

How can evaluation practice catalyse transformations towards regenerative futures?

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Abstract

Evaluation is a universal human activity and profoundly influences our actions. However, today's complex, volatile and transforming world demands very different kinds of evaluation practice from conventional Western approaches that still dominate the modern professionalised evaluation discipline, and which are actively holding us back from desirable transformations. It has been strongly argued that a regenerative orientation is needed to guide our evaluation of societal transformations, in order to encourage more radical action and avoid perpetuating superficial approaches to achieving sustainability. But to date we have had limited coherent understanding of what such regenerative futures would look like and how evaluation practice must accordingly change, as well as few case studies of implementation. This PhD aimed to address these gaps to understand how evaluation practice can catalyse transformations towards regenerative futures. It creatively synthesises literature to provide major conceptual advances in clarifying regenerative systems (through a new evaluative framework, the Regenerative Lens) and principles and approaches for transformation-focused evaluation. Through collaborative design research in contexts of regional-scale food systems, the thesis also explores how to start contextualising, implementing and embedding transformation- and regeneration-focused evaluation in the way that we collectively organise for systems change. A synthesis chapter draws on learning from across the thesis to identify three critical aspects that must be addressed if evaluation practice is to catalyse transformations towards regenerative futures. First, the new roles and capabilities urgently demanded of evaluation practice by our transforming world must be recognised. Second, stepping fully into those new roles requires an existential shift in the complexity awareness, power relations, and purpose of evaluation practice. Third, a number of wider cultural enabling conditions are essential to cultivate in order to accelerate the mainstreaming and embedding of transformation-focused evaluation in transformation efforts. This presents a bold and action-oriented agenda for future research and practice.

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Author's declaration

I declare that this thesis is a presentation of original work. It has not previously been presented for a degree or other qualification at this University or elsewhere. All sources are acknowledged as references.

I am the sole original author of all text outside the chapters that have been published as journal articles, or submitted for publication (e.g. Chapter 1, Chapter 6, and introductory text at the beginning of the other chapters); this text was reviewed and edited by Ioan Fazey and Peter Ball, such that the final text is almost entirely my own (approximately 95%). Chapters 2-5 include co-authored chapters published as papers in journals or submitted to journals for publication. I am the first author and the leading contributor to the writing of all of these chapters. Details about the publication status and author contributions of these chapters are provided in Appendix 4. Two other co-authored documents external to the main thesis are provided in Appendix 1 and 2, again with authorship statements in Appendix 4. Artificial Intelligence (e.g. ChatGPT) was not used to write any parts of this thesis, other than for locating some of the academic sources cited in Chapter 1 (Introduction) and Chapter 5.

Importantly, this thesis has been developed in a Western context. I recognise that patriarchal and colonialist cultures have both granted me unearned privilege to create and share this thesis, and contributed to the suppression and dismantling of other cultures that operate from ecocentric and regenerative foundations, and from which much can, and should, be learned. Much of this learning, however, has been appropriated and reinterpreted by Western academics without due attribution, and this thesis has been created without invitation from the regenerative cultures that I wish to honour. This thesis could therefore easily be seen as reinforcing such concerns, and the racial and gendered issues that are deeply entwined with regenerative practice.

So I offer this thesis, in all humility, as the best gift I can craft at this stage of my own lifelong journey of learning how to decolonise my own practice, reconfigure the Enlightenment worldview of separation that I have been steeped in, and cultivate more regenerative ways of living and being in the world. I hope that it can at least be a stage in the process of elevating marginalised perspectives of regenerative cultures, following the lead of many others including: the United Nations Declaration on the Rights of Indigenous Peoples (UN General Assembly, 2007); the IPBES Values Assessment (IPBES, 2022) and Transformative Change Assessment (IPBES, 2025); the work of EvalIndigenous, including the Wolastoq Declaration on

Indigenous Evaluation (Participants of the global Indigenous Evaluation Gathering, 2024); and the Protocols for Non-Indigenous People Working with Indigenous Knowledge (Indigenous Knowledge Systems Labs et al., 2024).

Signed: Sam Buckton

Date: 26/01/2026

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I consider many other people to have been mentors along my PhD journey, although they may not have realised it. These people have provided encouragement, sage advice, new perspectives, inspiration, opportunities for development, and a lot of intellectual food for thought. They include: Ioan Fazey's Transformations Research Group, including Chino Bayoneta, Matthew Darby, Lee Eyre, James Fearnley, Rebecca Goodman, Declan Jackson, Rebecca Newman, Suzanne Om, Adam Otoole, and Kate Rudd, as well as the extended writing group members Stefan Cousquer, Luea Ritter, and David Tyfield; the Regenerative Futures Workshop Group, including Victoria Hughes, Graham Leicester, Adrian Lovett, Christopher Lyon, Kate McLaven, Bill Sharpe, and Chloe Smee; my transformation-focused

evaluation gurus, Scott Chaplowe, Adam Hejnowicz, Zenda Ofir, Glenn Page, Michael Quinn Patton, and Barbara van Mierlo; Tobias Fechner, Cynthia Zanti Jabs, Max Zahniser and the rest of the inspiring COBALT Fellows cohort and invited presenters; Brian Watts, Bella Mehta, and my wonderful cohort of facilitators undertaking the Association of Facilitators' Level 1 Facilitator training; the Unearthodox team and its Regenerative Futures Advisory Group, including Claire Dusonchet, Zlatina Paneva-Aboud, Sasha Sebright, Sudha Iyer, Jan van de Venis, Lorenzo Costanzo, Andrew Merrie, and Jane Lawton; and many others including David Adams, Grace Blakeley, Oliver Broadbent, Louise Cantlay, John Colvin, Jasmine Cortazzi, Sophie Duncan, Haley Fitzpatrick, Ben Fletcher, Hannah Fraser, Bruce Goldstein, Tony Hodgson, Jessica Horn, Chris Ives, Jasper Kenter, Robin Wall Kimmerer, Julia Leventon, Tobias Luthe, Irene Lyon, Seth Lyon, Paul Manners, Jeremy Narby, Karen O'Brien, Curtis Ogden, Michelle Pereira, Kate Raworth, Cath Ritchie, Smriti Safaya, Karen Spiller, Tim Strasser, Pablo Vidueira, Sandra Waddock, Daniel Wahl, Fern Wickson, and Chris Yap.

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Last, but certainly not least, is my love and gratitude to my family, friends – including Gillian, Zaph, Ali, and the indomitable Alpacenboroughs, – and Anna: what would I do without you?

Chapter 1: Introduction

This first chapter of the thesis outlines the motivation for the research and the research gap being addressed. It then outlines the structure of the thesis, its overarching methodology, and the methodology of the individual sections and papers.

1.1 Background

Evaluation – the process of assigning quality, value or importance to something (ANZEA and Superu, 2015; Schwandt and Gates, 2021) – is a universal human activity and profoundly influences the action we take in the world (Patton, 2021; Stufflebeam and Coryn, 2014; Scriven, 1995). The way we evaluate, and the criteria and indicators that we evaluate against – Gross Domestic Product, the Sustainable Development Goals, net zero carbon, biodiversity gain, and so on – reflect what we value, and determine how all of our economies and societies function (Patton, 2021; Stufflebeam and Coryn, 2014; Scriven, 1995; Dahler-Larsen, 2013). The modern professionalised discipline of evaluation grew primarily from the need to financially audit efforts to rebuild better societies in the wake of World War II, and has been strongly shaped by Western values and worldviews (Ofir, 2025; Shadish and Luellen, 2005; Hassnain, 2023). This discipline grew up supporting discrete, isolated projects in service of a “delivery mode of governance” (Schwandt, 2019, p. 321), founded on assumptions of certainty and predictability, focused on quantification and financialization, assessing progress on predetermined objectives in linear theories of change, and ultimately encouraging relatively marginal and superficial improvements to existing systems (Chaplowe and Hejnowicz, 2021; Patton, 2011, 2021).

This model is a poor fit in today’s volatile, uncertain and rapidly transforming world, however (Patton, 2021; Kotschy et al., 2025; Jordan and Hall, 2023; Bilella, Mulder and Zaveri, 2021; Schwandt, 2019). Transformations, or major, fundamental, systemic changes (Feola, 2015; Fazey and Colvin, 2023), are needed across our societies (McPhearson et al., 2021; Moallemi et al., 2025; Kenter et al., 2025; IPBES, 2025; UNEP, 2022; Díaz et al., 2019) – in our food, energy, healthcare, education and finance systems, for instance, or the way we do business – to transcend intersecting and compounding environmental, social and geopolitical challenges, including climate change, biodiversity loss, increasing poverty and social inequality, disinformation, and neofascism (McPhearson et al., 2021; Moallemi et al., 2025; Kenter et al., 2025; Schreuder and Horlings, 2022; IPBES, 2025; UNEP, 2022; Díaz et al.,

2019; Fischer et al., 2024; Gweshengwe, 2025). These transformations must go beyond merely technological, behavioural and policy changes to include shifts in underlying beliefs, values, assumptions, intent, purpose, power structures, paradigms and worldviews (O'Brien and Sygna, 2013; Fazey et al., 2018b; IPBES, 2019; Davelaar, 2021). Transformation is in fact inevitable, since if we fail to respond appropriately to global crises, our ways of life will be catastrophically disrupted, as already demonstrated by increasingly deadly extreme weather events linked to climate change, for instance (Fazey and Leicester, 2022; Penuelas and Nogué, 2023).

Traditional modes of evaluation are at best inadequate, and at worst actively contributing to global crises and holding us back from desirable transformations (Patton, 2021; Kotschy et al., 2025; Jordan and Hall, 2023; Bilella et al., 2021). A key reason is that the criteria, framings and orientations that shape our evaluation practice, and therefore societal change, are failing to drive change at the speed, scale and depth required (Haberl et al., 2011; Reed, 2007; East, 2020; Haskell, Bonnedahl and Stål, 2021; Buckton et al., 2024; Hickel and Kallis, 2020; Priebe, Mårald and Nordin, 2021). Mainstream approaches to achieving sustainability often assume that it is sufficient to simply reduce anthropogenic harm to more acceptable levels through incremental improvement (e.g. in efficiency) and adaptation of existing processes, such as a 'net zero' approach to reducing carbon emissions (Reed, 2007; Demastus and Landrum, 2024; Bengtsson et al., 2018; Kates, Travis and Wilbanks, 2012). However, this 'weak sustainability' paradigm fails to shift problematic underlying drivers of unsustainability (Demastus and Landrum, 2024; Bengtsson et al., 2018; Kates et al., 2012), including the extractive dynamics of capitalist economic models focused on material growth (Kenter et al., 2025; Buckton et al., 2024; Hickel and Kallis, 2020), and a prevalent worldview of human separation from, and dominance over, the rest of nature (Reed, 2007). It is also insufficient given that we have already transgressed critical thresholds of planetary resilience (Reed, 2007; Camrass, 2020; Gibbons, 2020; East, 2020; Haberl et al., 2011). New, more ambitious and imaginative orientations are therefore urgently required for evaluation to guide more radical transformations and encourage *regenerative* dynamics that spiral up human and ecological health in mutually reinforcing ways (Reed, 2007; Gibbons, 2020; Moore and Milkoreit, 2020; East, 2020).

To date, however, the potential for evaluation practice to enable desirable transformations has been limited by three key research gaps. Firstly, we have lacked coherent understanding of what radically different, regenerative orientations for large-scale transformation would look like (Camrass, 2020; Gibbons et al., 2018). Secondly, we have lacked coherent understanding

of the implications for evaluation from the need to support desired transformations (Picciotto, 2021; Feinstein, 2019; Mickwitz et al., 2021). Thirdly, because of the limited application to date of more transformation-focused evaluation (Chaplowe and Hejnowicz, 2021; Colvin et al., 2024; Picciotto, 2021) or regenerative practice (Toner et al., 2023; Giller et al., 2021; Cole, 2023), especially in Western contexts, we have little understanding of how it could most effectively be implemented, embedded and ultimately mainstreamed in our transformation efforts. Without clarifying what societal transformations should be audaciously aiming towards, how evaluation can help us understand if transformations are on the right track, and how to embed transformation- and regeneration-focused approaches in practice, we are much less likely to overcome global crises in the critical decades ahead (Reed, 2007; Patton, 2021, 2019; East, 2020; Toner et al., 2023; Cole, 2023). Overall, this calls us to accelerate our learning about how evaluation practice can catalyse transformations towards regenerative futures.

1.2 Thesis research questions

This thesis addresses the overarching question: ‘How can evaluation practice catalyse transformations towards regenerative futures?’. This is answered by focusing on addressing three sub-questions:

- 1) ‘What orientation is needed for transformation?’ (Chapter 2)
- 2) ‘What forms of evaluation are needed to enable desired transformations?’ (Chapter 3)
- 3) ‘How can we embed transformation-focused evaluation in transformation efforts?’ (Chapter 4)

Chapter 5 then synthesises the learning from Chapters 2-4 to directly answer the overarching thesis question.

1.3 Research approach

Ontologically, this thesis is based on three core understandings: 1) the need for transformation; 2) complexity; and 3) the need for action-oriented research. As highlighted above, the urgency to address global crises calls for systemic transformations; more superficial, marginal or isolated adjustments and reforms are insufficient (McPhearson et al., 2021; Fazey and Colvin, 2023). Transformations inevitably take place in complex, unstable, uncertain and contested social-ecological systems, in which research and researchers are

embedded (Fisher, Brondizio and Boyd, 2022; Fazey et al., 2018a): this is referred to by some as a ‘post-normal’ paradigm for research (Nogueira, Bjørkan and Dale, 2021; Horcea-Milcu et al., 2024). The urgency of the ‘transformational imperative’ (Chaplowe and Mukoma, 2023) and a post-normal paradigm then necessitates engaged, action- and solutions-oriented research that goes beyond passively improving our understanding of problems, to understand systems through active intervention in them in service of transformations (Horcea-Milcu et al., 2024; Fazey et al., 2018a).

Epistemologically, this understanding of the role of action-oriented research in complex systems transformation leads to a position of seeking more diverse forms of knowledge and methods, and adopting more diverse researcher roles, to support transformation (Fazey et al., 2018a; Wittmayer and Schöpke, 2014; Fazey et al., 2020; Nogueira et al., 2021; Horcea-Milcu et al., 2024). The research in this thesis draws on a variety of conceptual and empirical approaches. Alongside literature reviews that recognised the power of literature synthesis to generate new actionable insights from diverse and disparate knowledge (Wyborn et al., 2018), these approaches included second-order, collaborative and co-creative, action-oriented research (Bennett and Brunner, 2022; Fazey et al., 2018a; Umpleby, 2016) – where researchers acknowledge their embeddedness in the system of study rather than observing it, ostensibly with objectivity and independence, from the outside looking in (Fazey et al., 2018a, 2020) – and design research (Easterday, Rees Lewis and Gerber, 2018). I accordingly alternated between different researcher roles, including ‘change agent’, ‘process facilitator’ and ‘knowledge broker’ as well as reflective and self-reflexive scientist (Wittmayer and Schöpke, 2014).

Second-order aspects of this research are most apparent in Chapter 4 (‘How can we embed transformation-focused evaluation in transformation efforts?’) and Appendix 1. These papers drew on more diverse forms of knowledge beyond only epistemic, rational or abstract knowledge, including prospective, normative, intuitive, creative, and practical forms of knowledge, and ‘learning by doing’, which all play a role in design work and supporting transformations (Fazey et al., 2020; Murphy, 2017; Jones et al., 2016). This research was also highly collaborative and co-creative (see Appendix 4), and focused on action grounded in place – specifically, the region of Yorkshire and its food system, which is the focus of the FixOurFood programme in which the research was embedded, and was selected as a powerful case study of large-scale complex systems change (Doherty et al., 2022), not least because food systems have been identified as critical leverage points for wider societal transformations (Sonnino and Milbourne, 2022; Duncan, Carolan and Wiskerke, 2020). I used

my own proximity to the Yorkshire food system as a strength for supporting action, while remaining reflexive about my positionality as a facilitator, evaluator, and action-oriented second-order researcher (Holmes, 2020; Wittmayer and Schöpke, 2014).

Two other considerations shaped the overall approach to this thesis. Firstly, I treated the PhD as an opportunity to learn how to write in a variety of academic styles and formats, including different kinds of journal article – especially given their foundational importance for academic communication – such as perspective and review papers as well as empirical papers. All of my chapters are therefore written as journal articles (so their formatting varies according to the style of the journal in question). I also took the opportunity offered by FixOurFood's connection to the Transforming UK Food Systems programme to write a very different kind of academic piece (Appendix 2): namely, an accessible guide style aimed at lay audiences, as exemplified by previous work by Fazey & Colvin (2023).

Second, I was interested in developing the chapters and the guide in Appendix 2 in ways that cultivated networks and partnerships of collaborators, enhanced the impact of the research (see Appendix 3), and supported my wider academic career development. An inclusive approach to co-authorship of research outputs was adopted, recognising the many different ways that people shape research (Brand et al., 2015). This collaborative approach created a challenge in clearly articulating the different contributions and conceptual ownership of the co-created research, which are laid out in the author contribution statements in Appendix 4, drawing on the CRediT framework (Brand et al., 2015), and further elaborated in the methodology of the papers in Chapter 4 and Appendix 1.

Overall, drawing on multiple methods and ways of knowing and collaborative approaches allowed for a more insightful synthesis (Chapter 5) and a greater depth of understanding of the question that I set out to explore in this thesis.

1.4 Thesis structure and methods

Figure 1 summarises the structure of this thesis. The thesis includes four core chapters published or submitted as journal articles (Chapters 2-5), bookended by this introductory chapter and a brief concluding chapter (Chapter 6) that summarises the key conclusions and advances provided by the thesis, as well as its recommendations for future research. Chapters 2-5 build iteratively on each other: Chapter 3 builds on the evaluative implications of

Chapter 2, Chapter 4 puts learning from Chapters 2 and 3 into practice, and Chapter 5 synthesises learning from all three previous chapters.

Further publications are provided in Appendix 1 and 2. While these are tangential to the main flow of the thesis, Appendix 1 provides additional useful rationale and context for the rest of the thesis, while Appendix 2 is a further example of how the concepts explored in the thesis are being translated into practice. Appendix 3 describes the academic impact and influence on policy and practice already achieved by the thesis. Given the extensive collaborative research in this thesis, Appendix 4 lists the publication details and author contribution statements for the papers and other publications included in the thesis.

Each component of the thesis is explained in more detail below, including the methods used.

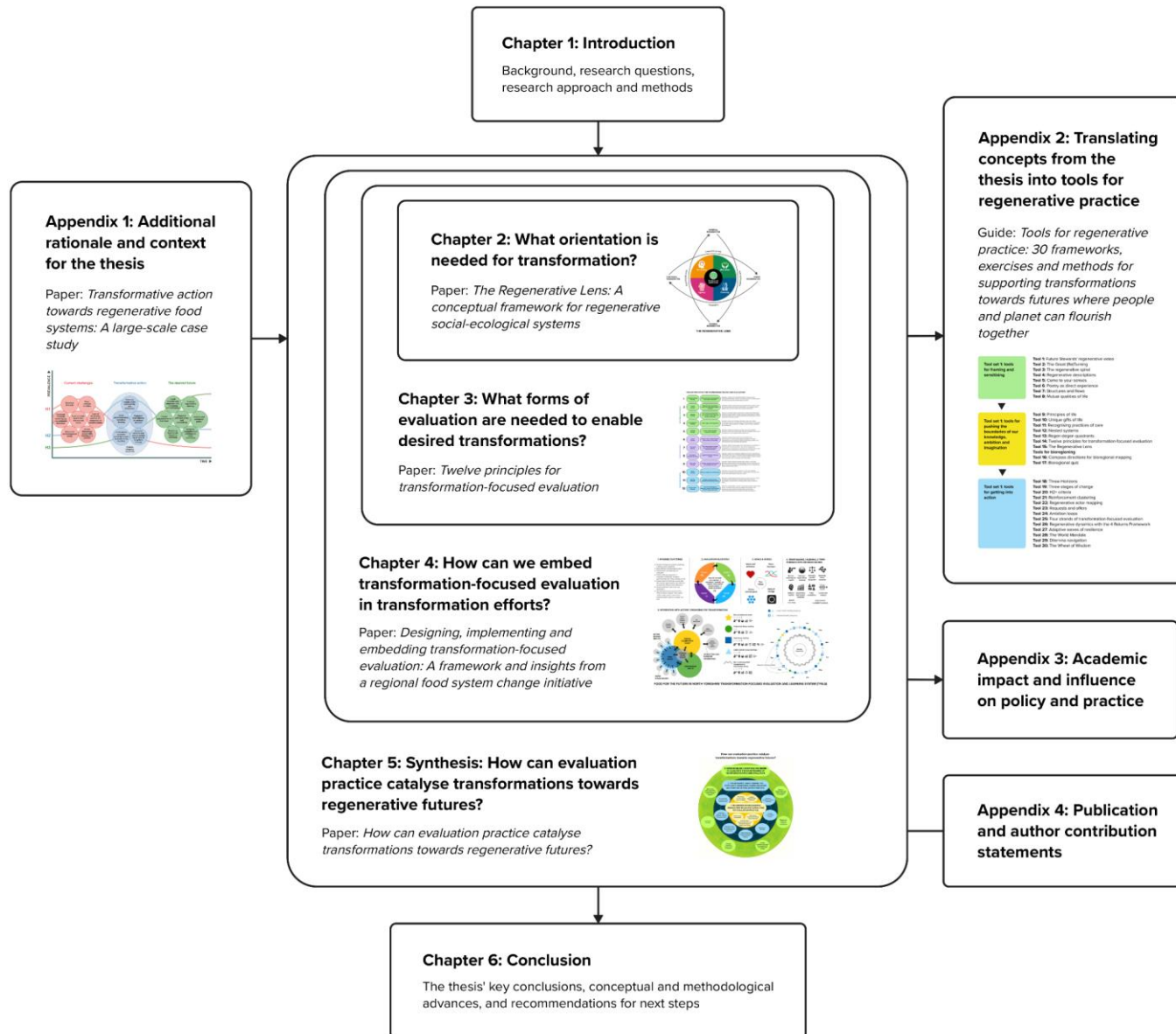


Figure 1. Diagram showing how this PhD thesis is organised. Following an Introduction in Chapter 1, Chapters 2-5 iteratively build on each other's findings (represented by the nested structure), before Chapter 6 summarises some key conclusions, advances and recommended next steps from the thesis. The paper in Appendix 1 provides additional rationale and context for the rest of the thesis, while Appendix 2 is a further example of how the concepts explored in the thesis are being translated into practice. Appendix 3 describes the academic impact and influence on policy and practice already achieved by the thesis. Appendix 4 lists the publication details and author contribution statements for the papers and guide included in the thesis. Key figures from the papers are provided for illustrative purposes. Figure created by Sam Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

Chapter 2: What orientation is needed for transformation?

This chapter addressed the first sub-question of the thesis: ‘What orientation is needed for transformation?’. It used an integrative review methodology (Snyder, 2019), combined with creative design work, to synthesise knowledge from across diverse literature and disciplines and generate a new conceptual framework for regenerative social-ecological systems, the Regenerative Lens, primarily intended for use as an orienting heuristic in evaluating and pushing the ambition and imagination of envisioned futures. The chapter has been published as a perspective paper.

Chapter 3: What forms of evaluation are needed to enable desired transformations?

This chapter addressed the second sub-question of the thesis: ‘What forms of evaluation are needed to enable desired transformations?’. It built on the findings of Chapter 2 by exploring the evaluative implications of supporting transformations towards regenerative futures. It used a systematised scoping review methodology (Arksey and O’Malley, 2005) to synthesise knowledge from disparate evaluation literature, supplemented by a consultation exercise (Arksey and O’Malley, 2005) with an advisory group of experienced evaluation and transformation researchers and practitioners, generating a cohered set of twelve principles for transformation-focused evaluation. It also identified approaches, methods, frameworks and tools for operationalising those principles. The chapter has been published as a review paper.

Chapter 4: How can we embed transformation-focused evaluation in transformation efforts?

This chapter addressed the third sub-question of the thesis: ‘How can we embed transformation-focused evaluation in transformation efforts?’. It built on the previous two chapters by putting many of their findings into practice. It used a second-order, co-creative, action-oriented and utilisation-focused design research methodology (Fazey et al., 2018a; Easterday et al., 2018; Patton and Campbell-Patton, 2022), and additionally applying principles of transformation-focused evaluation (Chapter 3) and other evaluation approaches identified in Chapter 3, to design and begin to implement a transformation-focused evaluation and learning system for the Food for the Future in North Yorkshire food system transformation initiative, and draw out lessons for the design, implementation and embedding of

transformation-focused evaluation in transformation efforts. The chapter has been submitted as an empirical paper.

Chapter 5: Synthesis: How can evaluation practice catalyse transformations towards regenerative futures?

This chapter synthesised the findings of the thesis, along with selected wider literature, to directly answer the overarching question of the thesis: ‘How can evaluation practice catalyse transformations towards regenerative futures?’. It also presented an action-oriented agenda for future research and practice to accelerate the mainstreaming of transformation-focused evaluation. The chapter has been submitted as a perspective paper.

Chapter 6: Conclusion

This brief chapter concludes the thesis by summarising its key findings, advances, and recommendations for next steps.

Appendix 1: Additional rationale and context for the thesis

Four appendices external to the main body of the thesis are included. Appendix 1 is a paper that provides additional rationale and context for the thesis. It introduces the Yorkshire food system context that features in Chapter 4, as an important exemplar of where transformation of complex systems is urgently needed. It explains the kind of transformation that evaluation must enable (see Chapter 3) and contextualises what a regenerative future might look like, applying ideas from Chapter 2.

The paper used a second-order, co-creative and adaptive methodology (Fazey et al., 2018a, 2020; van Assche et al., 2023), structured with the Three Horizons framework and futures practice (Sharpe et al., 2016) and additionally applying the Regenerative Lens (Chapter 2), to identify current challenges and desired futures in the Yorkshire food system, and key domains of action required to stimulate transformations towards the regenerative envisioned future. The study involved a multi-stage process over 14 months of data collection with surveys and 15 in-person or online workshops, with a diverse group of 114 practitioners and researchers from across the Yorkshire food system. Although I am lead author of the paper, I played less of a leading role in the investigation of this research, much of which was conceptualised prior to the start of my PhD, and which was a major collaborative effort across a large team of coordinating researchers and facilitators.

Appendix 2: Translating concepts from the thesis into tools for regenerative practice

While Chapter 2 and Appendix 1 describe an application of the Regenerative Lens to push the ambition and imagination of an envisioned future, the results highlighted how such post-hoc applications are likely to be insufficient, and that a regenerative orientation should instead be much more embedded throughout strategy design and futures processes. There was also a challenge in shifting mindsets away from a relatively human-centric perspective and utilitarian relation to nature. Overall, questions remained about how to adapt the Regenerative Lens and the ideas it contains into accessible, easily applied tools for regenerative practice and transformation-focused evaluation, particularly in contexts where such ideas are relatively unfamiliar.

This provided a key motivation for the research described in Appendix 2, as a way to develop tools and simple entry points for strengthening a regenerative and transformative orientation across our ways of working. The research is written as an accessible guide to tools for regenerative practice, in the style of other guides published by Transforming UK Food Systems, such as Fazey & Colvin (2023). It is based on a series of five in-person and online workshops with a diverse group of practitioners and researchers, combined with further creative design work, to develop and test practical tools that help to bring regenerative approaches into our lives, work, and transformation efforts. I am the lead author of the guide.

Appendix 3: Academic impact and influence on policy and practice

This appendix describes the academic impact and influence on policy and practice that has already been achieved by the research in this thesis.

Appendix 4: Publication and author contribution statements

This appendix lists the publication details and author contribution statements for all parts of this thesis that are published or submitted for publication, including Chapters 2-5, Appendix 1, and Appendix 2.

1.5 Ethics

Ethical approval for this research was obtained from the University of York Department of Environment and Geography, with ethical approval for the paper in Appendix 1 additionally obtained via the FixOurFood research programme, as this research began prior to the start of my PhD. Consent was obtained from participants before taking part in the research, and again before publication of any papers arising from the research, where contributions to the research were made clear following the CRediT framework (Brand et al., 2015) (see Appendix 4).

Chapter 2: What orientation is needed for transformation?

Despite growing calls for transformation to address global crises, there has been limited clarity on the kinds of future orientations that would encourage genuinely transformational change, rather than relatively superficial, marginal reform of existing systems (Camrass, 2020; Gibbons et al., 2018), limiting the potential of such orientations to widely influence policy and practice. This chapter of the thesis therefore addresses the question: ‘What orientation is needed for transformation?’ The chapter examines what a radical future orientation for transformations – regenerative systems – might look like, setting the scene for addressing questions about the kinds of evaluation needed to support desired transformations (Chapter 3).

Perspective

The Regenerative Lens: A conceptual framework for regenerative social-ecological systems

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SUMMARY

Societies must transform their dynamics to support the flourishing of life. There is increasing interest in regeneration and regenerative practice as a solution, but also limited coherent understanding of what constitutes regenerative systems at social-ecological scales. In this perspective we present a conceptual, cross-disciplinary, and action-oriented regenerative systems framework, the Regenerative Lens, informed by a wide literature review. The framework emphasizes that regenerative systems maintain positive reinforcing cycles of wellbeing within and beyond themselves, especially between humans and wider nature, such that “life begets life.” We identify five key qualities needed in systems to encourage such dynamics: an ecological worldview embodied in human action; mutualism; high diversity; agency for humans and non-humans to act regeneratively; and continuous reflexivity. We apply the Lens to an envisioned future food system to illustrate its utility as a reflexive tool and for stretching ambition. We hope that the conceptual clarity provided here will aid the necessary acceleration of learning and action toward regenerative systems.

INTRODUCTION

Transformations across societies—for better or worse—are inevitable given the scale, pace, and depth of environmental and social change.¹ Some of these deep structural changes will be imposed upon us as impacts of climate and other biophysical change accrue, while other, more desirable transformations may emerge if humanity stewards change toward new social-ecological patterns.¹

In this context, “sustainability” is a commonly stated goal for desired transformations.² Sustainability is typically referred to as finding ways to live today that do not compromise the wellbeing of future generations.² It has been strongly argued, however, that mainstream approaches to sustainability are inadequate. These approaches typically focus on reducing

anthropogenic harm to acceptable levels, such as through improving efficiency (e.g., “net zero” carbon targets), which is deemed too incremental and superficial given that we have already transgressed planetary thresholds.^{3–10} Moreover, sustainability often fails to challenge the underlying drivers of current crises, such as capitalism, commodification, and worldviews where humans are viewed as separate from nature.^{4,6,11–13} New framings and approaches are therefore urgently required to guide more radical transformations.⁴

An alternative approach gaining traction worldwide, encouraging rapid and deep change, is to strive for “regenerative” practice, dynamics, and systems.^{4,5,13–15} Broadly speaking, regenerative social-ecological systems—regions, economies, cities, businesses, communities, and so forth—can be defined as those that maintain positive reinforcing cycles of wellbeing



within and beyond themselves, especially between humans and wider nature.⁴ At its most basic semantic level, something regenerative has a capacity to exist or be created again (deriving from the Latin *regenerare*, “create again”).¹⁶ A regenerative dynamic has also been summarized as “life creates conditions conducive to life,”¹⁷ in which humans are “participating as nature” to support continued co-evolution of the biosphere.⁴

The concept of regenerative systems has long-established philosophical underpinnings, including from Indigenous, Eastern, and Western thought,³ and is still embodied in practice in certain (especially Indigenous) cultures and communities around the world,¹⁸ such as the “good living” approaches of Māori and Quechua peoples.¹⁹ However, regenerative approaches for social-ecological systems are still relatively unfamiliar (or forgotten) in Western societies, and embodying regenerative principles is challenging for newcomers because it requires fundamentally altered ways of thinking, acting, and relating between people and planet. A critical task facing humanity is thus to accelerate learning about transitioning to regenerative systems at a scale, pace, and depth that match those of global crises.

Academic fields drawing on regeneration concepts at social-ecological scales include agriculture, business, economics, and education (Table 1). Regenerative social-ecological systems (which we use interchangeably with “regenerative systems” in this paper) are closely related to other concepts and practices including living systems theory, Gaia theory, ecoliteracy, deep ecology, agroecology, permaculture, biodynamics, biophilia, biomimicry, and holistic management,^{5,13,17} and resonate with many “new economics” approaches aiming to replace the hegemony of neoliberalism, such as eco-feminism.^{8,20,21} Regenerative systems are thus inherently normative and political (particularly in defining human wellbeing) but also built upon fundamental properties of life, as we explore in more detail later on.

The literature often views designing for regenerative systems as a transformational solution to interlinked environmental and social crises, such as climate change and wealth inequality.^{22,38} Regeneration is positioned not only as the antithesis of contemporary societies’ extractive and exploitative activities but also as going well beyond mainstream solutions (e.g., sustainability) in terms of the depth of change advocated, including transformation of worldviews.^{3–13} In particular, regenerative approaches are underpinned by more holistic and mutualistic relations between people and wider nature.^{3,4} Regenerative approaches are also seen to encourage more positive, creative visions and narratives to guide action.^{5,51} This is in contrast to the common societal focus on difficulties of transformation or the threat of dystopian futures, which risks creating a self-fulfilling prophecy and encouraging denial, paralysis, and defeatism.^{3,34,51} Regenerative systems have thus been explored across diverse disciplines as systems that transcend the dynamics of current systems and traditionally advocated solutions.

