the data collection, what is novel is the evidence that the participants seem to exhibit these behaviours (all glimpsing, but also evidence of route choice and understanding the environment). The findings suggest that these behaviours add to acquiring knowledge or understanding of a situation that a person running recalls in other running situations in time. Concepts concerning glimpsing in motile beings are also linked to the ideas of learning and understanding as developed

in the previous section on visceral information and knowledge acquisition to build a running knowledge base.

There is also glimpsing between those who use wearable devices in the recordings and the participants speaking of when they went through the whole encountering process that Bates describes. The findings suggest that glimpsing is ongoing as a behavioural constant, and when there is a selection, the path towards knowledge acquisition occurs. What is perhaps novel is that in studies of browsing, even as recently as the last few years (McKay, Chang, Smith, & Buchanan, 2019), studies continue to look at internal, desk-based situations and not the domains of external leisure pursuits like this research.

Whilst the individual runners' sensory perception of information has been discussed, there will also be a discussion of ideas concerning co-encountered or collaborative encountered information because other people, runners, in an environment, allow for externally sensed information. Whilst the participant and the researcher were talking, the participants showed Ford's (2015) idea in "communicating parts of their knowledge by converting into information and putting it 'out there' in the form of, for example, speech, text or movement" (p. 11). This communication, "in turn, can be interpreted by other people and become part of their knowledge" (p. 11), such as the first data collection method on a run or the example of one of the participants relaying times and pace in a group training session. As Ford has observed, most information behaviour models apply to the individual (p. 78) and not groups. Ford (2015) has also suggested that "the sharing of information is by definition an act of collaboration" (p. 78). This research's findings agree with information collaboration but as a part of externally sensed embodied information from other people running. As already discussed, this external corporeal information develops into a runner's knowledge base. From the findings, sharing as an information behaviour is not always done to seek information. Instead, the information sharing or collaborative nature relates to information practices and experiences where the individual participates in a social world associated with the activity of running. The current scholarly suggestion that information behaviour can happen in solitary or social settings is too prescriptive. Instead, the findings have shown that information sharing can occur in a social situation where information behaviour is both individual and social. The findings agree with

Ford's suggestion that there is no such thing as "collective knowledge" but overlaps of individual experiences.

8.4.3 Combining device and embodied information use and knowledge

The analytical findings presented embodied and device information in running activities as a form of knowledge progression. It showed the idea of acquiring information that developed knowledge through running experience. The amalgamation of device information and embodied sensory information showed a potential progression that started from reliance upon device-driven information about their body towards the almost exclusive use of embodied information during a run. This progression indicated that the runner had reached a high level of embodied information knowledge related to their running activity. Whatever the device technology, there did seem to be some form of knowledge progression which begins with a higher device use which then decreases in favour of higher embodied running information such as knowing the body.

Therefore, this research's findings provide a perspective on the progression of running activities. It considers how devices are used and learned in running and how knowledge of the body (knowing the body) and its running knowledge base plays a role in understanding embodied information when executing a run. Within self-tracking HCI literature, Kuru (2016) observed the idea of device information used in running and progression in his proposed concept of mastery of runners using self-tracking devices. Kuru's presentation of the self-tracking information needs of his participants new to running saw them use a smartwatch with few metrics and then progressed towards a mastery using more metrics. It was the only work concerning self-tracking literature where there was some agreement concerning the idea of progression. However, this research's findings differ because the research participants developed an enhanced sense of knowing their body through using fewer device metrics, if any, in favour of sources of embodied information. Kuru's study did not focus on developing a running knowledge base that included embodied information, just devices. In a reversal of this, Gorichanaz's (2015) on a run information experience model only concentrated on corporeal information and did not include the informational use and value of device information feeding into the runners' knowledge base and experience whilst running. Within these findings, it seemed that information from devices was not

needed to be mastered, but the device became more of an emotional, integral part of the running experience. The device provided emotional support and a source of emotional negativity depending upon the *reason to run* and the related *type of run*. Within these findings, the line between a device and corporeal information may be blurred, suggesting that the person running with a device is a potential entity in its own right.

Using fewer device metrics as the runners' knowledge base increases also considers the findings with ideas of self-tracking abandonment found in self-tracking sociology and HCI literature. Returning to building knowledge about the body, both *experienced runners* and *those who run* used data from devices whilst both running in varying degrees and from the resulting record of the run (8.5) to learn about their bodies. Literature has shown that when specific goals, usually short-term ones, are met, people abandon self-tracking devices as self-knowledge development is no longer needed because it has satisfied what the wearer wanted to find out about themselves (Lupton, 2016; Barbour et al., 2012; Karapanos et al., 2016; Clawson et al., 2015). Abandonment, where a device was not helpful for their needs, was not seen in the participants. Abandonment was either down to hardware failures such as short battery life or water exposure. Device accuracy was not a factor in any device abandonment (Young et al., 2015), although one participant raised the issue of heart rate metric accuracy. To counter this, the participant had bought a heart rate band as a response instead of abandoning the device altogether.

8.4.4   Information use value

There will never be a simple, reducible answer to how people use and need information in studying human behaviour. This research does not claim such reducibility. However, research can address information usage in situations that have received little attention in scholarship, such as running. "Information use" and "needs" as concepts, Kari (2010) has suggested, are ideas that relate to a person's evolving needs through a time where they build up their knowledge as a response to those needs. External embodied use has shown how a person running has built up their knowledge through their *reasons to run*. They have understood what suitable environments are to run in, what potential hazards and dangers are, and critical moments that can affect their runs, such as changes in routes and the effects of the

weather. These findings provide such an examination of information use through encountering information from various forms in an intangible running knowledge base. This research proposes that the information use of device derived represented information and visceral and embodied information is a perceived value of information. Its use concerning the participant's related needs makes the types of information valuable to contribute to their leisure activity's goals.

8.4.5   Using information and creating records

Section 8.4 thus far has concentrated upon information behaviour, particularly its use, within the running activity itself. The outset of this section raised the issue of the context surrounding the act of making a record. This section has demonstrated how a participant encounters and uses information during a *type of run* to complete it, following their reasons for running. A contextual explanation of the running experience bookended between the start and end of a run recording will demonstrate two things. It will show what a represented record does not capture and what a person when viewing a *record of a run*, has the potential to relate to in their remembered running experience. Whether the person running is an *experienced runner* or *those who run*, the recorded, represented record, in effect, can act as a mechanism to recall residual memories and experiences of information encountered on a particular run. Aside from the constant development of a runner's knowledge base using corporeal information (internally and externally embodied information) and represented information (device information) during a run, the record of the run becomes another source of information that can develop the runner's knowledge base. How the person behaves with the *record of a run* will be addressed in 8.5. Before viewing such behaviour, Herner's (1970) description of information encountering as an ongoing, multi-temporal, cognitive experience is of relevance to the closure of this section and the opening of the next:

> continually, awake or asleep, consciously or unconsciously, we rummage through our minds, reviewing the data we have collected and stored within them, we know, our minds store memories of what interests us, and we match the contents of what we sense, regardless of where it occurs, against what interests us (p. 408).

Despite being proposed over fifty years ago, the findings bear out these tangible and intangible ideas whilst on the run and, as the next section will show, away from the run. The idea of rummaging is intangible. The findings show a correlation between Herner's memory store of interests matching what we sense irrespective of time. This correlation unifies our interests in developing a corporeal and technical knowledge base and the *record of a run*, outsourced to third parties or handwritten diaries. The participants, when running, seemed to suggest what interests them when they vocalised comments about their running environment, their devices and their bodies. The following section will show that those using records of their run seem to look at what interests them concerning their needs when they look at the records. Whatever the time in their lives, it will relate to the record's value. This consideration of value will link with information use and value as discussed in this section, attempting to demonstrate an ongoing change in personal information value amongst the participants. Like personal information values, the highly complex interconnectivity of information sources surrounding the running activity that connects the run, information created during and used after it should become apparent. Whilst the findings, for the time being, will be related to existing scholarship, it builds towards a discussion upon the very nature of information, records and related behaviours. This discussion will tie the comparative discussion sections together to explain the applicability of *neo-assemblage theory* in a dedicated section. For the immediate discussion at hand, the next section will discuss the idea of a *record of a run*.

8.5   Records of a run

This section builds upon the previous section about the types of information used and valued during a run influenced by the ideas of the participants' *reasons to run* and *types of runs*. This section will discuss the findings concerned with the concept of a *record of a run*. The previous sections alluded to how a *record of a run* is created in a running activity by looking at a smartwatch, watch or clock and noting the time at the beginning and end. The previous section discussed the embodied and represented information uses and values during a run which was effectively sandwiched between the start and stop of the recording. Such a recording, conceptualised as a *record of a run*, provides a further examination of one facet of a runner's knowledge base, which is in a relatively tangible form when compared to tacit knowledge and embodied

sensory information. This section discusses how participants used and valued *records of a run* in minutes or hours after a run or a more extended time such as a month or even a lifetime. The discussion will relate to personal archives, personal information management (PIM), information behaviour and self-tracking sociology literature. The *record of a run* has a connection to running information used and valued during a running activity, as discussed in the previous section. It should be borne in mind the interconnected relationship between the physical effort of a run, the cumulative effect of undertaking runs represented through many *records of a run* over a given time and the needs of the person running. The discussion will then head towards the definition of a record, preparing for the final discussion section on *neo-assemblages*, records and information (8.6). This second part will consider the participants' perspectives on their conceptualisation of a record in running and its qualities.

8.5.1 Participants creating a record

Relating this discussion to the participants' needs, creating information, primarily represented information (records), is vital for both *experienced runners* and *those who run*. This research suggests a new focus in personal archives to incorporate cognitive concepts from information behaviour such as information needs and information-related needs, questioning the reasons behind information creation in the first place, which directs an understanding of its use and value. The information behaviour observation seems that the participants create records to use and value them related to their *reasons to run* and another information-related need for socialising.

This discussion will continue to address the particular uses and values that arise from records created during the activity of the run. The findings concerning tangible, self-created personal information collections form a part of the runners' knowledge base and relate to the intangible concepts of knowledge and personal memory.

8.5.2 Participants' information and records management

There was very little active information management amongst participants. They did not purposefully ensure the transfer of digital data recordings of the runs from their devices to a storage medium such as a third-party server from which they could access them to use at specific points in time. The findings described participants' actions

through selecting, transferring, storing, and accessing their running records in digital and physical forms. Those that used physical methods of recording their runs had increased information management activity. They also had greater control over the personal record creation, transfer, storage, and access process. Participants managing digital offline records had similar levels of management. Interesting for this discussion is the seamless way third parties had designed device created records' transfer, storage, and accessibility by accompanying self-tracking applications such as Garmin, Suunto and Strava provide. The process was described as "minimal effort" as the third-party hardware, firmware, and software had designed the information management process. The records were uploaded to a third-party server, usually belonging to the device's manufacturer. For those that had the third party Strava application, there was a second transfer from the device manufacturer's server to the Strava server. A participant could access the records from the manufacturers' software or the chosen application not related to the device manufacturer through a smartphone or a laptop web browser. The idea of managing information and records was not a technical expression but synonymous with brand names and platforms (i.e., "my Strava/Garmin/Suunto"). Strava was the preferred third party online platform due to its social elements.

The first transfer of the *record of a run* was toward proprietary platforms (Garmin/Suunto). Participants considered forms of secondary backup storage as an alternative to Strava but only when prompted by the researcher's questions. The positional analysis of *records of a run* storage showed that all those who used third party storage did not intend to make backups. Only one participant made backups of selected records of their runs. However, they did not worry about losing their third-party records. They had identified them as unnecessary as their other running and activity records were held offline on their personal computer. Another participant only used their device and deliberately did not link their device to third party storage to back up to The Cloud for personal privacy and security concerns. However, among most of the participants who made records, there was an underlying assumption that the records would always be available to them. For many, the thought that they would not be available was almost inconceivable – they "would expect to always have it." Some participants, who were assumed to have a basic level of literacy and information

technology skills, considered access to personal information on online platforms a part of everyday life. For the participant that had offline digital records, access was maintained through planning and making backups of their digital records. Those who had physical records could find them (from where they were stored) and exercise control over them, or could not, so they could no longer access them.

For those that only held digital records with third parties, the findings engage with self-tracking sociology literature concerning questions of power and agency. Critical data studies on the quantified self and big data metrics (Beer, 2018; Ruckenstein & Pantzar, 2019) have approached much of this. However, the findings related to the participant's lack of personal information management. They entrusted their *records of a run* to a third party, suggestive of third party power over digital storage infrastructures of the participants' running records against those with analogue or offline storage. The majority of participants' storage was with at least one third party platform, and they had little or no regard for the management of their records. Despite the lack of work in their information management, these findings raise the self-tracking sociology concept of an "informed personal data flow" (Lupton, 2016), which conceptualises the idea that those who self-tracked knew how their data were collected and where data flowed. The findings suggest a general understanding of transfer from devices to a third party such as Strava or the device manufacturer. There was also the idea that the mobile smartphone has "everything on it", and one of the participants was aware that they thought they owned what was on their phone, as their running records, it was a pretence because it was stored elsewhere. The participants seemed to be informed about their data flow. However, they were generally apathetic to doing something about it, such as deliberate "networked privacy" (boyd, 2012) or "data dispersion" (Clarke, 1988), where their information can be spread across networks instead of one site and reconstituted accordingly. The participants, who only used self-tracking devices and platforms, understood that their data would be on both a manufacturer's platform and their chosen social running site. One participant had a very deep informed personal data flow because they had designed their system and had control of their privacy. However, they made much effort to do this. Most participants who did track did not seem to do this, preferring a "minimal effort" personal data flow entrusted to a third party. Within personal archival theory, Marshall (2007, 2008a,

2008b, 2013) forwarded the idea of *benign neglect* where people have the intention to keep records and keep them up to date, but they never get around to it. That behaviour does not apply to those who self-track because they use a third party that manages their records according to the platform's design. This discussion revisits the issue of third party involvement after further exploring the uses and values of participants' *records of a run* related to their reasons for running and other needs. This exploration will form a second point to revisit the idea of a "minimal effort" personal data flow, which most of the participants seem to practice.

There was a higher degree of personal management of their *records of a run* for the participants who did not use self-tracking applications and platforms. Their behaviour was strikingly similar to recordkeeping principles in the conceptual lifecycle of creating, storing, managing, accessing, disposing or retaining records (Franks, 2013); Shepherd & Yeo, 2001). Their behaviour was also similar to personal information management (PIM) processual principle of create, manage and use (Bergman & Whitaker, 2016). All the participants, it could be suggested, within their 'personal sea of information (PSI), seem to understand their running records as a distinct personal information collection (PIC) when considered as either "their Strava", Microsoft Excel file or diary or collection of diaries. In terms of recordkeeping and PIM concepts, the most important concept for the participants is the idea of access to use and value their *records of a run*. Access is impossible without creating the record in the first place, its transfer, storage and ongoing maintenance into a system to use them. However, such personal information management and recordkeeping concerns between creation and access are processes that seem to be of little concern to most participants unless they kept their digital records offline or in a physical format. The information management process is not a key consideration for most participants because they subscribe to "minimal effort" personal data flows. Even those that do not have idiosyncratic ways to manage their *records of a run* continue to use them and value them. Understanding the uses and values of their records about a run needs to be discussed first. Then, the discussion can return to the role of third parties and the nature of information and records.

8.5.3   Using and valuing personal records

After completing a run, participants saw that their record was duly processed, with either much or "minimal effort". The participants then accessed their *records of a run* through the medium of their choosing to reflect upon the physical activity of the *type of run* they had just undertaken. The nature of the reflection seemed to be driven by the *type of runner* and their *reason to run*. The *experienced runners* tended to reflect upon their current activity and running performance through a more detailed analysis of their running records. For the record of the immediate run, the reflection would act as another means of reassurance that their running metrics of pace, time, distance and sometimes heart rate were as they would expect. This reflection contributed to or reinforced their running knowledge base. They would also reflect on the *record of a run* against how their body felt after a run. This reflection aided their understanding if they had run too hard or needed to rest before their next run. They also reflected and compared their training run or competitive run against their other *records of a run*, which spanned months or years or within a particular training cycle of weeks. *Those who run* also reflected upon their records. They did not reflect upon them in as much analytical depth, looking at aggregated records of a week or month. A month of records to reflect upon was considered plenty. They did not use their records for significantly more extended periods to compare other training and race performances. The reflection resulted in a personal sense of achievement, something the participants seemed to value in the *records of a run*, especially over a month or longer.

After reflection and analysis, planning a run of *records of a run* was also observed amongst *experienced runners*. The *experienced runners* tended to reflect upon their *records of a run* for a race they had run before to see how fast they had to run for a specific competitive time or check the details about a particular race route. Similar use was finding a route for a particular *type of run*. The comparison of their *record of a run* would also prepare for a visceral run experience where an experienced runner would know what a specific pace would equate to in bodily sensations and feelings. Participants would use records as a part of a planned training programme, such as revisiting old training routines. Amongst *those who run*, such detailed planning was less evident.

Despite the perceived differences, the reflective, analytical and forward planning use of records surrounding their immediate running activity were similar. The reflective and planning uses of the *records of a run* were valuable in contributing to participants' running knowledge base. The record contributed to it by connecting to the participants' embodied performance at a particular time. It provided reassurance and a review mechanism against their runs within the last week or month.

For the majority of the *experienced runners*, the ability to access and refer back to long-term held records meant that the records accrued "greater value" when related to their recent running experience. The records had a "sense of achievement" related to a run just performed, similar to *those who run*. The records provided information on recent past efforts on a particular route or over the last week or month. For the *experienced runners* running for a long time, the reflection of their records, which held "best for life" times, provided a reflective prompt to find new *reasons to run* as the records charted their ageing and decline of performance as a result. The majority of the participants expected to be able to look back over time on their records whenever they wanted, whether for preparing for an event coming up or to look back on their past running achievements. Concerning online third party records, they thought that the records should "just be there." When considering social media sites, such personal records and information should be available as an extension of their memory, acting as a "memory bank" to use should they want to recall something.

The findings contribute to the information seeking of personally created information. Creating and seeking are two information behaviours that combine to contribute to a continuous running knowledge base through represented *records of a run*. Krikelas (1983) and Freund (2015) have noted such uses of personal collections of information. Other than these scholarly models, the idea that participants sought personally created information for reflective use concerning a runner's performance and *reason to run* has received little attention. Hartel (2010) has examined the collected and noted information sources of hobbyist cooks, but there has been little examination of habitual, personally created collections rather than information sourced from elsewhere. Cox, Griffin and Hartel (2017) had hinted at the use of self-tracking in running activities as a potential information source related to embodied information at the end of their paper. These findings expand upon the likely interconnected nature

of information use of embodied represented information with the body and self-tracking. Gorichanaz (2018) had devised an "embodied-recorded" constellation in ultrarunning – under which *records of a run* would fit – but self-tracking *records of a run* were not a source of information observed in his findings. He did not deliberately draw upon self-tracking devices as a source of information in his on a run information experience model that would feature in his knowledge base. However, one of his participants commented on self-tracking information in his information constellations framework.

The above has demonstrated that information behaviour literature is hospitable to ideas of how forms of information are not only used by individuals but seek to understand the reasons behind their use. Similarly, within self-tracking sociology, self-tracking devices and information have been observed as an idiosyncratic way of building knowledge (Ruckenstein & Pantzar, 2017). The findings reported such idiosyncrasies through the reflective use of self-tracking records. The findings cannot record all the idiosyncrasies of thought and running knowledge development. However, they can at least point towards performing physical activity and then reflecting upon the represented *record of a run*. These findings contribute to archival literature on the demonstrable and immediate use and value of personally created records for reflection about an activity where the person who has created it determines their use and value. Personal archiving literature has some understanding of the context for creation. However, it seemingly questions the creators' information and records management practices because it cannot map onto recordkeeping theory and practice before transfer into a collecting institution. These practices are something that, within archival thought, Fisher (2009) describes as the breaking of the chain of custody from the creator to the institutional repository.

Should collecting institutions wish to collect personal archives, they need to have an enhanced understanding and appreciation of the circumstances of the record. First, they need to understand and appreciate what the record or collection of records means to the individual. Secondly, they need to understand and appreciate how the created records connect to the individual and the experiential context of record creation. For example, section 8.4 demonstrated how a *record of a run* as a represented form captured some but not all of the embodied experience. Within

personal archival thinking, the acquisition of personal archives into a collecting institution seems as if a third party values the records if the third party is deemed worthy of collection, preservation and future access in a particular society (Schellenberg, 1956; Thomas & Martin, 2006). Without the individual connecting to the records as depicted in *neo-assemblage theory analysis* maps concerning records, there cannot ever be a complete understanding of the context of the records' creation, use and value by an individual. The tangible outputs of a person's assemblage, attached to their memory and identity embodied through their records, are deterritorialised from the person running assemblage and attached to a collecting institution's assemblage.

When away from the run, recorded information or records, whether digital or analogue, are used with the human mind to reflect upon their running information to use it within their current running goals, feel a sense of achievement, or a sense of personal history. There is the idea of a sense of connection with the experiential context of the run itself through the embodied experience and the person running's *reasons to run*, all intangible experiences in which relics of it reside in a represented recording of the run. When presenting such a context surrounding a record, it should be apparent that there is a complex interconnected set of relationships that are not always tangible or understood concerning the idea of a record. There was a further complexity concerning the interconnected nature of the records when the participants reflected upon collective records on an online social media platform. It also has implications for the idea of personal archives and ownership when considering the archival concept of the chain of custody. In an interconnected, complex digital self-tracking information world, such a notion is not as easy to consider compared to a paper-based paradigm of thought. The following section considers collective social records in online platforms to demonstrate such complexity.

8.5.4 Using and valuing records to socialise

The findings relating to collective records apply to online platforms only. The findings presented a personal, reflective use of running records by an individual that other people create within their online running social network. It is worth considering that the records of others would be a representation of the personal experiential context of a run of the other person. Some participants called the private, reflective act stalking,

or the use of the platform name first followed by stalking, such as Strava stalking. These findings support observations of this term in online running platforms (Esmonde, 2020). It is a benign act of looking at people's records through a mutual agreement in allowing reciprocal sharing of their online profiles. Such stalking had changed a conversation in real life where people already knew information about each other, so they had little basis for conversation or based a conversation on such stalking. This behaviour exemplifies what Lupton termed a collective and consensual sense of "panoptic surveillance" (Lupton, 2016, p. 59). However, the panopticon has connotations of power where somebody is being watched by an unknown person, usually in an authority role. Lateral surveillance is perhaps a more apt term for collective, consensual surveillance (Andrejevic, 2005; Jiow & Morales, 2015), where people knowingly and permissively watch each other. For example, browsing and commenting upon data within the online platform is permitted as a type of social surveillance where people grant permission to follow each other online. This mutual social surveillance seems to be a part of modern life, and it certainly seems to be an accepted behaviour within running social media platforms. The idea of Strava stalking certainly fits the dataveillance definition of using a personal data system to monitor another person in a mutually participatory way. Strava stalking also relates to lateral surveillance more than a panoptic idea of surveillance.

Within information behaviour, the idea of the collective pooling of information within the research of leisure pursuits such as hobbies that require represented information is an already researched area. Pooling and sharing information are not new findings within this literature (Case, 2010; Fulton, 2009; Lee & Trace, 2009; Otto, Metz, & Ensmenger). However, whilst the participants who use online sites have agreed to share their information, there is not much active consumption of information sharing of their running records. Instead, there is the personal element of stalking and making comparisons against the persons' performance tied to their *reason to run* when they interact with the running records of others. Looking and comparing the records of other runners, especially *experienced runners*, enabled some of the participants to understand their own running experience to check the records of others against their own internal running knowledge base. The comparative use seemed to be strong, where participants compared themselves against others to make sense of their data.

