Framing the Implementation and Adoption of Innovation in the NHS: An Interactive Multi-User Perspective

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Author’s Declaration

The work presented here is my own and has not been submitted for any other degree at the University of Leeds or any other institution. All sources are acknowledged as references.

I confirm that the work submitted is my own and that appropriate credit has been given where reference has been made to the work of others.

Tabish Zaman

Author Publications

Zaman, T., Mount, M., Pitsis, T. S., O'Connor, R., and Dean, S. (2018) A Socio-Cognitive Model of Innovation Adoption and Implementation, In Sund, K. J., Galavan, R., & Brusoni, S. (Eds.) *Cognition and Innovation*: *New Horizons in Managerial and Organizational Cognition*, Vol. 3, Emerald Group Publishing.

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In memory of my beloved father, Fasihuz Zaman.

You’ll never be forgotten.

Abstract

The UK National Health Service (NHS) has been slow at adopting seemingly well-evidenced innovation. A great deal of energy and resources have gone into understanding the issues behind the failure to adopt innovation in the NHS (Castle-Clarke, Edwards and Buckingham, 2017). In recent times Accelerated Access Review (AAR) identified new barriers to innovation and put forward solutions at both local and national levels (Department of Health and Department for Business, Energy and Industrial Strategy, 2017). Scholars and policy-makers have investigated the majority of the obstacles to adopting innovation in the NHS and results have appeared in multiple outlets over the last twenty years. Innovation within the NHS have mostly been judged on a least-cost basis or presumed to yield a positive return in the very first year. Some scholars also point to the fact that most perspectives on innovation deem it as a luxury rather than a routine part of the operational management.

The failure to successfully adopt innovations is costing taxpayers and despite so many obstacles well documented, the NHS is still struggling to overcome the scale of innovation. To this concern, my research is an attempt to better understand the process of innovation adoption in healthcare. Using a year-long field study at one of the largest UK-based University Hospitals, I have explored the process of adoption of electronic medicine chart (EMEDs) designed to replace traditional paper-based systems. Based on three groups of non-clinical and clinical stakeholders, I have developed a multi-view perspective of the adoption process.

Exploring the perspectives of both the clinical users (doctors, nurses, and pharmacists) and technology (clinical and non-clinical) implementer groups, I have developed a multi-view perspective of the adoption process. To address the struggles and complexity of the adoption process underpinning the implementation of innovation in hospitals, my research has advanced a socio-cognitive perspective through examining the groups of technology

implementers and technology users. Currently, a body of research exists which has examined the adoption of innovation underpinning implementation in firms. The literature has tended to provide economic-based theories of rational action by focussing on channels through which technical or economic benefits are communicated as a means to propagate its adoption. An alternative to economic-based explanations, the institutional theory perspectives have identified forces triggering adoption, irrespective of the innovation's technical, work-related, or economic benefits to the adopter. Contributing to the growing interest in socio-cognitive perspective, my research through interactive framing has examined the groups of technology implementers and technology users. This has been done to develop an understanding of how actors 'make sense' of the process unfolding through them (the implementers and users). Having used Gioia methodology, I have utilised data collected through rich in-depth interviews of the actors during the process of implementation and adoption. The data collected have been used to build a data structure leading onto an interactive grounded theory model of EMEDs adoption. The model is built on three core dynamic framing activities – intrinsic, frictional and transitioning. Collectively they represent a cognitive transformation of all the actors involved and offer insight into the negotiated state and challenges of adoption process faced by both users and implementers in a complex organisation.

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Chapter 1: Introduction

1.1 Research Context and Background

When compared to sectors such as banking and retailing where technology has transformed relationships between service providers and customers, the pace of technological change in healthcare has been slow (Alrahbi, Khan and Hussain, 2019). Technology in healthcare has the potential to transform the relationship between patients and health professionals. It can essentially drive improvements in quality, efficiency and population health (Imison et al., 2016). It can revolutionise patient and user experience by facilitating access to relevant information and online peer support (Gretton and Honeyman, 2016). For clinicians, it can translate into reduced effort and time spent in accessing information about patients, and includes benefits such as remote monitoring, improved clinical decisions and support customised treatment plans (Honeyman, Dunn and McKenna, 2016; Ham, Dixon and Brooke, 2012). Digital technologies including the internet, mobile devices, and sensors have been employed to improve the delivery of health interventions. Digital technologies play a key role in intervention development and facilitate evidence-based interventions to transcend cultures and population. Digital technology has had a particular impact in the last decade, as medical fraternity has pushed for developing and implementing clinical interventions which are evidence-based but are driven technologically (Aguilera, 2015). Healthcare institutions across the globe have benefitted from such a confluence.

Significantly, the English National Health Service (NHS) stands on the cusp of a new wave of technological innovation covering informatics, artificial intelligence, robotics, and computerisation to meet patient expectations and deliver better value for money (Keohane, 2018). The UK government, as well as policymakers and healthcare managers, have recognised that technological innovation is a critical lever for improving quality, safety and efficiency in the NHS (Sheard et al., 2017). The use of technological innovation in the NHS to digitise its system and process has been a long-

standing effort and is not new to the country's healthcare system. Technological innovation is the first step of digitisation when it comes to new technologies, which the NHS as an organization has been maneuvering ever since it came into existence. As far back as the 1960s, the first computer was used for administrative, financial and research purposes (Gove, 1976). The first national information technology (IT) strategy for the NHS was formulated in 1992 (Donaldson, 1992) and was quickly followed by strategies in 1998 and 2002, culminating in the creation of the National Programme for IT (NPfIT). It was also referred to as 'Connecting for Health', the idea was to: a) create a single electronic care record for patients, b) to link primary and secondary care IT systems and c) to offer a common platform for health professionals (Britnell, 2015). NPfIT, known for its multi-million-pound programme of investment, dominated the NHS digitisation agenda from 2002 to 2011, but ultimately failed to deliver on its main objectives, which included providing the NHS with an integrated electronic health record system across secondary care (Wolff et al., 2017). Rigid, centralised decision-making, along with lack of local engagement, failed to capture users' needs and engagement when implementing NPfIT (Watcher, 2016). By 2012, NPfIT had all but ceased to exist, but then in 2013 the then Secretary of State for Health, Jeremy Hunt, challenged the NHS to 'go paperless' by 2018, an ambition further outlined in the *NHS five year forward view* (Clarke et al., 2017).

Past evidence has contributed to developing strategies for the *NHS five year forward view*, but this does not hide the fact that the NHS has been slow to embrace innovative technologies. While continuing to transform and save lives, the NHS has nonetheless struggled to integrate new technologies. (Greenhalgh et al., 2017). As much as technological innovation is critical and its contributions have been recognised by both internal and external stakeholders, its adoption within the NHS has been a topic of intense discussion (Collins, 2018). In the context of my research, adoption refers to the introduction of a product, service, process or practice which is new to the adopting organisation (Hameed, Counsell and Swift, 2012; Pichlak, 2016; Van de Ven, Angle, and Poole, 2000).

Systematic reviews and policies have commented upon the poor understanding and mechanisms that facilitate the adoption of innovation in the NHS (Kyratsis, Ahmad, and Holmes, 2012). Government and policymakers have stressed the need to create an environment for clinicians and local NHS organisations to help them adopt innovations and transform the way care is being delivered (Parris et al., 2016). In order to facilitate the 'adoption' of new technologies with the NHS, a special budget of £50 million was sanctioned to be spent between 2013 and 2018.

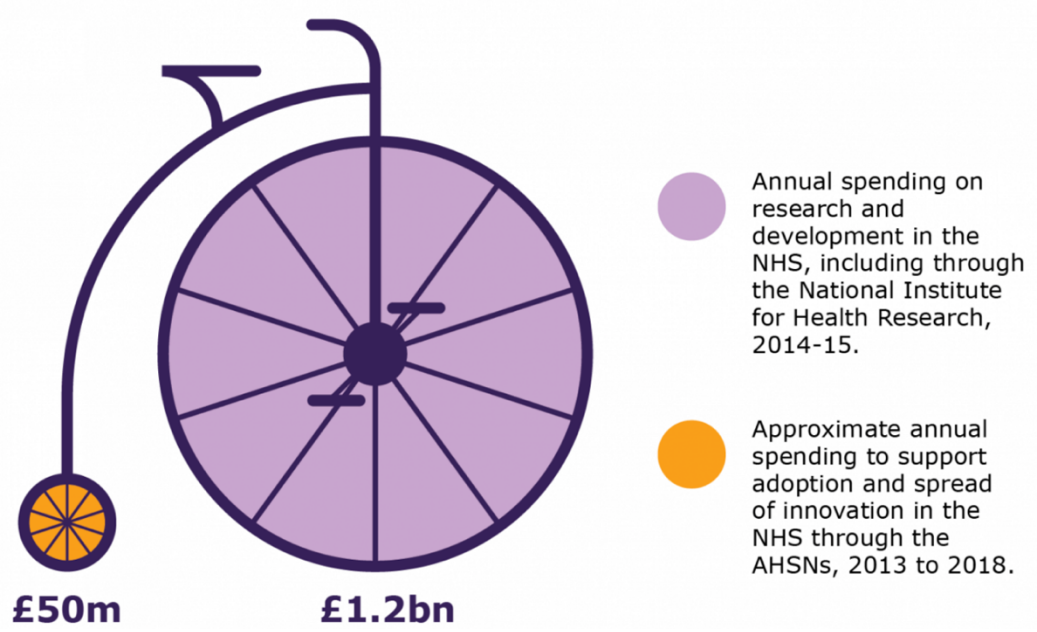


Figure 1.1: Comparison of spending on innovation; adoption and spread of innovation in the NHS (Department of Health 2017; NHS England, 2017)

This was separate from the annual NHS budget for innovation (Collins, 2018). The sanctioning of such a special budget has put the focus firmly on the NHS and its priorities, for which government and policymakers are slowly recognising the importance of adoption in a setting as complex as the NHS. To put the notoriously difficult nature of adoption in the NHS in perspective, the explanations are often attributed to complex, unpredictable and highly interdependent relationships between individuals, teams, and systems within the clinical environment (Abbott, Foster, Marin and Dykes, 2014). This heterogeneity and complexity are, as I will show, underrepresented in the current models of innovation adoption.

1.2 Theoretical Foundations

A rich stream of literature on innovation adoption has been accumulating over the years with scholars contributing to its development from various disciplines. Theoretical cornerstones of innovation adoption studies have, however, been tied together by different editions of Rogers' seminal work (Rogers, 1962; Rogers, 1983; Rogers, 1995; Rogers, 2003). His ideas have permeated most perspectives on innovation adoption, leading to models and explanations best explained through broad classifications and theoretical underpinnings.

Emerging from the economic literature, the first set of explanation on innovation adoption is built on the rational actor model and is one of the most dominant sets of theories in adoption studies (Ansari, Fiss, and Zajac, 2010; Rogers, 1995; Sturdy, 2004). Scholars researching these numerous explanations have focussed on economic theories of rational action when studying innovation adoption. These studies have emphasised the informational conduits through which the technical or economic benefits of innovation are communicated to others as a means to propagate adoption. These apply unidirectional causations in order to assess the impacts of determinants on adoption of specific innovations (Cooper and Zmud, 1990; Fichman and Kemerer, 1999; Kapoor, Dwivedi, and Williams, 2014; Kimberly and Evanisko, 1981; Prajogo and McDermott, 2014; Rogers, 1983; Tonratzky et al., 1990; Zaltman et al., 1973). Emerging from the field of economics, rational accounts have been associated with an ‘intuitive appeal’ given their emphasis on the economic benefits resulting from the adoption of an innovation.

The other prominent explanation emerges from an institutional theory which emphasises the influence of group pressure on adoption. The institutional account sheds light isomorphism that triggers adoption regardless of the innovation’s technical, work-related, or economic benefits to the adopter (Abrahamson, 1991; Abrahamson and Fairchild, 1999; Abrahamson and

Rosenkopf, 1993; Abrahamson and Rosenkopf, 1990; Bikhchandani et al., 1992; Dimaggio and Powell, 1983; Haunschild and Miner, 1997; Meyer and Rowan, 1977; Suchman, 1995; Tolbert and Zucker, 1983; Westphal et al., 1997).

Another popular perspective is known as 'diffusion of innovation theory' (DOI) which has argued that the attributes of innovation which potential adopters weigh up during the adoption decision encompass five characteristics: the innovation's relative advantage over its predecessor, compatibility with existing values and past experiences, complexity of use, observability to others, and its temporary trialability (Rogers, 1962).

Furthermore, empirical studies using the DOI theory are primarily focused on how technological innovations in the form of concrete products and services are communicated to consumer adopters through various advertising channels such as television, social media, and so on (Bass, 1969; Van Den Bulte and Joshi, 2007). Others, meanwhile, have modelled the diffusion of innovation in homogenous and heterogenous social systems (Chatterjee and Eliashberg, 1990; Gatignon and Robertson 1985).

1.3 Research Gap and Objectives

Prior studies from all perspectives have significantly advanced our understanding of the macro-level dynamics of innovation adoption. However, the necessary assumptions to advance these perspectives are undergirded by homogenous adoption decisions. Offering us mostly a parsimonious account of the process, prior assumptions of homogeneity become particularly salient at the intra-firm level in complex and high-reliability organisations, such as hospitals and other healthcare institutions. This is because they are characterised by a multiplicity of actors with heterogeneous roles, professional backgrounds, meaning systems, and underlying logics formed throughout their socialization into various working roles (Wright et al., 2017). In such contexts, the dominant macro-level

rational and institutional accounts of innovation adoption advocated by prior studies (Strang and Macy, 2001; Teece, 1980; Williamson, 1979; Abrahamson, 1991; DiMaggio and Powell, 1983) do not provide adequate tools or theoretical mechanisms to explore the micro-level socio-cognitive struggles of the adoption process alongside a complex array of stakeholders.

More importantly, these perspectives abstract from the micro-level complexities and the socio-cognitive mechanisms that enable or preclude adoption among heterogeneous actors (Ansari, Fiss, and Zajac, 2010; Garud, Gehman, and Kumaraswamy, 2011). The main issue with both economic and institutional perspectives is the absence of psychological and cognitive effect, which is an inherent reality for any change-related process, including the introduction of new technology. They continue to provide a primarily asocial conception of human behaviour that emphasizes the role of group pressure, which can often lead to the inefficient or harmful adoption of innovation for the organisation (Abrahamson, 1991; Strang and Macy, 2001). These accounts position social pressures as a predominant driving force of adoption. They are typically non-agentic and abstract from the socio-cognitive minutiae that underpin actors' struggles as they navigate different stages of the innovation process.

To address this gap, my study has highlighted cognition at group level and to offer insight on a socio-cognitive process which organisational actors experience during the adoption which underpins the implementation process. Socio-cognition is grounded in the belief that individuals develop internal cognitive schema which enables them to organize, make sense of, and integrate new information about the world around them (Berger and Luckmann 1967; Davis and Hufnagel, 2007). In this thesis, I argue that while there exist distinct macro-level stages of innovation, or 'moments of transition' that actors advance through during the adoption of innovation, how actors 'journey' through the stages is non-linear and complex. This conceptualization of innovation inside organisations aligns with prior studies that position the process as neither linear nor random (Garud, Tuertscher

and Van de Ven, 2013). The question of what the process looks like, however, remains a puzzle that prior explanations do not sufficiently account for. Drawing from the literature on social and cognitive psychology, specifically that of framing (Goffman, 1974), I posit that such non-linearity is attributed to asymmetric processes of framing among disparate actors that are punctuated by spatio-temporal experiences of distinct stages of the innovation process leading to adoption.

To advance this perspective, I present a year-long empirical field study involving the adoption of Electronic Medicine Chart technology (EMEDs) at one of the largest hospitals within the NHS. Using an interactive framing perspective (Goffman, 1974), I inductively examine the interactions between groups of technology 'implementers' (clinical and non-clinical) and technology 'users' (clinical) to develop an understanding of how disparate actors make 'sense' of the technology (see for example, Weick, 1995; Weick, Sutcliffe, and Obstfeld, 2005; Oliver et al., 2017) and illustrate how the implementation process unfolds as a dynamic one. I have adopted a grounded theory approach and utilized multiple qualitative methods to construct a rich account of the socio-cognitive mechanisms that underpin the adoption process. My analysis reveals that actors make sense of the process through various cognitive frames, which is experienced collectively to constitute the socio-cognitive stages of the adoption process. I found that all the three groups (non-clinical implementers, clinical implementers, and users), undergo a cognitive transformation as they collectively negotiate the challenges of innovation adoption.

Cognition, as we know, is a reciprocal process that consists of inseparable human behaviour and emotions (Hosking and Anderson, 2018). As such, very little is known with regards to the cognitive experiences of organisational actors that are the targets of innovation. This is on the back of scholars acknowledging that this technological innovation and its adoption remains one of the most difficult challenges facing organisations (Rafaelli, Glynn and Tushman, 2019). Adopting a socio-cognitive approach provides an opportunity to emphasise the micro-level struggles of organizational

members' sentiments and aspirations encompassing innovation adoption. For a social process such as innovation adoption, a socio-cognitive approach allows us to understand the complexity of innovation adoption (Compagni, Mele and Ravasi, 2015).

My analysis deconstructs the socio-cognitive transformation associated with the process of adoption. For scholars, I offer a process model that contributes to the growing body of socio-cognitive perspectives on adoption studies (Ansari, Fiss and Zajac, 2010; Compagni, Mele and Ravasi, 2015; Kennedy and Fiss, 2009; Rafaelli, Glynn and Tushman, 2019; Röth and Spieth, 2019; Zaman et al., 2018). Built on the heterogeneity of multiple actors and irrationality of decisions amongst them, the analysis offers a multi-group perspective on the process. For practitioners, I offer insights into the challenges of the adoption process faced by different stakeholders in a complex organisation and provide a framework that implementers can use to help account for the complexity in the innovation adoption process.

1.4 Analytical Lens and Research Framework

To unpack the socio-cognitive complexities of innovation adoption, I have used the notion of interactional framing which is rooted in the symbolic interactionist of Blumer (1971). According to the interactional approach to framing, the symbolic aspects of meaning are negotiated through the ongoing interactions. Framing from an interactionist perspective is a social phenomenon and conceptually it is associated with having two dual characters (Gray, Purdy and Ansari, 2015). Framing: (1) captures the institutionalisation of meaning structures, and (2) provides a macro-structural underpinning for actors' motivation, cognitions, and discourses (Cornelissen and Werner, 2014; p. 29-30). The notion of framing comprises of frames and serves two roles: (1) internal cognitive 'schemata of interpretation' (Goffman, 1974; p. 21) that allow actors to construct 'sense' in an otherwise meaningless succession of events; and (2) the explicit articulation (behaviour) of an internal cognitive schema that serves as the basis for interaction between multiple actors as they make seek to collectively

negotiate sense. From a cognitive perspective, framing are seen as the internal understandings that guide actors' perception of the social realities in which they find themselves and others. Thus, they serve as a sensemaking tool that allows actors to bracket moments of past and present experience from which meaning is constructed (Weick, 1995). According to Goffman (1974), framing represents an internal guide to interpretation that activates individuals' cognition and is constructed through interactions with other actors. Framing is both an internal knowledge structure and external representation of an internal thought that becomes the basis for individuals to sense-give the others, (Benford and Snow, 2000; Gioia and Chittipedi, 1991). This process of internalisation and externalisation gives life to the concept of framing in which they take a fluid form and are constantly negotiated, re-internalized, and re-externalised. Thus, a framing from this perspective, is both a start and endpoint to sensemaking, albeit the former an internal cognitive manifestation and the latter an external social manifestation. Using these ideas, I analyse how actors within complex organisations make sense of the adoption process.

1.5 Thesis Structure

My thesis has been divided into six chapters with the literature on innovation adoption being reviewed in Chapter 2 followed by the review of framing literature in Chapter 3. Chapter 4 discusses the method and research context. In Chapter 5, I review the results and findings of the research. Chapter 6, the final chapter, reviews the model which has emerged from the findings. The chapter concludes by outlining the contributions, implications, and limitations of my research.

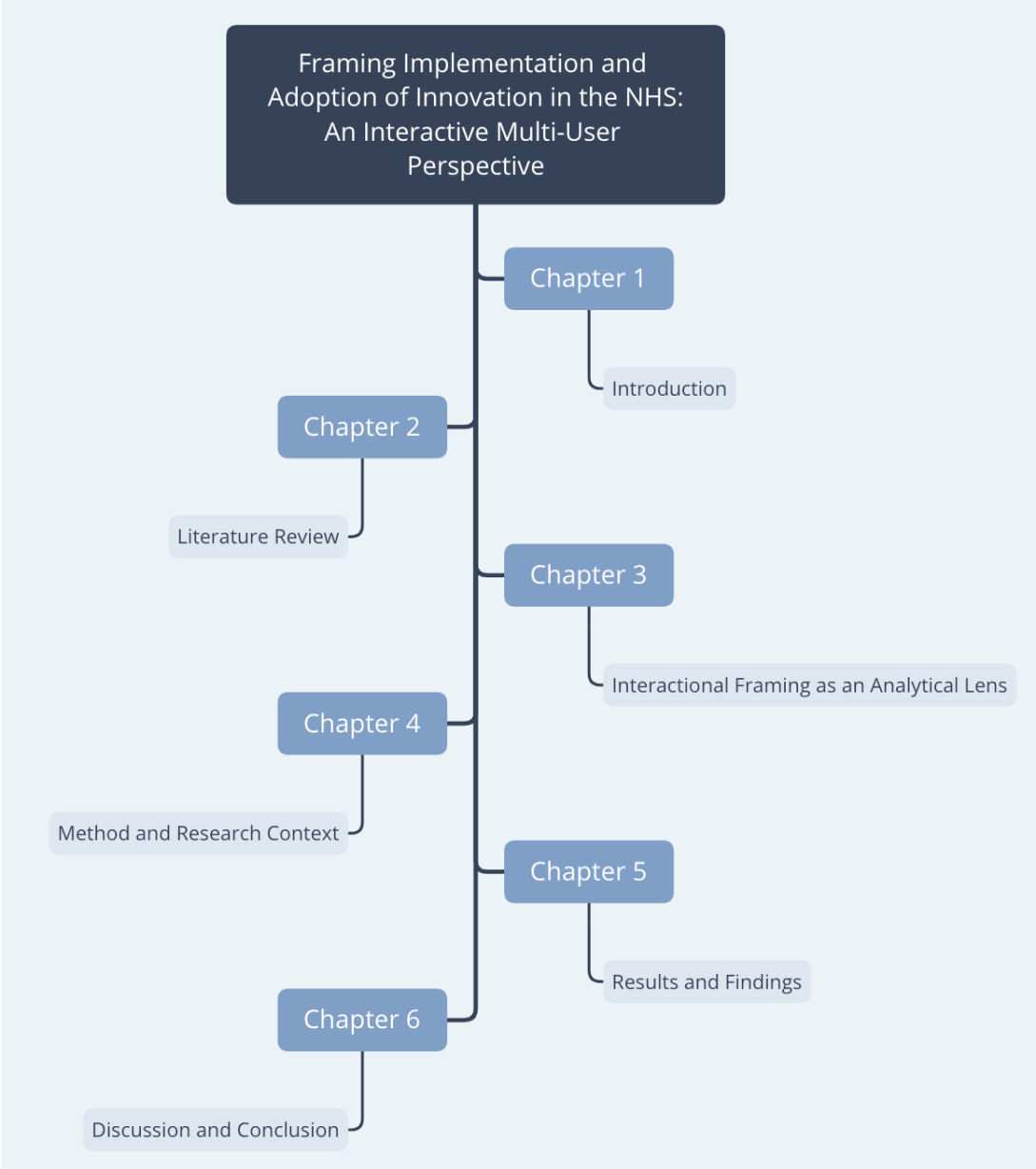


Figure 1.2: Thesis structure

Chapter 2: Literature Review

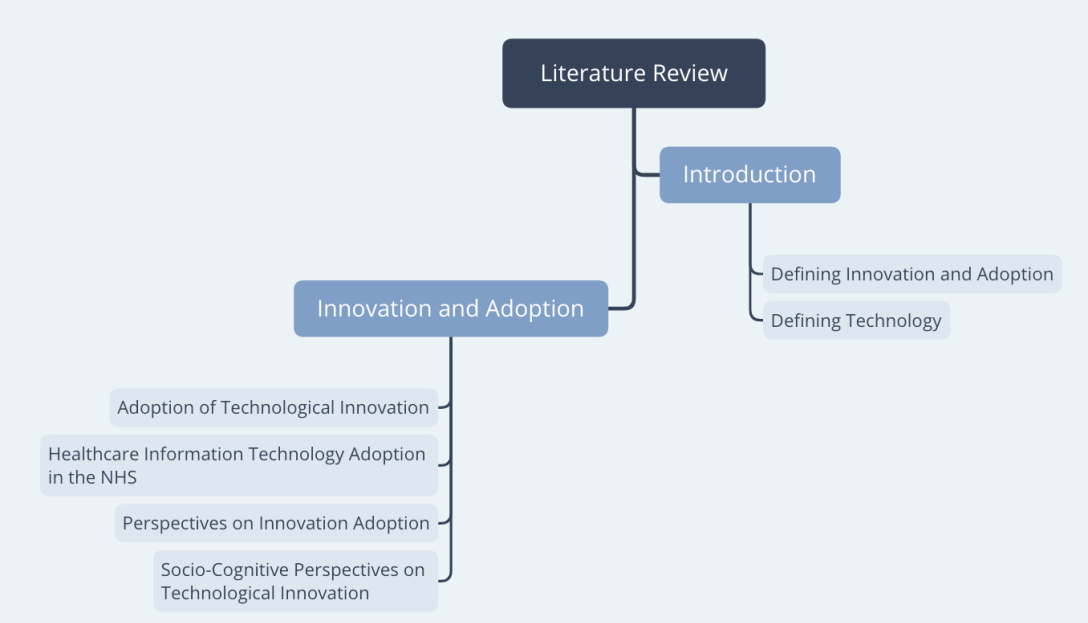


Figure 2.1: Chapter structure

2.1 Introduction

This chapter begins by reviewing the concept of innovation adoption, followed by the adoption of technology. The focus then shifts onto healthcare information technology (HIT) and its adoption. Discussion of HIT uncovers some of the current themes in healthcare research, including the rich history of electronic medical records in the NHS. The second part of the chapter discusses the theoretical cornerstone of adoption literature which includes some of the prominent perspectives on innovation adoption.

While the structure of this thesis presents the literature review as occurring before the proceeding chapters, the reality is that the approach to the literature was more abductive than it was a linear process. This is especially the case in grounded approaches to theory building because my understanding and interpretation of the literature, as well as the literature's salience and relevance, evolved as I conducted the research and coded data. Hence, the literature review is a living document comprised of the original literature search on innovation and the adoption of technology in health care. As I conducted the research, my data required me to extend or close down elements of my study, and as a result, the literature review was

completed alongside the thesis. It worth mentioning that, while as Ph.D. students we are expected to find the ‘gap’ in the literature, sometimes this gap does not become evident until you conduct your research (at least, in my own experience in a grounded approach).

2.2 Defining Innovation and Adoption

An initial, if not naive, Google Scholar search for ‘innovation’ produced approximately 3.88 million hits. Fortunately, when the term ‘adoption’ is added, the search produces a mere 2.69 million hits. It is fair then to conclude that innovation is one of the most crowded, if not overwhelming, domains of research for a Ph.D. student. As a concept, innovation can mean a new entity or a new way of looking at an old issue, constituting a radical discontinuity with the past, which is the main difference between innovation and improvement (Bekkers and Tummers, 2018). Innovation can also be defined as the invention, development, and implementation of ideas (Young, 2017). In healthcare, it may be a novel idea, product, service or care pathway which has clear benefits in comparison to what is being done currently (Kelly and Young, 2017). Meyer and Goes (1988) define innovation as significant departures from prior techniques for diagnosis, treatment, or prevention, as determined by the collective judgments of experts in the field. In a non-healthcare context, innovation is defined as the ‘adoption of an idea or behaviour, whether a system, policy, program, device, process, product or service, that is new to the adopting organisation’ (Damanpour, 1992; p. 376). Innovation can also be understood as ‘the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations’ (Gault, 2018; p. 618). Rogers (2002; p. 990), who has made major contributions to adoption studies, defines innovation as ‘an idea, practice, or object that is perceived as new by an individual or other unit of adoption’. One of the earliest conceptualisations of innovation is attributed to Schumpeter (1934), who used the notion of ‘creative destruction’ to derive the concept of innovation, highlighting the contextual nature of the phenomenon (Kotsemir, Abroskin and Meissner,

2013). The contextual nature of innovation is very much relevant to my research, which underlines the highly variable nature of social change as shaped by groups of actors, organisations, and technology itself (Perry-Smith and Mannucci, 2017). For this research, innovation has been studied from the perspective of the adopting organisation. In this context, therefore, innovation has been defined as a new medical device that is perceived as new to the adopting organisation. The new medical device also represents added functionalities, improvements, process and service in comparison to the device used previously.

From healthcare perspectives, adoption is a key implementation outcome (Balas et al., 2018). My thesis provides insight into the adoption process underpinning the implementation process. Innovation adoption is itself a distinct process, involving complete or partial decisions to proceed with the implementation of an innovation that is at an early stage for adopters (Chor, Wisdom, Olin, Hoagwood and Horwitz, 2015). Adoption of innovation is of utmost importance particularly for quality improvement as well as, eventually, for the survival of the organisation (van Oorschot, Hofman, and Halman, 2018). The thought of improving quality in the context of my research is critical, considering the current state of healthcare in the United Kingdom. Adoption of innovation to improve quality is a key policy target not only for the NHS but also for healthcare systems around the world (Greszczuk et al., 2018). In a climate dominated by financial scarcity, changing public expectations and emerging technologies, the quality, and efficiency of healthcare systems are constantly being evaluated. (Department of Health, 2017). Some of the strategies for evaluation and improving quality within the NHS, for example, have included devolving responsibilities and identifying senior clinicians as agents of change. Such initiatives have not only allowed authorities to monitor the adoption behaviour but have also resulted in an overall increase in participation of other individuals acting as agents of change (Greszczuk et al, 2018). Through these initiatives, attention is drawn to the macro environment as well as organisational change regarding health system innovation adoption and dissemination (Greenhalgh et al, 2017).

For my research, however, it is very important to distinguish adoption from another term which has been used in the same breath by the scholars: diffusion. The overlapping term 'diffusion of innovation' is defined as 'the process by which an innovation is communicated through certain channels over time among the members of a social system' (Rogers, 1995; p. 5). It can be understood as the spread of adoption across units through networks of communication and adaptive emulation (Varabyova, Blankart, Greer and Schreyögg, 2017). The spread of new ideas and practices through social contact has also been referred to as diffusion (Centola, 2015). As the concept indicates, diffusion is the likelihood of innovation to be accepted by an organisation which is related to the speed at which the innovation might be accepted (de Vries et al., 2018). For my thesis, the focus is consequently on the adoption process as means to understand how actors and organisational members make sense of events and mechanisms following the implementation process.

2.3 Defining Technology

Technology has been previously defined in terms of beliefs, artefacts and evaluation routines (Garud and Rappa, 1994). While these three aspects of technology were used to propose the socio-cognitive model of technology, one of the first definitions of technology as beliefs is based on its representation as knowledge (Rosenberg and Nathan, 1982; Laudan, 2013; Layton, 1984).