An increasing number of initiatives and organizations are beginning to put regenerative thinking into practice.¹³ They include: place-based initiatives at local or regional levels, such as towns in the Transition Network or Brazil’s Ecovida network; the “regenerative culture” of care within the global campaign movement Extinction Rebellion⁵²; efforts of more mainstream

organizations exploring what regenerative businesses and economies might look like, such as the World Business Council for Sustainable Development⁵³; whole sectors starting to examine how transformations to regenerative dynamics can be enabled, such as the Regen10 initiative and Regeneration International organization in global food systems; and other new organizations springing up to help cohere or support others to enact regenerative principles, such as the Capital Institute,⁵⁴ Doughnut Economics Action Lab (DEAL), FixOurFood,⁵⁵ Forum for the Future,⁵³ Future Stewards, H3Uni, Positive, Regenerative Communities Network, Regenesys Institute, Regeneration Organization, the Royal Society of Arts,⁵⁶ and many others. Concurrently, regenerative systems are also gaining prominence in accessible non-academic texts spanning fields from business to cultural renewal.^{5,57–60}

Despite the potential for a regenerative framing and approach to overcome many of the challenges facing people and the planet, two important challenges remain. First, the growing body of literature around regenerative systems remains relatively disparate, with few attempts to conceptualize regenerative systems in ways that cut across multiple disciplines and scales to reflect on broader themes. While pluralistic approaches to regenerative systems are not necessarily problematic, a lack of coherence and clarity risks the concept being co-opted for greenwashing^{22,38,61} and then limits understanding about the actions needed to encourage truly regenerative systems. In particular, there is often vagueness in existing explanations of outcomes and dynamics of regenerative systems and how they differ fundamentally from problematic current systems. Conceptual clarity around these aspects is especially important because outcomes of attempts to support transformation will be a reflection of how radical our visions of desired futures are, and therefore how transformative our actions are likely to be.⁶² The focus on dynamics then brings attention to how such outcomes are being realized, and therefore whether or not a system is achieving desired outcomes without also fundamentally changing the underlying nature of the system.¹

Second, although the number of heuristics and tools for designing, identifying, and evaluating regenerative systems is growing, there is a lack of frameworks focused on regenerative systems in a broad sense (e.g., not focused only on the built environment,⁶³ businesses,^{53,64} economies,^{31,54} or development^{65,66}) that remain accessible while being underpinned by a rich global body of knowledge, and whose primary aim is to enhance communication and stimulate conceptual change in order to guide practice toward radically different futures, rather than validation, prediction, or explanation.^{67,68} Addressing these two challenges is necessary if learning is to be accelerated about how to support wider societal transformations to fundamentally new kinds of futures.

In this perspective, therefore, we present a conceptual cross-disciplinary regenerative systems framework, the Regenerative Lens, informed by a wide literature review. The framework emphasizes that regenerative systems maintain positive reinforcing cycles of wellbeing within and beyond themselves, especially between humans and wider nature, such that “life begets life.” We identify five key qualities needed in systems to encourage such dynamics: an ecological worldview embodied in human action; mutualism; high diversity; agency for humans and

Table 1. Regeneration concepts in different fields of study at the scale of social-ecological systems

Field	Regeneration in context	References consulted
Agriculture	Regenerative agriculture, closely related to agroecology, permaculture, and biodynamics, “explicitly focuses on creating reciprocal relationships between ecological, social, cultural, and spiritual components in social-ecological communities to grow all forms of capital while expressing the essence of each person, farm, and place,” ⁷ with particular focus on enhancing soil health. Some definitions of regenerative agriculture focus more on outcomes (e.g., carbon sequestration), while others focus more on practices (which often include zero or low tillage and livestock-arable integration). ²² Some interpretations place more emphasis on the support of human wellbeing (e.g., in farming communities) and political activism aspects (thus aligning more toward agroecology), with regenerative agriculture inseparable from redressing land enclosure and racism ^{23,24}	Gibbons, ⁷ Duncan et al., ¹⁸ Newton et al., ²² Schreefel et al., ²⁵ Lal, ²⁶ Titttonell et al., ²⁷ Carlisle, ²³ Penniman ²⁴
Business	Application of ideas from regenerative design, regenerative development, regenerative sustainability, and stewardship theory to business, such that regenerative businesses adopt a systemic view of the world and their place in it and ensure profits produce rather than reduce socio-environmental wellbeing: they “enhance, and thrive through, the health of social-ecological systems in a co-evolutionary process.” ²⁸ Regenerative or ecocentric entrepreneurship includes treating nature as an enabling partner from which entrepreneurs learn and find creativity ²⁹	Caldera et al., ³⁰ Hahn and Tampe, ²⁸ Vlasov ²⁹
Design	Regenerative design adopts a holistic perspective that is biophilic, biomimetic, participatory, and closely tied to the uniqueness of particular places, aiming for co-evolution between humans and the rest of nature. Applied in architecture and urban planning but in also other areas and design of societies and futures more generally	Camrass, ³ Reed, ⁴ Wahl ⁵
Development	Regenerative development uses a place-based systems thinking approach to actively generate positive, co-evolutionary, ecological, and social outcomes from development, particularly via feedback between them. It recognizes the importance of positive feedback between inner (paradigm) and outer dimensions of sustainability. ⁷ Sometimes seen as similar to, or an application of, regenerative sustainability. “Regenerative community development” builds on regenerative development by focusing on communities as nested and networked building blocks of nature and societies ⁷	Gibbons, ⁷ Caldera et al. ³⁰
Economics	Regenerative economics framings (including regenerative capitalism) emphasize a variety of different principles and practices, including the need to go beyond traditional sustainability approaches, using dynamic systems approaches, resource circularity, understanding wealth holistically, encouraging adaptability and diverse collaboration, and transdisciplinary education and advocacy. ^{7,8} Some have conceptualized regenerative economies as mimicking the structure and dynamics (including self-renewing properties) of natural ecosystems, including: a balance between efficiency and resilience (e.g., from a diversity of organizations and roles) that means strong resource flows can be sustained into the future; high levels of mutualism; and continuous learning ³¹	Gibbons, ⁷ Shannon et al., ⁸ Fath et al., ³¹ Fullerton ³²
Education	Various concepts of regenerative learning, education, and creativity, and education for regenerative futures. Pedagogy for regenerative futures is constantly evolving and embraces connectivity between the human and more-than-human, and ambiguity. Teachers create conditions for the emergence of creativity and mutualism, including transdisciplinarity and finding inspiration from nature, drawing especially on ideas from regenerative design. Students are not just taught about environmental crises but are also given the wisdom and skills to encourage regeneration and flourishing of life. Sustainability education is decolonized and recentered on Indigenous histories, concepts, and wisdom ³³	Armon, ³⁴ Hauk, ³⁵ King, ³⁶ Wooltorton et al. ³³

(Continued on next page)

Table 1. Continued

Field	Regeneration in context	References consulted
Food systems	Regenerative food system concepts draw on many other fields such as regenerative agriculture and regenerative design and consider a wide variety of aspects including food production, food waste, entrepreneurship, finance, governance, livelihoods, and technology. Some suggested principles of regenerative food systems include: acknowledging and including diverse forms of knowing and being; taking care of people, animals, and the planet; moving beyond capitalist approaches; commoning the food system; promoting accountable innovations; and long-term planning and rural-urban relations. ³⁷ Relocalizing foodsheds is often a primary goal, and food democracy/sovereignty, shifting consumer worldviews, and elevating Indigenous food systems are also important aspects. ⁷	Gibbons, ⁷ Duncan et al., ¹⁸ Anderson and Rivera-Ferre, ³⁸ Loring, ³⁹ Dahlberg ⁴⁰
Governance	“Regenerative governance” modes include holacracies and sociocracies, which mimic the living system characteristics of modularity, subsidiarity, nestedness, and feedback. ⁷ Traditional hierarchical management is replaced by a more self-managing model, with authority distributed across all employees in an overlapping hierarchy of roles and domains of work, decisions by mutual consent, and continuous feedback. ⁷ There are many other suggestions of governance models and methods applicable to regenerative (e.g., food) systems, such as cooperatives and commons	Gibbons, ⁷ Duncan et al., ¹⁸ Fath et al., ³¹ Bronson ⁴¹
Nature conservation	Assisted natural regeneration accelerates ecological processes to reach desired restored states for ecosystems (overlaps with regenerative agriculture)	Lohbeck et al. ⁴²
Organizing	Closely related to ideas about regenerative business, regenerative organizing is “the process of sensing and embracing surrounding living ecosystems, aligning organizational knowledge, decision-making, and actions to these systems’ structures and dynamics and acting in conjunction, in a way that allows for ecosystems to regenerate, build resilience and sustain life.” ¹³ Regenerative organizations seek to help local places flourish, and their leadership embraces the ambiguities and paradoxical nature of place-based tensions, thus making them opportunities for reflexivity and creativity rather than merely conflicts. ^{28,43}	Muñoz and Branzei, ¹³ Slawinski et al. ⁴³
Sustainability	Regenerative sustainability aims “to address the dysfunctional human-nature relationship by entering into a co-creative partnership with nature to restore and regenerate the global social-ecological system through a set of localized ecological design and engineering practices rooted in the context and its social-ecological narratives.” ⁴⁴ It emphasizes collective constructivist processes of reflection and visioning, with a holistic worldview	Camrass, ³ Gibbons, ⁷ Hes and du Plessis ⁴⁵
Tourism	Regenerative tourism aims to fulfill the potential of local tourism localities, including their environments and communities, to flourish, rather than extracting economic wealth to be distributed elsewhere. It achieves this via a holistic systems approach, weaving Indigenous and Western science knowledge, seeing nature as teacher, encouraging care, collaboration, and continuous reflection, learning and evolution, and fostering the agency of local actors. Tourism systems are regarded as inseparable from nature and obligated to respect Earth’s principles and laws	Bellato et al., ⁴⁶ Dredge ⁴⁷
Urban studies	“Urban regeneration” has many different interpretations, but is often related to the development of a “run-down” urban area to improve socio-economic conditions. ⁴⁸ A neoliberal interpretation focuses on creating financial wealth and individual freedom via market liberalization. ⁴⁹ Ideas about “regenerative cities” include adopting a more holistic, social-ecological perspective of the city in its environment and enhancing the health of cities’ hinterland ecosystems ⁵⁰	de Magalhães, ⁴⁸ Sager, ⁴⁹ Fayed et al. ⁵⁰

non-humans to act regeneratively; and continuous reflexivity. We apply the Lens to an envisioned future food system to illustrate its utility as a reflexive tool and for stretching ambition—and ultimately, we hope, to aid the necessary acceleration of learning and action toward regenerative systems. In the sections that follow, we first describe our methodological approach and assumptions before describing the different aspects of the Regenerative Lens framework and its application. We finish by discussing the Lens in a broader context and suggest some next steps for regenerative systems research.

METHODOLOGICAL APPROACH AND ASSUMPTIONS

Our overall approach to developing the Regenerative Lens was shaped by our motivation to create a reflexive tool,⁶⁹ or an “orienting heuristic” akin to the Three Horizons framework for designing transformative change,⁷⁰ rather than to aim at generating new theory or providing quantitative indicators for evaluating regenerative systems. There is abundant pre-existing theory on aspects of regenerative systems as well as important efforts to develop quantitative (and qualitative) indicator frameworks, including for regenerative economies³¹ and regenerative development.^{65,66} Conceptual constructs such as our Lens may instead have value in improving communication and stimulating conceptual change to guide practice, especially for those entirely unfamiliar with this way of thinking, rather than (or in addition to) validation, prediction, or explanation.^{67,68} The “lens” metaphor is relevant because the framework’s primary intended use is as a figurative lens through which to envision radically different futures, evaluate existing visions, and reflect on one’s action in the world.

With this overall purpose in mind, three key assumptions further informed our approach. First, we considered it valuable to distill insights from diverse disciplines to develop the Lens. Our framing of social-ecological systems is inherently broad and inclusive. Social-ecological systems—themselves “living systems” characterized by the special properties of life⁷¹—are based around humans and wider nature as interdependent interacting entities.⁷² Although regenerative system concepts in other disciplines (e.g., physiology or electrical engineering) may share thermodynamic or living system properties with regenerative social-ecological systems, we focus on more social contexts in this paper. We used an integrative review methodology, which is appropriate for synthesizing disparate information from different fields, to generate new insights and perspectives (but not to comprehensively and systematically review all available literature).⁷³ We reviewed regeneration literature in diverse fields (Table 1) and other literature, using inductive thematic analysis⁷⁴ to identify major themes. We combined literature synthesis with our own conceptual reasoning and some of the authors’ practical experience in facilitating regenerative initiatives (I.F. and B.S.). This integrative method was considered important because there are particular challenges in creating frameworks of concepts of which we have limited experience, and more inter- and transdisciplinary approaches could be vital in helping us to go beyond the limits of our language and current metaphorical ways of understanding things.⁷⁵ Moreover, there is a growing volume of available information about regenerative systems and therefore a concomitant need to consolidate this

information to understand its essence, especially for scholars new to regenerative fields, in a way that increases information accessibility and mitigates information overload.⁷⁶

Second, we considered it valuable to focus on dynamics and outcomes of regenerative systems in our framework. This is not only because we found these aspects typically underdeveloped elsewhere, but because (as we previously highlighted) they are fundamental to encouraging transformatively different futures. A system might produce desired outcomes, but these are likely to be short-lived if they still arise from degenerative dynamics that erode the system’s resilience. If, however, there is a focus on fostering radically different system dynamics with a more beneficial directionality for people and planet, desirable outcomes are likely to be more sustainable in the long term, and the framework could generate more useful insights about how certain practices would more effectively support emergence of regenerative systems.

Third, we aimed for an optimal level of simplicity in designing the framework. In some of the authors’ experience as facilitators, an orienting heuristic with more than about 4–5 distinct elements of the same broad type, such as principles or qualities—even though each element may be rich in underlying detail—is difficult for participants to take in and feel connected to without in-depth exploration. Existing regenerative frameworks often contain relatively large numbers (ca. 8–10) of principles.^{31,32,56} We therefore aimed for a level of simplicity that also preserves important essences of the complexities involved more appropriate to what the human brain has evolved to understand⁷⁷ and does not preclude nuances in particular cases of application.

Overall, the Regenerative Lens resulting from this approach is valuable as an accessible heuristic (while remaining grounded in a rich body of conceptual and empirical literature—indeed, a breadth of synthesis of regenerative ideas hitherto unattempted) that can be used in a wide range of contexts to push ambition, imagination, and transformative intent in envisioning, and therefore action toward, better futures. In the following sections we present the Regenerative Lens framework, which explains the outcomes expected of a regenerative system and the underlying qualities, dynamics, and practices that support emergence of these outcomes.

OUTCOMES OF REGENERATIVE SYSTEMS

Ecological outcome

To be considered regenerative, a system—e.g., a company, city, or bioregion—would maximize the ability of Earth’s biosphere to build, maintain, repair, and reproduce itself, as well as adapt and evolve, such that it retains its integrity over time (Figure 1). This ability might be called the “liveness” of life⁷⁸ and is underpinned by living systems’ distinctive thermodynamic behavior. As “dissipative systems” far from equilibrium and exchanging substantial energy flows with their environment,^{31,79,80} living systems locally overcome the universe’s general tendency toward increasing entropy (roughly speaking, the inaccessibility of a system’s energy for doing useful work) as described by the Second Law of Thermodynamics.^{81,82} Living systems actually decrease local entropy, which often corresponds to an increase in apparent “order.”^{81,82} Life thus avoids “heat death” or “entropic death,” an equilibrium where no further energy flow and change in state

are possible.⁸³ Furthermore, living organisms maintain some structural consistency over time thanks to the information preserved in DNA or RNA, enabling them to regenerate parts or all of themselves following damage, decay, and reproduction.^{84,85} Even an individual organism's death does not preclude regeneration of its structure, assuming it has already passed on its genes.

To maximize lifeness across ecosystems, a general principle is the need for balance between efficiency (equivalent to the removal of entropy-increasing friction⁸⁶) and resilience (interpreted here as the capacity to maintain functioning and adaptability in a changing environment), and the system characteristics producing them (e.g., relating to component size, specialization, and connectivity), as they often trade off against each other.^{31,87} This balance is typically observed in ecosystems under natural selection and results in flows (of, e.g., energy, carbon, nitrogen) being maximized while remaining resilient.^{81,87} Large size and low connectivity (e.g., of species or organisms in food webs) would be expected to typically result in higher efficiency and lower resilience, with small size, high functional specialization, and high connectivity associated with lower efficiency and higher resilience.^{31,87}

The ecological outcome of regenerative systems is thus about maximizing life's inherent capacity to sustain its organization, productivity, and resilience,⁸⁸ which includes a sufficient level of biological diversity and complexity as well as efficiency of resource flows. This contrasts starkly with the present day, in which human activity has reduced both efficiency and resilience of energy flows in ecosystems by eroding wild biomass (especially of the largest animals and plants) and biodiversity, dramatically reducing regenerative potential.^{87,89,90}

Human outcome

A regenerative system would also take a holistic view of human wellbeing in which everyone's full suite of needs is met and ongoing human cultural and intellectual evolution is enabled (Figure 1). Humans have a sophisticated and, some suggest, universal set of needs, as illustrated by many specific frameworks including Maslow's hierarchy,^{30,91,92} eudaimonic wellbeing,⁹³ Sen's capabilities,⁹⁴ human-scale development,⁹⁵ eco-cultural health,⁸⁸ and many others.^{96–98} We have basic material needs, including air, water, food, and shelter, which must be met to avoid death. However, we also have intangible needs, including love, belonging, and meaning, without which we typically enter a negative emotional state.⁹² In Maslow's hierarchy, the highest needs are self-actualization (fulfilling one's potential) and finally self-transcendence.⁹¹ Other holistic health frameworks highlight extensions to more relational, subjective, and emancipatory aspects of wellbeing, including our interactions with other objects, organisms, and patterns (e.g., links between food and culture, socialization, livelihood and identity, and the importance of wider ecological health for human health), and having agency and empowerment to lead meaningful lives.^{88,94,96,97} Emphasis on such higher-order needs alongside basic needs sets regenerative approaches apart from others with narrower accounts of human dignity and personhood.^{30,99}

Similar to the ecological outcome described above, a balance between efficiency and resilience of anthropogenic resource flows (e.g., food, money, and ideas) is also key to meeting human needs and enabling cultural and intellectual evolution.^{31,87} For

example, a balance between large efficient elements (e.g., multinationals) and smaller, less efficient elements (e.g., local contractors) is needed to distribute resources (e.g., finance) in inclusive ways across economies, mimicking other structures found in nature.³¹ However, today's societies exhibit many examples of over-prioritizing resource flow efficiency at the expense of resilience and continued evolution. In this context, resilience includes “transformative resilience” or maintaining the capacity for transformation.⁵ Examples include: our financial systems dominated by a handful of large organizations, whose “brittleness” contributed to the 2008/2009 financial crisis³¹; huge increases in agricultural yield efficiency during the industrial era but a tendency toward monocultures that often have lower resilience in the face of shocks¹⁰⁰; and extreme rates of information flow globally leading to “information overload”⁸⁶ and “ossification of canon” in scientific fields where potentially revolutionary ideas become lost in a huge sea of information.¹⁰¹ Conversely, flow efficiency is insufficient in many cases (e.g., in terms of wealth distribution), contributing to the fact that our societies are increasingly failing to meet even the material needs of billions of people.^{6,39,102} A regenerative system, in contrast, would manage resource flows in ways that balance efficiency and resilience, and thus enable fulfillment of needs and ongoing evolution in human cultures over the long term.

Interdependent outcomes

The desired outcome of regenerative systems is not only ecological and human regeneration but also a mutually reinforcing dynamic between these.⁴ This is an important example of a more general dynamic needed in regenerative systems: the mutual reinforcement between regeneration of a system in question (“internal regeneration”) and regeneration of the wider system it sits within (“external regeneration”) (Figures 1 and 2).

A fully regenerative system would be both internally and externally regenerative (Figures 1 and 2). For a person, internal regeneration might involve supporting one's individual needs while external regeneration could be positively supporting the social and ecological conditions of one's home community, which in turn supports one's internal regeneration. A fully regenerative farm would not only employ practices that advance the farmer's economic needs and regenerate soils and ecosystems on which the farm directly depends but also regenerate wider social and ecological environments, e.g., by boosting pollinator populations and acting as a hub for community interaction, which in turn support the farm. A fully regenerative business would not only focus internally on regenerative outcomes for its employees but also externally for wider society and ecosystems. Moreover, those wider social and ecological environments (e.g., communities, politics, finance systems) must be aligned to the regeneration of the person/farm/business in question, since all systems are internally self-organizing by using external gradients; otherwise, a system risks being “self-sacrificing” and burning out (Figure 2).

In the particular internal-external case of human regeneration and wider ecological regeneration, humans' active participation with the environment helps ecosystems to regenerate their own health and, therefore, human health^{4,34,88,98} (Figure 1). Ecosystems fulfill a wide array of human needs, including by providing food, materials, carbon sequestration, water purification,

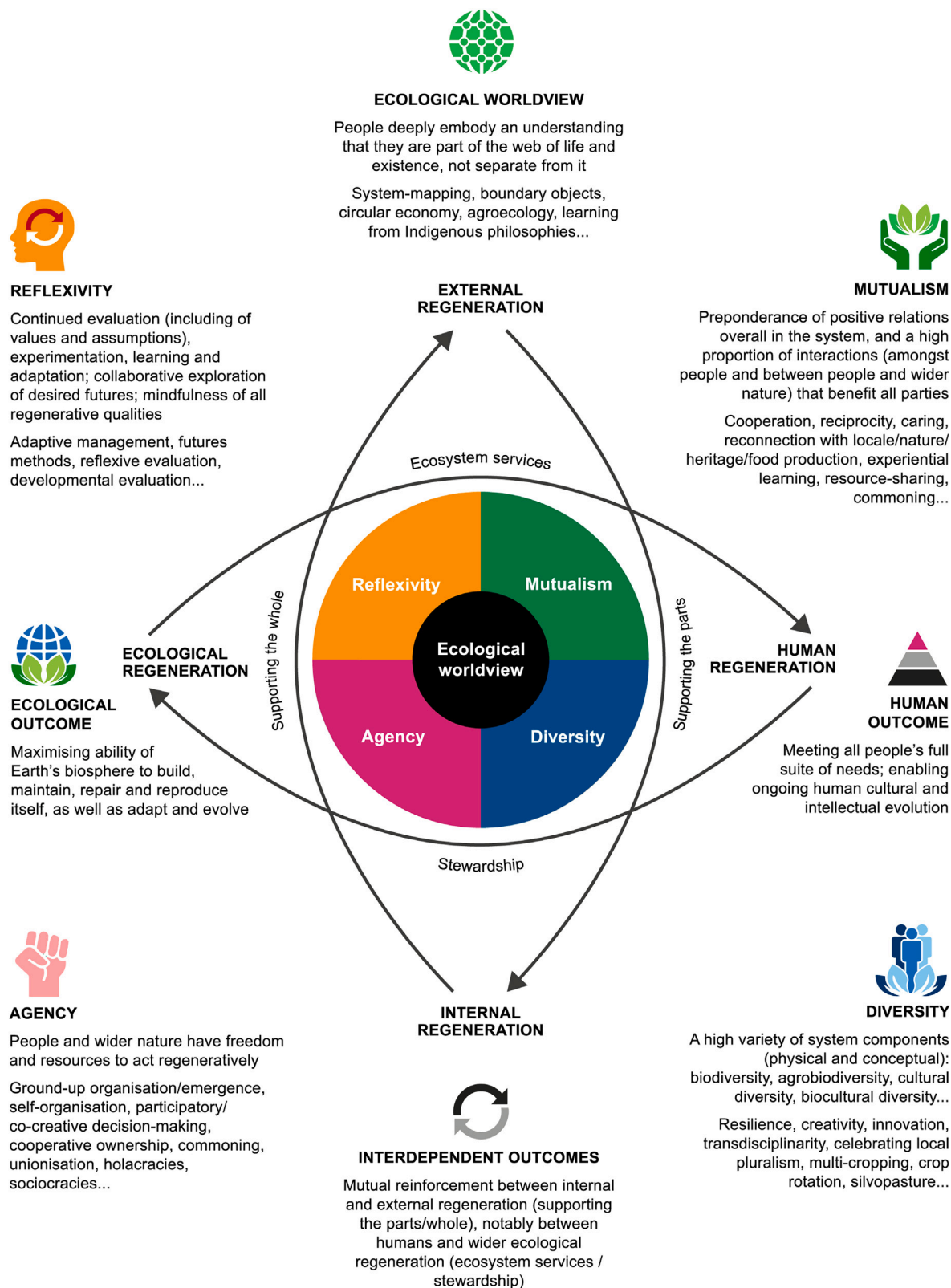


Figure 1. The Regenerative Lens framework

Summary framework of the Regenerative Lens, based on the structure of a human eye. The horizontal and vertical arrowed "outlines" of the eye represent the mutually reinforcing dynamics that characterize the outcomes of regenerative systems, with details given in the text outside the eye to the west, east, and south.

(legend continued on next page)

recreation, and spiritual meaning.¹⁰³ The term “ecosystem services” is commonly used to describe this relation¹⁰³; we use the term as a shorthand in our framework (Figure 1), recognizing that although it has received critique, e.g., for encouraging exploitation, anthropocentrism, and commodification, it can also encapsulate other values and ontologies that align more to a regenerative approach.¹⁰⁴ Reciprocally, ecosystems need a degree of human stewardship, as recognized by many Indigenous peoples^{34,98,105,106} (Figure 1). Although a stewardship approach would be humble enough to recognize that ecosystem regeneration is often more effective when unassisted by humans,¹⁰⁷ it also acknowledges that ecosystem health may, at least initially, need help to kick-start positive reinforcing cycles.⁴ As environmental health improves, nature’s integration into human self-identity can be enhanced, further encouraging pro-environmental and pro-social behavior in a virtuous cycle.¹⁰⁸

If a system lacks these dynamics, it risks losing its integrity (Figure 2). This is illustrated by our current extraction and pollution of the environment jeopardizing ecosystem services (e.g., due to biodiversity declines)¹⁰⁹ and driving degenerative reinforcing cycles. These cycles include the reactionary, short-term responses to human-exacerbated crises such as the COVID-19 pandemic that focus on meeting more immediate human needs (important though these are) at the expense of environmental stewardship,¹¹⁰ and environmental degradation reducing humans’ self-identification with nature, which weakens pro-environmental and pro-social behavior.¹⁰⁸ Moreover, much human activity today is externally degenerative and either internally regenerative (“self-centered”), such as polluting businesses that treat their employees well, or internally degenerative (“fully degenerative”), as illustrated by the worsening mental health and mounting human death toll from anthropogenic climate change or the dramatic loss over the last half-century of human cultural (e.g., language) diversity and viability and associated knowledge and practice of maintaining healthy ecosystems, which also threatens the regenerative capacity of wider ecosystems^{111–115} (Figure 2). Fully regenerative futures, meanwhile, would be built around the reciprocal support between internal and external regeneration and, notably, between human and wider ecological regeneration.

FIVE KEY QUALITIES FOR ENABLING REGENERATIVE SYSTEMS

In distilling our knowledge and research on regenerative systems, we identified five key qualities, along with their associated dynamics and practices, which support the achievement of regenerative outcomes (Figure 1).

Ecological worldview

Of foundational importance to enabling regenerative systems is an “ecological worldview,”³ whereby people deeply embody an understanding that they are part of a complex web of existence (including the rest of life) and not separate from it.^{3,38,116,117} This worldview, aligning with much Indigenous

thought globally (such as “good living” philosophies),^{19,34,118} views the world as nested interacting holons (wholes that are also parts) in a holarchy.^{119,120} Without it, approaches and actions are likely to fall back on reductionist and siloed thinking, e.g., as often characterize sustainable development,³ and egocentric notions of humans and human societies separate from nature.⁵ This risks both human and ecological degeneration but also failure to maximize reinforcing regenerative cycles arising from human-ecological relations. Embodying an ecological worldview means that all actions—from production of food, energy, and materials, to financial transactions, to our reproductive decisions (for those with the agency to make such choices)—are performed with awareness of, and in ways that nurture, the positive interdependencies previously described.

An ecological worldview might be encouraged by collaborative efforts to map or otherwise visualize the internal and external system and how they affect each other, with a long-term lens.³⁰ For example, DEAL’s Doughnut Design for Business tool encourages businesses to reflect on how they impact, and are impacted by, the sectors of the “doughnut” that represents the safe and just living space for humanity.¹²¹ Discussions about “boundary objects”—objects that inhabit and foster coherence across multiple intersecting social worlds¹²²—could be similarly beneficial. Furthermore, established economic approaches such as cosmocalism and the circular economy could be useful routes into developing an ecological worldview. Cosmocalism honors local communities as key social units while recognizing their position and role in a global network of sharing resources in a commons, thus transfiguring local-global relations.¹²³ The circular economy, meanwhile, reconceptualizes something traditionally treated as a negative externality (waste) as something that can regenerate production (both internally and externally), contributing to Earth’s cyclical processes of life.^{30,124,125} There are many innovative examples of circular economy practice, from closed-loop vertical farms to “agro-parks” of factories operating in an industrial symbiosis, reusing one company’s waste stream as another’s inputs.¹²⁵ Regenerative agriculture offers examples, such as applying compost and manure rather than synthetic fertilizer and relying on natural pest control rather than pesticides.²⁵ However, circular economy approaches based on economies of scale and commodification may not fundamentally challenge the mindsets and power relations (e.g., relating to human-nature dualism) that regenerative systems aim to transform; smaller-scale, place-based, grassroots agroecological approaches may align more strongly with a regenerative system overall.¹²⁵ Finally, and importantly, there is much to learn from Indigenous philosophies, such as the Quechua people’s “Allin Kawsay” or Māori “Mauri Ora,” in developing more holistic perspectives.³⁰

Understanding the need for an ecological worldview and encouraging it is one thing; it is another to actually embody it so that it becomes a subconscious driver of how we do things. We are a long way from that. Nonetheless, the importance of this shift for enabling regenerative systems cannot be overstated, as the worldview underpins all other qualities.

The pupil and iris include the five key qualities of regenerative systems that support the emergence of regenerative outcomes, with details in the text outside the eye to the north, north-east, south-east, south-west, and north-west. These blocks of text include a brief definition of the quality (first paragraph) and examples of dynamics and practices associated with that quality (second paragraph).

	Internally degenerative	Internally regenerative
Externally regenerative	SELF-SACRIFICING • A social enterprise that burns out its employees • A regenerative farm forced to sell its land because its affordably priced produce brings in insufficient revenue • A martyr for a regenerative cause	FULLY REGENERATIVE • A country that becomes carbon-negative through ecosystem restoration and regenerative agriculture • A city that meets the needs of its citizens by restoring its hinterlands • A thriving farm that boosts biodiversity in the wider landscape and acts as a hub for community interaction • A social enterprise that nourishes society and (therefore) its employees
Externally degenerative	FULLY DEGENERATIVE • A society that extracts and burns fossil fuels, causing climate change and extreme weather that is increasingly deadly to the society's citizens • A country that starts a war with another country, killing people and crippling the economy on both sides • A predatory company merger or acquisition that reduces the value of both companies and leads to redundancies • A person whose addiction to a harmful drug also damages the person's social relationships	SELF-CENTERED • A country that invests in social infrastructure using profits from activities driving climate change and biodiversity loss • A business that pays and treats its employees well but pollutes the environment • Humanity prioritizing its own reproduction and population growth at the expense of millions of other species' reproduction

Figure 2. Examples of internally/externally regenerative/degenerative systems

Hypothetical examples of social-ecological systems that are internally and/or externally regenerative and/or degenerative.

Mutualism

Mutualism can be a quality of interactions between individual actors as well as an overall network. In the former case, it describes interactions between two or more actors that benefit all parties. In the latter, “network mutualism” describes the preponderance of positive over negative or neutral relations (e.g., exchanges of beneficial resources) in an ecosystem.¹²⁶ As illustrated by healthy natural ecosystems, regenerative systems would need relatively high network mutualism.³¹ This suggests an important role for individual mutualistic interactions, including cooperation (working toward a common goal) and reciprocity (returning favors), to enhance overall network mutualism. That is not to dismiss the importance of apparently non-mutualistic interactions (e.g., parasitism, predation, competition, altruism), as many result in “indirect mutualism”¹²⁶ that promotes overall ecosystem health. Such interactions (e.g., human removal of invasive species, or even human decisions to raise smaller families) might be particularly important in the shorter term as we navigate pathways toward regenerative systems. However, it is clear that societies must overturn the

prevalence of non-mutualistic, internally and externally degenerative dynamics (Figure 2), and place greater emphasis on mutualistic interactions—among humans and between humans and wider nature—if they are to develop regenerative systems. This is because in general, predominantly self-centered or competitive interactions risk external degeneration while self-sacrificing interactions risk internal degeneration (Figure 2).

Mutualism in regenerative systems is as much a shift in our perspective of how organisms interact as it is about how we choose to interact.⁵ It means moving from a narrow view of life founded on individualism and competition, developed from Darwinism and notions of the “selfish gene”⁵ (and which today often characterize the dominant global economic model of neoliberalism^{127,128}), to recognizing the importance of mutualistic relationships in the evolution and flourishing of life on Earth and humans' evolutionary success.³⁴ It also means moving from a blind focus on direct organism interactions to considering how all interactions, including indirect and non-mutualistic ones, contribute to an overall mutualistic and, therefore, regenerative system.^{31,126}

Mutualistic interactions require care for others as well as care to meet one's own needs. Encouraging mutualism therefore means encouraging care. An ideal place to start in inculcating a culture of care is grounding regeneration in local contexts and communities, from which wider responsibility can be developed. Everyone has a local context and typically a special care for it, connecting via cultural narratives—an ever-evolving “story of place” that honors and celebrates habitats, communities, buildings, history, and heritage.^{3,4,46,129,130} Similarly, it could be valuable to reconnect people with the production of their food.^{12,124} For example, local wild food foraging can facilitate people's connectedness to nature, which in turn fosters altruistic motivations.¹³¹ Even exposure to videos of nature can make us more cooperative.¹³² In education, caring and mutualistic relations could be fostered by encouraging understanding of how different cultural values shape both positive and negative human-nature relationships, providing experiential learning in nature, and embedding practical regenerative skills development in curricula.³⁴ Caring can also come simply from an enterprise's collective regenerative mission, increasing feelings of purpose, meaningfulness, and motivation in employees.³⁰ Antitheses of this ethic of care include mental and spatial distancing of workers from their work, and between food production and consumption (which typically accompanies commodification).^{12,124}

Between people, mutualism could also take the form of resource sharing. For instance, food sharing is a form of “social nourishment,” combating loneliness and strengthening social networks and community resilience.^{133,134} Networks of sharing common-pool resources can also powerfully express other regenerative qualities (see below). For example, sharing crop seeds can encourage crop genetic diversity and address dietary deficiencies in key nutrients¹¹ and increase agency by challenging corporate monopoly control of seeds.¹³⁵ Similarly, sharing knowledge about successful (e.g., agricultural) practice could involve use of digital technologies that resist corporate monopolization of data, as exemplified by small-scale networks of regenerative farmers built around commons of data sharing and open-source coding (e.g., sharing environmental farm data, mapping, and co-developing DIY soil sensors).^{41,136} Overall, resource sharing and connecting people with nature and local heritage could encourage mutualistic interactions, which should feature strongly in any regenerative systems' internal-external relations.