The findings agreed with Lomborg et al. (2018) that serious leisure athletes tended to use both the social and individual parts of self-tracking with individual reflective use and a social aspect. Some selected what they presented, and others used private or alternative platforms or media to record. The communities in these examples seemed to reflect their running clubs or personal social networks. The platform also provided spaces for asynchronous interactions using the data or record as a basis of conversation or reinforcing or gaining positive emotional responses.

The participants that used online running platforms seemed to prefer Strava over Garmin and Suunto platforms because their friends who run were also on Strava. The running records from many manufacturers' devices could be uploaded and shared on Strava, unlike proprietary platforms such as GarminConnect or Movescount. The *experienced runners* had larger online groups and contacts, enabling online social interaction and private reflection. Sharing their records meant that they received recognition ("praise") for their running efforts and could comment on each other's running records. Concerning planning for a run, there was either information about encountering or seeking out routes, maps through people's GPS traces that consisted of their *records of a run*. There was also sharing information to plan a run and learn about new routes. Sharing *records of a run* also introduced a level of competition where people would chase "segments" online. *Those who run* (Group 2) had minimal online social running networks and used other digital means of socialising, like using other social network sites (i.e., Facebook, WeChat) or email. There was very little social use of their records for *those who run*. They were happy with their smaller pool of running routes and were more selective over whom they shared their records. The findings of *those who run* agreed with Hitchings and Latham's (2017) observation that non-runner runners did not share the social aspects compared to serious leisure or club runners typified in this research as *experienced runners*. Hitchings and Latham (2017) did not have online sociality in mind, but it seems to contribute to their conclusion concerning the social aspects of club running.

For the *experienced runners* in Group 1, Hartel's (2010) adapted hobby career arc from Stebbins (2010) could explain the greater use of online sociality than Group 2 participants. The Group 1 participants had already begun running (beginning). They had developed to a competent standard (development) where running activity was a

part of their daily practice. They understood running terminology and shared it with other runners (establishment). They are then at the prime of their running, where they are known as runners by other people who run and people outside of their running circle (maintenance). The use of online sociality is a part of the runners' career arc, which encompasses running projects for specific goals, which could be a "subject arc" within Hartel's explanation. A subject arc is a particular subject that is time-bound within the hobby career arc, and the career can encompass many different subjects that contribute to the career arc. Below the subject arc is an "episode arc", which is a discrete project or activity, which in this case is reviewing other people's records of runs. Alternatively, they could be looking at their running records about a run or undertaking a run, all episodes which contribute to a particular subject. Those in Group 2 do not find running a hobby or could be at the beginning of a running hobby career arc. Their running skills are very much in development, so they concentrate on themselves. They may establish a routine for themselves, but they are not as interested in embedding it into their lives nor finding other people running to socialise with, whether online or in person. Group 2 runners seem to exhibit a sense of just learning enough about running so they can undertake it and work on the running. Within their lives, the activity of running as a subject arc within their hobby of overall fitness could better explain their approach to running. Each run represents an episode in their fitness episode arc.

An emerging finding resulting from the Covid-19 pandemic was using the online *record of a run* in virtual runs. In a virtual run, people shared their *record of a run* taken at the same starting time as others to show they were somehow running together despite social distancing restrictions outside their household. The *records of a run* were also shared on online competition and race sites so that *experienced runners* could continue to compete with others, despite lacking the embodied "thrill of the race". The need to substitute socialising was also critical during the Covid-19 pandemic, especially for *experienced runners*. For experienced runners, socialising was already a hallmark of their (small) leisure world (Chatman, 1999) and as a part of developing and maintaining their career arcs (Hartel, 2010).

The online social environment saw participants actively curating records to share and upload to social platforms that they wanted people to see. Some went as far as to put

effort into their running records' titles as a part of their social presence. One participant went as far as to suggest that his Strava records were a part of his persona as "a joker". The *records of a run* became a part of their social identity, so much so that they invested time into creating titles. For those that made digital records offline and in paper-based systems, there was a curatorial aspect for personal consumption, not part of social performance. However, the personal records still seemed to connect with these participants in reinforcing their identity, just in a private sphere. The only participant who had offline digital records made some effort to maintain them. Other participants made no further curatorial effort beyond their immediate usefulness using online records and a paper logbook. Within the online environment, there is an ease in creating, storing, and accessing a running record that requires little effort beyond making titles and the effort in creating the data through a run. However, there is less effort in maintaining the records over a long time with such ease whilst they remain readily available. Whilst the process remains simple, there remains the risk of *benign neglect* (Marshall, 2007) despite the initial curatorial efforts in presenting the self online. The curation of the participants' online records supports the idea of the *archival I* as posited by Douglas (2018). Douglas' participants self-selected their records for permanent preservation in an archive as a way of engineering how people would perceive them in the future. These findings contribute to Douglas' conclusion in placing the development of personal identity through records in an everyday context of private citizens instead of noteworthy people. There certainly seemed to be a use for their *records of a run* in a digital social context. The participants derived personal social value from the records to complement their lived running experience.

8.5.5 Personal identity values of running records

For three participants who were male and *experienced runners*, their running records were bound up with personal history. They presented strong emotional reactions when the researcher suggested that the records could be lost forever. It seemed the participants secondarily valued the records away from their immediate use. The secondary value had a greater meaning to themselves and a sense of personal history. Archival thought has described such a secondary value as informational or historical instead of a primary evidential use, or in the case of the participants, reflective, planning and social uses. Pink et al. (2017) noted how the affective dimensions in

activity went beyond the physical activity itself and into visualisation and analysis for a sense of accomplishment (p. 8). There was an idea of a sense of achievement in many of the participants who self-tracked in both research situations, which seemed to confirm Pink et al.'s findings. Pink et al. concluded that data use during an activity and then for analysis shows how "personal meaning" and affective states were bound up inextricably with "numbers and graphs". This research's findings not only broadly corroborate Pink et al.'s conclusion with those that cycle arguing that understanding this relationship is crucial to understanding the concerns of data politics and power. The findings also reinforce the data politics and power arguments. It was not just the affective dimensions that went into the *records of a run* for a sense of accomplishment. The findings, for a few, suggest a personal historical value is bound up in *records of a run* over a longer time, reaching far beyond the original physical activity of running. Pink et al.'s conclusions were also sensitive to the idea of the ongoing, interconnected nature of the physical activity and the person's attachment to a digital visualisation or *records of a run* across time.

The runners in the research seem to exhibit similar observations to Pink et al. (2017) with cyclists. They retained their data for the long-term if it became useful or used in a different way from which it was initially collected (p. 8). Those with a habit continue to track and monitor over time. The analysis of long-term data trends was also a trait of their data use. They would refer back to their records when about to run a set course they had run before or even share data about routes with others. What does seem to emerge discussing the findings with self-tracking sociology is that those that have a longer-term leisure pursuit have a recorded sense of their long-term data that can be accessed. The findings suggested that runners who exhibited strong reactions to the potential loss of their data seemed to have strong identities as runners. Keeping a long-term store of running records related to their continued sense of identity and the data's loss represented some form of identity loss. If *neo-assemblage theory analysis* mapping represents the destabilisation of someone's identity, the loss of the record components from a runner's information assemblage would be a significant destabilising event for the runner. If the records are a part of their memory in a tangible form, it is a considerable loss. The runner would lose a part of their identity

through such tangible representations of their memory, whether they would revisit the records in the future again or not.

When considering the affective dimensions of digital *records of a run*, Cushing's (2013) "individual-digital item relationship" (p. 1723) with digital objects is of relevant consideration. Cushing's perspective is from personal information management and digital archives. Thinking of an object (a digital item) as a "digital possession", Cushing's four characteristics agreed with those with stronger affective emotions towards their digital records. Amongst the participants who demonstrated stronger emotions with their digital collections, they showed the four characteristics that the digital possession (i) represented something about them, (ii) their identity, (iii) it had value, (iv) and a sense of bounded control. The participants with a solid connection to their records had a self-extension with their *records of a run* as digital possessions. Where this research's findings meet these criteria, the participants who had a strong relationship with the digital-item had a sense of their history and identity bound up in those digital records or possessions. Only three participants strongly exhibited this with digital *records of a run* accumulated over years of running. One participant seemed to show a sense of a personal digital possession that recorded a 10k run they participated in and completed.

This digital sentimentality raises the issue of memory and the self in self-tracking. The findings described a valuable serendipitous encounter with the participant's *records of a run* that prompted memories of their past running. The *records of a run* prompted some participants to tell stories about their runs, personal narratives not necessarily contained in the *records of a run* but could act as a prompt. It seemed as if the participants were filling the gaps between the recorded information points whilst telling their stories about a run. These findings support the idea that memory is not just reflective but also a narrative of the self (Rettberg, 2014) that one participant described as "the story of my life". However, over time, the participants may have forgotten about runs that they have taken part in, and they would not have any reason to consult those records as they were a part of their primary *reasons to run*. However, there did seem to be a positive emotional response through a valuable serendipitous encounter of personal history. Whilst one participant was looking back at his handwritten records, he said that it elicited a sense of "nostalgia" for his former

running. The unplanned serendipitous encounter seemed to affect him emotionally. Adam expressed a similar sentiment when looking back on records that had photographs with the well-meaning, happy "fluffy stuff".

Despite the substantial value of personal identity, history and positive emotion, for those trying to manage their data, most displayed "minimal effort". They relied on the platforms to do this in a digital sphere. Even keeping physical items of self-tracking was not a straightforward task for some, although there was no perceived value in them. The findings agree with Epstein et al. (2015), who found that long-term trackers did not always manage their data. However, there seemed to be an expectation amongst the participants that they would always be available.

8.5.6   Personally created information and third party control

The participants met the idea of losing their *records of a run* with ambivalence and a projection of short-term irritation. The participants thought they would recover and start making records again. However, there was a contradictory expectation that the *records of a run* would always be available to the participants, like a "memory bank" despite "minimal effort". Three participants demonstrated a strong emotional response about their identity, like losing a valued possession. All participants saw the *records of a run* belonging to them yet also recognised that a third party enabled the management of their *records of a run* and their valued social information sharing platform. There was a predominant "minimal effort" informed personal data flow. However, it was also somewhat contradictory considering the effort in creating the *record of a run* and the personal curatorial efforts to maintain an online social running identity. For only three participants, these records were a part of their personal history, the stories of their lives to paraphrase one participant.

Cushing's (2013) characteristics of digital possessions suggest the idea of personal ownership that is bounded in a platform and can be transported with them when thought of as being in a bounded place. Schultz (2018) raised concerns about the relationship of applications within a social context, their third party dependency, and the risk of third party ownership despite the individual using them for their information and personal archives. Schultz's concerns have broader societal implications about the status of online platforms. There have been suggestions of

designating Facebook with UNESCO digital world heritage status (Öhman & Aggarwal, 2020) and the suggestion of archivists influencing the design of these platforms to cater for secondary informational or heritage value (Sinn & Syn, 2014). There is an assumption in this literature that these social media sites are forms of personal archives despite the authors recognising the interconnected nature of online social records. However, the participants could not see their data being of any interest to anyone else but themselves. This personal view, or even a small world view, for those that embrace online sociality twins with a sense of apathy around third party data use and storage (Hull, 2018; Lupton and Michael, 2017). The participants did not consider any management over their records, except for one participant. The findings suggest that a third party holds power over the participants in that they control the management process. If a third party no longer stored and made their information accessible, most of the participants would in the least lose the sense of achievement imbued in their records, their sociality and for some, their sense of personal history. A small idea of losing records was seen in one platform's (Strava) change in access to features and aggregated information, levying a charge. Most felt compelled to pay the small monthly fee (£4 a month) as part of their overall running experience.

Interestingly, in a small volume of published LIS digital preservation research, Copeland (2011) actively embraced third party storage due to empirical research precisely based on the "minimal effort" principle. Copeland suggested that third party storage could be an easier route to guard against hardware obsolescence, placing online storage over personal ownership with offline hardware storage. Copeland found that in the short-term, use of online social platforms was for communication and socialisation, which were not too dissimilar to this research's findings on online sociality. Whilst not observed in all of Copeland's participants, like this research, some did have emotional responses to documented "life events" (p. 1296) or histories to borrow from some of the participants. Sinn and Syn's (2014) similar empirical findings showed that participants did not consider Facebook data a record of their recorded lives. They were not concerned with looking after the information but would be sad if it were lost (p. 118). Sinn and Syn attributed "The Cloud" as responsible for this apparent "benign neglect" (p. 119). However, based on this research's findings, those who used third-party platforms did not actively look after their *records of a run*

because they relied upon a "minimal effort" informed data flow. There is no issue with the concept of *benign neglect*. Amongst the participants, it seemed as if there was perhaps an underlying assumption in the informed data flow that their *record of a run* would always be available. Like Sinn and Syn's participants, there was evidence of an emotional response if they were lost. The contradiction between apathy in managing their records and an assumption that their information will always be available seems evident in other third-party platforms. However, the difference between Facebook and Strava is that a single physical activity type drives the creation of a *record of a run*. Whilst Sinn and Syn's participants did not see their Facebook data as records, the participants in this research were actively creating a *record of a run* through a physical experience of a run to use and value it for reflection, planning and socialising.

While discussing a record in a digital, online platform, the ideas of data and interconnectivity between the third party, other people and other records and information become salient. The discussion will now turn to the participant and archival scholarly definitions of a record to understand the idea of a running record in online third-party platforms and more traditional forms such as documents, whether as paper or electronic file formats.

8.5.7 Archival perspectives of records and archives

The concept of a record in this research derived from the participants' perspectives and not the predetermined views of archival scholars and practitioners. It is perhaps reassuring to archival scholars that the contribution to this understanding supports the general concept of a record in archival science. A record in archival science consists of data or information in an intangible form separate from its medium until it is recorded or inscribed onto a particular medium. A record is a represented, tangible, recorded form of information that aids human memory or provides evidence for one party's accountability (Society of American Archivists, 2021c). Within this research on personal information, the findings agree with a record being a tangible aid to human memory. Within the context of a personal record, the record does not necessarily provide evidence for accountability as defined above but perhaps in the sense of personal accountability related to their identity as a runner. The record can also provide evidence and act as an instrument for memory to reflect upon an activity.

The documentary nature of the record is perhaps what separates the idea of the record as something tangible from information in whatever form it encompasses. According to archival thought, having information on a recorded medium makes a record a special type of information (Yeo, 2018). Therefore, the discussion often revolves around the documentary nature of records. Yeo (2018) agrees with Bell (2014), who asserted that somebody still recognises the idea of a record on their computer screen as an electronic document format as the same as a document on a piece of paper. Whilst the two are not materially the same, human meaning and sense-making give rise to the terms the digital document and a paper document and treat the two concepts as synonymous. Such "design reification" (Blackwell, 2006), as seen in computer science, affects how participants saw their records on the screen in text and visualisation on an application. The reification of records and user experience (UX) in a digital environment made the participants think about their records like "a diary" and as "records" of their runs. The participants thought much in the same way that some archival quarters continue to conceptualise records and archives, irrespective of the medium. For example, such conceptualisation was evident in the advent of digital records (Bantin, 1991) and continued with the concern of personal digital archives of noteworthy figures (Thomas & Martin, 2006). Digital records are markedly different from paper, and it has been a problem to solve within the archival profession. What is different about these findings is that they confirm from participant perspectives what archival scholars and professionals have been suggesting about the difference between digital and paper-based records. However, the participants do not see personal digital record keeping as a problem to solve. These findings present in comparison how participants perceive records concerning their use and value and how they consider the qualities of records about how they use them. When considering paper-based records, the participants suggested that they were contemplative, private and personal, tailored and most significantly, did not have a social element, which reinforced the private element of paper-based records. The physical and personal nature imbued a sense of sentiment towards the records. However, paper records were not easily searchable, unlike the information in digital records.

Digital records also had a greater volume, depth and richness of information. However, there was a recognition that digital records were fallible and could fail. As a result, the participants could make a significant effort to retain records against the potential risk of loss or do nothing. Most of the participants did nothing, entrusting their running records to third party storage.

Should the archival profession continue to work with democratised records from *personal archives*, the archival profession must accept, as Tschan (2002) suggested, that the creator [i.e., the participants] and not the archivist should be making appraisal decisions. The profession also has to accept what a creator constitutes as an archival idea of a record. However, to suggest notions of *appraisal* – deciding upon what is worth keeping - upon personal records from a detached, professional archival point of view is a moot point. The use and value of the personal records are precisely that – personal. Without any archival training, the participants do not have cause to think about archival principles and practices. Sinn and Syn argued that if we do not have a record of society, such as Facebook, then we will not have records to reflect society at a given moment in time. To influence such recording, theories of personal archives only advanced in 2001. Hobbs (2001) was critical of using institutional archival practice upon personal archives because they are not the same. The findings of this research would agree. Participants did not use the phrase personal archives.

This discussion is related to the small body of archival literature on personal archives. Fisher (2009) noted that Schellenberg's evidential or primary value represented "accountability" and information value as "heritage" (p. 24) in the Canadian total archive approach so that archival institutions acquired personal archives for information (heritage) value. The findings question Fisher's three-step proposal for a theory of personal archives. The first step of creation is where a person creates records without administrative order or contextual relationship. Records are usually in a recordkeeping system of an institution and then transferred to an institutional archive. Fisher uses traditional approaches to compare records creation for private archives, which Hobbs (2001) had already suggested was that conventional approaches were not a good fit. Fisher's creative stage is relevant to the findings because all the participants had different creative approaches, which must be accepted.

However, the participants did not purposely record evidence of activity for institutional accountability. Douglas (2018) has already researched the act of creating personal archives for public figures. Douglas concluded that public figures curating an *archival I* - a documentary persona for institutional archival deposit - broke conventional institutional practices in abandoning procedures and impartiality, favouring active self-image curation. These findings suggest that people's collections of information – records – through time should not just be ring-fenced as *personal archives*. Institutional archival practice should leave the construction of personal archives to the person instead of trying to impose rules. The counterargument is that we will not have a social history of everyday people, and there will not be research materials available in the future about them. Instead, we will continue to perpetuate the personal histories of those figures associated with institutions and the State. However, the question of the informational value of personal information collections, personal records, and personal archives of the people who create and (often not) maintain their information is that they do not all realise its informational value to themselves. One participant did see it as their external "memory bank", but again, it was a personal observation. It was not a memory bank for somebody else to plunder, benignly or malignantly. For the community and personal collections creators, the interested users (if a community) should have the agency over the records. If a person decides they have little value in their records, that is their decision, not that of an apparent external actor. Participants saw their collections as having little value or interest to anyone else, especially in the long-term future. There were thoughts of longitudinal medical studies or some sociological interest, but mainly it was a case of, "who cares about my stuff?" This rhetorical question steers this discussion back to participants' use and value of records.

8.5.8 Participant and archival perspectives of a record

The participants framed the idea of a record from the recording of a run. The information recorded from a run was inscribed digitally on a device's storage hardware, on a third-party digital platform like a server or written in a physical medium like a diary. The findings suggested creating something representative and tangible that could be stored and accessed in a digital platform or a book for some use – something archival scholars would consider a record. However, the participants did

not define the information as to whether it was a record, information or data, let alone know the difference between intangible and tangible forms. Such definitions seem to be irrelevant to the participants. What appeared to be important to the participants was that a form of information was recorded onto some form of medium for some form of use and value. One participant categorised their records into "vital" instead of records of lesser importance. Such classification would satisfy the principles of records management classification (Shepherd & Yeo, 2001), but this was an outlier response.

The participants' views seem to be engaging with Yeo's (2018) more recent thoughts discussing the definition of data, information, and records in sociomaterialist culture. An archival practitioner has raised a definition problem or question who is seemingly intent on continuing to classify into a hierarchy of data, information and records and advocating for the importance of records and recordkeepers in the current information age. Cook's (2001, 2013) community archive paradigm was the first explanation of a democratising shift for social and community requirements in a digital age for the archival profession. In line with Records Continuum Model thinking (Upward, 1996; 1997), Cook saw records as "dynamic virtual concepts". The findings demonstrate this amongst those using the records, even 20 years after the statement. Cook also noted that records were "active" in human memory construction. Again, the findings in this research seem to point in this direction, with human memory having some form of relationship with tangible records. However, this perspective remains institutional. Whilst institutional archives welcomed the participatory, community and personal archives under the banner of democratisation, communities and individuals have always created and managed their forms of records in their everyday lives. They have not generally had archival interventions or awareness of archival principles and practices. The participants in this research are a testament to this.

From an institutional perspective, professional archival activities build around a record as a special type of information. A record can have an institutional, governmental, societal or personal purpose. Upon those grounds, an archivist decides to keep a record as a part of an archive. These findings support the complexity of the idea of the record. However, the findings do not place the record at the centre of the debate. Instead, the findings have shown the wide variety of dependents and human

interactions with a record that assemble at various points in time, thus changing a view of the record. The information in its recorded form has uses and values which change over time.

Moving away from documentary records, Douglas (Douglas, Alisauskas, & Mordell, 2019; Huvila, Douglas, Gorichanaz, Koh, & Suorsa, 2020) has looked to other forms of records that extend human memory. Douglas has researched bereavement and body marking (tattoos) that commemorate loved ones in a permanent marking on a body. A body marking can also change at various points with the value of the personal record recorded onto the medium of skin. Douglas is questioning the very nature of the records and their creative context, moving away from the digital and analogue question and reframing the idea of records into a more fluid, dynamic, lived experience, suggesting that records are somehow alive.

It is often the consideration of personal information and personal information creation contexts and their subsequent uses that archival theorists have often ignored. Instead, they bring administrative, institutional order to record creation processes. In discussing the lively journey of a record and its varying context, this research has found that records creation and its subsequent use and value are a part of everyday life in their activities over time. For some participants, the records, if available, accrued personal historical significance, yet for others, it did not. It agrees with Fisher's (2009) personal archives theory that the first phase of personal archives (creation) does not have administrative order. Perhaps, the findings are one of the first explorations to why this is not needed. As Fisher suggests, personal creation and management processes should not be subject to an archival intervention because this would be contrary to the daily use and value of records in the context of the person to which they belong.

This discussion has challenged archival assumptions surrounding how institutional archives value records and archives through concepts related to the appraisal of personal archives. In particular, it has demonstrated that institutional approaches do not engage with the process of creation and its contexts in personal archives. The discussion explored the situational context of record creation to concentrate on records' personal uses and value. Uses intertwine with individual values, namely

reflection, planning, socialising, a sense of achievement and identity related to the personal needs to create records. The uses are just as valuable to the participants and the material object of the record itself. Secondly, equating the record itself with physical records in a fixed form is also challenged towards the end of the section. This challenge provides the final piece of the discussion, which introduces the concept of the *neo-assemblage*. It is a conceptual framework presenting a fluid, contextual model of understanding the concepts of information and records in the extent of their interconnected relationships with multiple material objects in the activity of running. This questions and provides a new contribution towards the storage and management of archival objects outside of the physical paradigm of thinking about records within the research context of running.

8.6   Assemblages and concepts of information and records

This section will discuss the importance of the *neo-assemblage theory analysis* findings that map and analyse fluid interconnected complexities. The centrality of the human is for ease of discussion and to respond to the research questions, but anthropocentrism should not be an assumed standpoint.

This section will first discuss findings concerning ideas of collective knowledge. Secondly, the section discusses existing concepts of a record found in archival thought alongside findings concerning the *record of a run*. This discussion presents new analytical possibilities and perspectives in archival science. The alternative *neo-assemblage theory analysis* gives a new view on information, records, people and their physically perceived environment, which links to key ideas in existing information behaviour and archival science literature concerning the concepts of creation and context. It also contributes to discussing the unique character of records above other forms of information.

The concept of records as physical and digital entities has complex relationships with the human participant, making them visually explicit using *neo-assemblage theory analysis*. Complexity is even more apparent when introducing third parties and their infrastructure into an assemblage. The final section will concentrate on the presence of third parties in a person's *neo-assemblage*, discussing these findings alongside self-

tracking sociology literature on the sociomaterialist digital assemblage concept and concerns of agency and structural power.