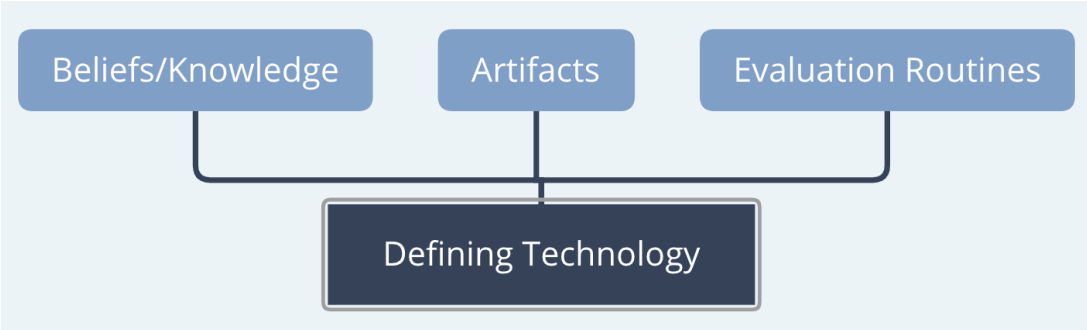


Figure 2.2: The three perspectives on technology (Garud and Rappa, 1994)

Conceptualising technology as knowledge allows us to connect it with cognitive theory literature where cognition has been defined as ‘the activity of knowing: the acquisition, organization, and use of knowledge’ (Neisser, 1976; Pg.1). Understanding technology as knowledge has certain implications. Given the scope of my research, doing so allows me to appreciate how the beliefs of actors have changed over time, as this concerns how actors comprehend the technology as it is implemented. Another definition of technology includes the physical artefacts which represent the form and functionality of a technology (Sahal, 1981; Constant, 1987). Such a perspective on technology illustrates attributes such as dimensional shape and construction. The definition includes how technology is used, and in order to understand such a perspective on technology, one must take into consideration the evolution in its ‘form’ and the ‘function’ its serves over time (Garud and Rappa, 1994). The third and final aspect of technology has been defined in terms of evaluation routines. According to Jagtenberg (1983), technology manifests itself in certain practices which often comprise of testing routines that sustain technology. This perspective on technology focuses on how evaluation routines are shaped over time.

At its most concrete level, technology can be understood as a tool, technique, physical equipment or a system by which employees, units or organisations extend their capabilities (Damanpour, 1987). It has been understood as a coherent bundle of (scientific) knowledge which is specific to a particular domain of application (Dolfsma and Seo, 2013). Technological innovation allows organisations to conceive, design, manufacture and introduce a new product, service or technique (Manzaneque et al., 2018). The turbulence, complexity, and competitiveness of organisational environments, however, make the evaluation and adoption of technological innovation a difficult proposition (Howell and Higgins, 1990). In addition to technological innovation, the literature also has mentions of technological innovation systems (TIS) which, as a dynamic socio-technical system, oversees actors in collaboration within a particular infrastructure adopting a specific technology (Frishammar et al., 2019; Markard, 2018). The literature in this regard has focussed on identifying variables that facilitate or hinder

the adoption of technological innovation (Rogers and Shoemaker, 1971; Kimberly and Evanisko, 1981).

2.4 Adoption of Technological Innovation

The factors and variables that facilitate or hinder the adoption of technological innovation have been analysed at individual, group and organisational level (King, 1990). At organisational level, process and factor approach distinguishes the two lines of research. An organisation's behaviour during the adoption of technological innovation is central to the process approach at organisational level (Camisón and Villar-López, 2014). Scholars have investigated various structural, cultural, and environmental events considered critical to the process of adoption (Grimmelikhuijsen and Feeney, 2017). Existing frameworks within the process model range from two to five or more stages (Gopalakrishnan and Damanpour, 1997; Damanpour and Schneider, 2008; Klein and Sorra, 1996). Technological innovation adoption has also been studied using a linear or sequential approach. Theorists using such an approach have utilised the stage-gate method to describe how these forms of innovation progress within an organisation (Howieson, Lawley and Selen, 2014). The most frequently used model, however, remains the 'unitary sequential model' which has been derived from Lewin's (1951) model of the change process.

The factor approach examines the innovation attributes which influences the innovation adoption (Oliveira, Thomas, and Espadanal; 2015; Wolfe, 1994). Presented as a multidimensional phenomenon, three perspectives of innovation adoption research have been put forward by Pierce and Delbecq (1977). The first perspective highlights the role of context and structure for innovation while the second perspective focuses on the attitude of the organisational members as a source of change. The final perspective highlights organisational innovation as a dynamic and continuous process in which structure and membership are of main concern (Kautz and Nielsen, 2004). Contextual factors that influence the adoption process have also been studied (Premkumar and Roberts, 1999; Frambach and Schillewaert,

2002; Matta, Koonce and Jeyaraj, 2012). Innovation related activities are conducted within an environmental context, during which organisations obtain market-related information, technology, and resources from the environment (Frambach and Schillewaert, 2002). Consequently, adoption is understood as an organisational response to the changing environmental conditions in which it operates (Wischnevsky, Damanpour, and Mendez, 2011). Scholars have reviewed the characteristics of the organisation's external environment in relation to its ability to adopt the innovation (Ciganek, Haseman, and Ramamurthy 2014). Conceptualisations designed to describe environmental characteristics within innovation literature have been categorised into three dimensions: dynamism, hostility, and complexity in the environment. Dynamism (also known as uncertainty) is the rate of change within an industry and includes the degree of unpredictability, instability of consumer preferences, modes of technology intensity and actions of the competitors (Bstieler, 2005). Hostility in the environment is linked to the level of resources available to the organisation and the competition for these resources (Covin and Slevin, 1989; Miller and Friesen, 1983). Complexity within the environment has been conceptualised as the degree of heterogeneity – the level of complex knowledge related to diversity in production and marketing orientation - required to understand the environment (Miller and Friesen, 1983).

The most widely recognised theoretical basis to study adoption is the diffusion of innovation theory formulated by Rogers (1995). This theory assumes that innovation is adopted quicker if it comprises of five qualities - relative advantage, complexity, compatibility, trialability, and observability (Tornatzky and Klein, 1982; Kapoor, Dwivedi and Williams, 2014). Relative advantage focuses on the perception of the potential adopters as they compare the advantages of incumbent innovation to that of earlier innovations (Rogers, 2010). Compatibility is defined as the 'degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters' (Rogers, 1995; p.15). Complexity relates to the degree to which innovation is perceived difficult to understand, learn and use by the organisational members. The notion of

trialability is about the perception which dictates the possibility of learning. Finally, observability is defined ‘as the degree to which the results of an innovation are visible to others’ (Rogers, 1995; p.15).

Following Rogers’ seminal work, Tornatzky and Klien (1982) examined IT innovations using the references of Rogers’ (1995) innovation attributes. They identified 25 other innovation attributes operating on the premise that innovation characteristics establish the relationship between attributes of innovation and the adoption of implementation (Tornatzky and Klien, 1982). Such studies argued the need for achieving a better understanding of the effects of such attributes, considering they increasingly influence the adoption decision of an innovation. The conceptual yardstick was proposed by Tornatzky and Klein (1982) which contained seven features representing the ideal innovation-attribute study. Moore and Benbasat (1991) developed an instrument to measure the individual perception of adopting an IT innovation. While doing so, they examined attributes from both Rogers and Tornatzky and Klein’s original work and identified three additional dimensions. The literature on innovation adoption has proliferated ever since Rogers’ influential work (Kapoor, Dwivedi and Williams, 2014).

In the context of healthcare, Greenhalgh et al. (2004) undertook a systematic review to address the diffusion and sustenance of innovations in the health service delivery by delving into each of Rogers’ (1962) five attributes. In healthcare, technological innovation is mostly discussed in terms of healthcare information technology (HIT) which is of great interest to scholars and practitioners.

2.5 Healthcare Information Technology (HIT) Adoption in the NHS

On the pretext of patient safety quality of care, the NHS has been making efforts to keep pace with technological advances with additional benefits around service effectiveness and efficiency. It has undergone frequent restructuring and, in the process, has built a rich history of NHS IT strategies

and programs (Price et al., 2018). Currently, the NHS comprises of 8700 organisations as well as an ever-evolving structure (Smee, 2018).

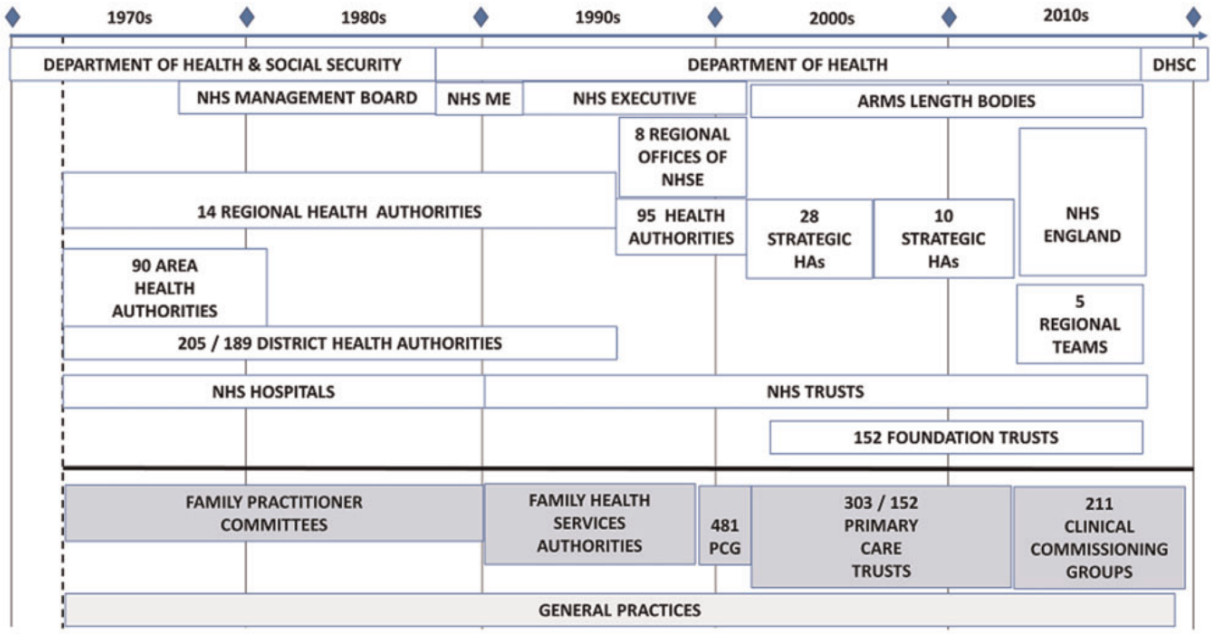


Figure 2.3: Evolving structure of the NHS from 1973 to 2017 (NHSME – NHS Management Executive; NHSE – NHS Executive; HA – Health Authority; DHSC – Department of Health and Social Care; PCGs – Primary Care Groups; Clinical CGs – Clinical Commissioning Groups (Price et al., 2018).

As Figure 2.3 suggests, the NHS is a complex, volatile temporal context for the implementation of any technological innovation. At each given level, organisations within NHS have responsibilities which include planning; stakeholder engagement; and resource and performance management (Phillips, 2018). With the NHS's ever-evolving structure, scholars have analysed the organisational dimensions surrounding HIT innovations. The work, however, has been hampered by the use of inter-related terms that are used interchangeably. Table 2.1 below shows examples of some of the concepts surrounding HIT innovations. The surrounding body of evidence as shown in the table below has made navigating and interpreting the literature somewhat confusing.

Table 2.1: Concepts surrounding HIT innovation and its adoption (Adapted from Cresswell and Sheikh, 2013)

TERM	INTERPRETATION	SCHOLAR(S)
Adoption	"Acceptance and incorporation of HIT applications into everyday practice"	Rogers, 1983
Implementation	"Consideration and introduction of HIT application"	
Diffusion	"Study of how, why and at what rate new ideas and technology spread"	
Deployment	"Process of putting technology into use"	Dearle, 2007
Infusion	"Degree of comprehensiveness or sophistication of the use of innovation and degree to which it is embedded in an organisation"	Zmud and Apple, 1992
Integration	"Process by which technology becomes incorporated within organisational practices"	Stead, Miller and Musen, 2000
Normalisation	"Process by which innovation becomes routine"	May et al, 2009
Routinization	"Process by which using an innovation becomes part of regular organisational practice"	May et al, 2009

Understanding HIT adoption not only requires IT expertise but is also associated with a specific clinical practice, which is why it is much more difficult to build a consensus around the concept of HIT adoption (Cresswell and Sheikh, 2013). More importantly HIT, is an umbrella term for technology used in healthcare (Dranove et al., 2015). HIT represents a variety of components and often serves as a catch-all term which, again, makes it difficult to clearly define the idea (Mckenna et al., 2018). The literature continues to provide different definitions and elects to study certain HIT components over others (Agha 2014; Dranove et al., 2015; Miller and Tucker 2011; McCullough, Parente and Town 2016). Also, some scholars have focussed on the interaction between an organisation, its people and the technology. Such studies have shed light on human factors as well as issues that go beyond the direct human-technology interface. This includes analysing strategies employed to introduce systems and how these systems are adopted by various stakeholders within the organisational setting.

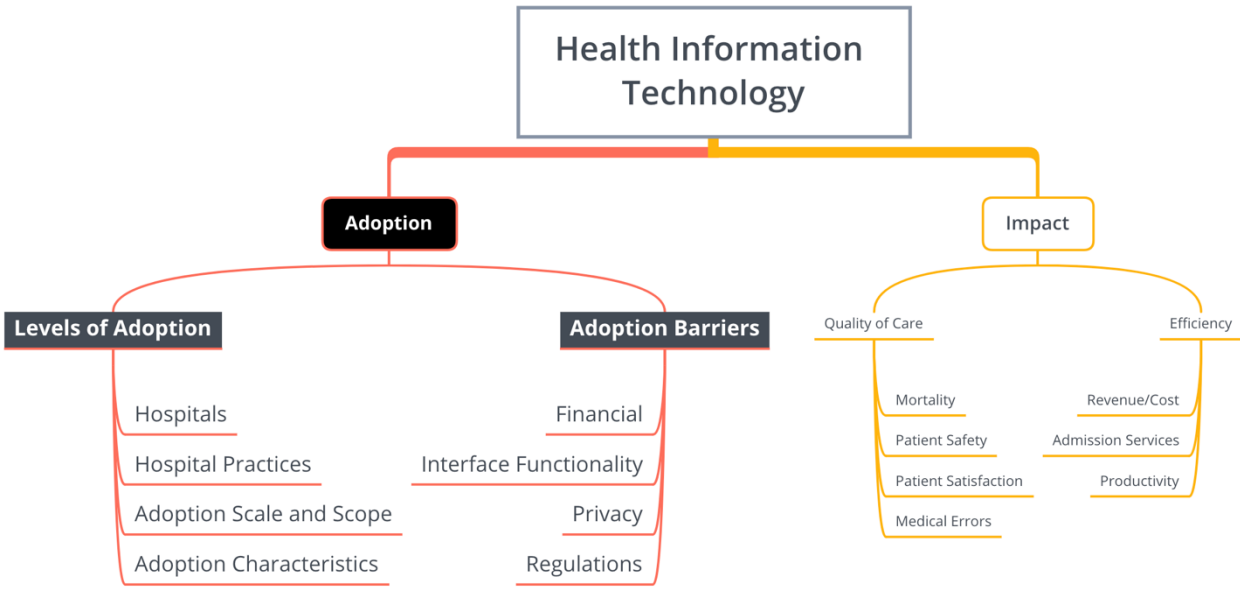


Figure 2.4: Overview of research themes in HIT

Healthcare information technology (HIT) has been a long-standing subject, drawing ample interest from scholars and practitioners both within and outside the healthcare industry. HIT innovations have been associated with significant potential to improve patient safety, organisational efficiency and patient satisfaction (Ratwani et al., 2019). The priority for most clinical research has been to explore new approaches to diagnosis and treatment and major gains in quality have been facilitated by information technology, especially in relation to patient safety (Bates et al., 2003). For the past few decades, harm caused by medical care has also received considerable attention from healthcare researchers and with growing sophistication of computers and software, HIT has played a significant role in reducing the risks associated with medical care by streamlining care, correcting errors and assisting with decision making (Howe et al., 2018). With patient safety affecting thousands of patients, HIT literature has specifically focussed on electronic medical records and its role in improving patient safety (Hydari et al., 2018).

HIT is an all-encompassing term which includes computer and information technology used by key healthcare professionals (HCPs). Multiple IT applications play a role in improving patient safety but electronic medical

records (EMRs) specifically have a salient influence in the direction. For their role in shaping patient safety dynamics, EMRs are being studied in multiple disciplines which have made defining EMRs a difficult task. Healthcare Information and Management Systems Society (2012) have listed applications which are a part of 'Electronic Medical Records'.

Table 2.2: Electronic Medical Records Components and Applications (HIMSS, 2012)

Category	Applications
Electronic Medical Records (EMRs)	Business Intelligence – Clinical Data Repository (CDR) Clinical Decision Support System (CDSS) Computerised Practitioner Order Entry (CPOE) Order Entry (Includes Order Communication) Patient Portal Physician Documentation (PD) Physician Portal

According to the World Health Organisation (2013), the sheer number of diagnoses, drugs, and procedures available to healthcare professionals produces cognitive overload, often resulting in errors even by very competent and conscientious HCPs (Heponiemi et al., 2018; Ratanawongsa et al., 2018). The way to reduce the risk and enhance patient safety, however, is through the use of tools that 'can improve communication, make knowledge more readily accessible, require key pieces of information (such as the dose of a drug), assist with calculations, perform checks in real-time, assist with monitoring, and provide decision support' (Hydari et al., 2018; p. 6; Bates and Gawande, 2003). Scholars have analysed HIT-induced incidents which point to issues such as input, information transfer, technical and human contributing factors leading to errors in healthcare (Koppel et al., 2005; Magrabi et al. 2012; Westbrook et al., 2012). Aron et al., (2011) using three-year panel data, studied HIT's impact through automation and its role in reducing medical errors. Freedman et al., (2014) studied the beneficial impact effects of CPOE. Miller and Tucker (2011) used country-wide panel data from 1995-2006 and found out that EMRs had helped reduce neonatal mortality by 16 deaths per 10,000 births. Medicare admission data from 2002-2007 were used to examine the role of HIT adoption patient outcomes for conditions such as acute myocardial infarction, congestive heart failure,

coronary atherosclerosis, and pneumonia. The outcome of such a study reiterated the importance of equipping HCPs with tools (EMRs) to help them improve the overall patient safety (McCullough, Parente and Town, 2016).

2.5.1 Electronic Medical Records in the NHS

The National Health Service Experimental Computer Program (1968) had resulted in hospital-wide use of computers. It paved the way for what is now considered the forerunner to the electronic patient records in a London hospital along with the creation of the first databases (Richards, 2001). Between the 1980s and 1990s, reports such as the Korner Report (1982), Griffiths Report (1984) and Resource Management Initiative (RMI) (1986) show that the NHS saw an increase in the number of IT policies (Clarke et al., 2018). With RMI, the objective was to provide clinicians and NHS managers with information by introducing new technology; this resulted in hospital staff being required to send extensive sets of performance data and cost to government and regional authorities (Wainwright and Waring, 2000; Kirkman-Liff and Schneller, 1992). RMI also encouraged individual hospitals to develop their information system, culminating in what came to be known as the Patient Administration System (PAS). PAS comprised of basic patient activity but, for clinicians, PAS brought various additional information such as resource usage for theatres. PAS soon paved the way for Hospital Episode Statistics (HES), which is still in use by the Department of Health (DoH) for in-patient analysis.

1992 heralded the Information Management and Technology (IM&T) policy as outlined by DoH. IM&T provided patient-centric, secured, confidential information, derived from operational systems as the policy was further updated in 1998 and renamed as Information for Health (IfH). IfH offered patients the functionality of lifelong Electronic Health Records (EHRs) along with 24-hour emergency care access to patient records (NHS Executive, 1998). The key to this report was the mention of lifelong electronic health records (EHRs); clock access to these for clinicians; seamless care for patients during healthcare encounters; better public access to health

information; and provision of management information to optimize the use of NHS resources (Price et al., 2018). To ensure better implementation of EHRs and other key measures outlined in 1998 report, a National Programme for Information Technology (NPfIT) was initiated which, further down the line, attracted a lot of criticism due to lack of transparency and its failure to engage adequately with clinical end-users (Keen, 2006). Following this, NHS Digital published another report Information and Technology for Better Care (2015) which included measures of data protection, providing additional support to users for their use of technology, data, and information (Health and Social Care Information Centre, 2015).

It was in 2013 that the then Secretary of State Jeremy Hunt challenged the NHS to ‘go paperless’ and set forth targets to achieve this transformation (Kelly and Young, 2017). As a common form of therapeutic intervention, the prescribing of medicines is critical to high-quality patient care. The inpatient prescribing system in UK hospitals primarily uses the paper-based model established almost sixty years ago and, barring a few minor changes, has largely remained the same since (Cornford et al., 2009). Some examples of the paper-based model are ‘Aberdeen sheets’ and ‘medication Kardex’. With multiple variations, the paper-based model lacks standardisation, with different NHS regions and Trusts having developed their versions of inpatient paper-based prescription charts. In 2011, the publication of ‘Standards for the design of hospital inpatient prescription charts’ was an attempt to standardise prescription charts across the nation (Academy of Medical Royal Colleges and Royal Pharmaceutical Society and Royal College of Nursing, 2011).

HIT adoption in healthcare has segregated research themes, but to provide some semblance and structure to the notion of HIT adoption, the section below discusses two other streams of research which have caught scholars attention.

2.5.2 Ergonomics and Human Factors (HFE)

Ergonomics aims to understand aspects of human capability and its application to the design and development of innovation (Meister, 2018; Silver et al., 2004). This specialised area of interest pertains to the successful application of human factor engineering to information technology (Dul et al., 2012). With the developments in healthcare, prominence of HFE has risen and is mostly recognised by researchers, an important discipline which can facilitate mitigating medication errors, improving the design and implementation of health information technology (Mao et al., 2015). As a stream of research, human factors and ergonomics (HFE) have mostly been looked at supporting healthcare safety and quality improvements (CIC, 2016; Vosper et al., 2018). The contributions have mostly been in areas of patient safety and more specifically towards ‘surgical safety’ due to the sensitivity of the procedure and its potential for errors in the human-technology-systems interactions (Hignett et al., 2018). Patient safety incidents are mostly related to lack of attention to human factors related to design, implementation of technologies, processes and socio-technical systems (Carayon et al., 2014).

Taking into consideration the notion of patient safety, HFE streams comprise of three domains:

- physical ergonomics (which mostly concerns physical activities and design of medical devices);
- cognitive ergonomics (concerning mostly mental processes including design of usable interfaces for HIT and training programs); and
- organisational ergonomics (involving sociotechnical systems and design of overall work system (Carayon et al., 2014).

The focus of HFE research has expanded to ‘system resilience’ more recently, where scholars are investigating the effectiveness of HFE interventions (Thatcher and Yeow, 2018; Jeffcott et al., 2009). Specific work relates to office interventions among computer users (Brewer et al., 2006); participatory ergonomics interventions (Rivilis et al., 2008); and workplace

ergonomic interventions with economic analyses (Tompa et al., 2010). With the burgeoning interest in HFE, it is widely regarded as one of the very first multi-, inter-, and cross-disciplinary streams which draws knowledge from design, engineering, psychology, organisational management and human sciences (Hignett et al., 2018). Using insights from organisational, occupation and social psychology, scholars have studied adoption and implementation of technological innovation and identified critical factors for the success of such interventions (Rice and Aydin, 1991). Scholars in this domain have used psychological theories, research methods, and intervention strategies to workplace issues in the context of technological innovation (Pai and Huang, 2011; Lanseng and Andreassen, 2007).

In the UK, HFE provides validated procedures for modelling, designing and testing tools for healthcare professionals to perform optimally and safely in complex systems. The 2016 Care Quality Care Commission had certified that HFE principles play a role in reducing the risk of adverse events reoccurring but as a concept, it is often confused with quality improvements (Vosper, 2018). While QI is a tool for technically exploring processes, but without a holistic systems approach, HFE prioritises optimisation of human wellbeing and system performances (Hignett et al., 2018). Within the QI approach, although people help deliver the process, they are not considered part of the improvement process. HFE together with QI can contribute towards successful systems improvements. Another important strand of research within healthcare has specifically focussed on what is also known as healthcare information systems (HIS).

2.5.3 Healthcare Information Systems (HIS)

Considering the inclusivity of human, technology, and interactions within a system, scholars in this field have used a socio-technical lens to evaluate HIS (Coiera, 2003). The shift from solely focussing on technical aspects to considering the cultural, political, social and organizational factors indicates the evolution in the complex nature of healthcare domains (Andargoli, Scheepers and Rajendran 2017). Healthcare information systems depend

on an advanced health information network that supports clinical care, personal health management, the reduction of avoidable mistakes in population health, and evidence-based medicine (Hanrahan et al., 2006; Katehakis et al., 2007). Important societal and economic indicators including patient safety, potential health care cost savings, empowerment of consumers, new policies, and growing regional health care initiatives have led to an integrated patient-centred health care information system as researchers have investigated the development and use of information system in various settings using a variety of theoretical and methodological approaches including action research; social interactionism based on diffusion of innovation theory; and actor-network theories (Mäenpää et al., 2009; Kaplan, 2002; Anderson et al., 2017; Whitley and Pouloudi, 2001).

While healthcare can be thought of as an information-rich environment it is highly complex, involving diverse, interdependent, knowledge-intensive disciplines, and is dynamic comprising of knowledge that is regularly being framed and reframed (Vanderhook and Abraham, 2017; Vincent and Amalberti, 2016). Practitioners and policymakers within healthcare have promoted the use of a computerised information system on the pretext that these will improve the quality, efficiency, and safety of healthcare (Greenhalgh and Stones, 2010). Advances in information systems can seem to offer tremendous organisational, safety, performance, and economic benefits, but the discrepancy between attitudes of different professional groups to healthcare information takes can be a good measure of how these benefits have been delivered (Lintern and Motavalli, 2018). Comparing clinicians, IT professionals and health plan executives, the latter are most satisfied with the introduction and adoption of IS. Healthcare professionals are generally positive about the introduction of innovative technologies but with time, end up being disenchanted on discovering how IS disrupts their workflow (Lapointe and Rivard, 2006). Some of the research, for example, found evidence that health information systems have not produced the anticipated healthcare benefits (Greenhalgh and Stones, 2010). Clinicians have labelled it as disruptive and inefficient (Karsh et al., 2010). Although the usage rates of HIS have been reported at above 90%, dissatisfaction with

the impact of HIS on workflow and patient remains very high (Challenger, Clegg and Shepherd, 2013).

2.6 Perspectives on Innovation Adoption

Adoption of innovations within social systems has been studied from several different, albeit complementary, perspectives that collectively seek to explain the processes leading to the adoption and propagation of new technologies and practices within and across organizations (Ansari et al., 2010; Compagni, Mele, and Ravasi, 2015). At the intra-organizational level, innovation adoption is characterised by internal assimilation, integration, and use of a product, service, process, technology, or practice that is considered new to the adopting organization (Klein and Sorra, 1996; Garud, Tuertscher, and Van de Ven, 2013). Existing studies that examine the processes by which intra-organizational assimilation and integration occur can be broadly categorized into two sets of explanations (Ansari et al., 2010). The first (rational actor perspective) conceptualises the process as being driven by an actor's search for technical, economic, and other related benefits (Katz and Lazarsfeld, 1955) from the innovations they adopt and use in their everyday work. Thus, adoption is the outcome of rational action, in which actors choose to adopt and use an innovation as it offers some objective benefit over the one it supersedes (Rogers, 2003).

The second (institutional or sociological perspective) on the other hand, conceptualizes the process as one in which individual and organizational tendencies towards isomorphism force conformity towards socialized norms (DiMaggio and Powell, 1983). The bulk of empirical studies in this regard simplify diffusion to a mere social contagion or network effect (Bohlmann, Calantone and Zhao, 2010). In the section below, I have discussed the perspectives which have helped build further grounds to understanding innovation adoption.

2.6.1 Rational Perspective on Innovation Adoption

The rational actor perspective, with its roots in the field of economics, views adoption and diffusion as an outcome of the objective juxtaposition of an innovation's intrinsic characteristics by an individual actor relative to its purpose and use, whereby only the fittest survive (Katz and Shapiro, 1987; Mansfield, 1961). The 'diffusion of innovations' theory proposed by Rogers (2003) represents the most dominant view in this regard and proposes that, within the objective attributes of innovation, five key characteristics influence an actor's adoption decision. These characteristics include the innovation's relative advantage over its predecessor; compatibility with existing values and past experiences; the complexity of use; observability to others; and its temporary trialability (Kennedy and Fiss, 2009; Damanpour and Aravind, 2012; Crossan and Apaydin, 2010; MacVaugh and Schiavone, 2010). Thus, adoption and diffusion from this perspective concern learning about the value of innovation from information that is directly observable from the environment, or communicated by early-stage innovators and adopters to optimise adoption decisions (Greve, 2003; Greve and Seidel, 2015). This has led to the proliferation of predictive models that assume rational utility maximising behaviours among actors (Priem, Li, and Carr, 2012; Schreier and Prugl, 2008; Teece, 2010; George, Haas, Pentland, 2014) and processes of imitation as information cascades to other potential adopters (Banerjee, 1992; Bikchandani et al., 1992), which reduces the uncertainty and risk surrounding a given innovation (Ansari et al., 2010; Greve and Sirovatka, 2014; Rao, Greve, Davis, 2001). Some of the prominent work encompassing the economic perspective on innovation adoption have been listed in the table below:

Table 2.3: Econometric perspective on theories of adoption

Scholars and Cross-Referenced Studies	***Determinants influencing Adoption***	***Context***
Attewell, 1992; Kimberly and Evanisko, 1981; Rogers, 1983; Tornatzky et al., 1990	Organisational Learning	Business Computing
Chatterjee et al., 1992; Rogers 1983; Meyer and Goes, 1988; Cooper and Zmud, 1990; Downs and Mohr, 1976	Top management support, strategic investment rationale	Web Technologies
Damanpour, 1992; Iacovou et al., 1995; Rogers, 1995; Zaltman et al., 1973	Readiness, perceived benefits, and external pressure	Electronic data interchange
Grandon and Pearson, 2004; Premkumar and Roberts, 1999	Perception of strategic value, operational support	E-Commerce
Grover, 1993	Organisational, environmental and innovation (IT) based factors	Customer based inter-organisational system
Fichman and Kemerer, 1999	Knowledge barriers, increasing returns to adoption	Model development
Jeyaraj et al., 2006	Predictors of individual IT adoption, top management support, computer experience	Meta-analyses
Kuan and Chau, 2001	Perception-based model for examining factors affecting adoption	Electronic data interchange
Liang et al., 2007	Influence of top management in coordinating the effect of institutional pressure on IT assimilation	Enterprise resource planning
Meyer and Goes, 1988	Innovation attributes, contextual attributes	Technological innovations
Premkumar and Roberts, 1999; Gatignon and Robertson, 1989; Cooper and Zmud,	Innovation, organisational and environmental characteristics, relative advantage, top management support	Communication technology

1990; Attewell, 1992; Rogers, 1995		
Thong, 1999	CEO characteristics, innovation characteristics and organisational characteristics	Informational Technology
Zhu et al., 2017	Linkage of technological, organisational and environmental factors	E-business

Studies have mostly focused on identifying the determinants of adoption utilising Tornatzky and Fleisher's Technology-Organization- Environment (TOE) framework or Iacovou, Benbasat and Dexters' framework. Scholars in the domain have argued regarding the lack of simplicity and rigour in adoption models which fail to take into account contextual differences such as contingency variables (van Oorschot, Hofman, and Halman, 2018). As is evident from table 2.3 above, studies have mostly investigated contingencies affecting the adoption of different types of innovation in different contexts (Dewar and Dutton, 1986; Kimberly and Evanisko, 1981). Yet, while rational actor theories have dominated economics and pervaded sections of political science (Bulgurcu, Cavusoglu, and Benbasat, 2010) and sociology (Powell, Lovallo and Fox, 2011), the psychological assumptions behind these perspectives have been challenged and disproved as a theory of human behaviour (Green and Shapiro, 1996; Tversky and Kahneman, 1986). Different actors have different estimates of an innovation's value and risk (Yuan and Woodman, 2010), and often make sense of its characteristics and impact in non-linear, irrational ways, influenced by a complex array of constituents and forces (Garud, Tuertscher, and Van de Ven, 2013). This issue is particularly salient in the context of complex organisations, such as hospitals as the disparate actors within such institutions occupy vastly different professional positions (nurses, physicians, managers, and technologists among others) and are influenced by different, often conflicting, logics (Thakur, Hsu, and Fontenot, 2012). As such, little is known about how adoption is made sense in these contexts and how disparate actors make sense of and are socialised into using innovations.