Diversity

Diversity refers here to the variety of system components, both physical and conceptual, quantitative and qualitative, ecological and human. Regenerative systems require high levels of diversity, including biodiversity, agrobiodiversity, cultural diversity, biocultural diversity, the degree of role specialization in society, and diversity of organizations such as businesses.^{11,31,40,35} Diversity makes important contributions to the resilience and other dimensions of regenerative system health.^{31,87,100,137} For instance, biodiversity in wider ecosystems is important for adaptation in the face of environmental perturbations, reducing negative impacts on people^{100,137}; cultural diversity reduces impacts of environmental shocks and stressors on human societies and holds repositories of knowledge (e.g., in language) about

sustaining humans and other life in many different environments^{88,98,138}; and diversity of organizations and currencies in financial systems may increase resilience against shocks such as financial crashes.⁸⁷ Biodiversity may even be autocatalytic, whereby diversification of species creates niches for more species to exist.¹³⁹ Diversity is also important for its direct contributions to human wellbeing (e.g., from experiencing biodiverse surroundings).^{11,140} Particular effort is needed to enhance and protect diversity¹⁴¹ because humanity is already more adept at increasing the efficiency of resource flows,⁸⁶ often at the expense of diversity.

An important manifestation of diversity in human regeneration is creativity, which facilitates cultural and intellectual evolution in a similar way to the genetic mutations that enable biological evolution.^{35,142} To counter global declines in creativity in young people,¹⁴³ exacerbated by education systems that restrict access to creative subjects,¹⁴⁴ creativity would need to be fostered by embracing transdisciplinarity, ambiguity, and awareness of the complexity and regenerative properties of nature (see also “reflexivity” below).³⁵ Creativity and other forms of diversity may be positively reinforcing: for instance, cultural diversity is suggested to play an important role in regenerating our imagination,¹³⁴ further enhancing opportunities for creativity.^{35,129}

Grounding regenerative systems in local stories of place, as described above, is one way in which diversity (e.g., cultural, biological, and biocultural) could be encouraged. This highlights the impossibility of a one-size-fits-all solution for enabling regenerative systems and that regeneration must instead co-evolve with its locale,^{6,46} revitalizing diverse local and Indigenous ways of knowing that include “good living” philosophies and traditional ecological knowledge.^{19,35,38,40,117,145}

Regenerative agriculture features many practices that aim to increase biodiversity, including multi-cropping, crop rotation, and silvopasture.^{25,26} A goal of soil-protecting practices in regenerative agriculture, for example, is to increase diversity of soil fauna and microbiota to improve soil structure.²⁶ On the social side of regenerative agriculture, which includes skill building and encouraging ingenuity and adaptability to new social and economic conditions,¹²⁹ a diversity of agricultural activities can enhance wider regenerative capacity in various ways.¹²⁹ In particular, the diverse social interactions in multi-functional landscapes can lead to synergistic knowledge sharing, innovation, and upskilling.¹²⁹

Agency

We interpret agency as having the freedom and resources to behave in a desired way. It is an important quality in regenerative systems because people and wider nature require agency—the freedom from oppression, and the energy, materials, time, and space—to act regeneratively. For people, this includes having control over their own livelihoods and opportunities to meet their immaterial and material needs, making choices they value while also working toward collective regenerative goals.^{5,31,38,117,136,146} Frameworks such as Sen's capabilities stress the essentiality of this kind of agency for human wellbeing.⁹⁴ This agency has been referred to as “autonomy through interdependence,” in contrast to self-interested autonomy-as-individualism or *homo economicus* that characterizes neoliberalism,¹²⁷ and is closely related to the concept of “food sovereignty” in

food systems whereby local communities control the governance of their own food system (rather than, say, globalized markets and corporations).¹⁸ Although our mainstream economic, political, and other organizational structures may empower people in some ways (e.g., by granting access to all the knowledge and social connection provided by the internet), in other ways they fall far short of the empowerment required in regenerative systems (e.g., by colonizing the land and sea that underpin local and Indigenous livelihoods). Similarly, the enclosure, colonization, privatization, commodification, and technological control of non-human nature that characterize mainstream economies are a far cry from the agency that nature deserves and requires in regenerative systems.^{6,124}

Behind the lack of agency granted by many human societies lies an inaccurate Hobbesian view of people as inherently selfish, violent, and in need of top-down control,¹⁴⁷ and an anthropocentric notion of nature as subordinate to people and in need of taming.^{6,148} That is not to dismiss the importance of top-down policymaking altogether, but enabling agency in regenerative systems requires greater trust in the inherent cooperative tendencies of human communities when given opportunities to self-organize¹⁴⁷ as well as trust in the self-organizing power of ecosystems. The core dynamic associated with agency in regenerative systems is therefore ground-up organization and emergence within supportive policy environments, both in human communities and non-human contexts, as opposed to dependence on more top-down control driven by markets and governments.³¹

Agency in regenerative systems would be reflected in governance structures, including cooperatives, commons, informal collectives of micro-enterprises, unions, holacracies, and sociocracies.^{6,7,31,41,135,136,146} Cooperatives exemplify regenerative modes of exchange whereby value generated is reinvested back into the cooperative, not accumulated by a small number of capital owners.¹⁴⁶ In any case, decision-making should be democratic, with place-based co-creative processes with community stakeholders being commonplace, encouraging discussions about conflicts in views as central to policy processes.^{3,116,149} Enterprises should flatten hierarchies within their organizational structure and ensure inclusive involvement of employees along with senior management in decision-making.³⁰ Holacracies and sociocracies have been suggested as regenerative governance models inspired by living systems for replacing traditional management hierarchies, featuring an overlapping holarchy of roles and domains of work, decisions by mutual consent, and continuous feedback,⁷ although these are still exploratory ideas.

Initiatives focusing on agency in regenerative systems, however, should beware of (possibly unintentional) perpetuation of injustices. For example, a commons in regenerative systems would transcend food banks, community fridges, and school breakfast clubs, where food donors and beneficiaries remain anonymous to each other and the food may be cheap and low in nutritional value.^{6,12} Although such initiatives may have short-term importance, they perpetuate dependency and marginalization without challenging the underlying system that creates such injustices and see food as little more than a political act.⁶ Food justice initiatives, such as farmers' markets, should also avoid becoming elitist and accessible only to richer people.¹² True food sovereignty might instead take the form of community urban farming.^{38,150}

At its heart, agency in regenerative systems is thus a matter of human and non-human justice, including the securing of future intergenerational justice and redress of historical injustice, which is associated especially with the colonialist practices of capitalism.⁶ A system arguably cannot be regenerative if it is not emancipatory and fails to right such injustice (e.g., if it exists on stolen land) or does not enable resource sovereignty. It involves a rebalancing of power dynamics, leveling up hierarchies between groups of people and between people and wider nature.⁶ In this way it is perhaps the regenerative quality most closely tied to ideas about equity and equality. It is key to regenerative systems because regeneration is intimately related to bottom-up, autopoietic forms of organization and network governance without dependence on top-down control, and the importance of freedom for human wellbeing.

Reflexivity

Reflexivity is a deeper form of reflection that continually re-evaluates the values and assumptions underpinning our actions.¹⁵¹ Although it includes continued and iterative experimentation, evaluation, learning, and adaptation^{30,28}—more post hoc, reflective forms of reflexivity—here we consider it to go further, additionally encompassing collaborative exploration of desired regenerative futures³ and also an active, present-moment awareness of the many dimensions of participation in regenerative systems (e.g., ecological worldview, diversity, mutualism, and agency). While being more obviously key to human learning, reflexivity is also a collaborative co-evolutionary quality occurring between humans and wider nature.^{3,28,29} For instance, regenerative entrepreneurs treat nature as an enabling partner from which to reflexively learn, adapt, and find creativity, while regenerative organizations reciprocally enhance the adaptive, evolutionary, and thus regenerative capacity of wider ecosystems.^{30,28,29} The constructivist practice of reflexivity contrasts with the instrumental rationality characterizing many traditional mechanistic approaches to sustainability.^{3,140}

Reflexivity is considered essential to supporting the emergence of regenerative systems for several reasons. Internal and external environments are constantly changing, so frequent reflexive practice is needed for a system to remain viable and to maintain focus, ambition, and motivation.³ This is particularly important today, when major shifts in our values are urgently required. Reflexivity is also key for embodying the regenerative qualities described in this perspective in how we act in the world. Participating in regenerative systems means remaining constantly attuned to and guided by these qualities. An absence of such reflexivity risks over-focusing on limited aspects of regenerative systems or only paying lip service to regenerative qualities.

A long-term regenerative system therefore requires a “learning community”³¹ that embodies deep reflexivity. This requires strong investment in education (notably, education that embraces Indigenous knowledge and encourages creativity and mutualism,^{34,35} as described above) and adaptive management that continually learns from nature and places.^{28,29,43} Regenerative enterprises should remain aware of system feedbacks and recognize that staying viable means continuous engagement with knowledge and innovation.³⁰ Futures thinking and methods, such as collaborative Three Horizons workshops (see [Box 1](#)),⁶²

Box 1. Background to our application of the Regenerative Lens to an envisioned future food system

The future vision to which our Regenerative Lens was applied is taken from a Three Horizons⁶² process run by FixOurFood (a £6 million 5-year research program funded by UK Research and Innovation's Transforming Food Systems Strategic Priority Fund⁵⁵), using surveys and online workshops with researchers and other stakeholders in the Yorkshire food system. FixOurFood aims to understand how to support transformation toward a regenerative food system in Yorkshire.⁵⁵ It focuses on three subsystems—agriculture, schools and early years settings, and food economies—and how they are connected. Three Horizons is a participatory futures practice and framework for convening conversations about transformative change, centered around three horizons of current challenges (the “first horizon”), desired futures (the “third horizon”), and action to support transformation (the “second horizon”).⁶²

Perceived challenges in the current Yorkshire food system include: the system is dominated by a relatively small number of large corporations, limiting agency at local scales to achieve major positive change; conventional farming methods focused on high yields that degrade the local and global environment; insufficient appreciation of food's importance in schools; siloed policy; and high levels of stress for people. The third horizon vision, in contrast, imagines a Yorkshire food system with high local diversity (e.g., of food businesses), agency, and self-sufficiency. The food system's priority is nutritious and sustainable food, with good practice rewarded by government and markets. Food system actors are well connected and engaged, and human and environmental wellbeing are high and increasing. See [Note S1](#) for details of the third horizon vision.

To apply the Regenerative Lens, we convened an online 1.5-h meeting of six FixOurFood researchers to interrogate the third horizon vision (integrated across all three subsystems), with a particular focus on the five key qualities for enabling regenerative systems (ecological worldview, mutualism, diversity, agency, and reflexivity), and asking where and how (1) the vision already aligns to the Lens and (2) alignment to the Lens could be strengthened. Participants were divided into two breakout groups, with each group addressing both questions for a single quality at a time. Responses were recorded in the collaborative online whiteboard Mural (<https://www.mural.co/>).

lend themselves well to such a learning community.³ Reflexivity can also be enhanced by evaluation methods used,³ such as Reflexive Monitoring in Action¹⁵² or Developmental Evaluation.¹⁵³ By making reflexivity a standard practice in our lives, our systems are more likely to maintain agile, co-evolutionary internal-external partnerships that enable adaptation to dynamic conditions, hopeful aspiration toward regenerative futures, and embodiment of regenerative qualities as we participate in regenerative systems.

THE REGENERATIVE LENS AS A WHOLE

When the framework's components are viewed as a whole ([Figure 1](#)), four important additional insights emerge. First, each quality contributes in an essential way to avoiding a system's long-term degeneration. For example, without mutualism and agency there could be no cooperative action in communities toward a common goal of a regenerative future. Similarly, without reflexivity we would struggle to shift worldviews underlying degenerative practice and keep systems viable in constantly changing circumstances. Without an ecological worldview a system is likely to focus on human and internal regeneration, with a continued effect of eroding the wider Earth system's capacity to support people.

Second, the five qualities are mutually reinforcing. For example: epistemic pluralism and creativity could be key to designing responses to system feedbacks, while reflexivity could in turn foster creativity; connecting with nature and locale to foster mutualism could also encourage a more ecological worldview; and mutualistic resource sharing can also enhance agency. Losing any one quality would thus have a disproportionate overall impact.

Third, the distinction between reaching and encouraging regenerative systems (i.e., outcome vs. process) is not clear-

cut. This is because a regenerative system's outcomes will never be static⁴³ but rather an ongoing dynamic of mutually reinforcing wellbeing and biological, cultural, and intellectual co-evolution. Regeneration is thus simultaneously a means and an end.³⁶

Finally, the framework uses system distinctions to encourage a conceptual shift but avoids dichotomies. Although the Lens's social-ecological, human-ecological, and internal-external framings do represent dualisms in a framework aiming to break down traditional dualisms, these are fuzzy and flexible boundaries that remain useful as distinctions rather than dichotomies in explaining regenerative concepts.⁷² In each case, the distinction retains the two entities as interactive, interdependent, and mutualistic, which helps to highlight the contrast with our current systems. This is not necessarily incompatible with recognizing indivisible aspects common to all life (whether defined biologically or spiritually). Moreover, the internal-external distinction encourages the user to progressively expand the scope of inquiry to bring increasingly larger systems into view and seek to transform them from degenerative to regenerative, similar to the Scope 1, 2, and 3 approach to cutting carbon emissions.¹⁵⁴ It also distinguishes the framework from common mainstream framings of resilience that focus on how a system can internally sustain itself in relation to external change without addressing the deeper causes of the external change.¹⁵⁵ In this sense our framework is closer to a multi-system model of resilience.¹⁵⁶

APPLYING THE REGENERATIVE LENS

We suggest that the Regenerative Lens could be useful for driving ambition and imagination to create new kinds of futures, maintaining transformational intent in change processes, and reflexively evaluating progress. Here we present an example of using the Lens to evaluate and stretch ambition in an envisioned future, in this case a future Yorkshire food system envisioned by

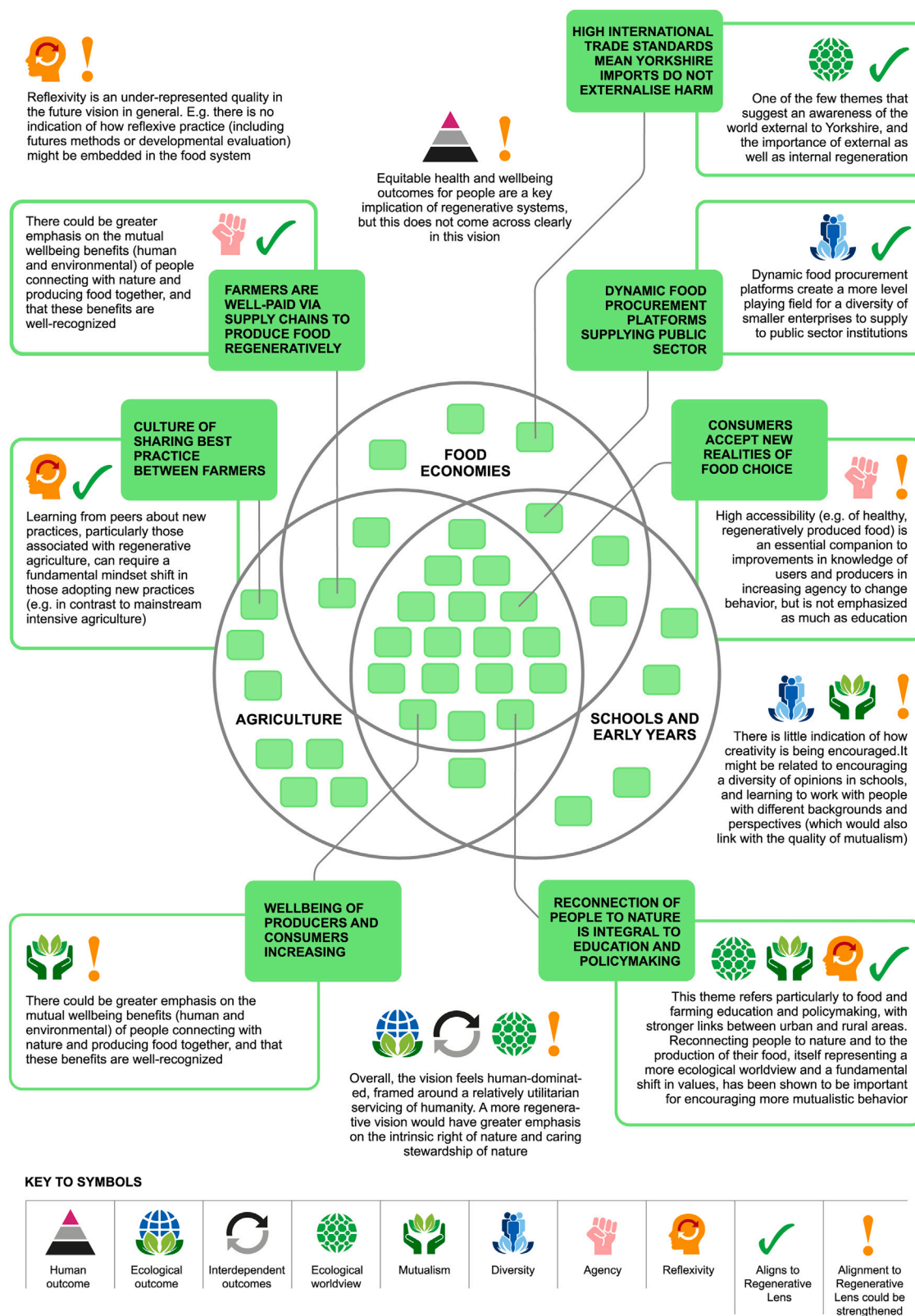


Figure 3. Applying the Regenerative Lens to an envisioned future

Visual summary report from applying the Regenerative Lens to an envisioned future food system. The central Venn diagram represents the whole vision. Each circle represents a subsystem (agriculture, food economies, and schools and early years settings). Each green rectangle is a Post-it note with the title of a theme in

(legend continued on next page)

FixOurFood⁵⁵ through a collaborative Three Horizons⁶² process with 113 food system stakeholders (Box 1 and Figure 3). Humans have considerable imaginative capacity but often struggle to envision genuinely different futures beyond their existing frames of reference.⁷⁵ The Regenerative Lens was therefore used by a group of researchers to stretch the vision. It helped actors to consider where there were existing regenerative qualities and dynamics in the envisioned future and what might need to be modified to give it a stronger basis in regenerative thinking (Box 1 and Figure 3).

There was already considerable inclusion in the envisioned future of regenerative qualities and dynamics. For example, an ecological worldview was suggested in relation to externalities of international trade, diversity was inherent in the theme about dynamic food procurement platforms supplying the public sector (which create a more level playing field for a diversity of smaller enterprises), and several regenerative qualities, including an ecological worldview, mutualism, and reflexivity, were considered to be reflected in the theme “reconnection of people to nature is integral to education and policymaking” (Figure 3). Nonetheless, there were also many opportunities where emphasis on regenerative qualities and dynamics could be strengthened to increase alignment to the Regenerative Lens. For example, the vision as a whole was considered overtly human-dominated, reflecting a utilitarian approach to nature. The vision also lacked clarity on: how creativity would be encouraged; the mutual wellbeing benefits of people connecting with nature and producing food together; equitable health and wellbeing outcomes; and how reflexive practice would be embedded in food system activity (Figure 3). Without greater consideration of these issues, the envisioned future then had less potential to support ambitious transformative action.

Participants gave positive feedback on the application exercise, notably how it helped them to reflect on their vision and consider more deeply interconnections between its different components. Thus, while developing a more structured, reproducible method for applying the Lens was outside the scope of this perspective, the framework did have significant value for the participants involved. Currently we are therefore learning how to apply the Lens more regularly, continuously, and collaboratively in futures-oriented work and in supporting transformational, reflexive forms of evaluation. Ultimately, a more ambitious vision based on regenerative principles makes actors more likely to engage in practices that give rise to regenerative dynamics.

DISCUSSION AND NEXT STEPS

Regenerative systems are a significant departure from dominant approaches focused on reducing harm to acceptable levels. Yet, so far, there has been little synthesis of the many disparate ideas about regenerative systems, limited clarity around regenerative outcomes and dynamics, and a lack of simple but powerful orienting heuristics for encouraging regenerative systems in diverse contexts. Our framework emphasizes that to be regener-

ative, a system—e.g., a person, family, community, or organization—cannot be regenerative on its own but only as part of a regenerative “ensemble” of interdependent social-ecological systems that are mutually supporting each other. To foster these dynamics and therefore the wellbeing and continued evolution of human societies and wider nature, a regenerative system would need the individual and mutually reinforcing contributions of five essential qualities: an embodied ecological worldview, mutualistic interactions, high diversity, agency, and reflexivity.

Our work confirms the ideas in various other regenerative frameworks.^{31,53,54,56,63–66} The particular value of the Regenerative Lens, however, is in the focus of its purpose as an orienting tool for encouraging reflexivity and ambition in futures processes in diverse contexts, along with its relatively broad, interdisciplinary approach. The framework’s structure is also in itself apparently a new way of conceptualizing regenerative systems, notably its emphasis on the dynamics of regenerative systems, with other aspects of the framework then situated within this foundation. These other aspects focus on regenerative qualities that explain deeper motivations for applying certain practices and why they are essential for supporting wider regenerative dynamics. With this said, we do not view our framework as static: in line with the need for reflexivity, the framework will inevitably evolve as we learn more about supporting change toward regenerative futures.

By applying an integrative review methodology, we do not intend to suggest that complete agreement exists across all researchers and initiatives on the definition of a regenerative system. Nor should there be, as locally (e.g., bioregionally) defined regeneration, avoiding blanket interventions, is a key principle of regenerative systems. Our engagement with the literature is in any case non-comprehensive and omits much practical or embodied knowledge that is less readily accessible. Nonetheless, some frequently arising themes become evident when exploring transformative interpretations of regenerative systems, as we summarize in our framework; as Table 1 illustrates, there is much overlap between different regenerative fields. There are two main areas where we have purposefully avoided certain interpretations of regenerative systems: neoliberal interpretations (e.g., of urban regeneration) and apolitical interpretations (e.g., of regenerative agriculture), which have both been criticized.^{27,72,157} Instead, we recognize that regenerative systems are inextricably normative and political as well as founded on the fundamental properties of life. In particular, the quality of agency in our framework emphasizes the importance of redressing injustices against people and wider nature (including those associated with neoliberalism).

Many important questions remain, especially regarding how regeneration can be enabled or embodied within thinking and action. When our framework has been raised with colleagues, some have questioned whether a system might need to be degenerative (externally or internally) before it can be regenerative in the longer term; whether regeneration in one aspect of a system might mean degeneration in another; and whether the

the vision. Some themes are thus associated with a particular subsystem, or cross-cutting (in spaces between overlapping subsystems). Analysis of only a subset of the themes is included in this figure—these themes are magnified to show their titles, and lines connect them to their corresponding position in the Venn diagram. For the other theme titles and detailed text underpinning each theme, see Note S1. Some of the analysis refers to a particular theme (text adjacent to the enlarged green Post-it notes), and some refers to the vision as a whole (text unassociated with enlarged green Post-it notes).

practices we advocate are ambitious enough, given that they are typically small-scale and yet we require global-scale regenerative systems. Yet these questions, while valid, may not be the most useful questions to ask, because they are underpinned by assumptions—in this case, of scarcity and the need for economies of scale—that regenerative systems purposefully challenge. We should certainly heed potential negative side effects of regenerative action and consider the role of non-mutualistic interactions in a wider mutualistic system, but there is also a need to shift emphasis from problems to potential and creatively developing new approaches. Moreover, we should honor regeneration's distinctive and transformative approaches to geographic scales of action, power relations, governance structures, and change pathways. For instance, economies of scale may provide more efficient resource flows but fail to embody other (e.g., social justice or diversity) aspects of regenerative systems. We think that more important questions might include the following. (1) Where is there greatest synergy between the different regenerative qualities? (2) What can we learn from regeneration success stories about how regenerative systems can be enabled? (3) What forms of networks and collaboration facilitate the spread of regenerative practice from grassroots origins while preserving pluralism? (4) And ultimately, how can we encourage virtuous reinforcing feedback between human and wider ecological wellbeing?

While the need for regenerative systems has never been more urgent, we are a long way from embodying regenerative dynamics in how we think, act, govern, or do business. This perspective, however, has attempted to clarify how regenerative systems could look and behave and has shown how a Regenerative Lens can guide ambitions for new kinds of futures. Nonetheless, regeneration is a radical shift from mainstream thought and action. Even as increasingly deadly extreme weather events drive home the reality of our environmental crises, narratives of reducing harm to sustainable levels (e.g., net zero carbon) dominate, perpetuating the notion that we can continue to improve current societal patterns rather than acknowledging that deeper transformations are required. On the other hand, a focus on growing regenerative systems that reinforce human and planetary wellbeing provides a much more transformative and hopeful message for reaching a radically different future.

SUPPLEMENTAL INFORMATION

Supplemental information can be found online at <https://doi.org/10.1016/j.oneear.2023.06.006>.

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AUTHOR CONTRIBUTIONS

Conceptualization, S.J.B. (lead), I.F., B.S., and E.S.O. (supporting); methodology, S.J.B. (lead), I.F., and B.S. (supporting); formal analysis, S.J.B.; investigation (integrative literature review), S.J.B.; investigation (applying the Regener-

ative Lens), S.J.B. (lead), I.F., B.S., E.S.O., B.D., and R.L. (supporting); investigation (Three Horizons process), S.J.B., I.F. (co-leads), B.S., E.S.O., B.D., P.B., K.D., M.B., R.L., S.B., M.C., E.C., L.C., N.N., C.Y., A.C., B.F., A.F., G.G., A.J., I.K., A.K., B.M., and M.S. (supporting); writing – original draft, S.J.B. (lead) and I.F. (introduction only); writing – review & editing, S.J.B. (lead), I.F., B.S., E.S.O., B.D., P.B., K.D., M.B., R.L., E.C., L.C., N.N., C.Y., and S.M. (supporting); visualization, S.J.B.; supervision, S.J.B., I.F., and B.S. (equal); project administration, S.J.B. (lead) and I.F. (supporting); funding acquisition, I.F., B.D., P.B., K.D., M.B., S.B., M.C., and L.C. (equal).

DECLARATION OF INTERESTS

The authors declare no competing interests.

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One Earth, Volume 6

Supplemental information

The Regenerative Lens: A conceptual framework for regenerative social-ecological systems

Sam J. Buckton, Ioan Fazey, Bill Sharpe, Eugyen Suzanne Om, Bob Doherty, Peter Ball, Katherine Denby, Maria Bryant, Rebecca Lait, Sarah Bridle, Michelle Cain, Esther Carmen, Lisa Collins, Nicola Nixon, Christopher Yap, Annie Connolly, Ben Fletcher, Angelina Frankowska, Grace Gardner, Anthonia James, Ian Kendrick, Alana Kluczkovski, Simon Mair, Belinda Morris, and Maddie Sinclair

Supplemental items

Note S1: Detailed future vision for a regenerative Yorkshire food system (see also Box 1)

The detailed third horizon vision for a regenerative Yorkshire food system, produced via a Three Horizons process¹ organised by the FixOurFood research programme,² was visualised and stored in Mural, an online whiteboard tool (<https://www.mural.co/>). Its size makes it unsuitable for reproducing here as a figure, and we recommend instead viewing it in Mural. A version showing only main themes can be found in this mural:

<https://app.mural.co/t/fixourfood6606/m/fixourfood6606/1667493925775/815906445d8a3c4878c554ce0a275d7c6f4bdd0d?sender=u1414d60a5ab39ae076536290>. A version showing the main themes as well as underlying detail can be found in this mural:

<https://app.mural.co/t/fixourfood6606/m/fixourfood6606/1665572998525/10e8fe34eb611c4748650636cec9f034e7d5d6e2?sender=u1414d60a5ab39ae076536290>. These are related to Box 1 and Figure 3 in the main text.

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Chapter 3: What forms of evaluation are needed to enable desired transformations?

The previous chapter highlighted how regenerative systems and dynamics can provide a powerful way of envisioning a transformation. It found that regenerative concepts have been explored in a wide array of different fields – including agriculture, business, design, development, economics, education, food systems, governance and organising, nature conservation, sustainability, tourism, and urban studies – and that while each field has its own distinct features, there are common threads that run through them, which were incorporated into the Regenerative Lens framework. The chapter reached an understanding of a regenerative social-ecological system as one that maintains positive reinforcing cycles of health both within and beyond itself – including between humans and wider nature – to create conditions conducive to the flourishing of life, and identified key outcomes, qualities, dynamics and practices associated with regenerative systems.

An important question arising from these findings is what forms of evaluation are then needed to enable transformations towards regenerative futures. While there have been many ideas about how evaluation needs to change to meet this transformational imperative, to date we have lacked a cohered and comprehensive understanding of the many different aspects that will need to change in the way evaluation is approached and implemented (Picciotto, 2021; Feinstein, 2019; Mickwitz et al., 2021). This chapter therefore addresses the question: ‘What forms of evaluation are needed to enable desired transformations?’, including associated principles (Figure 2), approaches, methods, frameworks and tools. This establishes the conceptual foundation whose implementation in practice is then explored in Chapter 4.

TWELVE PRINCIPLES FOR TRANSFORMATION-FOCUSED EVALUATION



Figure 2. Graphical abstract of Chapter 3. Produced by Sam Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

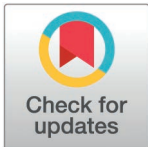
RESEARCH ARTICLE

Twelve principles for transformation-focused evaluation

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Abstract

There are growing calls for societies to transform towards regenerative futures that support the flourishing of life and transcend interlinked social and ecological crises. Many actors are now trying to identify whether desired transformations are occurring, and how different interventions are contributing to transformation. These are questions of *evaluation*. However, we lack a holistic appreciation of how evaluation can most effectively assist transformation efforts. We undertake a systematized scoping review of a large body of evaluation literature to identify principles and methodologies for transformation-focused evaluation. We identify twelve distinct but interdependent principles which, when applied by evaluators (and supported by evaluation commissioners, sponsors and funders), are considered to significantly enhance the effectiveness of evaluation in assessing and assisting transformations, although tensions exist between some of the principles. The principles were clustered into three overarching themes of Complexity Principles (how evaluation approaches complex systems), Power Principles (evaluators' power relations), and Purpose Principles (evaluation's deeper purpose and values). The Complexity Principles call for transformation-focused evaluators to appreciate evaluands (e.g., a transition initiative, sector, or region) as unique, entangled, nested, dynamic and uncertain systems, and employ more diverse, developmental, contextually adapted and future-sensitive evaluation approaches. The Power Principles urge evaluators to promote justice, embrace diverse and marginalized perspectives, and reduce evaluator-evaluand polarization by shifting power towards evaluation users, whilst also fostering a more autonomous evaluation profession and mutualistic partnerships of knowledge and action. Most fundamentally, the Purpose Principles advocate for a recentering of values, reflexivity and learning at the heart of evaluation practice, and ensure that the core purpose of evaluation is to support systemic, societal transformation towards regenerative futures. Relevant methodologies are suggested for operationalizing the principles. Transformation-focused evaluation is a radical shift from conventional practice but the urgency to address global crises makes the shift a crucial one.

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Author summary

There are growing calls for societies to transform towards regenerative futures that support the flourishing of life and transcend current crises. Many actors are now trying to identify whether desired transformations are occurring, and how different interventions are contributing to transformation. These are questions of *evaluation*. However, we lack a holistic appreciation of how evaluation can most effectively assist transformation efforts. Here, we review a large body of evaluation literature to identify principles and methodologies for transformation-focused evaluation. We identify twelve distinct but interdependent principles which, when applied by evaluators (and supported by evaluation commissioners, sponsors and funders), are considered to significantly enhance the effectiveness of evaluation in assessing and assisting transformations, although tensions exist between some of the principles. The principles were grouped into three overarching themes of Complexity Principles (how evaluation approaches complex systems, like food or energy systems), Power Principles (evaluators' power relations with different groups of people and nature more widely), and Purpose Principles (evaluation's deeper purpose and values). Relevant methodologies are suggested for operationalizing the principles. Transformation-focused evaluation is a radical shift from conventional practice but the urgency to address global crises makes the shift a crucial one.

Introduction

The world faces deepening environmental, social and geopolitical crises, including climate change, biodiversity loss, wealth and health inequality, and an 'infodemic' of misinformation [1–4], driven strongly by the globalization of Western capitalism [5]. The complex nature of Earth's social-ecological systems [6] (e.g., food, energy or transport systems, cities, economies, regions, and societies) – characterized by interconnectivity, feedbacks and other emergent and often unpredictable dynamics [7] – means that these crises are interlinked, often reinforcing, and 'wicked problems' to deal with [8,9]. There is increasing recognition of the need for transformative system-wide changes in societies to fundamentally address these crises [1,4,10,11], including within the framework of the United Nations' Sustainable Development Goals [12]. Transformation is in fact inevitable, as failure to steward necessary transformations is likely to result in catastrophic disruption to human societies [13], which has already begun in earnest across many parts of the world [13,14]. It has been strongly argued that more desirable transformations should aim for radically different dynamics that support the flourishing of life – what many now refer to as 'regenerative' dynamics [15]. Regenerative framings go beyond conventional framings of sustainability that focus on minimizing anthropogenic harm, and instead focus on fostering conditions that result in mutual reinforcement or 'spiraling up' of human and wider ecological wellbeing [15]. Such transformations present a huge challenge, not least because they require fundamental shifts in our values and worldviews [15], various lock-ins and power dynamics make the status quo highly resistant to change [13,16], and we may have to act even whilst many of the familiar social and ecological systems around us are collapsing [13,17].