8.6.1   Collective knowledge

Ford (2015) suggested that collective knowledge only overlaps individual knowledge with other people. As an alternative perspective to explain these individual overlaps, *neo-assemblage theory analysis* maps in running activity can recast them through relations of exteriority between two or more individuals.

Ideas from one individual are conveyed either linguistically or non-linguistically in text, speech or embodied information to form new sense impressions in another individual. These new impressions would temporarily deterritorialise their assemblage whilst the other components in the person assemblage react and adjust to the new fainter sense-impression components as ideas. *Neo-assemblage theory analysis* mapping allows us to visualise the idea of collective knowledge but not necessarily as overlaps. Instead, the maps visualise collective knowledge as a network of interconnected relations of exteriority between individuals and instruments of recording such knowledge. Such instruments can be a diary or an online site where individuals can share knowledge. All knowledge is discrete to the individual as an arrangement of sense impressions within the mind. However, it could be socially coded within a stable social assemblage depending upon the individuals' social setting. *Neo-assemblage theory analysis* mapping visually helps an analyst understand how knowledge amongst a group of individuals relates to each other. It also provides an awareness of other components and their relations of exteriority as factors that can influence ideas concerning knowledge.

We can only be aware of and observe collective knowledge when an individual communicates with another individual either linguistically or non-linguistically. DeLanda has explained the act of conversation with verbal and non-verbal gestures as having deterritorialising and territorialising effects (DeLanda, 2016). DeLanda's (2006) third chapter on 'Persons and Networks' in *A New Philosophy of Society* describes interaction and performativity between individuals in a Goffmanesque social performance. The findings show such expressions and knowledge sharing in the run recordings and social media tools. Whilst there may be collections of shared

information, the idea of group knowledge can only exist with each person running assemblage when people engage in social situations. Instead of overlaps, overlapping can be re-imagined through the notion of the social assemblage in the participants, where, as a collective assemblage, the relations of exteriority across the components of the social assemblage interact in causal effects of learning and knowledge experiences. There were examples of sharing running knowledge between the participant and the researcher (as a runner) and retold experiences of linguistic and non-linguistic knowledge. *Neo-assemblage theory* analysis maps analyse and present this sharing through an individual's fluid, dynamic subpersonal components. The speech components of each person running assemblage joins in relations of exteriority.

8.6.2   An alternative perspective upon causation in information behaviour

The *neo-assemblage theory analysis* addresses Case and Given's (2016) noted difficulty determining causation. They find that phenomena within information seeking behaviour are not always evident to the researcher. So, it is difficult to "identify key factors and their likely sequences and interactions in the process of information seeking." (p. 185).

While *neo-assemblage theory analysis* maps are grounded in observed behaviours, the analysis of the relations of exteriority between components and their resulting causal effects provides insight into such processes in a non-linear fashion. By identifying stabilising and destabilising events, the maps can chart changes to the components of the assemblages and the emergent assemblage itself. The maps provide a mechanism for understanding ideas of multiple processes. *Neo-assemblage theory analysis* also deepens understanding by demonstrating a given process's complexity through the far-reaching effects of a small change to just one *relation of exteriority* between two components. Such a change has implications for all of the assemblage components and thus the assemblage itself. The complex maps, such as a person running with a smartwatch in an external environment, demonstrate the analytical possibilities of relations that can help visualise fundamental interactions between relevant components. The maps are not processual diagrams, so they do not have start and endpoints. The maps provide a new perspective on the idea of the process. The analyst or another researcher can view the maps and begin their analytical journey to

understand how a person interacts with a given object. The analytical mapping can also enhance understanding by providing a flat ontological outlook so that the human subject does not have to be the focus of analysis.

8.6.3   An alternative perspective on information and knowledge

Within the literature on information behaviour, defining the word information has been fraught with danger. Bates (2010), Case and Given (2016) and Ford (2015), for example, tend to favour drawing attention to the problem of defining information as a concept or phenomenon instead of providing a definition. Bates (2010) describes the importance of "information" to the fields that study it, which has given rise to a plethora of definitions without universal agreement. This lack of consensus has made information a "highly contested" term (2010, p. 2347). Ford (2015) asks his reader to critically engage with the word information, asking, "what is it not?" (Ford, 2015, p. 246). This question suggests that Bates' observation of the multiplicity of definitions remains current. Ford (2015) suggests that information can be "representational forms" (p. 11) and can also take non-linguistic forms in the environment that informs a person. Ford illustrates this point using meteorologists who look at cloud formations as information to understand and develop their knowledge of weather systems. Ford asks whether non-linguistic forms of information that humans internalise become "knowledge" (p. 246). This internalisation underscores one potential definition of information in contrast to knowledge. Knowledge is internal and intangible, whereas information is tangible. Case and Given (2016) state that "one of the problems of studying any phenomenon – or merely talking about a thing – is reaching an agreement on what to call it." (p. 55). Case and Given based their deliberately opaque definition of information as a "primitive concept" (p. 76) on Bateson (1972). For Bateson, information is "any difference that makes a difference to a conscious, human mind…whether originating from an external environment or the (psychologically) internal world" (Case & Given, 2016, p. 56). It suggests that any internalised form of information is not necessarily knowledge, and knowledge could be information. *Neo-assemblage theory analysis* maps demonstrate how something can join a person's mind assemblage and make a difference through its joining in relations of exteriority and the resulting causal effects that these relations can have upon the assemblage and its components.

What seems to be clear is that there is no universal definition for information in information behaviour literature. The findings of this research do not intend to provide a definition. However, a new perspective sees information in running activities as assemblages and components of assemblages that form relations of exteriority and have degrees of causal effects upon each other. The findings agree with the broader definitions of information in a field, by its admission, that cannot reach a consensus. Such a lack of consensus is not a negative statement. It reveals the depth of the field's human ontological and epistemological consideration of information. It reflects DeLanda's (2006) assertion that rejects the linguisticality of experience as a means of explaining reality. Instead, DeLanda focuses on the realist approach to the material and expressive properties of components in fluid relations of exteriority. What constitutes information cannot be truly defined. Therefore, the realist approach observes as many phenomena as possible described or considered as information but only within the context of the person assemblage or the social assemblage when a group of person assemblage*s* join in relations of exteriority.

The *neo-assemblage theory analysis* perspective sees information as a fluid concept perceived and considered through human senses. It perceives the external environment, external and internal embodied information and represented forms of information. The research questions asked about the types of information that the participants used in their running activity. Instead of suggesting what to call it, the research findings, through describing the complexity of information in the participants' leisure world, attempt to advance a visual analytical map that is ontologically flat. Such mapping moves away from attempts to give information and knowledge a universal definition. Instead, it provides a visual analytical template to address the idea of understanding assemblage components that inform or make a difference to a person assemblage's mind in a given setting. Having a person assemblage, a human, within the analysis situation calls the idea of knowledge as a distinctly human or sentient concept into play. Knowledge is related to developing a skill or piece of learning for a person, and it does not necessarily have to be expressed or understood intangible, represented linguistic forms.

Neo-assemblage theory analysis mapping of the joining and breaking of relations of exteriority reframes Case and Given's (2016) rejection of the idea that information

cannot exist "independently of a knowing mind" (p. 73). The *neo-assemblage* perspective only supports this stance to some extent. When an object is considered or perceived as information, it is an appraisal made by a "knowing mind" when considering a mind as a subpersonal component in an assemblage. The findings demonstrated how the components of a person running could understand visceral information through perception and cognition and perceive objects in the external reality of the person running assemblage. However, the object of perception still exists, whether as information or not, independent of a knowing mind. *Neo-assemblage theory* is a "mind independent reality" (DeLanda, 2016, p. 1). Therefore, *neo-assemblage* speculative realism also opens possibilities of an alternative conjecture of what an assembled object thought to be information is when perceived by a human mind. As illustrated in this discussion, it is the connection of the components of the human mind with another component or assemblage that the person assemblage considers to be information.

Neo-assemblage theory analysis can also contribute to a renewed understanding of what Raber (2003) questioned as the threshold moment that information becomes knowledge. Machlup (1983) also suggested that the liminality between information perception and knowledge acquisition occurred between receiving information from an external source and internal thought. Such explanations are linear and processual in their approach. *Neo-assemblage theory analysis* can help to explain the multiplicity of liminal moments. As a materially perceived entity by an individual, the idea of information makes a sense-impression upon that individual. The idea - the sense-impression – then forms a sense impression component of knowledge that resides in the subpersonal components of the individual. Relations of exteriority form these impressions with existing sense impressions (i.e., ideas) within the individual and relations with assemblages outside the individual. Through a *neo-assemblage theory* perspective, such causal effects suggest an alternative consideration of a linear process such as a liminal moment from perception to knowledge. *Neo-assemblage theory analysis* strengthens the idea of the complexity of how humans interact with objects or components of material and expressive properties that seem to inform them. A reassessment of such interaction through a joining in relations of exteriority is as follows. A person as a *neo-assemblage* acquires knowledge about their leisure

activity through external components in relations of exteriority. These relations of exteriority also reinforce their understanding and developing knowledge through the rearrangement of components in a given assemblage due to the causal effects of the new exterior relations.

The introduction of a new component mapped into an existing assemblage can assist in understanding such liminality between information and knowledge. The concept of information and knowledge are linguistic terms to understand how an individual and their subpersonal components interact with linguistic and non-linguistic entities. In *neo-assemblage theory analysis* mapping, those interactions understood through relations of exteriority provide an alternative lens in visualising and understanding how an individual learns and develops new ideas as internal knowledge and develops physical skills.

8.6.4   An alternative perspective on records

This section discusses the definition and understanding of a record primarily found in archival thought and compares it with a *neo-assemblage theory analysis* perspective of a record. The concepts of information, records, and knowledge within the analytical findings were not distinct, and this was not an imprecision of terms. The *neo-assemblage theory analysis* maps showed that the three terms should not have prescriptive descriptions when considered assemblages and components. This lack of precise terminology reinforces DeLanda's position against the difficulties that the "linguisticality of experience" presents when understanding phenomena. So far, the discussion has solely focussed upon the *neo-assemblage theory* perspective of what a record is. The following section will examine the accepted linguistic terminology of a record, which assists the discussion in providing contrast against a *neo-assemblage theory analysis* perspective of a *record of a run*.

Revisiting Yeo's (2018) recent discussion on the definition of data, information and records in sociomaterialist culture in section 8.5.7, Yeo has raised the question of a fifth paradigm shift toward information in society as the latest democratising shift and its impact on the archival profession and society. Yeo (2018) responds to Cook's (2013) four Kuhnian paradigmatic shifts of archival science, which saw archives move from an instrument of accountability for government and institutions to the fourth paradigm

of community. The community paradigm is a notable shift towards democratising archival work away from the institution. Yeo suggests the fifth paradigm of information in a society where he sees information blurring with the notion of a record. The democratisation has taken one step further. Yeo suggests that the professional recordkeeper and their skills are at risk of being lost in a hyper-democratised information society where everyone can create and use information. However, this fifth paradigm shift raises a question over what, precisely, is information and what is a record before offering any defence of the relevance of the recordkeeping profession. The Society of American Archivists (2021c) (SAA) has five definitions of record in its noun form. Its first definition is of interest, "data or information stored on a medium and used as an extension of human memory or to support accountability" (Society of American Archivists, 2021c).

Let us first consider this definition with *neo-assemblage theory* conceptualisations of a record. The findings showed a *record of a run* used for personal reflection related to the person running's *reason to run* and their planning and, in the longer term, as a tangible representation to aid memory. Within the discussion of information from an information behaviour perspective, we saw that any attempt at a definition has been difficult. A materialist, object-orientated approach explains the *neo-assemblage theory* conceptualisation of represented and embodied forms of information based on sensory perception. Within this perspective, the idea of information is only a live concept when considering such a material object or perception amongst the cognitive subpersonal components of a person running and potential other sentient beings. However, the definition of a record here demonstrates that a record is either datum or materially inscribed information (whether language written onto paper or binary code inscribed onto a hard drive disk). The SAA definition suggests that a record is a represented, recorded, tangible form of information that aids human memory. In effect, the idea of a record is a tangible assemblage attached to a person running assemblage as a component to assist the subpersonal components that concern the concept of memory.

Similarly, within SAA definitions (Society of American Archivists, 2021a), data are "facts, ideas, or discrete pieces of information" that are "medium independent" and "intangible" until made tangible (to a person assemblage) in a recorded form. Data are

a raw form that has not been interpreted and needs interpretation to produce meaning. In its intangibility, the definition suggests that a "fact" or an "idea" is not necessarily recorded and does not have to have a medium attached to it. Data presented, for example, on a piece of paper may be similar to data presented on a computer screen. The medium is not relevant. Similar issues of tangibility apply to the SAA definition of "information" (Society of American Archivists, 2021b): "a collection of data, ideas, thoughts, or memories. The meaningful portion of a signal, as distinguished from noise".

Information seems to be a collection of data of seemingly complicated, intangible "ideas, thoughts, or memories" which reside within human minds that may well be committed to a medium. It would seem that information within archival thought has some form of meaning as an aggregate of data. Information can take the form of "words, sounds, images, and formulas [sic]". However, like data, information does not seem tangible "until it has been recorded in some medium." The SAA dictionary notes that information remains intangible until recorded. The SAA definitions suggest a declarative moment where a human adjudges information recorded onto a tangible medium to be called a record.

From a realist *neo-assemblage theory* perspective, an analysis of the components and relations that have changed in a person-information object assemblage could help understand the designation of this special status of this information type. *Neo-assemblage theory* offers an alternative conception of information as a "collection of data, ideas, thoughts, or memories" made tangible through recordings, such as running information in a diary or an online third party platform. The *neo-assemblage theory* approach can help to understand the components concerning a record. The approach can present a conceptual framework on how the components of a record have causal effects on the components of a person assemblage. Such effects include aiding a person's memory or using the records to analyse and review records of their run with behaviour that accorded with their *reason to run*. Nevertheless, the *neo-assemblage theory* consideration does not just encompass the documentary, fixed, tangible idea of the record concerning a human assemblage.

Moving away from documentary records, Douglas (2020) has looked to other forms of records that extend human memory in researching bereavement and body marking (tattoos) that commemorate loved ones in a permanent marking on a body. Douglas' study has much potential to be reconceptualised using *neo-assemblage theory* thinking. A record is a part of the entire person assemblage. The tattoo's tangible personal subcomponents as a record on the skin can affect cognitive subcomponents. Relations of exteriority explain the tattoo's effect on the person.

There is a minimal movement of archival scholars questioning the very nature of the idea of the record, which is moving away from the digital and analogue questions raised in the literature review. These findings certainly support the complexity of the *record of a run* concept, but it does not necessarily place the record at the centre of the debate. Instead, the findings have shown various dependents and human interactions with a record that assembles through time. The varying interactions change the view of the object considered a record.

A record becomes the focus of activity in personal archival science, a material extension of human memory. A *neo-assemblage theory* conceptualisation widens the definition and conceptualisation. In this view, a record is a piece of information (however defined) that is made tangible to a person assemblage but only when assembled with a person assemblage does it have some effect. Within information behaviour, the definition of information could be "any difference that makes a difference" (Case & Given, 2016, p. 73). The concept of a record from archival science is undoubtedly a form of information that can make a difference to a person due to the archival definition insisting upon a tangible form in a recorded medium. Returning to *neo-assemblage theory* thought, whether something is a piece of information or a record of knowledge, what is a new consideration is the conceptual framework that *neo-assemblage theory* affords. The perspective renews how personal data, information or records and archives, materially the same, are created, used and valued over time.

The analytical possibilities of the assemblage can contribute to a discussion of physical information and, by extension, in light of this discussion, of records. At the appropriate *level of scale*, the *neo-assemblage theory* constructions can reveal the complexity of

the relationships of the components in the information assemblages. This revelation can support an enhanced understanding of information composition engaged in assemblages with and without humans. Within archives and recordkeeping thought, looking at information on a stored medium consolidates its focus of activity, something that information behaviour does not where a broad definition of information and data can be considered an object of study. Focusing on the tangible could provide a new research area between information behaviour and personal archive studies.

8.6.4.1 A new perspective on personal records creation

For personal archival science (Hobbs, 2001; Fisher, 2009), *neo-assemblage theory* conceptualisations present a model that addresses the point of creation of a record. The conceptualisation provides an understanding of the interrelated, assembled components of creating a record. *Neo-assemblage theory analysis* mapping incorporates personal subcomponents concerning the run and records creation context. Such a model can be compared to a traditional concept of the record and the interactions of a person with a record, whether it is the person who has created it or somebody else viewing it. This model is a new contribution to the study of personal (digital) archives. This research has found that creating records is a part of everyday life in the activities of *those who run*. Over time, and only for some participants, creating a *record of a run* and its subsequent storage and access accrues personal historical significance. The conceptual findings agree with Fisher's (2009) first phase of personal archive theory, which proposes that the records creation stage does not have administrative order as seen in organisational recordkeeping. The conceptual findings contribute to an understanding of the creation and the administrative processes of the records of individuals in everyday life. The participants also understood records as data and information. Within digital online environments, the *records of a run* had dynamic and social uses. Combined with the continuing changes in assemblages either of the person running or the material components of a record in either a physical or digital environment, a record was not a static entity. When used as a reflective tool or an aide-memoire, the *record of a run* has fluid relations with a person running at different times.

Should a record then be transferred to a cultural archival institution, for whatever reason, the interaction of that person entity (as an archivist) processing the records

would not enter into relations of exteriority in the way that the original creator of the recorded information had and potentially could use it. This *neo-assemblage theory* approach disapplies prescriptive, procedural archival interventions in personal archives. Institutional archival custody will not have the same relations of exteriority and the effects on personal values that the participants demonstrated with their records, such as a sense of achievement, personal history and emotion. A *neo-assemblage theory* approach provides a sense of agency in the concept of personal records. When removed from one personal assemblage into an institutional archival assemblage, it ruptures the records' potential relative effects upon an individual. There is also a *neo-assemblage theory* explanation for why the participants could only see the records relevant to themselves and their lives. Only some participants found their *records of a run* an important, special tangible assemblage in constructing their identity.

8.6.4.2 A new perspective on a special type of information

In his documentation perspective, Buckland (1991) could be considered a conceptual bridge, an entry point between archival science and information behaviour. Buckland (1991) has conceptualised information in three ways, information-as-thing, information-as-knowledge and information-as-process. Information-as-thing refers to objects that inform, information-as-knowledge refers to the use of information communicated in information-as-process wherein the activity of a person being informed through a communicative means (i.e., perception) sees the effect of a change in somebody's knowledge. What Buckland proposed applies to both fields, especially in looking at the ongoing use of information (information-as-process) and experience of information in the findings from using information during a run through to levels of reflection of the represented information generated from such physical activity.

Buckland (1991) opined that "if everything is information, then being information is nothing special" (p. 59). Given the difficulty in the wide-ranging exploration of what information is, archival science already has administrative mechanisms and linguistic tools to designate types of information with a special criterion in conceptualising information stored on various media as a record. However, why does information have to be special? If it is a ubiquitous commodity, as an essential human need, such as food (Ford, 2015), it is perhaps a commodity that does not have a special place in a person

assemblage. Probably because of its ubiquitous nature, there is a need to designate some types of information special. When the thought of *records of a run* as special types of information was to be hypothetically withdrawn from or denied to a person, three male participants who had been running for several years revealed the value of personal records. This special information formed a part of their identity. Records as special information made achievements tangible for other participants, such as getting fitter or attaining other running goals. The findings have shown that what makes information special to the participants is subjective. It is not that "being information is nothing special", but the causal effects on a person assemblage that gives the information object its personal value or consideration of it as special information. For archivists, the designation of such a special value is not a radical or novel suggestion. However, in information behaviour, applying value to represented, tangible forms of information is a novel proposition. The definition of information remains hard to attempt. Perhaps researching special information as a tangible record stored as information on an accessible medium within personal information collections could become a specific focus within information behaviour work. Using *neo-assemblage theory analysis* conceptualisations could also advance such understandings of records as a special type of information. Suppose the information is special to people, whether as a reflective tool related to a running goal or part of their personal history and identity, as a higher information related-need. In that case, there needs to be further consideration of digital *records of a run* that rely upon third-party infrastructure.

8.6.5   An alternative perspective for sociomaterialism

Within *neo-assemblage theory analysis*, the *record of a run* is a territorialised component. It territorialises a person's identity as a running or their general self-worth. Deterritorialisation describes any changes to such a stable assemblage. For example, the analysis map that illustrated an infrastructure failure demonstrated the temporary deterritorialising effects a failure could have upon the person-digital records *neo-assemblage*. The representation of a total loss of infrastructure and a runner's running records allows a new perspective of the causal effects of such loss. Records of other runners can also have deterritorialising effects, such as pressure through comparison or even breaking a running assemblage by avoiding social running records.

However, offline, digital records have a more territorialising effect upon a runner's information assemblage due to a smaller assemblage and a closer control and relationship of the records by the individual. There was a territorialising effect in revisiting a record between two points in time. Over very long periods, a record can cause a person to have an emotional reaction to it, such as nostalgia or a fond remembrance of positive memories related to their running. *Neo-assemblage theory analysis* maps demonstrate the emotional response in a person and record assemblage. It is a new perspective on the records management idea concerning the change of value in a record over time (Shepherd and Yeo, 2001). However, the value of a personal record or many personal records as personal information collected over time held by third parties concerns the construction of self-identity as runners.

Lupton (2014) saw a sociological gap in the quantified self HCI (human-computer interaction) literature. As a result of her research, Lupton identified the main themes as agency, a hybrid of human and technology and a sociality against various structural surveillance concerns.

Such structural intrusion or interference concerns are related to states, governmental institutions and private organisations such as Facebook and, for runners, Strava. Lupton (Lupton & Watson, 2020) has since advanced this with the idea of a new materialist more-than-human theory and digital assemblages. However, these are still anthropocentric ways of thinking. The *neo-assemblage theory* lens has the potential to explore components of assemblages irrespective of whether a person is in the assemblage. For example, the digital *records of a run* are in a material sense without the person assemblage before forming relations of exteriority with it. *Neo-assemblage theory* can centre upon a component in an assemblage that does not have to be a human being. For ease of discussion, including the person assemblages at the centre or close to the centre of discussion will better compare the findings and self-tracking sociology literature.

It was Lupton's (2016) introduction of the concept of a sociomaterialist "digital assemblage" (pp. 40, 70) combining material elements in a situation to explain an overall hybrid experience between humans and technology that provided the catalyst for *neo-assemblage theory* thinking. Lupton described these imagined assemblages'

fluid and changing nature to show the fleeting relationship between technologies and humans. This study developed a *neo-assemblage theory* approach and novel analytical method based on DeLanda's (2016) *Assemblage Theory*. Such an analytical approach went beyond merely the human and the technological. It also included environmental aspects and the scope for examination of the components of such assemblages, including the subpersonal components of a person assemblage. Within the *neo-assemblage theory analysis*, the assemblages were discrete and provided agency to the participants as each person running assemblage demonstrated heterogeneity. Every assemblage is heterogeneous in its components, as would the resulting linguistic assemblages in the data through the devices included in the device-person assemblage. Assemblage representation can be a robust device for representing agency should the researcher wish to centre the human in assemblages. It can also be an analytical vehicle for reconceptualising approaches concerning structural power.

8.6.6   An alternative perspective on structural power

Neo-assemblage theory analysis looks at the components of the human-technology assemblage to provide a conceptual basis for understanding causal relations between the components in an ontologically flat, non-hierarchical consideration. The *neo-assemblage theory analysis* findings of the participants' assemblage maps can present the human components of sense impressions and ideas and the effects of the assemblage components around them. As DeLanda argues, the immediate jump from the individual as a micro entity to data politics and power as macro entities such as states and organisations does not account for complexities roughly comparable to the meso level (Ruckenstein and Pantzar, 2017).