2.6.2 Sociological Perspective on Innovation Adoption

A key feature of the spread and decline of successful and failing innovations in that both follow the adoption process in which later adopters imitate early adopters and further invest in choices they have themselves made previously. The assumptions made are that organisations imitate or invest in choices to appear legitimate. These actions allow adopters (early or late) and imitators to appear in line with the normality around them (DiMaggio and Powell, 1983; Sturdy, 2004). For early or late adopters and imitators, a form of path dependency emerges which comes with variation in success and failure of innovation. Process and outcomes of the standardisation are influenced by both success and failures. With a path-dependent process, asymptotic distribution is a factor of process' history (Garud, Kumaraswamy and Karnøe, 2010).

By discussing agency and dynamics within the process, these accounts still offer a population-level perspective of the process. Despite arguing for a more sociological account of adoption and diffusion, these perspectives nonetheless provide a primarily asocial conception of human behaviours. Both human behaviour and institutions are influenced by social relations. Rational, self-interested behaviours are affected by social relations and a case is made for individual choice as embedded in institutions. Granovetter (1985) suggests that individual choices and actions, while instrumental, are situationally embedded. For organisations, the internalised rules of behaviour have a social origin which, in spite of being an integral aspect of the adoption process, has been glossed over in previous accounts. Studies based on institutional theories have been derived from the notion that adoption mostly depends on legitimacy (Tolbert and Zucker, 1983; DiMaggio and Powell, 1983; Bikhchandani et al., 1992). The table below has identified several theoretical insights generated from work using the sociological view.

Table 2.4: Institutional Perspectives and Associated Theoretical Insights

Conceptual Adoption Mechanisms	***Theoretical Insights***	***References***
Evolution of technology through periods of incremental change facilitated by breakthroughs that affect adoption behaviour and influenced by environmental uncertainty	Evolution economic theory	Tushman and Anderson, 1986; Tushman and Nelson, 1990
Adoption behaviour is dependent on mechanisms related to bounded rationality, dominant coalition, operating procedures within the firms, etc.	Behavioural theory of the firm	Cyert and March (1963)
Adoption of innovation or any form of change is regulated by its regulative and normative legitimacy	Institutional theory	Meyer and Rowan, 1977; Tolbert and Zucker, 1983; Dimaggio and Powell, 1983; Bikhchandani et al., 1992
Adoption motivated by firms' belief that innovation is a future strategic resource	Resource-based view	Barney, 1991; Pfeffer and Salancik, 2003
Firm's behaviour motivated by the firm's survival considerations	Schumpeterian theory of creative destruction	Henderson and Clark, 1990; Schumpeter, 1934; Porter, 2011
Model aspects of technology change and differences among innovation in the rate of imitation	Diffusion econometrics	Griliches, 1957, Mansfield, 1961, Geroski, 2000
Links the gap between work of Griliches (1957), Mansfield (1961) and Rogers (1962) by making a case of adoption-diffusion behaviour at aggregate industry level and individual firm's adoption behaviour	Organisational adoption behaviour and market structure	Reinganum, 1989; Jensen, 1982; Hannan and McDowell, 1984; Milliman and Prince, 1989

The sociological perspective, also referred to as social accounts, concerns growing levels of pressure towards social conformity (DiMaggio and Powell, 1983). The social account highlights the role of group pressure which can often lead to the inefficient or harmful adoption of innovation or practices for an organisation (Abrahamson, 1991; Strang and Macy, 2001). An important point of discussion within the social account revolves around efficiency, which has a role in increasing the legitimacy as far the adoption of innovation is concerned. With efficiency, the study can be categorised into weak and strong forms (Ansari, Fiss and Zajac, 2010). The weak form of legitimacy argument presumes that the rationale for initial adoption is down to economic efficiency. However, on reaching the threshold, efficiency justifications become irrelevant. Adoption at this stage becomes a pressure game and a legitimacy concern (Tolbert and Zucker, 1983). On crossing the threshold, social pressures are dominant factors and replace efficiency concerns, leading organisations to adopt an innovation or practice with less consideration given to its appropriateness (Ansari, Fiss and Zajac, 2010). A strong legitimacy argument does not hold the diffusing innovation technically efficient. Here, cultural compatibility (Soule, 1999) and normative expectations (DiMaggio and Powell, 1983) play a role. Organisations adopt or are advised to adopt, in order to maintain a stand or reputation. In such cases, organisations copy models promoted by their peers who are known to be leaders and visible in the context (Ansari, Fiss and Zajac, 2010).

Both the rational and social account emphasises the inter-organisational conditions and typically assume a population-level perspective. An important difference pertains to the durability of the behaviours. Within the rational account, new information can be weak and lead to reversals after a point of time. For example, individuals or groups may go back to old systems or practices (Lieberman and Asaba, 2006). As per social accounts, behaviours are institutionalised which in turn creates a more stable social order (Ansari, Fiss and Zajac, 2010). Cultural imperatives are central to social accounts, while technical implications make up the rational account (Ansari, Fiss and Zajac, 2010).

The focus on explanatory variables for the adoption choice (Everdingen et al., 2011; Vowles, Thirkell and Sinha, 2011; Frambach and Schillewaert, 2002; Waarts et al., 2002) has dominated studies which also ascertain the macro-level adoption pattern rather than the micro-level adoption process. Focal areas of adoption and diffusion research have remained either on communication or/and imitations among potential adopters. Given the notion of newness associated with innovation in studies of such contexts (e.g., hybrid seed corn for Iowa farmers; tetracycline for physicians (Ryan and Gross, 1943; Coleman, Katz and Mentzel, 1966), awareness generally leads to adoption, which also justifies the perspectives used to analyse adoption (Makkonen et al., 2016). However, not all settings and organisations are characterised with the same kind of newness, or homogenous communities, with regard to adopters. Such contextual circumstances have forced scholars to expand the focus beyond adoption choice and more towards adoption process and its underpinning adoption behaviour. From a behavioural perspective, the role of adopter changes from being an object to a subject. To this, scholars have contributed to developing the behavioural perspective on innovation adoption.

2.6.3 Theory of Reasoned Action and Planned Behaviour

Behavioural factors including the structural antecedents of innovation adoption have been utilised for several theories, such as: the theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975); the theory of planned behavior (TPB) proposed by Ajzen (1991); and the technology acceptance model (TAM) developed by Davis (1989). These theories have explained the behaviours of adopters and their attitude towards innovation. These theories, however, have been applied to investigate the individual level of adoption whilst introducing to the literature sets of behavioural beliefs which may or may not apply at organisational level (Agarwal and Prasad, 2000; Pichlak, 2016). TRA was developed in order to investigate the social behaviour in general whilst TAM was introduced specifically to explain computer usage intention and actual usage behaviour (Rahi et al., 2018;

Lim, 2018). The assumption underlying TAM was the causal relation between perceived usefulness and perceived ease of use, and the decision-makers' attitudes, intentions and actual innovation usage (van Oorschot, Hofman and Halman, 2018). Overall, these theories stress specifically that the intention of using innovation is the only predictor of the actual adoption (Chang et al., 2008). However, recent studies have taken steps towards unpacking the behavioural black box of adoption (Yang, Kankanhalli, Ng and Lim, 2015).

It should be noted however that studies so far have mostly reflected the ‘choice orientation’ wherein innovation-centricity overpowers the adopters’ needs. The description of adopters’ action as problem-solving or solution-seeking goes beyond its actual adoption, which is why it is important to describe organisational innovation adoption as adopter behaviour (Makkonen et al., 2016). Adoption behaviours are located between adopter organisations and markets, but previous work has used a mental model of actions in relation to internal and external landscapes (Claudy et al., 2015; Conte and Castlefranchi, 2016). For some, scholarly innovation is an internal entity and is contextualised through adopter’s perceptions and interpretations with regard to identifying needs and solutions (Cohen and Levinthal, 1990; Prado and Sapsed, 2016; Marabelli and Newell, 2014). Adopters’ perceptions and interpretations are key to understanding the adoption process in a complex organisation, which is why scholars are increasingly looking to extend the behavioural aspects of innovation adoption, focussing on exploring the process through a socio-cognitive perspective (See for example, Ansari, Fiss and Zajac, 2010; Compagni, Mele and Ravasi, 2015; Kennedy and Fiss, 2009; Moon et al., 2016; Rafaelli, Glynn and Tushman, 2019; Röth and Spieth, 2019; Zaman et al., 2018)

2.4 Socio-Cognitive Perspectives on Technological Innovation

Both cognitive and social properties are reciprocal and a socio-cognitive perspective on adoption has allowed me the opportunity to understand how cognitive properties and invariant social interrelations are interlinked (Gadomski, 2002). The perspective highlights the role of culturally produced signs and symbols, as well as the way historic, socially constructed meanings mediate the cognitive process (Hjørland, 2004).

Reviews of socio-cognitive theories of innovation in the literature include individual and institutional-level sensemaking, shown to be driven by the interaction between what Garud and Rappa (1994) define as three fundamental dimensions of technology: its underlying beliefs, its physical artefacts, and its evaluation routines. These interactions are at the heart of socio-cognitive processes which generate and narrow technology trajectories (Makri and Lane, 2007). To develop new technology, the beliefs of those involved in what is needed, what is possible and what is desirable shapes the path to evaluate potential forms and functionalities of the new technology. Such an evaluation routine highlights the gap between expectation and reality, which triggers another cycle of development and evaluation leading to a ‘cyclical dynamic of path creation’ and ‘technological trajectories’ (Garud and Rappa 1994; p. 358; Doshi, 1982). The technological problems for which researchers develop similar solutions, such as the technological community, are also determined by socio-political processes as they come to accept certain evaluation routines as standard (Rappa and Debackere, 1991). The standard set of evaluation routines results in an agreement on a specific design of technology, which accounts for one core technology trajectory in industries all across. Once the technology attains legitimacy, institutional pressures result in ‘inversion’ during which existing evaluation routine comes across as a reality for researchers (Latour and Woolgar, 1997; p. 240). Unopposed and un-questioned evaluation routines define what can or should be done including the cause and effect relationship and responsibilities for researchers to look for improvements in technology (Garud and Ahlstrom, 1997). In other words,

researchers look for solutions only within institutionally supported trajectories and conveniently ignore the other alternative trajectories.

Following Garud and Rappa (1994) proposing the socio-cognitive model of technology evolution, the literature has made considerable progress towards understanding innovation and its associated dynamics through the socio-cognitive lens. In this regard, an important point was made by Howells (1995), who argued that one of the features of a modern economy is the distinction between the social group managing the production of technology and another social group which maintains the technique in use. Such a split can be viewed as economical in terms of bounded rationality especially because the use of technology is far less complex than its production. Within society, an organisation is the principal unit of social control; technological innovation can only be introduced when it suffices the perception or interest of the institution. The social context of the organisation has a strong influence on the intended nature of technological innovation, but the process is primarily cognitive. This is where Wieck's (1979) ideas are useful. He argues that organisations are a product of the personal interactions of its members, and these interactions are conditioned by the inability of people to process all of the information that they receive. Weick (1979), March and Simon (1958), together have sought to understand the thought process within organisations which is referred to as the socio-cognitive approach (although none have focussed on technology or technological innovation). Building upon this, Howells (1995) applied the socio-cognitive approach to the process of technological innovation and he presented technological knowledge in the form of socially distributed cognitive knowledge. He tapped into Teece's (1982) idea which proposed properties of technical knowledge through his model of firm behaviour. Howells (1995) also used Metcalfe's (1998; 2002) work which had previously highlighted the decision-driven nature of technological change. Linked cognition, also referred to as 'cognition ensemble', which essentially combines qualities, criteria, and techniques from existing technologies and market concepts, makes the project/product worthy of a degree of development. Such has been the focus of studies using the socio-cognitive lens in decades gone by.

With a different focus, scholars in recent times have started to look at other aspects of the innovation process. According to Fichman (2004), the dominant paradigms (rational and institutional perspectives) are reaching the "point of diminishing return" in providing additional opportunities for meaningful research (p. 315). His call to step outside the dominant perspective was taken up by scholars from across the discipline. Wang (2009) came up with two theoretical approaches (socio-relational and socio-cognitive) which relate to factors and processes in the social environment of the organisation. The socio-relational perspective, for example, is more in line with Strang and Macy's (2001) work. Strang and Macy worked on social contagion to conclude that innovation is more likely to be imitated when earlier adopters are prominent and considered successful in the social system. From a socio-cognitive point of view, external stakeholders such as software vendors and consulting firms shape organisations understanding of innovation which they intend to adopt. Such a perspective argues for an IT innovation to exist in material form in addition to being viewed as a concept whose adoption and diffusion can be theorised and mobilised through the public discourse (Marsan et al., 2012).

Before this study, Strang and Meyer (1993) tried separating the concept (what they called as 'theoretical argument' and 'practice') from the material form whilst studying the diffusion of innovation. Wang (2009) likewise argued that innovation as a concept applies to all IT innovation and there is a claim that each innovation encompasses an organising vision about IT and its application to the organisation itself (Swanson and Ramiller, 1997). Kyratsis et al., (2012) explored innovation adoption at multiple embedded levels (individual, organisational and interorganisational) by responding to the need to address sustained interpretive work exploring the role and motives of actors and the influence of the organisational context and the social construction of evidence (Ferlie and Dopson, 2005). Prasad's (1993) study of symbolic processes during the implementation change exemplified the use of sensemaking. His work explored the symbolism of computerisation by occupational groups within a healthcare organisation which transitioned from

pre-computerisation through training and learning into the ‘adoption phase’. The work highlighted the change in mental frameworks of healthcare professionals who attributed their adoption decision to the social status within the organisation. Technology adoption continues to be investigated through antecedents such as attitudes, intention, behaviour (Seligman, 2006). König, Kammerlande, and Enders (2013) studied the adoption of discontinuous technologies by incumbent firms. König et al., (2013) studied the family influence but highlighted in particular emotional ties to existing assets and rigidity of mental model during the adoption process.

Based on previous research and mechanisms related to the social construction of technology and technology use in organisations, Griffith (1999) studied technology features as triggers for sensemaking. His work was an attempt to anticipate user understanding which informed inform the management of technology. Based on Orlikowski and Gash's (1994) call for the need to focus on how and when technological understandings change, Griffith (1999) proposed a feature-based theory of sensemaking (FBST). He linked dimensions of technology features with sensemaking triggers and discussed the triggering process in the context of later-stage models of technology understanding and use on the lines of adaptive structuration theory. Adaptive structuration describes the dynamics which allows for individuals to express and enact realities (Weick, 1979).

Table 2.5: Socio-cognitive Perspective on Innovation

Focus of the Study	***Context/Type of Innovation/Technology***	***Authors***
Authors have used Denmark and Netherlands as cases to compare patterns of biogas development. The timing and shape of development in both the countries have been explained using a socio-cognitive perspective. The authors believe using such a perspective was instrumental in identifying the key attributes of the development especially when dealing with radical innovation, its performance, and market viability	Biogas Development	Raven and Geels, 2010

Authors have debated the commercial and actual value of open source software (OSS) by capturing the IT specialists' perception of the discourse on OSS. They have drawn on the socio-cognitive perspective of IT innovation adoption in addition to organising vision theory to the perception of around 271 IT specialists.	Open Source Software	Marsan, Paré and Beaudry, 2012
Authors have looked at managerial cognition and have argued that dominant logic and innovation activities do not necessarily impact business performance. Through this paper, they argue that it is the interaction which directly impacts the business performance while postulating that innovation is a socio-cognitive process. As a process innovation constitute an interactive motivated social context and is also represented by the knowledge of external realities.	The study is set in the media industry and authors have explicated the effects on innovation outcomes often under the scrutiny in media industry firms	Bergman, Jantunen and Tarkiainen, 2015
Authors have presented a theoretical model and ascertained the flexibility of cognitive frames through categorical positioning. They have also introduced emotional frames which relate to organisational members 'sentiments and aspirations during innovation adoption. According to them, technological change poses the most challenge for firms creating pressure for leaders to reframe their mental models. This paper has highlighted the role of a flexible cognitive frame along with emotional framing in helping leaders and organisations emotionally engage in transformation efforts during technological changes.	The study has explored top management teams' (TMT) frame flexibility. It is a theoretical study which argues that initial forces constrict how TMT perceive innovation, but frame flexibility helps overcome those constraints increasing the possibility of adoption and expanding organisations' innovation practices.	Rafaelli, Glynn and Tushman, 2019
The study has linked organisational-level process associated with adoption and implementation of innovation to its diffusion at a population level. The work has looked into the early experiences associated with the implementation of innovation and how it influences later adoptions. It also explains how actors are driven by social gains which motivates them to engage in practices and skill reproduction.	The authors have investigated the diffusion of robotic surgery in Italian Health Care System	Compagni, Mele and Ravasi, 2015

Authors have examined actors' taken for granted notions of technology and the aim is to develop detailed insight into how technologies are developed, used and changed. The study has given us a firm foundation of technological frames bringing into play aspects of shared cognitive structures concerning technology. Authors studied and highlighted the differences between technological frames of two groups of actors – technologists and users.	The study was conducted at a large professional firm within which implementation of 'Notes' was investigated. The study was designed to explore how groupware technology was perceived by both technologists and consultants.	Orlikowski and Gash, 1994
Using a sensemaking perspective on innovation project decisions, authors of this study set up an experimental study with 455 participants in an effort to showcase the positive relationship between an innovation project market, technological innovativeness, and its perceived risk. Authors have reported differences between employees of different departments during the evaluation of innovation projects. They have applied a cognitive perspective on sensemaking and have categorised individual's resistance to change.	An experimental study addressing the lack of focus on consumers' resistance to change on innovation adoption. The study has also tried establishing the connection between innovations' context and decision-making	. Röth and Spieth, 2019
The conceptual foundation of this study is based on low market success for new products. The rationale for the low success rate has been attributed to consumers experiencing resistance preceding new product adoption. Differentiating active innovation resistance from passive innovation resistance, the study relates to consumer perception postulating that innovation-specific factors which do not meet expectations result in functional and psychological barriers.	Authors have used scenario-based experiments to argue that cognitive and situational passive resistance are strong inhibitors for new product development.	Heidenreich, Kraemer and Handrich, 2016
Authors have chosen to focus on how meanings evolve as they are amplified to become institutionalised cultural conventions. The study pushes the debate between micro and macro perspectives and by adopting the framing perspective, scholars have tried explaining the mechanisms through which collective interpretations are institutionalised which eventually shape interpretations.	Using the interactional framing perspective, authors have integrated framing lens with that of structuration to explain how micro processes for the bases of macro-level institutions.	Gray, Purdy and Ansari, 2015

Authors of this paper have introduced the term requirement determination (RD) characterised by sensemaking which has been acknowledged as a chaotic, non-linear and continuous process. With multiple stakeholders, various ways of understanding requirements are taken into account and scope creep, project drift or requirements often becomes a moving target. Authors have used technological frames as introduced by Orlikowski and Gash (1994) to build their process model to show how frames and frameshifts influence sensemaking during RD of an information system delivery (ISD) project.	The research is based on identifying and agreeing on the requirements for new information technology	Davidson, 2002
Authors have proposed a co-evolutionary model of technological frames and technology by applying the cognitive lens. The work reports on how cognitive lens change across the lifecycle which in turn might change the expected technological outcome. Authors postulate that in order to understand the evolution of technology one has to take into consideration the technological frames of all the actors implicated in the process.	The work is based around interactions of producers, users, and organisations which result in the development of collective frame in order to make sense of new technologies.	Kaplan and Tripsas, 2008
Authors have analysed path dependence in organisation through cognitive frames and organisational process. The paper is driven by the literature on path dependence tendency by focussing on 'self-reinforcing mechanisms and neglecting reflexivity'. They have expanded the cognitive perspective on path dependence through theories relating to networking and processual nature of innovation	Through twenty-five semi-structured interviews, authors tried to probe and understand employees' perception of innovation. This was undertaken in order to stumble upon ideal types of innovation styles.	Thrane, Blaabjerg and Møller, 2010
This paper has examined the social and cognitive processes which unfold as technology develops. In this study, the authors have focussed on the relationship between beliefs that researchers hold, the technological artifacts and the routines used for evaluation. Three basic conceptualisations of technology have been proposed in this study – beliefs, artifacts and evaluation routines. The three conceptualisations of technology	This longitudinal study has examined the development of cochlear implant technology. Authors have tracked the evolution of implant technology which has been described as socio-psychological products.	Garud and Rappa, 1994

have formed the basis of the socio-cognitive model of a technology evaluation.		
In this study, the author has used Weick's social-psychological knowledge base and Teece's conceptualisation of the firm. The study has heavily lent on Weick's ideas which combines psychological insights and organisational analysis. Labelled as coherent and self-contained, Weick (1979) has diverged from the orthodox view of the firm whilst constituting an explicit model of how organisational members think. Building on it, the paper is arguing that the socio-cognitive approach can be an alternative to understanding assumptions of 'rational' behaviour.	This paper is built on various case studies of innovation, especially technological innovation. The focus is firmly on the process by which innovation within a firm is generated.	Howells, 1995
This study has used a socio-cognitive approach in order to differentiate how insiders use scenario thinking and outsiders use comparative thinking. The work has illustrated three-point differences between the two groups of actors - a) Foci and Sensemaking, b) Epistemology and c) Assessment Criteria. Overall the authors argue that assessment is an important aspect of technological choice and by showing the diversity in how insiders and outsiders' approach such an assessment has various implications. Each group creates and enacts a different reality.	Authors have explored technology. By identifying 'insiders' and 'outsiders', the authors have shown how the groups tend to select different criteria to assess technologies	Garud and Ahlstrom, 1997

Strategic crisis at the London International Financial Futures and Options Exchange (initiated by the loss of a key benchmark product from their manual trading environment) leading to an electronic trading platform (DTB/Eurex) was studied by Scott and Barrett (2005). The study provided evidence for an empirically grounded form of sensemaking and attempted to provide us with theoretical tools associated with new technology adoption. Combining Weick's work (1999; 1993) and social theories of reflexive modernisation, they came up with what they referred to as 'strategic risk positioning' as a form of sensemaking and meaning construction. Using boundary theory (Ashforth, Kreiner and Fugate, 2000; Desrochers, Hilton and Larwood, 2005; Kreiner, Hollensbe and Sheep, 2009; Nippert-Eng,

1996), a social constructivist perspective on technology (Orlikowski and Scott, 2008), sensemaking (Weick, 1995) and attribution theory, Duxbury et al., (2014) offered insight into the adoption of mobile technology. More importantly, through this longitudinal study, they demonstrated the relationship between the use of mobile technology and successful boundary management.

The discussion above is further extended in the subsequent chapter where the focus shifts towards the socio-cognitive lenses employed to study innovation and its adoption. From sensemaking to framing, scholars have used these to great effect to illustrate various social phenomena. Given the scope of my thesis, however, the chapter below addresses framing and illustrates why it was chosen to study the adoption of EMEDs.

Chapter 3: Interactional Framing as an Analytical Lens

3.1 Introduction

This chapter is an extension of the discussion from the previous chapter which addressed the concept of innovation adoption and the various perspectives which have dominated the literature. Also, the previous chapter also touched upon the key themes on HIT and, more importantly, discussed the socio-cognitive perspectives on technological innovation. I rationalise framing and its importance to my studies by highlighting how the concept has been utilised by other scholars. I advance the debate by reviewing the literature on framing which has been used as a foundation on which a socio-cognitive perspective of EMEDs adoption has been argued in my thesis.

3.2 Importance of Framing Literature

According to Cornelissen and Werner (2014), very few constructs are, as 'ubiquitous' across management and organisational research as framing. Within management, Carl Weick (1995) has used framing to discuss internal self-conscious and process of cognitive sensemaking. Creed, Langstraat, and Scully (2002) have used framing to explain the strategic process of creating meaning in the social movement literature. The interest in the framing construct highlights some theoretical challenge as meaning shifts between literature as per the research questions, methods and theoretical paradigms (Cornelissen and Werner, 2014). The verb 'framing' in the view of social movement scholars signals 'work' or 'construction' (Snow, Rochford, Worden and Benford, 1986). The concept of framing constitutes frames which Goffman refers to as 'schemata of interpretation' and facilitates in constructing a sense of an otherwise meaningless succession of events (Goffman, 1974, p. 21). Gitlin (1980; p. 21) views frame as 'devices' which help, for example, journalists to store an enormous amount of information and subsequently present them to their audience in an effective and informative manner. Categorisation of a phenomenon, concept, and ideas under a topic is, therefore, a framing exercise (Hertog and McLeod, 2001; p.

144). On a conceptual level, a frame represents characteristics of communication which includes symbols and catchphrases (Gamson and Modigliani, 1989). Based on this concept, frame has been defined by Entman (1993) as ‘a selection process of specific aspects within reality and eventually making those realities noteworthy through a text’. Another approach to view frame is that of within the thought process (Lim and Jones, 2010). The example can be illustrated through an ‘audience frame’ which refers to social actors’ subjective principles of understanding the situation (Scheufele, 1999). Goffman (1974; p. 10) refers to frame as ‘principle of organisations which governs events (primarily social ones) and comprises individuals’ subjective involvement in them. The organizing activities in the process are based on individuals’ cognition (Lim and Jones, 2010). Frames are also defined as ‘knowledge structures’ which facilitates organisational stakeholders to organise and interpret incoming perceptual information by fitting it into an already available cognitive representation from the memory (Barsalou and Hale, 1993; Minsky, 1975). The process which points to an active phenomenon and signifies agency and contention in terms of reality construction is hence defined as framing (Benford and Snow, 2000). In general, the process of framing can be deliberative and goal-oriented. Framing is undertaken to achieve specific purposes within an organisation (Benford and Snow, 2000).

The use of framing within management and organisational research represents an important theoretical challenge. While its widespread use across different literature has cemented its position as one of the central constructs with management and organisation theory, there is a need to bring order to the ever-growing discipline of the construct. The popularity of the construct shifts the concepts in different directions (Werner and Cornelissen, 2014). For the purpose of my studies, it is important to highlight different theoretical definitions, as well as issues associated with it, and deconstruct the concept for better and precise use in the thesis.

3.3 Framing in Organisations (Meso Level)

Scholars have studied framing which has involved exploring strategic change through strategic and technological frames within organisations (Raffaelli, Glynn and Tushman, 2019). This broad area is referred to as meso (or organisational level), which involves analysis of the concepts in construction and negotiation of meaning within organized groups (Cornelissen and Werner, 2014). Researchers pursuing the line of research have conceptualised framing as 'bottom-up' process of meaning construction (Morgan, Frost and Pondy, 1983; Tannen, 1985). Researchers have used the tenets of the symbolic interactionist tradition of sociology, wherein human behavior is a result of how people react, use language and other symbols to create meaning (Blumer, 1971; Goffman, 1974). Cognitive meaning and symbolic language are dynamically connected in this tradition of sociology and language invoke the framing (Tannen, 1985). Language not only distinguishes a separate 'internal' cognitive process but helps individuals in the construction of collective meaning. At this level, language and cognition are considered recursive and the act of framing involves the use of cognitive frames and new frames which are established through creative extension and use of language (Cornelissen and Werner, 2014). Frames at meso level are defined as 'plastic principles of organisation which govern the subjective meanings assigned to social events' (Goffman, 1974; p. 11). Frames have been distinguished from framing in ways how individuals use language or other symbolic gestures to reiterate existing interpretive frame or call generate new frames in the context. In this regard, Goffman's framing can be defined as the 'active task of figuring out what is going on and what frames apply without which no utterance could be interpreted' (1974; p. 11).

Focus at this level of analysis is on framing as interactional co-construction instead of the isolated nature of frames and individual knowledge structures (Dewulf, Putnam, Lewicki, Bouwen, Van Woerkum, 2009). Emphasis on social construction has led to the expansion of micro-level research on cognitive frames for collective construction of strategic frames within organisations (Gilbert, 2006; Huff and Jenkins, 2002; Kaplan, 2008;

Nadkarni and Narayanan, 2007). Strategic frames are referred to as a ‘set of cause-effect understandings about industry boundaries, competitive rules, and strategy environment relationships available to a group of related firms in the industry’ (Nadkarni and Narayanan, 2007). Such strategic frames are a product of social construction due to the interaction between managers of the firm within the industry and have consequences for firms as they bind organisations to a set of capabilities. It also blinds them simultaneously to alternative options (Benner and Tripsas, 2012). These frames either help or hinder organisations from adapting to their environment in a period of change (Kaplan, 2008).

According to Kaplan (2008), one of the drawbacks of prior research on the strategic frame is the repeated focus on cognitive aspects and their consequences (Gilbert, 2006; Nadkarni and Narayanan, 2007). Such studies have focused on the social construction of frames (the actual process of frame creation and negotiation). Kaplan (2008) proposed the framing contests model to counter the drawbacks.

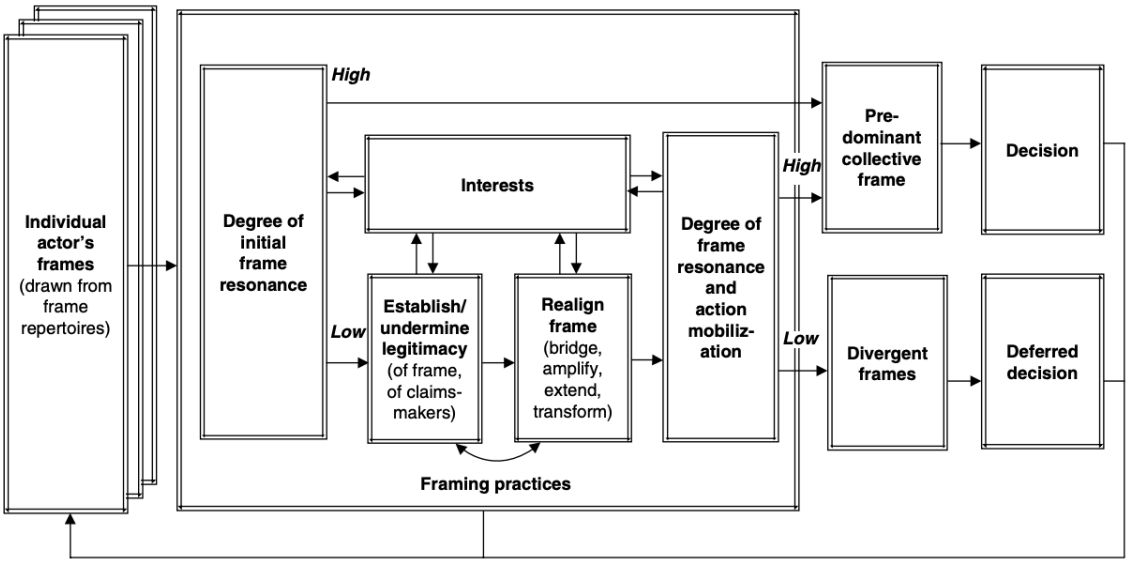


Figure 3.1: Framing contest model as advocated by Kaplan (2008)

The framing contest model advocates that an actor’s framing in social construction focus on their political interest as they try to win over others in the organisation to support a strategic change or direction (Kaplan, 2008). Framing is both symbolic and cognitive, as it was noted that skilled actors

used frames which mediated between their own political interests and others' beliefs and expectations (Goffman, 1974; Kaplan 2008, p.744). The interplay between frames and relations led to certain frames prevailing over others, due to the majority in organisation judging them as resonant and legitimate (Kaplan, 2008). Kaplan's (2008) work is closely associated with Goffman's (1974) initial work and stresses the importance of interconnection between symbolic framing practices and the establishment of collective strategic frames (Cornelissen and Werner, 2014).