Accordingly, actors are now increasingly grappling with the challenge of answering questions like: Is our system transforming towards a desired future? What are the impacts (both desirable and undesirable) of our systems' transformations? Is our initiative or intervention significantly contributing to transformation, and does it have the enabling conditions in place to achieve this? To what extent is our initiative or intervention aligned to transformative or

regenerative principles? [4,18,19]. These are fundamentally questions of *evaluation* – the systematic assignment of quality, value or importance to something by people [20,21] – that enable learning about transformations and their stewardship [19]. While people apply evaluative thinking almost constantly in practically every activity, often subconsciously [22], evaluation has also become a formalized discipline and practice [23], and evaluation can be applied in more or less structured ways to particular *evaluands*, such as projects, programs, initiatives, policies, portfolios, strategies, interventions, communities, organizations, societies, regions, and social-ecological systems. However, many mainstream Western evaluation techniques – although valuable in the right circumstances – were not designed for contexts of transformation [24]. Accordingly, it has been stated that ‘Evaluating transformation means transforming evaluation’ [4], and there is increasing interest in, and application of, more transformation-focused evaluation approaches [24]. However, we lack a holistic appreciation of what ‘transforming evaluation’ entails for this purpose, particularly because the literature around this topic has received scant review to date.

In this paper we aim to provide comprehensive guidance which, when applied by evaluators (and supported by evaluation commissioners, sponsors and funders), is considered to fundamentally shift evaluation practice to significantly enhance its effectiveness in assessing and assisting transformation efforts. This guidance is based on a systematized scoping review and inductive thematic analysis of a large body of evaluation literature focused on transformation contexts. We structure the outputs of the review as a set of principles for transformation-focused evaluation along with suggested approaches, tools and other methodologies for operationalizing these principles. This is a valuable response to calls for greater coherence and alignment in ‘guiding principles, ethical guidelines and competencies for evaluators’ supporting transformation [25]. In the following sections, we first outline the historical context of the evaluation field and some of its key paradigmatic shifts over time to address issues inherent in transformations, and where our review adds value. We then describe our framing and methodological approach in carrying out the review. After presenting the resulting set of principles, we discuss them in a wider context and end with a call to action to take this work forward.

Background: transformations and evaluation

The need to support desirable transformations and navigate the transformations already happening around us raises new challenges for evaluation and evaluators [4,19,24,26,27]. Transformational change is broadly understood to involve some kind of major, fundamental change, as opposed to marginal or incremental change [28], such as adjustments and reforms [8,28,29]. As such, and when considered in relation to the many crises threatening societal systems – such as energy, transport, or food systems – transformation is often considered to go beyond merely technological, behavioral and policy changes, and involve shifts in underlying beliefs, values, intent, purpose, structures, institutions, power relations, paradigms or worldviews that in turn bring about system reconfiguration [3,5,30–32]. These deeper shifts are generally more difficult to achieve [32]. From an evaluation perspective, this raises many issues, such as how to work with complexity, unpredictability, power inequalities and conflicting values, and ultimately how evaluation can help different actors learn how to adapt to, and support, systemic change and maintain ambition and transformational intent.

Many non-Western evaluation approaches have been working effectively with these issues for thousands of years. For instance, appreciation of complexity and relationality is deeply embedded in Eastern and African cultures and Indigenous thought and practice more generally [33–35]. Western evaluation, on the other hand, has historically been rooted in a *positivist* paradigm that limits its utility in contexts of transforming complex social-ecological systems [36,37]. The positivist paradigm assumes that there is a single objective reality or truth best

measured by a neutral, independent observer, and that change processes can be planned and controlled rationally [36,37]. Positivism lends itself to evaluation approaches that assess evidence for predetermined outcomes and causal relationships between interventions and these outcomes, focusing on quantitative and objective indicators of change [36]. However, positivist approaches are not well suited to contexts where there is more uncertainty in the goals of innovation projects, a need for ongoing adaptation and learning in the face of dynamically changing conditions, and a need to reconcile the diverse and often conflicting values and desires of different stakeholders [36,37]. These conditions are part and parcel of transformations in complex social-ecological systems.

Particularly since the 1960s, there have been efforts to align Western evaluation practice to addressing these kinds of issues. Several evaluation paradigms emerged out of critiques of positivism, including the *post-positivist* [38,39], *constructivist* [36,40], *realist* [41–43], and *pragmatic* or *utilization-focused* paradigms [39]. Various other branches of evaluation have adopted more complexity-informed approaches and theories of change, rejecting the linear logic models that characterize positivist evaluation [44]. Collectively these paradigms bring greater attention to aspects such as observer biases [38,39], multiple subjective and co-created realities [36,40], the importance of the context (e.g., culture) in which interventions take place and its implications for (ir)replicability [41], the processes that lead to observed outcomes [43], and the practical use and effects of stakeholders' knowledge, beliefs and values [39]. Associated evaluation approaches also adopt more qualitative, participatory and mixed methodologies [36,40], and typically choose methodologies to suit particular contexts rather than applying one-size-fits-all approaches [39]. Some of these paradigms are relatively mainstream in some sectors. For instance, realist, complexity-aware and participatory evaluation approaches are gaining prominence in the health sector [45–47].

Some evaluation paradigms have gone further by encouraging stakeholders to challenge problematic values and institutions, which are seen as key barriers to reconfiguring social-ecological systems [36]. For example, the *critical realist* paradigm, related to critical systems thinking/heuristics [48,49], brings in greater awareness of the systemic structures that influence a system's behavior, and reflexivity of evaluators about their own positionality and power entanglements [50,51]. The *reflexive* evaluation paradigm, meanwhile – grounded in Beck's theory of reflexive modernization [52] – takes the stance of supporting networks of actors to challenge existing systems and develop radically different visions, practices and systems, and not merely reflecting on them [36]. It also differs from other critical theories in considering intertwined rules and norms, interdependencies, infrastructure and existing technologies, as well as the stabilizing mechanism of power relations [53]. Mertens' *transformative* evaluation paradigm adopts a clear normative stance of leveling power inequalities and elevating marginalized voices [54]. These paradigms radically shift the traditional neutral, independent stance of evaluators towards more embedded, advocative and ethical stances, but also greater reflexivity about evaluators' inevitable biases and their implications for how evaluations are conducted.

More recently (spurred particularly by the COVID-19 pandemic), evaluators have been urged to fundamentally shift their practices to support large-scale (even global-scale) systemic transformations towards more sustainable and resilient futures, in recognition of the urgency to address planetary crises [4,24,26,27]. Some have linked this shift to trends towards *post-normal* evaluation that recognizes and engages with complexity, unpredictability, incompleteness, instability, transformations, and a plurality of values [4,55]. Post-normal evaluation gives greater importance to practical or phronetic reasoning (including moral, experiential, emotional, social and political dimensions) rather than focusing only on scientific and economic rationality [55]. As well as attending to issues of power and complexity, this shift

includes focusing evaluation criteria on aspects such as ‘transformation fidelity’ (the match between transformation rhetoric and change on the ground), the alignment and momentum amongst different actors and initiatives, and how ecosystem resilience is being manifested [4]. Fundamentally, this also means evaluators acknowledging that they have ‘skin in the game ... the game being the future of humanity on Earth’ (i.e., a stake in successful transformations) and taking a moral position of supporting positive transformations [4]. Methodological approaches such as Blue Marble Evaluation or Dynamic Evaluation have been advocated for this transformation-focused or post-normal evaluation paradigm [56,57]. Examining the historical paradigm shifts in the evaluation field situates the recent turn to transformation-focused evaluation as another step in the field’s evolution towards accounting for the challenges of stewarding change in complex social-ecological systems.

Ideas around transformation-focused evaluation are gaining increasing recognition in the evaluation field [24,26]. Several recent conferences of prominent evaluation associations and societies have focused on evaluation for transformations [4], generating three books on transformational evaluation [58–60] and the Prague Declaration on Evaluation for Transformational Change: a set of pledges for transformational evaluation agreed to by attending evaluators, commissioners, parliamentarians and other evaluation users [19]. An update of the Prague Declaration is currently under review; on 22 April 2024, the Earth Day Evaluation Declaration promoted an update to Point 6 of the Prague Declaration (‘Focus on sustainability’) that calls for ‘context-specific criteria for environmental, social, and economic sustainability and regeneration [in] all evaluations recognizing that these three domains are intertwined’ [61]. Criteria for evaluating transformations have also emerged from recent special issues of evaluation journals [4,62,63]. With the increasing number of organizations and networks working on transformations and transitions, the demand for transformation-focused evaluation is also growing, although examples of its application are still relatively few [19]. Several major cohering and funding organizations have started to embrace transformation-focused evaluation [34,62,64–68], including the International Evaluation Academy [69].

Despite these developments, there is still no comprehensive, holistic guidance about what is needed for effective transformation-focused evaluation. Evaluation geared towards assisting transformations remains a niche practice and a major leap from how evaluation is most often undertaken [25]. Particularly for evaluators, commissioners, sponsors and funders with no prior experience of evaluations in contexts of transformation in complex social-ecological systems, who may naturally lean towards more positivist approaches, it can be challenging to find easily accessible guidance or navigate the many different evaluation approaches, methods and tools available (e.g., see [70]). We address this gap by conducting a rigorous review and stock-take across literature on evaluation in transformation contexts. Over 2300 documents were screened, and guidance was drawn out from 138 accepted documents to develop core principles for transformation-focused evaluation and identify methodologies to support operationalization of these principles.

Materials and methods

Overview

We conducted a systematized scoping review and inductive thematic analysis of academic and gray literature to identify: a) guiding principles and b) methodologies relevant to transformation-focused evaluation. Below we explain how the research was framed, followed by the specific methods used, including the process of literature searching, document screening for inclusion/exclusion, data extraction, coding, analysis and synthesis.

Framing

Our work was framed by our understanding of the concepts of *social-ecological systems*, *transformation*, *regenerative systems* or *futures*, and *evaluation* (see Introduction and Background), all of which fed into our understanding of *transformation-focused evaluation*. We saw transformation-focused evaluation as evaluation that acts in service of efforts to transform social-ecological systems [6] (e.g., food, energy or transport systems, cities, economies, regions, and societies) towards regenerative futures (broadly speaking, where human and non-human life can flourish) [15]. Such evaluation would: be a dynamic process of examining, questioning, deliberating and altering both means (e.g., decisions and interventions) and ends (e.g., goals, values and principles) [21] in contexts of actors in transformation-focused initiatives; focus on aspects such as identifying signals of transformational change and regenerative dynamics, understanding the impacts of transformation, determining the extent to which an initiative is contributing to transformation or has the potential to do so, assessing an initiative's alignment to transformational principles, and evaluating whether initiatives' principles, values, goals and theories of change are appropriate, effective and sufficiently ambitious or transformation-focused; and be supported by appropriate evaluation methodologies, approaches, methods, techniques, concepts, frameworks and tools. We also recognized transformation-focused evaluation as requiring transformation of evaluation itself: that evaluation practice needs to fundamentally change compared to how it is frequently undertaken today and conventions in the past, and not just tweaked, if it is to be fit for contexts of transformation and supporting transformation efforts [4,27]. This has also been strongly argued by others [19], e.g., in terms of the inadequacy of the revised Development Assistance Committee (DAC) criteria in communicating the urgency of transformation [4]. Some have used the term 'transformational evaluation' to describe transformation-focused evaluation [59], but we preferred 'transformation-focused evaluation' to avoid confusion with Mertens' Transformative Evaluation paradigm [54]. Transformation-focused evaluation is not yet a cohered evaluation paradigm like Transformative Evaluation, and it was not our intention to suggest otherwise. Rather, our definition of transformation-focused evaluation, as well as the concepts underpinning it, were broad 'sensitizing concepts' [4] requiring contextual adaptation and high-inference interpretation, rather than universal and black-and-white [4].

Method

Taking our definition of transformation-focused evaluation as a starting point, we wished to understand: a) What are the different dimensions of transformation-focused evaluation that set it apart from other kinds of evaluation approaches, and are important for enhancing its effectiveness in assisting transformation? and b) What methodologies are relevant for transformation-focused evaluation? To answer these questions we used a systematized scoping review method [71]. Scoping reviews are appropriate for reviewing the 'extent, range and nature of research activity' around a poorly cohered topic, where breadth is more important than depth [71]. It was not our intention to carry out a fully replicable review, given the qualitative nature of document screening and analysis and the requirement for high-inference judgment from the researchers. Nonetheless, to increase methodological transparency and rigor, we drew on the recommendations of the PRISMA framework extension for scoping reviews (PRISMA-ScR) [72] (Fig 1; see S5 Table). The only deviations from the full PRISMA-ScR checklist (S5 Table) were: not critically appraising documents or identifying their funding sources before inclusion for coding (other than appraisal during screening), due to the inclusive nature of the review and the qualitative nature of the results sought; and for

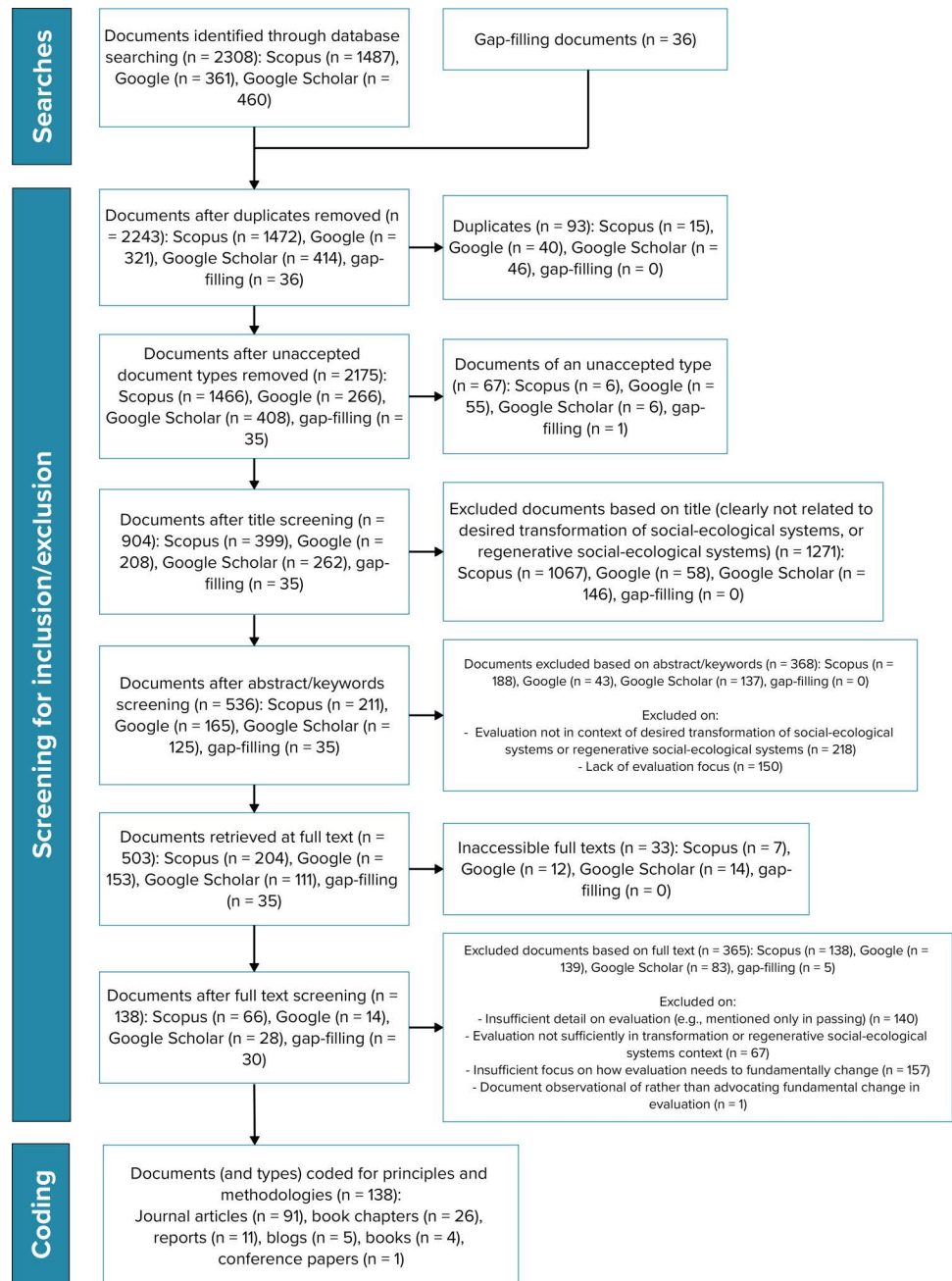


Fig 1. Flow diagram for the scoping review, based on PRISMA-ScR [72]. Image created by S.J.B. in Mural (<https://www.mural.co/>).

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conciseness, not choosing to refer to the paper as a scoping review in the paper's title, instead referring to this method in the Abstract.

Search strategy. We aimed to search for literature providing guidance for evaluation and evaluators (justified based on empirical evidence, other literature, or authors' own opinions and experience) in contexts of transforming social-ecological systems towards regenerative futures, whilst also recognizing that in these contexts evaluation needs to fundamentally shift compared to how evaluation is frequently undertaken today and past evaluation conventions.

Literature searches were performed in Scopus, Google Scholar and Google (i.e., google.com) (Fig 1). Scopus was chosen over similar databases due to its combination of high overlap with other databases, high coverage of social sciences literature, and support of sophisticated Boolean and other search operators [73]. Although Google Scholar has more limited support of search operators, making it less suited to reproducible query-based searches [73], it was searched because it is the most comprehensive literature database known [73] and could therefore identify academic documents missed by Scopus, as well as moderate amounts of gray literature [74]. Google was searched mainly to obtain gray literature, of which it is an important source [75]. The search language was English, the dominant language of academia [76]. Searches in Google and Google Scholar were performed incognito in Google Chrome Version 110 (Official Build, 64-bit) with all cookies rejected, to avoid bias of search personalization. The global – i.e., no country redirect (NCR) – version of the search engines were used (<https://scholar.google.com/> and <https://www.google.com/>). For explaining the relevance of particular evaluation approaches to transformation-focused evaluation, where information in the main literature sample was too scant, external texts located by hand-searching in Google were consulted.

Search strings (S1 Table) were created both inductively and deductively. Trial searches with initial search strings were tested, and additional terms then added based on terms used by documents found in the searches. All search strings included a term for evaluation (evaluat*). We focused on the term ‘evaluation’ for our searches because of its importance in describing the discipline of evaluation, and also its explicit reference to values, which are fundamental to reaching evaluative decisions [21,77]. We recognize that other terms may be used to describe evaluation (such as ‘assessment’, ‘monitoring’, or ‘appraisal’), and that our review may therefore omit knowledge from sources referring to evaluation only in this way (potentially more prevalent outside the main evaluation discipline). The strings also contained terms related to transformation or regenerative social-ecological systems (based on a recent review [15]).

As recommended for scoping reviews [71], we also included a ‘consultation exercise’ [71], in our case with a group of experienced evaluation and transformation researchers and practitioners, to supplement the findings of the literature review. This ‘advisory group’ was invited to suggest additional documents (academic or gray literature) not found in the database searches that offered substantively different perspectives on transformation-focused evaluation to those already identified, or presented other methodologies relevant to transformation-focused evaluation (Fig 1). They were also invited to draw on their own expertise to suggest additional guidance for transformation-focused evaluation, if this was not already evident from the literature sample and deemed vital for the effectiveness of transformation-focused evaluation. Any guidance based on the opinions of the advisory group were cited as such [78]. In practice the findings of the review were dominated by guidance from the literature sample, with only a handful of supplementary suggestions from the advisory group. Finally, the advisory group was asked to suggest case studies of real-world evaluations that illustrated the application of transformation-focused evaluation, two of which were chosen for the final paper. The advisory group also acted as co-authors in reviewing and editing the manuscript of this paper.

We acknowledge that while the search strategy includes diverse perspectives, it will also omit many voices. Academic knowledge is dominated by Western and Global North perspectives [79,80], and the cultural make-up of our advisory group means that we are unable to fully do justice to the principles and approaches of more marginalized groups, including a wide array of Indigenous and Eastern philosophies and methodologies [34,81], although some members of the advisory group had experience in working with such groups and knowledge.

Document screening for inclusion/exclusion. Documents were then screened by S.J.B. for inclusion or exclusion in the review (Fig 1; S4 Table). Thus, no co-authors of this paper screened documents that they had themselves authored. Documents were first screened based on title (see S2 Table for full details of screening criteria) and excluded if they were clearly unrelated to desired transformation of social-ecological systems or regenerative social-ecological systems. In Google and Google Scholar, pages were screened until over half of the (ten) results on a page were excludable based on title, since this was typically an indication that relevance of results would decline significantly in subsequent pages; no further pages were screened past this point.

Remaining documents were screened based on abstract and keywords (or an equivalent section, such as a book overview or executive summary in a report). If these clearly did not suggest evaluation would be discussed in the context of desired transformation of social-ecological systems or regenerative social-ecological systems, the document was excluded.

Remaining documents had their full text screened. Reasons for exclusion at this stage included insufficient detail about evaluation (e.g., mentioned only in passing), evaluation insufficiently in the context of desired transformation of social-ecological systems or regenerative social-ecological systems, insufficient focus on how evaluation needs to fundamentally change, and documents neutrally observational of, rather than advocating, fundamental change in evaluation. Accepted documents advocated evaluation for contexts of desired transformation of social-ecological systems or regenerative social-ecological systems, and recognized that fundamental shifts were required in evaluation for it to be fit for these contexts. If a document lacked an abstract and keywords or equivalent section, it was immediately screened based on full text after the title screening. In books, if chapters had abstracts, all chapters were screened as if they were separate documents. Otherwise, the full book was screened.

Acceptable document types included journal articles, reports, books, book chapters, blogs, and formal statements. Editorials that were standalone articles were included, whereas those that primarily summarized articles in a special issue were excluded, given that these articles should in theory appear elsewhere in the literature sample if they are relevant. Documents in a language other than English were translated into English using Google Translate [82]. Documents whose full text could not be accessed were either requested from the University of York Library or the documents' authors. Some documents in Google or Google Scholar were inaccessible because of a non-functional URL (Fig 1).

Data extraction, coding, analysis and synthesis. From documents accepted post-screening, guidance for evaluators (and explanation of its importance) was extracted from the text (Fig 2; S4 Table). All data extraction, coding and analysis was undertaken by S.J.B., with the results critiqued by the advisory group. Inductive open-coding was used to identify initial distinct semantic themes [83], with quotes selected from the document to evidence any theme assigned (Fig 2). An iterative approach was used, whereby themes were identified as coding progressed, with earlier themes refined in light of later documents. In Mural (<https://www.mural.co/>), these first-level themes were then inductively grouped into second-level themes with a similar (either semantic or latent) topic (Fig 2) (for details see mural) [83]. In some cases, one first-level theme was incorporated into more than one second-level theme. A final round of thematic analysis investigated whether the second-level themes, when examined together, revealed any latent 'meta-themes' (Fig 2). Key components of the first-level themes were summarized based on the selected quotes, and these fed into the final text of this paper (Fig 2). The descriptions aimed to capture all unique substantive ideas associated with a theme. A saturating approach was used, such that the only themes and ideas recorded in a given document and incorporated into the analysis were those substantively different from ones already identified. This effectively treats each unique idea as equally valid regardless

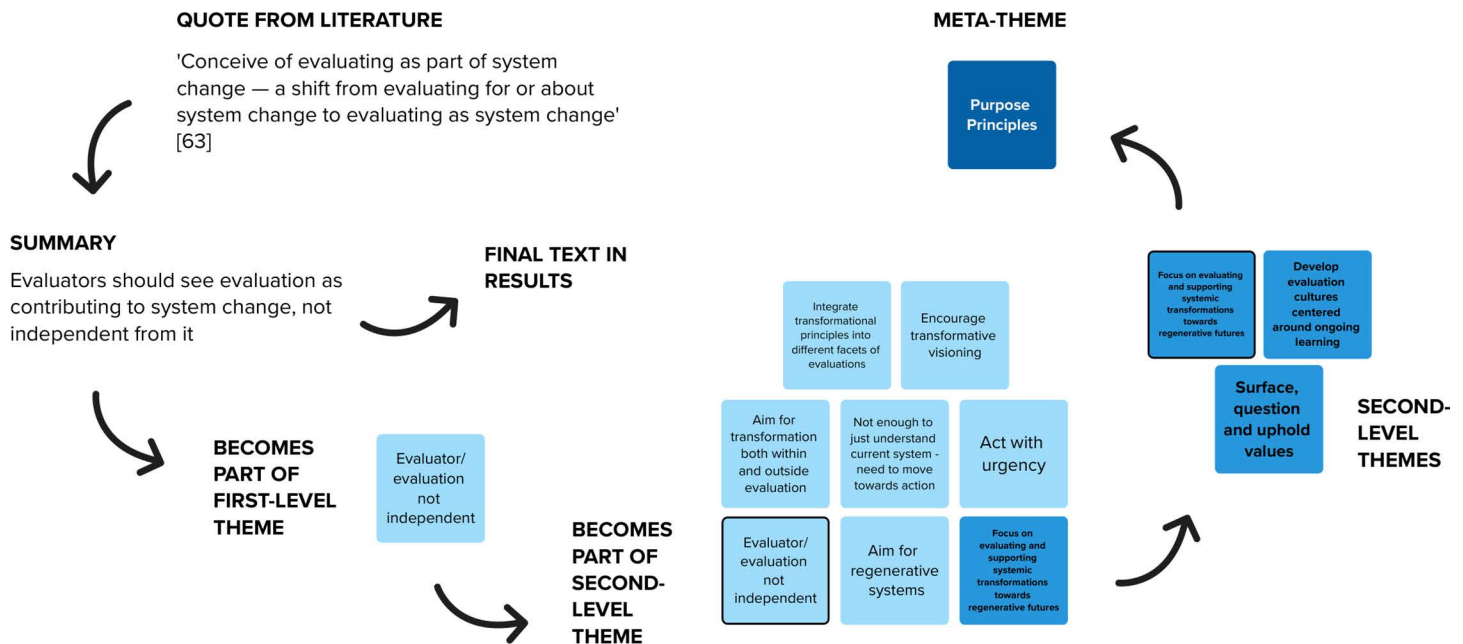


Fig 2. Example of the thematic analysis used to identify principles for transformation-focused evaluation. The example focuses on the Purpose Principles. Image created by S.J.B. in Mural (<https://www.mural.co/>).

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of how many documents mention it, rather than elevating the most commonly mentioned ideas. This was considered to help mitigate biases in the literature (e.g., towards Western perspectives).

We referred to the second-level themes as ‘principles’ because they provide broad advice and guidance and are hypotheses rather than truths: they may or may not be followed and lead to desired outcomes in a particular context [84]. The fidelity to, or effectiveness of, principles is the concern of Principles-focused Evaluation [84]. Principles can be useful ‘anchors’ in the dynamic, uncertain and complex environments that characterize transformations in social-ecological systems, and are sufficiently flexible to guide action even when contexts vary across space and time whereas more rigid, prescriptive criteria would risk losing relevance [84,85]. We maintained the advocative voice of the literature analyzed, e.g., wording the principles as ‘evaluators should...’ or ‘evaluators need to...’. The advisory group was asked to identify complementarities and tensions between the principles.

To identify methodologies for transformation-focused evaluation, we identified any specific named methodologies advocated or applied in accepted documents, with a clear link to transformation-focused evaluation. Under the broad umbrella of ‘methodologies’ we included any overarching evaluation approaches, complex system concepts and frameworks, theories of transformational change, regenerative system frameworks and tools, visioning methods, indicator frameworks, frameworks of evaluation criteria, and analysis methods (many of which imply a method of data collection). We interpreted overarching evaluation approaches as typically not prescribing specific evaluation methodologies, but rather as conceptual analytical perspectives based on principles which then have implications for the kinds of specific methodologies that might be relevant.

As with the principles, our interest was in uncovering the range of different methodologies advocated rather than understanding how many documents advocated a particular approach, so as coding progressed only methodologies not previously advocated were recorded. The

relevance of any methodology to transformation-focused evaluation, and to particular principles of transformation-focused evaluation, was determined based on quotes from the document in the main literature sample, other literature, and/or opinions from the advisory group. We wish to emphasize that this is a quick and rudimentary form of Principles-focused Evaluation rather than an in-depth analysis.

Results

Twelve distinct guiding principles for transformation-focused evaluation were identified (Table 1). Broadly speaking, the principles addressed: issues of complexity (e.g., interconnectivity, irreducibility, uncertainty, rapidly changing conditions, and future-sensitivity); power (e.g., the power relations between evaluators and evaluation users, commissioners, sponsors and funders, as well as other actors, and the importance of justice in these relations); or the deeper purpose and values of evaluation (Table 1). The principles are nonetheless strongly interdependent and show many complementarities, as well as some tensions (Fig 3). The principles are explained in detail below. A diverse range of different evaluation methodologies were advocated for transformation contexts (Table 2). Some overarching evaluation approaches emphasize certain principles or groups of principles more than others, whilst a few (such as Blue Marble Evaluation and Reflexive Monitoring in Action) have relatively broad coverage across all the principles (Table 2).

Complexity principles

Five principles related to the systemic complexity inherent in transformations and its implications for evaluation. They include the need for evaluators to: treat evaluands as nested systems with complex interactions; recognize that evaluands are unique and need context-adapted evaluation; use mixed methods to understand contributions to change under conditions of uncertainty, imperfect information, and pluralist lived realities; use more agile and developmental approaches; and include foresight alongside retrospective evidence.

1. Complex systems principle: Treat evaluands as nested systems with complex interactions. *Evaluators should treat an evaluated system as having complex, interdependent relations with the surrounding systems it is nested within and interacts with during transformation processes [18,57].*

This principle brings evaluation closer to the physical reality of systemic transformations [18]. As highlighted by global crises such as the COVID-19 pandemic, we live in an increasingly globalized and interconnected world, underscoring the need to remain aware of the interlinkages of system changes [56]. There are several key implications of this worldview for evaluation practice. Evaluators must be able to think and work integratively across spatial and temporal scales [113], taking into account ‘macro-issues’ rather than focusing solely on ‘micro-issues’ [57]. For instance, evaluators might adopt a ‘multi-level perspective’ that looks at niche, regime and landscape levels [134], a ‘glocal’ perspective that considers linkages between local and global systems [27], and consider how specific programs and projects contribute to broader strategies and policy [57]. Evaluators must also recognize that while some changes take place rapidly, others (particularly those at wider systemic scales) may take decades [78,113]. The Developmental and Foresight Principles detail further implications for evaluators regarding futures and timescales.

Evaluators must also understand how initiatives and interventions, and their effects, are influenced via complex interactions with their contexts [18]. This requires a more theory-driven approach of understanding mechanisms behind observed outcomes, taking context into account and mapping relationships and interdependencies between actors

Table 1. Principles for transformation-focused evaluation.

Principle type	Principle short-hand name	Principle	Explanation
Complexity Principles	Complex Systems Principle	1. Treat evaluands as nested systems with complex interactions	Evaluators should treat an evaluand as having complex, interdependent relations with the surrounding systems it is nested within and interacts with during transformation processes, and therefore think and work integratively across spatial and temporal scales, consider outcomes, impacts and indicators holistically, and be prepared for complex dynamics (e.g., feedbacks, spillover effects, trade-offs, synergies, disservices, emergence, self-organization, chaos, rebound effects, path dependency, lock-in effects, and tipping points).
	Context Principle	2. Recognize that evaluands are unique and need context-adapted evaluation	Evaluators should recognize that every evaluand and its context, culture and transformation have unique characteristics, necessitating context-adapted rather than one-size-fits-all evaluation approaches. Evaluators must accordingly gain a deep understanding of an evaluand's locale, culture and context, and become 'bricoleurs' drawing on different methods and creatively adapting them to the situation at hand.
	Detective Principle	3. Be a mixed-methods detective in an uncertain, multi-reality and hard-to-control world	Given the uncertainty and pluralist lived realities in complex systems change, evaluators should draw on multiple, mixed methods to improve understanding about transformations and how interventions contribute to them, accepting that there are many equally valid ways of knowing, clear-cut conclusions about causality are usually unattainable, and that most large-scale change is outside the control of individual initiatives (i.e., considering multiple contributions from different initiatives and forces rather than attributions to single interventions, and gaining multiple perspectives on system changes).
	Developmental Principle	4. Remain agile and developmental	Evaluators should move away from treating programs, initiatives and projects as static, and instead recognize the dynamic, unsettled nature of transformations and therefore the need for continual reflection, feedback, experimentation, adaptation and development. This means avoiding setting evaluation logic in stone from the outset, instead allowing it to evolve over time, and also focusing on evaluands' positives, strengths, competence and potential and how these can be developed further.
	Foresight Principle	5. Include foresight alongside retrospective evidence	Evaluators should become future-sensitive, using and evaluating information from futures and foresight methods alongside evidence from the past and present to guide transformative action.
Power Principles	Justice Principle	6. Promote justice in power relations, rights, and use of knowledge	Evaluators should promote justice as a key component of transformations, including through addressing power inequalities, upholding human and non-human rights, decolonizing evaluation, and honoring diverse perspectives and ways of knowing when designing and implementing evaluations – giving voice to the most discriminated and marginalized groups of people and learning particularly from Indigenous, Global South and Eastern philosophies. Evaluators must accordingly understand the power relations, cultural differences, histories and underlying ontologies within the communities and societies of interest.
	Power Shift Principle	7. Shift power towards evaluation users and blur the evaluator-evaluand dichotomy	Evaluators should aim to be guides rather than directors or controllers of transformation-focused evaluations: evaluations should thus be genuinely participatory and empowering for evaluation users [86], allowing them to take greater ownership, leadership and responsibility of designing and delivering evaluations, and acting on their findings. This may also shift evaluators from external and independent positions relative to the system of interest, towards more embedded, cooperative positions where they are actively supporting evaluated initiatives.
	Autonomous Evaluation Principle	8. Support autonomous evaluation practice	Evaluators should resist evaluation contracts and designs dictated principally by markets and individuals or organizations with vested interests and power in maintaining the unsustainable status quo. Instead, evaluators should support stronger professionalization and autonomy of evaluation practice, which includes adopting clearer ethical and critical stances and permission to speak frankly in support of transformational change.
	Partnerships Principle	9. Cultivate mutualistic partnerships of knowledge and action	Evaluators should cultivate long-term mutualistic partnerships of knowledge-sharing built upon strong ethical and professional codes of conduct when working together towards transformations. They should also encourage and assess alignment and cooperation of different transformation efforts. Partnerships should exist not only within evaluation teams, or with commissioners and users of evaluations, and other local stakeholders – but also with other evaluators and associations of evaluators, researchers, junior evaluators, students, interns, and other young people. Evaluators should therefore devote intentional time and resources for sharing evaluation findings and experiences in an honest and transparent way.