The participants preferred to focus on their activities and people in their networks in "mediated sociality" using embodied and technological sensors in their human experience (Lomborg, Thylstrup & Schwartz, 2018, p. 15). Pink et al. (2017) describe this mediated hybrid as technoanthropology, which mixes the human and the device as a part of the fluid assemblage of human experience. *Neo-assemblage theory* would contest anthropocentrism. Instead, it examines the assemblage, relationships, causal effects and changes in an ontologically flat perspective instead of appending technology to the human in a structural power struggle between the micro and the macro, the person and the third party commercial organisation.

That is not to exclude components of a human body assemblage; the human is not always at the centre. Similarly, the human body or a commercial organisation is not something to be made total or essential but as the particular assemblage under consideration and how the components interact then in double determination. The assemblage can help consider potential directions of the human body and technology relations and empirical observation. Greiner (2014) has noted that brain function has been "outsourced" (p. 301) to servers. In a *neo-assemblage theory* approach, this would suggest a more comprehensive human body-technology type assemblage where the person would never see the server itself but only indirectly through the infrastructure that provides the information to them. Greiner's suggestion also leans towards archival thought where digital records and their infrastructure are twenty-first-century aide-memoire. *Neo-assemblage theory* is a lens that can help frame lived experience research from a renewed perspective of how technology, people, and other elements assemble and form relations of exteriority that jostle for causal effect upon the emergent assemblage and the effects that an emergent assemblage has upon the components.

The findings show that assemblages formed should not be disentangled as considered as wholes in opposition or whole entities that have total effects upon other whole entities. They are fluid, dynamic and messy. Just focussing on the represented information aspects (the linguistic components) does not give a complete picture, which is an impossible task given the potential of the multiplicity of components' relations to exteriority. *Neo-assemblage theory* conceptualisations are not an argument for holism as a contextual explanation (Polkinghorne & Given, 2021) but for a broader picture of the assemblage involved in a complex situation. The findings demonstrate the complexity of the ongoing running process and the forms of information encountered, whether under the person's control or through a third party and then its continuation via various assembled sense impressions of a person entity in another situation.

Taking a solely human-centred approach with *neo-assemblage theory*, the human has the apparent power to form such assemblage. However, other components in the assemblages are also on their potential paths over time, which could cause a deterritorialising effect on the emergent assemblage. Due to the speculative realism

of *neo-assemblage theory analysis* maps, they can demonstrate the potential effects of destabilising a human-technological assemblage. It is these alternative possibilities that enhance Lupton's digital assemblages. Such a possible occurrence was the loss of personal information about the person held by a third party, which would have an emotional effect on some participants, but it must be stressed, not all. There were also the observed effects where the information held by third parties that are considered a part of their personal history is beyond their immediate control. To mitigate this control, some chose to have smaller assemblages concerning their running information. However, others were unaware of the reliance on what they considered to be their personal history in a recorded form with another organisation. The *neo-assemblage theory analysis* conceptualisation of a *record of a run* and its allied components of technical infrastructure reveals the complexity of the idea of a record and the attached effects that it can have upon an individual's knowledge base for running and their identity. The *neo-assemblage theory analysis* conceptualisation of runners and their information recasts sociological thought of structural power and micro, meso and macro levels into a flat ontology, demonstrating the complexity of *neo-assemblage* components. The components are working continuous, fluid relations of exteriority, working in a stable, territorialised state. However, it can be liable to fluctuations of deterritorialising when some of the components change and their resulting causal effects, whether observed or speculated.

8.6.7   Concluding remarks

This research proposes a new ontological and epistemological approach to information, records and human interaction.

Using *neo-assemblage theory* is not entirely novel. However, as an analytical mapping tool to explain information concepts, archival and self-tracking sociology from an interconnected perspective is a new perspective. The *neo-assemblage theory* approach offers plausible insights and explanations of social and material complexities. Within information behaviour, *neo-assemblage theory* provides a new view to consider. Case and Given (2016) remind their reader that human information behaviour "is not so simple. It is neither straightforward nor typically complete; it is more like a series of interruptions, punctuated by other interruptions" (p. 362).

Constant interruptions are similar to *neo-assemblage theory* processes of deterritorialisation, territorialisation, coding and decoding through fluid relations of exteriority. The *neo-assemblage theory analysis* maps offer a framework to address concurrent, recurrent connections between the components resulting in subtle or noticeable changes in identified assemblages from empirical research. The use of *neo-assemblage* theory offers an analytical tool to analyse the "not so simple", that is, the complexity of human information behaviour. It also provides a mechanism for understanding the complexity of components. It can explain how humans consider material information and records through perception and thought as interacting subpersonal components.

Chapter 9. Conclusion.

9.1   Introduction

This thesis has developed an understanding of how people use and value information related to their running activities across time. The research used qualitative *situational analysis* derived from *grounded theory*. A novel *neo-assemblage theory analysis* complemented the *situational analysis* approach. The *situational analysis* enabled the researcher to immerse themselves in collected data to produce interpreted concepts and issues, then for a deeper relational analysis between the interpreted concepts and issues. This analysis resulted in an understanding conveyed in the descriptive findings. The findings described the types of information used by people during and after a run and demonstrated that a person's *reason to run* influenced different *types of runs*.

This thesis contributes to understanding the use and value of technologically assisted embodied experiences amongst humans. Research has found that humans use and value technologically mediated information about themselves to varying degrees. In understanding such use, this research makes a practical methodological contribution by developing an audio-visual data collection method using a 360-degree camera. It also evaluates an analytical method of a virtual reality headset within the *grounded theory* and *situational analysis*. This thesis makes a theoretical-methodological contribution in combining constructivist and speculative realist methods. The research also contributes to an academic understanding of the concepts of information, records and knowledge, first understood through constructivist *situational analysis*, which was reframed then through a speculative realist *neo-assemblage theory* perspective. The *neo-assemblage theory analysis* provides a visual analytical framework to renew the view of information, records and knowledge into a flat ontological, speculative realist understanding of the relationship between sensory perceptions and objects that inform a person. Such sensory perceptions and objects reinforce a person's cognitive beliefs and ideas about developing their running knowledge.

This chapter will restate the main findings of this research against the research questions posed after the literature review. Section 9.2 addresses responses to the

five research questions. Section 9.3 explains the contribution of this research to new knowledge about how people use information and records in everyday life and their implications. Section 9.4 explains the theoretical contribution of *neo-assemblage theory analysis*. Section 9.5 states the methodological contribution, and section 9.6 describes method contributions. Section 9.7 describes the implications of this research for archival professionals and people who self-track. The implications concern firstly researchers of information and records, secondly recordkeeping and archival practitioners and finally, members of the public that habitually create, store and use information about themselves. The chapter concludes with the researcher's recommendations for further research in 9.8.

9.2   Addressing research questions

This section will evaluate the findings against the research questions.

9.2.1   RQ1. What types of embodied and represented information do runners collect and use when running?

The two main types of information runners used were embodied and represented information. Collect is not the right word for embodied information; encountered would be more appropriate. The term record is also more suitable than collected when related to represented information because the term collected has connotations of deliberate management and curation. The participants encountered and recorded it whilst running rather than collecting it. The information participants used varied in volume depending on the *type of run* and its reasons.

Types of embodied information observed in the findings were sensory, namely aural, visual, haptic and visceral information. Types of represented information were metrics such as pace, time, distance and to a lesser extent, heart rate and cadence. The metrics were recorded and transferred from their devices into an accessible represented form, either physically in diaries, digitally in spreadsheets or digitally online through third-party applications. Irrespective of media, most participants used represented information to reflect upon their previous run, a series of weekly or monthly recordings, or plan their next run. Some participants would encounter their past running records outside of their immediate running goals. Such an encounter would let them reflect on records more personally with nostalgia. This nostalgic encounter

was not a common occurrence found only amongst those with competitive *reasons to run* and run for a considerable time. These uses depended on the *type of runner* and their reason for running at the activity time.

9.2.2 RQ2. In what ways do runners consider their embodied and represented running information valuable?

Embodied information encountered and experienced whilst running became valuable to the person's running knowledge base. The value of the information lies, firstly, when running to complete the run that aligns with their *type of run* and *reason to run*. Secondly, there is value in learning about their embodied information which they may use on their next run.

The information from the runners' watches was primarily valuable concerning the moment of the run. Device derived information reassured them that their embodied knowledge about the run was correct about the *type of run* they were undertaking. The represented information from the run also extended into a time after the activity itself. The person running undertook valuable personal reflection about the run and their performance within these times. The participants generally valued the same types of represented information such as pace, distance and time about their *type of run*. Those with competitive *reasons to run* collected more data over extended periods and analysed them more than those that did not.

Online socialising was valuable for personal social identity and a personal sense of achievement within online running platforms. However, online socialising was more valuable for participants when used by runners with competitive *reasons to run*, such as club runners. They had more extensive online social connections using running specific social media sites such as Strava. A few participants also exhibited a sense of personal history within their *records of a run*, which they would refer to synonymously as the third party platform name.

9.2.3 RQ3. To what extent are runners aware of third parties in relation to their represented running information?

Information about running was generally stored with third parties to manage. The significant third parties that appeared in the research were Garmin, Suunto, Strava, and Huawei. The organisations' names were also synonymous with the online platforms

they used to store and access their personal running information, which the participants considered part of their personal property. Upon further questioning, most participants knew that they did not fully control their online personal information about their running and socialising. Some participants acknowledged that it was a price to be able to go online and socialise and use the services. Three participants did take steps to control their personal running information.

9.2.4 RQ4. To what extent are runners concerned about the long-term existence of their represented running information?

There was a limited interest amongst the participants in ensuring that they intentionally managed their information over a long time. The information was more for surrounding the moment of the run, linked to an immediate sense of achievement related to their reasons for a run. The participants did not seem to think about their information with long-term availability implications as those in the archival profession would. For example, they did not consider the implications of digital access issues over a significant time. Amongst a small number that had some interest in their records over a much more extended time, such running information was considered a part of their personal history. There was a concern expressed about a hypothetical situation in which their running information may not be accessible among those participants. Only one participant exhibited deliberate intent to ensure their digital running information was available to them for over three decades.

9.2.5 RQ5. Can the concept of the assemblage give an overarching alternative explanation of the interconnected complexity and contexts of people, technology and information environments in the situation of running?

Using DeLanda's *neo-assemblage theory*, this research provided an alternative lens to understand the complexity through *neo-assemblage theory analysis* mapping. The mapping provided a new lens to illustrate the complex relationships, through relations of exteriority of assemblage components, between people, technology and information environments whilst running.

Neo-assemblage theory analysis mapping can demonstrate runners' concurrent uses of information. For example, it can show uses of both represented and embodied forms of information during a run, including embodied information from other people

running. The mapping of the relationship of uses led to understanding how these types of information were valuable to the participants to help them perform the run they set out to achieve.

The *neo-assemblage theory analysis* maps visibly demonstrate the link with wearable devices, the information created on a run and the participants' reflections of their runs. Participants made recordings of their runs through their running watches. Some without running watches made conscious efforts to remember certain information about their running activity when they had finished it. Some without running watches even recorded information about their run in a diary. *Neo-assemblage theory analysis* mapping considered this transfer of information from various forms into stable recording media.

Neo-assemblage theory analysis mapping demonstrated how device information could affect the person running emotionally. For example, participants felt reassurance or pressure when considering information on a running watch. *Neo-assemblage theory* mapping gave an illustrative mechanism to understand the complexity of the number of assembled components required to consider information and the central relations of exteriority between components to derive some form of emotion whilst running.

An awareness of third party involvement with participants' represented information was evident in the name of a device manufacturer being synonymous with their running watch or the online platform they used to review their running data. The *neo-assemblage theory analysis* maps visualise these as devices and go beyond the participants' view of third party involvement by illustrating the presence of third party infrastructure in the assemblages of their online digital information.

Away from a run, participants used a *record of a run* as a form of represented information to either reflect upon their running activity or plan their next run. They also used *records of a run* to socialise online but only if the record was digital and on a third-party platform. *Neo-assemblage theory analysis* mapping demonstrated the interconnected nature of the represented information and the runner, whether it was their personal information or social information.

The *records of a run* were personally valuable depending on the type of person running and their reason for running. For most participants, the *records of a run* were not valuable over long periods. However, the records were valued by participants because they represented a short-term sense of achievement. For the small number of participants who highly valued their records, they imbued a sense of personal history in the records. Although they placed value on information, most of the participants did not take any intentional actions concerning the management of their records, including most of those who found a sense of personal history in the records stored and managed by third parties. The *neo-assemblage theory analysis* maps visualise the strength of these emotions and attachments. The mapping also allows for speculation and could illustrate how, in *neo-assemblage theory* thinking, breaking the relationships between *records of a run* as assemblage components and a runner, again an assemblage of components, can have detrimental effects. The speculative mapping reinforced how some forms of recorded information can be crucial to a person.

9.3   Knowledge contributions

This research contributes new observations and analyses of the records creation process concerning the personal collection of records in archival science. It contributes an in-depth understanding right from the moment of record creation in an activity to its short-term use and storage and onto longer-term uses. This research draws together two fields – information behaviour scholarship and archival science scholarship – which are rarely linked together but have many areas in which they overlap concerning the consideration of information and records. This research examines the moment and context of creating information and records and understands how participants use records across time. To the author's knowledge, this is the first study that has been conducted within the immediate context of records creation in everyday life in archival science to understand the dynamic, fluid nature of information use and value.

This research is one of the first LIS studies to investigate the topic of running, building upon the work of a few authors, most notably Gorichanaz (Gorichanaz, 2015; 2018; Hartel, Cox, & Griffin, 2016). This work develops a data collection method of the running experience from Gorichanaz's (2015) autophenomenological study, where he used a voice recorder. This study uses a 360-degree video audio-visual recording

between a researcher and participants. It collected data from the runs of four participants to capture the experience of running. The research captured data related to the embodied experience of running. However, it also captured the point at which information is created and subsequently explored how they use it and value it with participants.

This research contributes new knowledge about how people running use information. Researchers in the fields of leisure studies, digital sociology, sociology of running, health studies, HCI and information behaviour have been interested in runners' data, their devices and use (Esmonde, 2020; Hull, 2018; Janssen, Scheerder, Thibault, Brombacher, & Vos, 2017; Karahanoğlu, Gouveia, Reenalda, & Ludden, 2021; Kuru, 2016; McKinney, Cox, & Sbaffi, 2019; Pobiruchin, Suledar, Zowalla, & Wiesner, 2017; Temir, O'Kane, Marshall, & Blandford, 2016; Wiesner, Zowalla, Suledar, Westers, & Pobiruchin, 2018). Fewer researchers have been interested in how their embodied experiences are a part of the information experience (Allen Collinson, 2008; Allen Collinson & Hockey, 2011; Cox, Griffin, & Hartel, 2017; Cox, 2018). However, what they have not visually captured or examined before is the actual process in 360-degree audio-visual capture of how people create records whilst running and how they interact with their environment through their senses. This work builds an understanding of how people running use embodied and device derived information together and how the two forms of information have causal effects. Instead of examining specific components related to human activity and information in running activity, it concentrated on how running data and embodied sensory information work together. This synthesis has been analysed through *neo-assemblage theory analysis* to present the complexity of a given situation in running activities.

The second contribution concerns new knowledge about how people running create information as records and how they use it after the run. The use ranges from short to long, such as throughout their lifetime. There was nothing published on this before in archival science. This research provides a deep understanding of how and why people use, value and retain information as personal archives over a long time from the point at which it was created or encountered. This work builds upon a relatively new field in archival science concerning personal digital archives. This field is an extension of personal archives first published in 1996 (Dalgleish, 1996; McKemmish,

1996; Powell, 1996; Southcott, André, & Thomas, 1996) and explored further by Hobbs (2001). Hobbs (2001), Marshall (2007) and Tschan (2002) are clear that it is the creator of the record that decides on the value of a record. This research has demonstrated how personal records creators determine value by charting the course of records at the point of creation in data collection and viewing how they form following values over time through further interviews and analysis. This charting of records creation and use is a novel exploration of the creation and use of records within a personal context.

This research also advances Fisher's (2009) personal archive theory and Douglas' (2018, 2019) work on personal attachment and reverence for people doing archival, curatorial work with records in personal contexts. This research offers a further understanding of personal record creation contexts better. It widens the scope of what a record is, and this research also provides a mechanism to analyse such contexts with *neo-assemblage theory analysis*. This analysis considers the record in a material sense and through the emotional and cognitive association with the person who creates and uses it. Sinn and Syn (2014) noted that people who use digital materials more for the short term expressed a sense of sadness if their online records were lost. This research provides an analytical tool that can map what losing records means in material terms and speculate upon the effects of the loss upon a person. As a result, we have a new contribution of useful insight into how records creation, use and value within the activity of running, which is transferable to other studies of records creation and long-term use.

The implications of the complementary analyses of *situational analysis* and *neo-assemblage theory analysis* allow a researcher to consider both constructivist and speculative realist approaches. It will enable the researcher to concentrate upon analyses of phenomena through language and think how, through neo-assemblages, language is but one component that contributes to the emergence of an assemblage entity. As a result, the pragmatic aim of understanding experience and a contingent, ahistorical truth can be attempted with a new methodology.

9.3.1 Implications for researchers in information behaviour

Within information behaviour, contexts of information creation have already been well-researched. However, an implication of the 360-degree camera data collection method can capture a wider contextual lens of the observed phenomena surrounding information creation and provide researchers with potential new opportunities for further insight.

Through the data collection and analytical method, there is new knowledge of how runners use all the available types of information they interact with during a run. Whilst cognitive processes are not observable, the resulting thought processes analysed during the running recordings have revealed how people draw on knowledge of past sensory information experienced during runs to negotiate their current run. Through analysis, research has contributed to the idea that information used during a run depends upon the type of a run derived from the person's reasons for a run, whether it is for competitive achievement or personal fitness goals. This *type of run* then dictates the level of represented information used from devices.

The implications of the 360-degree camera method (Pretlove, Cox, Sbaffi & Hopfgartner, 2021) have already attracted academic attention in geography and virtual reality (Bos, 2021). Research that requires observation and an understanding of a chosen research situation that the researcher can re-immerse themselves into through virtual reality technology can use 360-degree audio-visual capture.

9.4 Neo-assemblage theory analysis as a theoretical contribution

This study fully develops a diagrammatic conceptualisation of *neo-assemblage theory analysis*. This new analytical method analysed both observed phenomena and as a tool to provide causal explanations that unobserved phenomena such as thoughts, ideas, and knowledge can have upon the resulting observed phenomena. This research is the first known that develops an illustrative method and demonstrated its analytical potential using empirical data about information in running activities.

The theoretical contribution provides new knowledge in new considerations of the term information and records in running activities over time using *neo-assemblage theory* thinking. The *assemblage theory* approach derived from Deleuze had already received limited attention within information studies thinking. Day and Lau (2010)

draw attention to the idea of machinic assemblages as a helpful construct for analysis. Building upon these machinic assemblages, Faucher (2014) used *assemblage theory* as an approach to philosophically examine the idea of the document. Gerolami (2015) used assemblages to explore the library as a space of social justice (Gerolami, 2015). Hondros (2016) analysed the internet for video distribution with assemblages. Bates, Goodale, Lin & Andrews (2019) draw upon assemblage thought in their critical socio-material examination of archived weather records through data journeys. Within archival science, Brilmyer (2018) used the assemblage as a critical lens for the politics of disability (Brilmyer, 2018). Frohmann (2008) used *assemblage theory* for ethical and ontological consideration of documents. This research builds upon the small yet growing assemblage by providing a visual analytical method using DeLanda's consolidation of *assemblage theory* as germinated by Deleuze and Guattari. The application of *assemblage theory* is using DeLanda's iteration of *assemblage theory* that was developed, in part, to explain a new critical lens on society. The adopted approach provides a visual analysis of DeLanda's critical lens, which is unknown in existing scholarship with library and information science and archival science. It provides a visual analytical method that other researchers can use and follow to understand the context of a particular person, group or object, depending upon their description in an assemblage.

It is important because it offers a novel tool to convey complex relationships between people, technology and information. It brings *neo-assemblage theory* into information behaviour, archival science and digital sociology, allowing a cross-disciplinary theoretical explanation. The theoretical contribution produces a methodical framework that can enable researchers to critically carry out their *neo-assemblage theory analysis* to evaluate a research situation. This study gives the *neo-assemblage theory analysis* a more comprehensive theoretical application. It is different from other uses of Deleuze's *assemblage theory* because it adopts DeLanda's *neo-assemblage theory* and provides a visual template to understand the complexity between people, technology, and information. It is a significant theoretical development because it allows for a new analytical method and perspective to understand information's ontological status in reality. The development also contributes to human orientated epistemology through its double determination of

causal effect. When questioning what information is, the concept of a record is an inscribed piece of information onto a medium is questioned. This thinking challenges the notions of archival processes surrounding records being objects that ought to be managed instead of described as multifaceted components in a complex, fluid, interconnected assemblage. The *neo-assemblage theory analysis* mapping method described in the methodology gives researchers a methodological basis to make their own *neo-assemblage theory analysis* maps. It can also allow researchers to question and challenge the basis of the analytical method due to the transparency of its philosophical origins provided in this thesis.

9.5   Methodological contribution

This research contributes an innovative methodology under the pragmatic paradigm that has used a pluralist constructivist theory/methods package (*situational analysis*) and a speculative realist ontology (*neo-assemblage theory analysis*). *Neo-assemblage theory* rejects the linguisticality of experience, but the research has shown that the approach can work alongside a linguistic constructivist methodology because the researcher interprets and conveys the data through language. *Neo-assemblage theory analysis* challenges the constructivist idea "that perception is intrinsically linguistic with the ontological assumption that only the contents of experience exists, this position leads to a form of social essentialism." (DeLanda, 2006, p. 46). Having first analysed the collected data from a constructivist viewpoint that the researcher was most familiar with, the use of *neo-assemblage theory analysis* has enabled the researcher to keep such a human linguistic ontology in check with an alternative decentring human perspective. The philosophical contribution is that it integrates linguistic entities into a wider speculative realist ontological consideration.

9.6   Method contribution

This research contributes to audio-visual data collection and analysis methods using a virtual reality headset.

There has been an increasing interest in visual methods, especially video recordings, to collect data within running (Cook, Shaw, & Simpson, 2016; Temir, O'Kane, Marshall, & Blandford, 2016). These use video recordings to collect data within running using a 180-degree camera to understand how people negotiated the external environment

and record how they used their device. There has also been participatory data collection in running activities with participants whilst asking them questions and taking field notes after the run with participants (Esmonde, 2020). There was no audio-visual recording in this publication.

This research into running took these audio-visual recordings and the participatory idea of running with a participant a step further by adding a 360-degree functionality for data analysis. This method allowed increased data collection of the audio and visual perceptions of the context of the run and the linguistic and non-linguistic actions of the participants. The method also allowed the researcher to participate more fully in the running activity with the participant. The researcher did not have to be concerned about directing the camera lens to an activity whilst asking the participants questions. The 360-degree capture allowed such observations in the immersive analysis stage. 360-degree capture also blended and advanced the nature of observation, participation and visibility of the researcher (Guest, Namey, & Mitchell, 2013) in an audio-visual method by allowing the researcher to observe and participate and reduce their visibility. A 360-degree camera is an early use of such a method within information behaviour research to study people who run (Pretlove, Cox, Sbaffi & Hopfgartner, 2021). A 360-degree camera has been used before as a method in "radical inclusion" activities in archives (Colegrove & Mikel, 2018) but not in a research activity that captures the various uses of different types of information.

For analysis, a virtual reality (VR) device was used to re-immerse into the situation of the recording as means of repeat immersions into the data. VR allowed observation through 360-degree interactive capture of how participants perceived embodied information and used represented information. VR devices are the first to be used for data collection in *situational analysis* and the developmental *neo-assemblage theory analysis*. As well as human geography (Bos, 2021; Cook, Shaw, & Simpson, 2016), there is potential to use this method in the novel field of data walking, which seeks to understand the idea of datafication in built environments (van Es & de Lange, 2020). Data can be collected and used for many users to analyse and experience a recorded 360 situation. This shared experience would allow a richer analysis through sharing the experience to understand everyday observations and observations that not each researcher observed.