Another work on the strategic framing of change highlights interconnections between framing in communication and interpretive frames of understanding (Cornelissen and Werner, 2014). The literature in this direction treats the constructs of framing as 'purposeful communication effort of leaders or managers in shaping the frames of interpretation of others in an organisation so that they collectively accept and support a change (Bartunek, 1993; Garvin and Roberto, 2005; Gioia and Chittipeddi, 1991; Lee, Ramus, and Vaccaro, 2018; Kotter, 1996). Gioia and Chittipeddi (1991) and Gioia, Thomas, Clark, and Chittipeddi (1994) through a series of work, demonstrated how the president of a US university cleverly used metaphoric phrases to push for change and impressed upon other stakeholders their own interpretations and ways of implementing the change. These works portray frames as stable modes of representation seated in broader cultural belief systems. They are used by strategically motivated actors as a salient, underlying logic in their narrative to garner support for organisational changes (Fiss and Zajac, 2006; Sonenshein, 2006, 2010). Such framing efforts contribute to an asymmetrical model of social interaction and meaning construction. It is also partial to the acts of the speaker over listeners as opposed to framing being a joint act of meaning construction (Goffman, 1983; Tannen, 1985).

It was Orlikowski and Gash (1994) who came up with the concept of technology frames. These frames referred to situations wherein individuals in organisations made sense of specific applications and consequences of technology in addition to the nature and role of the technology itself

(Orlikowski and Gash, 1994). Based on cognitive frames, the conceptualisation used a sociological focus to explain how technological frames guide and affect the pattern of implementation and use among users (Barrett, Heracleous, & Walsham, 2013; Kaplan & Tripsas, 2008; Leonardi, 2011). The domains advocated by Orlikowski and Gash (1994) served as guidelines for articulating people's interpretive relations with technology. They highlighted three domains (nature of technology, technology strategy, and technology in-use).

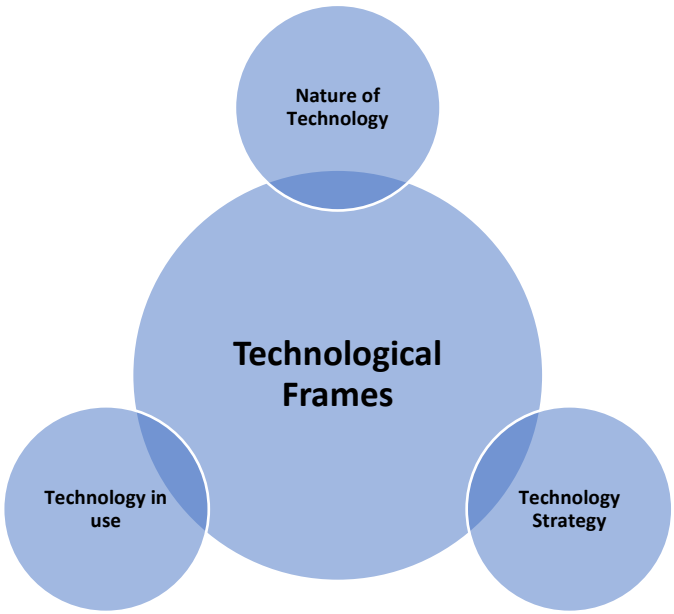


Figure 3.2: Domains of technological frames as identified by Orlikowski and Gash (1994)

These domains were found to be incongruent to the context within which the research was situated. Scholars working in this direction have established that individuals interpret and give meaning to technology. It is an ongoing, interpretive process, through which they develop a trajectory for its use in a specific context (Kaplan and Tripsas, 2008).

A large amount of work exists on political contests which use different technological frames across user groups within organisations (Nyberg, Wright and Kirk, 2017). Azad and Faraj (2008) looked at the process by which different actors and groups negotiate frames into an aligned ‘truce frame’ associated with new technology. The alignment of this ‘truce frame’ has been shown to reduce ambiguity, facilitate joint understanding and direct

patterns of use (Azad and Faraj, 2008). Davidson (2006) worked on congruent technological frames and its consequences for effective adoption and use of technology. Another work showed the use of mobile email devices and how they were framed differently across two occupational groups (Mazmanian, 2013). The study showed how congruent frames within each group facilitated for heterogeneous uses of the mobile device. It highlighted that individuals across the two groups shared broad assumptions but at the same time identified the possibility for different uses (Mazamanian, 2013). Studies in the direction domain have looked at structure and content of technological frames, but overall there is a dearth of research on technological frames that are constructed and the role they play in shaping and influencing behaviours (Davidson, 2006; Kaplan and Tripsas, 2008). According to Davidson (2006; p. 30), studies have focussed more on the consequences of technological frames instead of identifying and abstracting such frames themselves. This is because scholars have focussed on the cognitive aspects of technological frames. It has created a bias which takes away the focus from processual, interactive nature of these frames. The bias deflects attention from how due to communication such frames are socially constructed, negotiated, shaped and reshaped over a period (Cornelissen and Werner, 2014).

Social movement researchers too have borrowed Goffman's notion of frames and refer to them as 'schemata of interpretation' (Goffman, 1974; p. 21). Moving on from technological frames, researchers from this stream of literature have focussed on the process through which frames are constructed by activists (Lee, Ramus, and Vaccaro, 2018). These processual effects were shown to link the interpretations and beliefs of individuals (along with the entire activist's movements). They were referred to as the 'frame alignment process' (Benford and Snow, 2000; Snow, Rochford, Worden and Benford, 1986). The frame alignment process brings about three aspects of framing: a) diagnostic framing, b) prognostic framing, and c) motivational framing. These aspects of framing have been referred to as 'tasks of framing' and are distinct yet related concepts (Snow and Benford, 1988). Diagnostic frames have been defined as tasks of framing

which defines problems and assigns blame or responsibility to an individual or institution. Prognostic framing is a way of identifying problems with strategies and motivational framing and includes the aspect of framing which activates individual activists into action (Benford, 1993; p.199; Snow and Benford, 1988; p. 199–202; Fisher, 1997, p.5). Within the context of a social movement, all three aspects of framing highlight the strategic nature of framing. These tasks are intended to garner support from activists and neutral parties including media and public. Together they have been referred to as ‘collective action frames’ because besides performing the interpretive functions, they are also agentic and contentious in a way that challenges existing authoritative views and framing of reality (Snow and Benford, 1988; p.198).

The majority of the studies in this area of literature focus on the strategic use of frames to align activists and movements to shape outcomes including mobilisation and resource acquisition (Markowitz, 2009; Oliver and Johnston, 2000; Polletta and Kai Ho, 2006). The initial definition of framing by Benford and Snow (2000; p. 613) emphasised it being an active processual phenomenon with agency and contention at the level of reality construction. Subsequent studies have treated framing as a mere external, strategic process of communication and persuasion. This has led to frames being used as strategic messages or accounts of movement leaders who with the use of language, guide movement’s direction in line with the existing belief system and values to inspire public and group members (Carlos, Sine, Lee and Haveman, 2018).

Framing research, however, suffers from the ‘neglect of empirical studies, descriptive bias, and static tendencies’ (Benford, 1997; p. 423). The criticism of framing research in social movement literature is that scholars have overlooked the processual approach to framing and have focussed on identifying frames across empirical settings (Benford, 1997). There have been suggestions that researchers should focus on the ongoing, interpretive process of meaning construction with the social movement context (Polletta, 2006). The obsession with strategic frames has led to an increasing

disconnect from the original traditions of frame analysis (Goffman, 1974). The review at the meso level highlights the versatility of the construct in studies of meaning construction. Work at this level indicates the tendencies among researchers to focus on frames and organisational consequences. Such studies range from the implementation of technology to social movement through mobilization of activists (Loseke, 2017; Peters, 2017). This has led to an emphasis on outcomes instead of treating framing as a process of meaning construction.

3.4 Framing in Social Movement (Macro Level)

Framing studies in social movement have mostly assumed an institutional context, including studies such as the diffusion of new ideas and practices by Ansari, Fiss, and Zajac (2010). The construct of frames and framing within this context is strengthened by its duality. The dual nature of the construct is derived from the foundational work of Bateson (1972), Burke (1937) and Goffman (1974). It captures the institutionalisation of meaning structures besides providing a structural underpinning of actors' motivations, cognition, and discourses at a micro-level.

Frames within institutional traditions were given a derivate position and were seen to translate broader, societal level logics (Beckert, 2010; Thornton, Ocasio and Lounsbury, 2012). On the other hand, cultural-cognitive traditions within neo-institutional theory treat framing as central to institutions (Beckert, 2010). To emphasize this, Scott (2003; p. 880) argues that, 'framing is central to the cultural-cognitive aspects of institutions that involve the creation of shared conceptions that constitute that nature of social reality and the frames through which meaning is made'. Beckert (2010; p. 607) too states that neo-institutional theory 'emphasizes the role of cognitive frames and meaning structures as decisive for the explanation of economic outcomes by broadening the notion of an institution; institutions are defined as inter-subjectively shared meanings and thereby become almost indistinguishable from cognitive frames.' The content of institutions according to some is 'taken for granted' cognitive frames, which help in

organising social and cultural experience across a general area of activity (Goffman, 1974). Also, referred to as meaning structures, cognitive frames stabilise power arrangements and interaction patterns, embodying ‘structures of expectation’ (Lounsbury, Ventresca, and Hirsch, 2003). These taken for granted frames which play a significant role in the longevity of meaning and experience associated with institutions due to expectations, role enactments and behaviors (Berger and Luckmann, 1966; Diehl and McFarland, 2010; Douglas, 1986; Weber and Glynn, 2006). Institutional traditions around frames and logics were publicised by Lounsbury, Ventresca, and Hirsch (2003). Their work ideated the concept of a ‘field frame’ which, according to them, had the durability of institutional logic but was endogenous to actors and prone to changes and modification (Lounsbury, Ventresca, and Hirsch, 2003; p. 72). It is said to provide an analytical structure which can explain the process by which framing practices evolves into a set of a commonly held convention. It then leads the way for new practices, forms and market categories (Jones, Maoret, Massa, and Svejenova, 2012; Rao, 1998), an example being the work of Weber, Klaus and DeSoucey (2008) in which the study advocates for grass-fed meat and dairy products. As part of the framing, they defined and classified new markets to distinguish it from industrial agriculture. This was done to motivate farmers’ entry into the newly created market categories (Weber, Klaus and DeSoucey 2008).

Another line of research at this level looks at the construction and alteration of broader ‘institutional fields’ including alteration in micro-political struggles over frames and their consequences (Powell and Colyvas, 2008). An institutional field in this context is referred to as “those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products” (DiMaggio and Powell, 1983, p. 148). In such a context, the framing of one group is challenged by the other group; this is referred to as a ‘framing contest’ (Dan and Ihlen, 2011). In a period of change and major disorder, these framing contests intensify. Previous frames and meanings are challenged and

rebutted (Fligstein, 2001; Maguire, Hardy, and Lawrence, 2004; Meyer and Hollerer, 2010). Mayer and Hollerer's work (2010) highlighted the instance of intense framing in their study of shareholder values. They highlighted that the framing of shareholder value was influenced by previous understanding, which weighed on a continental logic of shareholder involvement in corporate governance (Fligstein, 2001). The worker showed the unsettling of a 'fragile truce' between corporate and political stakeholders in the wake of the introduction of the new concept (Fligstein, 2001; p. 1254). The settling of the field frame came after a period of intense framing contest whereby actors strategically framed the concept as 'only' a new management instrument. They used alternative labels and claimed that 'it aims to serve shareholders and stakeholders equally well' (Mayer and Hollerer, 2010; p.1258).

Settlement of a frame is the product of repeated interaction wherein actors and groups are exposed to each other's frame (Ansari, Fiss and Zajac, 2013). This exposure is likely to facilitate alteration of their own interpretation to integrate elements from others' frames (Donnellon and Gray, 1990; Pinkley and Northcraft, 1994). Settlement of a frame is the result of the strategic effort of actors and movements who borrow frames of other actors to incorporate them into their own framing (Fligstein, 2001; Fligstein and McAdam, 2011). These actors take what they get from the institution instead of attempting to new meaning (Fligstein, 2001; p. 106). As part of the framing efforts, skills, and ability of these actors to effect these changes in an institutional field depend on specific discourse. Rao (1998) illustrated this point through his work of consumer watchdog organisation. He showed that the institutional template was formulated because of a framing contest between issue entrepreneurs and movements. The ascendant frame prevailed due to the direction of initial movement, which aligns with common societal discourses of science, objectivity, and professionalisation.

3.5 Interactive Framing in Organisation and Social Movements

In an institutional field, new frames are constructed and negotiated through interaction between actors (Lounsbury, Ventresca and Hirsch, 2003). A bottom-up micro perspective on framing and interaction among these actors leads to the possibility of confirmation of the shared interpretive schemas (Kellogg, 2009; Strang and Meyer, 1993). This occurrence means that framing extends beyond an individual and forms a part of 'common ground' between different actors in the same institutional field (Berger and Luckmann, 1991; p.75; Loewenstein, Ocasio and Jones, 2012). During the process of building up the 'common ground', the meaning is locally negotiated and the dominant frame among the population propagates through interacting actors until the point the entire population shares the same interpretive schemas or frame (Fay, Garrod and Roberts, 2008). Building up of the common ground is an emergent process and is driven by results from local communication wherein actors are aware of conventions of existing frames (Cornelissen and Werner, 2014). In a local setting, provisional framing evolves into a convention for a large group of actors also referred to as a 'field frame' and further into an 'institutional frame', which is taken for granted in an institutional field (Douglas, 1986; Navis and Glynn, 2010). According to Powell and Colyvas (2008) when a frame is first produced, it brings specific concepts from different cultural domains. In a study by Rao, Monin, and Durand (2003), chefs are framed as 'creators' instead of 'translators' of cuisine and the framing activity in this context is influenced by cultural images of artistic creativity. When frames are conventionalised, they are embedded as automatic categorisations, but the evolution of frames do not stop (Glucksberg, McGlone and Manfredi, 1997). These frames continue to evolve until the categories are fully naturalised and are taken for granted. A fully integrated institutional frame loses all its association with the source domain. It can no longer be identified or processed as a metaphor (Kennedy, 2008; Suchman, 1995; Zucker, 1983). The shift from field frame to institutional frame involves repeated instantiations of a frame for it to be naturalised. It also pertains that actors

and the groups involved forget it as a metaphor (Cornelissen and Werner, 2014).

With different research orientations and levels of analysis, understanding framing comprehensively can benefit from taking into account the mutual and reciprocal influences between language, cognition, and culture. For the purpose of this thesis, it is important to pin down a broader conceptualisation of framing and linking it to interactive framing. This serves to create an augmented conceptualisation of framing which in turn allows linking an individual's framing to an interactively established group. Goffman (1974) in his conceptualisation of framing, focussed on the experience of interaction which included the shared framing activities always constructed and agreed upon by actors. The socially constructing framing activities reflect the principles of interaction which were shown to be connected with the social identities of the actors (Tannen, 1985). The act of framing, however, is constrained and embedded in an institutional setting. In spite of being constrained, actors as creative agents have the ability not only to reinforce the institutional setting but also to rejig words and thoughts for a completely new take on framing (Diehl and McFarland, 2010; Goffman, 1974). Scholars looking at this phenomenon have given it their own terms – for example, 'lamination' (Diehl and McFarland, 2010) and 'editing' (Weber and Glynn, 2006). It can be referred to as reframing which is always grounded on established norms and genres.

Repeated interactions and negotiations not only bring the focus on reframing but also throw light on common ground or, in other words, the settlement of joint meaning between actors (Ansari et al., 2013; Granqvist and Laurila, 2011). For some, it can be a basis for how new practices emerge and are adopted eventually (Lounsbury et al., 2003; Weber et al., 2008). The work in this regard has mostly looked at institutional consequences and their emergence, which is why my work here in exploring common ground can alleviate the paucity of research. As such, little research exists on how common ground is established through interactions and repeated negotiations (Barley, 2008; Schneiberg and Clemens, 2006). Another

important point of consideration is understanding how individuals play a role in enacting and performing framing activities in line with institutional logic (Reay et al., 2016). In cases where framing activities lack grounding, actors find it difficult to accept new framing notions which are often related to commitments to existing practices and the structure of actors' experiences. According Bingham and Kahl (2013), it is also down to mismatch in actors' expectations as one of the reasons for lack of grounding in framing activities.

As discussed above, framing serves two roles: (1) the internal cognitive "schemata of interpretation" (Goffman, 1974: 21) that allow actors to construct 'sense' in an otherwise meaningless succession of events; and (2) the explicit articulation (behaviour) of an internal cognitive schema that serves as the basis for interaction between multiple actors as they seek to collectively negotiate sense. From a cognitive perspective, frames are seen as the internal understandings that guide actors' perception of the social realities in which they find themselves and others. Thus, they serve as a sensemaking tool that allows actors to bracket moments of past and present experience from which meaning is constructed (Weick, 1995). In the context of my study, therefore, the distinct working groups affected by its implementation will make sense of it by fitting the new innovation to existing representations and understandings from memory (Barsalou and Hale, 1993). That is, cognitive frames shape how organizational actors perceive the world and their own interests.

This internal cognitive representation of frames, in turn, shape how actors make choices and act, which represents an external manifestation of an internal understanding. According to an interactionist approach, this process is known as 'framing,' in which multiple actors communicate through the exchange of individualised cognitive frames as a means to suggest what is occurring to others (Kaplan, 2008). From this perspective, frames are non-static and evolve and mutate as interactions occur. That is, frames are "…constructed, deconstructed, and reconstructed as individuals engage with one another in everyday interactions…" (Gray, Purdy and Ansari, 2015; p. 118). Thus, the use of frames in this context refers to simplified cognitive

representations of the environment. Applying these views to the analysis of the EMEDs implementation, therefore, allows me to develop an understanding of how the various cognitions, actions, and interactions of multiple actors unfold over time. More importantly, using interactive framing as an analytical lens privilege the socio-cognitive mechanisms in the adoption of technological innovation.

Gray et al., (2015) used the amplification process to show how interactive framing constituted the building blocks of diffusion and institutionalisation of meaning within organisations. Their work contributed to the debate between micro and macro perspectives, but more importantly, conflated social interactions with social structures. The important thing to note was how interaction framing allowed them to explain the process through which collective interpretations evolved and amplified to become institutionalised. As reviewed above, organisational theorists and scholars have adopted a semantic view on framing (Bateson, 1972; Cornelissen and Werner, 2014; Fillmore, 1982). There are some who have used interactional models of framing (Collins, 2004; Dewulf et al., 2009; Goffman, 1974; Tannen and Wallet, 1987). There is another group of scholars who have used intuitional approaches to reflect on a cognitive decision-making view of framing (George et al., 2006; Kennedy & Fiss, 2009).

Building on the above, my thesis utilises the interactive approach to framing. Within the interactional approach, the meaning is continually negotiated through ongoing interactions. As a social and performative phenomenon, actors engage with one another in everyday interactions. In order to communicate with each other, actors ought to share a minimum level of understanding about what is going on around them and should be aware of contextual social rules. Drawing upon existing cultural registers (frame), the actors borrow frames from the wider culture, which constitutes their current actions. In that process of doing so, they reaffirm the shared interpretation held in the culture through their verbal, non-verbal and physical responses to each other (Goffman, 1974). Using such a notion of framing, my thesis aims to answer the following research questions:

1) How do the interactions between multiple actors lead to *new framing activities* during the adoption of technological innovation (EMEDs)?
2) What *constitutes the framing process* and how does it *contribute to understanding the adoption* of technological innovation involving multiple actors?

Chapter 4: Method and Research Context

4.1 Introduction

In order to fulfil the objectives of my thesis, this chapter lays out the rationale for selecting the grounded theory approach. The chapter details the difficulties of handling process data along with a comparison of some of the approaches which came close to being employed as an effective research method. The chapter essentially has two major sections. The first part reviews the researcher's dilemma of working with process data and rationale for choosing grounded theory. The second part narrates the research context followed by the research design employed to achieve the objectives of my research. To reiterate, my thesis looks to answer the following research questions:

1) How do the interactions between multiple actors lead to *new framing activities* during the adoption of technological innovation (EMEDs)?
2) What *constitutes the framing process* and how does it *contribute to understanding the adoption* of technological innovation involving multiple actors?

4.2 Rationale for Choosing Grounded Theory

The objective of grounded theory (GT) is to seek a theory that is tied to the evidence (Belfrage and Hauf, 2017). The theory formed is consistent with the empirical data (Orlikowski, 1993; Eisenhardt, 1989). According to Strauss (1987), GT is not dependent on any specific disciplinary perspective and distinguishes itself from other methodologies due to its emphasis on theory development.

As for my research, the topic of innovation adoption has generated a huge amount of scholarly insights, my research, however, is addressing specific issues within the innovation adoption literature. Having reviewed the prominent strands of innovation adoption literature (economic, institutional,

DOI and theories of reason action/behaviour), my research is looking to contribute to the growing stream of research through a socio-cognitive lens. Most of the studies through the lenses of economic, institutional or behavioural perspectives are parsimonious because they are abstract from individual differences to explain the micro-level phenomena (Ansari, Fiss, and Zajac, 2010; Garud, Gehman, and Kumaraswamy, 2011; Mangula, Weerd and Brinkkemper, 2017). The abstraction of adoption is particularly salient at the intra-firm level in complex organisations, such as hospitals and other healthcare institutions, which are characterized by a multiplicity of actors with heterogeneous roles, professional backgrounds, meaning systems, and underlying logic. In such contexts, the traditional rational (Strang and Macy, 2001; Teece, 1980; Williamson, 1979) and institutional (Abrahamson, 1991; DiMaggio and Powell, 1983) accounts of innovation adoption advocated by prior studies, fail to account for the inherent heterogeneity among disparate actors, irrationality of their adoption decisions, and complexities of propagation within and between non-isomorphic groups (Ax and Greve, 2017; Heitmueller et al, 2016).

In the NHS context, adoption has been an issue (Heitmueller et al., 2016) and my study would be a step towards addressing the paucity of empirical work in the domain. I am seeking to explore the process of innovation adoption through a disparate group of actors and GT acknowledges the individual and social construction of meanings in which theory generation is inherent. GT is based on an explicit framework for analysis and theory development (Hussein et al., 2017). More importantly, GT has been acknowledged for its credence in healthcare stressing upon the experience and reality of actors involved (Chapman, Hadfield and Chapman, 2015). Considering the complexity of the context contributed by the multiplicity of actors and situational analysis of EMEDs adoption, GT was considered suitable for my research. It allowed for understanding the multiplicity of interactions and having posited innovation adoption as a very social process, GT has helped explore the variations within the process (Childress, Gioia and Campbell, 2018). In social sciences, GT has become a widely-used methodology and its popularity can be attributed to the availability of clear

guidelines on how to ‘perform’ GT and its objective of establishing a theory (Bryant and Charmaz, 2010; Charmaz and Henwood, 2017; Gibson and Hartman, 2013; Thomas and James, 2006).

Originating from sociology, GT has its roots in symbolic interactionism in which the meaning is negotiated and understood through interaction within the social process (Jeon, 2004; Blumer, 1986). The researcher using a GT methodology attempts to uncover what symbolic meaning, artefacts, clothing, gestures, and words have for a different set of groups as they interact with each other (Cutcliffee, 2000). The symbolic interactionists are of the view that individuals are active participants in creating meaning out of the context as they construct realities through symbols around them while interacting with each other (Morse and Field, 1995). GT is about seeking a ‘whole new relational externality’ with a view that the knowledge on a phenomenon is gained through its understanding and is not replicable by those who do not experience it directly (Steinbeck, as cited in Weick, 1979, p. 29). As a definition, it is a theory induced from data (Lincoln and Guba, 1985). According to Glaser and Strauss, GT is a theory that, “… fits the situation being researched and work when put into use. By fit we mean that the categories must be readily (not forcibly) applicable to and indicated by the data under study; by work, we mean that they must be meaningfully relevant and be able to explain the behaviour under study (1967; p. 3).”

GT explores the system or behaviour in a context through description and explanation and as a methodology is used to develop a theory that is grounded in data which is systematically gathered and analysed (Strauss and Corbin, 1994). GT is a quest for social processes in human interaction as theorists using this methodology attempt to identify patterns and processes and try to understand how a group of actors define the reality around them (Hutchinson, 1993; Stern, Allen, and Moxley, 1982). A central feature of GT is its method of comparative analysis which enables data collection and analysis to occur simultaneously (Glaser and Strauss, 1967). It means that that the theory induced out of this process is conceptually dense with multiple conceptual relationships which are embedded in a

context of descriptive writing (Cutcliffee, 2000). GT is inductively derived from the phenomenon in the context and can be either substantive or formal (Glaser and Strauss, 1967). A substantive theory is relevant to people in the context and is very flexible, readily modifiable (Glaser, 1978). On the other hand, a formal theory goes beyond the substantive theory and falls into the category of fit, relevance, and modification (Strauss and Corbin, 1990). This means that the GT approach facilitates the emergence of core problems and processes (Backman and Kyngas, 1999). In the table below, GT is compared with two other qualitative methodologies employed for these types of research.

Table 4.1: Approaches in Qualitative Inquiry (Adapted from Starks and Trinidad, 2007; p. 1373)

	Phenomenology	***Discourse Analysis***	***Grounded Theory***
Philosophy	Existence of perceived reality with common features	Interaction and multiple discourses produce knowledge and meaning	**By examining concepts, theories are discovered.**
Methodology Research Question	Interested in "what is the lived experience of the phenomenon of interest?"	Interested in "types of discourses used and how they shape relationships, identities, and activities"	**Interested in "How does the social process of the phenomenon happen in the context of the environment?"**
Data Collection	Observing participants in the context where the phenomenon is experienced	Observing participants in conversation in their natural environment	**Observing participants where the basic social process take place**
Sampling	Participants who have experienced the phenomenon of interest	Participants situated in one or more than one discourses of interest	**Participants who have experienced the phenomenon under different conditions**

Aim	Describing the meaning of the lived experience of the phenomenon	Understanding how people use language to create and enact identities	**Developing an explanatory theory of basic social processes**

GT has undergone multiple methodological and philosophical iterations since its inception and different approaches using GT has evolved. Researchers argue that one must be clear about the methodological foundations of the chosen approach to GT and how it informs the methods (Locke, 2001). According to Bryant and Charmaz, "Researchers need to be familiar with [grounded theory methodology], in all its major forms, in order to be able to understand how they might adapt it in use or revise it into new forms and variations (2010; p.17)."

There are three methodical approaches within GT (Mills, Bonner and Francis, 2006):

- **Traditional GT** (Glaser and Strauss, 1967; Glaser, 1978; Strauss, 1987)
- **Evolved GT** (Strauss and Corbin, 1990; Glaser, 1992; Strauss and Corbin, 1998)
- **Constructivist GT** (Charmaz, 2006; 2010; 2017)

Irrespective of the approaches, GT overall facilitates constructing a theory about the issues important to peoples' lives. Using GT, scholars have stressed the importance of establishing iterative links between epistemology, theoretical perspective, and methodology (Mills, Bonner, and Francis, 2006).

Glaser and Strauss coined the term 'grounded theory' to describe 'the discovery of theory from data systematically obtained from social research' (Glaser and Strauss, 1967; p. 2). Scholars have regarded these texts as seminal because it challenges ideas that quantitative and qualitative research were rooted in similar logic and thus should be evaluated using

similar methods (Charmaz, 2010). Glaser and Strauss (1967) challenged two key assumptions which up until that point were used as the dominant approach to social research: a) should theory testing and confirmation always be the aim of the research? and b) should a rigid divide exist between theory and collection of data? (Dey, 1999). In their attempt to question these assumptions, Glaser and Strauss (1967) shifted the focus to approaches for data analysis and formulation of the theory.

As a methodological approach, traditional GT has its root in objectivism which seeks the external truth. Data collection and analysis are viewed as objective processes, within which the researcher is considered neutral and passive. Evolved GT is viewed as a departure from traditional GT which emerged from the works of Strauss and Corbin (1990). In contrast to traditional GT, evolved GT acknowledges the existence of multiple realities. Strauss and Corbin (1990; p. 279) denounce the idea of a 'pre-existing reality'. They assert that 'our position is that truth is enacted' (Strauss and Corbin, 1990; p. 279). This line of thinking suggests that evolved grounded theory is epistemologically rooted in post-positivism or constructivism. Scholars argue that such a line of thinking reflects the contemporaneous development of GT (Hallberg, 2010).

Constructivist GT is the most recent advance in GT which is underpinned by the epistemology of constructivism and interpretivism theoretical perspective. This is in contrast with the traditional GT approach, which roots for objectivity and a positivists approach to the research. Charmaz (2000: p. 513) in her words positions constructivists GT away from the other two approaches of GT, "Both [traditional and evolved grounded theory] … assume an external reality that researchers can discover and record. Glaser through discovering data, coding it and using comparative methods step by step; Strauss and Corbin through their analytic questions, hypotheses, and methodological applications."

As an approach, constructivist GT it is both exploratory and explanatory and well suited to the development of insights from the clinical groups especially

when little empirical evidence exists in relation to the end-user perspective of innovation adoption. Constructivist GT is a flexible approach which allows the researcher to go back to important issues that may emerge in data (Charmaz, 2006). Such an approach recognises the importance of theoretical and pragmatic considerations. It also brings to the role of reflexivity and the importance of the literature reviews.

4.2.1 Importance of Reflexivity

Reflexivity refers to the recognition of influence which the researcher may have on the research owing to his own background and perceptions. A research is ‘blind and without purpose’ if there is no element of reflexivity (Flood, 1999; p. 35) A pre-understanding of the research subject influences the results of the research (Chia, 1996; Palmer and Dunford, 1996). Pre-understanding ‘as a subjective meta-theoretical commitments’ plays a role in the research process and can be understood through the concept of reflexivity (Bourdieu, 1990). Other aspects such as gender, race, class, and culture also have an impact and remain unconscious to the researcher during the research process (Marcus, 1994). There is an argument that researchers should be consciously aware of how far they should go into giving a methodological account of their experiences (Finlay, 2002). Constructivist GT highlights the importance of reflexivity throughout the research process (Mills, Bonner and Francis, 2006). It recognizes the role of research participants and the researcher in creating knowledge and theory on issues being researched. It acknowledges that all knowledge generated by the analysis is co-created (Gubrium and Holstein, 2008).

4.2.2 Importance of Literature Review

Every approach within GT aims to reduce any preconceived notion that exists prior to the collection of data. However, the type of approach dictates how existing literature is incorporated into the research process. Traditional

GT argues that a researcher should have no prior notion or ideas before the commencement of data collection and analysis (Glaser and Strauss, 1967). Glaser reaffirmed these ideas by suggesting that, “there is a need not to review any of the literature in the substantive area under study for fear of contaminating, constraining, inhibiting, or impeding the researcher’s analysis of codes emergent from the data” (1992; p. 31).

A pragmatic argument has also been put forward which highlights that the relevance of literature can only be gauged after empirical research has been done. Conducting a literature review prior to data collection may lead to the most relevant literature not being reviewed (Glaser, 1998; Urquhart, 2012). Scholars have levelled criticism at traditional and evolved GT for the apparent lack of literature review prior to conducting the empirical research. From a methodological perspective, this can fail to acknowledge the implicit theories which may determine the early stages of data collection and analysis. Such an approach has been referred to as ‘naïve inductionism’ which can pose a lot of problems for a novice (Dey, 1999; Bryant, 2003). Morse has reiterated:

> such a naive perspective as working without consulting the literature may be possible for a senior investigator with a vast knowledge of social science theory with many concepts at his or her fingertips and real theoretical wisdom. However, ignoring the literature is a strategy that is fraught with danger for a new investigator. Literature should not be ignored but ‘bracketed’ and used for comparison with emerging categories. Without a theoretical context to draw on, new investigators find themselves rapidly mired in data – the very state that Glaser himself warns against. (2001; p. 9)

Conducting a literature review prior to undertaking empirical research helps locate the research within a wider field and demonstrate a sense of

originality (Hutchinson, 1993). Both originality and relevance have ethical attributes which do not warrant research if the topic has already been well studied. According to Dunne:

> The idea of postponing a literature review until data collection and analysis is well underway is simply unworkable for many researchers. This is particularly true for Ph.D. students, whose research funding, ethical approval and progression through the doctoral process may all be heavily dependent upon producing a detailed literature review prior to commencing primary data collection and analysis. (2011; p. 115-116)

Constructivist GT is an answer to such criticism, as it recommends the literature should not be ignored before starting the research (Charmaz, 2017; Mulugeta et al., 2017). The objective is not to be restrained by existing knowledge in relation to the findings. The literature is re-examined and added as part of the analysis of main data (Urquhart and Fernandez, 2006). Constructivist GT argues for reviewing existing literature prior to carrying out the data collection as it lowers the potential risk of replicating previous work (Belgrave and Seide, 2019). The aim is not to identify and establish pre-assigned codes for data analysis but rather to identify gaps in current knowledge. The whole process helps the researcher to mitigate the risk of researching isolation and development of non-cumulative theory development (Charmaz, 2006). Considering the exploratory aims of my own research, early stages of the literature review indicated the need for a thorough investigation of a multi-actor perspective of innovation adoption.