(Continued)

Table 1. (Continued)

Principle type	Principle short-hand name	Principle	Explanation
Purpose Principles	Values Principle	10. Surface, question and uphold values	Evaluators should work with evaluands to surface and reflexively question the underlying values at play in transformation processes, and ensure that transformational values are upheld. This requires evaluators to surface the normative and cultural contexts of evaluands, and encourage reflexivity around the values, beliefs and assumptions held by both evaluators and evaluands.
	Learning Principle	11. Develop an evaluation culture centered around humility and learning	Evaluators should develop evaluation cultures centered around humility and learning during transformation processes, rather than driven by accountability requirements to show positive results, and fear of failure. Accountability should instead be focused on things like alignment to principles and values, or ensuring rigorous and systematic learning processes and consequent adaptation, rather than focused only on achieving particular impacts in complex systems. Such learning cultures should become embedded as core, long-term activities of all teams, rather than performed by just one person or unit. Organizations will need to be able to review negative feedback and contradictions without defensiveness and be prepared to admit that original objectives were not met – instead seeing these outcomes as valuable opportunities for learning.
	Transformation Principle	12. Focus on evaluating and supporting systemic transformations towards regenerative futures	Evaluators should facilitate systemic transformation towards regenerative futures, remembering the urgency for global transformations in a 'time-is-running-out world'; and therefore focus on evaluating transformations and integrate transformational principles across different facets of evaluations. This requires: more action-oriented evaluations, where evaluators recognize their personal interest in successful transformation ('skin in the game') and become more vocal advocates for transformation; shifting evaluation criteria to focus on transformation fidelity without evidence of, and contributions to, systemic change; thinking of desired outcomes more ambitiously in terms of social-ecological flourishing; and the transformation of evaluation practice, as laid out in the other principles.

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[43,123]. Examining a pre-existing system before intervening would include understanding its parts and their interconnections, the system as a whole, and the system's dynamics over time, including its response to other interventions [102]. In contrast, evaluations with a less complexity-aware 'project mentality' may treat evaluated interventions 'as if they existed in a vacuum' [135], work from a positivist worldview grounded in Newtonian assumptions that favor predictability, replicability, and linear causal relationships between initiatives and measured outcomes [123,136], and adopt the general Western tendency for reductionism rather than appreciating interconnections [121]. Transformations can rarely be commanded and controlled in such linear and predictable ways [99], and innovation is messy and iterative rather than a smooth orderly process [137]. Moreover, many evaluations still focus on planned activities and intended outcomes and impacts rather than more emergent results [105], and although many give due consideration to side-effects on human systems, they neglect impacts on environmental systems, which means that evaluation can inadvertently contribute to the ongoing destruction of natural systems rather than support their protection and recovery [105].

Evaluators should instead bring into view the full range of social, economic and ecological impacts of an initiative beyond its immediate sphere, their interactions, and their modification by external forces [4,134,135,138] – looking not only at how interventions affect targeted feedback loops, but also how these then influence other feedback loops, subsystems, and the system as a whole [102], considering costs, benefits, spillover effects, trade-offs, synergies and dissynergies [4,139]. System transformation is often influenced by contextual forces, such as the price of oil influencing renewable energy investment [113], or an initiative might start out as radical but because of environmental changes becomes more mainstream [18]. Other signs of complex system interactions that evaluators should be prepared for include outcomes that are emergent and unanticipated [18,67,99,139], self-organization [139], chaotic processes (where system outcomes are sensitive to initial conditions) [140], feedbacks [138], attractors (patterns that a system is 'drawn' to being in) [140], stigmergy (coordinated behavior of independent actors because of the shared environmental context) [140], rebound effects [113], path dependency [141], lock-in

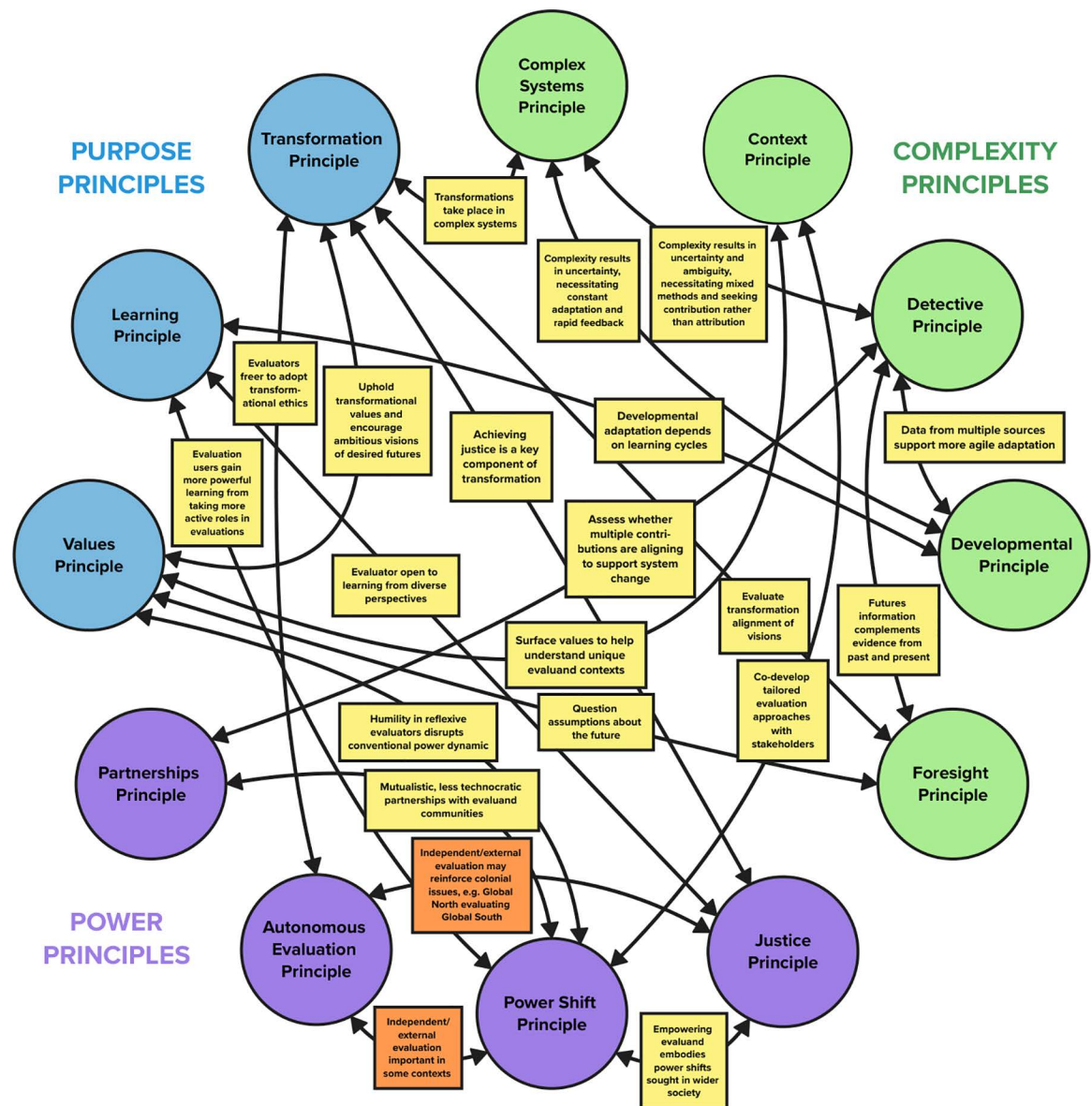


Fig 3. Examples of interdependencies between principles for transformation-focused evaluation. Complementarities are shown in pale yellow boxes; tensions are shown in amber boxes. Image created by S.J.B. in Mural (<https://www.mural.co/>).

<https://doi.org/10.1371/journal.pstr.0000164.g003>

effects and system inertia [141,142], and tipping points [89]. A complex systems perspective of power relations may reveal apparently negative outcomes, like backlash from the establishment, to in fact be signs of program success [100]. The uncertainty inherent in complex systems also highlights the importance of mixed methods (see Detective Principle), and the need for constant adaptation and rapid feedback in evaluations [136] (see Developmental Principle).

The Complex Systems Principle has implications for chosen indicators and indicator frameworks. These should be holistic, assessing the multiple dimensions of sustainability in an integrated rather than siloed way [56,143]. For example: food system evaluators should recognize the cultural and social dimensions of how food links to health alongside nutritional dimensions [144]; the evaluation of regenerative buildings should explicitly recognize interconnections between human and ecological systems rather than just listing a limited set of performance requirements [145]; and

Table 2. Overarching evaluation approaches relevant to transformation-focused evaluation. The approaches listed are those advocated for transformation contexts in our literature sample or suggested by the advisory group. Principles are color-coded according to the three main groups of principles: green for Complexity Principles, purple for Power Principles, and blue for Purpose Principles. A tick in a given box indicates that the evaluation approach emphasizes or supports the corresponding principle, based on the literature examined and/or opinions of the advisory group. Details about each evaluation approach are provided in [S3 Table](#).

Overarching evaluation approach and sources	Principles of transformation-focused evaluation emphasized or supported											
	1	2	3	4	5	6	7	8	9	10	11	12
Adversary Evaluation [57,87]	✓		✓			✓		✓		✓		
African Evaluation Principles [88]	✓	✓				✓	✓	✓	✓	✓	✓	✓
Aotearoa/New Zealand's evaluation guidelines [20,89]		✓				✓			✓	✓		
Blue Marble Evaluation [4,56,90]	✓	✓	✓	✓	✓		✓		✓		✓	✓
Cabaj's Inquiry Framework for Evaluating Systems Change [67]	✓	✓	✓							✓	✓	✓
CECAN's Complexity Evaluation Framework [91,92]	✓	✓	✓	✓								
Collaborative Evaluation [93]		✓					✓		✓			
Concilio et al.'s evaluation framework for complex projects [94]	✓	✓	✓	✓								
Culturally Responsive Evaluation [95,96]		✓				✓	✓			✓		
Culturally Responsive Indigenous Evaluation (CRIE) [97]		✓		✓	✓	✓	✓			✓		✓
Deliberative Democratic Evaluation [98]						✓	✓	✓	✓			
Democratic Evaluation [98]							✓	✓	✓			
Design-driven Evaluation [99]	✓	✓		✓	✓		✓		✓	✓	✓	
Developmental Evaluation [85,100]	✓			✓			✓			✓	✓	
Dynamic Evaluation [57]	✓			✓							✓	✓
Empowerment Evaluation [101]							✓			✓	✓	
ENCOMPASS framework [102]	✓	✓	✓	✓								✓
Equitable Evaluation Framework [103]	✓	✓				✓	✓			✓	✓	
Equity-focused Developmental Evaluation [104]	✓			✓		✓	✓			✓	✓	
Feminist Evaluation [100]	✓	✓	✓		✓	✓	✓			✓		✓
Footprint/Sustainability-inclusive Evaluation [105]	✓	✓				✓	✓					✓
Gates et al.'s ethics of evaluation for socio-ecological transformation [106]					✓	✓	✓			✓		✓
Hargreaves' framework for evaluating system change [65,107]	✓	✓	✓	✓			✓				✓	
Inclusive Evaluation [108]						✓	✓					
Indigenous Evaluation [33]	✓	✓				✓	✓			✓		
Indigenous Feminist Evaluation [109]	✓	✓			✓	✓	✓			✓		✓
Latham's Systems Change Evaluation framework [110]	✓			✓								✓
LGBTQ+ Evaluation [111]		✓				✓	✓			✓		
Made in Africa Evaluation [35,112]	✓	✓				✓	✓	✓	✓	✓	✓	✓
Mickwitz et al.'s theory-based framework for evaluating transitions [113]	✓				✓	✓	✓		✓	✓		✓
Multi-stakeholder/Polycentric Evaluation [114,115]	✓										✓	
Nation-to-Nation (N2N) Systems Evaluation Framework [116]	✓	✓				✓	✓			✓		
Navigating the Intersection of Culture and Evaluation (NICE) Framework [117]		✓				✓				✓		
Orders of Outcomes framework [118,119]	✓			✓	✓						✓	✓
Participatory Evaluation [120]							✓				✓	
Patton's Evaluation Criteria for Evaluating Transformation [4]*	✓			✓	✓							
Patton & Felcis' Principles for Evaluating Transformation [63]*	✓	✓		✓	✓		✓					
PCI Reflective Evaluation Framework [121]	✓			✓		✓	✓			✓		
Prague Declaration on Evaluation for Transformational Change [122]	✓					✓	✓	✓	✓			✓
Preskill et al.'s Propositions for Improving Practice in Evaluating Complexity [123]	✓	✓		✓							✓	
Principles-focused Evaluation [84]	✓	✓		✓			✓			✓		
Real-time Evaluation [57,124]				✓			✓				✓	
Realist/Realistic Evaluation [41–43,57]	✓	✓	✓							✓		

(Continued)

Table 2. (Continued)

Overarching evaluation approach and sources	Principles of transformation-focused evaluation emphasized or supported											
	1	2	3	4	5	6	7	8	9	10	11	12
Reflexive Evaluation and Reflexive Monitoring in Action (RMA) [53,78,125]	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Research Quality Plus (RQ+) Assessment Framework [126]	✓	✓										
Sitra's Evaluation Framework [66]	✓	✓	✓	✓	✓	✓			✓		✓	✓
Systemic Evaluation [127]	✓	✓		✓						✓		
TIPC Methodology [128]	✓			✓			✓			✓		
Transformative Empowerment Evaluation [101]						✓	✓			✓		
Transformative Evaluation [54,129]		✓	✓			✓	✓			✓	✓	
Transformative Participatory Evaluation [130]						✓	✓			✓		
Utilization-focused Evaluation [131]		✓					✓		✓	✓		
Value(s)-based Evaluation [132]		✓				✓	✓			✓		
Visionary Evaluation [62,133]	✓	✓		✓	✓		✓			✓	✓	✓

*Patton's Evaluation Criteria for Evaluating Transformation [4], and their refinement in Patton & Felcis' Principles for Evaluating Transformation [63], are primarily criteria or principles that transformation initiatives should follow and should therefore be evaluated, rather than criteria or principles for how transformation-focused evaluations should be carried out (although there is some overlap). This is a subtle difference, but is a key distinction from the principles presented in this paper, and explains why relatively few of this paper's principles are emphasized/supported by Patton & Felcis' contributions.

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more broadly, evaluations should assess how well integrated transformative initiatives are across sectors and silos, and the interactions between different transformative initiatives [27] (see Partnerships Principle). Reductionist and fragmented approaches to indicators, e.g., traditional pillars of sustainability (environmental, social, economic) – especially if they focus on easily quantified metrics – may omit important (especially qualitative) aspects, like justice, values, paradigms, worldviews, and human-nature connections [146–148]. Evaluators may need to incorporate harder-to-measure compound indicators to capture systemic impacts [149]. Indicators should in any case be developed and altered dynamically, especially post-intervention when the system is better understood [102] (see also Developmental Principle).

Operationalizing this principle means moving away from reliance on linear logic models and key progress indicators, SMART goals, randomized controlled designs, and standardized, replicable, scalable models that are geared towards evaluating isolated projects and programs in stable environments rather than complex systems [27,123,150]. Evaluators should instead become fluent in systems thinking and complexity science [64,140]. Many concepts and frameworks can encourage systemic perspectives, including boundary critique [106], complexity theory [18], critical systems thinking/heuristics [106], living systems theory [147], relational systems thinking [106], complex adaptive systems [102,147], socio-technical systems [113], social-ecological systems [89], value-creating systems [78,151], and structuration theory [152]. Indicator frameworks from regenerative design and development fields could also help to consider system contexts in a more holistic way [153] (see Transformation Principle). Various analysis methods can then help to visualize, explore or otherwise experience the particular systems in question, such as causal loop diagramming [154], Participatory Impact Pathways Analysis [155], social network analysis [154], agent-based modeling [18], soft systems methodology [154], the World Mandala [78,156,157], Digital Twins [139], digital bioregional story maps [106], systems sensing [26] and systemic constellation [26]. These system concepts and tools can be used to develop more complexity-appropriate theories of change [26], although more traditional positivist approaches can also help in clarifying assumptions in theories of change [36]. Evaluators should also familiarize themselves with methods for conceptualizing and analyzing transformations and transitions in complex systems (see Transformation Principle).

Numerous overarching evaluation approaches are based on complexity and systems thinking principles, including Blue Marble, Design-driven, Developmental, Dynamic, Feminist, Footprint, Systemic, and Visionary Evaluation, amongst many others [67,113,123,91,92,94,107] (Table 2). Footprint Evaluation (aka Sustainability-inclusive Evaluation) provides guidance for evaluations to embed criteria of environmental sustainability and contribute to the protection and recovery of natural systems, encouraging appreciation of the interconnections between human and natural systems [105]. Reflexive Evaluation builds on the multi-level perspective that explains how interactions between niches, socio-technological regimes and landscape may lead to system change [53,125]. Indigenous Evaluation approaches are commonly based on more holistic and relational worldviews [33], where ‘worlds are made up of extended networks of kin to whom we have reciprocal responsibilities’ [109], whilst many Eastern philosophies still in use today also carry a deep appreciation of complexity [34]. The African Evaluation Principles are one of the first and few evaluation association principle sets to so explicitly embed a complex systems approach [88]. Other evaluation approaches are not necessarily specified for complex systems but are nonetheless valuable in such contexts; for instance, Theory-based Evaluation [158] (e.g., Realist Evaluation [18,41]) works from endogenously generated theories of change to unpack the mechanisms behind expected or observed impacts [158] (Table 2).

Capturing all outcomes (both positive and negative) of system interventions – the general principle of ‘true cost accounting’ [56,159] – would be supported by methods such as outcome harvesting/mapping and ripple effects mapping [65] (Box 1). These encourage brainstorming of observed outcomes and impacts regardless of whether they were expected. A form of Adversary Evaluation has additionally been advocated for Dynamic Evaluations in weighing up both positive and negative impacts of system interventions [57].

Part of an evaluator’s role is also to help evaluation users to unpack and navigate complexity, to facilitate understanding and agency [4]. Frameworks such as Three Horizons and the prioritization process in the Most Significant Change method, which are underpinned by (inductive) thematic analysis, can assist in this task [160–162]; other recommendations include for evaluators to report specific impact stories alongside big-picture considerations [4], and orient to principles, as in Principles-focused Evaluation [163] (see Developmental Principle).

Box 1. Method – Ripple effects mapping

Ripple effects mapping (REM) is a participatory method that is useful for exploring diverse, emergent, unpredicted and unintended impacts (both positive and negative) of an initiative in a complex system, facilitating more agile, adaptive decision-making [164]. It moves away from questions about attribution (did A cause B?) towards questions about contribution (how did an intervention contribute to changing an outcome or a system?) [164]. Drawing on the principles of appreciative inquiry, REM can help to identify the ‘added value’ or spillover effects of an intervention [164]. These characteristics give REM an affinity to the Complexity, Context and Developmental Principles. REM is typically done in workshop settings using group interviews and reflections to brainstorm how the effects of an intervention have ‘rippled out’ across a system (visualizing these using mind maps or similar), without worrying whether these effects were intended as part of an initiative’s official plans or theory of change [164].

2. Context principle: Recognize that evaluands are unique and need context-adapted evaluation. *Evaluators should recognize that every evaluand and its context, culture and transformation have unique characteristics, necessitating context-adapted rather than one-size-fits-all evaluation approaches [4,57,136,140].*

Transformation is inevitably context-specific [136]. This is a shift away from Newtonian assumptions of replicability that have characterized many evaluations [136]. As such, evaluators should be wary of using standardized methods and criteria without thought for their appropriateness to the situation [4]. They should instead be ‘bricoleurs’ [56], choosing among the diverse array of available approaches and tools (potentially exploring new and unfamiliar techniques) to select and creatively adapt those best-suited to their particular context [57,136,140] (Box 2). The urgency of societal transformation (see Transformation Principle) means that evaluators may have to rapidly develop credible methods for the situation in hand in limited timeframes (as well as with limited budget and expertise) [67]. Ideally, these methods would be co-developed with the evaluation’s intended users, treating them as authorities on whether and how the methods should be applied (see Power Shift Principle) [4]. This principle is important for ensuring that the effectiveness of evaluations is optimized for particular situations of transformation, and for honoring and celebrating evaluands’ unique qualities [78]. This is likely to make the evaluation more useful to its intended users [131].

This principle requires evaluators and stakeholders to build up a rich understanding of their particular locale, culture and context [123,165]. Evaluators may need to investigate the cultural, political and economic history of a place (e.g., visualized on a timeline of key events), as well as its norms and values [123,165] (see Values Principle). The shifting and contextual nature of LGBTQ+ identity is a good example of how evaluation should not rely on rigid standardized methods but remain more flexible and responsive [111].

The Context Principle has implications for selecting indicators of success. Transformation-focused evaluation has been contrasted against evaluations with market-driven, homogenized approaches that impose uniformity on a multicultural reality [166], and use prescriptive, one-size-fits-all indicators [167,168]. For instance, there has been criticism of education evaluations with a technical-positivist focus on students attaining set goals, and relatively superficial psychometric measurement of learning [169]. Recognizing evaluands as unique instead suggests that indicators should be collaboratively developed and tailored to particular places so that they are meaningful and culturally appropriate [167,168,170], or that evaluators should identify ‘best principles in practice’ rather than looking for adherence to predefined specific ‘best practice’ [123], and give a ‘tentative best judgment’ rather than recommending ‘best practice’ when identifying or extrapolating insights from evaluation results [171]. In education contexts, evaluation would encourage the development of more reflexive, conscientious, autonomous and democratically active citizens, appreciating that students cannot be slotted into predefined boxes [166,169].

Operationalizing this principle requires awareness of the many approaches, frameworks and tools outlined in the other principles. Furthermore, Blue Marble Evaluation makes bricolage explicit as one of its operating principles, whilst many approaches emphasize the importance of designing evaluations to fit their particular contexts (Table 2). Various methods have been advocated for deepening understanding of specific contexts, including examination of publicly available data (e.g., on demographics), media and social media analysis, interviews of people with long-term experience, and design labs [123]. To support stakeholders in exploring their context, building on strengths and focusing on what people already love and are motivated to protect – using approaches including asset-based community development, appreciative inquiry and positive psychology – could be more successful in engaging people in dialogue and encouraging sustained collective action than problem-focused approaches [172].

Box 2. Case study – Biodiverse Landscapes Fund evaluation

The Biodiverse Landscapes Fund (BLF) is a UK government-funded £100 million project spanning 2022–29 that funds initiatives in six biodiversity hotspots around the world that

safeguard biodiversity, enhance natural carbon sinks, and develop economic opportunities for local people [173]. It aims to center the voices and rights of Indigenous peoples and other marginalized communities. There is potential for the fund to contribute to regenerative landscapes by decelerating and in some cases reversing current patterns of landscape-level ecocide and cognitive violence, and contribute to local to global learning and co-innovation networks dedicated to regenerative futures.

An independent evaluator team for the BLF is being hosted by Itad and Oxford Policy Management [173]. The team has developed a complexity and systems-informed evaluation framework (cf. Complex Systems Principle) which blends Developmental Evaluation and impact evaluations in 6-monthly, annual and expansive adaptive learning cycles (cf. Developmental Principle). Overall it exemplifies the use of bricolage to adapt to context, blending Principles-based Evaluation, Systemic Evaluation, contribution analysis (Box 4), and multiple learning traditions (cf. Context and Detective Principles). It also aims to contribute to systemic transformation towards regenerative futures (cf. Foresight and Transformation Principles). A complexity lens is necessary not least because the BLF engages with mosaic and often transboundary landscapes, human-wildlife interconnections, 18 host governments in the Global South plus the sponsoring government (UK) and large numbers of conservation and development partners, and has a multi-level focus including engagement with enabling factors outside landscapes (government policy, legal and illegal markets, and long-term finance).

3. Detective principle: Be a mixed-methods detective in an uncertain, multi-reality and hard-to-control world. *Given the uncertainty and pluralist lived realities in complex systems change, evaluators should draw on multiple, mixed methods to improve understanding about transformations and how interventions contribute to them [102], accepting that there are many equally valid ways of knowing [102], clear-cut conclusions about causality are usually unattainable [62,123,135,136] and most large-scale change is outside the control of individual initiatives [78].*

Evaluators should be prepared to seek narratives, correlations, patterns and explanations rather than well-defined causal connections in complex systems change [18,136], and maximize opportunities to understand the system and enhance its learning capacity [123] through using a wide variety of tools, drawing on both qualitative and quantitative data sources [62,135], and improving access to information [123]. Evaluators may even have to be guided by hunches and principles in place of hard data about impact in systems [67]. In this way, conducting a transformation-focused evaluation is similar to being a detective or a court judge weighing up multiple sources of evidence and possible scenarios of change, and using abductive reasoning to identify the most likely chain of events [78].

This principle is important because available information about a complex system is never perfect or ideal [62], with clear causal relationships (e.g., between an intervention in a complex system and the system's outcomes) and experimentally controlled counterfactuals rarely possible to establish [18,67]. Changes in one system may trigger changes in other systems, leading to transformations that seem distant in space and time from original interventions [174]. Moreover, a system or transformation is never a single reality, given that all actors experience it differently, highlighting the need for epistemological pluralism in evaluations [102]. Mixed methods are also important for engaging appropriately with diverse cultural groups in evaluations [175] (see Justice Principle).

A key shift in this principle is from the language of ‘attribution’ to ‘contribution’, which is more transparent about uncertainty [146]. Evaluators will need to consider multiple contributions from different initiatives and forces rather than attributions to single interventions [64], and assess whether a given contribution is aligning or cooperating with (or at least not obstructing) other efforts, which is important for enabling wider system change [78] (see Partnerships and Transformation Principles). Rather than attempting to causally link an initiative to specific outputs and outcomes, the initiative may also have to shift focus to its influences on wider system conditions and the directionality or trajectory of system change [64,86]. The difficulty of linking interventions to impacts also highlights the importance of examining the designs of strategies, policies, etc. prior to implementation to assess their likelihood of achieving desired impacts (e.g., whether they are aligned to transformation principles) [78] (Box 3).

Adversary Evaluation is the clearest embodiment of the ‘detective’ or ‘judicial’ approach to evaluations [87]. However, this principle has implications for data collection and analysis in evaluations more generally. Real-time data sources (e.g., Big Data) may be key, especially for more developmental evaluation approaches with rapid feedback [139] (see Developmental Principle), in addition to literature reviews, surveys, stakeholder opinions, modeling results, digital storytelling, blogs, social media/network analysis, etc. [4,123]. Combining more interpretivist epistemology and associated qualitative and relatively subjective data (e.g., from focus groups and open-ended interviews), with more positivist epistemology and associated quantitative and relatively objective data (e.g., quantitative indicators and systems modeling), could help to gain a more comprehensive picture of transitions and the diverse perspectives, needs and values of people in the system [102,142,176], whilst information from futures and foresight methods (e.g., scenarios) can complement information from the past and present [177] (see Foresight Principle). It is also important for evaluators to ‘catch the wave’ of recent advances in Artificial Intelligence, Machine Learning and Digital Twins for enriching system understanding [139]. In general, while quantitative modeling may be valuable, evaluators should bear in mind that its role is not so much to find ‘truths’, but more to facilitate the ‘probing’ of the system [134].

Various analysis methods enable structured exploration of the influence of interventions on systemic change in an abductive way, including contribution analysis [18] (Box 4), general elimination method [65], ripple effects mapping [164] (Box 1), and process tracing [18,65]. Comparative case studies and qualitative comparative analysis provide additional analysis methods for assessing complex forms of causation in situations with limited and imperfect data [65]. The Most Significant Change method [65], meanwhile, adopts the approach of collecting personal stories about the changes people have experienced, which can enhance impact evaluations [161] (Box 5). In general, evaluators may have to rely more on grounded-theory or inductive analysis rather than hypothesis-deductive approaches [78].

Box 3. Method – The importance of principles, criteria and questions for evaluating transformations

While there are many specific evaluation approaches, methods, frameworks and tools that can support transformation-focused evaluation, it is ultimately dependent on appropriate principles, criteria and evaluation questions, ideally developed collaboratively with evaluation users to fit particular contexts [4,78] (see Context and Power Shift Principles).

This paper presents a set of principles that can guide transformation-focused evaluations (Table 1), and the methodologies advocated emphasize or support some or many of these principles (Table 2). Principles are important not only for how evaluations are

done, but also for the transformation-focused initiatives being evaluated; these then become criteria against which the initiative can be evaluated, and inform what evaluation questions should be asked [4,63]. For example, the principle of transformation fidelity (i.e., that action should back up transformation rhetoric) leads to an equivalent criterion: the extent to which the realities of transformational change initiatives match transformational aspirations and rhetoric [4]. An associated evaluation question would be: ‘What is being envisioned as transformational and how [well] is that vision being realized through action?’ [4]. As a further illustration, Realist Evaluation is built around the principle that the system context (including cultural and normative dimensions) influences the impact of interventions [41]. This leads to more nuanced evaluation questions than merely ‘How well does the intervention work?’ – rather, ‘What works for whom, in what circumstances, in what respects, and how?’ [42]. Principles can be useful ‘anchors’ in dynamic, uncertain and complex environments, and are sufficiently flexible to guide action even when contexts vary across space and time whereas more rigid, prescriptive criteria would risk losing relevance [84,85]. Given the difficulty of determining an initiative’s contributions to systemic transformation, evaluations may often have to shift focus back to the initiative’s alignment to transformational principles in its design and implementation (see Detective Principle).

Changing evaluation principles and criteria is a key aspect of transforming evaluation practice to make it fit for evaluating transformation [4]. Conventionally, many evaluations follow the Development Assistance Committee (DAC) evaluation criteria: namely, assessing evaluands’ relevance, coherence, effectiveness, efficiency, impact, and sustainability [4]. However, these criteria have been criticized for giving a ‘business as usual message’ that fails to sufficiently address the complexity, magnitude and urgency of transformation [4].

Box 4. Method – Contribution analysis

Contribution analysis uses abductive reasoning (deciding which of various possible explanations for a phenomenon is the most compelling) to evaluate the contribution made by an intervention to an observed change [18]. Although originally designed for evaluating simple interventions, it has since been used in contexts of transformation in complex systems [18]. Broadly speaking, contribution analysis involves an ongoing iterative and participatory process of creating a theory of change or ‘contribution story’ (potentially involving multiple ‘sub-theories of change’ in complex settings), assessing evidence in support of it and possible alternative explanations for observed outcomes, and then refining the contribution story based on this analysis [18]. Rather than answering black-and-white questions about attribution and causation, contribution analysis helps to answer more nuanced questions about an intervention’s *contribution* to change, recognizing that it will be just one of many influencing factors [18]. Contribution analysis is thus allied to principles such as the Complexity, Detective and Developmental Principles.

4. Developmental principle: Remain agile and developmental. *Evaluators should avoid treating evaluands as static, and instead recognize the dynamic, unsettled nature of transformations and therefore the need for continual reflection, feedback, experimentation, adaptation and development [99,141,101].*

This principle is in contrast to evaluations based on a linear process of setting predetermined objectives, implementing them, and then summatively evaluating the impact of an evaluand (a project, program, initiative, etc.) in light of those objectives [178]. Indeed, the principle represents a fundamentally different perspective on sustainability that recognizes the need for resilience and continual adaptation, rather than the linear continuation of positive results [27]. It is also a shift from aiming towards fixed, ideal states (which may not exist), instead focusing more on evaluating an ongoing process with emergent outcomes [26,147].

Rather, evaluations should be rapid, agile and adaptive [146], use a monitoring system with real-time feedback [102], and avoid setting evaluation logic (e.g., criteria, approaches and theories of change) in stone from the outset, but rather allow it to evolve over time [18,99]. For instance, theories of change may need frequent revision [18]. Evaluations may also need to expand their time horizons to start seeing meaningful effects and system ‘tipping points’ resulting from interventions [134,102], and ensure capacity for post-implementation evaluation when designing initiatives [179]; in many evaluations, questions about longer-term impact and sustainability are only briefly explored or dismissed as outside the evaluation’s timeframe [24]. Similarly, a shift may be required from assessing outputs, cost-effectiveness, efficacy and impact, to assessing an initiative’s capacity to deal with ongoing global challenges, including reflection and learning processes that can contribute to longer-lasting changes [94] (see Values and Learning Principles). These shifts clash with what many people expect from an evaluation, which could otherwise result in forced premature adoption of models not because they are appropriate, but because evaluators, funders or other stakeholders demand them to fit their preconceived notions of what good evaluation is [180]. Funders will need to recognize the need for more developmental and agile evaluation, with potentially longer funding cycles, rather than requiring identifiable outcomes and concrete strategies from the outset [136,163].

In developmental evaluations it is more empowering to evaluands to have a hopeful and solutions-oriented approach [181] (e.g., appreciative inquiry [162]) that focuses on their positives, strengths, competence and potential, and how these can be developed further, rather than problems, weaknesses, and punishment for poor practice, which can reinforce power inequalities and marginalization [101,182] (see Context Principle). While risks, disappointments, failures and weaknesses should not be ignored, they should be acknowledged as valuable opportunities for learning [62,182] (see Learning Principle).