9.7   Implications

This research has provided a glimpse into the various uses and value of different types of information over some time. The times range from the point of encountering and creation of information and its incorporation into a personal running knowledge base to a personal reflection of activity over thirty years since it occurred. The research findings also have implications for archive practitioners (9.7.1) and for people like the participants who self-track their physical activities (9.7.2).

9.7.1   Archival professionals

Neo-assemblage theory analysis mapping has practical implications for archival professionals. The mapping can help illustrate the context of a record of an individual and how they use it. This renewed perspective can help archivists working with personal archives to ask further questions about a record. A *neo-assemblage theory* visualisation could map questions surrounding a record that could help the archivist understand the record and its context better. Such questions could ask about the value and emotional relationship between a record and the creating individual and the person's means of access to the record. An example from this research is the *neo-assemblage theory analysis* map of a diary and the person-diary assemblage when a person interacts with it. The *neo-assemblage* can also represent an information ecosystem that affords the representation of a record in a digital environment to demonstrate the complexity of digital records. An example of this in the research is *neo-assemblage theory analysis maps* of the participants' records on Strava created on their devices and uploaded and accessed through their smartphones or other internet-connected devices. The *neo-assemblage theory* approach can also help conceptualise and visually articulate digital records' fragility and dependency. The *neo-assemblage theory analysis* map of the deterritorialised digital records assemblage with a speculated loss of records held by a third party demonstrates this fragility. The *neo-assemblage theory analysis* mapping approach can provide a visual understanding and alternative concentration toward the material nature of what humans label records.

9.7.2   People who self-track

This research has implications for members of the public who use self-tracking device technology. Most of the participants who used self-tracking devices found that the

resulting information gave them a sense of achievement and positive emotions within online social media platforms for running. Among those with competitive *reasons to run*, the self-tracking data could elicit negative emotions both during a run and in online social settings. This research can alert people to the beneficial aspects of self-tracking and the negative aspects that may affect their well-being.

A number of the participants found that they had a sense of achievement and that the self-tracking records were a part of their personal history. Through *neo-assemblage theory analysis* conceptualisations, the research has shown that third parties manage, store, and make accessible self-tracking records of individuals through technological devices. Individuals generally do not make intentional management decisions about their information. They were instead allowing third parties to manage it. The implications of this research are to raise awareness of the extent of third party involvement and its potential risks and give them emancipatory choices about their running records. Most participants did not seem concerned with loss, but some were concerned that their digital memory could be lost irretrievably. This research can illustrate the complexity of the storage of self-tracking records to people. It can provide them with a visual representation of where digital memory is stored so that they can ask questions or make choices about the storage of their data with third parties.

9.8   Recommendations for further research

The section proposes four recommendations for further research.

The first recommendation concerns the diversity of the consenting participants. Whilst there were four male participants and four female participants of varying age ranges, participant ethnicity was predominately White, with six White British and one White Other. Only one participant described themselves as Asian-Chinese. All of the participants who were in employment were middle class with generally high-level qualifications in and around the first-degree level. None of the participants had known disabilities, so there was no opportunity to derive any findings based on the experience of disability amongst *those who run*. The research represented the experiences of a small set of *experienced runners* and *those who run* for personal health and fitness

reasons working in professional backgrounds. There were also no participants that did not use self-tracking technology due to the cost of the devices.

The Covid-19 pandemic curtailed further theoretical sampling. The researcher recommends further research addressing these diversity and inequality issues. Further research should also sample and recruit more runners from socioeconomic groups, ethnicities and range of physical abilities that this research has not sampled. In particular, future research should examine barriers to technology and running and understand what can happen when removing such obstacles. This exploration will extend the deep understanding of types of information in running activity from the localised findings. Research could be carried out in association with parkrun UK, as they have a recognised diversity of participants with event locations spread across the UK and beyond. Urban running groups not included in traditional running clubs are also other potential groups of runners to research.

The second recommendation concerns DeLanda's (2016) *neo-assemblage theory*. The *neo-assemblage theory analysis* maps are not an exclusive representation of DeLanda's *neo-assemblage theory.* DeLanda presents more diagrammatic ideas, such as the virtual diagram for speculating about the possibilities of future realities based upon assemblages. He also introduces mathematics into the speculative realist perspective, and such explorations would have distracted from the research task at hand. Therefore, the visual, conceptual development of DeLanda's ideas for empirical observation does not meet the full potential of DeLanda's theoretical work. DeLanda's theoretical work can be further explored and critically engaged for additional analytical possibilities with *neo-assemblage theory*.

The third recommendation is methodological. The powerful positionality of the researcher as both a researcher at a UK University with expensive audio-visual equipment and as an experienced club runner requires addressing. Researchers who intend to use this method should train their participants to use the camera and familiarise them with running with it to do their own recorded runs. This interaction would reduce the power of the researcher in the recording. It would also increase the participatory nature of the research, giving the participants a sense of ownership in the research process. The research could omit questions entirely. Instead, the

researcher could ask questions as a review of the run with the researcher using 360-degree virtual reality playback or viewing the 360-degree footage on a device screen.

The fourth recommendation concerns research into the effect of other third-party platforms that consist of a modern-day digital "memory bank" using *neo-assemblage theory analysis* mapping. Platforms could include and are not limited to social media platforms such as Facebook and Instagram. However, they must feature platforms that store and make information accessible for a long time. Further research could develop a more comprehensive understanding of these *neo-assemblages* from both a human and a material object perspective using the transferable findings of this research and *neo-assemblage theory analysis* mapping of human information relationships.

References

Abbas, A. (2000). *The embodiment of running in magazine and memory 1979-1995.* PhD Thesis, Keele University.

Abbas, A. (2004). The embodiment of class, gender and age through leisure: a realist analysis of long distance running. *Leisure Studies*, 159-175. doi:https://doi.org/10.1080/0261436042000226354

Acker, A., & Brubaker, J. R. (2014). Death, memorialization, and social media: a platform perspective for personal archives. *Archivaria, 77*, 1-23.

Ajana, B. (Ed.). (2018). *Self-tracking. Empirical and philosophical investigations.* Cham, Switzerland: Springer Nature. doi:https://doi.org/10.1007/978-3-319-65379-2

Alise, M. A., & Teddlie, C. (2010). A continuation of the paradigm wars? Prevalence rates of methodological approaches across the social/behavioral sciences. *Journal of Mixed Methods Research, 4*(2), 103-126. doi:10.1177/1558689809360805

Allen Collinson, J. (2008). Running the routes together: corunning and knowledge in action. *Journal of Contemporary Ethnography, 37*(1), 38-61. doi:https://doi.org/10.1177/0891241607303724

Allen Collinson, J., & Hockey, J. (2011). Feeling the way: notes towards a haptic phenomenology of distance running and scuba diving. *International Review for the Sociology of Sport, 46*(3), 330-345. doi:https://doi.org/10.1177/1012690210380577

Andrejevic, M. (2005). The work of watching one another: lateral surveillance, risk and governance. *Surveillance & Society, 2*(3), 479-497. doi:10.24908/ss.v2i4.3359

Ashenfelder, M. (2013). The Library of Congress and Personal Digital Archiving. In D. T. Hawkins (Ed.), *Personal archiving: preserving our digital heritage* (pp. 31-44). Medford, NJ: Information Today, Inc.

Atkinson, M. (2008). Triathlon, suffering and exciting significance. *Leisure Studies, 27*(2), 165-180. doi:https://doi.org/10.1080/02614360801902216

Ayobi, A., Cox, A. L., & Marshall, P. (2016). Reflections of 5 years of personal informatics: rising concerns and emerging directions. *CHI'16 Extended Abstracts* (pp. 2774-2781). San Jose, CA, USA: ACM. doi:https://doi.org/10.1145/2851581.2892406

Bailey, S. (2007). Taking the road less travelled by: the future of the archive and records management profession in the digital age. *Journal of the Society of Archivists, 28*(2), 117-124. doi:https://doi.org/10.1080/00379810701607777

Bantin, P. C. (1998). Strategies for managing electronic records: a new archival paradigm? An affirmation of our traditions? *Archival Issues, 23*(1), 17-34. Retrieved from http://www.jstor.org/stable/41101985

Barbour, J. B., Rintamaki, L. S., Ramsey, J. A., & Brashers, D. E. (2012). Avoiding health information. *Journal of Health Communication, 17*(2), 212-229. doi:https://doi.org/10.1080/10810730.2011.585691

Bass, J. (2013). A PIM perspective: leveraging personal information management research in the archiving of personal digital records. *Archivaria, 75*, 49-76.

Bastian, J. A. (2013). The records of memory, the archives of identity: celebrations, texts and archival sensibilities. *Archival Science, 13*, 121-131.

Bates, J., Goodale, P., Lin, L., & Andrews, P. (2019). Assembling an infrastructure for historic climate data recovery: data friction in practice. *Journal of Documentation, 75*(4). doi:10.1108/JD-08-2018-0130

Bates, M. (2007). What is browsing— really? A model drawing from behavioural science research. *Information Research, 12*(4), paper 330. Retrieved from http://www.informationr.net/ir/12-4/paper330.html

Bates, M. J. (2005). An introduction to theories, metatheories, and models. In K. E. Fisher, S. Erdelez, & L. E. McKechnie, *Theories of information behavior* (pp. 1-24). Medford, NJ: Information Today.

Bates, M. J. (2010). Information. In M. J. Bates, & M. N. Maack (Eds.), *Encyclopedia of Library and Information Sciences* (Vol. 3, pp. 2347-2360). New York: CRC Press.

Bates, M. J. (2018). Concepts for the study of information embodiment. *Library Trends, 66*(3), 239-266. doi:https://doi.org/10.1353/lib.2018.0002

Bateson, G. (1972). *Steps to an ecology of mind.* New York, NY: Ballantine Books.

Beer, D. (2016). *Metric power.* London: Palgrave MacMillan. doi:https://doi.org/10.1057/978-1-137-55649-3

Behr, K. M., Nosper, A., Klimmt, C., & Hartmann, T. (2005). Some practical considerations of ethical issues in VR research. *Presence, 14*, 668-676. doi:10.1162/105474605775196535

Bell, A. (2014). Participation vs principle: does technological change marginalize recordkeeping theory? In C. Brown (Ed.), *Archives and Recordkeeping: theory into practice* (pp. 227-252). London: Facet Publishing.

Benton, T., & Craib, I. (2011). *Philosophy of social science : the philosophical foundations of social thought* (Second edition, tenth anniversary ed.). New York, New York: Palgrave Macmillan.

Bergman, O., & Whittaker, S. (2016). *The science of managing our digital stuff.* Cambridge, MA: The MIT Press.

Blackwell, A. F. (2006). The reification of metaphor as a design tool. *ACM Transactions on Computer-Human Interaction, 13*(4), 490-530.

Bødker, M., Gimpel, G., & Hedman, J. (2014). Time-out/time-in: the dynamics of everyday experiential computing devices. *Information Systems Journal, 24*, 143-166. doi:https://doi.org/10.1111/isj.12002

Booms, H. (1991). Uberlieferungsbildung: Keeping archives as a social and political activity. *Archivaria*, 25-33.

Bos, D. (2021). Geography and virtual reality. *Geography Compass, 15*(9). doi:10.1111/gec3.12590

boyd, d. (2012). Networked privacy. *Surveillance & Society, 10*(3-4), 348-350. doi:0.24908/ss.v10i3/4.4529

Breton, E. R., Fuemmeler, B. F., & Abroms, L. C. (2011). Weight loss-there is an app for that! But does it adhere to evidence-informed practices? *TBM, 1*, 523-529. doi:https://doi.org/10.1007/s13142-011-0076-5

Bridel, W. F. (2010). *"Finish... whatever it takes". Considering pain and pleasure in the Ironman triathlon. A socio-cultural analysis.* PhD Thesis, Queen's University, School of Kinesiology and Health Studies, Ontario.

Brilmyer, G. (2018). Archival assemblages: applying disability studies' political/relational model to archival description. *Archival Science, 18*, 95-118. doi:10.1007/s10502-018-9287-6

Brown, A. (2013). *Practical digital preservation: a how-to-guide for organisations of any size.* London: Facet Publishing.

Bryman, A. (2001). *Social research methods.* Oxford: Oxford University Press.

Buckland, M. K. (1991). Information as thing. *Journal of the American Society for Information Science, 42*(5), 351-360.

Carroll, L., Farr, E., Hornsby, P., & Ranker, B. (2011). A comprehensive approach to born-digital archives. *Archivaria, 72*(Fall), 61-92.

Case, D. O. (2010). A model of the information seeking and decision making of online coin buyers. *Information Research, 15*(4). Retrieved from https://InformationR.net/ir/15-4/paper448.html

Case, D. O., & Given, L. M. (Eds.). (2016). *Looking for information: a survey of research on information seeking, needs and behavior* (4th ed.). Bingley: Emerald Publishing Limited.

Chatman, E. A. (1999). A theory of life in the round. *Journal of American Society for Information Science, 50*, 207-217.

Chen, J.-s. (2011). Studying up harm reduction policy: the office as an assemblage. *International Journal of Drug Policy, 22*, 471-477. doi:10.1016/j.drugpo.2011.08.008

Choe, E. K., Lee, N. B., Lee, B., Pratt, W., & Kientz, J. A. (2014). Understanding Quantified-Selfers' practices in collecting and exploring personal data. *CHI 2014*, (pp. 1143-1152). Toronto. doi:https://doi.org/10.1145/2556288.2557372

Clarke, A. E., & Friese, C. (2007). Grounded theorizing using situational analysis. In A. Bryant, & K. Charmaz (Eds.), *The SAGE handbook of grounded theory* (pp. 362-397). SAGE Publications Ltd. doi:10.4135/9791848607941

Clarke, A. E., Friese, C., & Washburn, R. S. (2018). *Situational analysis. Grounded theory after the interpretive turn.* (2nd ed.). Los Angeles, United States of America: SAGE Publications, Inc.

Clarke, R. (1988). Information technology and dataveillance. *Communications of the ACM, 31*(5), 498-512.

Clawson, J., Pater, J. A., Mynatt, E. D., & Mamykina, L. (2015). No longer wearing: investigating the abandonment of personal health-tracking technologies on Craigslist. *UbiComp '15*, (pp. 647-658). Osaka. doi:https://doi.org/10.1145/2750858.2807554

Colegrove, P., & Mikel, M. (2018). Radical inclusion: immersive 360-degree video capture, dissemination, and use of emerging technology in support of traditional archival roles at a university library. *Proceedings of the Association for Information Science and Technology*, *55*, pp. 779-780. doi:10.1002/pra2.2018.14505501113

Cook, S., Shaw, J., & Simpson, P. (2016). Jography: exploring meanings, experiences and spatialities of recreational road-running. *Mobilities, 11*(5), 744-769. doi:https://doi.org/10.1080/17450101.2015.1034455

Cook, T. (2001). Archival science and postmodernism: new formulations for old concepts. *Archival Science, 1*(1), 3-24.

Cook, T. (2013). Evidence, memory, identity, and community: four shifting archival paradigms. *Archival Science, 13*(2-3), 95-120.

Cooper, H. (1988). Organizing knowledge synthesis: a taxonomy of literature reviews. *Knowledge in Society, 1*, 104-126.

Cooper, H. M. (1984). *The integrative research review: a systematic approach* (Applied social research methods series ed., Vol. 2). Beverly Hills, California: SAGE.

Copeland, A. J. (2011). Analysis of public library users' digital preservation practices. *Journal of the American Society for Information Science and Technology, 62*(7), 1288-1300.

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: techniques and procedures for developing grounded theory. 4th edition.* Thousand Oaks: SAGE Publications Ltd.

Cox, A. M. (2018). Embodied knowledge and sensory information: theoretical roots and inspirations. *Library Trends, 66*(3), 223-238. doi:https://doi.org/10.1353/lib.2018.0001

Cox, A. M., Griffin, B., & Hartel, J. (2017). What every body knows: embodied information in serious leisure. *Journal of Documentation, 73*(3), 386-406.

Cox, R. J. (2008). *Personal archives and a new archival calling: readings, reflections and ruminations.* Duluth, MN: Litwin Books, LLC.

Crawford, K., Lingel, J., & Karppi, T. (2015). Our metrics, ourselves: a hundred years of self-tracking from the weight scale to the wrist wearable device. *European Journal of Cultural Studies, 18*(4-5), 479-496. doi:https://doi.org/10.1177/1367549415584857

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York: Harpter & Row.

Cumming, K., & Picot, A. (2014). Reinventing appraisal. *Archives and Manuscripts, 42*(2), 133-145. doi:https://doi.org/10.1080/01576895.2014.926824

Curry, L., & Nunez-Smith, M. (2015). *Mixed Methods in Health Sciences Research: A Practical Primer.* (Vol. 1). Thousand Oaks: SAGE Publications, Inc. doi:10.4135/9781483390659

Cushing, A. L. (2010). Highlighting the archives perspective in the personal digital archiving discussion. *Library Hi Tech, 28*(2), 310-312. doi:10.1108/07378831011047695

Cushing, A. L. (2013). "It's stuff that speaks to me": exploring the characteristics of digital possessions. *Journal of the American Society for Information Science and Technology, 64*(8), 1723-1734.

Dalgleish, P. (1996). The appraisal of personal records of members of Parliament in theory and practice. *Archives & Manuscripts*, *24*(1), 86-101. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8551

Dallinga, J. M., Mennes, M., Alpay, L., Bijwaard, H., & de la Faille-Deutokom, M. B. (2015). App use, physical activity and healthy lifestyle: a cross sectional study. *BMC Public Health, 15*(833), 1-9. doi:https://doi.org/10.1186/s12889-015-2165-8

Daniel, J. (2012). Choosing the size of the sample. In *Sampling essentials: practical guidelines for making sampling choices* (pp. 236-253). Thousand Oaks: SAGE Publications, Inc. doi:https://doi.org/10.4135/9781452272047

Daniels, M. F., & Walch, T. (1984). *A modern archives reader: basic readings on archival theory and practice.* Washington, D C: National Archives Trust Fund Board.

Day, R. E., & Lau, A. J. (2010). Psychoanalysis as critique in the works of Freud, Lacan, and Deleuze and Guattari. In G. J. Leckie, L. M. Given, & J. E. Buschman (Eds.), *Critical theory for library and information science* (pp. 101-118). Santa Barbara, California: Libraries Unlimited.

Deakin, H., & Wakefield, K. (2014). Skype interviewing: reflections of two PhD researchers. *Qualitative Research, 14*(5), 603-616. doi:10.1177/1468794113488126

DeLanda, M. (2002). *Intensive science and virtual philosophy.* London: Continuum.

DeLanda, M. (2006). *A new philosophy of society. Assemblage theory and social complexity.* London: Bloomsbury Academic.

DeLanda, M. (2016). *Assemblage theory.* Edinburgh: Edinburgh University Press Ltd.

Deleuze, G., & Guattari, F. (1988). *A thousand plateaus. Capitalism and schizophrenia.* (B. Massumi, Trans.) London, United Kingdom: Bloomsbury Academic.

Derrot, S., Fauduet, L., Oury, C., & Peyrard, S. (2012). Preservation is knowledge: a community-driven preservation approach. *iPres 2012. Proceedings of the 9th conference on preservation of digital objects.* (pp. 1-8). Toronto: University of Toronto.

Didžiokaitė, G., Saukko, P., & Greiffenhagen, C. (2018). The mundane experience of everyday calorie trackers: beyond the metaphor of the Quantified Self. *New Media & Society, 20*(4), 1470-1487. doi:https:/doi.org/10.1177/1461444817698478

Dollar, C. M. (1984). Appraising machine-readable records. In M. F. Daniels, & T. Walch (Eds.), *A modern archives reader: basic readings on archival theory and practice* (pp. 71-79). Washington, D C: National Archives Trust Fund Board.

Douglas, J. (2018). A call to rethink archival creation: exploring types of creating in personal archives. *Archival Science, 18*, 29-49. doi:https:/doi.org/10.1007/s10502-018-9285-8

Douglas, J., Alisauskas, A., & Mordell, D. (2019). "Treat Them with the Reverence of Archivists": Records Work, Grief Work, and Relationship Work in the Archives. *Archivaria*, 88-120. Retrieved from https://www.proquest.com/scholarly-journals/treat-them-with-reverence-archivists-records-work/docview/2518378602/se-2?accountid=13828

Duranti, L., & Thibodeau, K. (2006). The Concept of Record in Interactive, Experiential and Dynamic Environments: the View of InterPARES. *Archival Science, 6*(1), 13-68. doi:10.1007/s10502-006-9021-7

Elsden, C., Kirk, D. S., & Durrant, A. C. (2016). A quantified past: toward design for remembering with personal informatics. *Human-Computer Interaction, 31*(6), 518-557. doi:https://doi.org/10.1080/07370024.2015.1093422

Epstein, D. A., Ping, A., Fogarty, J., & Munson, S. A. (2015). A lived informatics model of personal informatics. *UbiComp '15* (pp. 731-742). Osaka: ACM. doi:https://doi.org/10.1145/2750858.2804250

Erdelez, S. (2005). Information encountering. In K. E. Fisher, S. Erdelez, & L. E. McKechnie (Eds.). Medford, New Jersey: Information Today, Inc.

Esmonde, K. (2020). 'There's only so much data you can handle in your life': accommodating and resisting self-surveillance in women's running and fitness tracking practices. *Qualitative Research in Sport, Exercise and Health, 12*(1), 76-90. doi:10.1080/2159676X.2019.1617188

Evans, J., McKemmish, S., Daniels, E., & McCarthy, G. (2015). Self-determination and archival autonomy: advocating activism. *Archival Science, 15*, 337-368. doi:https://doi.org/10.1007/s10502-015-9244-6

Faucher, K. X. (2014). An information meta-state approach to documentation. *Journal of Documentation, 7*(4), 503-525. doi:10.1108/JD-09-2012-0118

Fielding, J. L., & Gilbert, G. N. (2000). *Understanding social statistics.* London: SAGE Publications Ltd.

Fisher, R. (2009). In search of a theory of private archives: the foundation writings of Jenkinson and Schellenberg revisited. *Archivaria, 67*, 1-24.

Ford, N. (2015). *An introduction to information behaviour.* London: Facet.

Foreman-Wernet, L., & Lauterbach, E. (2003). *Sense-making methodology reader: selected writings of Brenda Dervin.* Cresskill, NJ: Eurospan.

Foster, A. E., & Ellis, D. (2014). Serendipity and its study. *Journal of Documentation, 70*(6), 1015–1038. doi:10.1108/JD-03-2014-0053

Franks, P. C. (2013). *Information and Records Management.* London: Facet.

Fredriksson, B. (2003). Postmodernistic archival science — Rethinking the methodology of a science. *Archival Science, 3*(2), 177-197. doi:10.1007/BF02435657

Freund, L. (2015). Contextualising the information-seeking behavior of software engineers. *Journal of the Association for Information Science and Technology, 66*(8), 1594-1605. doi:10.1002/asi.23278

Friese, C. (2009). Models of cloning, models for the zoo: rethinking the sociological significance of cloned animals. *BioSocieties, 4*, 367-390. doi:10.1017/1745855209990275

Frohmann, B. (2008). Documentary ethics, ontology, and politics. *Archival Science, 71*(1), 165-180. doi:10.1007/s10502-008-9073-y

Fulton, C. (2005). Chatman's life in the round. In K. E. Fisher, S. Erdelez, & L. E. McKechnie (Eds.), *Theories of information behaviour* (pp. 79-82). Medford, New Jersey: Information Today, Inc.