4.3 Using the Constructivist GT to Understand EMEDs Adoption Process

There are three key methodological characteristics which distinguish GT from other qualitative approaches. These are a) theoretical sampling, b)

constant comparative method, and c) development of theory. Theoretical sampling, according to Glaser and Strauss (1967; p.5), is a simultaneous process of collecting data and analysing it at the same time. The rationale for theoretical sampling is to inform data collection process and develop core categories (Charmaz, 2006). It is about actively seeking data to confirm or refute earlier findings or notions with the objective of reaching theoretical sufficiency (Faija et al, 2017). One of the key features of GT is the dynamic interplay of data collection and analysis (Payne, 2007; p.68). this interplay is facilitated by a constant comparative method. According to Hood (2007), use of an iterative approach to data collection and analysis is a key attribute of GT which help in remaining open to explanations, themes, and the emergence of theory from the co-constructed data. Data analysis begins as soon as the first set of interviews has been collected. Researchers move back and forth between data collection and data analysis and each step informs one another giving the whole process a cyclic and iterative attribute (Belgrave and Seide, 2019)

As described earlier in the chapter, GT works upon the principles of abductive reasoning where both inductive and deductive approaches are in play for theory development (Fisher and Aguinis, 2017) One begins by examining the data and reviewing all the possibilities. The cyclic aspect of GT establishes closer links between data collection and analysis (Flick, 2002). Developing a theory remains the key objective of GT (Nadkarni et al, 2018). Two types of theory can be developing using the GT approach - substantive and formal theory (Vander Linden, 2017). Practical consideration limits the scope of the research project because of which most grounded theory project leads to the development of the substantive theory (Goulding, 2002).

Theoretical saturation and sufficiency have also been noted as central to the development of the theory (Ott and Eisenhardt, 2017). Theoretical saturation can be understood as a stage where newly gathered data fails to bring to light any additional insights or codes (Charmaz, 2006). However, scholars have argued on the determination of theoretical saturation. Some of them

believe it is difficult to verify the point at which it can be verified and leaving it to researcher's subjective judgement means it can be open to different interpretations (Birks and Mills, 2011). Due to the researcher subjectivity involved in theoretical saturation, it has been argued that claiming theoretical saturation can be uncritical (Dey, 1999). Another criticism levelled towards the concept of theoretical saturation is a term which indicates a wider and comprehensive approach to data collection. Scholars argue that GT should seek 'theoretical sufficiency' rather than theoretical saturation. According to Dey (1999; p. 117), "It may be more appropriate to refer to category 'sufficiency' rather than 'saturation'... Theoretical 'sufficiency' would then refer to the stage at which categories seem to cope adequately with new data without requiring continual extensions and modifications. 'Saturation', on the other hand, seems to imply that the process of generating categories (and their properties and relations) has been exhaustive rather than 'good enough'.

Aiming for theoretical sufficiency is more in line with the constructivist approach, which argues that data can always be subject to re-interpretation (Charmaz, 2006). From an early stage of this research, theoretical sufficiency was the more realistic and manageable goal (Hadley, 2017). It was compatible with the objectives of my thesis and was therefore employed to guide my process of data collection and analysis.

4.4 Difficulty of Negotiating Process Data

In order to deliver the objectives of my research, it was imperative that I experience the process of EMEDs implementation first hand. The objective remains to extract theory from the ground up through collecting qualitative data (Bower, 1997; Pettigrew, 1992; Van de Ven, 1992). Scholars acknowledge that making sense of process data often collected in a real organisational context is not easy. Process data have been labelled as messy and scholars have advocated various strategies to navigate the intricacies associated with them. The complexity of dealing with process

data has been attributed to various characteristics as highlighted by Langley (1999). The figure (4.1) has adapted from Langley (1999) identifies four key problems associated with process data.

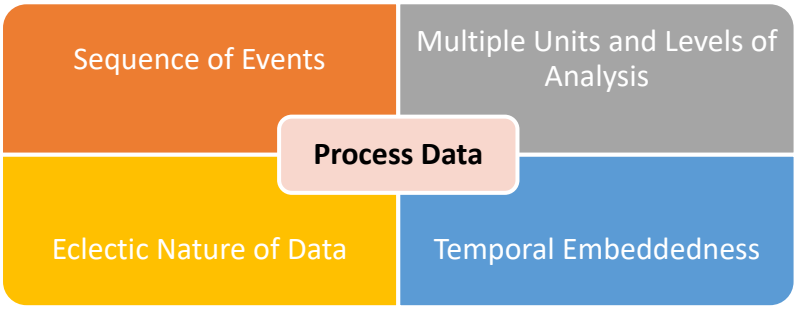


Figure 4.1: Characteristics of process data (adapted from Langley, 1999)

Process data are characterised with having a sequence of events which as a conceptual entity, most researchers are unfamiliar with. Since process data relates to understanding how and why a phenomenon over time (Van de Ven and Huber, 1990) evolve, these mostly contain stories within which actors detail events, activities, and choices over time (Langley, 1999). 'Events' are quite different from 'variables', which researchers are generally used to. The data pertaining to events require researchers to detect patterns amongst them. According to Van de Ven and Poole (1995), the identified patterns can be in different forms, but the most common ones found in the literature is the linear sequence of 'phases' which happen over a period of time in terms of an outcome (Burgelman, 1983; Rogers, 1983). Building on the difference between events and variables, it was Mohr (1982) however, who distinguished between variance and process theories. Whilst variance theories are set out to provide explanations through relationships between dependent and independent variables process theories, on the other hand, aim to explain the sequence of events leading to an outcome. Interaction between entities and temporal ordering is key and in order to build a process theory, one has to look out for pattern in the events.

To add to this, data involves multiple levels and units of analysis. The multiplicity of levels and analysis in process data are linked to having ambiguous boundaries. Qualitative researchers are faced with the difficulties

of isolating units of analysis in ambiguous ways. According to Pettigrew (1992), a process-based phenomenon has a fluid character as it spreads over both space and time. Context plays an important role when adopting a qualitative process approach which involves multiple levels of analysis and as researchers it is difficult to segregate. As a researcher, when handling process data the challenge remains to organise the sheer volume of words and it can often lead to a sense of anxiety. However, on a positive note, such data offer an opportunity for discovery. The complexity associated with process data also reflects the phenomenon under consideration. To this, researcher has been critical of simple process models characterised with a linear progression of neatly defined phases for outcomes (Schwenk, 1985; Van de Ven, 1992). More and more scholars, as a result, are recycling between phases and parallel tracks (See, for example, Mintzberg, Raisinghani and Theoret, 1976; Nutt, 1984; Schroeder, Van de Ven, Scudder and Polley, 1989). The work in that direction has refocussed the importance of exploring process model in better ways but the challenge remains as always to move away from a shapeless large volume of data to some sort of theoretical understanding which reflects adequately the richness, dynamism, and complexity of the data. Various strategies have been put forward in order to navigate through the complexity of process data. Prominent amongst them are narrative, quantification, alternative template, temporal bracketing, synthetic and grounded theory strategies.

4.5 Research Context

My research is situated within MEDCO (name changed), a large NHS hospital located in a major city in the North of the UK. The hospital is part of the group of NHS Trust University Teaching Hospitals and serves more than 80,000 inpatients per year in 98 wards, with approximately 1,000 inpatient beds. MEDCO was considered to be a theoretically relevant case (Eisenhardt and Graebner, 2007; Siggelkow, 2007) on which to base my study for two reasons. First, the hospital was transitioning from using a paper-based prescribing system to EMEDs - a digitised medical prescribing system. Prescribing systems, whether paper-based or digitised, has three distinct functionalities for different user groups: (1) the prescribing of medicines by doctors; (2) medicine reconciliation by pharmacists; and (3) medicine administration by nurses. Secondly, the hospital setting and disparate groups were characterized by diverse professional backgrounds. The adoption of EMEDs represented a revelatory context at MEDCO which allowed me to examine how the process unfolds in a complex organisational setting.

The prescribing of medicines is a common form of therapeutic intervention in healthcare and is integral to high-quality patient care (Shemilt, Morecroft, Ford, Mackridge and Greem, 2017). Prescribing systems within the NHS hospitals in the UK have predominantly relied on paper-based records, which have been in use for almost 60 years (Cornford, Dean, Savage, 2009). The paper-based model uses paper prescription charts such as ‘Aberdeen sheets’, ‘drug charts’ or ‘Medication Kardex’ (Crooks et al, 1967; Gommans, McIntosh and Bee, 2008), and there are no standardised system-wide paper-based prescription charts across the NHS (Shemilt et al., 2017). Therefore, NHS regions and Trust across the UK have developed their own prescription-based chart shaped by their own idiosyncratic practices (Courtenay et al., 2017). These sheets are usually kept in a folder at the end of the patient bed and used by clinical professionals involved with prescribing, dispensing and administering medications (Garfield, Jheeta, Husson, Lloyd, Taylor, Boucher, Jacklin, 2016). Paper-based charts are the source of clinical information for all the health professionals dealing with a

particular patient. Maintained on sheets of paper, these drug charts reflect the state of patients across the ward. The paper prescription charts have been in use, but on a lower cost and do not require extensive user training. While these benefits have been driving the use of traditional paper-based charts, the problems of handwriting, legibility and incomplete sections on prescriptions have prompted the need to move towards electronic prescribing. For both social and economic impact within and outside the hospital, electronic prescribing as a technological innovation was meant to address the issues of patient safety and clinical governance (Assimakopoulos, Oshri, and Pandza, 2015).

In 2014, as part of the ‘Safer Hospital and Safer Ward’ Technology fund, MEDCO decided to implement EMEDs as a replacement to the obsolete paper-based prescribing system. The paper-based prescribing system caused a plethora of problems, such as duplication of medicines, errors in prescribing, and lack of patient safety. EMEDs is a digitized prescribing system that ‘facilitates communication of prescription or medication order, helping in the selection, administration, and supply of medicine through information and decision to provide a comprehensive audit trail for the entire medicines support’ (Cornford et al., 2009; p.9). As such, the intention was for EMEDs to circumvent the problems associated with the prior paper-based system.

An EMEDs Project Board (EPB), set up by the hospital management was assigned with the responsibility of implementing the new technology. The EPB had representation from each user group through their respective ward-heads and constituted a group of implementers that formed the central team responsible for the roll out and correct take-up of EMEDs. There were two groups of implementers, one that represented the non-clinical EMEDs technology team and the others that comprised of clinical actors representing doctors, nurses, and pharmacists. Overall, the implementation group was led by actors from the EMEDs technology team, who were the technological experts with knowledge about the new system that steered the clinical implementation teams. The members of this team, however, had little

or no clinical knowledge or experience and relied on the clinical implementation groups to translate knowledge during the adoption and diffusion process. Table 4.2 provides a summary of the groups that comprise the main actors in our study.

Table 4.2: Groups of Actors Recruited for the Study

Groups of Actors	Description
Group A Non-Clinical Implementers	*Actors of this group had technical competencies. They were primarily responsible for drawing up implementation plans, which included identifying and selecting hospital wards most suitable for EMEDs implementation. Following which they arranged for logistics and offered technical help to clinical users.*
Group B Clinical Implementers	*Actors of this group were clinically efficient. It is important to reiterate that actors of this group can be classed as former users of paper charts. They were temporarily assembled for the purpose of EMEDs implementation and specialised in their respective clinical competencies (nursing, pharmacy, and consultancy). They, however, lacked technical knowledge in relation to EMEDs. They collaborated with members of Non-Clinical Implementers to organise and deliver EMEDs training to clinical users.*
Group C Clinical Users	*Actors of this group were the active users of EMEDs/paper charts in hospital wards. Doctors used EMEDs/paper charts to prescribe medicines to patients. Nurses used EMEDs/paper charts for administering medicines to patients. Pharmacists used EMEDs/paper charts to re-conciliate medicines.*

4.6 Addressing the Research Formalities

4.6.1 Ethical Approvals

In social research, ethical implications of research questions, aims and methods are extremely critical (Flick, 2017). The overarching set of ethical principles as outlined by Faculty of Education Social Sciences and Law (ESSL), Leeds University Business School (LUBS) Faculty and Research Ethics Committee University of Leeds (AREA) was used to guide how this research would be conducted and managed. Central to ensuring that the research is conducted ethically, personal reflections constituting ethical practices and the seeking ethical oversight of research protocols was also necessary. Ethical approval from AREA was sought before initiating the research. In addition to that, the Research and Innovation Department of Leeds University Teaching Hospital was also was approached for ethical clearances. They sanctioned the research and as part of these processes, due considerations were given to several issues such as:

a) gaining informed consent,
b) informing participants of their rights to withdraw, and
c) assuring them of confidentiality and anonymity.

The following documents were provided to the committee to gain ethical clearances.

Table 4.3: Documents Submitted for Ethical Clearances

Documents List
AREA 15-123 FW R D Management Permission - Tabish Zaman.txt
AREA 15-123 Committee Provisional 1.1.doc
AREA 15-123 Ethical Approval Leeds.doc
AREA 15-123 Information Sheet.docx
AREA 15-123 Consent Form.docx
AREA 15-123 Further information.txt (by email)
AREA 15-123 Data Management Plan Draft 1.0.docx
AREA 15-123 Debriefing form.docx
AREA 15-123 Fieldwork Risk Assessment Form 201516.docx
AREA 15-123 Risk assessment.pdf

4.6.2 Informed Consent

A developed understanding of informed consent entails recognition of the ongoing nature of the process of gaining consent so that it does not remain a one-off or a ‘tick box’ exercise (Green and Thorogood, 2018). The need to remain alert to consent influences the entire research process. Being able to offer every participant the opportunity to give informed consent is a requirement for the researcher to be clear and precise in what they are seeking from them. For the consent to be meaningful and informed, participants should be provided with sufficient information about what the research is all about. On gaining access to the hospital, I gave a presentation to both the groups involved in my study. Because the actors involved in the study belonged to separate units with the hospital, it was not possible to have everyone attend the presentation. As a result of this, I had to deliver multiple presentations in order to inform the prospective actors about my research. Following these presentations, I also provided actors with information sheets. Information sheets contained background information on my research including objectives, rationale and contact details. However, before proceeding with the semi-structured interviews, consent was also sought over the recording device. Verbal consent was taken for every actor interviewed.

4.6.3 Rights to Withdraw

Another ethical guiding principle was the participant’s right to withdraw. In principle, it was assumed to be the choice of the individual participants to participate or decline participation in research, answer a specific question or request removal of their narratives from the study. Everyone was advised that if they agreed to be interviewed, they could stop the interview at any time, or skip questions. They were also informed that they maintained their rights to withdraw without furnishing a reason for it.

4.6.4 Anonymity and Confidentiality

Another central premise of ethical research is ensuring confidentiality and anonymity for the participants. For me to achieve this, all the project related data were stored at my residence in a locked cabinet. The transcribed files in the digital format were backed up and stored in Dropbox. The folder was double password-protected and only I had access to it. Personal identifying details including those of third parties (if given at all) have not been included. Participants from each team were assigned numbers and any information that might identify (names etc.) any of the participants were removed from the transcript at the earliest opportunity.

4.7 Research Procedure

To reiterate, the objectives of my research were to find out:

1) How do the interactions between multiple actors lead to *new framing activities* during the adoption of technological innovation (EMEDs)?
2) What *constitutes the framing process* and how does it *contribute to understanding the adoption* of technological innovation involving multiple actors?

My approach to fulfilling those objectives was to depend on a well-specified if rather general research question. Like most qualitative research, I have employed multiple data sources, but central to my study were the semi-structured interviews.

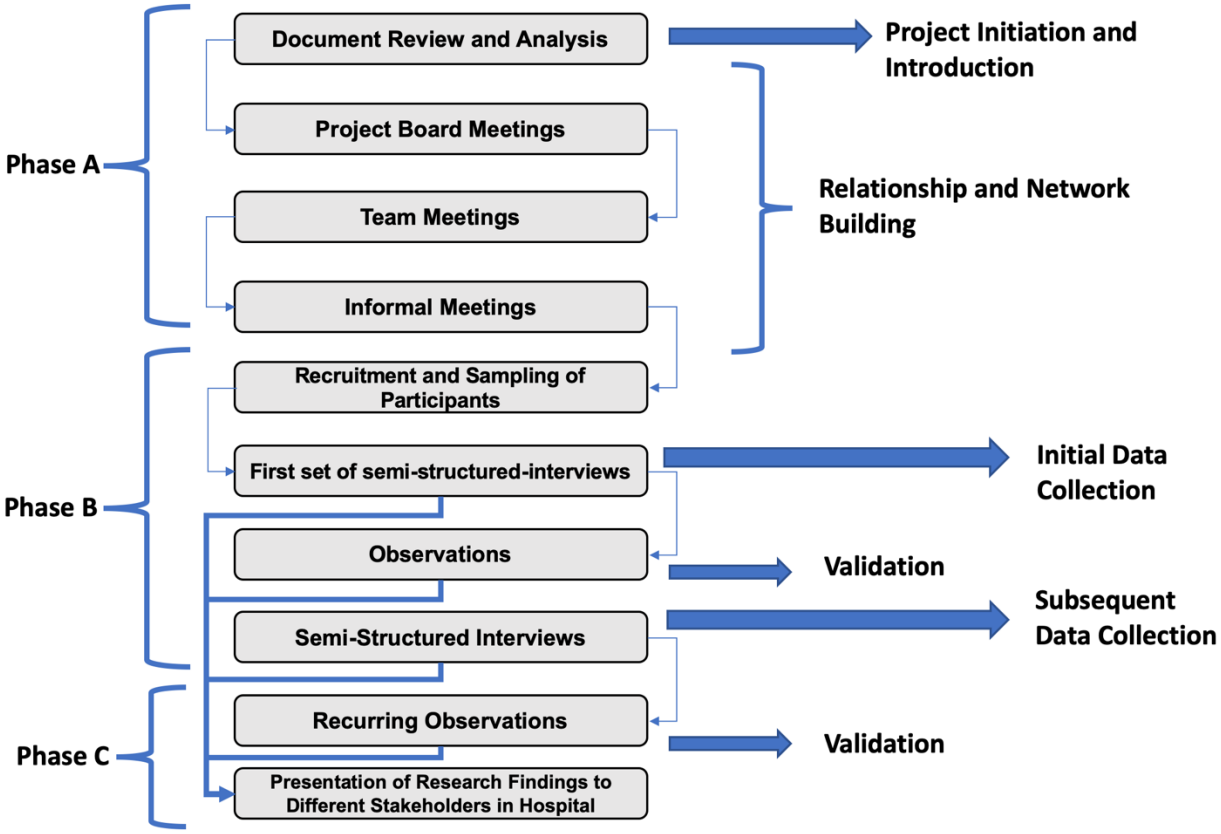
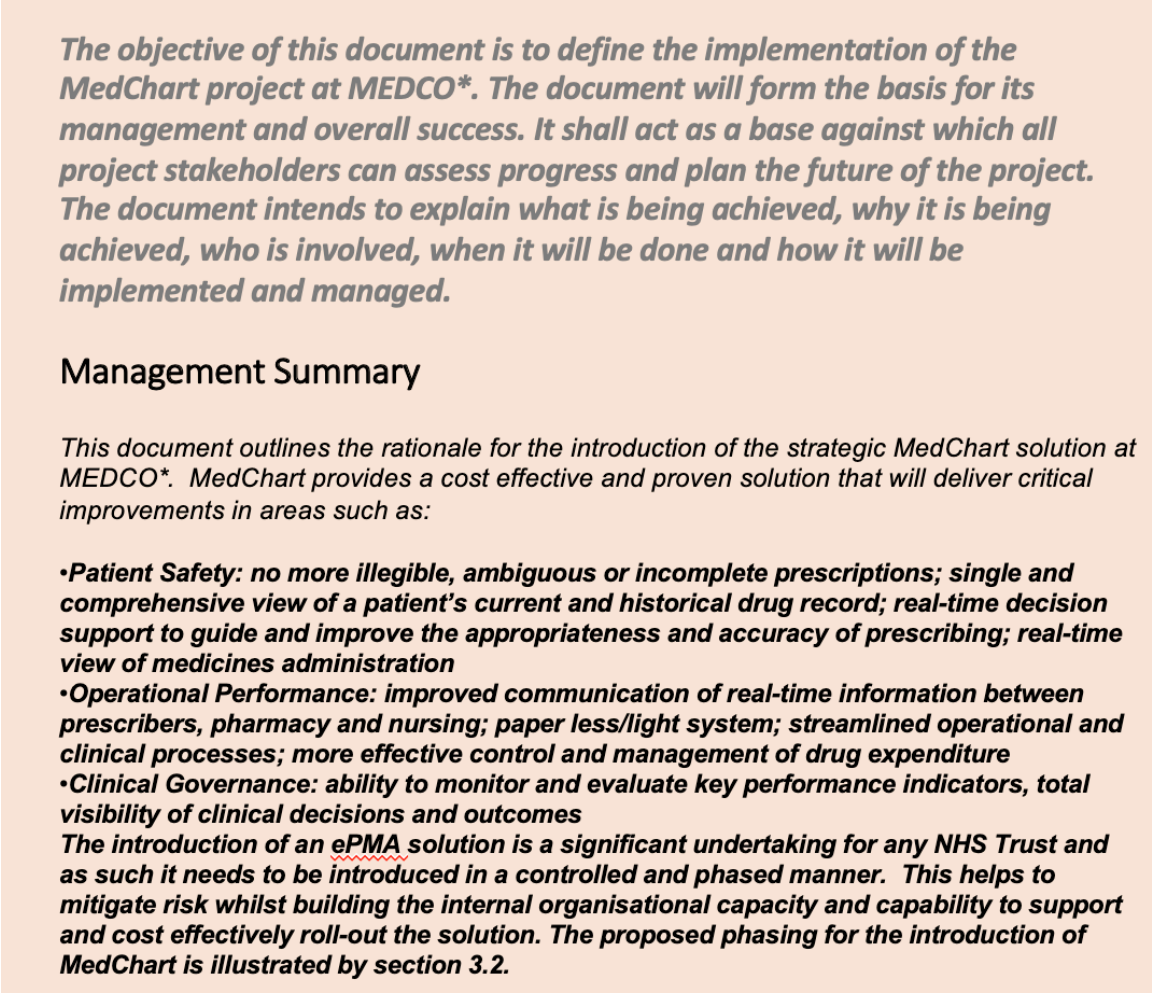


Figure 4.2: Visual representation of data collection process and strategies

Before I conducted my first set of interviews, however, I had spent a considerable amount of time meeting different stakeholders and individuals across the hospital. I had reviewed the documents which kickstarted my official engagement onto the project. I was given access to internal servers and emails which also helped me build upon my initial assumption for implementation and operational plans.



The objective of this document is to define the implementation of the MedChart project at MEDCO*. The document will form the basis for its management and overall success. It shall act as a base against which all project stakeholders can assess progress and plan the future of the project. The document intends to explain what is being achieved, why it is being achieved, who is involved, when it will be done and how it will be implemented and managed.

Management Summary

This document outlines the rationale for the introduction of the strategic MedChart solution at MEDCO. MedChart provides a cost effective and proven solution that will deliver critical improvements in areas such as:*

•Patient Safety: no more illegible, ambiguous or incomplete prescriptions; single and comprehensive view of a patient's current and historical drug record; real-time decision support to guide and improve the appropriateness and accuracy of prescribing; real-time view of medicines administration
•Operational Performance: improved communication of real-time information between prescribers, pharmacy and nursing; paper less/light system; streamlined operational and clinical processes; more effective control and management of drug expenditure
•Clinical Governance: ability to monitor and evaluate key performance indicators, total visibility of clinical decisions and outcomes
The introduction of an ePMA solution is a significant undertaking for any NHS Trust and as such it needs to be introduced in a controlled and phased manner. This helps to mitigate risk whilst building the internal organisational capacity and capability to support and cost effectively roll-out the solution. The proposed phasing for the introduction of MedChart is illustrated by section 3.2.

Figure 4.3: Excerpts from one of the first project initiation documents, version (0.5)

I followed these up by being a part of the project board meeting which led to me attending team meetings. It was at this stage; I was able to build a network and identify potential actors to work with. Given the opportunities, I was ready to turn my informal interactions with actors into the intended semi-structured interviews. The strategy underpinning the interview was to have a "gentle one-side conversation which explores research participants perspective on their personal experience with the research topic" (Charmaz, 2014; p. 56). Some of the principles I adhered to while conducting my interviews have been highlighted in Table (4.4) below:

Table 4.4: Principles of Conducting Semi-Structured Interviews (Adapted from Charmaz, 2014; p. 56)

Key Principles	Implication for my interviews
1) Selection of research participants who have first-hand experiences of the phenomenon under consideration	I worked with actors directly/indirectly engaged in EMEDs implementation
2) An in-depth exploration of participants' experiences and situation 3) Reliance on open-ended questions	The interview schedule evolved as I began meeting actors further in the project. It illustrated not only my deeper engagement with the project but also reflected actors and their role and level of engagement
4) Obtaining detailed responses	Depended heavily on whom I was interviewing and what their role was in EMEDs implementation process
5) Emphasis on understanding perspectives, meaning and experiences	Captured breadth of experiences across the three groups of actors
6) Following up on unanticipated areas of inquiry, implicit views and accounts of action	Led to an informal, unrecorded discussion around secondary aspects of EMEDs implementation

The semi-structured interviews allowed me to obtain both retrospective and real-time accounts of actors experiencing the phenomenon (Gioia, Corley and Hamilton, 2013). The popularity of semi-structured interviews can be explained by its compatibility with numerous analysis approaches which of course includes the flexible and adaptable nature of grounded theory. It allowed me to seek clarifications and request elaboration from actors. More importantly, it helped me gain a comprehensive view of participant's experience and interpretation. With semi-structured interviews, participants were able to raise issues which as a researcher one may overlook. It provided for both varieties and differences while lending an overall sense of focus to the research (Charmaz, 2006).

4.7.1 Evolution in Interview Protocols

An important point of consideration was how my interview protocol evolved as my interaction with actors increased over time. Like other researchers, I had the trouble initially where actors were unwilling to share things or discuss their experiences. To illustrate this, I present an excerpt from one of my interviews conducted in the initial stages of my research.

Table 4.5: Excerpt from the first set of interviews conducted in the hospital ward

Interviewer/ Response	
I	Could you introduce yourself and tell me about your role and what you do?
R	Yeah, I'm XXX I'm one of the ward sisters on J42. My role is to manage the staff on the ward day-to-day. Usually, my role is as a coordinator, of the ward so that involves making sure ward rounds, doing all the ward rounds for all the patients, helping any of the teams and then any administration of medication I would do, also checking off the discharge paperwork and discharging patients.
I	Okay, so I guess you've done enough of, you've handled enough of paper charts?
R	Yes.
I	What do you think of that paper chart, when it existed?
R	Yeah, I mean we still have some because we've still got some medical outliers who aren't yet on the EMEDs in the system. Yeah, it's okay but obviously, you have problems with charts going missing, things being handwritten as they're not always legible. They need transcribing, so sometimes you run out of space and you have to chase the doctors to transcribe them. I mean it was a system that we were used to, so it was fine, but it obviously, it did have it's,
I	Disadvantages.
R	Disadvantages yeah.
I	So, I mean that's what people talk a lot about, its disadvantages, what would you say like, the advantage of paper-based chart was, given today it replaced EMEDs at all, you think?
R	I think we were just used to the paper chart and one of the advantages was that it was, if it was in the right place, it was at the end of the bed.
I	Bed yes.

R	And it was easy for the doctors to write, change the antibiotic, or to while you're on the ward round.
I	Okay.
R	Also, it was easy when you're in an emergency situation […]
I	Just pick it up.
R	Just pick it up, write what you want, and then it can be given straightaway, rather than having to find a computer, so the prescription, login, get someone to second check it, that's the only thing.
I	Okay, I think this as the location of paper based chart obviously at the you know the patient's bedside, now we're all moving towards EMEDs, some of the feedback I've got like, you know, you used to interact with patient a lot more when the location of the paper chart was there, you know, you speak to patient, patient's used to interrupt you when you need to talk, even doctors used to do that. Now it's all moving to EMEDs, is it taking it away from the patient altogether?
R	I wouldn't, I mean I suppose […]
I	Patient still come back to you and still,
R	Yeah and we still, if we're administering the medication, we're still at the end of the bed, because we still have to give the medication at the end of the bed. And so, I think, from a nursing point of view, I don't think it makes that much difference in the interaction with the patients, because […]

As one would notice, the interviewee was reluctant and was not particularly forthcoming. Given the initial stage of the research, I was still figuring out the approach and appropriate strategy in terms of asking the right questions. But with time, I was able to make contacts and prior to conducting the interview spent time with individuals on an informal basis. This yielded a positive outcome to the quality of interaction. To highlight this, I present another excerpt from one of the interviews conducted much later in the process.

Table 4.6: Excerpts from the interview conducted much later in the process

Interviewer/ Response	
I	Just begin with your name and your position and how long you've been in the trust.
R	My name is XXX, I am an ST3 A&E trainee doing my IT anaesthetics block, I am on ITU for the six months now, starting the beginning of February. The first time I've been at the Leeds Trust,

	so I was BRI for two and a half years as an A&E reg prior to coming here. Yeah.
I	Okay. That's good, so in terms of your experience, when was the first time you hear about EMEDs?
R	The first time I heard about EMEDs was just through the emailing system, saying EMEDs is coming when I was on anaesthetics. They set up face to face training, but I wasn't able to go to those, I forget why, I think there was conflict with what I was doing, I just seemed to miss them. But you always had the opportunity to do it on-line in your own time and it's like 120 minutes or so and you do it in one go, which sometimes I think as I've done electronic records before and I've done a face to face and it took hours. Not this hospital, somewhere else. Just because people are different levels of learning and computer ability, so like anything it seems straightforward while you were doing it, but until you actually put it into practise, then you really start to learn how to use it. So, I think overall, it's a nicely made EMEDs system it's a nice electronic one. I've used a variety in the past, all different calibre of ease and […]
I	Just talking about those e-Learning experiences, what did you make of it, how was the whole session for you personally, did you […]
R	The one on-line I did myself? Straightforward, it was yeah, it was easy to do, it was broken down into bits from what I can remember. It did show you how to get on, how to search for particular drugs or fluids, where there were found. Just the overall outline of what it was going to look like, with the PRN and 2.06.0 and things like that, and the, for complicated doses where you could either do calculation or you want to do a stat dose, and then follow it on with something else, it showed you how to do that too, which was nice.
I	Okay.
R	Yeah.
I	That's good to hear. But in terms of retaining all of that, were you able to apply whatever you learned 2.28.7 or to the floor directly or […]
R	No, like I said its… until you actually start doing something routinely then you really do start to learn. So, it was a nice introduction and even though it seemed straightforward I knew that,
I	What you would face.
R	And yeah, you don't really start learning something until you actually start doing it on a routine basis, so I experienced hiccups and there was a couple of things that, became a little frustrating, specifically with fluid boluses, where there isn't anything to actually write for a fluid bolus, so you either could annotate it, but would always come up as a bag or especially for something like PACU where the nurses over there need some kind of guideline to be able to do what they

	needed to do rather than having to come and find you and then there'd be a delay in treatment. So, for example, post op renal transplant, part of their post op orders were, to give fluid, to keep urine output of 30mls or more per hour, but you couldn't translate that onto EMEDs, there wasn't anything, so I know it's still evolving and protocols are being out into place so that's something will come up in time. On maybe, specifically for renal transplant, but, for other patients as well it would be nice. So, little quirks like that, that until you start doing, you realise what you do routinely on pen and paper, that you don't, you're not going to know.
I	Exactly. I believe there are no boxes like independent boxes or something where you could prescribe what you want, like.
R	Yeah.
I	It's not customised, you pick everything form the list and the, Yeah, no, that's okay, I mean what we also want to figure out is, in terms of, like, okay, whatever you learned from e-Learning and then obviously, you came onto the floor with armed with those information then started out blind then? Issues you faced on the floor, and how were you able to channelise that back to the EMEDs team or the - whom did you go back to if you had any problems?
R	Initially there were EMEDs trainers around the you just called, you page them, and they will come, they were very good and responsive. Some of them weren't sure how to answer the question you had but sought help from other colleagues and sometimes there was just no answer it was just the way the system was, but then it highlights what we needed to do. After they left, I remember I'd emailed XXXX with one or two issues and they were in the process, of I guess, other people had emailed saying, we've come across this, is there a way round it? It would be easier if we had this. So, because it's still evolving, other protocols were put in place. The protocols are nice, and they've actually improved since we started where some things were selected anyway and you didn't want that, but you couldn't deselect, but that seems to have resolved.
I	Okay. So, you're seeing that happening now, things which have common sense, they are getting done on their own, yeah.