This principle is important for enabling adaptation to dynamically changing conditions [183]. In reality there is rarely a position of stability from which to retrospectively evaluate a project [18], and systems may revert back to old patterns after an intervention, highlighting the need for ongoing monitoring, trajectory analysis, and a focus on long-term results [56,67,136]. Experimental approaches that require more fixed conditions are rarely feasible in complex systems [18]. Demanding specificity and measurability up front, as in linear logic models, can actually be damaging in complex system contexts because it constrains exploration, experimentation and adaptation [180]. Furthermore, the urgency of addressing global crises (see Transformation Principle) means that there is insufficient time to go through traditional sequences of ‘in-depth situation analysis, comprehensive needs assessment, planning, design, implementation and evaluation’ [56]. Instead, these activities must all happen simultaneously, continually and rapidly [56].

Evaluation approaches such as Developmental Evaluation and Reflexive Evaluation take this principle to heart, supporting more rapid, continual feedback for innovation initiatives adapting to dynamic conditions and moving away from the traditional cycles of formative and summative evaluation that are typically ill-suited to such instability [53,85,89] (Table 2). Methods such as rapid cycle testing [65], snapshot surveys [123], the What? So What? Now What? framework [184], actual-ideal comparison [184], Most Significant Change [184] (Box

5), outcome mapping [184] and Williams' pattern-spotting framework for qualitative data analysis [185] may also assist rapid, dynamic, developmental evaluation approaches. These methods may be complemented by data science technologies such as Big Data to support more real-time and quasi-real-time evaluations [57]. Principles, which underpin Principles-focused Evaluation, can also be vital 'anchors' in environments of dynamism, uncertainty and complexity, and are sufficiently flexible to guide action even when contexts vary across space and time [84] (Box 3). The GUIDE framework offers recommendations for formulating high-quality principles that are Guiding, Useful, Inspiring, Developmental and Evaluable [84]. Rapid feedback or learning memos, debriefs, critical incident reviews, and after-action reviews, meanwhile, are useful methods for sharing emerging insights [123], which may require shorter, more user-friendly report formats [179]. In general, a 'learning by doing' approach is advocated, using pilot projects, living labs, policy labs and hackathons to encourage experimentation [141,94].

Box 5. Method – Most Significant Change

Most Significant Change (MSC) is a participatory, dialogic method of monitoring and evaluation [161,162]. It involves researchers/evaluators collecting stories (usually via interviews) from those involved in or affected by an intervention, followed by participatory analysis and discussion of these stories to identify the most significant ones for demonstrating the impact of the intervention [161]. Typical MSC questions might be: 'During the last month, in your opinion, what was the most significant change that took place for participants in the program?', followed by 'From among all these significant changes, what do you think was the most significant change of all?' [161]. MSC questions can also be directed more strongly towards personal experience: for example, an evaluation of youth workers' experiences in a voluntary sector youth organization asked participants: 'Looking back over the last month or so, what do you think was the most significant change that occurred for you as a result of coming here?' [162].

MSC is useful for capturing a rich, qualitative picture of impact and people's experience, including people's values, rather than over-simplified quantitative indicators [161] (cf. Values Principle). In this way it can be a valuable complement to more quantitative impact evaluations [161]. It can also be useful for identifying unexpected outcomes and as an iterative, dynamic, developmental approach [161,184] (cf. Complex Systems and Developmental Principles). It aims to support a culture of organizational learning rather than just accountability [161] (cf. Learning Principle), and encourages incorporation of a diversity of views – indeed, the simple approach of collecting stories facilitates communication across different cultures [161] (cf. Justice Principle).

5. Foresight principle: Include foresight alongside retrospective evidence. *Evaluators should become future-sensitive, using and evaluating information from futures and foresight methods alongside evidence from the past and present to guide transformative action [177].*

Many evaluations use a retrospective approach – investigating past events to generate recommendations for future action – with the assumption that what works (or not) in the past will work (or not) in the future [177]. However, in VUCA contexts (characterized by volatility, uncertainty, complexity and ambiguity), and to support transformational change, evaluations also need to draw on futures and foresight methods, integrate future-sensitivity into their terms of reference, and judge interventions against the future [177], rather than

relying on generalizations from hindsight [4]. For example, a more future-oriented formulation of the evaluation question “To what extent did the intervention respond to beneficiaries’ needs as defined in the program documents?” would be “To what extent is the program geared to ensuring that it meets the needs of the stakeholders in the next ten years, even if circumstances change?” [177]. Without such future-sensitivity, there is a danger that initiatives will be continually caught out by changing contexts, fail to sustain desirable outcomes, and fall back on marginal, incremental change rather than systemic transformation [113,177].

An important role for evaluators is then to expand foresight evaluation capacity [4], extend attention to mid- and long-term futures [177], and support stakeholders in: envisioning desired futures and innovations [113,177]; exploring possible future scenarios, global shifts and megatrends, including how current paths of action will respond to wider system dynamics [78]; and questioning assumptions about the future (see also Values Principle) [177]. At the least, a simple exercise would be to identify existing strategic plans of relevant organizations that interact with the intervention at hand, or major milestones that are due to occur, such as Agenda 2030 expiring in 2030 [177]. To encourage transformational change, it is important for people to envision radically different desired futures [167,170,177]. These futures can then inform theories of change (including expected times for outcomes to occur), and generate rich, contextually adapted and collaboratively developed indicators of change [170,177]. Evaluators might also evaluate the quality (e.g., transformation-orientation) of envisioned futures [63] (see Transformation Principle), and initiatives’ ‘futures literacy’, future preparedness and resilience, making recommendations for how these could be improved [177].

Future-sensitivity is embedded in a number of overarching evaluation approaches, including Culturally Responsive Indigenous Evaluation (CRIE), Gates et al.’s ethics of evaluation for socio-ecological transformation, Mickwitz et al.’s theory-based framework for evaluating transitions, the Orders of Outcomes framework, Patton’s Evaluation Criteria for Evaluating Transformation, Patton & Felcis’ Principles for Evaluating Transformation, Reflexive Evaluation and Reflexive Monitoring in Action (RMA), Sitra’s Evaluation Framework, and Blue Marble, Design-driven, Feminist, Indigenous Feminist, and Visionary Evaluation (Table 2). This principle also has an affinity to Theory-based Evaluation, in the sense of futures methods results being used to enrich theories of change [113,177]. Various methods and tools help to structure the envisioning or exploration of desired or possible futures. Methods include horizon scanning, scenario building (exemplified by the work of the Intergovernmental Panel on Climate Change [186]), Delphi analysis, backcasting (working backwards from an envisioned future to understand the necessary intermediate actions), wind-tunneling (testing how existing strategies would fare in different futures), and methods for describing the future as if it exists today (e.g., imagining future newspaper headlines) [177]. Risk analysis, Bayesian statistics, and power-law mathematics can also assist prospective assessment of the effectiveness of alternative strategies prior to any implementation [134,187]. Other futures tools and frameworks include Three Horizons [160], Seeds of Good Anthropocenes [188], the Regenerative Lens [15], anticipatory action learning [189], the Value Proposition Toolkit [64], the ParEvo tool [177], and Futures Wheel [177].

Power principles

Four principles related particularly to power relations in transformation-focused evaluation and the responsibilities of evaluators to: promote justice, including through addressing power inequalities, upholding rights, decolonizing evaluation, and honoring diverse and marginalized perspectives; shift power towards evaluation users and blur the evaluator-evaluated dichotomy; support more autonomous evaluation practice; and cultivate mutualistic partnerships of knowledge and action.

6. Justice principle: Promote justice in power relations, rights, and use of knowledge. *Evaluators should promote justice as a key component of transformations, including through addressing power inequalities, upholding human and non-human rights, decolonizing evaluation, and honoring diverse and marginalized perspectives [136,89,100,106,108,190].*

Evaluators can and should be ‘activists’ for democracy and justice [100,108], including: overcoming structural injustices in knowledge systems [191]; enabling self-determination of Indigenous peoples and upholding territorial rights [106]; supporting LGBTQ+ health and equity [111], intersectional justice [111] and human rights in general [175]; and promoting the rights of Nature and other sentient beings, avoiding anthropocentrism [89,192]. As well as applying this principle in stakeholder engagement, evaluators should see evaluation results as opportunities to lobby for justice [136], and local voluntary organizations for professional evaluators could support advocacy and social action [171]. This is a fundamental shift from the more neutral, independent stance traditionally adopted by many evaluators [4].

This principle requires that evaluators become aware of power relations, cultural differences, histories and underlying ontologies within the communities and societies of interest, including how these uphold the status quo and whether unjust power structures have been disrupted [136,190]. It also requires evaluator reflexivity (see Values Principle) to recognize the power implications of any evaluation approaches advocated and what forms of knowledge they treat as valid [111]. This is particularly pertinent to the Western evaluation field, its paradigms and its history. For instance, conventional Western evaluation paradigms are founded on historical violence against Indigenous communities, with evaluations performed in extractive ways without participants’ knowledge or consent, and often used to validate Western scientific methods whilst denigrating Indigenous ways of knowing [109]. Even supposedly neutral evaluation criteria may actually impose White values and knowledge [193], and have often been used as an excuse to ignore and perpetuate violence against Indigenous peoples [109]. Modern algorithms and technologies may be inherently racist in their formulation [194]. Western evaluation has also been seen to grow from White patriarchal logics [136].

Conversely, an important aspect of justice-oriented evaluations is to honor a diversity of perspectives and ways of knowing and evaluating [106,190], giving a voice to the most discriminated and marginalized groups of people (e.g., considering diversity of race, gender and ability) [113,190] and learning particularly from Indigenous, Global South and Eastern philosophies [106,194]. This is a particular shift from the domination of evaluation approaches from the West and Global North [194], and acknowledges, contrary to many Western beliefs, that there is no absolute, objective scientific truth that defines what appropriate evaluation is [111]. For instance, it may be important to: elevate unspoken felt-knowledge and embodied experience as a valid form of knowledge and truth [109]; include place-based ecological knowledge and ancestral wisdom communicated via dreams or intergenerational traditions [106]; ensure meaningful participation of youth [195], LGBTQ+ people [111] and those in poverty [191]; and include views of laypeople or those with on-the-ground experience of real-world problems alongside other ‘expert’ opinion [172,191]. This principle therefore requires evaluators to work in multi-actor, multi-disciplinary teams [113,187], remaining open to new ideas, willing to learn and continuously identifying opportunities for enhancing their own learning [111,101] (see Values and Learning Principles). There have additionally been calls for more South-South cooperation in evaluations to resist the dominance of Global North evaluation approaches [34].

Ethical dilemmas are likely to arise in justice-oriented evaluations, and evaluators should be transparent about these and how they were addressed [136], potentially using Dilemma Resolution techniques [78,196]. More appropriate evaluation questions than ‘Does the

intervention work?’ would accordingly be ‘What works for whom, in what ways, under what conditions and with what results?’, because these questions recognize that one intervention will not work for everybody [56]. Indeed, dilemmas and contradictions can become valuable sources of transformative insight and learning if approached with the right attitude [165]. By remaining sensitive, reflexive and transparent in these ways helps evaluators to develop trusting relationships with stakeholders to unearth their perspectives and experiences [129] (see Values Principle).

This principle is important because failing to attend to local context and its power relations, and imposing externally developed evaluation approaches, can simply reproduce problematic power inequalities that hinder transformation [136]. Embracing this principle instead deepens appreciation of systemic complexity and interdependence [135,181], enables more meaningful judgements of the outcomes and impacts of transformation [67,102], encourages greater resilience through the ‘requisite variety’ in evaluation design and processes [134,106], and can generate more powerful learning between people with different perspectives [182]. As a particular example, including voices of young people is important because they tend to have more transformative values (e.g., fighting for social and environmental justice, peace, etc.), are good at building networks and alliances, have strong communication and technological savviness and connectivity, and offer fresh perspectives [195]. The Justice Principle is also an ethical imperative in itself [78].

Operationalizing this principle means applying evaluation approaches that are sensitive to cultural context, inequalities (including those related to race, gender, socio-economic status, sexual orientation, species, etc.) and conflict [34,89,111,122]. Transformative Evaluation has an explicit focus on promoting social justice, challenging power hierarchies in society and working in an inclusive and empowering way with minority and marginalized communities [54]. The Navigating the Intersection of Culture and Evaluation (NICE) Framework, Gates et al.’s ethics of evaluation for socio-ecological transformation, Prague Declaration, and Transformative Empowerment Evaluation, Transformative Participatory Evaluation, Culturally Responsive Evaluation, Equitable Evaluation, Equity-focused Developmental Evaluation, and Inclusive Evaluation, adopt similar stances (Table 2).

Approaches addressing more specific arenas of (in)justice include: Indigenous Evaluation and the Nation-to-Nation (N2N) Systems Evaluation Framework, which focus on elevating and empowering the knowledge and cultures of Indigenous peoples and First/Tribal Nations (Box 6); Feminist Evaluation, focused on advancing gender-based justice; LGBTQ+ Evaluation, which promotes LGBTQ+ inclusion and liberation; Aotearoa/New Zealand’s evaluation guidelines, which explicitly reference care toward the environment; and Made in Africa Evaluation, which aims to decolonize evaluation in Africa and support locally developed African evaluation approaches that promote African livelihoods and values (Table 2). The African Evaluation Principles similarly call on evaluations to empower Africans, address inequalities and power asymmetries, and embrace a diversity of perspectives particularly from the Global South and Indigenous cultures [88].

Box 6. Case study – Indigenous Feminist Evaluation in the ‘My Two Aunties’ program

Established in 2019, the ‘My Two Aunties’ (M2A) program is a home-visitation program for Indigenous communities in southern California run by Tribal Family Services (a department of the Indian Health Council) [109]. ‘Aunties’ traditionally provide mentorship for healthy families in these communities, and the program aims to decolonize and destigmatize social services by drawing on these Indigenous feminist and kinship

traditions, thus combatting ‘settler colonial imposition of patriarchy and violence against Indigenous women and families’ [109]. The aunties also acted as evaluators of the program [109]. Accordingly, an Indigenous Feminist Evaluation approach was used [109]. This approach:

- is rooted in a relational worldview, where ‘worlds are made up of extended networks of kin to whom we have reciprocal responsibilities’ (cf. Complex Systems Principle);
- respects tribally-specific teachings and ‘land-based ontological pluralism’ rather than imposing single truths and approaches (cf. Context, Detective and Justice Principles);
- centers Indigenous ways of knowing, including unspoken felt-knowledge and embodied experience, e.g., in the personal reflection surveys of parents conducted after each home visit (cf. Justice Principle);
- respect the data sovereignty, privacy, and specific knowledge-exchange protocols of communities [109] (cf. Partnerships Principle);
- is reflexive (e.g., naming the violence associated with Western evaluation) (cf. Justice and Values Principles);
- is explicitly normative, aiming to have a transformative impact that fosters just futures for coming generations far into the future [109] (cf. Transformation Principle).

In this way the ‘My Two Aunties’ evaluation embodied many of the Complexity, Power and Purpose Principles presented in this paper, and particularly emphasizes the Justice Principle by promoting the decolonization of evaluation.

7. Power Shift Principle: Shift power towards evaluation users and blur the evaluator-evaluand dichotomy. *Evaluators should aim to be guides rather than directors or controllers of transformation-focused evaluations: evaluations should thus be genuinely participatory and empowering for evaluation users [101], allowing them to take greater ownership, leadership and responsibility of designing and delivering evaluations, and acting on their findings [136,121,130].*

This principle sees participation as going beyond tokenistic consultation and instead involving a genuine transfer of power towards users of evaluations [101,130]. These stakeholders are not simply sources of data [136] and evaluators not mere data collectors [162]. Rather, users should be involved in deliberative discussions throughout the process of designing, conducting and drawing conclusions and recommendations from evaluations [122,197], and trusted as ultimate authorities on what is appropriate for their context, including the purpose of evaluation [122], evaluation questions [122], which data to collect [136], and what criteria and indicators to evaluate against [89]. Moreover, evaluation outputs (e.g., reports) should be disseminated to stakeholders with the agency to act on the findings, and not only to funders [35]. Indeed, evaluation data should be treated as autonomously owned by evaluated communities [111].

This principle signifies a fundamental shift in the role evaluators play [106], and blurs the traditional dichotomy between evaluator and evaluand [78]. Transformation-focused evaluators might be better described as participant observers [130], facilitators [136], change agents [4], ‘active design team member[s], fully participating in decisions’ [179], critical friends [179], or partners with other stakeholders [121] – rather than primary experts imposing their own view of reality and evaluation approaches on communities without consultation [101,130], and conducting top-down evaluations that externally judge evaluands without

providing opportunities for development and reflection [198]. Rather, they are guided by critique and deliberation with evaluation users [106], and listen to voices that disagree with the perspectives of the evaluator or funder [179]. Evaluators may not even be the primary evaluators, but rather supporting communities to critically evaluate their own progress [121], building capacity for evaluative thinking and evaluation utilization in evaluated systems [171]. Evaluators may require training in developing these kinds of facilitation, communication and interpersonal skills (including conflict resolution), with which evaluators can help communities access their untapped collective wisdom and creativity, and nurture conditions of trust and inclusivity where insights can be safely and willingly shared [172,176]. Overall, however, evaluators may have to move fluidly between more ‘internal’ roles (invested in the system) and ‘external’ roles (independent from the system), and remain able to adopt the stance of a more external, independent, critical expert if this is considered most appropriate for the case in hand [100], such as where there is a risk of organizations cherry-picking results or greenwashing [78] (see Autonomous Evaluation and Values Principles).

Examples of this role reconfiguration include genuine youth-participatory evaluation, in which evaluation is not something ‘done to’ young people but ‘with or by’ young people, potentially with young people as co-evaluators or directors of evaluation and adult evaluators as coaches or facilitators [195]. In education, there have been calls for greater participation of students in self-assessment, self-reflection and peer assessment rather than didactic teacher-led approaches, disrupting the traditional power asymmetry [169].

This principle is important for a number of reasons. Overall, it embodies the kinds of ethically imperative power shifts sought in the transformation of wider social-ecological systems [190] (see Justice Principle). Shifting power towards the evaluand can deepen participants’ understanding of evaluation [136], and by building evaluations around dialogue in community settings, people can learn from each other, become more aware of social forces influencing their beliefs and behavior, and learn the importance of giving others feedback [182] (see Learning Principle). More technocratic evaluations – in which the methodology, questions and analysis are ultimately designed and imposed by the expert evaluator research team – may lead evaluators to ask the wrong questions and overlook important aspects, such as political dimensions [191]. Adopting this principle would also encourage commitment to act on evaluation results [136] and increase the likelihood that transformation-focused evaluation would become an integral, self-sustaining part of working cultures rather than a periodic externally applied exercise [101] (see Learning Principle).

Operationalizing this principle requires evaluators to build trust-based relationships with stakeholders in culturally appropriate ways that are context-aware [136], acknowledge and challenge power imbalances [190] (e.g., incorporating voices of the most marginalized [199] – see Justice Principle), and encourage deliberation about different values [89] (see Values Principle). A wide variety of evaluation approaches are built around greater participation and empowerment: as well as all those listed under the Justice Principle, they include Adversary, Collaborative, Deliberative, Democratic, Design-driven, Developmental, Participatory, Real-time and Reflexive Evaluation (Table 2). Empowerment Evaluation aims to enhance communities’ capacity to self-evaluate [101,200]. Utilization-focused Evaluation, meanwhile, encourages working with evaluation users in participatory ways that foster a sense of ownership by the users as they shape the evaluation approach [131]. Broadly speaking, participatory action research is often an appropriate method or framing for these kinds of participatory evaluations [197], and some analysis methods lend themselves well to dialogic and participatory contexts, such as Most Significant Change [162] (Box 5).

8. Autonomous evaluation principle: Support autonomous evaluation practice. *Evaluators should resist evaluation contracts and designs dictated principally by*

markets and individuals or organizations with vested interests and power in maintaining the unsustainable status quo [25,135]. Instead, evaluators should support stronger professionalization and autonomy of evaluation practice, which includes adopting clearer ethical and critical stances and permission to speak frankly in support of transformational change [25,146].

This principle is important because evaluations led by those in positions of power may be insufficiently critical (e.g., policy evaluations led by the associated government ministry) [19]. If evaluations are driven by globalized markets and vested interests in traditional kinds of economic growth, meanwhile, economic impacts (e.g., ‘value for money’ or ‘social return on investment’) will typically dominate the focus of evaluations, with less attention given to social and environmental considerations [25,135,139], and the evaluation may impose more homogenizing criteria that ignore individual uniqueness [166] (see Context Principle). For example, evaluation criteria for development are often based on industrial and technological paradigms focused on economic efficiency [181], and education evaluations underpinned by neoliberal thinking are product-focused, assessing student merit based on their ability to compete, whilst ignoring sociocultural diversity [166]. By supporting more autonomous and professionalized evaluation practice, however, evaluators could be more selective in choosing to conduct evaluations that align with ethical stances of supporting transformational change [25].

Operationalizing this principle will require collective action from evaluators to develop the ‘features of professionalism’, emphasized in the Prague Declaration [122], including ‘an ethical charter, expert knowledge, proven competencies and self-management’ [25]. As for particular evaluation approaches supporting this principle, Democratic Evaluation is notable for purposely avoiding excessive manipulation of evaluations by government agencies and the ‘information monopoly’ of program managers [98]. Adversary Evaluation has a goal of resisting neoliberal domination of evaluation and contributing to public good [87], whilst the African Evaluation Principles urge evaluators to guard against vested interests [88].

9. Partnerships principle: Cultivate mutualistic partnerships of knowledge and action. *Evaluators should cultivate mutualistic partnerships of knowledge generation and sharing when working together towards transformations, built upon strong ethical and professional codes of conduct [135,122]. They should also encourage and evaluate alignment and cooperation of different transformation efforts [78].*

Partnerships of knowledge generation and sharing should promote mutual trust, shared values, transparency, honesty (including about mistakes and limitations), fairness, inclusivity, and shared responsibility for evaluation results [122]. The principle of *ukama* or ‘relatedness’ from African *Ubuntu* philosophy has been suggested as a foundation for nurturing solidarity and complementarity between Global North and South [165]. Partnerships should respect actors’ different responsibilities and role boundaries, and avoid letting egos and personal agendas dominate [163]. They should exist not only within evaluation teams, or with commissioners and users of evaluations, and other local stakeholders (including Indigenous peoples) – but also with other evaluators and national or international associations of evaluators, researchers, junior evaluators, students, interns, and other young people [135,122]. To develop strong, lasting relationships, it may be important to engage with stakeholders in person ‘in the field’ rather than only online engagement [122]. Another important aspect of this principle is that evaluators should encourage and assess alignment and cooperation of different transformation efforts [78]. This principle means taking care to avoid: developing only short-term, superficial relationships with partners [122]; failure to maximize accessibility of evaluation results [122]; and repetition, redundancy or incongruence of separate transformation initiatives [78]. Evaluation data are often considered proprietary, resulting in inadequate sharing across the field and therefore lack of coordination and integration [179].

Transparent and respectful knowledge exchange is a key aspect of this principle. Evaluators should devote intentional time and resources for sharing evaluation findings [179], and doing so in an honest and transparent way [146]. International fora and conferences provide suitable spaces for evaluators to share evaluation results and experiences with other evaluators, researchers and policy professionals [146], as well as writing articles [201]. Importantly, evaluators should make a particular effort to share their knowledge with actors working to transform systems [202], and with experts across different disciplines [78]. Evaluation reports should aim to be open-source, engaging, attractive and easily accessible, with clear, transparent and context-sensitive language that avoids unnecessary jargon [179,122]. Transparency means being honest about mistakes, failures and unintended consequences, and how theories of change evolved over time, for instance [179]. At the same time, evaluators should respect the unique protocols around knowledge-sharing and caretaking responsibilities around knowledge in particular (e.g., Indigenous) communities [109]. Overall, evaluators should reflect on whether they are being as effective as possible in helping to disseminate findings, influence others, and ultimately assist transformation [106,179,197].

This principle is important for numerous reasons. Inter- or transdisciplinary, multi-sector and multi-stakeholder approaches and partnerships are necessary for working with wicked problems [64,191,203]. Partnerships can provide a greater diversity of ideas and skills and encourage shared learning: for instance, evaluators could work productively with futurists and modelers to develop more powerful scenario planning (e.g., discussing what trends to pay attention to for the future) [56], and senior evaluators could act as mentors for junior evaluators, students and interns [122]. Indeed, the necessary shift to multiple and bricolaged methods (see Context and Detective Principles) means that having mixed teams of evaluators with different types of expertise – including newcomers, ‘outsiders’ and amateurs – may be critical (because one evaluator is unlikely to know every method) [57,122]. Greater knowledge-sharing by evaluators could furthermore enhance learning and innovation in the evaluation field as a whole [179]. Stronger coordination between different evaluations and ‘cross-case learning’ would enable them to complement each other in providing a more holistic understanding of a system [113,141], provide insights about how initiatives could be deepened, broadened and scaled up [204], and support more alignment and cooperation of initiatives to facilitate system change [78]. Evaluators should bear in mind that evaluation results may be used by new or previously unestablished actors in transitions, such as new NGOs or cooperatives, emphasizing the importance of making results transparent and accessible [113]. Finally, adopting these partnership values could encourage the implementation of evaluation recommendations [122].

While there are no specific evaluation methods to guide these forms of wider partnership-building per se, many of the evaluation approaches that promote decolonization, justice, and genuine participation (see Justice and Power Shift Principles), such as Transformative Evaluation, embed the building of trusting relationships with evaluation users (Table 2). Furthermore, the ‘Yin Yang Principle’ of Blue Marble Evaluation encourages engaging with different perspectives, harmonizing conceptual polarities and divisions, and transcending boundaries [90]. The African Evaluation Principles encourage a focus on developing relationships of reciprocity and mutual accountability [88], whilst the Prague Declaration also emphasizes the importance of mutualistic partnerships [122]. Utilization-focused Evaluation makes a point of encouraging wider dissemination of significant evaluation findings to expand influence [131].

Purpose principles

Three principles were considered to relate to the deeper purpose and values of evaluation in transformation contexts and were collectively called the Purpose Principles. They encourage evaluators to surface, question and uphold values, foster evaluation cultures centered around

ongoing learning, and ultimately focus on evaluating and supporting systemic transformations towards regenerative futures.

10. Values principle: Surface, question and uphold values. *Evaluators should work with evaluands to surface and reflexively question the underlying values at play in transformation processes [89,101,205,206], and ensure that transformational values are upheld [136].*

There are several dimensions to this principle. The first is that evaluators should surface, evaluate, and facilitate discussions about subjective aspects of evaluands, including their underlying values, worldviews and norms that shape behavior [89,101,205]. Evaluation does not take place in a value-free vacuum – there are always political, economic, cultural, and other value-laden forces at play [136]. For instance, different stakeholders will have different perspectives on where a system's boundary lies [205], there will be plural values held for nature [89], desired system outcomes and evaluation results are likely to be contested [136,106], and political influence or vested interests may sway project outcomes [113]. As in the Context and Justice Principles, evaluators are therefore obliged to take into account the memories, heritage, and associated values of particular places, events, rituals, languages, arts and culture [132], and integrate the intellectual and emotive aspects of evaluation [168]. Indeed, evaluators should recognize the importance of people's emotional and spiritual development during an evaluation as well as more objective dimensions, like gaining knowledge [182]. This requires a warm, nurturing social environment to encourage respect for other people's beliefs and values [182].

The second dimension is the importance of reflexivity and questioning underlying values, assumptions, beliefs and worldviews. Evaluators should encourage critical reflection amongst stakeholders and help them to understand their own positionality [206], asking important and difficult reflexive questions even if the answers raise uncomfortable discussions [176], and potentially playing a 'brokering' role in mediating conflicts of values [89]. This may include questioning the acceptance of contextual aspects of evaluations (e.g., the policy strategies behind the policy impacts being evaluated, or the fundamental goals of a program or initiative more generally) as fixed and appropriate, whereas in reality they may have flawed assumptions that affect downstream actions [113,137]. Similarly, evaluators should beware blindly applying existing indicators to local contexts without reflecting on whether they truly are measures of success [136] (see Context Principle).

Equally, evaluators should recognize that they themselves are not value-free [25] and never perfectly neutral or objective [4], and reflect on how their own worldviews and values shape evaluations [106] (see Justice Principle). The worldview evaluators carry influences ontology, epistemology and axiology, and thus inevitably the way they evaluate [136]; evaluators see 'through the eyes of [their] own history and environment' such that their 'view of reality is always partial and slanted' [136]. Similarly, evaluators are never fully 'external' to and independent from evaluands – a second-order approach that recognizes evaluators' embeddedness within the system being evaluated may be more appropriate [106,101]. A 'good internal praxis' [165] of reflexivity in evaluation teams would include articulating the assumptions guiding an evaluation and whose they are [132], transparency about power relations, learning from their own stories of success and failure, openness about their fears and vulnerabilities, and sharing this learning with others [165].

The third dimension is that transformation-focused evaluators should uphold and remain true to their own transformational values, whilst appreciating the many different perspectives that people have on what transformation means [78]. They should take an ethical stance of supporting positive transformation (see Transformation Principle), justice (see Justice Principle), and the public good [136], and integrate their ethical codes into evaluation activities, relations, organizations and training [171,122] (see Autonomous Evaluation Principle).

This principle involves a fundamental shift from evaluations built on a positivist worldview that assumes objectivity and neutrality of evaluators [136], leading to evaluations that typically focus on quantitative facts [101], omit important value-laden political and cultural dimensions [166], and lack reflexivity about their own values and approaches [106]. For example, much evaluation of education tends not to be reflexive about why something is learned [169]. While they may be well-suited to some contexts (e.g., evaluating medical interventions), more positivist, quantitative evaluations are often insufficient for the social contexts of transformation [78]. The principle is based on a more constructivist view of people as ‘socio-historical subject[s]’ with strong political-ethical dimensions [169].

There are various reasons why this principle is important to adopt. For one, it brings evaluations closer to the social reality of transformations [78]. Values are inextricably linked to more objective or quantitative aspects examined in evaluations [101]. Ignoring the underlying values and beliefs of participants – the ‘elephants in the room’ – could perpetuate a ‘culture of silence’ that simply reproduces a problematic status quo [101]. Shifts in social norms, values, beliefs, assumptions, and purposes are also powerful indicators of the depth of transformation [121]. Self-reflection by evaluators, meanwhile, requires humility, which disrupts the conventional power dynamic of the evaluator as directive expert [122] (see Power Shift Principle). Lastly, understanding what inhabitants value about their locale has been noted as encouraging regenerative mindsets and action, because these values can then be incorporated into manifesting the place’s potential [147].

Numerous evaluation approaches have an explicit focus on surfacing and reflexivity around people’s values, including: Adversary Evaluation; Deliberative Democratic Evaluation; Developmental Evaluation and especially Equity-focused Developmental Evaluation; Made in Africa Evaluation; the NICE Framework; and Principles-focused, Systemic, Transformative, Value(s)-based, and Visionary Evaluation (Table 2). In Reflexive Evaluation or Reflexive Monitoring in Action, evaluators act as ‘sparring partners’ [53] who continuously encourage innovation teams and networks to challenge underlying assumptions and systemic patterns in designing and managing transition initiatives [53,125]. Empowerment Evaluation and Feminist Evaluation encourage critical thinking particularly about power relations and prescribed roles [100,101]. Other tools and methods that help to elicit values include the Three Horizons framework, the Value Proposition Toolkit and Causal Layered Analysis (e.g., in encouraging participants to imagine radically different desired futures and the contrasting values underpinning them [64,160,170] – see also Foresight Principle), the Theory U framework [67], the Four Levels of Conversation framework [67], and the Most Significant Change method [207] (Box 5).

11. Learning principle: Develop evaluation cultures centered around ongoing learning. *Evaluators should develop evaluation cultures centered around ongoing learning during transformation processes [100,201], rather than driven by accountability requirements for showing positive results [139,162,191,114], and fear of failure [78].*

Many evaluation contracts and designs, both today and historically, have been driven by requirements of accountability for the achievement of specific predetermined objectives, compliance with regulation, and the need to show positive results for funders and governments, rather than accountability for learning [139,162,191,114]. In international cooperation, for example, Global South countries are often required to present proof of a well-implemented project to donors, which satisfies donors’ accountability needs but not necessarily the learning needs of the country being evaluated [24]. This focus has given evaluation negative connotations of program problems, punishment and control [136], and created a fear of failure [78]. It also encourages simplistic, linear, ‘value-free’ designs and framings of interventions leading to particular outcomes, with limited timescales tied to funding cycles [139,208].

Transformation-focused evaluators should try to support a cultural shift in the meaning of accountability and purpose of evaluation. Accountability should instead be focused on things like alignment to principles and values, or ensuring rigorous and systematic learning processes and consequent adaptation rather than having particular impacts in complex systems [67,114]. Indeed, strategic learning may be the only outcome in system change that social innovators and evaluators can truly control [67]. A future-sensitive approach (see Foresight Principle) additionally suggests that initiatives should be accountable *to* future as well as present or past generations [78,177]. This then potentially shifts evaluation from being seen by evaluands as a punitive exercise and primarily for the benefit of funders and regulators, toward seeing the value of open, honest reporting and learning, and evaluation's benefits for the people being evaluated, and beyond [100,162]. Organizations will need to be able to review negative feedback without defensiveness [201], be prepared to admit that original objectives were not met [179], and confront contradictions or tensions (e.g., between Global North and South perspectives and positionality), recognizing these outcomes as powerful opportunities for learning [165].

Overall, this shift means that adaptive learning for facilitating positive transformations becomes the central purpose of evaluation [139] (see also Developmental and Transformation Principles). Evaluators should advocate the value of evaluation to this end, especially persuading people in power [19], and helping others overcome associations of fear and blame around evaluations [201]. Avoiding the term 'evaluation' altogether may be useful in the initial stages of attracting participants in some evaluations [162] (instead using language like 'review' or 'consultation' [209]). Having stakeholder 'champions', who believe in the value of evaluation and are enthusiastic to take results to those with the power to implement change, is also useful [136]. Creating an evaluation *culture* centered around learning requires further steps to embed this mode of evaluation. For instance, evaluation should ideally become a core activity of all teams, rather than performed by just one person or unit [201]; moreover, longer time horizons are needed, since transformation should never be seen as 'done' and instead be understood as a continual learning process [121] (see Developmental Principle).