Fulton, C. (2009). Quid pro quo: Information sharing in leisure activities. *Library Trends, 57*(4), 753-768. doi:10.1353/lib.0.0056

Garmin. (2022). *GarminConnect homepage*. Retrieved from GarminConnect: https://connect.garmin.com

Gerolami, N. (2015). The library assemblage: creative institutions in an information society. *Journal of Documentation, 71*(1), 165-174. doi:10.1108/JD-09-2013-0120

Giaretta, D. (2011). *Advanced digital preservation*. Heidelberg: Springer. doi:https://doi.org/10.1007/978-3-642-16809-3

Glaser, B. G. (2006). *Doing formal grounded theory: a proposal*. Mill Valley, California: Sociology Press.

Goodsell, T. L., & Harris, B. D. (2011). Family life and marathon running: constraint, cooperation, and gender in a leisure activity. *Journal of Leisure Research, 43*(1), 80-109.

Gorichanaz, T. (2015). Information on the run: experiencing information during an ultramarathon. *Information Research, 20*(4 Paper 697). Retrieved from http://InformationR.net/ir/20-4/paper697.html

Gorichanaz, T. (2017). The information of story: the genre and information activities of ultrarunning race reports. *Aslib Journal of Information Management, 69*(4), 460-474. doi:https://doi.org/10.1108/AJIM-03-2017-0071

Gorichanaz, T. (2018). Understanding and information constellations in ultrarunning. *Library Trends, 66*(3), 329-350. doi:https://doi.org/10.1353/lib.2018.0006

Gorichanaz, T. (2019). Information creation and models of information behavior: Grounding synthesis and further research. *Information creation and models of information behavior: Grounding synthesis and further research, 51*(4), 998–1006. doi:10.1177/0961000618769968

Gorichanaz, T. (2020). *Information experience in theory and design.* Bingley: Emerald.

Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal, 26*, 91-108. doi:10.1111/j.1471-1842.2009.00848.x

Green, B. C., & Jones, I. (2005). Serious leisure, social identity and sport tourism. *Sport in Society, 8*(2), 164-181. doi:https://doi.org/10.1080/17404305001102010

Greer, L. D. (2001). Sporting identities: a trialectic of the triathlon. *TASA 2001 Conference*, (pp. 1-9). Sydney.

Greiner, S. (2014). Cyborg bodies - self-reflections on sensory augmentations. *Nanoethics, 8*, 299-302. doi:https://doi.org/10.1007/s11569-014-0207-9

Grix, J. (2002). Introducing students to the generic terminology of social research. *Politics, 22*(3), 175-186. doi:10.1111/1467-9256.00173

Grunseit, A., Richards, J., & Merom, D. (2018). Running on a high: parkrun and personal well-being. *BMC Public Health, 18*(59), 1-11. doi:https://doi.org/10.1186/s12889-017-4620-1

Guest, G., Namey, E. E., & Mitchell, M. L. (2013). *Collection qualitative data: a field manual for applied research.* London: SAGE Publications, Ltd. doi:10.4135/9781506374680

Handley, K. (2008). Non-participant observation. In R. Thorpe, & R. Holt (Eds.), *The SAGE dictionary of qualitative management research* (pp. 142-144). London: SAGE Publications Ltd. doi:10.4135/9780857020109.n67

Harman, G. (2016). Series editor's preface. In M. DeLanda, *Assemblage Theory* (pp. vii-x). Edinburgh: Edinburgh University Press.

Harrison, D., Marshall, P., Bianchi-Berthouze, N., & Bird, J. (2015). Activity tracking: barriers, workarounds and customisation. *UbiComp '15* (pp. 617-621). Osaka: ACM. doi:https://doi.org/10.1145/2750858.2805832

Hartel, J. (2003). The serious leisure frontier in library and information science: hobby domains. *Knowledge Organisation, 30*(3/4), 228-238.

Hartel, J. (2010). Managing documents at home for serious leisure: a case study of the hobby of gourmet cooking. *Journal of Documentation, 66*(6), 847-874. doi:https://doi.org/10.1108/00220411011087841

Hartel, J. (2010). Time as a framework for information science: insights from the hobby of gourmet cooking. *Information Research, 15*(4), colis715. Retrieved from http://InformationR.net/ir/15-4/colis715.html

Hartel, J. (2019). Turn, turn, turn. *Proceedings of CoLIS, the Tenth International Conference on Conceptions of Library and Information Science, Ljubljana, Slovenia, June 16-19, 2019. 24(4)*, p. paper colis1901. Information Research. Retrieved from http://InformationR.net/ir/24-4/colis/colis1901.html (Archived by the Internet Archive at https://web.archive.org/web/20191216122638/http://informationr.net/ir/24-4/colis/colis1901.html)

Hartel, J., Cox, A. M., & Griffin, B. L. (2016). Information activity in serious leisure. *Information Research, 21*(4 Paper 728). Retrieved from http://informationR.net/ir/21-4/paper728.html

Hawkins, D. T. (Ed.). (2013). *Personal archiving: preserving our digital heritage.* Medford, NJ: Information Today, Inc.

Heath, C., Hindmarsh, J., & Luff, P. (2010). *Video in qualitative research: analysing social interaction in everyday life* (Vol. 23).

Hektor, A. (2001). *What's the use: internet and information behaviour in everyday life* (Vol. Linkoping Studies in Arts and Science 240). Linkoping, Sweden: Linkoping University.

Herner, S. (1970). Browsing. In A. Kent, & H. Lancour (Eds.), *The encyclopedia of library and information science* (Vol. 3, pp. 408-415). New York, NY: Dekker.

Heyvaert, M., Hannes, K., & Onghena, P. (2017). *Using mixed methods research synthesis for literature reviews.* Thousand Oaks, California: SAGE Publications, Inc. doi:10.4135/9781506333243

Hindley, D. (2018). "More than just a run in the park": an exploration of parkrun as a shared leisure space. *Leisure Sciences*, 1-21. doi:https://doi.org/10.1080/01490400.2017.1410741

Hitchings, R., & Latham, A. (2017). How 'social' is recreational running? Findings from a qualitative study in London and implications for public health promotion. *Health & Place, 46*, 337-343. doi:https://doi.org/10.1016/j.healthplace.2016.10.003

Hjørland, B. (2002). Domain analysis in information science. Eleven approaches - traditional as well as innovative. *Journal of Documentation.* (58), 422-62.

Hobbs, C. (2001). The character of personal archives; reflections on the value of records of individuals. *Archivaria, 52*(Fall), 126-135.

Hockey, J. (2009). Mundane ritual practices and distance running. *Journal of Ritual Studies, 23*(2), 77-88. Retrieved from http://eds.a.ebscohost.com/eds/pdfviewer/pdfviewer?vid=2&sid=b2c7efad-bad044e93-9fe8-a891f8b43ebe%40sessionmgr4003&hid=4205

Hoffman, D. L., & Novak, T. P. (2018). Consumer and object experience in the internet of things: an assemblage theory approach. *Journal of Consumer Research, 44*, 1178-1204. doi:10.1080/jcr/ucx105

Hondros, J. J. (2016). Problematizing the internet as a video distribution technology: An assemblage theory analysis. *Information, Communication & Society, 19*(2), 221-233. doi:10.1080/1369118X.2015.1050439

Hong, Q. N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., . . . Vedel, I. (2019). Improving the content validity of the mixed methods appraisal tool: a modified e-Delphi study. *Journal of Clinical Epidemiology, 111*, 49-59.e1. doi:10.1016/j.jclinepi.2019.03.008

Howlett, M. (2021). Looking at the 'field' through a Zoom lens: Methodological reflections on conducting online research during a global pandemic. *Qualitative Research*. doi:10.1177/1468794120985691

Hoy, M. B. (2016). Personal activity trackers and the Quantified Self. *Medical Reference Services Quarterly, 35*(1), 94-100.

Hull, B. (2018). *Fitness technologies: information use in the serious leisure pursuit of running.* Sheffield: University of Sheffield.

Huvila, I., Douglas, J., Gorichanaz, T., Koh, K., & Suorsa, A. (2020). Conceptualizing and studying information creation: From production and processes to makers and making. *83rd Annual Meeting of the Association for Information Science & Technology October 25-29, 2020., 57*, p. e226. doi:10.1002/pra2.226

Huvila, I., Sköld, O., & Börjesson, L. (2021). Documenting information making in archaeological field reports. *Journal of Documentation, 77*(5), 1107-1127. doi:10.1108/JD-11-2020-0188

International Organisation for Standardisation. (2012a). *Space data and information transfer systems. Open archival information system (OAIS). Reference Model.* International Organisation for Standardisation.

International Organisation for Standardisation. (2012b). *Space data and information transfer systems. Audit and certification of trustworthy digital repositories.* International Organisation for Standardisation.

Jacobsen, T., Punzalan, R. L., & Hedstrom, M. L. (2013). Invoking 'collective memory': mapping the emergence of a concept in archival science. *Archival Science, 13*, 217-251. doi:https://doi.org/10.1007/s1052-013-9199-4

Jaidka, K., Khoo, C. S., & Na, J.-C. (2013). Literature review writing: how information is selected and transformed. *Journal of Documentation, 65*(3), 303-325. doi:10.1108/00012531311330665

Janssen, M., Scheerder, J., Thibault, E., Brombacher, A., & Vos, S. (2017). Who uses running apps and sports watches? Determinants and consumer profiles of event runners' usage of running-related smartphone applications and sports watches. *PLOS One, 12*(7), e0181167. doi:https://doi.org/10.1371/journal.pone.0181167

Japzon, A., & Agosto, D. (2007). Exploration of the motivation for and knowledge of preservation practices for personal digital artifacts. *Annual Meeting of the Society for Information Science & Technology.* Milwaukee.

Jarvie, K., Evans, J., & McKemmish, S. (2021). Radical appraisal in support of archival autonomy for animal rights activism. *Archival Science, 21*(4), 353-372. doi:10.1007/s10502-021-09362-3

Jenkinson, H. (1922). *A manual of archive administration including the problem of war archives and archive making. .* Oxford: Clarendon Press.

Jenkinson, H. (1984). Reflections of an archivist. In M. F. Daniels, & T. Walch (Eds.), *A modern archives reader: basic readings on archival theory and practice* (pp. 15-22). Washington, D.C.: National Archives Trust Fund Board.

Jiow, H., & Morales, S. (2015). Lateral surveillance in Singapore. *Surveillance & Society, 13*(3/5), 327-337. doi:10.24908/ss.v13i3/4.5320

Joas, H. (2005). Mead, George Herbert. In E. Craig (Ed.), *The shorter Routledge encyclopedia of philosophy* (p. 644). Abingdon: Taylor & Francis. Retrieved

from
https://ebookcentral.proquest.com/lib/sheffield/reader.action?docID=25424
9

John, J. L. (2008). Adapting existing technologies for digitally archiving personal lives. Digital forensics, ancestral computing, and evolutionary perspectives and tools. *iPres 2008. Proceedings of the fifth international conference on preservation of digital objects.* (pp. 48-55). London: British Library.

Johnson, D., Scheitle, C., & Ecklund, E. (2019). Beyond the in-person interview? How interview quality varies across in-person, telephone, and Skype interviews. *Social Science Computer Review, 39*(6), 1142-1158. doi:10.1177/0894439319893612

Johnston, L. (2011). We are all archivists: encouraging personal digital archiving and citizen archiving on a community scale. *iPres 2011. 8th international conference on preservation of digital objects* (pp. 210-214). Singapore: National Library of Singapore & Nanyang Technology University.

Jones, W., & Teevan, J. (Eds.). (2007). *Personal information management.* Seattle: University of Washington Press.

Karahanoğlu, A., Gouveia, R., Reenalda, J., & Ludden, G. (2021). How Are Sports-Trackers Used by Runners? Running-Related Data, Personal Goals, and Self-Tracking in Running. *Sensors, 21*(11), 3687. doi:10.3390/s21113687

Karapanos, E., Gouveia, R., Hassenzahl, M., & Forlizzi, J. (2016). Wellbeing in the making: peoples' experiences with wearable activity trackers. *Psychology of Well-Being, 6*(4). doi:https://doi.org/10.1186/s13612-016-0042-6

Kari, J. (2010). Diversity in the conceptions of information use. *Information Research*, colis709. Retrieved from http://InformationR.net/ir/15-13/colis7/colis709.html

Keane, H. (2003). Critiques of harm reduction, morality and the promise of human rights. *International Journal of Drug Policy, 14*, 227-232. doi:10.1016/S0955-3959(02)00151-2

Krikelas, J. (1983). Information-seeking behavior: patterns and concepts. *Library Quarterly, 19*, 5-20.

Kroski, E. (2010). Tutorial: personal digital archiving. *iPres 2010: Proceedings of the 7th international conference on preservation of digital objects* (p. 409). Vienna: Österreichische Computer Gesellschaft .

Kuhn, T. S., & Hacking, I. (2012). *The structure of scientific revolutions* (Fourth ed.). Chicago; London: The University of Chicago Press.

Kuru, A. (2016). Exploring experience of runners with sports tracking technology. *International Journal of Human-Computer Interaction, 32*(11), 847-860. doi:https://doi.org/10.1080/10447318/2016.1202461

Lamont, M., & Kennelly, M. (2012). A qualitative exploration of participant motives among committed amateur triathletes. *Leisure Sciences, 34*(3), 236-255. doi:https://doi.org/10.1080/01490400.2012.669685

Langdon, J. (2016). Describing the digital: the archival cataloguing of born-digital personal papers. *Archives and Records, 37*(1), 37-52. doi:https://doi.org/10.1080/23257962.2016.1139494

Lee, C. P., & Trace, C. B. (2009). The role of information in a community of hobbyist collectors. *Journal of the American Society for Information Science and Technology, 51*(3), 621-637. doi:10.1002/asi.20996

Lee, I. S., Brown, G., King, K., & Shipway, R. M. (2016). Social identity in serious sport event space. *Event Management, 20*, 491-499. doi:https://doi.org/dx.doi.org/10.3727/152599516X14745497664352

LeFurgy, W. G. (2010). Personal archiving: striking a balance to reach the public. *iPres 2010. Proceedings of the 7th international conference on preservation of digital objects* (pp. 387-389). Vienna: Österreichische Computer Gesellschaft.

Lloyd, A. (2010). Corporeality and practice theory: exploring emerging research agendas for information literacy. *Information Research, 15*(3). Retrieved from https://www.informationr.net/ir/15-3/colis7/colis704.html

Lloyd, A., & Olsson, M. (2019). Enacting and capturing embodied knowledge in the practices of enthusiast car restorers: Emerging themes. *Journal of Librarianship and Information Science, 51*(4), 1033–1040. doi:10.1177/0961000618769979

Lomborg, S., Thylstrup, N. B., & Schwartz, J. (2018). The temporal flows of self-tracking: checking in, moving on, staying hooked. *New Media & Society, 0*(00), 1-18. doi:https://doi.org/10.1177/1461444818778542

Lunghi, M., Tibbo, H., & Lee, C. (2016). Personal digital archiving: How can the cultural heritage community help individuals curate their own materials? *iPres 2016. Proceedings of the international conference on digital preservation.* (pp. 300-301). Bern: Swiss National Library.

Lupton, D. (2014). Self-tracking cultures: towards a sociology of personal informatics. *OzCHI '14.* Sydney. doi:https://doi.org/10.1145/2686612.2686623

Lupton, D. (2016). *The quantified self: a sociology of self-tracking.* Cambridge: Polity.

Lupton, D., & Michael, M. (2017). 'Depends on who's got the data': public understandings of personal digital dataveillance. *Surveillance & Society, 15*(2), 254-268.

Lupton, D., & Watson, A. (2020). Towards more-than-human digital data studies: developing research-creation methods. *Qualitative Research*, 1-18. doi:10.1177/1468794120939235

Lustig, J. (2020). Epistemologies of the archive: toward a critique of archival reason. *Archival Science, 20*(1), 65-89. doi:10.1007/s10502-019-09313-z

Machlup, F. (1983). Semantic quirks in studies of information. In F. Machlup, & U. Mansfield (Eds.), *The study of information: Interdisciplinary messages* (pp. 641-672). New York, NY: Wiley.

Major, W. (2001). The benefits and costs of serious running. *World Leisure Journal, 42*(2), 12-25. doi:https://doi.org/10.1080/04419057.2001.9674226

Mandary, M., & Metzinger, T. K. (2016). Real virtuality: a code of ethical conduct. Recommendations for good scientific practice and the consumers of VR-

Technology. *Frontiers in Robotics and AI, 3*(Article 3), 1-23. doi:https://doi.org/10.3389/frobt.2016.00003

Marcus, G. E., & Saka, E. (2006). Assemblage. *Theory, Culture & Society, 23*(2-3), 101-109. doi:10.1177/0263276406062573

Marshall, B. H. (Ed.). (2018). *The complete guide to personal digital archiving.* Chicago: ALA Editions.

Marshall, C. C. (2007). How people manage personal information over a lifetime. In W. Jones, & J. Teevan (Eds.), *Personal Information Management* (pp. 57-75). Seattle: University of Washington Press.

Marshall, C. C. (2008a). Rethinking personal digital archiving part 1. Four challenges from the field. *D-Lib Magazine, 14*(3/4). doi:https://doi.org/10.145/march2008-marshall-pt1

Marshall, C. C. (2008b). Rethinking personal digital archiving part 2. Implications for services, applications and institutions. *D-Lib Magazine, 14*(3/4). doi:https://doi.org/10.1045/march2008-marshall-pt2

Marshall, C. C. (2013). Social media, personal data, and reusing our digital legacy. In D. T. Hawkins (Ed.), *Personal archiving: preserving our digital heritage* (pp. 85-108). Medford, NJ: Information Today, Inc.

Marshall, C. C., Bly, S., & Brun-Cottan, F. (2006). The long term fate of our personal digital belonging: toward a service model for personal archives. *Proceedings of IS&T Archiving 2006*, (pp. 25-30).

Massumi, B. (2013). Translator's foreword: pleasures of philosophy. In G. Deleuze, & F. Guattari, *A Thousand Plateaus* (pp. vii-xviii). London: Bloomsbury Academic.

McGuinness, J. (2019). Prescribing parkrun. *British Journal of General Practice, 69*(679), 64. doi:https://doi.org/10.3399/jgp19X700901

McKay, D., Chang, S., Smith, W., & Buchanan, G. (2019). The things we talk about when we talk about browsing: an empirical typology of library browsing behavior. *Journal of the Association for Information Science and Technology, 70*(12), 1382-1394. doi:10.1002/asi.24200

McKemmish, S. (1996). Evidence of me. *Archives & Manuscripts*, *24*(1), 28-45. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8543

McKinney, P., Cox, A. M., & Sbaffi, L. (2019). Information literacy in food and activity tracking among parkrunners, people with type 2 diabetes, and people with irritable bowel syndrome: Exploratory study. *Journal of Medical Internet Research, 21*(8), e13652. doi:10.2196/13652

McLaughlin, H. (2012). The philosophy of social research. In H. McLaughlin, *Understanding social work research* (pp. 22-46). SAGE Publications Ltd. doi:10.4135/9781473913844

Meister, S. (2014). Addressing the personal digital archives needs of a contemporary artist. *iPres 2014. Proceedings of the eleventh international conference on digital preservation.* (pp. 79-81). Melbourne: State Library of Victoria.

Mok, T. M., Cornish, F., & Tarr, J. (2015). Too much information: visual research ethics in the age of wearable cameras. *Integrity of Psychological Behaviour, 49*, 309-322. doi:https://doi.org/10.1007/s12124-014-9289-8

Myntti, J., & Zoom, J. (Eds.). (2019). *Digital preservation for libraries. Preparing for a sustainable future.* Chicago, MI: ALA Editions.

Nafus, D., & Sherman, J. (2014). Big data, big questions. This one does not go up to 11: the quantified self movement as an alternative big data practice. *International Journal of Communication, 8*, 1874-1794.

Nash, J. E. (1979). Weekend racing as an eventful experience. Understanding the accomplishment of well-being. *Urban Life, 8*(2), 199-217.

National Coordination Office for Space-Based Positioning, Navigation, and Timing. (2020, October 14). *GPS Overview*. Retrieved October 14, 2020, from GPS: The Global Positioning System: https://www.gps.gov/systems/gps/

Naumer, C. (2005). Flow theory. In K. E. Fisher, S. Erdelez, & L. E. McKechnie (Eds.), *Theories of Information Behaviour* (pp. 153-157). Medford, New Jersey: Information Today.

Neff, G., & Nafus, D. (2016). *Self-tracking.* Cambridge, MA: The MIT Press.

Neville, R. D. (2013). Exercise is medicine: some cautionary remarks in principle as well as in practice. *Medicine, Health Care and Philosophy, 16*, 615-622. doi:https://doi.org/10.1007/s11019-012-9383-y

Noblit, G. W., & Hare, R. D. (1988). *Qualitative Research Methods: Meta-ethnography.* Thousand Oaks, CA: SAGE Publications, Inc.

Nylander, S., & Tholander, J. (2016). Drifting off course - how sport technology can use real-time data to add new dimensions to sports. *Proceedings of the 15th International Conference on Mobile and Ubiquitous Multimedia* (pp. 1-4). Rovaniemi: ACM. doi:https://doi.org/10.1145/3012709.3012740

Odom, W., Zimmerman, J., & Forlizzi, J. (2014). Placelessness, spacelessness, and formlessness: experiential qualities of virtual possessions. *Proceedings of the 2014 Conference on Designing Interactive Systems* (pp. 985-994). ACM.

Öhman, C., & Aggarwal, N. (2020). What if Facebook goes down? Ethical and legal considerations for the demise of big tech. *Internet Policy Review, 9*(3), 1-21. doi:10.14763/2020.3.1488

Olkowski, D. E. (2005). Deleuze, Gilles (1925-95). In *The shorter Routledge encyclopedia of philosophy.* (pp. 164-165). Abingdon: Taylor and Francis Group.

Otto, J., Metz, S., & Ensmenger, N. (n.d.). Sports fans and their information-gathering habits: How media technologies have brought fans closer to their teams over time. In W. Aspray, & B. Hayes (Eds.), *Everyday information: The evolution of information seeking in America* (pp. 185-216). Cambridge, MA: MIT Press.

parkrun. (2022). *parkrun international homepage.* Retrieved from parkrun: http://www.parkrun.com

parkrun Ltd. (2018). *parkrun UK: 2017 Run Report.* Annual Report.

parkrun UK. (2022). *Home, parkrun UK.* Retrieved 01 14, 2022, from parkrun UK: https://www.parkrun.org.uk

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (Second ed.). Thousand Oaks, California: SAGE Publications, Inc.

Pederson, H., Pedersen, L. K., & Thing, L. F. (2018). 'Liquid running communities' - an analysis of serious runners' communities. *European Journal for Sport and Society*. doi:10.1080/16138171.2018.4191152

Petrelli, D., & Whittaker, S. (2010). Family memories in the home: contrasting physical and digital mementos. *Personal Ubiquitous Computing, 14*, 153-169. doi:https://doi.org/10.1007/s00779-009-0279-7

Pink, S., Samartojo, S., Lupton, D., & Heyes La Bond, C. (2017). Mundane data: the routines, contingencies and accomplishments of digital living. *Big Data and Society*. doi:https://doi.org/10.1177/2053951717700924

Plano Clark, V., & Ivankova, N. (2016). *Mixed methods research: a guide to the field.* Thousand Oaks, CA, USA: SAGE Publications, Inc. doi:https://doi.org/10.4135/9781483398341

Pledge, J., & Dickens, E. (2018). Process and progress: working with born-digital material in the Wendy Cope Archive at the British Library. *Archives and Manuscripts, 46*(1), 59-69. doi:https://doi.org/1080.01576895.2017.1408024

Pobiruchin, M., Suledar, J., Zowalla, R., & Wiesner, M. (2017). Accuracy and adoption of wearable technology used by active citizens: a marathon event field study. *JMIR Mhealth Uhealth, 5*(2), e24. doi:https://doi.org/mhealth.6395

Polkinghorne, S., & Given, L. M. (2021). Holistic information research: From rhetoric to paradigm. *Journal of the Association for Information Science and Technology, 72*(10), 1261-1271. doi:https://doi.org/10.1002/asi.24450

Powell, G. (1996). The collecting of personal and private papers in Australia. *Archives & Manuscripts*, *24*(1), 62-77. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8547

Prasopoulou, E. (2017). A half-moon on my skin: a memoir on life with an activity tracker. *European Journal of Information Systems, 26*, 287-297. doi:https://doi.org/10.1057/s41303-017-0040-7

Pretlove, L. J., Cox, A. M., Sbaffi, L., & Hopfgartner, F. (2020). Using a 360 degree camera as a mobile data collection method towards understanding information types and use in running. *Proceedings of the Association of Information and Science Technology. 57*, p. e390. Wiley. doi:10.1002/pra2.390

Quantified Self. (2022). *Quantified Self homepage*. Retrieved from Quantified Self: https://quantifiedself.com

Raber, D. (2003). *The problem of information: an introduction to information science.* Lanham, MD: Scarecrow Press.