As one would notice in table 4.6 above, the responses are much more detailed in comparison to responses in table 4.5. Attention, therefore, was paid to interview protocol. Focussing on research questions, I paid attention to the revision of the interview protocols as research progressed. There were twists and turns involved in discovering the grounded theory, which also included modifying even my initial research questions. I followed wherever

the actors lead us in the investigation of my guiding research questions. For example, while discussing we came across another technology which had already been implemented. The mentions of it came across in quite a few interviews. Given the importance of it to EMEDs implementation, I decided to follow up on it by scheduling an interview with one of the support nurses. The excerpts from the interview has been highlighted in the table 4.7 below:

Table 4.7: Excerpts from one of the interviews

I	Could you just tell me what, PPM, what is PPM Plus?
R	PPM Plus is our electronic patient record. So, we have gone ahead and created that or ourselves, rather than, it's not a shop bought system. Leeds Trust has created it.
I	Okay.
R	So, you've got Pluses and minuses with that because you know like Medchart we bought it off the shelf and if you have any problems with that or if you need it, if you've got any need you can go back to them and say, "this is what we need from the system" and they can do it for you. Erm, whereas PPM Plus we have in a bit of disadvantage where because we have built it, we've got the advantage of making any changes to suit our care needs and stuff, but we lack a bit of like you know, in terms of the, what do I say, I don't know, like terms of […]
I	You mean the support?
R	Yeah, like because think there is a huge downfall because it gets crashing, it crashes every now and then…..
I	So where is this PPM team based?
R	They're over at the J33; you know, that's the main Informatics department. So, we do have a nursing team for PPM Plus as well.
I	What does the nursing team do with PPM Plus?
R	Oh, I wouldn't be able to tell you that because I've never sort of like gone over and spent a day with them to see what they, what the sort of stuff that they do. We have always been an EMEDs and you know like, like us dealing with all the EMEDs issues I suppose they will have that support given.

I	I know what PPM Plus the patient part management is. Pharmacy team use it quite a lot within the recourse of the patients from, like, you know, if they've been discharged previously so they can pull off all the medicine records. What I'm trying to figure out here is, like, it has come up quite a lot in discussion; what I'm trying to figure out: how does the nursing team negotiate PPM Plus with EMEDs? Or does, just it, does it effect in any way or, so when […]

It is therefore clear that for a research of this nature, one cannot simply adhere to a standardised interview protocol. The development of it occurs during the research that discovers them. The onus lies on researchers and their willingness to adjust (Gioia, Corley and Hamilton, 2013)

4.7.1 Data Sample, Size, and Timeline

As per the objectives of the research, I had identified three groups of actors who were central to the process of EMEDs adoption. I spent a number of hours in hospital wards in order to identify actors for the interview. Actors belonging to the clinical User group were extremely busy due to their clinical duties. Considering this, I had to pre-arrange the meetings with them. As for their recruitment for the interview, actors belonging to this group were primarily based in hospital wards and actively worked around EMEDs and paper charts as part of their job description.

Table 4.8: Users Group Semi-Structured Interviews

Teams	Number of semi-structured interviews
Ward Nurses	8
Ward Pharmacists	9
Ward Doctors	7
Total interviews	**24**

The other group in my study were the Implementers comprising of non-clinical and clinical groups. Due to my proximity to the Implementers group, it was relatively easier to recruit actors for the interview. Actors from this group were based in an office-based (EMEDs Hub) environment. Their duties and

responsibilities were exclusively linked to aspects of EMEDs implementation and involved imparting technical knowledge to clinical users.

Table 4.9: Implementers Group Semi-Structured Interviews

Group	Individuals	No. Semi-Structured Interviews
Non-Clinical Implementers	Deputy Project Manager (1x) Non-Clinical Implementers (4x) Clinical System Trainer (1x) EMEDs System Trainer (1x) EMEDs System Administrator (1x) IT Technician (1x)	9
Clinical Implementers	EMEDs Senior Nurse (1x) Junior Sister/Charge Nurse (3x) Clinical Implementers (9x) EMEDs Lead Pharmacist (1x) EMEDs Specialist Clinical Pharmacist (1x) EMEDs Lead Pharmacy Technician (1x) Trainee Specialist Pharmacist (1x) Pre-reg Pharmacist (3x) Pharmacy Technician (4x) Lead Doctor (1x)	25
	Total Interviews	**34**

Interviews from both groups were between 15 and 60 minutes long. In total, I spent close to sixty hours interviewing actors from both groups. As discussed earlier, besides the interview I spent my time in team meetings and undertaking non-participant observations. Table (4.10) below highlights the breadth of work and the time spent on-site to collect the data.

Table 4.10: Activities Around Data Collection

Activities	Number of Hours Spent
Semi-Structured Interviews (Formal and Informal discussions)	**90 Hours**
Team Meetings	15 Hours
Non-participant observation	90 Hours
	195 Hours

4.7.2 Data Management

Each interview was audio- recorded and later transcribed. Audio recording allowed me to focus on conversation/data instead of having to write descriptive field notes during the interview. In practicality, the audio recording of the interviews helped me check and authenticate responses. According to May (2003), the presence of a recording device may influence the interaction between participant and researcher. Being aware of this, I negotiated such challenges while conducting all the interviews. Interviews were sent for transcription as soon as they took place. I engaged a professional transcriber whose services are regularly used by healthcare researchers. When choosing professional transcriber, I had to ensure that their reliability, accuracy, and consistency was in line with the ethical and data security requirement of Leeds Teaching Hospital Trust (LTHT) and the University of Leeds.

On another note, I contemplated transcribing the data myself which, according to some scholars, is an important part of the analysis and helps researcher gain familiarity with data (Unrau and Grinnell, 2011; Rubin and Rubin, 2011). But due to the time constraints and volume of data generated, I had to opt against it. I did, however, continue to review the transcripts for accuracy and checked for any errors following transcription. Data were then uploaded onto a computer-based software, NVivo.

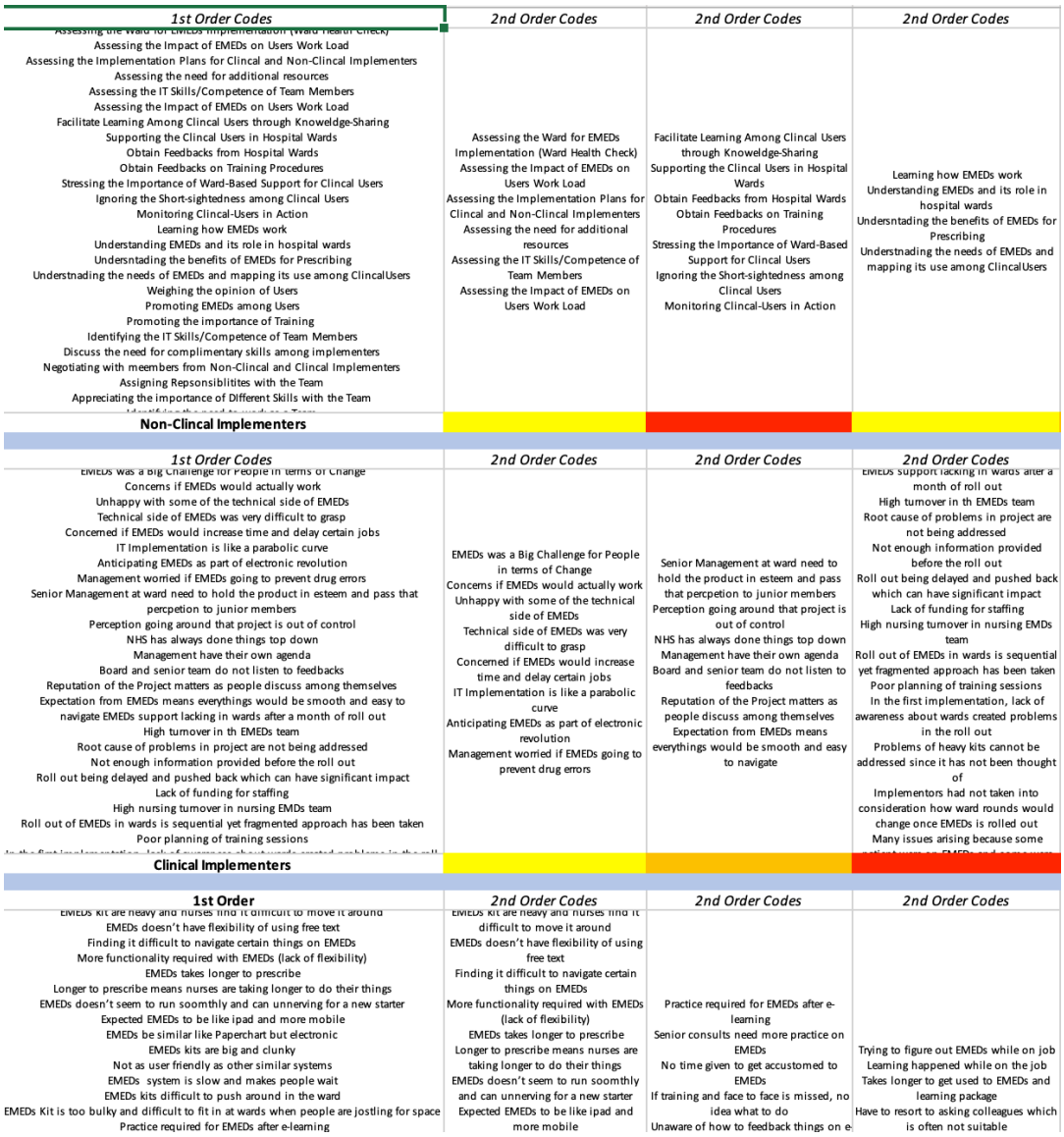
4.7.3 Using NVivo

Over the past decade, a wide range of tools has been made available to researchers for qualitative data analysis. Within the management and business studies especially for qualitative researchers, NVivo has gained considerable traction over the last few years (Jones and Diment, 2010). NVivo as an analysis software package works well with most research design and analytical approaches (Zamawe, 2015). Once I had the first set of interviews transcribed, I used NVivo as a tool to organise the transcript. I

used NVivo in combination with Microsoft Excel to analyse the transcripts. NVivo also allowed me to organise the original audio files. For qualitative researchers, one of the features that enhances qualitative rigour is the approach to analysis which also includes the way data is organised into 1st and 2nd order categories in order to facilitate its assembly into a structured form (Gioia et al., 2013).

4.8 Data Analysis

It has been noted by a number of interpretive researchers that interviewing and analysis tends to proceed together (Langley, 1999; Lincoln and Guba, 1985; Locke and Golden-Biddle, 1997). A number of informant codes and categories emerged early in my research, which was a process akin to Strauss and Corbin's notion of open coding.



1st Order Codes	2nd Order Codes	2nd Order Codes	2nd Order Codes
Assessing the Impact of EMEDs on Users Work Load Assessing the Implementation Plans for Clincal and Non-Clincal Implementers Assessing the need for additional resources Assessing the IT Skills/Competence of Team Members Assessing the Impact of EMEDs on Users Work Load Facilitate Learning Among Clincal Users through Knoweldge-Sharing Supporting the Clincal Users in Hospital Wards Obtain Feedbacks from Hospital Wards Obtain Feedbacks on Training Procedures Stressing the Importance of Ward-Based Support for Clincal Users Ignoring the Short-sightedness among Clincal Users Monitoring Clincal-Users in Action Learning how EMEDs work Understanding EMEDs and its role in hospital wards Undersntading the benefits of EMEDs for Prescribing Understnading the needs of EMEDs and mapping its use among ClincalUsers Weighing the opinion of Users Promoting EMEDs among Users Promoting the importance of Training Identifying the IT Skills/Competence of Team Members Discuss the need for complimentary skills among implementers Negotiating with meembers from Non-Clincal and Clincal Implementers Assigning Repsonsiblitites with the Team Appreciating the importance of Different Skills with the Team	Assessing the Ward for EMEDs Implementation (Ward Health Check) Assessing the Impact of EMEDs on Users Work Load Assessing the Implementation Plans for Clincal and Non-Clincal Implementers Assessing the need for additional resources Assessing the IT Skills/Competence of Team Members Assessing the Impact of EMEDs on Users Work Load	Facilitate Learning Among Clincal Users through Knoweldge-Sharing Supporting the Clincal Users in Hospital Wards Obtain Feedbacks from Hospital Wards Obtain Feedbacks on Training Procedures Stressing the Importance of Ward-Based Support for Clincal Users Ignoring the Short-sightedness among Clincal Users Monitoring Clincal-Users in Action	Learning how EMEDs work Understanding EMEDs and its role in hospital wards Undersntading the benefits of EMEDs for Prescribing Understnading the needs of EMEDs and mapping its use among ClincalUsers
Non-Clincal Implementers			
1st Order Codes	2nd Order Codes	2nd Order Codes	2nd Order Codes
EMEDs was a Big Challenge for People in terms of Change Concerns if EMEDs would actually work Unhappy with some of the technical side of EMEDs Technical side of EMEDs was very difficult to grasp Concerned if EMEDs would increase time and delay certain jobs IT Implementation is like a parabolic curve Anticipating EMEDs as part of electronic revolution Management worried if EMEDs going to prevent drug errors Senior Management at ward need to hold the product in esteem and pass that percpetion to junior members Perception going around that project is out of control NHS has always done things top down Management have their own agenda Board and senior team do not listen to feedbacks Reputation of the Project matters as people discuss among themselves Expectation from EMEDs means everythings would be smooth and easy to navigate EMEDs support lacking in wards after a month of roll out High turnover in th EMEDs team Root cause of problems in project are not being addressed Not enough information provided before the roll out Roll out being delayed and pushed back which can have significant impact Lack of funding for staffing High nursing turnover in nursing EMDs team Roll out of EMEDs in wards is sequential yet fragmented approach has been taken Poor planning of training sessions In the first implementation, lack of awareness about wards created problems in the roll out	EMEDs was a Big Challenge for People in terms of Change Concerns if EMEDs would actually work Unhappy with some of the technical side of EMEDs Technical side of EMEDs was very difficult to grasp Concerned if EMEDs would increase time and delay certain jobs IT Implementation is like a parabolic curve Anticipating EMEDs as part of electronic revolution Management worried if EMEDs going to prevent drug errors	Senior Management at ward need to hold the product in esteem and pass that percpetion to junior members Perception going around that project is out of control NHS has always done things top down Management have their own agenda Board and senior team do not listen to feedbacks Reputation of the Project matters as people discuss among themselves Expectation from EMEDs means everythings would be smooth and easy to navigate	EMEDs support lacking in wards after a month of roll out High turnover in th EMEDs team Root cause of problems in project are not being addressed Not enough information provided before the roll out Roll out being delayed and pushed back which can have significant impact Lack of funding for staffing High nursing turnover in nursing EMDs team Roll out of EMEDs in wards is sequential yet fragmented approach has been taken Poor planning of training sessions In the first implementation, lack of awareness about wards created problems in the roll out Problems of heavy kits cannot be addressed since it has not been thought of Implementors had not taken into consideration how ward rounds would change once EMEDs is rolled out Many issues arising because some
Clinical Implementers			
1st Order	2nd Order Codes	2nd Order Codes	2nd Order Codes
EMEDs kit are heavy and nurses find it difficult to move it around EMEDs doesn't have flexibility of using free text Finding it difficult to navigate certain things on EMEDs More functionality required with EMEDs (lack of flexibility) EMEDs takes longer to prescribe Longer to prescribe means nurses are taking longer to do their things EMEDs doesn't seem to run soomthly and can unnerving for a new starter Expected EMEDs to be like ipad and more mobile EMEDs be similar like Paperchart but electronic EMEDs kits are big and clunky Not as user friendly as other similar systems EMEDs system is slow and makes people wait EMEDs kits difficult to push around in the ward EMEDs Kit is too bulky and difficult to fit in at wards when people are jostling for space Practice required for EMEDs after e-learning	EMEDs kit are heavy and nurses find it difficult to move it around EMEDs doesn't have flexibility of using free text Finding it difficult to navigate certain things on EMEDs More functionality required with EMEDs (lack of flexibility) EMEDs takes longer to prescribe Longer to prescribe means nurses are taking longer to do their things EMEDs doesn't seem to run soomthly and can unnerving for a new starter Expected EMEDs to be like ipad and more mobile	Practice required for EMEDs after e-learning Senior consults need more practice on EMEDs No time given to get accustomed to EMEDs If training and face to face is missed, no idea what to do Unaware of how to feedback things on e-	Trying to figure out EMEDs while on job Learning happened while on the job Takes longer to get used to EMEDs and learning package Have to resort to asking colleagues which is often not suitable

Figure 4.4: Initial stages of navigating the first and second-order codes

During the first-order analysis, I tried to faithfully adhere to informant terms and effort was made to not distil categories at this stage. But given the sheer size of the data, more than 300 first-order codes emerged and the number of categories which emerged became overwhelming. Admittingly, I was lost without the slightest idea about how to make sense of all of that data. But I found guidance in Gioia et al., (2013) which mentioned: that getting lost is critical at this stage, and that "[y]ou gotta get lost before you can get found" (2013; p. 20).

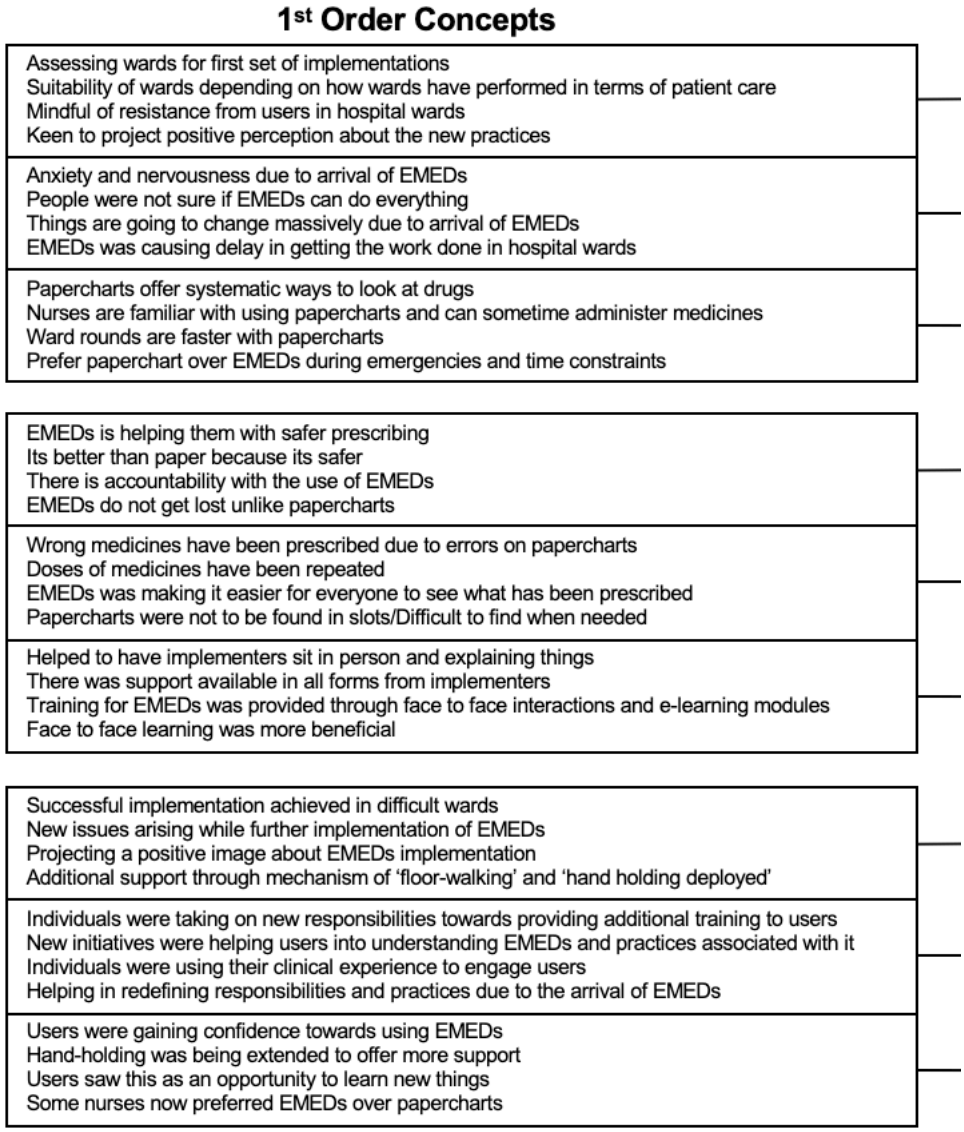


Figure 4.5: Distilled first-order concept

Moving on, I found my feet by looking at some of the work which has used similar methodology. I started seeking out similarities and differences among the categories using the notion of axial coding (Strauss and Corbin, 1998) and tried reducing the categories to manageable number. I started to give out labels and phrasal descriptors to these categories. At this point according to some researchers, I ought to treat myself as a 'knowledgeable agent', who should be thinking at multiple levels simultaneously (of the informant terms and codes and at the more abstract, second-order theoretical level of themes, dimensions, and the larger narrative - answering the important question of ''What's going on here?'' theoretically). The

objective was to develop tentative answers to questions through gestalt analysis which often leads to formulation of other questions (Gioia and Chittipeddi, 1991). It led to my second order analysis which brought my data into theoretical realms, and I began contemplating if emerging themes are indicative of concepts which would help and describe the adoption of EMEDs. Working with second order themes, I also explored the possibility of distilling emergent second-order themes aggregate dimension. By this stage I did have my first-order and second-order themes and I was ready to assimilate them into creating the aggregate dimensions which together would have formed the basis for building my data structure.

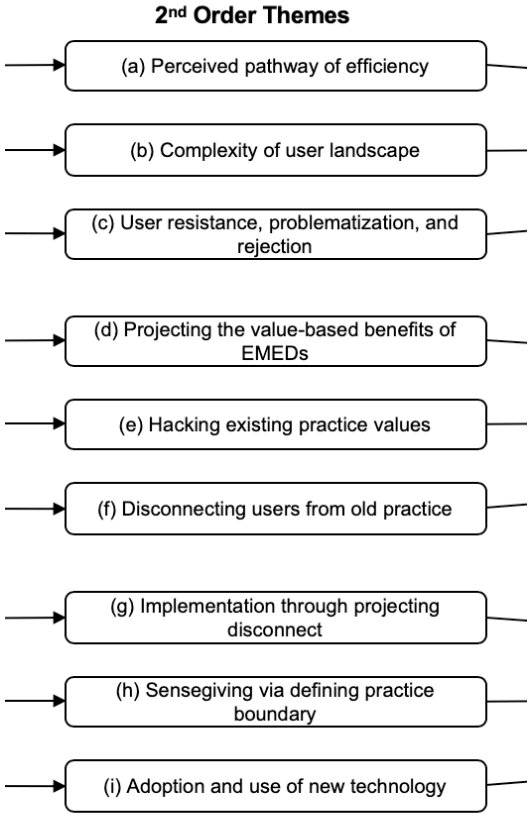


Figure 4.6: Distilled second order themes

But before I discuss my data structure, it is important to note that it took various repetitive iteration in order to arrive at both first-order and second-order concepts and themes. As much as the process appears linear, it involved filtering a huge amount of data before working with manageable

categories and distilling them into first order concept and second order themes. The figure 4.7 below is just a visual representation of how I progressed from open coding to axial coding but in no way does it represents the messy and iterative nature of data processing.

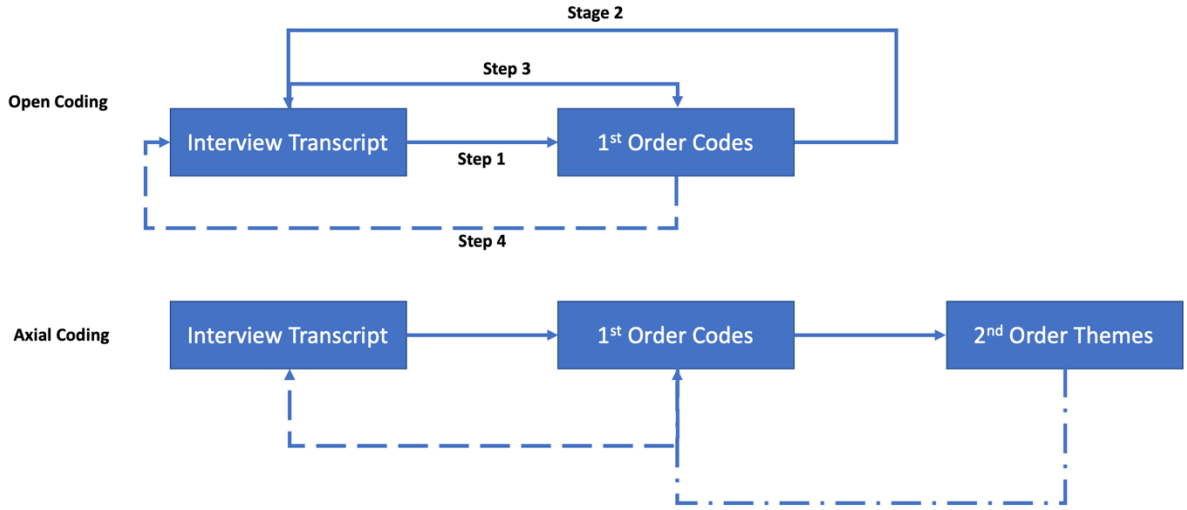


Figure 4.7: Visual representation of progression in data analysis

Having secured the basis of my data structured which included distilled first-order concepts and second-order themes, I configured my data into a sensible visual aid which provided a graphic representation of how I moved from raw data to terms and themes in conducting the analyses. This according to some is a key component in demonstrating rigour in qualitative research (Pratt, 2008; Tracy, 2010). The effort put into creating a data structure allowed me to begin thinking about the data theoretically and methodologically. But it must be noted that data structure is simply a static picture of a dynamic phenomenon and process research doesn't investigate processes unless the static picture is converted into a motion picture. My data structure, therefore, has formed the basis for the grounded theory model which has been discussed in Chapter 6. My ultimate goal of building inductive model grounded in the data has captured actors' experience.

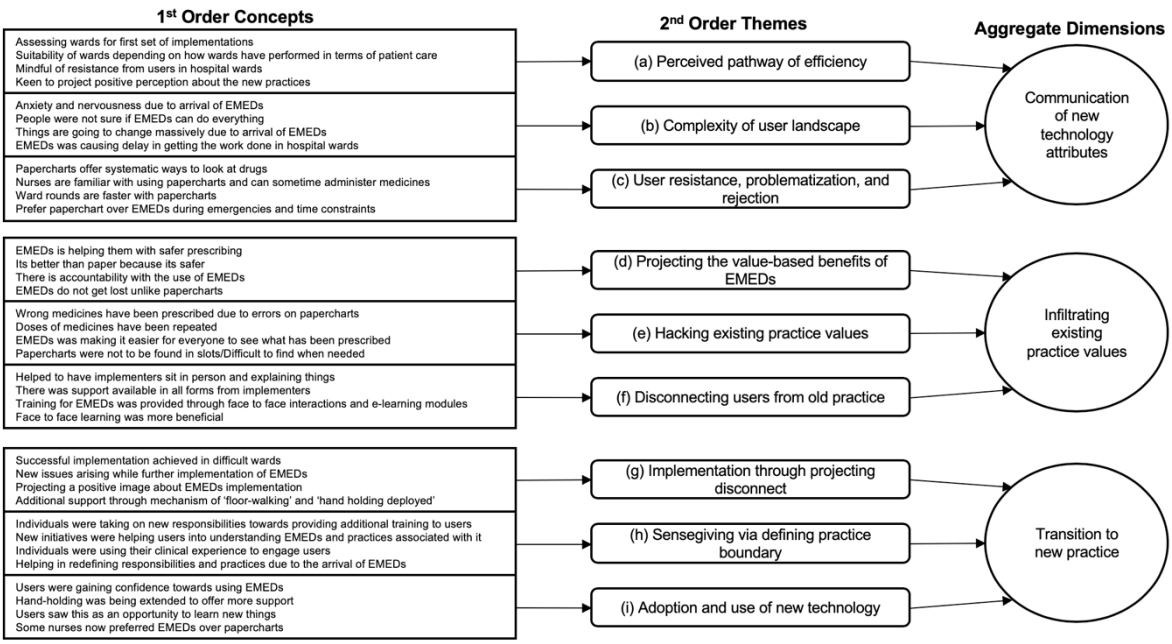


Figure 4.8: Data structure

Building on my data structure, the next chapter discusses the findings which have been represented in the data structure as above.

Chapter 5: Results and Findings

5.1 Introduction

This chapter discusses the findings within the wider objectives of my thesis which is represented by the following research questions:

1) How do the interactions between multiple actors lead to *new framing activities* during the adoption of technological innovation (EMEDs)?
2) What *constitutes the framing process* and how does it *contribute to understanding the adoption* of technological innovation involving multiple actors?

This chapter is structured around my data structure which highlights three key steps of the analyses. It highlights three main aggregate dimensions that emerged from my analyses, which include the ‘dynamics of communicating the new technology attributes’, the ‘mechanisms of infiltrating existing practice values’ to disconnect vested users of paper-based charts and their associated ways of working, and finally the means of ‘transitioning to embracing the new technology’ that was EMEDs. The figure 5.1 also depicts the second-order themes underpinning each aggregate dimension and their constitutive first-order concepts. Yet, while the figure provides a static representation of the data, the second-order concepts are an ascending temporal progression of the adoption process.

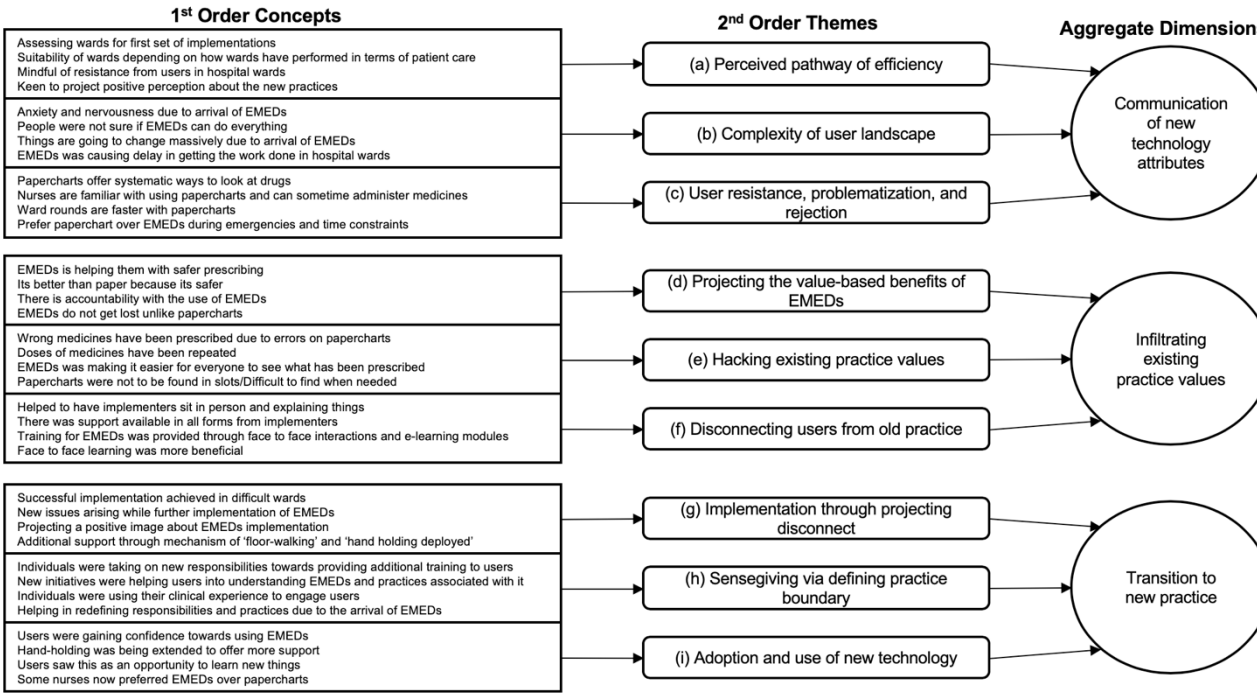


Figure 5.1: Data structure

I have structured the findings in the following sub-sections according to the three aggregate dimensions and second-order themes. Table 5.1 provides supporting empirical evidence for each second-order theme and I report the temporal progression of the adoption process in a descriptive narrative with additional supporting evidence.