The real result of an evaluation, after all, is the learning from its process and findings and how this steers action [78,122]. Learning takes many forms, and takes place at many levels and at all stages of an initiative or transition (not just at the start or end) [210]. In transitions there is also a need to 'unlearn' old patterns and ways of doing things as well as learn new ones [210]. Some have distinguished between single-, double- and triple-loop learning [211]. 'Single-loop learning' (i.e., problem-detection-correction) is limited to asking whether intended outcomes have been achieved, and monitoring predetermined performance indicators [152] – in other words, 'are we doing things right?' [211,212]. Double-loop learning, meanwhile, involves examining the causal mechanisms underlying observed change, asking 'are we doing the right things?' [211,212]. Triple-loop learning goes even further, exploring and questioning underlying assumptions, values and beliefs, and asking 'how do we decide what's right?' [104,211,212]. Reflexivity (see Values Principle) is therefore key for deeper learning to occur. To support learning towards system innovation, it is important not just to encourage reflexivity but also to monitor and record reflexivity changes and learning journeys (as in Reflective Monitoring in Action) – i.e., collective reflection on an initiative's reflexivity by the actors involved will in turn help to increase the initiative's reflexivity [213].

Many different frameworks, in addition to single-, double- and triple-loop learning [211,104], help to conceptualize and facilitate more transformational forms of learning. In Freirean pedagogy and the related Telessala Methodology, students 'learn by doing' and become empowered, reflective citizens, rather than unquestioningly absorbing information delivered didactically [101,182]. The concepts of experiential learning [171,206] and

design-based learning [94] also emphasize a learning-by-doing approach. In generative learning, learning is based on integration of new and pre-existing knowledge in creative ways [162]. There are also ideas about learning being shaped by social and contextual interaction, such as social learning [191], the Critically Reflective Work Behavior framework (used particularly for social learning in businesses) [94], and the socio-cultural perspective on learning, whereby learning is understood to originate from social and material interaction and is shaped by cultural, historical and relational factors, such that learning involves the ‘whole person’ [43]. ‘Transformative learning’ shares features of triple-loop learning, experiential and social learning; it is action-oriented and includes critical reflection of underlying assumptions and beliefs and how these are shaped by context [171]. In futures research, ‘anticipatory action learning’ is used to reflexively interrogate possible and desired futures and how they could be brought about [189] (see Foresight Principle). While learning traditions including collaborative learning (from educational sciences), organizational learning (from management studies), and interactive learning in the learning economy (from institutional economics) have value for understanding learning in system change processes, they are not yet sufficient for working with complexity [210]. Hence, novel theories about complexity-informed learning have emerged from transformation-focused evaluation practices, such as system learning, whereby actors learn to redefine system barriers as opportunities and are thus inspired to design activities contributing to systemic change [213].

Many overarching evaluation approaches assimilate these ideas about learning, including Blue Marble, Design-driven, Developmental, Dynamic, Empowerment, Equitable, Participatory, Real-time, Reflexive, Transformative and Visionary Evaluation (Table 2). For instance: Transformative Evaluation draws on transformative learning theory [199]; Reflexive Monitoring in Action incorporates ideas about system learning [213]; and Empowerment Evaluation aligns with Freirean principles [101]. Several evaluation frameworks for evaluating complex systems change (e.g., those of Cabaj, Hargreaves, and Preskill et al.) also aim to create cultures of learning (Table 2). A number of other data collection and analysis methods are also geared towards supporting transformational learning, such as authentic dialogue [101], After Action Reviews [67], and appreciative inquiry [64]. Failure Reports and Intelligent Failure Learning Loops are structured processes to encourage admission and understanding of ‘failures’ in interventions and learn from them [67]. More generally, interviews and focus groups are important data collection methods for enabling reflection [123].

12. Transformation principle: Focus on evaluating and supporting systemic transformations towards regenerative futures. *Evaluators should facilitate systemic transformation towards regenerative futures, remembering the urgency for global transformation in a ‘time-is-running-out world’ [4,26], and therefore focus on evaluating transformations and integrate transformational principles across different facets of evaluations [63].*

Whilst the nature of transformation is inevitably context-dependent, transformation should be understood as getting to deeper causes of problems, rather than incremental, superficial or reformist change that perpetuates problematic current systems [4,136]. Evaluators should aim to assist transformations to regenerative, resilient futures, which feature ‘adaptive sustainability’ [4], social justice [190] (see Justice Principle), and the flourishing of life [106]. Evaluation can support these kinds of transformations in multiple ways, including by understanding the implications and impacts of ongoing transformations, as well as providing developmental feedback for purposeful interventions in systems change [19]. This principle is vital, and ethically imperative, because the urgency of current crises means that fundamental change is needed across societies to safeguard the survival and thriving of life [26,113].

This principle shifts evaluation criteria. Many past evaluations have been geared towards increasing our understanding about current systems and measuring problems rather than evaluating transformative principles, visions and action [4,172,214]; while these have produced much useful information, they have tended to support only incremental improvement [113] which at best slows the ‘incremental destruction of life’ [172]. Such evaluations have tended to focus on criteria of economic growth and productivity [215], effectiveness in achieving micro-scale outcomes [24], and whether money, time and effort were spent efficiently [24], and give insufficient attention to environmental impacts [135]. Transformation-focused evaluation criteria, on the other hand, would aim to encourage transformative action [214] and regenerative thinking [216]. They would need to link interventions to system-level impacts [86] (such as how underlying structures, patterns and mindsets of systems are shifting [64,122]), developing and continually testing theories of system change [64]. Transformation-focused evaluation criteria would assess: visions of futures and transformation trajectories, and whether these are meaningful and genuinely oriented towards system change rather than more isolated or incremental change [63,113] (see Foresight Principle); experimentation [113]; the alignment and momentum amongst different actors, networks, institutions, ideas, initiatives and movements towards transformation [4] (see Partnerships Principle); and whether transformation rhetoric is backed up by appropriate action rather than greenwashing [4]. They would move away from assessing isolated pillars of sustainability (e.g., environmental, social, economic) towards assessing interactions between different dimensions, including co-evolutionary relationships between human systems and wider nature [217]. Transformation-focused evaluation would also assess the health of social-ecological systems over multiple generations into the future [109,215], and measure how conditions conducive to life are being created or maintained in a place, so people can see their role in increasing a place’s vitality or quality of life [172].

This principle also underscores the imperative to fundamentally redesign evaluation practice, as laid out in all the other principles, and integrate these transformational principles across different facets of evaluations [19,63]. This is a major paradigmatic shift, and not merely tweaking evaluation, like a greater reliance on technology as the evaluation field adapted to the COVID-19 pandemic [19]. The principle particularly highlights a shift from the traditional neutrality of evaluation, as it recognizes that evaluators are not independent of the system being evaluated (see Values Principle); rather, they have a personal interest in successful transformation (‘skin in the game’) [4]. There have been calls for evaluators to instead become more vocal communicators and advocates for transformation [146]. Evaluations are thus seen as part of transformation processes, not removed from them – i.e., seeing evaluation *as* system change, not just for or about system change [4,64]. Evaluators may have to be pickier about the contracts they choose to accept, refusing those that are not sufficiently geared towards transformation or restrict the evaluator’s ability to encourage more transformational approaches [78] (see Autonomous Evaluation Principle).

Numerous overarching evaluation approaches explicitly support transformational change as an ethical imperative. These include Blue Marble, Dynamic, Feminist, Footprint, Transformative, and Visionary Evaluation, Transformative Empowerment Evaluation, Transformative Participatory Evaluation, the African Evaluation Principles, Gates et al.’s ethics of evaluation for socio-ecological transformation, and the Prague Declaration (Table 2). Many other approaches and frameworks, while not necessarily taking such a strong ethical stance, nonetheless focus on assessing transformational, systemic change, including Cabaj’s Inquiry Framework for Evaluating Systems Change, Hargreaves’ framework for evaluating system change, Latham’s Systems Change Evaluation framework, Mickwitz et al.’s theory-based framework for evaluating transitions, the Orders of Outcomes framework, Patton’s Evaluation

Criteria for Evaluating Transformation, Patton & Felcis' Principles for Evaluating Transformation, and the TIPC methodology (Table 2). The Systems Change Evaluation Canvas tool can aid reflection when designing a systems change evaluation [218].

Various theories and frameworks help to conceptualize transformations and other forms of change in complex social-ecological or socio-technical systems. These include transition theory and regime shifts [113,152,219], panarchy and adaptive cycles [152], Meadows' leverage points and the related Intervention Level Framework [32,67,102], the Action Scales Model [102], the World Mandala [78,156,157] and Ambition Loops [78,220,221] (particularly for identifying synergistic actions), actor network theory [113], innovation systems theory [113], the multi-level perspective [113], the Stewards' Pathway (a developmental theory of system change) [64], Kania et al.'s system change framework [64], and 'directionality' of system change [138,152]. The Signals of Transformational Change and related Four Dimensions of Transformational Change frameworks make an important shift from only tracking limited, specific quantitative metrics and indicators to tracking broader signals of systemic shifts at different stages of progress [62,222]. It is recommended to present evidence of contributions to system changes (e.g., changes in an initiative's system maps over time and/or more narrative-based 'contribution stories') to different stakeholders to obtain their interpretations, because these will vary depending on whose perspective is taken into account [102]. This is supported by tools such as SenseMaker, based on the Cynefin framework from management science, which helps to obtain micro-narratives from the system context, drawn from people's experiences, reflections, perceptions and attitudes, and make sense of emergent patterns from those narratives [102,223]. The Most Significant Change method can also help to identify anecdotal evidence of transformative impacts [206] (Box 5). Other frameworks such as Three Horizons, the Six Pillars framework, Causal Layered Analysis and the Theory U framework also help to convene conversations about transformational versus reformist change, and structure exercises of visioning radically different futures [67,78,170] (see Foresight Principle).

Various disciplines, frameworks and tools exist for focusing evaluation on regenerative systems and futures. Fields such as regenerative design, regenerative development and regenerative sustainability, as well as many Indigenous frameworks and philosophies, already embrace many of the principles laid out in this paper in support of the flourishing of life – such as considering change as more unpredictable and emergent, recognizing unique locales, embracing reflexivity and co-creation, and seeing the evaluand as part of a wider social-ecological system [15,172,224]. Regenerative design and development tools, such as the Regenerative Community Development Evaluation Tool [216], Regenerative Capacity Index [225], and LENSES framework [167], emphasize a shift from focusing on evaluating outcomes (e.g., of sustainable buildings) to evaluating processes of design and building community regenerative capacity [172,224], avoiding generic top-down forms of assessment [224]. Various other tools encourage ambition, imagination and regenerative thinking in exercises of envisioning desired and possible futures, such as the Regenerative Lens [15] or Seeds of Good Anthropocenes [188].

Discussion

This paper presents the first systematized review of literature on evaluation in transformation contexts, and provides the most comprehensive set of guiding principles and relevant methodologies for transformation-focused evaluation to date. The principles (Table 1; Fig 3) highlight the importance of transforming evaluation's complexity awareness, its power relations, and its purpose and values, if evaluation is to assist wider transformations in societies. They call for transformation-focused evaluators to appreciate evaluands (e.g., a transition initiative, sector, or region) as unique, entangled, nested, dynamic and uncertain systems, and employ more diverse, developmental, contextually adapted and future-sensitive evaluation approaches. The

principles also urge evaluators to promote justice, embrace diverse and marginalized perspectives, and reduce evaluator-evaluand polarization by shifting power towards evaluation users, whilst also fostering a more autonomous evaluation profession and mutualistic partnerships of knowledge and action. Most fundamentally, the principles advocate for a recentring of values, reflexivity and learning at the heart of evaluation practice, and ensure that the core purpose of evaluation is to support systemic, societal transformation towards regenerative futures.

Our review suggests that if these principles – which represent major shifts in evaluation conventions – are applied by evaluators (and supported by evaluation commissioners, sponsors and funders), they will significantly enhance the effectiveness of evaluation in assessing and assisting positive transformations. An important caveat is the tension between the Justice, Power Shift and Autonomous Evaluation Principles, which we discuss below. For an evaluation to be ‘transformation-focused’ as understood in this review, we suggest that it must apply Principles 1-6 and 9-12 (particularly because of the many interdependencies and complementarities between these principles, as illustrated in Fig 3), and also apply the Power Shift Principle where this does not contradict the Autonomous Evaluation Principle, and apply the Autonomous Evaluation Principle only where this does not contradict the Justice Principle (Fig 3). The principles are to be applied as an integrated set, not selected on a whim as from an *à la carte* menu. Together they provide a powerful approach to preparing for, and navigating, desired transformations as well as the transformations and social-ecological collapses that are already in train.

While the principles bear similarities to the Prague Declaration [122], they go further than the Declaration in several ways. Firstly, they clarify how transformation-focused evaluation is a fundamental contrast from how evaluation has often been done in the past, building on but going further than earlier paradigm shifts in evaluation. Secondly, they surface certain principles that, while possibly implicit in the Prague Declaration, are not obvious in that statement. These include the recognition that evaluands are unique, the need for more agile and developmental evaluation approaches, the importance of working with values, and the change in emphasis from results-based accountability to learning – all of which underscore the deeper paradigmatic shifts necessary for a more transformation-focused evaluation. Thirdly, our principles are more action-oriented in suggesting existing methodologies for putting the principles into practice. Our principles also complement and build on Patton and Felcis’ criteria and principles for evaluating transformations [4,63]. In particular, the latter have a stronger focus on *what* features of evaluands should be evaluated, whereas our principles focus on *how* evaluation practice itself should be conducted, and highlight the numerous ways in which evaluations can *embody the transformations they aim to support* by fundamentally shifting their *modus operandi*.

Viewing the principles as a whole, what stands out is the radical shift from what might be termed ‘first-order’ evaluation – where evaluators aim to be independent, value-neutral observers assessing systems from the outside – towards ‘second-order’ evaluation [226], where evaluators are embedded in system change processes, treat evaluation as an intervention that becomes part of system change, are reflexive about their own positionality, and actively support successful transformation because it is morally imperative and they have ‘skin in the game’ [4]. This shift is likely to be controversial for those who see evaluation as a neutral technical activity. Ultimately, however, a key skill for evaluators is to know when to ‘step into’ the system being evaluated, adopt a more cooperative power relation with other stakeholders and potentially build the capacity of initiatives to evaluate themselves, and when to ‘step out’ and adopt a more removed, independently critical approach. This will depend on context [227]. For instance, independent or external evaluation – where power cannot be exerted on the

evaluator to give a particular judgment, and the evaluator has not been actively involved in the transformation effort up to that point – may be particularly important given the need to hold governments and businesses to account at a time when greenwashing and ‘transformation-washing’ is rife [10,228], and many investors and businesses are retreating from Environmental, Social and Governance (ESG) commitments due to their politicization by right-wing actors [229–231]. Independent evaluation is also deemed important for intergovernmental financial institutions such as the International Monetary Fund, whose governance structure otherwise lacks democratic accountability [232]. In other cases, more second-order approaches may be appropriate. In the Netherlands, for instance, groups of civil servants at a few municipalities act as reflexive evaluators to work on the dual purpose of tackling societal challenges, such as the energy transition, as well as changing internal modes of operation, to turn into a learning organization [78]. External evaluations may also be inappropriate where they reinforce colonial issues, such as Global North evaluating the Global South, highlighting a tension between the Autonomous Evaluation and Justice Principles (Fig 3). We would emphasize that more independent, external evaluations can still be transformation-focused even if they do not apply the Power Shift Principle. For instance, they can still apply stronger ethical stances of assisting positive transformations. Such ‘bias’ does not preclude evaluators from offering useful critical feedback, as highlighted in approaches such as Reflexive Monitoring in Action [213]. The Power Shift Principle is an ideal that is pragmatically inappropriate in some contexts, but applicable and indeed imperative in others.

We call on evaluators, funders, policymakers, communities and other actors to attend to the presented principles in the commissioning and practice of evaluation if they aim to support transformations in social-ecological systems towards regenerative futures. This is because evaluation aligning to these principles not only provides insight into the impacts of transformations and developmental feedback for transformation initiatives, but also actively supports and embodies transformation in its ethics and approach. It would also encourage ongoing critical reflection in initiatives on whether ambition and transformational intent are being maintained, and not simply whether the status quo is being maintained and managed effectively. Sustaining such transformational intent is likely to be essential for achieving genuinely transformational change in societies, rather than more incremental change that fails to address global crises with the speed, breadth and depth that are urgently required [13]. There is likely to be a similar challenge in maintaining a transformational focus in evaluation practice and not falling back onto conventional approaches. Developing ‘communities of practice’, such as the Transformational Change Learning Partnership of the Climate Investment Funds [222], is likely to be important for embedding the kinds of transformation-focused principles presented in this paper.

Whilst some of the principles have been in practice for longer and are more mainstreamed, others may be more unfamiliar or contentious. Adaptive management applies developmental evaluation principles and has become increasingly common over the last two decades in conservation and natural resource management, as well as international development [233–235]. For even longer, China’s approaches of ‘directed improvisation’ (whereby the central government facilitates local, decentralized experimentation) and co-evolution between governments and markets, have applied developmental principles and are key factors behind China’s extraordinary success in poverty alleviation [236–238]. There has also been much progress in evaluations adopting complexity-aware and more genuinely participatory approaches, e.g., in the public health field [45,46].

However, the association between evaluation and objectivity, neutrality, quantification, standardization, controlled experimental designs, and counterfactual evidence, is widely institutionalized (e.g., in guidance from research funding bodies, and policymaking [174]).

Such forms of evaluation are valuable in their appropriate context, but are rarely sufficient, and often unfeasible or inappropriate, where transformational change is sought in complex systems. There may also be significant pushback from governments and private sector organizations with vested interests in prolonging the status quo rather than fundamentally transforming their actions. These all present major hurdles to convincing actors of the importance, trustworthiness and rigor of transformation-focused evaluation. While transformation-focused evaluators can, and have a responsibility to, maintain rigor – including by remaining empirically grounded, justifying the choice of methods, and questioning underlying assumptions [85] – actors in wider society also have a responsibility to reset standards and expectations around what makes a rigorous evaluation. Particular responsibility lies on commissioners, sponsors and funders of evaluations to shift notions of accountability towards adaptation and learning rather than achievement of specific results, and to expand temporal horizons to enable more ongoing, developmental forms of evaluation.

Despite these barriers, there are also significant opportunities, such as in the growing importance of impact investing and evaluation in the private sector (e.g., social enterprises) and philanthropy space in support of transformative change [239–241], and collaboration with the many science communities working at the nexus between environment and development, such as the Intergovernmental Panel on Climate Change and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. The current crisis in development evaluation following major cuts to international aid budgets might spur evaluators to work more collaboratively, embrace responsible use of powerful new technologies such as AI, and both reframe and more strongly champion the vital role played by evaluation in assisting transformations. Moreover, the kaleidoscope of different approaches, tools, techniques and concepts now available offer many tangible routes into operationalizing transformation-focused evaluation principles. But transformation-focused evaluation is ultimately more than just applying particular evaluation methods, and requires a radical shift in our mindsets, including how we think about action and intervention more broadly. As our review has shown, transformation-focused evaluation means adopting a complexity-informed worldview, attending to issues of power, working in more coordinated, cooperative ways with diverse actors, and adopting an ethical stance of supporting social-ecological transformations towards regenerative futures by facilitating reflexivity and learning, seeing evaluation as part of the change process itself. It is also about reminding ourselves of how fundamental evaluation is to how we see the world and act within it, and its deep connection to the very things that make us human, including reasoning, critical judgment, understanding, intuition, values, empathy and morality [242]. Change the way we evaluate, and a whole new world of possibility emerges.

Supporting information

S1 Table. Information on database searches used to obtain literature on transformation-focused evaluation.

(DOCX)

S2 Table. Screening criteria for documents found in the literature review.

(DOCX)

S3 Table. Overarching evaluation approaches relevant to transformation-focused evaluation. Numbers in the third column refer to the principles proposed in this paper. They are color-coded according to the three main groups of principles: green for Complexity Principles, purple for Power Principles, and blue for Purpose Principles.

(DOCX)

S4 Table. Data extraction form.
(DOCX)

S5 Table. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist.
(DOCX)

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Chapter 4: How can we embed transformation-focused evaluation in transformation efforts?

Chapter 2 clarified what a regenerative orientation for transformations would look like, while Chapter 3 deepened understanding of the implications of the transformational imperative for evaluation. Together, these explained how evaluation practice must transform its own complexity awareness, power relations and purpose, and infuse its criteria and ways of working with ideas related to regenerative systems, dynamics and practice, in order to enable desired societal transformations.

This then raises the question of how such concepts can be applied in practice. Because of the limited application to date of transformation-focused evaluation (Chaplowe and Hejnowicz, 2021; Colvin et al., 2024; Picciotto, 2021), particularly in Western contexts, we have little understanding of how it could most effectively be implemented and embedded in our transformation efforts. This chapter therefore answers the question: ‘How can we embed transformation-focused evaluation in transformation efforts?’, using the Food for the Future in North Yorkshire food system transformation initiative as a case study to explore how to embed transformation-focused evaluation in a real-world context.

Designing, implementing and embedding transformation-focused evaluation: A framework and insights from a regional food system change initiative

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Abstract

Transformation in societal systems such as food systems is required to overcome global crises. An essential part of stewarding desirable transformations is for organizations and initiatives to develop understanding of whether such transformations are occurring, their contributions (both potential and actual) to transformation, and the impacts of transformations already underway, as well as maintaining capacity for agility and adaptation. These are fundamentally issues of *evaluation* – the process of assigning quality, value or importance to something – that enables learning about transformations. However, the movement towards transformation-focused evaluation is a relatively recent chapter in the evolution of the evaluation field, a major and challenging departure from mainstream evaluation practice, and lacking in case studies of its design and application. Here we provide a rare insight into the collaborative process of designing, and starting to implement and embed, transformation-focused evaluation in the context of a large regional-scale food system transformation initiative, Food for the Future in North Yorkshire. We present the transformation-focused evaluation and learning system designed for the initiative, which shows how core evaluation questions, goals and guides, and different forms of feedback, sense-making and learning could be integrated and reinforce each other within an ecosystem of actors striving to support food system transformation. We discuss the innovations, progress and challenges in the framework and its application, as well as our lessons more broadly for the growing number of organizations and initiatives interested in using transformation-focused evaluation to support large-scale system transformation.

Introduction

To transcend intersecting and compounding environmental, social and geopolitical challenges [1] – including climate change, biodiversity loss, social inequality, disinformation, and neofascism [2–8] – societies must be transformed towards futures with radically different, regenerative dynamics that enable life to flourish [5–7,9,10]. Transformation is broadly understood to involve some kind of major, fundamental change, rather than merely marginal or superficial change [11]. An essential part of stewarding desirable transformations is for organizations and initiatives to develop understanding of whether such transformations are occurring, their contributions (both potential and actual) to transformation, and the impacts of transformations already underway, as well as maintaining capacity for agility, adaptation and

evolution [5,12–14]. These are fundamentally issues of *evaluation* – the process of assigning quality, value or importance to something [15,16] – that enables learning about transformations [13].

However, evaluating transformation requires a transformation of evaluation practice itself [5]. Traditional Western modes of evaluation are poorly suited to contexts of transformation in complex systems [17]. Such evaluations have frequently been characterized by: treating evaluands as isolated projects; linear theories of change based on causal linkages for static, pre-planned objectives; time horizons limited by project budget cycles; evidence drawn primarily from the past and present; and an obsession with quantifiable metrics [14,17]. Their power relations and epistemology have also been deemed problematic, including: accountability focused narrowly on meeting donors’ needs (e.g. value for money), often to the detriment of a project’s wider mission; a technocratic approach with superficial stakeholder participation in shaping the evaluation; and an assumption that evaluators are value-neutral observers independent from the system of interest, which is a fallacy [14,17].

In contrast, propositions of more transformation-focused evaluation (TFE) emphasize how evaluations must: consider the complex interplay of evaluands with wider systems, and their contribution to change (including long-term consequences) in light of many other influencing factors; help transformation initiatives remain nimble to emergent, unpredicted changes; and employ qualitative as well as quantitative methods, and foresight methods, drawing on diverse forms of knowledge [14,17,18]. This echoes trends towards such complexity-informed approaches in various other disciplines, such as organizational and environmental management, particularly since the 1970s [19–22].

More ambitious proposals for TFE advocate further shifts in power relations, epistemology and purpose, including that evaluators should: adopt a more activist, ethically grounded stance that foregrounds, surfaces and reflexively questions *values*, and decolonizes evaluation; strive for more autonomous and professionalized evaluation practice that can speak out against vested interests in the unsustainable status quo; shift power towards the users of evaluations, with a focus on building organizations’ capacity to self-evaluate, and evaluation recognized as an intervention that is inextricably part of change processes rather than removed from them; and carry broader accountability for human and planetary flourishing, maintaining the orientation of partnerships towards achieving just transformations towards regenerative futures, and developmental learning from this process [14,17,18].

There is increasing recognition of the need for TFE in the evaluation field [5,13,14,18,23–25] but application and development of TFE in practice remains limited [12–14]. As well as the inherent challenges of system transformation, the shifts in mindset that underpin TFE, and widely institutionalized but outdated assumptions about what evaluation is and can be [17,26], this situation is exacerbated by the messy nature of real-world contexts, where unpredictability, emergence and continually shifting parameters are commonplace, and agility, adaptation and urgency are paramount [5,27]. In such circumstances, evaluators may need to flexibly shift between different roles [14,28], and evaluations may need to be rapidly established and implemented in the absence of extensive resources and expertise [27]. These factors, combined with contexts of working amongst multiple crises and even system collapse [29–31], make it a difficult task to embed the radically different approaches of TFE within traditional systems of governance and management [14,18].

This paper therefore aims to address the question of how we can effectively design TFE and embed it in governance for system change. We present findings from two years of collaborative, action-oriented design research with a large regional food system transformation initiative that designed a transformation-focused evaluation and learning system. The initiative, Food for the Future in North Yorkshire, is currently coordinated by North Yorkshire Council [32] with support from the FixOurFood research programme [33]. In the following sections we describe our methodology, before presenting the resulting evaluation framework. We finish by discussing the innovations, progress and challenges in the framework and its application, as well as our lessons more broadly for the growing number of organizations and initiatives interested in designing, implementing and embedding TFE to support large-scale system transformation [14].

Materials and methods

This study used a co-creative, action-oriented design research approach to design a transformation-focused evaluation and learning system (TFELS). Below we first introduce our case study, before describing the ontological framing and epistemology of the research and the methodology through which it was applied.

Case study: Food for the Future in North Yorkshire

North Yorkshire Council (NYC) became operational in April 2023 as part of the UK Government's 'devolution' plan to give greater power to local and regional authorities. NYC represents the merging of eight district councils and the abolishment of the previous North Yorkshire County Council, replacing the previous two-tier district/county council system with a single overarching council. The City of York and North Yorkshire became a single Mayoral Combined Authority with a new Labour Party (politically left of centre) mayor in 2024. The Combined Authority works in partnership with NYC and City of York Council. As in other local councils in the UK, NYC's structure consists of democratically elected representatives (known as councillors – 90 councillors in NYC's case) who make key decisions, and officers hired to support the design and implementation of council policies. At the time of writing in 2025, NYC is nominally controlled by the Conservative Party (politically right of centre) with support from some Independent councillors, although the Conservatives lack an overall majority.

NYC was spurred to develop a new food strategy by publication of Henry Dimbleby's National Food Strategy report [34] and consequently the UK Government's food strategy [35] (which has since been updated [36]), alongside the multiple crises and challenges of the COVID-19 pandemic, Brexit, trade wars, climate change, the cost-of-living crisis and the obesity epidemic – highlighting the need for more resilient, sustainable and salutogenic food systems. The strategy is currently referred to as Food for the Future in North Yorkshire (hereafter abbreviated to 'Food for the Future'), and its development to date has been coordinated by NYC's Public Health team.

North Yorkshire is the largest county in England by area (8,000 km²), with a human population of over 615,490, a diversity of soils, land cover and farming systems, and a mix of urban and rural environments (Fig 1) [32,37]. The county's food system also shares many challenges with other food systems, such as high rates of food insecurity [32,38]. The North Yorkshire case is therefore likely to be of interest to those involved in other regional-scale system change initiatives. Inspired by their prior involvement in Three Horizons [39] workshops in 2022 organized by the research consortium FixOurFood [33] to explore how transformation of the Yorkshire food system towards a regenerative future could be supported [40], NYC aimed to use a similarly transformation-focused approach in Food for the Future. There remained a key question about how the initiative and its impact would be evaluated, motivating a dedicated design process.

The aims of the design process were threefold. Firstly, it aimed to create a TFELS that could be applied by Food for the Future. It therefore required that the initiative's stakeholders were sufficiently empowered to apply the TFELS without external support. Secondly, the design process aimed to facilitate participants' learning about TFE and appreciation that TFE requires a fundamental shift in thinking about the role and process of evaluation. The third key aim was to record the design process and participants' learning in a way that could be shared with other interested parties to facilitate similar processes in other transformation initiatives.

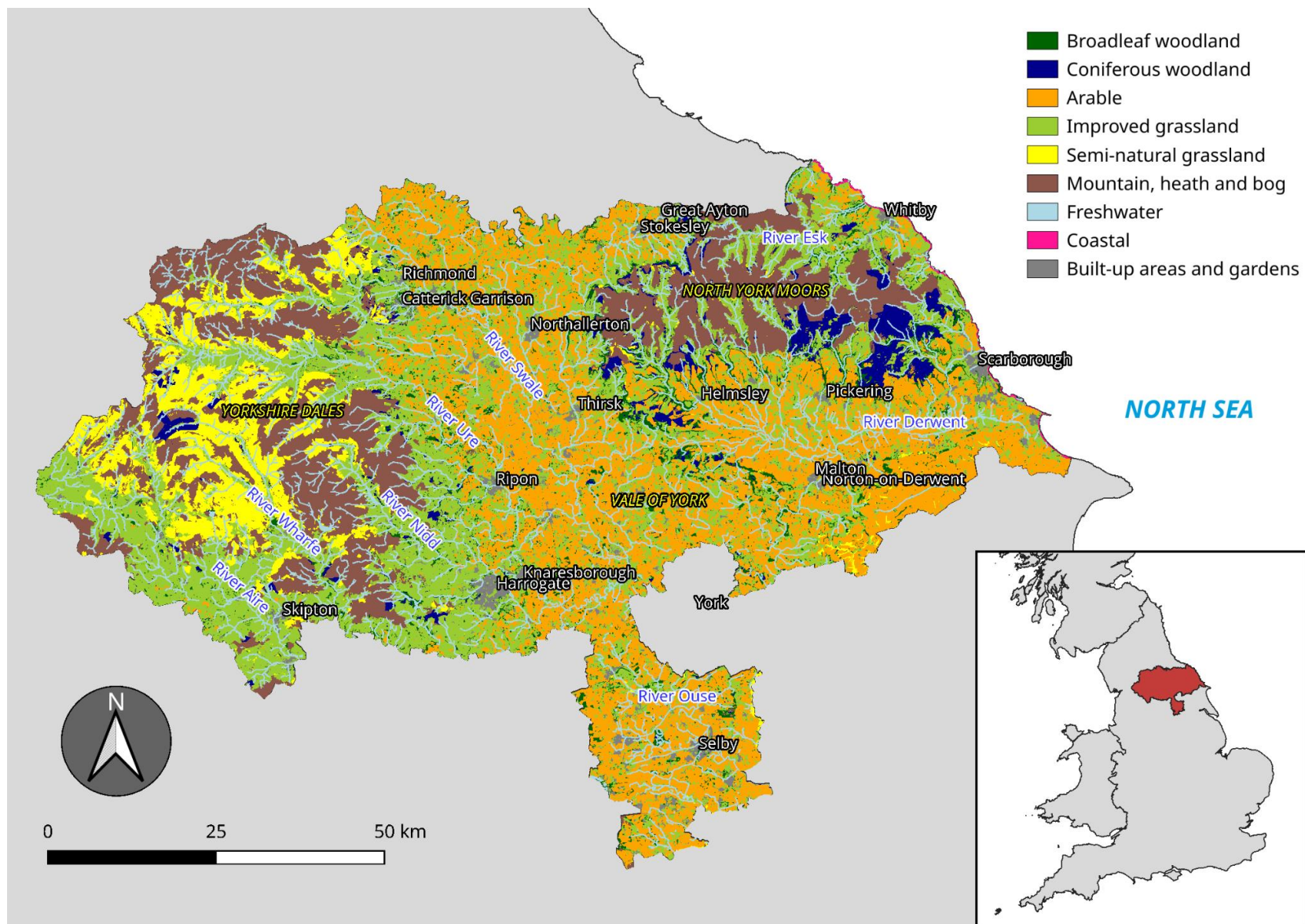


Fig 1 | Map of the North Yorkshire county under jurisdiction of North Yorkshire Council, England. The map shows major land cover types, river systems and human settlements. The land use pixel scale is 1 km. Image produced by Juan Pablo Cordero and Sam J. Buckton using AgriFoodPy [41] and QGIS. Based upon Land Cover Map 2023 © UKCEH 2024. Contains Ordnance Survey data © Crown Copyright 2007, Licence number 100017572. For further maps see the North Yorkshire Council Council Plan 2025-2029 [37].

Ontological framing

Our study was framed by three key ontological positions. First is the concept of a *regenerative food system*. We recognized the urgent need to support the emergence of a regenerative food system in North Yorkshire. By a *food system* we meant aspects related to the production, processing, distribution, access, preparation, preservation, consumption, disposal and recycling of food, and the interactions between these [33,42], as well as interactions more broadly between food-related behaviors, technologies, economies, politics, health, environment and society, and the assumptions and worldviews underlying the food system [33,42–44]. This holistic perspective is essential for tackling the interconnected nature of food system challenges [42,44]. Broadly speaking, *regenerative systems* maintain positive reinforcing cycles of health within and beyond themselves, including between humans and wider nature [9], such that ‘life creates conditions conducive to life’ [45]. Importantly, being regenerative goes well beyond reducing anthropogenic harm to acceptable levels [46,47], with new dynamics that result in ‘more good’ rather than simply ‘less bad’, and worldviews that appreciate ecological interdependence and mutualism [9,43,47–49]. While there is no one definition of a *regenerative food system*, such systems often honor the uniqueness of places and regions, relocalize foodsheds, elevate Indigenous and traditional ecological knowledge, feature regenerative and agroecological forms of farming, and strive for food sovereignty [43]. A regenerative systems framing was used during earlier research to support NYC to push ambition and imagination in the envisioned future food system [32] (see below), whilst also allowing stakeholders to co-create their own understanding of what this would look like in the North Yorkshire context.