Randolph, J. J. (2009). A guide to writing the dissertation literature review. *Practical Assessment, Research & Evaluation, 14*(13), 1-13. Retrieved from http://pareonline.net/getvn.asp?v=14&n=13

Rapp, A., & Tirassa, M. (2017). Know thyself: a theory of the self for personal informatics. *Human-Computer Interaction, 32*(5-6), 335-380. doi:https://doi.org/10.1080/07370024.2017.1285704

Redwine, G. (2015). *Personal digital archiving.* Digital Preservation Coalition. doi:https://doi.org/10.7207/twr15-01

Rettberg, J. W. (2014). *Seeing ourselves through technology. How we use selfies, blogs and wearable devices to see and shape ourselves.* Basingstoke: Palgrave Macmillan. doi:https://doi.org/10.1057/9781137476661.0001

Rock, P. (1979). *The making of symbolic interactionism.* London, UK: The Macmillan Press Ltd.

Rohr, M. D. (2005). Richard Rorty. In E. Craig (Ed.). Abingdon: Taylor & Francis Group. Retrieved from http://ebookcentral.proquest.com/lib/sheffield/detail.action?docID=254249

Ronkainen, N. J., Harrison, M. E., & Ryba, T. V. (2013). Running, being, and Beijing - an existential exploration of a runner identity. *Qualitative Research in Psychology*. doi:https://doi.org/10.1080/14780887.2013.810796

Rooksby, J., Rost, M., Morrison, A., & Chalmers, M. C. (2014). Personal tracking as lived informatics. *Proceedings of the 32nd Annual ACM Conference on Human Factors in Computing Systems* (pp. 1163-1172). ACM.

Rorty, R. (1982). *Consequences of pragmatism.* Brighton, UK: The Harvester Press.

Rorty, R. (2005). Pragmatism. In E. Craig (Ed.), *The short Routledge encyclopedia of philosophy.* Taylor & Francis Group. Retrieved from http://ebookcentral.proquest.com/lib/sheffield/detail.action?docID=254249

Ruckenstein, M., & Pantzar, M. (2015). Datafied life: techno-anthropology as a site for exploration and experimentation. *Techne: Research in Philosophy and Technology, 19*(2), 193-212.

Ruckenstein, M., & Pantzar, M. (2017). Beyond the Quantified Self: thematic exploration of a dataistic paradigm. *New Media & Society, 19*(3), 401-418. doi:https://doi.org.uk/10.1177/1461444815609081

Ruckenstein, M., & Schüll, N. D. (2017). The datafication of health. *Annual Review of Anthropology, 46*, 261-278. doi:https://doi.org/10.1146/annurev-anthro-102116-041244

Runkeeper. (2022). *Runkeeper homepage.* Retrieved from Runkeeper: https://runkeeper.com

Sánchez Laws, A. L., & Utne, T. (2019). Ethics guidelines for immersive journalism. *Frontiers in Robotics and AI, 6*(Article 28), 1-12. doi:https://doi.org/10.3389/frobt.2019.00028

Savolainen, R. (2009). Information use and information processing. Comparison of conceptualizations. *Journal of Documentation, 65*(2), 187-207. doi:10.1108/00220410910937570

Schellenberg, T. R. (1956). *Modern archives: principles and techniques.* Chicago: Society of American Archivists.

Schellenberg, T. R. (1984). The appraisal of modern public records. In M. F. Daniels, & T. Walch (Eds.), *A modern archives reader: basic readings on archival theory*

and practice (pp. 57-70). Washington, D C: National Archives Trust Fund Board.

Schultz, M. (2018). Avoiding a gambit for our personal digital archives. In B. H. Marshall (Ed.), *The complete guide to personal digital archiving* (pp. 174-184). Chicago: ALA Editions.

Sharon, T., & Zandbergen, D. (2017). From data fetishism to quantifying selves: self-tracking practices and the other values of data. *New Media and Society, 19*(11).

Shepherd, E., & Yeo, G. (2003). *Managing records: a handbook of principles and practices.* London: Facet Publishing.

Shipway, R. M. (2010). *On the run: perspectives on long distance running.* PhD Thesis, Bournemouth University.

Shipway, R. M., & Holloway, I. (2010). Running free: embracing a healthy lifestyle through distance running. *Perspectives in Public Health, 130*(6), 270-276. doi:https://doi.org/10.1177/1757913910379191

Shipway, R. M., & Holloway, I. (2013). Health and the running body: notes from an ethnography. *International Review for the Sociology of Sport, 0*(0), 1-19. doi:https://doi.org/10.1177/1012690213509807

Shipway, R., & Jones, I. (2007). Running away from home: understanding visitor experiences and behaviour at sport tourism events. *International Journal of Tourism Research, 9*, 373-383. doi:https://doi.org/10.1002/jtr.641

Shipway, R., & Jones, I. (2008). The great suburban Everest: an 'insiders' perspective on experiences at the 2007 Flora London Marathon. *Journal of Sport & Tourism, 13*(1), 61-77. doi:https://doi.org/10.1080/14775080801972213

Shotter, J. (2014). Social constructionism. In D. Coghlan, & Brydon-Miller, M., *The SAGE encyclopedia of action research* (Vol. 102). London: SAGE Publications Ltd. doi:10.4135/9781446294406

Sinn, D., & Syn, S. Y. (2014). Personal documentation on a social network site: Facebook, a collection of moments from your life? *Archival Science, 14*, 95-124. doi:https://doi.org/10.1007/s10502-013-9208-7

Sloyan, V. (2016). Born-digital archives at the Wellcome Library: appraisal and sensitivity review of two hard drives. *Archives and Records, 37*(1), 20-36. doi:https://doi.org/10.1080/23257962.2016.1144504

Smith, S. L. (1998). Athletes, runners, and joggers: participant-group dynamics in a sport of "individuals". *Sociology of Sport Journal, 15*, 174-192.

Smith, S. L. (2000). British nonelite road running and masculinity: a case of "running repairs?". *Men and Masculinities, 3*(2), 187-208.

Society of American Archivists. (2021a). *SAA Dictionary: data*. Retrieved April 27, 2021, from Dictionary of archives terminology: https://dictionary.archivists.org/entry/data.html

Society of American Archivists. (2021b). *SAA Dictionary: information*. Retrieved April 27, 2021, from Dictionary of archives terminology: https://dictionary.archivists.org/entry/information.html

Society of American Archivists. (2021c). *SAA Dictionary: record*. Retrieved April 27, 2021, from Dictionary of Archives Terminology: https://dictionary.archivists.org/entry/record.html

Southcott, M., André, R., & Thomas, N. (1996). Theory, practice and pragmatism: arrangement and description of personal papers in the Mortlock Library of South Australiana. *Archives & Manuscripts*, *24*(1), 102-115. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8553ntry/record.html

Stebbins, R. A. (1992). *Amateurs, professionals and serious leisure.* Montreal, QC: McGill-Queen's University Press.

Stebbins, R. A. (2005). *Challenging mountain nature: risk, motive, and lifestyle in three hobbyist sports.* Calgary: Detselig Enterprises Ltd.

Stebbins, R. A. (2009). Leisure and its relationship to library and information science: bridging the gap. *Library Trends, 57*(4), 618-631.

Stebbins, R. A. (2018). *Social worlds and the leisure experience.* Bingley: Emerald Publishing Limited.

Strauss, A. L. (1987). *Qualitative analysis for social scientists.* Cambridge, UK: Cambridge University Press.

Strava. (2022). *Strava homepage*. Retrieved from Strava: https://www.strava.com

Sullivan, J. R. (2012). Skype: an appropriate method of data collection for qualitative interviews? *The Hilltop Review, 6*(1), 54-60. Retrieved from https://scholarworks.wmich.edu/hilltopreview/vol6/iss1/10

Taylor, R. S. (2015). Question-negotiation and information seeking in libraries. *College & Research Libraries, 76*(3), 251-267. doi:10.5860/crl.76.3.251

Temir, E., O'Kane, A. A., Marshall, P., & Blandford, A. (2016). Running: a flexible situated study. *CHI '16 Extended Abstracts.* San Jose: ACM. doi:https://doi.org/10.1145/2851581.2892385

Tholander, J., & Nylander, S. (2015). Snot, sweat, pain, mud, and snow - performance and experience in the use of sports watches. *CHI 2015* (pp. 2913-2922). ACM. doi:https://doi.org/10.1145/2702123.2702482

Thomas, S., & Martin, J. (2006). Using the papers of contemporary British politicians as a testbed for the preservation of digital personal archives. *Journal of the Society of Archivists, 27*(1), 29-56. doi:https://doi.org/10.108000039810600691254

Tschan, R. (2002). A comparison of Jenkinson and Schellenberg on appraisal. *The American Archivist, 65*(Fall/Winter), 176-195.

Tulle, E. (2007). Running to run: embodiment, structure and agency amongst veteran elite runners. *Sociology, 41*(2), 329-346. doi:https://doi.org/10.1177/0038038507074978

United Kingdom Athletics. (2022). *UK Athletics, Official Website*. Retrieved 01 14, 2022, from UK Athletics, Official Website: https://www.uka.org.uk

Upward, F. (1996). Structuring the records continuum part one. Post-custodial principles and properties. *Archives & Manuscripts, 24*(2), 268-285. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8583

Upward, F. (1997). Structuring the records continuum part two. Structuration theory and recordkeeping. *Archives & Manuscripts,, 25*(1), 10-35. Retrieved from https://publications.archivists.org.au/index.php/asa/article/view/8613

van Es, K., & de Lange, M. (2020). Data with its boots on the ground: Datawalking as research method. *European Journal of Communication, 35*(3), 278-289. doi:10.1177/0267323120922087

Vitak, J., Liao, Y., Kumar, P., Zimmer, M., & Kritikos, K. (2018). Privacy attitudes and data valuation among fitness tracker users. In G. Chowdhury (Ed.), *iConference 2018, LNCS 10766* (pp. 229-239). Springer Nature.

Waugh, D., Roke, E. R., & Farr, E. (2016). Flexible processing and diverse collections: a tiered approach to delivering born digital archives. *Archives and Records, 37*(1), 3-19. doi:https://doi.org/10.1080/23257962.2016.1139493

Wells, E. (2012). Related material - the arrangement and description of family papers. *Journal of the Society of Archivists, 33*(2), 81-87.

Wiesner, M., Zowalla, R., Suledar, J., Westers, M., & Pobiruchin, M. (2018). Accuracy and adoption of wearable technology used by active citizens: a marathon event field study. *JMIR Mhealth Uhealth, 5*(2), e24. doi:https://doi.org/10.2196/mhealth.9623

Williams, K. (2013). The weight of things lost: self-knowledge and personal informatics. *CHI 2013.* Paris. Retrieved from https://personalinformatics.org/docs/chi2013/williams.pdf

Wilson, T. D. (1999). Models in information behaviour. *Journal of Documentation, 55*(3), 249-270. doi:10.1108/EUM0000000007145

Wiltshire, G. R., & Stevinson, C. (2018). Exploring the role of social capital in community-based physical activity: qualitative insights from parkrun. *Qualitative Research in Sport, Exercise and Health, 10*(1), 47-62. doi:https://doi.org/10.1080/2159676X.2017.1376347

Wiltshire, G. R., Fullagar, S., & Stevinson, C. (2018). Exploring parkrun as a social context for collective health practices: running with and against the moral

imperatives of health responsibilisation. *Sociology of Health & Illness, 40*(1), 3-17. doi:https://doi.org/10.1111/1467-9566.12622

Wood, S., Carbone, K., Cifor, M., Gilliland, A., & Punzalan, R. (2014). Mobilizing records: re-framing archival description to support human rights. *Archival Science, 14*, 397-419. doi:https://doi.org/10.1007/s10502-014-9233-1

Yaco, S., & Hardy, B. B. (2013). Historians, archivists, and social activism: benefits and costs. *Archival Science, 13*, 253-272. doi:https://doi.org/10.1007/s10502-012-9187-0

Yair, G. (1992). What keeps them running? The 'circle of commitment' of long distance runners. *Leisure Studies, 11*(3), 257-270. doi:https://doi.org/10.1080/02614369200390131

Yang, R., Shin, E., Newman, M. W., & Ackerman, M. S. (2015). When fitness trackers don't 'fit': end-user difficulties in the assessment of personal tracking device accuracy. *UbiComp '15* (pp. 623-634). Osaka: ACM. doi:https://doi.org/10.1145/2750858.2804269

Yingling, J., & McClain, M. (2015). Snowball sampling, grounded theory, and theoretical sampling: roles in methamphetamine markets. *SAGE Research Methods Cases*. doi:10.4135/9781446273050014555098

Yoo, Y. (2010). Computing in everyday life: a call for research on experiential computing. *MIS Quarterly, 34*(2), 213-231. Retrieved from https://www.jstor.org/stable/20721425

Appendix 1 – Information School Ethics Committee approval

Lee Pretlove
Registration number: 180138065
Information School
Programme: Information Studies (PhD/Info Studs (SSc) FT) - INFR31

Dear Lee

PROJECT TITLE: iRunner: understanding the value of runners' self-tracking data (qualitative research)
APPLICATION: Reference Number 031267

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 21/11/2019 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 031267 (form submission date: 06/11/2019); (expected project end date: 01/10/2021).
- Participant information sheet 1072261 version 1 (06/11/2019).
- Participant information sheet 1072021 version 2 (06/11/2019).
- Participant information sheet 1072020 version 2 (06/11/2019).
- Participant information sheet 1072019 version 2 (06/11/2019).
- Participant consent form 1072023 version 2 (06/11/2019).
- Participant consent form 1072022 version 2 (06/11/2019).

The following optional amendments were suggested:

Suggested improvements have been made by the reviewers. According to this form, the applicant cannot see these reviews, hence I will email the PDF of this form with the suggested improvements to you. These are suggested improvements for clarity and completeness.

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Email Ischool Ethics
Ethics Administrator
Information School

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy:
  https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure
- The project must abide by the University's Good Research & Innovation Practices Policy:
  https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix 2 – Participant information pack

What we will do during the running recording.

iRunner.
Understanding running information and its value.

Please allow up to 90 minutes for the whole process

We will first talk about the participant information sheet, the consent form and the visual guides, like this one, that explain the recording process. I can show you a test video of a test recording.

The recording should last between thirty and forty minutes. Not all of that time can be spent running, it is your choice to run with what you are comfortable with.

Running as an activity is something that forms a part of your weekly activities or lifestyle. Therefore, you will already be aware of the everyday hazards and risks that running entails.

I will record the run and I may ask you questions about how you use information during your run.

You may find being recorded with a small camera distracting from seeing potential hazards. The recording method has been tested to be as discreet as possible so that any distractions are minimised.

Please be aware of the potential of being distracted away from potential hazards whilst answering questions. We will run somewhere you are comfortable and familiar with to minimise these distractions.

You should feel comfortable during the recording as if the camera is not present. We will try and treat the recording as a conversation whilst running.

You can decline to answer any particular question or questions. This is completely understandable.

The camera will record your answers and your non-verbal responses and actions during the run.

The camera will also record metrics like running speed, the route, distance and elevation that we both experience.

If you agree to proceed and sign the consent form, we will start the recording.

What we will do with your data from the running recording.

iRunner.
Understanding running information and its value.

You, the participant, goes for a run with me, the researcher. You may answer questions, if you want to, that I would like to ask you.

As you have agreed, the run will be recorded with a 360 degree camera to capture your answers and to observe your behaviour during running.

You may wish to share the data you recorded about your run with me for this research. You do not have to do this.

The 360 degree camera will store the audiovisual data from the run on an microSD card.

The data will then be analysed making notes in specialist research software. Data produced will only be stored in the secure folder and will be anonymised

The data will be edited and processed through audio visual editing software. Data produced will only be stored in the secure folder.

I will delete the data on the microSD card through reformatting. This makes the card clean, ready for further work.

The data from the camera (and other data you share) will be transferred to a secure folder on the University of Sheffield's closed filestore.

Results of the analysis from your data and other participants will then be written up into a thesis. The interpretation of the data will be anonymous.

The thesis will be published in The University of Sheffield's eThesis repository. If you agree, and depending upon your level of anonymization, the data from the work will be published into a national data repository.

At the award of the doctorate or within a month after 30/09/2022, the original data will be destroyed.

The data in the filestore will only be accessed by me, my supervisors and the iSchool IT Manager and the thesis examiners.

What we will do during the information recording.

iRunner.
Understanding running information and its value.

Please allow up to 90 minutes for the whole process

We will first discuss the format of the process and review your consent given in the first 'on the run interview'.

We will review your 'on the run' recording to remind you of the run. It will help inform discussion for the next set of questions.

We will look at your running information related to that run and other runs. Similar to the running recordings, we will make audio and visual recordings.

You should feel comfortable during the recording as if the camera is not present. We will try and treat the interview as a conversation.

Depending upon the medium in which you record and view your running information, we make recordings of that visual information as well as your audio responses.

I will ask you questions about you, your running information, how you use the information after the run and how and where you keep it and how often you use it.

You can decline to answer any particular question or questions. This is completely understandable.

Either a camera or screen recording software will record your answers, and the way you use and access your running information. This will depend upon the way in which you record and view your information.

After any questions that you may have and re-iterated your consent, we proceed with the interview recording.

The University Of Sheffield.

Lee J Pretlove
Doctoral Researcher
ljpretlove1@sheffield.ac.uk

Research Laboratory RC-318
Information School
The University of Sheffield
Regent Court
211 Portobello
Sheffield
S1 4DP
United Kingdom

UKRI

Arts and Humanities Research Council

White Rose
College of the Arts & Humanities
Universities of Leeds, Sheffield & York

All icons made by smalllikeart [https://www.flaticon.com/authors/smalllikeart] except 'petri dish' icon by Smashicons [https://www.flaticon.com/authors/smashicons] and 'clean' icon by Freepik [https://www.flaticon.com/authors/freepik] from www.flaticon.com.
Black and white icons made by freepreloaders.com [http://freepreloaders.com] and Raj Dev [https://freeicons.io/profile/714] from www.freeicons.io.

What we will do with your data from the information recording.

iRunner.
Understanding running information and its value.

The interview will be recorded with a camera and screen recording software if required, to capture your answers and to observe your interaction with your running information.

The camera will store the audiovisual data from the interview on an microSD card.

If you have digital information, the screen recording will store visual data straight to the University of Sheffield's secure filestore.

The data will then be analysed making notes in specialist research software. Data produced will only be stored in the secure folder and will be anonymised

The data will be edited and processed through audio visual editing software. Data produced will only be stored in the secure folder.

I will delete the data on the microSD card through reformatting. This makes the card clean, ready for further work.

The data from the camera (and other data you share) will be transferred to a secure folder on the University of Sheffield's closed filestore.

Results of the analysis from your data and other participants will then be written up into a thesis. The interpretation of the data will be anonymous.

The thesis will be published in The University of Sheffield's eThesis repository. If you agree, and depending upon your level of anonymization, the data from the work will be published into a national data repository.

At the award of the doctorate or within a month after 30/09/2022, the original data will be destroyed.

OR

The data in the filestore will only be accessed by me, my supervisors and the iSchool IT Manager and the thesis examiners.

The University Of Sheffield.

Lee J Pretlove
Doctoral Researcher
ljpretlove1@sheffield.ac.uk

Research Laboratory RC-318
Information School
The University of Sheffield
Regent Court
211 Portobello
Sheffield
S1 4DP
United Kingdom

UKRI

Arts and Humanities Research Council

White Rose
College of the Arts & Humanities
Universities of Leeds, Sheffield & York

All icons made by smalllikeart [https://www.flaticon.com/authors/smalllikeart] except 'petri dish' icon by Smashicons [https://www.flaticon.com/authors/smashicons] and 'clean' icon by Freepik [https://www.flaticon.com/authors/freepik] from www.flaticon.com.

Anonymising information about you.

What is anonymising and anonymity in research?

Anonymity is making sure that you are not identified from the data collected about you. It also makes sure that if data about you is shared or published, you cannot be identified. It is my responsibility as a researcher to make sure that the information I collect about you for my research is looked after properly and in line with your wishes. As the information is about you, it should be looked after in the way that you want. Your choices for anonymity are described in the boxes below.

Levels of anonymity

Light

- You will be assigned an identifier. This will not identify your name (e.g. Participant 1).
- Written transcriptions and reports based upon sound (audio) and video recordings **will only refer to your identifier**.
- **All** sound (audio) and video recordings **will** be made **publically available**, with your explicit permission.
- Video recordings and still photographs with your image and body **will not be disguised.**
- Sound (audio) recordings that have your voice in **will not be disguised.**
- Video recordings and still photographs with information other than your name that can identify you **will be disguised.**

Heavy

- You will be assigned an identifier. This will not identify your name (e.g. Participant 1).
- Written transcriptions and reports based upon sound (audio) and video recordings **will only refer to your identifier**.
- The sound (audio) and video recordings **will not** be made **publically available** in any way.

Custom

- The same options as '**Heavy**' anonymity, plus customisable options outlined below.
- **Some** sound (audio) recordings, video recordings and images **can be** made **publically available**, with your explicit permission.

Of the agreed recordings and images

- Video recordings and still photographs with your image and body can be included with an agreed range of anonymity, from completely disguised to undisguised.
- Sound (audio) recordings that have your voice can be included with an agreed range of anonymity, from completely disguised to undisguised.
- All intended materials intended to be made public will be checked with you first before they are made publically available.

Lee J Pretlove
Doctoral Researcher

ljpretlove1@sheffield.ac.uk

Research Laboratory RC-318
Information School
The University of Sheffield
Regent Court
211 Portobello
Sheffield
S1 4DP
United Kingdom

iRunner.
Understanding running information and its value.

The University Of Sheffield.

UKRI

Arts and Humanities Research Council

White Rose
College of the Arts & Humanities
Universities of Leeds, Sheffield & York

All icons made by smalllikeart [https://www.flaticon.com/authors/smalllikeart] except 'petri dish' icon by Smashicons [https://wwwi.flaticon.com/authors/smashicons] from www.flaticon.com.

The University of Sheffield Information School	iRunner: understanding running information and its value.

Researchers

The doctoral candidate undertaking research is Lee Pretlove (ljpretlove1@sheffield.ac.uk).

His supervisory team are Dr. Andrew M. Cox (a.m.cox@sheffield.ac.uk); Dr. Laura Sbaffi (l.sbaffi@sheffield.ac.uk) and Dr. Frank Hopfgartner (f.hopfgartner@sheffield.ac.uk).

All are members of the Information School, The University of Sheffield, Regent Court, 211 Portobello, Sheffield, S1 4DP.

Purpose of the research

This research aims to understand whether runners use self-tracking devices, how runners use the information from the device(s), whether they find it valuable, whether they refer back to it and whether they have any concerns about the information and where it is kept. It also aims to understand whether archival institutions place value or have interest in the preservation of personal self-tracking archives.