Table 5.1: Representative Supporting Data for Each 2nd Order Theme

Second Order Themes	**Representative First-Order Data**
(a) Perceived pathway of efficiency	*"So, we knew that if we wanted to test the implementation of a new way of working, we couldn't have gotten a better ward. It could be more difficult in lower-performing wards. The idea is to prove the technology and new practice" (Deputy Manager).* *"Yeah, I mean I think it's a similar attitude so from when we were in theatres and working with the anaesthetist. A lot of them were quite reluctant*

	upfront and its finding out and scoping where to sell the performance benefits first" (EMEDs System Trainer).
(b) The complexity of user landscape	*"…as an EMEDs team, we have to do all the training but it's so much information all at once, I found that really difficult" (Trainee Specialist Pharmacist).* *"Doctors, on the other hand, from working on the ward, I remember rolling-out, they seem to think it's timelier in what they do. So, prescribing medicines takes longer than it would do on paper and that's because they're having to use the system, find the medicine, you know do the whole process changes" (Charge Nurse).* *"Other people who you'd have expected to have just taken to it like that, have been really scared of it and unsure of what they're doing and wanting to ask lots of questions and being, "oh but what if this happens, what if that happens?" (Lead Pharmacist).*
(c) User resistance, problematisation, and rejection	*"So, that when we make a huge number of amendments to drug charts, the time we spend making those amendments and changing those things is so much greater now than it was, and I think there is a great investment in time, in making sure the drug chart is correct at the outset, the longer that an error is continued in EMEDs the more difficult it becomes to rectify it later on" (Ward Pharmacist).* *"The advantages at the moment are that I know where to find what medicines are prescribed. So, antibiotics are all together, the regular medicines are all prescribed together, and I suppose you build up*

	over a period of time a systematic way to look through a drug chart so that you know that you've done the right thing" (Ward Pharmacist).
(d) Projecting the value-based benefits of EMEDs	*"So, it is kind of safety and the objective is to make sure the medication process is a bit safer. Sometimes prescriptions are incomplete that helps whoever the pharmacist or doctors are prescribing to make it more complete because the system is supposed to guideline you and give you alerts if they say anything" (Clinical System Trainer)* *So, the thing is that you don't need someone before, you need someone to come all the way. If you call a pharmacy, "can you please give this person medication or add this medication to the person's list," you have to wait like an hour until for the pharmacist to come all the way down to the ward. But now they don't need to come down at all." (Clinical System Trainer).*
(e) Hacking existing practice values	*"Wel,l just clarity, and you can actually read what it says because you frequently couldn't and that's a problem. And things like oxygen, they prescribe oxygen as an anaesthetist coming out of theatre, fine they need oxygen and they do it regularly, but then when the patient doesn't need it anymore or it could have been swapped to when required, or that kind of thing, it's just left and ignored, but it's not actually crossed out on paper chart it's just there" (Lead Pharmacy Technician).* *"In relation to my role, you no longer have to go around and physically search for drug charts; a drug chart could be with a nurse, it could be with a doctor, pharmacy could have it, it could have gone to*

	theatre. So, there is time saved there not having to search for a physical drug chart" (Pharmacy Technician).
(f) Disconnecting users from old practice	*"XXXX was around as well, various other members of the team and staff, they were really helpful, they'd be here until about midnight-ish and then go and then come back, but there'd be someone around if we needed them, so they'd come back for the morning meds round in the morning..." (Ward Nurse).* *"I was on nights in, over both weeks when they were here, and the EMEDs team were implementing it, and we knew about it, the EMEDs team had brought up laptops and given us all information, our clinical education team had been out and helped us to relieve each other and be able to do the training, for a nursing point of view and the medics were putting session after session on for the medical staff to attend and the consultants were attending and trying to get all the junior staff to go" (Ward Nurse).*
(g) Implementation through projecting disconnect	*"I think that the other thing that we were worried about was whether it would delay or increase the time that it takes to do certain jobs. It was fairly clear from the literature and what had happened to other people because we went around quite a lot of other places to see what they were doing. Although it did reduce quite a lot of the common errors, it also introduced new errors, that need to be managed, so, although we knew what some of those were, we aren't really seeing them all yet." (Lead Doctor).*
(h) Sensegiving via defining practice boundary	*"The closer the actual roll-out plans became, the bigger the push was towards EMEDs, you know, your ward sisters told you to do, so I took it upon*

	myself to complete the training quite early on and completing the training compared to medicines on a paper chart" (Junior Nurse). *"Basically, we would be there we'd do a drug round with them and then depending on their needs obviously we would either escalate it if they were having trouble or slowly step back and try and give them as much independence as possible" (Junior Nurse).*
(i) Adoption and use of new technology	*"I think there are some very quick and easy wins to EMEDs. You know that you don't have to transcribe drug chart, its immediately legible. The prescription is clear, and the ability to pick medicines means there is a, it's kind of like a restricted formula" (Ward Pharmacists).* *I'll say so; I mean, I am quite comfortable now with EMEDs. I got used to it afterwards, you just need to adapt for the better" (Ward Nurse).*

5.2 Communication of New Technology Attributes

During the initial stages of my study, non-clinical implementers sought to control how EMEDs was to be communicated to clinical implementers and users with a particular focus on driving frames related to its technical attributes and proposed efficiencies compared to the existing paper charts system. On instructions from the hospital board, non-clinical implementers attempted to build a positive narrative on EMEDs by focussing on technical attributes and its potential to improve the quality of care for patients in hospital wards. As a line of thought, it was considered a popular narrative (by the hospital board), aimed at clinical implementers and users who were genuinely interested in enhancing the quality of care under their watch. On the ground, however, this was initially met with significant resistance and

was outrightly rejected by users. The three groups involved in my studies contributed to these dynamics through the following factors: (1) the perceived pathway of efficiency by non-clinical implementers; (2) the complexity of the user landscape highlighted by clinical implementers; and (3) the resistance, problematisation, and rejection exhibited by clinical users.

a) Perceived pathway of efficiency

Non-clinical implementers were tasked with drawing up implementation plans, identifying the sequencing of implementation across different hospital wards, and eventually operationalising EMEDs across MEDCO. In drawing up the plans, the non-clinical implementer team first audited each ward and their readiness for EMEDs implementation based on metrics of efficiency and operational performance. As one interviewee stated: *"We go to the ward, tell them what we are coming to do, how it is going to work technically and emphasize the benefits, and how we will support them for preview and rolling out"* (EMEDs Systems Trainer). Another said: *"We do a thing called 'Ward Health Check', it's an indicator of how good you are on your medicine management, how good you are at infection control, on your patient complaints"* (Deputy Manager). High performing wards were seen as a logical first port-of-call as non-clinical implementers envisaged a lower resistance to change and a heightened sensitivity to attributes of efficiency: *"Well, I like to position them as benefits rather than objectives. [EMEDs] is a better way of prescribing drugs as communicating [patients'] drug needs are more concrete… like, it shows you that this drug has been prescribed before. So, the objective is to make sure the medication process is easier for users"* (EMEDs System Administrator). Framing communication and implementation this way was seen as a good benchmark for imitation in other wards and among other users: *"when they [users] say it won't work for us [ward], it's like well it can work for you because we've proven it elsewhere"* (Deputy Manager).

b) The complexity of user landscape

On first interactions in the selected wards with clinical implementers, however, it became apparent that there was unforeseen complexity in the user landscape. Clinical implementers perceived the changes induced by EMEDs to be a huge departure from the existing paper-based system: *"…my perception is that nurses are cautious, there is a lot of anxiety associated with it and that's understandable because we've been using paper charts forever"* (Pharmacy Technician). As one interviewee noted: *"When initially I first saw the electronic prescribing, I was like, 'okay what am I looking for, what am I picking up?' On a paper chart you know straight away what you need to look at because you start from the top and go work your way through, whereas obviously with the electronic system, everything's all over the place"* (Trainee Specialist Pharmacist). These perceptions served to fill the group with varying degrees of nervousness and demonstrated the inherent complexity from the perspectives of different clinical implementer groups: *"I did spend a couple of hours up on the surgical ward using it and everyone we came across had a problem that nobody seemed to be able to resolve. So, it made me more nervous, because there was EMEDs support up there and that still, things were not clear"* (Lead Pharmacist).

c) User resistance, problematisation, and rejection

Almost immediately following non-clinical implementers communications with clinical implementers, several user groups were being made aware of EMEDs and its functionalities of efficiency. The spread of information in such a manner led to a significant resistance to and problematisation of EMEDs among users. Actors with variable reasons began faulting EMEDs and were quick to highlight issues counter to efficiency: "*I think that's what people are worried about because people have had so many medications here. It's not like on the ward where you do medicines at 8, 12, 6 and then 10 o'clock at night. You can be doing medicines non-stop with EMEDs"* (Junior Nurse). Several others exhibit similar resistance and reluctance to

move from paper chart practices: *"everyone grows up writing, so the use of a paper drug chart is absolutely intuitive"* (Pharmacist). Users continued to counter and avoid using EMEDs in their everyday work and continued to revert to paper chart practices. The initial experience of EMEDs had added to their workload through changes in how "ward rounds" and inspections were conducted and "longer wait times" for doctors to prescribe and nurses to administer drugs. As one pharmacist stated: *"seeing patients takes an incredible amount of time and as you become faster and more used to the system it speeds up but, I don't think we would ever get it back down to the speed when it was being written."*

5.3 Infiltrating Existing Practice Values

By this stage, both sets of implementers were witnessing widespread resistance and problematisation of EMEDs among clinical users of frames that focused on the technical attributes and proposed efficiencies of EMEDs. Non-clinical and clinical implementers, as a result, had to resort to communicating a deeper meaning in order to infiltrate the existing values associated with paper-based charts. These groups thus re-focused their communication efforts towards the values undergirding practices and framed the new practice around issues of patient safety and clinical governance. Then issues around patient safety had various aspects which were being framed for users in order to highlight: i) incidence of adverse drug events, ii) incidence of patient health complications due to the comprehension of medical history, and iii) agreed on workflows in order to manage risks. By highlighting these issues in relation to patient safety, the implementers were able to appeal to those users who were deeply accustomed to the values of paper charts as well as being connected to patients in hospital wards. Issues around clinical governance were being associated with: i) visibility of centralised data sets, iii) improved risk management, and iii) visibility of clinical decisions. These issues appealed to those users who used paper charts to regulate the clinical processes and operational performances in hospital wards. By highlighting the issues such as these, the implementers

were able to capture greater attention of the users with varying interest culminating in triggering of affinity towards the new technology by infiltrating the values of users.

d) Projecting the value-based benefits of EMEDs

Non-clinical implementers met various other stakeholders to gain insights into the deeper rationales and values of users to frame the adoption of EMEDs in their respective wards. Given the resistance and rejection of EMEDs among clinical user groups, it was imperative that non-clinical implementers started to project and communicate the benefits of the new ways of working to both clinical implementers and users beyond efficiency. It was a move which worked well to allay some of the fears which actors experienced. Non-clinical implementers met various other stakeholders who highlighted the good things EMEDs could do in the context of more fundamental values associated with patient safety and health-related outcomes. As one interviewee pointed out: *"…. we changed tact and started to push EMEDs as a clinical concern to users around issues patient safety…. [EMEDs] offers tremendous benefit here but some don't realise what they are getting out. So, for like prescribers the clinical decisions are part of what the system does and all that kind of stuff is really helping them be safer with their prescribing and there's allergies constantly there for the lifetimes of the patients, so the risk of missing allergies is reduced"* (Deputy Manager). Patient safety within the hospital ward had been a burning issue, to which the majority of the clinical workers were able to relate. For non-clinical implementers, it came down to stimulating the notion of (quality) care through patient safety. To this one of the interviewees noted, *"So it is kind of safety and the objective is to make sure the medication process is a bit safer. Sometimes prescriptions are incomplete that helps whoever the pharmacist or doctors are prescribing to make it more complete because the system is supposed to guideline you and give you alerts if they say anything. And sometimes, you know, when patients miss medications, it's just more about patient safety. So, it's just like making sure that people*

get their medications on time, maybe if they are not getting those medications on time there is a way of recording this on the system, so it's more safety and auditing. You know what they've had and what they haven't had and when they had and who'd given." (Project Support Officer).

e) Hacking existing practices values

Building on the new value-based framing that was the outcome of interactions between non-clinical implementers, clinical implementers now focused their attention towards hacking existing paper-based practices by discrediting them as a breach in core values of patient safety. Regarding this, one of the pharmacy technicians noted that: *"the nurses having talked to them had read it [prescribed the wrong drug] because it was prescribed so poorly."* In another instance one of the interviewees noted that paper charts were not ideal in a lot of ways, *"There is no sort of safety net or level of interacting with the drug chart that can be monitored. So, there's problems there, a lot of the time when you pick up a drug chart it wasn't written very well, it didn't follow the whole principals of the medicines management code, so then you had to then spend time in your day chasing other people up to then re-write the medicines and you know, review the chart. They used to go missing, they used to get lost a lot"* (Junior Nurse). Given the consensus and demerits of paper charts, actors within the clinical implementer group started to embrace EMEDs and its potential benefits. Working closely with non-clinical implementers, clinical implementers made efforts to learn the nuances of the new practice and make connections to their specific user group: *"Yeah, I am more of a "hands-on" person, I need to see and do it myself to learn. So, I was given access and think that probably from the next day, I was a bit more into contact with using it, so that's how I learned to do it"* (Junior Nurse). Their acclimatisation and acceptance were critical in propagating EMEDs within the hospital and communicating the specific value-based frames for different users. By this stage, the clinical implementers were beginning to embrace EMEDs which

served well for the project implementation and its propagation of the technology itself in the hospital. The actors of this group were able to sell on the new technology to clinical users. To this one of the interviewee was quoted as saying, *"I think there are definitely some advantages: I think it is safer, I think it is, like I said earlier, the audit trail is better, I think, cause my role as educational trainers we have to be mindful of how we train people on EMEDs..."* (Pharmacists in Education and Training). The clinical acumen they possessed in addition to the newly acquired knowledge on EMEDs helped stimulate interest more widely among clinical users.

f) **Disconnecting users from the old practice**

For clinical users, the discrediting of paper-based practices against core values of patient safety and comparison of EMEDs as a new value-laden practice was critical. It served as a means for disconnecting themselves from old ways of working. Through awareness and training, users were being introduced to ways of working that were positioned as being safer for patients and healthcare outcomes. To this one of the interviewee noted, *"I was on nights in, over the both weeks when they were here, and the EMEDs team were implementing it, and we knew about it, the EMEDs team had brought up laptops and given us all information, our clinical education team had been out and helped us to relieve each other and be able to do the training, for a nursing point of view and the medics were putting session after session, for the medical staff to attend and the consultants were attending and trying to get all the junior staff to go.."* (Senior Charge Nurse, Critical Care). Prior to EMEDs, users often struggled using paper charts in terms of their legibility, which made them more a safety risk. The juxtaposition of EMEDs at the value level of practice, therefore, disconnected users from old ways of working. As one respondent noted: *"I think with EMEDs it is much better… you've got a proper document of all the medications, you can access GP records as well and bring up the past medications. They obviously don't easily get lost either"* (Ward Doctor). With EMEDs,

clinical users were starting to see lots of other benefits which was noted by one of the interviewees, *"There are certain things I think EMEDs will improve, so for example, things being legible, so you can always obviously read it because it's already typed for you, and it obviously flags up if it thinks the dose is wrong, or somebody's had a dose or something and if you're not sure how to prescribe things it gives you set things. So, for example, here they use hemofiltration, like dialysis and you need to prescribe Lithium, I would never know how to prescribe it but on EMEDs its already set up, it's got the set dose for hemofiltration which is helpful. So, there's certain things which are helpful for EMEDs, and like once you get, once you get used to it, so for in theatres you always prescribe like painkiller things post operatively, and it's easy after you've done it a few times cause there's all, you know where they are set down, set lists are"* (Junior Doctor, Anaesthetics and Intensive Care).

5.4 Transition to New Practice

By this stage, clinical users were warming to the new practices induced by EMEDs and the values of patient safety made them feel comfortable with the change. The context was beneficial for non-clinical implementers to stimulate its widespread adoption throughout the hospital. This was predicated on the communication of value-based benefits through clinical and user sponsors that framed and juxtaposed the deficiencies in old ways of working with the new technology through collaborative efforts. The important thing to note at this point was the transformation on part of every group as they interacted with each other. The implementation strategies employed by non-clinical implementers had evolved by this stage which also brought about the change in their attitude. Their approach towards implementation was more informal as opposed to how it began initially. Elements in their approach reflected more risk-seeking behaviour. For clinical implementers and users, the transformation was represented more in terms of how they perceived the new technology in comparison to paper-based charts. The communication of value-based benefits persuaded the

clinical population within the hospital to embrace the new technology and its associated practices.

g) Implementation through projecting disconnect

After the first few tests run of EMEDs, it came down to the actual task of implementing throughout the hospital. Non-clinical implementers were keen on projecting that EMEDs was not a major transformation in the primary purposes and values undergirding their practices. To this one of the interviewees noted *"…it was essentially paper chart but on a system. Just literally electronic tick boxes and things. So, it wasn't until getting to know the system a bit better, the rest is really, there is a lot more to it than that. I thought, it was literally just a checklist because, I think, coming from a non-clinical background definitely didn't appreciate how much detail goes on to medical charts"* (Project Support Officer). With EMEDs, non-clinical implementers were particular in communicating how aspects of prescribing would continue to remain the same. More importantly, communicating these attributes led to EMEDs being adopted more easily across the hospital wards. This was reiterated by another interviewee, *"…because we weren't changing the meaning of the process even though we were replacing it with something new, it stayed the same so doctors prescribe, nurses administer, and pharmacists order and review drugs all for purposes of patient care and safety. EMEDs is a better way of serving this purpose"* (System Trainer). Besides pursuing that line of communication, it was interesting to observe the change in implementation strategies. By this stage, non-clinical implementers were also being driven by the need to finish the project. To this one of the interviewees noted, *"… we take more risks than we did; we were very cautious at start. We had multiple people on multiple shifts all the time, doing really intense 'hand-holding' whereas now we are a bit more relaxed about it as we know that nobody died yet and so we're probably not going to kill somebody. It's alright the system works, so everything is fine. So, we just need to just be pragmatic about stuff more and I think we are*

more pragmatic, and I think the support level we've just given to our recent go live ward J-23, so we did that ad-hoc. We only give them support from 8 am to 7 pm. That is our lowest level of support that we've ever given, so I think that is kind of an indication that we're, we don't need 'hand-holders' much" (Deputy Project Manager).

h) Sensegiving via defining practice boundary

With the newly acquired affinity towards EMEDs, clinical implementers helped non-clinical implementers with various aspects of execution. Although mostly assigned training duties, clinical implementers were taking initiatives and were utilising their clinical experience to establish strong communication with clinical users, *"So, you'd go along and even though I couldn't deliver the training myself, I could assist, with showing them where things were on the system, so I could put EMEDs into the context of our work"* (Project Nurse). Through initiatives, clinical implementers were attempting to own the process of implementation and dictate how aspects of EMEDs were to be communicated to clinical users. They were resorting to unconventional ways to help clinical users to learn about EMEDs. To this one of the interviewees noted, *"I write a newsletter to try and explain to them like, little bits and pieces, so giving them all the information all at once at the beginning, we're kind of obliged to do, but you're never going to remember it all, are you?"* (Pharmacist, Surgical team). In addition, clinical implementers started to evaluate and redesign the overall implementation according to the nuances of their particular domain of expertise. For example, one of the specialist clinical pharmacists noted that: *"they need to understand how a prescriber adds medicines to the chart. They need to know all about their own processes for pharmacy, you know ordering and clinical review of the prescription and they also need to know a bit about how nurses administer and what the record is telling them. So, the pharmacy staff, in particularly pharmacists, need a much broader overview of, an actually that really hard, because what we found with face to face training, was that, it introduces people to what the system*

looks like and what the screens look like and what the functions are, but until they use it in a clinical setting, they can't, they can't make sense of how it applies to their practise." Clinical implementers through their interactions, therefore, set the parameters for using the new practice to assist in the adoption of EMEDs. They were exploring avenues in order to ensure that others in the hospital ward were making progress in terms of understanding the nuances of EMEDs. Their interaction with clinical users on a daily basis had allowed them to understand the concerns which were holding back the users in hospital wards. To this one of the interviewees noted, *"They don't like doing that and they don't like anything that involves a swirl going on and we all know that you know, some IT systems, sometimes they upgrade you and they don't have the developers they need, everyone's under pressure"* (Clinical System Trainer).

i) Adoption and use of technology

By this stage EMEDs, despite some early resistance, was being communicated in a positive light to the clinical user group by clinical implementers. To this one of the interviewees noted, *"I think there are some very quick and easy wins to EMEDs. You know that you don't have to transcribe drug chart, it's immediately legible. The prescription is clear, and the ability to pick medicines means there is a, it's kind of like a restricted formula I guess, where you have doses attached to a medicine as opposed to you have a medicine and then you create a dose, and with decimal points, things like that, they were errors that were occurring previously as well and they were, they disappeared overnight "* (Clinical Pharmacy Team Leader). This positive reaction towards EMEDs was, in part, due to the various forms of training and learning that allowed them to feedback and continually refine its use and align it to primary values of patient safety. To this one of the ward doctors noted, *"I think it's nice because you can see everything there, there with a paper chart you run out of space and then you have a second or a third paper chart there and I think is you've got one on the go, then you're going to run into missing*

something so you've always got to keep going back and re-writing the chart. So, I think it leaves a lot open for error to occur that way […] with EMEDs system, you have a track of what's been given. I think on some of them, if you wanted to change, say, they're already on oral Paracetamol, for a post-op anaesthetic patient, you have the option to do a PO or IV […]". The benefits of working with EMEDs was being noted all around but, more importantly, the clinical users were embracing it for its role in improving the quality of care in hospital wards. As one nurse noted: *"we're making less errors, then even if it's taking us longer to do them, that's a positive…"* For some, it was also an opportunity to re-learn some of the practices associated with prescribing medicines. They were revisiting their professional practices which included changes in how medicines were being administered, prescribed or reconciled. This was highlighted by one of the ward pharmacists, *"It is kind of totally re-learning the way that we do thing… and had been trained to do things and how your professional practice had evolved over a number of years. You kind of hit a reset button and really think about how you were doing things again. So yeah, I think re-learning the practice that you've learned."* More importantly, the users were integrating the new practice in their daily routine and had oriented themselves towards fully adopting EMEDs across the hospital.

5.5 Summary of Findings

Moving from the static representation of the data structure depicted in figure 6.1, I have been able to derive a temporal understanding of how the adoption innovation unfolds between implementers and adopters within a complex organisational setting. To do so, in the following, I explicate the movement between the different aggregate dimensions that emerged in my findings ultimately leading to the transition towards new technology. During the initial stages of communicating a new management practice's attributes, implementers develop cognitive frames that are biased towards its technical capacities and capabilities as a means to communicate benefits to users.

Yet, these technical, attribute-based frames tend to be isolated from the idiosyncratic understandings of various users and the values undergirding users' adherence to existing practices. As such, technological innovation is met with significant resistance that leads to the problematization and subsequent rejection of initial efforts to induce management innovation among organizational actors of the innovation. This finding runs counter to rational accounts of adoption that emphasize the importance of communicating the attributes of new innovations to users to trigger the adoption decision (Bass, 1969; Rogers, 1995).

To combat the initial rejection, I found that implementers must seek to develop a deeper understanding of the values among users as a means to infiltrate existing practices. Since practices are usually the manifestation of deeper level values, hacking the value system of existing practices through value-based frames is an important cognitive mechanism to disconnect users from a preference towards the status-quo. My findings suggest that projecting the value-based benefits of the new technology against the value-based deficiencies of the existing system creates a vacuum for adoption. In my case this was manifest in implementers emphasising values of patient safety and care, that is accentuated in the context of EMEDs and suffers if users do not shift from old paper-based practices. This finding represents an important contribution, as it demonstrates the cognitive pathway through which managers can combat the significant resistance, fear of change, and social complexities associated with the adoption of innovation (Birkinshaw et al., 2008; Damanpour, 2014).

In the final stages of transitioning, I found that once users were 'disconnected' from the existing paper-based system owing to a breach in underlying values, it was imperative that the implementers delineated and communicated the boundaries of the new practice in the context of said values for its subsequent uptake among users. Our results suggest that influential sponsors and early adopters (i.e., the physicians, nurses, and pharmacists that first embraced EMEDs) were critical in this regard to pave the way for learning and imitation.

Considering these collective insights, the analysis of my finding provides important new theoretical and practical insights to the study the adoption innovation in a complex organization. From a theoretical standpoint, I advance a socio-cognitive understanding of adoption that is currently missing from the literature premised on changes in cognition, actions, and interactions between implementers and users. Contrary to rational theories, we found that communicating the superior technical attributes of an innovation is not sufficient for stimulating adoption. Rather cognitions have to be triggered at a deeper, value-based level in the context of inducing changes in the existing process, practices, and structures characteristic of technological innovation (Heidenreich, Kraemer and Handrich, 2016; Volberda et al., 2013). Interestingly, defining the boundaries of the new practice is the endeavour of early adopters who not only trigger imitation but drive collective sensemaking among implementers and users to delineate its nuances for different working groups. For managers, my findings offer guidelines for building strategies and communicating organisational changes to processes and practices to users, particularly in complex organisations such as the NHS where appropriate the benefits of innovation are notoriously difficult.

Chapter 6: Discussion and Conclusion

6.1 Introduction

The final chapter of my thesis takes forward the findings and reviews the emergent grounded theory model. This chapter has two parts: building on the results of the thesis, the first part of the chapter illustrates the dynamic model. While my data structure is a static representation of the key concepts that have emerged from my study, Figure 10 is a dynamic depiction of the model of the innovation adoption process in my data however, is a dynamic, processual depiction of the relationship between the concepts that have served as the basis for a grounded theory model of innovation adoption. Contextualising the interaction between the three groups of actors, the model illustrates framing as a conceptual point of departure for my grounded theory building. Framing as noted in my literature review serves two roles: (1) internal cognitive "schemata of interpretation" (Goffman, 1974: 21) that allow actors to construct 'sense' in an otherwise meaningless succession of events; and (2) the explicit articulation (behaviour) of an internal cognitive schema that serves as the basis for interaction between multiple actors as they seek to collectively negotiate sense. The notion of framing includes the frames of reference for organisational actors and they are key to organising and shaping actors' interpretations of events and organizational phenomena (Moch and Bartunek, 2006; Weick 1979b).

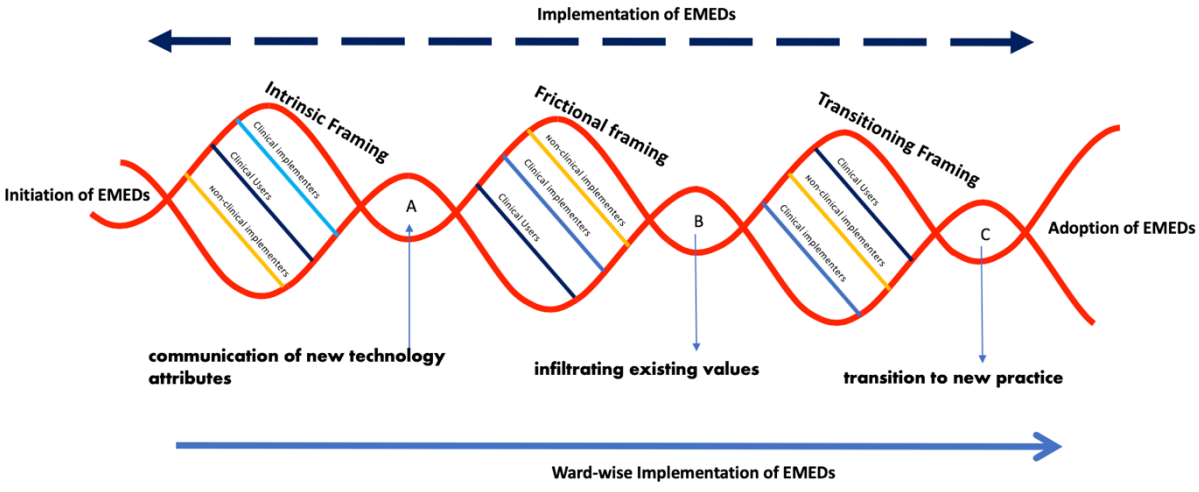


Figure 6.1: A grounded theory model of innovation adoption in a complex organisation

My grounded theory model suggests that interactive framing is an important subprocess within the adoption process of EMEDs, pivoting the cognitive transformation of actors around the new technology. The shared cognition around technology as suggested by Orlikowski and Gash (1994; p. 33) is an effective means to investigate and assess the impact of technological innovation in organisation. The model illustrates three framing activities: intrinsic, frictional and transition. These framing activities represent the shifts in the cognitive transformation of actors. The cognitive transformations of actors are linked by three critical landmarks which together represent the socio-cognitive roadmap for actors. These landmarks not only succeed the framing activities at each step but also serve to link the activities together - " (a) Communication of new technology; (b) Infiltrating existing values, and (c) Transition to new practices make the framing activities salient.

6.2 Framing Foundations of the Model

6.2.1 Intrinsic Framing and Communication of New Technology

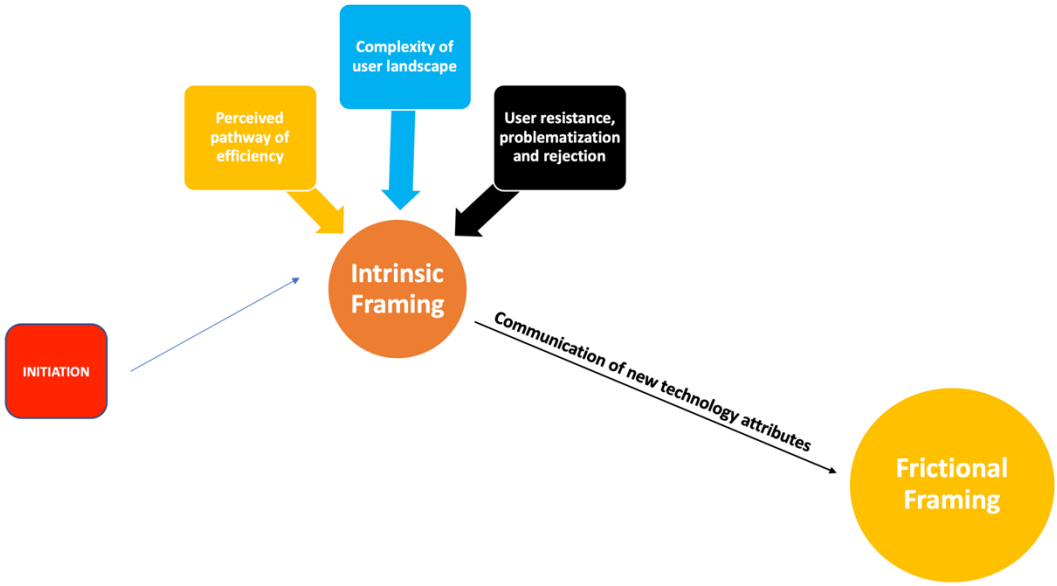


Figure 6.2: Initiation to Intrinsic Framing

As soon as EMEDs is initiated in a hospital, actors engage in what is being referred to as intrinsic framing. Framing around the technology is rooted in socio-cognitive research which has examined collective cognitions and

social constructions of technology (Bijker, 1987; Bijker, Hughes and Pinch, 1989; Henderson, 1991; Saetnan, 1991). According to this stream of research, members of the social group interactively come to an understanding about a) the knowledge of the technology in question, and b) local understanding in the given setting. The meaning and significance of technology have been described in the context of its use and users. At this stage, when the majority of the population in the hospital were still unaware of the technology, non-clinical implementers were operationalising and formalising plans to equip hospital wards with the new technology. These plans were, however, being remodelled and renegotiated following their interactions with the other groups of actors. For clinical implementers and users, it was a case of projecting their allegiance to paper-based charts (old system) which had been in use at the hospital for a very long time. Both these groups negotiated the initial stages of EMEDs operationalisation through projecting the issues with the new technology. This was mostly due to the lack of exposure and being unaware of what EMEDs offered in terms of its attribute. Their resistance was inherent at this stage and was reminiscent of reshaping implementation objectives on part of non-clinical implementers and resistance on part of clinical implementers and users. These types of framing especially around technology have a strong influence on actors' assumptions, expectations, and role of technology (Noble, 2017; Bijker et al.,1989; Orlikowski, 1992a). It also determines the context regarding the use of technology, especially because technologies are social artefacts and they embody objectives, values, interests, and knowledge about the technology (Orlikowski and Gash, 1994).