Who will be participating?

I am inviting adults over the age of 18 who have been running indoors or outdoors for a least a month.

What will you be asked to do?

The research into runners consists of two phases. The first phase is a participatory interview in which you will go on a thirty to forty minute run with the interviewer, who will be recording the interview with a handheld 360 degree camera. The questions will ask about your demographic information (your age, gender etc.) so that I have a profile of our participants. I will then ask you questions about your running habits; how you track your running; how you use the information; your attitudes towards the use and value of the information and how and where you keep your tracking information.

After a period of analysis and review by the researcher, the second phase will see a review of the recorded running interview, which will be also be recorded. I will also ask questions about how you use the self-tracking data that you have, understand how much self-tracking data you have about your running and how far back you use it. This will involve screen recording the data if you use self-tracking technologies as well as audiovisual recording. For those who do not use digital technology, the interview will only consist of audiovisual recording.

What are the potential risks of participating?

The risks of participating are the same as those experienced in everyday life, especially for those that accept the risks that are associated with running as an activity.

Your may find running with having to think about answering questions and being recorded by a small handheld camera distracting. As a result, you may not be fully concentrating on the immediate environment. The running interview will be conducted on a route that you are familiar and about which you will have an awareness of hazards and risks that could be encountered.

What data will I collect?

The data about you that I will be collected will be recorded audio to capture your answers to interview questions and recorded visual to observe your use of tracking devices and or your non-verbal responses to questions.

The second phase of data collection will also use audiovisual data collection to record your verbal and non-verbal responses to questions. Where it is relevant, digital screen recording will record all of your actions when you interact with digital self-tracking platforms.

What will I do with the data?

The collected data will be transferred from the recording devices to the Information School's secure data drive which is accessed only on campus or through a virtual private network and only through the researcher's university account authentication.

The data will be stored here and then processed for editing through Garmin VIRB Edit and for subsequent anonymisation where required through Adobe Premiere Pro. The file will always be located within the secure data drive.

I will be analysing the data for inclusion in my doctoral thesis. The data will be stored on the Information School's research data drive which can be accessed only by me, my supervisor, and the School's Examinations Officer and ICT staff operating the facility. I will also store an encrypted password protected back up copy on my personal laptop.

This data will be deleted from local systems within 1 month of my degree being awarded. Unless the participant has expressly consented to waiver anonymity, it is planned to place the anonymised data into a social science data archive (the UK Data Archive) for use by future researchers. Levels of anonymity will be discussed with you for any published data and your request will be recorded and documented. You will have complete control over how the data is used and presented and you can change your consent options at any time during the research.

Will your participation be confidential?

Your choice of specification for confidentiality and anonymity will be respected. The three levels of anonymity are described below and will be recorded in a check box so that your wishes are respected:

Light ☐
- You will be assigned an identifier. This will not identify your name (e.g. Participant 1).
- Written transcriptions and reports based upon sound (audio) and video recordings will only refer to your identifier.
- All sound (audio) and video recordings will be made publically available, with your explicit permission.
- Video recordings and still photographs with your image and body will not be disguised.
- Sound (audio) recordings that have your voice will not be disguised.
- Video recordings and still photographs with information other than your name that can identify you will be disguised.

Heavy ☐
- You will be assigned an identifier. This will not identify your name (e.g. Participant 1).
- Written transcriptions and reports based upon sound (audio) and video recordings will only refer to your identifier.
- The sound (audio) and video recordings will not be made publically available in any way.

Custom ☐

- The same options as 'Heavy' anonymity, plus customisable options outlined below.
- Some sound (audio) recordings, video recordings and images can be made publically available, with your explicit permission.

Of the agreed recordings and images

- Video recordings and still photographs with your image and body can be included with an agreed range of anonymity, from completely disguised to undisguised.
- Sound (audio) recordings that have your voice can be included with an agreed range of anonymity, from completely disguised to undisguised.
- All intended materials intended to be made public will be checked with you first before they are made publically available.

The detail of the customisable levels of anonymity, should you choose 'Custom' will be discussed with your and recorded in writing prior to data collection.

As described in 'what will I do with the data?' above, the original, raw data collected about you will be stored securely in secure University storage. Once the original, raw data has been analysed, the data will be anonymised and you will be informed at all stages of how anonymity has been carried out. For example, after the first phase of interviews, I will show you how the data has been processed in accordance with your choice of anonymity.

As described in the section above, your data will be deleted one month other successful completion of the research project.

What will happen to the results of the research project?

The results of this study will be included in my doctoral (PhD) thesis which will be publicly available. Please contact the Information School in twelve months after the last phase of interviews. The results of this research will be reported in journal papers and a summary of the results will be posted through a link on The Information School's website.

As a participant, if you choose to do so, you will be kept informed of all developments relating to your contribution to this research.

What is the legal basis for processing your personal data?

The University of Sheffield will act as the Data Controller for this study. This means that the University is responsible for looking after your information and using it properly. In order to collect and use your personal information as part of this research project, we must have a basis in law to do so. The basis that we are using is that the research is 'a task in the public interest'.

As we will be collecting some data that is defined in the legislation as more sensitive (information about your health, we also need to let you know that we are applying an additional condition in law: that the use of your data is 'necessary for scientific or historical research purposes'.

Declaration of consent

- I confirm that I have read and understand the description of the research project, and that I have had an opportunity to ask questions about the project.

- I understand that my participation is voluntary and that I am free to withdraw three months after the interview without any negative consequences.

- I understand that if I withdraw I can request for the data I have already provided to be deleted, however this might not be possible if the data has already been anonymised or findings published.

- I understand that I may decline to answer any particular question or questions, or to do any of the activities.

- I understand that my responses will be kept strictly confidential, that my name or identity will not be linked to any research materials, and that I will not be identified or identifiable in any report or reports that result from the research, unless I have agreed otherwise. Any agreements to the contrary have been recorded and are included as an addendum to this consent.

- I give permission for all the research team members to have access to my responses.

- I give permission for the research team to re-use my data for future research as specified above.

- I agree to take part in the research project as described above.

_____   _____
Participant Name (Please print)   Participant Signature

_____   _____
Researcher Name (Please print)   Researcher Signature

Date _____

Note: Further information, including details about how and why the University processes your personal information, how we keep your information secure, and your legal rights (including how to complain if you feel that your personal information has not been handled correctly), can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.
If you have any difficulties with, or wish to voice concern about, any aspect of your participation in this study, please contact Dr Paul Reilly, Research Ethics Coordinator, Information School, The University of Sheffield (ischool_ethics@sheffield.ac.uk).

Consent addendum

Participant pre-run questions

A4. What option *best* describes your work within the last seven days? If you are retired, what work did you do before you retired? Please tick one answer.

- ☐ Modern professional occupations
  - ○ *such as: teacher – nurse – physiotherapist – social worker – welfare officer – artist – musician – police officer (sergeant or above) – software designer*
- ☐ Clerical and intermediate occupations
  - ○ *such as: secretary –personal assistant – clerical worker – office clerk – call centre agent – nursing auxiliary – nursery nurse*
- ☐ Senior managers or administrators (usually responsible for planning, organising and co-ordinating work, and for finance)
  - ○ *such as: finance manager – chief executive*
- ☐ Technical and craft occupations
  - ○ *such as: motor mechanic– fitter – inspector – plumber – printer – tool maker –electrician – gardener – train driver*
- ☐ Semi-routine manual and service occupations
  - ○ *such as: postal worker – machine operative – security guard – caretaker – farm worker – catering assistant – receptionist – sales assistant*
- ☐ Routine manual and service occupations
  - ○ *such as: HGV driver – van driver – cleaner – porter – packer – sewing machinist – messenger– labourer – waiter/waitress – bar staff*
- ☐ Middle or junior managers
  - ○ *such as: office manager – retail manager – bank manager – restaurant manager –warehouse manager – publican*
- ☐ Traditional professional occupations
  - ○ *such as: accountant– solicitor – medical practitioner – scientist – civil/mechanical engineer*
- ☐ In full time education
- ☐ Unemployed
- ☐ Prefer not to say

A5. What is your highest level of qualification? Please tick one answer.

- ☐ GCSEs or equivalent
- ☐ A-Levels or equivalent
- ☐ First degree
- ☐ Postgraduate degree
- ☐ None of these
- ☐ Don't know
- ☐ Prefer not to say

Participant pre-run questions

B. About your running

B1. How long have you been running for? Please answer in numbers or tick your preferred answer.

☐☐ years

☐ Don't know
☐ Prefer not to say

☐☐ months

B2. What is your personal best time at running 5km (3.11 mile) distance? Please answer in numbers or tick your preferred answer.

☐☐ minutes

☐ Don't know
☐ Prefer not to say

☐☐ seconds

B3. Over the last four weeks, what distance have you run in an average week, to the nearest unit of measurement? Please answer in numbers or tick your preferred answer.

☐☐ miles **or**

☐ Don't know
☐ Prefer not to say

☐☐ kilometers

B4. Over the last four weeks, how much time have you spent running in an average week to the nearest 30 minutes? Please answer in numbers or tick your preferred answer.

☐☐ hours

☐ Don't know
☐ Prefer not to say

☐☐ minutes

B5. Over the last four weeks, how many days a week do you run, on average? Please answer in numbers or tick your preferred answer.

☐ days

☐ Don't know
☐ Prefer not to say

Appendix 3 – Semi-structured questions for the first phase of data collection

Observe

Ask

1. What is your watch?

2. What other watches have you had?

3. What information do you use? When?

4. Is the information useful?

5. What information do you find valuable?

6. What if all information was lost tomorrow?

Appendix 4 – Semi-structured questions for the second phase of data collection

Planned semi-structured questions to start with for Adam

Pandemic

1. Since the last time we met, has your running and the types of information you use changed in any way? Is there anything you are doing differently or new?

Original research questions

1. Thinking back to the day of the recording, can you show me and/or talk me through how you would access the record.
   a. Is this a similar way in which you would access your record after a run?
2. Can you show me and/or talk me through what you would usually look at and why?
3. What is useful or not useful?
4. Do you look at any other information in this technology (matched runs, weekly stats)?
   a. If yes, can you show me and talk me through it?
   b. If no, ask why.
5. Why do you use this particular platform?
   a. Are there other platforms available, why not use these?

6. In the first recording, you said something about [state emotional response or response] if your running information history was lost. Do you still feel the same?
7. Why do you keep the information to look back on?
8. How far back do you go?
9. How far into the future do you think you'd want to use this information/history?
10. Do you do anything to protect your information against loss?
    i. **IF YES** – Why? How?
    ii. **IF NO** – Why not?
11. Can you imagine anyone else in the future who would want to use your running history information? (such as family, other social groups)

Planned semi-structured questions to start with for David

Pandemic

1. Since the last time we met in March, has your running and the types of information you use changed in any way? Is there anything you are doing differently or new?
2. A previous participant mentioned the idea of a "virtual ultra" have you encountered the idea of a virtual event or participated in one?

Original research questions

Use and value

3. can you show me and/or talk me through how you would access a record of a run?
4. Is this your preferred way of viewing it?
5. Can you talk me through what you usually look at (comparisons etc.)?

6. Why do you use this platform?
7. What are your thoughts on the changes to Strava?
8. What do you think of the new pricing?
9. Has the above affected you in any way?

10. Do you have any other information sources that you can show me and talk through? (you mentioned your electronic Microsoft Excel diary and your handwritten diaries in the first recording)

Historical value

11. In the first recording, you said you wouldn't be too bothered if you lost your information history compared to when you were competitive. Do you still think the same?
12. Why do you keep the information to look back on?
13. How far back do you go?
14. Do you think there is a difference between digital and analogue in how you perceive and use the information?
15. Do you do anything to protect your information against loss?
    i. **IF YES** – Why? How?
    ii. **IF NO** – Why not?

16. Can you imagine anyone else in the future who would want to use your running history information? (such as family, other community groups, other institutions)

Planned semi-structured questions to start with for Chris

Pandemic

1. Since the last time we met in March, has your running and the types of information you use changed in any way? Is there anything you are doing differently or new?
2. A previous participant mentioned the idea of a "virtual ultra" have you encountered the idea of a virtual event or participated in one?

Original research questions

Use and value

3. can you show me and/or talk me through how you would access a record of a run?
4. Is this your preferred way of viewing it?
5. Can you talk me through what you usually look at (comparisons etc.)?

6. Why do you use this platform?
7. What are your thoughts on the changes to Strava?
8. What do you think of the new pricing?
9. Has the above affected you in any way?

10. Do you have any other information sources that you can show me and talk through? (You mentioned Garmin Connect in the first recording)

Historical value

11. In the first recording, you said that you would be annoyed if you lost your information history compared to when you were competitive. Do you still think the same?
12. Why do you keep the information to look back on?
13. How far back do you go?
14. Do you think there is a difference between digital and analogue in how you perceive and use the information?
15. Do you do anything to protect your information against loss?
    i. **IF YES** – Why? How?
    ii. **IF NO** – Why not?
16. Can you imagine anyone else in the future who would want to use your running history information? (Such as family, other community groups, other institutions)

Planned semi-structured questions to start with Becky

Pandemic

1. Since the last time we met in March, has your running and the types of information you use changed in any way? Is there anything you are doing differently or new?
2. A previous participant mentioned the idea of a "virtual ultra" have you encountered the idea of a virtual event or participated in one?

Original research questions

Use and value

3. can you show me and/or talk me through how you would access a record of a run?
4. Is this your preferred way of viewing it?
5. Can you talk me through what you usually look at (comparisons etc.)?

6. Why do you use this platform?
7. What are your thoughts on the changes to Strava?
8. What do you think of the new pricing?
9. Has the above affected you in any way?

10. Do you have any other information sources that you can show me and talk through? (You mentioned Garmin Connect in the first recording)

Historical value

11. **In the first recording, you said something along the lines that you were not bothered about losing your running information history. Do you still think the same?**
12. Why do you keep the information to look back on?
13. How far back do you go?
14. Do you think there is a difference between digital and analogue in how you perceive and use the information?
15. Do you do anything to protect your information against loss?
    i. **IF YES** – Why? How?
    ii. **IF NO** – Why not?
16. Can you imagine anyone else in the future who would want to use your running history information? (Such as family, other community groups, other institutions)

Planned semi-structured questions to start with Group 2

What would you say are your reasons for running?

Do you do all your runs at the same speed or distance?

Do you use a device or instrument at all on your run?

What types of information do you use on the run?

Does the information give you any emotional feelings or responses?

Think about a type of run and tell me about it.

Do you use any bodily feelings whilst running?

Is there anything you are aware of in your environment?

Do you run with anyone else?

[IF DEVICE USED] You said you use a device on your runs. Do you record your runs?

Do you look at your information after a run? Can you talk me through what you do and see?

Do you share your information after a run at all?

Where do you look at it? How do you look at it? Why in this way?

How far back in time do you look at your running information?

Do you have any attachment to your information?

Do you think you'll always have access to it?

Where do you store it?

Have you thought that all this is stored by someone else? Does this concern you?

Do you have anything stored in handwritten sources?

Do you use the information to plan a run? How do you do this?

Is there any information from your running that you find particularly valuable to you?

How would you feel if it was lost tomorrow?

Do you think anybody else would be interested in your information, say, thirty to forty years?

Appendix 5 – Examples of situational analysis mapping

SOCIAL WORLD AND
ARENA MAPPING
Based upon the situation
messy map. Memoes voice
recorded
20200713_SA_SWAM_01
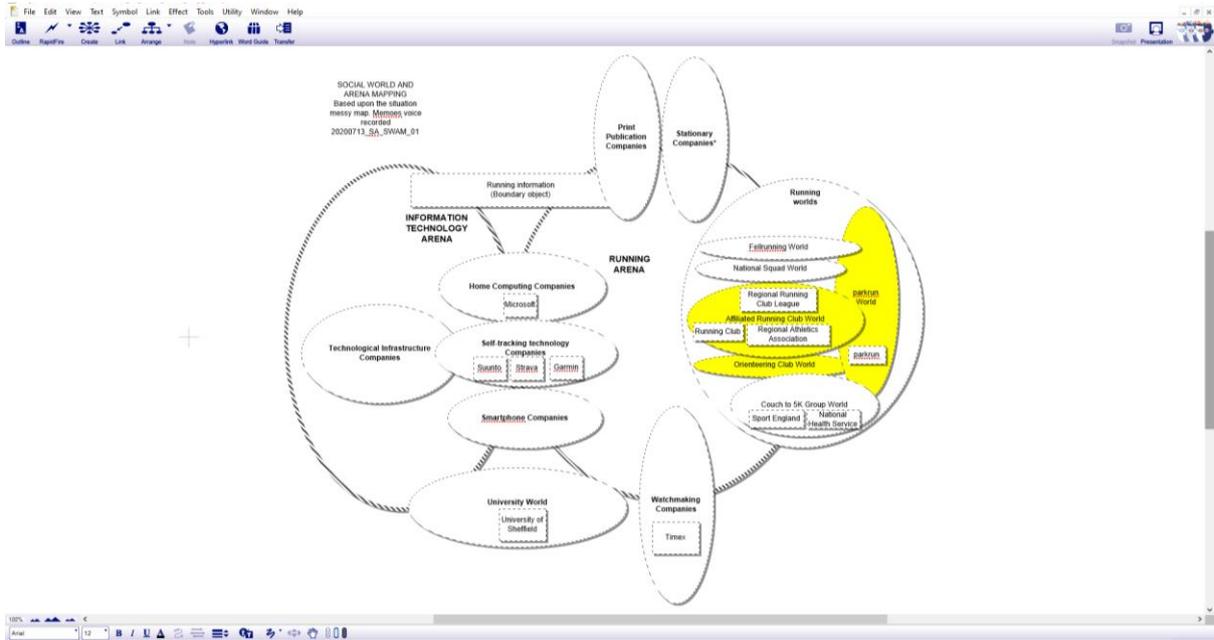
Appendix 6 – Timelines of data collection and analysis

Date(s)	Research action	Actant(s)
18/01/2020	**360 degree camera running data collection**	**Adam, Researcher**
20/01/2020 – 22/01/2020	Adam's verbatim transcription from Garmin VIRB audio-visual software	Researcher
02/02/2020	Analysis of Adam's data	Researcher
03/02/2020	Adam's visual and environmental transcription from Oculus Go	Researcher
12/02/2020	**360 degree camera running data collection**	**Becky, Researcher**
13/02/2020 – 18/02/2020	Becky's verbatim transcription from Garmin VIRB audio-visual software	Researcher
18/02/2020	Analysis of Adam's data concluded	Researcher
24/02/2020 – 25/02/2020	Becky's visual and environmental transcription from Oculus Go	Researcher
25/02/2020	Analysis of Becky's data	Researcher
01/03/2020	**360 degree camera running data collection**	**Chris, Researcher**
07/03/2020	Chris' verbatim transcription from Garmin VIRB audio-visual software	Researcher
08/03/2020	**360 degree camera running data collection**	**David, Researcher**
02/04/2020	Analysis of Becky's data concluded	Researcher
05/04/2020	Analysis of Chris' data	Researcher
06/04/2020	Chris' verbatim transcription from Garmin VIRB and Audacity software	Researcher
07/04/2020	Chris' visual and environmental transcription from Oculus Go	Researcher
19/04/2020	Analysis of Chris' data concluded	Researcher
20/04/2020	David's verbatim transcription from Garmin VIRB audio-visual software	Researcher
21/04/2020	David's verbatim transcription from Audacity software	Researcher
22/04/2020	David's visual and environmental transcription from Oculus Go	Researcher
24/04/2020	Analysis of David's data	Researcher
28/04/2020	Analysis of David's data concluded	Researcher
29/04/2020 – 02/06/2020	Code integration and move toward *situational analysis* mapping	Researcher
29/04/2020 – 02/06/2020	Iterative analytical writing up	Researcher

Table A1: An overview of Phase 1 tasks from the first data collection activity.

Day	Jan	Feb	Mar	Apr	May	Jun	Day
1			DC3				1
2		Ab1		Ae2			2
3		T1					3
4							4
5				Ab3			5
6				T3			6
7			T3	T3			7
8			DC4				8
9							9
10							10
11							11
12		DC2					12
13		T2					13
14							14
15							15
16							16
17							17
18	DC1	Ae1 T2					18
19				Ae3			19
20	T1			T4			20
21	T1			T4			21
22	T1			T4			22
23							23
24		T2		Ab4			24
25		Ab2 T2					25
26							26
27							27
28				Ae4			28
29				A W			29
30							30
31							31

Key:

DC1, DC2, DC3, DC4 Data collection participant 1, 2, 3, 4

T1, T2, T3, T4 Transcription from data collection 1, 2, 3, 4.

Ab1, Ab2, Ab3, Ab4 Analysis begins from data collection 1, 2, 3, 4.

Ae1, Ae2, Ae3, Ae4 Analysis ends from data collection 1, 2, 3, 4.

A Code integration and move toward *situational analysis* mapping

W Iterative writing up

Figure A2: A visual overview of Phase 1 research activities from data collection to analysis using the legend code from Table 6.

Date(s)	Research action	Actant(s)
03/06/2020 – 22/06/2022	Continuation of iterative writing up	Researcher
03/06/2020 – 01/07/2020	*Situational analysis* mapping	Researcher
03/06/2020	**Virtual data collection on GoogleMeet**	**Adam, Researcher**
03/06/2020	Adam's verbatim transcription from OBS Studio recording	Researcher
05/06/2020	**Virtual data collection on GoogleMeet**	**David, Researcher**
08/06/2020	David's verbatim transcription from OBS Studio recording	Researcher
09/06/2020	**Virtual data collection on GoogleMeet**	**Chris, Researcher**
09/06/2020 – 10/06/2020	Chris' verbatim transcription from OBS Studio recording	Researcher
02/07/2020	Point of philosophical revision for *neo-assemblage theory analysis*	Researcher
03/07/2020 – 17/08/2020	*Situational analysis* and *neo-assemblage theory analysis* mapping	Researcher
07/07/2020	**Virtual data collection on GoogleMeet**	**Becky, Researcher**
07/07/2020	Becky's verbatim transcription from OBS Studio recording	Researcher
05/08/2020 – 17/08/2020	Iterative writing up	Researcher

Table A2: An overview of Phase 2 tasks from the second data collection activity.

Key:

DC5, DC6, DC7, DC8   Data collection participant 5, 6, 7, 8

T5, T6, T7, T8   Transcription from data collection 5, 6, 7, 8.

A   Analysis

W   Iterative writing up

Figure A2: A visual overview of Phase 2 research activities from data collection to analysis.

Date(s)	Research action	Actant(s)
18/08/2020 – 06/12/2020	Continuation of analysis	Researcher
18/08/2020	**Virtual data collection on GoogleMeet**	**Joy, Researcher**
19/08/2020 – 26/10/2020	Analytical writing up of Phases 1 and 2	Researcher
27/10/2020	Joy's verbatim transcription from OBS Studio	Researcher
28/10/2020 – 07/12/2020	Iterative writing up	Researcher
29/10/2020	**Virtual data collection on GoogleMeet**	**Faye, Researcher**
30/10/2020	Faye's verbatim transcription from OBS Studio	Researcher
03/11/2020	**Virtual data collection on GoogleMeet**	**Guy, Researcher**
05/11/2020	Guy's verbatim transcription from OBS Studio	Researcher
02/12/2020	**Virtual data collection on GoogleMeet**	**Helen, Researcher**
03/12/2020 – 04/12/2020	Helen's verbatim transcription from OBS Studio	Researcher

Table A3: An overview of Phase 3 tasks from the third data collection activity.

Key:

DC9, DC10, DC11, DC12   Data collection participant 9, 10, 11, 12

T9, T10, T11, T12   Transcription from data collection 9, 10, 11, 12.

A   Analysis

W   Iterative writing up

Figure A3: A visual overview of Phase 2 research activities from data collection to analysis.