6.2.2 Frictional Framing and Infiltration of Existing Values

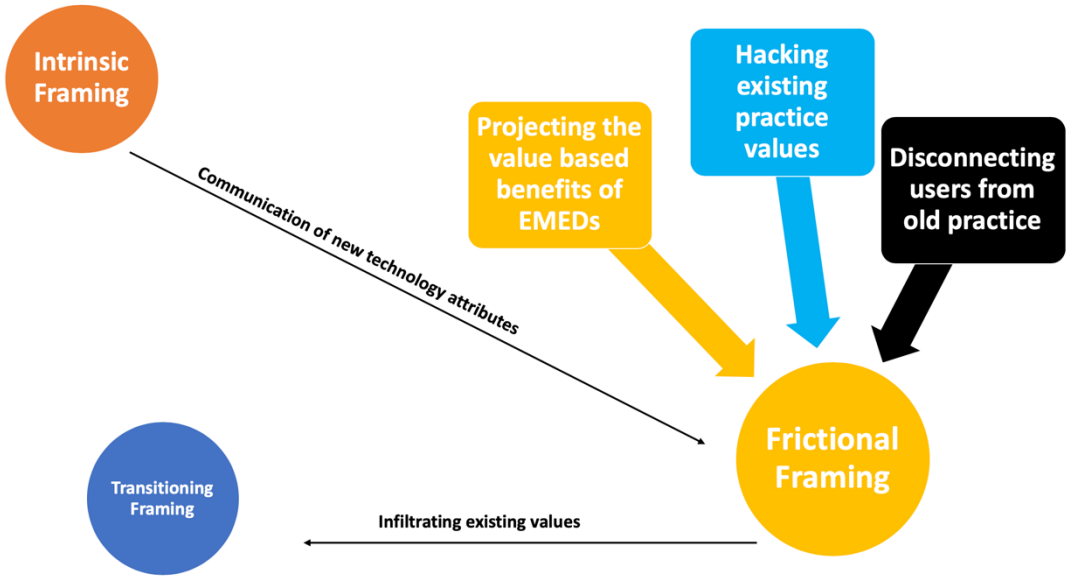


Figure 6.3: Intrinsic to Frictional Framing

The technological artefacts have different interpretations, especially when it involves different social groups as was the case with non-clinical/clinical implementers and users. The interactions between the actors determine the interpretations, which in turn are shaped, reshaped, and constrained further through different motives, knowledge and power base (Bijker et al.,, 1989). For example, nurses had different notions and knowledge of EMEDs as compared to pharmacists, who in turn had different interpretations to doctors. With attributes of new technology familiar to the majority of the population in the hospital by this stage, it brought to focus the discrepancy in how each of the three groups was negotiating their existing practice values. This was more applicable to clinical implementers and users who were deeply associated with practices of paper-based charts (old system). Each group had their respective framing and sharing of some of those was unlikely across the different stakeholder groups. For example, non-clinical implementers were expected to have technical perspectives on EMEDs as were treating it as a tool to be manipulated and deployed to accomplish their implementer tasks. Clinical users on the other hand viewed had developed a more strategic view of the EMEDs as a technology. They expected EMEDs to facilitate or rather improve how medicine prescribing would improve

patient safety. Their views can also be regarded as instrumental as part of which they expected immediate, task-specific benefits from using EMEDs in hospital wards – for example, better eligibility, remote working, etc. Having projected the new technology attributes in the initial stages, non-clinical implementers had to reframe the attributes with aim to infiltrate those deep-rooted linkages with paper charts. Through positioning the advantages of new technology directly in relation of key performance indicators such as patient safety and clinical governance, non-clinical implementers were able to make grounds and work with both the clinical implementer and the user into acknowledging the usefulness of new technology. The difference in the mindset of both clinical implementer and users was also evident at this stage. While clinical implementers were on board and looking to embrace the new technology, clinical users were continually negotiating their preferences given their deep-rooted associated with paper charts and advantages of new technology. The dynamics of frictional framing can also be attributed to the lack of congruency in technological framing. Congruency refers to the alignment of key elements within the framing activities, which does not mean identical values in framing but rather similar structure or student. To this, the notion of ‘cognitive consensuality’ has been illustrated which has been defined by Finney and Mitroff (1986; p. 320) as “a reasonable amount of implicit agreement among organisation members as to the appropriate meaning of information or events”. The lack of cognitive consensuality is one of the core tenets of frictional framing, which is apparent when non-clinical and clinical implementers were pushing EMEDs in order to transform the way medicine was being prescribed and administered in hospital wards. On the other hand, clinical users initially viewed the replacement of paper charts with EMEDs as a mechanism through which they would be more accountable and even replaced in their respective roles. It led to actors in the social group in filtering their existing values associated with paper charts and led to the final interactive framing. When such a dynamic exists, it has been shown that organisations experience difficulties around implementing and using technologies. It can lead to communication breakdown and engagement by users (Orlikowski and Gash, 1994). One of the challenges for the hospital board and set of

implementers at this stage was to minimise the effect of cognitive consensuality. As a critical point in implementation of EMEDs, frictional framing provides an opportunity to assess and recognise incongruence which includes learning about the tolerance and rigidity in relation to new practices associated with the technology. It also illustrates the commitment of different stakeholder groups and how do these of actors deviate from organisational realities (Schwartz, 1992).

6.2.3 Transition Framing and Transition to New Practices

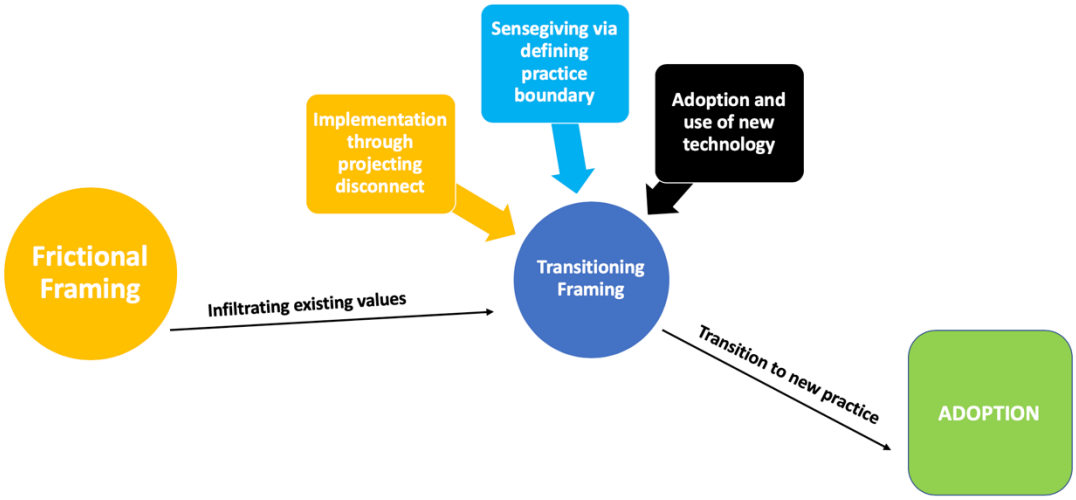


Figure 6.4: Transitioning Framing to Adoption

The process view on EMEDs implementation facilitated in examining the conditions under which framing had changed (Orlikowski and Gash, 1994). Actors initiated the intrinsic framing at the beginning of the process which was followed by frictional framing which eventually culminated in what is being referred to as transition framing. The final framing, therefore, could be explicated more in terms of the settlement towards EMEDs use and acceptance. The settlement in terms of their respective position was evident in how for example, non-clinical implementers were approaching the implementation plans at this late stage. The approach was relaxed and involved more risk-taking. The approach hinted at how the new technology was being pushed for acceptance throughout the hospital. It was being

framed and then reframed by non-clinical groups for its use in the hospital ward. From initially pitching it as a novel technology, EMEDs by this stage was being projected as ‘mere upgrade’ on paper-based charts. Such reframing of new technology allowed for clinical implementers and users to situate themselves more centrally to the process of implementation. Clinical implementers and users were continually assessing the new technology and its comparison with the old system was strengthening their affiliation for the new technology. In fact, one of the foundations on which Garud and Rappa (1994) based their socio-cognitive model of technology was their idea of technology expressed through a set of evaluation routines. At this stage when actors from all the three groups were framing and reframing the new technology, the group level practices were playing a role in manifesting the technology itself. These practices comprised of routines and normative values which defined EMEDs. It has been referred to as ‘traditions of testability’ and used as instruments by groups of actors to generate facts on technology in order to evaluate it (Latour and Woolgar, 1979; Constant, 1987). Evaluation routines are hence understood as external manifestation stemming from an actor’s belief and if data are inconsistent with the actor’s evaluation routine, they are rejected as noise or ignored altogether. By contrast, however, if data is consistent with the evaluation routines for actors, it is accepted as information and cognitively rearranged which then goes onto reinforce the belief of actors (Bateson, 1972; p. 187). By this stage, actors from all the three groups had more interest in confirming their beliefs in EMEDs than in actively trying to disprove them (Weick, 1979). Hence through evaluation routines, actor’s beliefs are first externalised and objectified before being finally internalised (Burger and Luckman, 1967). When these occur in groups, it often leads to multiple environments which is where the process of negotiation and shared interpersonal experience brings in consensual validation (Munroe, 1955). The members of the group agree upon facets of reality which they negotiate through the existence of their own version of the environment and eventually settle upon a common understanding. Evaluation routines are deemed essential in order to legitimatise a new technology hence during transition framing it plays an

important role leading to increase in commitment and conflict at the same time (Garud and Rappa, 1994).

Finally, it is critical to note that each of these unique framing activities is not only linked to each other through cognitive landmarks but are also seen to represent their respective framings. The notion of frames within framing activities have been compared to an 'environment' which always has actors in it (Goffman, 1977; p. 313). Goffman has referred to thematic of framing to have what he refers to as recessional qualities. In accordance with those qualities, all the three framing activities illustrated in my model depend on each other. Using a similar notion to 'primary frames', my model has three primary framing activities. These are a diverse yet mutually relatable for the group of actors. These are dynamic, action-oriented set of meaning, representing legitimate activities of the campaign during the project (Snow and Benford; p. 198).

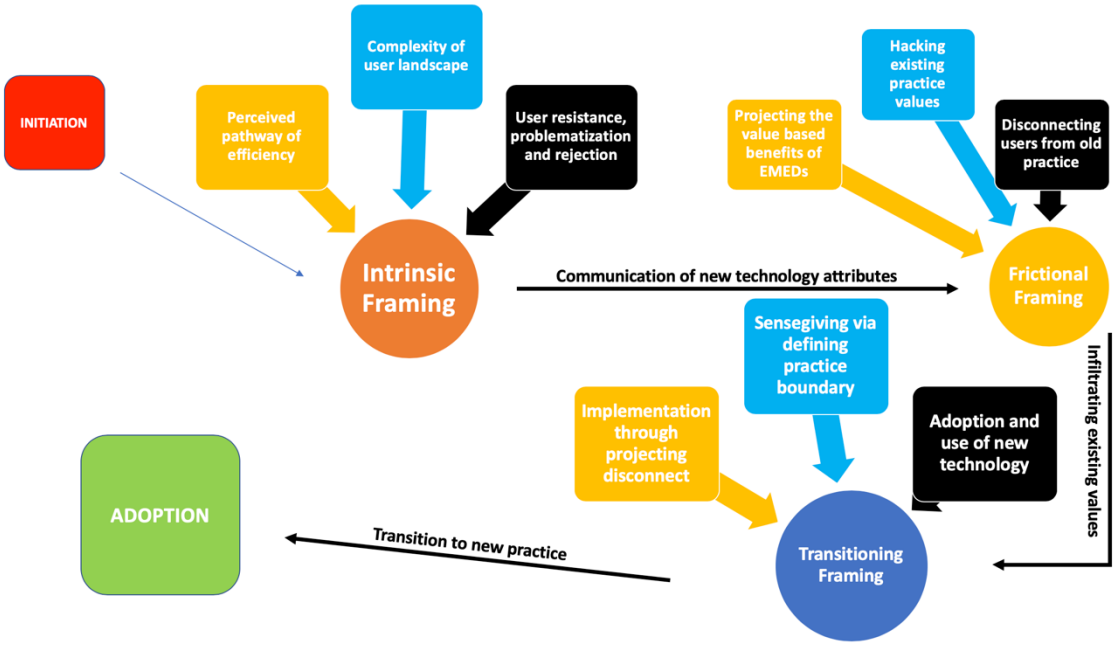


Figure 6.5: An Interactive Framing Model of EMEDs Adoption

6.3 Managerial Implications and Outcomes of the Model

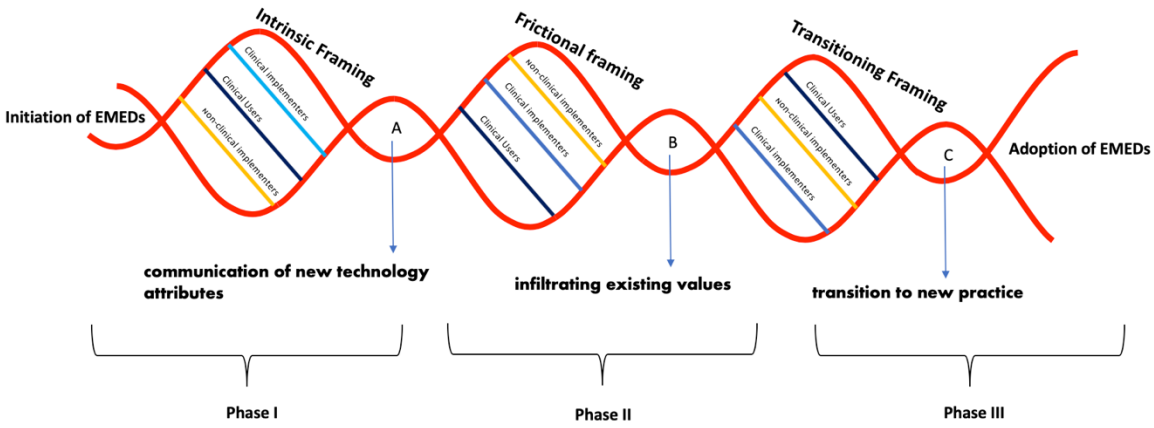


Figure 6.6: Phase-wise Illustration of the Model

6.3.1 Phase I: Fears and Implications of New Technology

Once a technology is operational, I found that the organisational members debate the relevance of the new technology and its risks for other stakeholders. The implementation process at this point requires clear objectives and transparency to build a sense of novelty among users. This avoids the project from being compared to prior implementations, as users negotiate the new technology better if the novelty associated with the technology is highlighted. The long-term benefits of doing so are greater as innovation is widely accepted, and its use is propagated due to curiosity and excitement. But more importantly, it leads to what is termed as ‘implementation success’. In theory, various facets have been associated with the notion implementation success and these include achievement of intended goals, level of decision adoption, reduction of employee resistance to change, commitment to the implemented changes, satisfaction with the implementation outcome and degree of learning for future activities (Bryson and Bromiley, 1993; Dooley, Fryxell and Judge, 2000).

6.3.2 Phase II: Capturing Value through New and Existing Practices

An organisation in which all end-users use a given technology in a standardised way is likely to be more effective in its implementation process compared to organisations in which use is idiosyncratic. To be effective, duties and responsibilities linked to workplace tasks associated with the new technology should be clearly explained to end-users. The changes brought about by innovation provides an opportunity to redefine those responsibilities. Such an opportunity can be seized by managers to facilitate a smoother start to the implementation process. The success of implementation processes relates to task completion by employees, motivation, and help from others (Guo et al., 2017). Alongside these, implementation success in a context as difficult as the NHS also depends on efforts to actively reduce resistance to change from other users and frontline employees (Lampaki and Papadakis, 2018). The next set of challenge relates to translating new practices into meaningful patient care outcomes. Given the scenario, it is an ideal time to socialise users that are already in a state of reorganisation and trying to figure out their respective duties concerning the new technology.

6.3.3 Phase III: Rationalizing the Transformation

The management should seek organisational members to draw out the benefits and project them to different groups within the organisation. Lack of awareness about the new technology can cause anxiety and an appropriate way to dispel the anxiousness is by providing organisational members to project the benefits through the creation of ‘superusers’, for example, or investing significant resources into creating comprehensive awareness programs for users across the board. Depending on the state of the old system, managers need to consider the limitations of the new technology, discuss and spell them out clearly to ensure the change from old to new is

widely accepted. It has been found out that many problems related to health information technology revolve around the interplay of hardware, software, content and user interface (clinical data and computer-generated decision support). Identifying these issues and clearly spelling it out in relation to the new technology can reduce the ambiguity of HIT related challenges (Sittig and Singh, 2015)

6.4 Research Contributions

6.4.1 An Interactive Framing Perspective on Innovation Adoption

Socio-cognition is grounded in the belief that individuals develop internal cognitive schema which enables them to organise, make sense of, and integrate new information about the world around them (Berger and Luckmann 1967; Davis and Hufnagel, 2007). Both cognitive and social properties are reciprocal in nature and a socio-cognitive perspective on adoption has offered me an opportunity to understand how cognitive properties and invariant social interrelations are interlinked (Gadomski, 2002). The perspective highlights the role of culturally produced signs, symbols, and the way historic, socially constructed meanings mediate the cognitive process (Hjørland, 2004).

Within the context of my research, the dynamics of the adoption process have been created by three diverse groups of actors. The knowledge structures emerging out of each group are simplified versions of reality. Framing represents the sub-plots which subsequently formed the basis of understanding the adoption process. Framings help in interpreting information thereby influencing other cognitive activities but more importantly framing helps in channelising perceptions (Markus and Zajonc, 1985). Conceptually, all of the framing activities represent the organised knowledge about the adoption process and have eventually benefitted information processing in ambiguous circumstances (Fiske and Taylor, 1984; Gioia, 1986). Cognitive processes are closely linked to framing and involve activities such as perception, learning activities and expectation formation. These processes not only enable sensemaking but also facilitate the

interpretation of events (Richter and Arndt, 2018). Both structure and processes are linked recursively and actors in my study have relied on existing cognitive structures to make sense of the new technology.

6.4.2 Socio-Cognitive Domains of Innovation Adoption

6.4.2.1 Knowledge

The socio-cognitive approach is interdisciplinary in nature and underlines the systematic relationship between semantic categories of meaning and socio-demography of the community within which actors create those meanings. The approach is useful in identifying integrated cognitive domains, social structure, and interactions (Robinson, 2010; Hemingway and Gough, 1998; van Dijk, 2017). One of the first socio-cognitive domains to have emerged during the adoption process involves the notion of knowledge. To this, one can illustrate the socio-cognitive model of technology in which technology was represented as knowledge (Garud and Rappa, 1994). Using this notion, cognition was defined as the ‘activity of knowing: the acquisition, organisation, and use of knowledge’ (Neisser, 1976; p.1). Garud and Rappa (1994) objectified knowledge which enabled associated artefacts to dictate standards of comprehension amongst the actors.

In my study, non-clinical implementers were the first set of actors to have acquired the knowledge of EMEDs. Knowledge acquisition as a critical component of organisational learning has been looked at the macro level which involves environmental scanning and transferring that data to the organisation to sense the signals of environmental changes (Moorman and Milner, 1998). Here, however, we have a group of actors acquiring knowledge and acting on data and information aiming to achieve successful strategic implementation of EMEDs. Knowledge acquisition can be operationalised as gathering of new clinical information in order to promote the technology to the actors outside the group. Acquisition of knowledge can also be coupled with knowledge implementation which completes the organisational learning process (Fortis et al., 2018; Gherardi, 1999).

Implementation of knowledge has implications for performance improvements (García-Sánchez et al., 2017). However, in the current context, the shared knowledge allows for actors to gain legitimacy in front of actors within the group and outside and the group. Within firms, the concept of knowledge as a dimension is considered to be both tacit and explicit. Such a conceptualisation of knowledge allows for us to understand how knowledge in relation to the new technology (EMEDs) was created and how actors around it were grasping that knowledge (Carlsen and Skaret, 1999) is created.

6.4.2.2 Collaborative Learning

Some of the workaround digital technologies have demonstrated the importance of technologies to help groups of learners collaborate on a greater scale (Koschmann, 1996). Learners collaborate more effectively when they engage in socio-cognitive activities – questioning, arguing or explaining (King, 2007; Andriessen et al., 2003; Webb et al., 2009). Actors through engagement in activities acquired domain-specific knowledge (knowledge about EMEDs) and cross-domain skills including collaborative learning. Collaborative learning can be attributed for its potential to facilitate cognitive development in learners (Schwarz and Linchevski, 2007). As a socio-cognitive roadmap in the adoption process, collaboration for implementation constitutes knowledge acquisition, implementation, and collaborative learning. For high-reliability global organisations, accelerating cognitive expertise of professionals is a critical challenge (Gore et al., 2018). In the context of my research, actors resorted to the new technology in order to enhance their cognitive expertise but, before they could, actors resisted to the change (paper charts to EMEDs). Resistance to change is a multidimensional concept and is defined as ‘a tridimensional (negative) attitude towards change, which includes affective, behavioral, and cognitive components’ (Oreg, 2006; p. 74). Oreg (2006) argued that effective constituent of this attitude involves two aspects. One being the negative emotions (such as anger) and second being the behavioural component

which includes negative action or intentions to act in response to the change (Rafferty and Jimmieson, 2017).

It has been argued that actors' subjective perceptions in relation to the extent of changes which they experience the transformational change is directly associated with psychological well-being (Rafferty and Jimmieson, 2017). Changes in the habitual pattern are disconcerting and disturbing which is in contrast to functioning in repetitive ways. Functioning in a habitual manner allows actors to achieve their goals and lends them the control over their environment (Moyle and Parkes, 1999; Schabracq and Cooper, 1998). Disruption is experienced when major aspects of workplace including culture and typical ways of working changes for actors (Kyratsis et al., 2017). Clinical implementers envisaged the same with EMEDs as it changed a core aspect of their working routine.

6.4.2.3 Collective Identity

Various works (Albert and Whetten 1985; Ashforth and Mael, 1996; Corley and Gioia 2004; Dutton and Dukerich, 1991) have pitched organisational orientation as an organisational level construct to deduce the identity of organisation. According to Brickson (2007; p. 865), collective identity orientation comprises of actor's 'shared perceptions about what their organisation is.' Brickson's (2007) empirical work has identified three types of organisational identity orientations namely individualistic, relational and collectivistic. The three types of organisational identity orientations have distinct cognitive and motivational attributes (Wickert et al., 2017). At micro-level during the adoption process actors formulate identities for themselves in line with the organisation and the newly implemented technology. In contrast, macro-level understanding of organisational identity relates to collectively agreed-upon set of central, distinctive, and enduring characteristics as they define an organisation (Albert and Whetten, 1985; Rafaelli et al., 2019). The organisational self-conception belongs to the actors of a larger group in relation to other groups and stakeholders. Organisation studies have recognised the importance of socially constructed

identity. There is a widespread belief that identity construction is a process which is unfolding, ongoing and produced in specific conditions (Carlsen, 2016; Harding, 2007; Ybema, 2010). Collective identity has implications in terms of forging relationships that are based on common purpose and fosters the adoption of a technology aiming to enhance the wellbeing of a larger group. Cognitively, attempts to establish collective identity especially in the context of adoption are definitions emerging out of the interactions between the groups and provides for actors to develop a collective sense of self, of others and the technology in question (Ravasi and Schultz, 2006).

6.5 Complexity of Adoption Process

Within cognitive psychology, numerous empirical, well-founded studies have demonstrated how actors process information which in turn has allowed us to understand the complexity underlying human choices and social processes (Falk and Bassett, 2017; Stein, 1997). Interest in cognitive bases of social processing has peaked in the last decade as scholars have tried to understand clinical conditions characterised by problems of social interaction (Happé et al., 2017). A micro-level account of innovation adoption suggests that adoption goes through a relational interplay between social and material elements (Garud et al., 2016). The interactions that relational complexity brings about has implications for organisational governance which is critical to harnessing the advantages of a multi-stakeholder adoption process. Although actors have the potential to deal with challenges that arise due to relational complexities, adoption process as such is characterised by various temporal rhythms and experiences. These rhythms generate different non-parallel elements of innovation which are key to the infrastructure required for the development and adoption of innovation.

If not addressed, these asynchronies can lead to the process becoming uneven, which draws our attention to issues such as momentum or time pacing (Eisenhardt and Brown 1998; Gersick, 1989). Despite attempts to orchestrate the process of EMEDs implementation by the hospital management, unanticipated roadblocks emerged both during and after the process had been completed. My findings emphasise that the process of

adoption is not linear in terms of how different user groups were experiencing the transitioning cycle. That is, during or after implementation, there were some who moved on to embrace the implications of the technology while others had their reservations.

Delayed implementation influences the performance gap between the old and the new, although, during this period, incumbent technology makes progress within the organisation (Henderson, 1995). Adoption of innovation can result in initial dips in productivity as existing socio-technical orders are disrupted (McAfee, 2002), this should not be a surprise given that the performance gaps exist in all projects – well-planned or unplanned (Stone, 2015). Different actors associated with EMEDs experience different social settings which add to the temporal complexity. Some actors are focussed on the present, and others consider a broader slice of time reflecting on the past before going into the future (Garud, Kumaraswamy, and Karnoe, 2010; Gavetti and Levinthal, 2000; Kaplan and Orlikowski, 2013). In order to address the temporal complexities, temporal coordination mechanisms are employed which includes linear technology roadmaps or stage-gate approaches (Cooper, 2014). To deal with relational complexity, stabilising elements at the top can provide a basis for the evolution of the system below (Clark, 1985).

6.6 Research Limitations

As much as the story rings true, like most research my study has its limitations. The key limitations of this research are linked to the generalisability of the findings. In spite of many positive aspects of my research such as studying the phenomenon in a real-life context, my research can be criticised for the lack of generalisability and objectivity. Relating this to the nature of the sample, the generalisations of conclusions was difficult (Yin, 2017). In qualitative studies, generalisability is associated with researcher's analysis and understanding of representative data (Carminati, 2018). One can, however, distinguish between the types of generalisability. A typology depicts three forms as a) statistical

generalisation, b) analytical generalisation c) case-to-case translation also referred to as transferability (Firestone, 1993). It should be noted that the replicability of my research findings does not compare to the quantitative statistical generalisability (Yin, 2017).

6.7 Future Research Direction

In order to address the lack of generalisability, future research will focus on attempts to validate the model by replicating the results using other examples of technological innovation. But before that can be attempted, future research would seek inclusion of patients as an important stakeholder in addressing the complexity of the adoption process.

As such, patients have the right to participate in planning and delivery of their healthcare which have traditionally occurred through inpatient groups - detailing experiences within particular health technology, as expert patient stories or interviews and patient representatives on health technology assessments (Berglas et al., 2016; Staley and Doherty, 2016). Inclusion of these experiences is more likely to enrich the narratives of the adoption process. With patient-centered care, clinicians across the globe are recognising the importance of patient-reported outcomes (PROs). PROs have been identified as the most obvious and direct measures of success when discussing high-quality patient-centered care (Jensen et al., 2015). Given the burst in technological infrastructure, we are already witnessing the incorporation of touch screen tablets, Internet-based applications, and electronic health records (EHRs) into clinical care. PROs have become integral and are now being demanded by regulators, payers, accreditors, professional organizations, and clinicians to measure and improve PRO-based outcomes at the patient, clinic, and healthcare system levels. Future research could be developed the direction in order to include an important voice which may lead to an adoption process which is identified with improved patient-provider communication, increased patient satisfaction and better management of chronic conditions (Detmar et al., 2002; Greenhalgh et al., 2004).

On a separate note, I would like explore other forms of innovation which are even more difficult to adopt. A lot has been written on management innovation and I am currently working on a couple of papers which discusses management innovation in similar context. Management innovation within the literature is represented by a variety of overlapping terms - administrative, managerial, organizational, social, and management innovation (Damapour, 2014). But overall non-technological innovations are viewed as secondary and mostly introduced to facilitate the application of technological innovation. According to the established belief that prior experience within a specific type of knowledge generally supports further application of the same body of knowledge, organisations just excel in certain innovations owing to that knowledge they possess and keep gaining performance advantages from it (Bierly, Damanpour and Santoro, 2009; Cohen and Levinthal, 1990; Roberts and Amit, 2003). Such logic has already induced continued emphasis on the primary role of technological innovations for firm performance, and inadequate emphasis on the role of management innovation (Damanpour, 2014). Management innovation remains an untapped source, especially when viewed in relation to organisational effectiveness which calls for the development of datasets, robust measures, and collection of cross-organizational comparable data. Given the development in the area, future research would seek to explore the adoption of non-technological innovation, often considered secondary to technological innovation for organisational effectiveness and performance.

6.8 Epilogue

Having nearly completed my PhD journey, I see my work primarily as an interactional product. The work is embedded with lots of interactions. It is an important point of consideration because during my time of undertaking this research, I met various individuals who have left a mark on what I have achieved in the end. The journey began years back when working for a consultancy, I was visiting the hospitals in southern part of India. Amongst the many things I discovered, I witnessed the importance of technology in healthcare from close quarters. My interaction with the clinicians across all

quarters helped me understand the role technology played in shaping clinical care and effectiveness in a very messy and complex environment. The journey thereafter took an unprecedented turn and from being in India not so long ago, I ended up in Leeds researching the largest single-site implementation of EMEDs in the world.

As the work progressed, I became aware of the importance of disseminating my research findings to a broader audience through presentation and publication. This has led to my work being presented at prestigious conferences and interacting with academics who have excelled in their own domain.

I would like to end this work on something which has shaped me by all account. No matter what I do, the contributions from two individuals will stay with me for the rest of my life. I must admit that this PhD experience has changed me as an individual but the source of that change has been Professor Tyrone Pitsis. His words and influence will remind me forever who I am and where I am headed. He has set me on a path which may lead to personal successes but his everlasting contributions towards my improvement have been invaluable. I appreciate his efforts immensely and without a doubt, it remains one of the most valuable means to have shaped my personality. Professor Tyrone’s efforts have been well complemented by Dr. Matthew Mount. Dr. Matthew’s passion, energy, and enthusiasm in every situation has been very uplifting. His efforts have set me a benchmark and I would consider myself a very content man, if in years down the line, I manage to accumulate a quarter of Matt’s drive, sensitivity, positivity, and magnanimity. These two individuals have been the cornerstones of my PhD journey and I am hoping to make use of all the wisdom they have bestowed upon me.

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