Second, achieving a regenerative food system would clearly require *transformation* of the current North Yorkshire food system. Transformation was taken to mean a major, fundamental change, qualitatively distinct from more marginal and superficial change [50]. We also considered transformation to go beyond merely technological, behavioral and policy changes, and involve shifts in underlying beliefs, values, intent, purpose, structures, institutions, power relations, paradigms or worldviews that in turn help to bring about system reconfiguration [51–55]. The substantial current challenges in the North Yorkshire food system, including power imbalances, inequality of food access, poor nutritional health, high levels of food wastage, ecological degradation, and the need to adapt to climate change, made food system transformation imperative [32]. In Food for the Future, the Three Horizons framework [39] was used as a framing for how transformation was expected to occur (Fig 2).

Third, we understood that achieving transformation would not be possible without transforming our approach to evaluation [14,18], as described in the Introduction. Because traditional understandings of evaluation are widely institutionalized (e.g. in policymaking [56]), there is an inherent challenge in shifting mindsets about evaluation in transformation contexts, and not only implementing TFE but *embedding* it within a different culture of working. One of the key roles of TFE is to push people towards deeper forms of *learning* (the change in knowledge and behavior as a result of experience [57]), which some call ‘triple-loop learning’ or ‘transformative learning’ [58–60], about underlying assumptions, values, beliefs and paradigms. Deeper learning is itself characteristic of *transformation* [51,54,61]. Together, the goal of a *regenerative food system*, brought about by *transformation* of the current food system and supported by *transformation-focused evaluation*, provided a powerful ontological framework for this research.

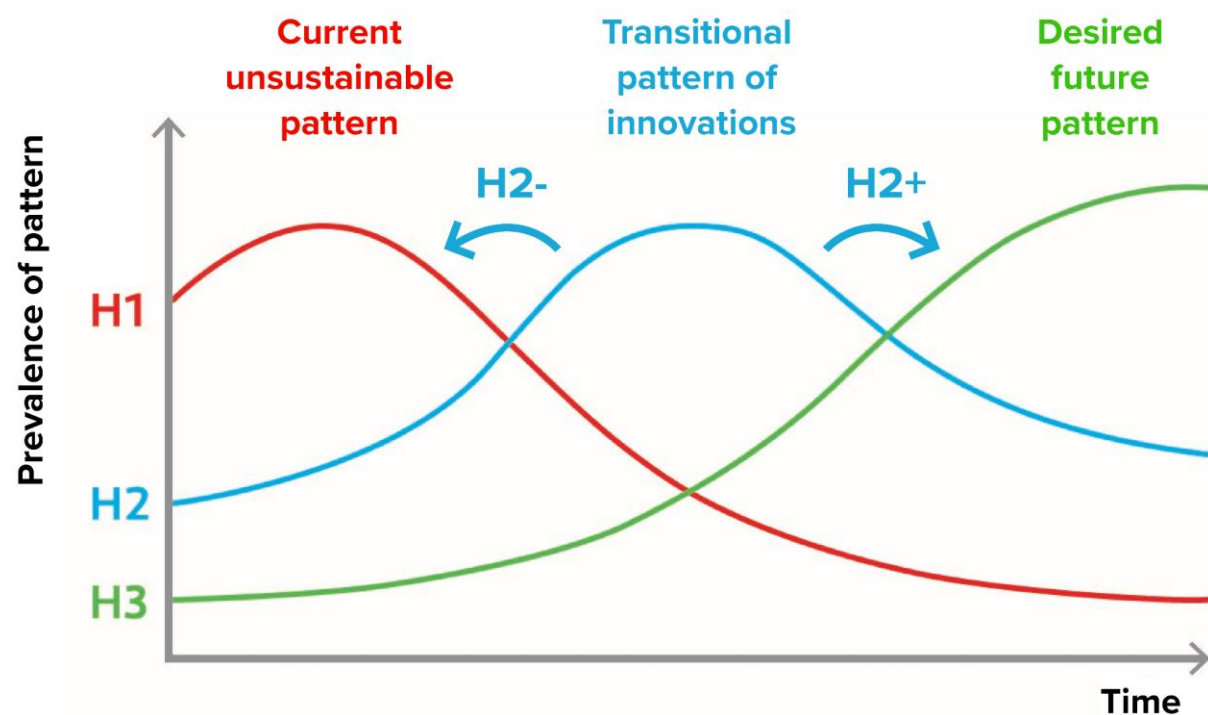


Fig 2 | The Three Horizons framework that helped to frame understandings of system transition and transformation in the Food for the Future in North Yorkshire initiative. In Three Horizons, the future is viewed as three horizons, or societal patterns. Horizon 1 (H1) is the pattern that dominates the present, but is declining as many aspects of it – ways of working, values, assumptions, technologies, and so on – lose their fit for purpose as the wider environment changes. Horizon 3 (H3) then represents an envisioned, radically different future – the sense of what a collective wants to bring into being. Horizon 2 (H2) is a transitional pattern of innovations, some of which (H2-) are captured by H1, extend

its lifespan and delay the diffusion of H3, whereas others (H2+) create space for H3 to diffuse and ultimately reconfigure the system. The scaling used in the graph is not intended to be taken literally, but rather for rough qualitative comparison. 'Prevalence' describes the relative prevalence of a horizon (e.g. the amount of resources it holds or transmits, or the proportion of human activity taking place related to the horizon). Time flows from left to right: the present is found where H1 is dominant, and all information to the right of this is in the future. Figure created by Sam J. Buckton in [Mural](#).

Epistemology

Epistemologically, our study took the form of *design research*. We considered design to be an iterative, ongoing process of creating new desirable ideas, tools and systems [62,63]. We focused on designing a TFELS, although design could also be considered to extend to Food for the Future's process of envisioning a *regenerative food system* in North Yorkshire and trying to stimulate the *transformation* required to bring it into being (see 'Ontological framing'). In design research, researchers 'design and study interventions that solve practical problems in order to generate effective interventions and theory useful for guiding design', recognizing that 'theory and interventions drive each other in complex, iterative ways' [64]. We saw design research as bringing additional methodological rigor and transparency to the process of *design* to enhance *learning* (where 'rigor' includes building on prior theory and research, and reflexivity around methodological appropriateness, the role and influence of the researcher, and the underlying cognitive dimensions of design [65–67]). We assumed that recording our own learning, as well as communicating this learning with others, would facilitate our own reflexivity and behavior change [68].

To support our design research, our study was underpinned by a second-order, co-creative and action-oriented approach to generating knowledge. In second-order research, research is recognized as a form of intervention in systems, researchers are engaged in change processes, researchers' positionality is understood to shape their observations and interpretation, and it is acknowledged that no single person will have a full understanding of the system being explored [69]. This is in contrast to a traditional 'first-order' or positivist research process whereby researchers assume their ability to observe systems in an independent and value-neutral way 'from the outside looking in' [69–71], with a belief that knowledge produced in this way, particularly as 'episteme' (pure theory), is its most valid form [69]. A reflexive second-order approach opened up possibilities for more collaborative, co-creative and action-oriented research by levelling the traditional power dynamic between 'expert' researcher and those being researched – enabling those users of research to play a

greater role in shaping it, and the value of knowledge and design to be judged by its usefulness and use by its intended users [72], and ultimately by its effectiveness in supporting transformation. Such research is considered to enable a more powerful collective learning journey for the people involved [72,73]. All participants were considered to have legitimate claims to the knowledge produced, and as such were invited to be named as co-authors of this manuscript.

As a result of applying design research underpinned by second-order assumptions, our study included diverse ways of knowing. For instance, prospective, normative, intuitive, creative, and practical forms of knowledge, and ‘learning by doing’, all play a role in design work and supporting transformations [70,74,75]. The importance of experiential, practical knowledge [69] was particularly clear in our case, given that we intended for the designed TFELS to be operationalized by Food for the Future stakeholders, whilst future-oriented, normative, ‘visionary’ or imaginative kinds of knowledge [69] were important for envisioning what a TFE approach would look like assuming that it was highly effective and successfully integrated into the wider governance of the initiative. Such epistemological pluralism is essential to support wise action in stewarding transformations [69].

Together, this approach – incorporating design research, a second-order stance, and epistemological pluralism – gave us greater confidence that the resulting artefact of our design process (namely, a TFELS for Food for the Future) would accurately reflect the needs of the initiative, be useful, applied and embedded, and achieve its intended outcomes, which are ultimately to support *transformation* towards a *regenerative food system* in North Yorkshire.

Methodology

An Evaluation & Learning Working Group (ELWG) was established in September 2023, drawing on interested members of Food for the Future’s existing partnership and including members of NYC’s Public Health team, a NYC Councillor, and other stakeholders (S1 Table), to undertake the main thrust of the design process. Angela Crossland (AC) was designated the ultimate ‘sponsor’ of the work with accountability for taking actions forward to the various groups in Food for the Future and to the wider council. Ruth Everson (RE) was designated the working group’s coordinator and administrator, with Sam J. Buckton (SJB) as a facilitator. Clarifying these power relationships was important because of the aim to ultimately empower Food for the Future actors to continually apply the TFELS themselves. This required a less

directive, more facilitative role for SJB and a more directive role for other Food for the Future stakeholders [76].

Engagement with the ELWG was structured around monthly to bimonthly 1.5-hour online workshops, starting in earnest in September 2023 following initial scoping meetings between SJB and NYC Public Health officers, and continuing until January 2025, at which point the ELWG's focus had switched to engaging more directly in meetings of the Core and Partnership Groups, who had emerged as being the key groups coordinating the decision-making and evaluation of Food for the Future, to build their capacity to implement the TFELS (Fig 3). Initial contracting amongst the ELWG included establishing the aims and a set of principles for the design process and how the group would work (S2 Table), and scoping out the purpose of the evaluation, drawing particularly on the approach of Design-driven Evaluation [63], Mickwitz et al.'s theory-based framework for evaluating transitions [77], and Utilization-Focused Evaluation [72] (Table 1). Questions asked of the ELWG included: What would success look like for this group? What needs to be understood and evaluated to support the governance of the initiative? Who are the users of the evaluation? Are there any key constraints that we need to be aware of? What process will you need that supports you effectively to reach your goals? Contracting was an ongoing, iterative process, particularly because of the adaptive, developmental nature of the food strategy itself, and contracting questions were frequently revisited throughout engagement with the ELWG.

As well as discussions about contracting, typical workshops included brainstorming and feedback on TFELS designs, presentations by SJB on different aspects of TFE, and 'learning by doing' sessions where aspects of TFE were actively applied to Food for the Future or other material (e.g. Principles-focused Evaluation). Between workshops, SJB created or updated TFELS designs in [Mural](#), a collaborative online whiteboard platform, that summarized the workshop discussions and also drew on other evaluation approaches, frameworks and tools that resonated with the case study (Table 2). This 'bricolaged' approach [78] was considered appropriate to the emergent nature of the evaluation design, the need to create something tailored to the case study, and aligning to TFE best practice identified by others, whilst also having transparent discussions with the ELWG about how the different 'ingredients' were being incorporated and their possible limitations [78] (Table 2). The designs were then presented, critiqued and developed in subsequent workshops in an ongoing iterative process.

Some members of the ELWG were additionally involved in three in-person full-day Three Horizons [78] workshops (between April and October 2023), along with surveys and between-workshop consultations, with NYC officers, councillors and wider stakeholders, to identify priority domains of action for transforming the North Yorkshire food system (Table 3), and three in-person full-day workshops exploring transformation-focused governance approaches for Food for the Future (January, April and May 2024) (Fig 3). These workshops all had implications for the initiative's evaluation, which were fed back to the full ELWG. Between the monthly ELWG meetings, SJB had additional meetings with RE and Rebecca Newman to discuss progress and plans for the ELWG and the coordination between the ELWG and the wider governance of Food for the Future. This integration with the different ongoing strands of the food action framework development (Fig 3) was considered fundamental to the success of the evaluation design process.

A full-day in-person 'Partnership in Action' event, effectively a celebration and launch event for Food for the Future, was held in York (UK) on 14 November 2024, involving c. 50 participants comprising members of the initiative's Core, Partnership, Action Domain, and Coordination Groups as well as some wider interested parties. This event applied aspects of the TFELS, including prioritization of transformation-focused actions that Food for the Future should support based on H2+ criteria, and a ripple effects mapping exercise [79]. Criteria in the former exercise included the extent to which the action disrupts H1 ('disruption'), protects 'pockets of the future in the present' with radically different ways of doing things ('incubation'), encourages deeper shifts in the underlying values, paradigms, purpose and worldviews towards those that align with the vision of a regenerative food system ('depth'), and supports more system-wide change ('breadth'), along with an extra criterion of additionality (the extent to which an action is novel and does not unnecessarily duplicate existing action). In the latter exercise, participants were asked to answer the question: 'What outcomes or impacts have you noticed already from the food strategy development and your involvement in it?'. It was emphasized to participants that it didn't matter how small or seemingly insignificant the outcome/impact was, and that it could be negative as well as positive. Participants wrote their answers individually on post-it notes. SJB thematically analyzed the results in Mural, first grouping them into positive and negative ripple effects and then inductively by theme (Supporting information). Any links identified by participants between different ripple effects were represented by arrows (Supporting information).

Sense-making and learning were facilitated through various means in addition to ripple effects mapping. A 1.5-hour online focus group in January 2025 with members of the ELWG

was dedicated to reflecting on learning from the design process. Participants were asked two main questions, based on the premise of imagining that we were using our experience to advise another organization on how to design a TFELS, and help people to shift their thinking about evaluation towards more transformation-focused approaches: 1) What would we identify as the most important factors to make these processes effective? and 2) What are some of the challenges we would expect others to face? Reflexive practice – understood to include the challenging of underlying assumptions, questioning the influence of power structures, and deeper forms of reflection on how our assumptions changed [80,81] – was also introduced to the design process in several ways. Part of SJB's role was to be a 'sparring partner' who continually encouraged participants to challenge underlying assumptions about evaluation [82]. Throughout the design process, participants also recorded key learning points or 'pivot points' (when the direction or assumptions of the design and strategy development process substantially shifted) along a timeline in Mural. SJB also kept a reflexive diary [83,84], which included reflections on the dynamics and energy within meetings and how these might be affected by the power relations at play, including the tricky navigation between SJB's positionalities as early-career researcher, evaluator and facilitator [85] as well as North Yorkshire food citizen, and how he was perceived by other participants. The process of paper writing, editing and review was additionally seen as a core part of the co-creative and reflective process, in shaping and consolidating ideas and learning. Such sense-making was particularly important in meeting the aim of sharing our learning with other interested parties to facilitate similar processes in other transformation initiatives.

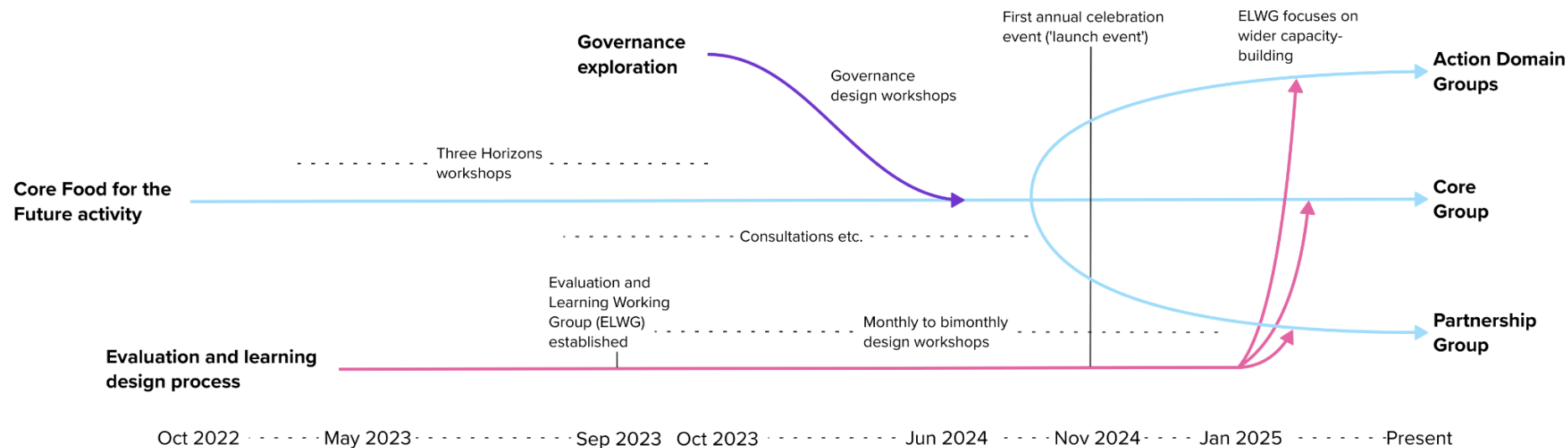


Fig 3 | Timeline of the key strands of work feeding into the Food for the Future in North Yorkshire initiative. ‘Governance exploration’ refers to a set of three workshops exploring possible transformation-focused modes of governance, some aspects of which were integrated into the main food strategy development activity. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

Table 2 | Approaches and frameworks that informed and inspired the transformation-focused evaluation and learning system (TFELS) and its design process for Food for the Future in North Yorkshire. Multiple approaches and frameworks were drawn upon because none were considered sufficient in themselves for the initiative's purposes.

Approach or framework	Aspects applied in case study and their relevance	Potential limitations and risks
Blue Marble Evaluation [78]	●Applied the Blue Marble Evaluation Bricolage Methods Principle ('Conduct utilization-focused evaluations incorporating Blue Marble principles to match methods to the evaluation situation') ●Enabled us to make better decisions about what would suit a particular context, given conditions of limited time and expertise, uncertainty, and the fact that no single tool, framework or method was entirely satisfactory for the purposes of Food for the Future ●Helped to keep the TFELS utilization-focused (see also Utilization-focused Evaluation below) and useful for its end users, even in changeable circumstances, as well as providing opportunities to weave in key concepts and frameworks related to transformation	●Risk of 'adultery' [86], i.e. slapdash incorporation of ideas from a wide array of sources without considering their fit for the situation at hand
Contribution analysis [62]	●Aspiration to periodically apply contribution analysis to understand Food for the Future's contributions to change in the North Yorkshire food system	●Will not provide clear-cut evidence of the initiative's causal effects

Approach or framework	Aspects applied in case study and their relevance	Potential limitations and risks
Design-driven Evaluation [63]	● A utilization-focused, co-creative, iterative design approach in creating the TFELS (see also Utilization-focused Evaluation) ● We applied some of the recommended steps of this approach in early meetings of the ELWG (particularly the identification of evaluation users and principles for the TFELS)	
Developmental Evaluation (DE) [86,87]	● Relatively continuous, adaptive, iterative, timely approach to evaluation and its design, appropriate for the dynamic nature of Food for the Future and the North Yorkshire food system ● The TFELS is an emergent design as well as the initiative itself ● Utilization-focused (see below) ● Complexity perspective and systems thinking ● Co-creation, with evaluators relatively embedded in the initiative ● A positive deviance or appreciative inquiry approach that builds on potential and what is already working well, rather than picking apart problems	● Risk of over-simplifying and trivializing DE rather than seeing it as an intensive, rigorous, approach which may also require discrete periods of focused, structured evaluation activity (the TFELS cannot claim to be a full DE [86])
Empowerment Evaluation [76]	● Building the initiative's capacity to continuously self-evaluate ● Increasing sustainability of the evaluation	● Lack of more independent, external feedback ● Higher risk of dishonesty or 'washing'
Mickwitz et al.'s theory-based framework for	● We found the list of questions to ask when designing transition-focused evaluations useful for structuring ELWG	

Approach or framework	Aspects applied in case study and their relevance	Potential limitations and risks
evaluating transitions [77]	conversations and sense-checking the TFELS design	
Orders of Outcomes [88]	● Inspired the TFELS' distinction between enabling conditions and impacts ● Earlier iterations of the TFELS followed the framework even more closely	● Orders of Outcomes is aimed primarily at coastal and marine management projects
Principles-focused Evaluation [89]	● Aspiration to regularly apply Principles-focused Evaluation to assess the initiative's fidelity to its core values and principles, including its focus on transformation	● Its effectiveness depends significantly on the quality and evaluability of the values and principles in question
Ripple effects mapping [79]	● Applied as a routine exercise to capture emerging outcomes of the initiative	● Risk of over-emphasizing positive outcomes over negative ones ● Risk of biased anecdotal evidence
Sentinel Indicators [90]	● Aspiration to apply this approach to quantitative indicators of food system health in North Yorkshire – i.e. monitoring indicators that represent processes of change that may be difficult to study in their entirety, are easily communicated, and signal the need for further analysis and investigation	● Sentinel indicators by themselves will not tell us about the impact of Food for the Future ● They risk oversimplifying the food system ● Indicators are 'limited interpretations, not objective descriptions' [91] – in fact they are often value-laden, including in how we choose which indicators to follow. In effect, the indicators we choose reflect how our particular group conceptualizes the food system

Approach or framework	Aspects applied in case study and their relevance	Potential limitations and risks
		●The desired future is contested and chosen indicators may therefore also be contested. No indicator will be universally accepted ●Risk of omitting important indicators because they are hard to measure (e.g. qualitative, contextual). It is particularly difficult to measure ‘ultimate ends’, like wellbeing [91] ●Food for the Future could potentially become focused on chosen indicators as ultimate goals, which may discourage efforts to achieve outcomes that are less easily measured
Signals of Transformational Change [39]	●An aspiration to look for signals of large-scale systemic shifts in the North Yorkshire food system and evaluate what, if any, contribution Food for the Future has made to these	●Relatively generalized; not geared towards food systems per se
Three Horizons (Three Horizons) [14]	●Underpins Food for the Future’s and the TFELS’ goals and guides ●Helped to orient the TFELS towards transformation	●Three Horizons has many suggestions for how transformations should best be stewarded, but is not intended to be a theory of change. There is a risk of ignoring other possible theories of change and transformation
Transformation-focused Evaluation (TFE) [71]	●Implemented TFE’s Complexity Principles via the TFELS’ systemic, contextually adapted, developmental approach, drawing on various kinds of feedback and knowledge, including creative and prospective knowledge (e.g. from	●Considering TFE’s Power Principles, there is an explicit drive in the initiative to understand priorities for food system intervention from the perspective of the county’s more marginalized or under-represented food citizens (e.g. young

Approach or framework	Aspects applied in case study and their relevance	Potential limitations and risks
	Three Horizons) ●Applied the Power Principles in the partnership approach to working and a joined-up approach to action that explores reinforcement between different interventions both within the initiative and beyond it. It also demonstrated a significant shift in power compared to typical evaluator-evaluand relationships, instead blurring this line, and building evaluative capacity across a whole network ●Reflected the Purpose Principles in its attention to underlying values, starting to shift the initiative away from more rigid results-based accountability towards a more adaptive culture of learning, and its focus on transformation towards a more regenerative food system	people, and those facing greater food insecurity), and to empower them through food system change, although these voices have not been represented in the design of the TFELS per se
Utilization-focused Evaluation [72]	●Shaped the TFELS according to the needs of the users of the evaluation, creating a framework that is more likely to be useful for and applied by the evaluation's primary intended users	●Lack of more independent, external feedback ●Losing sight of TFE

Table 3 | The seven action domains identified as critical for food system transformation via the Food for the Future in North Yorkshire Three Horizons process, and their priority actions.

Action domain title	Action domain goals	Priority actions
Securing nutritious and affordable food for all	● Tackling the root causes of food insecurity and creating the right conditions for everyone to have equal access to nutritious food, regardless of income, geography, demographic, disability or dependency.	1. Connect local community food providers and set up local joint arrangements. 2. Implement a 'local sourcing' food procurement policy. 3. Improve awareness and knowledge of those in client-facing public roles in food insecurity issues.
Raising Yorkshire pride in food businesses	● Celebrating and supporting a local food economy that prioritizes local food products, connects food producers and food citizens, and progresses more self-reliant and resilient food networks. ● Putting good food entrepreneurs and enterprises at the heart of local economic development to ensure that buying local is the healthy and easy choice whilst also creating jobs, businesses and prosperity and regenerating high streets and local places.	1. Develop a North Yorkshire strategy for growth and development of holistic food/business approaches. 2. Establish food enterprise zones. 3. Establish a dynamic food purchasing system.
Welcoming innovation in food industry	● Developing and utilizing the emerging science and innovation in diet and nutrition to improve the nutritional quality of food produced for our food citizens.	Priority actions merged with those of the action domain 'Raising Yorkshire pride in food businesses'
Shaping local spaces for healthy food communities	● Enabling communities to reach their full potential to access land and capital assets to grow their own food or set up community spaces for	1. Establish 'know how to grow and cook' schemes in schools and communities. 2. Establish a county-wide community growing initiative.

Action domain title	Action domain goals	Priority actions
	making, eating and sharing food, forming strong community connections and resilience. ● Making food hubs the centre of all communities and the places to go for local, nutritious produce.	
Producing food with nature	● Creating abundant spaces where people, crops, livestock and wildlife can thrive together to produce more food with better managed natural resources (including water, soil, and woodland). ● Promoting sustainable practices of land, ocean and freshwater management that improves biodiversity, better captures and stores carbon, and encourages regenerative dynamics.	1. Invest in farmer-led knowledge transfer about regenerative agriculture. 2. Introduce differential lending for regenerative farming investments. 3. Develop a public-facing campaign for direct action in food sustainability.
Creating an eat well culture through valued nutritional health education	● Enabling and inspiring food citizens to have a better understanding of the nutritional value of healthier food and how we can experience this easily and affordably in our everyday lives. ● Increasing self-efficacy, skills and motivation to prepare and consume nutritious food.	1. Develop and roll out a 'whole school approach to food' across North Yorkshire's schools via the North Yorkshire Healthy Schools award. 2. Embed Rethink Food's 'high school ready' programme for Year 6 pupils.
Facilitating circular food economies	● Encouraging regenerative food production and effective business solutions to reduce avoidable food loss, waste and pollution. ● Circulating products and materials (at their highest value) and regenerating nature. ● Ending linear 'take, make, waste' practices.	1. Ensure stronger retail incentives for regenerative farming. 2. Support business clusters through investment and local planning.

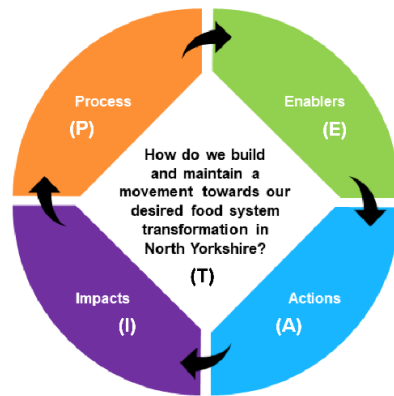
Results

The output artefact of our design research was the conceptualization of a transformation-focused evaluation and learning system (TFELS) for Food for the Future in North Yorkshire, aspects of which have already been put into practice (Fig 4). The TFELS treats evaluation holistically, considering its integration with the initiative's wider governance, and combines knowledge descriptive of the past and present (describing the existing TFELS) with prospective knowledge (what we identified as necessary in an effective future TFELS, even if this was not yet being implemented). Five dimensions comprise the TFELS: 1) intended outcomes from the TFELS if it were functioning successfully; 2) evaluation questions; 3) goals and guides; 4) sense-making, learning, and their feedback into decision-making; and 5) integration with actors' organizing for transformation (Fig 4). These five dimensions would in turn be reinforcing each other to produce desired outcomes. Below we describe each of these dimensions in turn, and their interactions, based on the collective design and sense-making process that emerged through the workshops and writing of this paper. More succinct versions of the TFELS illustration focused on dimensions 2-4 are used for communication within and beyond the initiative (S1-S2 Figures).

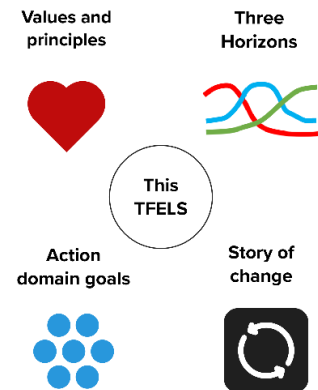
1. INTENDED OUTCOMES

- Keenly sensing food system conditions, enabling rapid adaptation
- More effective transformative action
- Transformed understanding of evaluation
- Critical, reflexive approach to evaluation maintained, avoiding greenwashing and cherry-picking results
- Deeper forms of learning, shared with like-minded organizations and initiatives to positively influence their behaviour
- Transformational intent and hope maintained
- The momentum and success of the TFELS and the initiative more widely continuously draws in new actors, maintaining the system's integrity over time

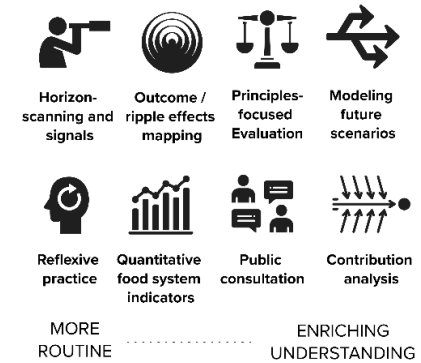
2. EVALUATION QUESTIONS



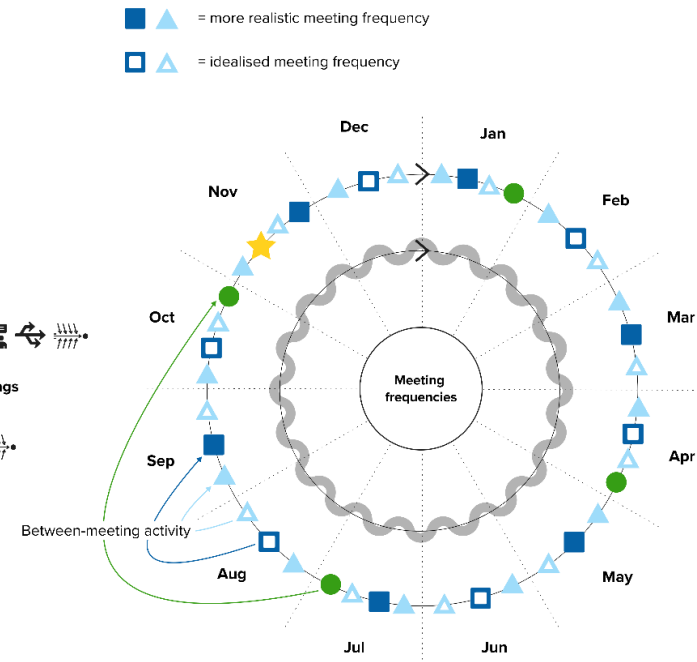
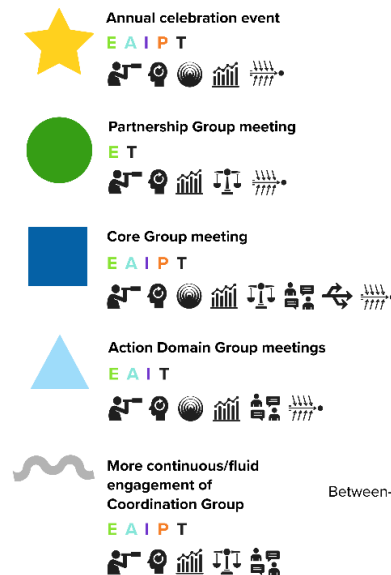
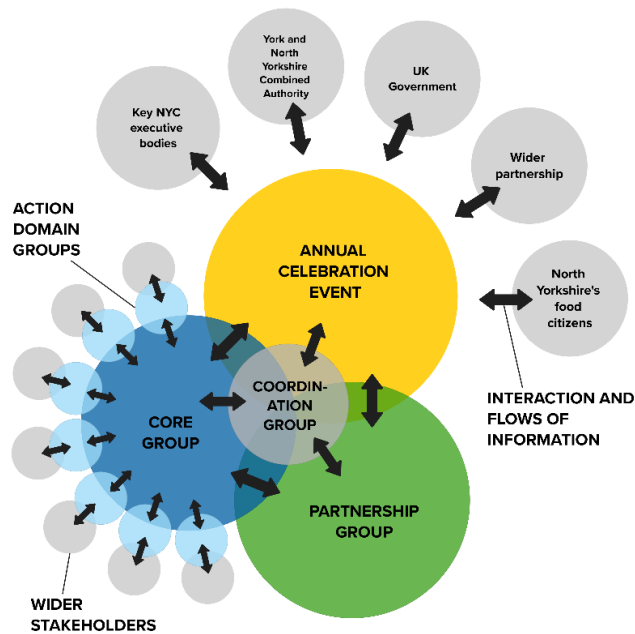
3. GOALS & GUIDES



4. SENSE-MAKING, LEARNING, & THEIR FEEDBACK INTO DECISION-MAKING



5. INTEGRATION WITH ACTORS' ORGANIZING FOR TRANSFORMATION



FOOD FOR THE FUTURE IN NORTH YORKSHIRE TRANSFORMATION-FOCUSED EVALUATION AND LEARNING SYSTEM (TFELS)

Fig 4 | The Food for the Future in North Yorkshire transformation-focused evaluation and learning system. Image produced by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

1. Intended outcomes

If the TFELS were functioning successfully, it would have numerous outcomes driving the transformational potential of Food for the Future (Fig 4; S3 Table). Broadly, these outcomes relate to food system action, the initiative's learning, and maintaining motivation and transformative intent. Action-related outcomes would include the initiative keenly sensing food system conditions, enabling rapid adaptation, and ultimately supporting more effective transformative action. This is vital in the context of the dynamic, often unpredictable context of the North Yorkshire food system, and in order to intervene in the system in ways that enable the emergence of radically different patterns, rather than more superficial action that fails to disrupt the status quo.

Learning-related outcomes would include a transformed understanding of evaluation as something that genuinely supports transformation, and maintaining a critical, reflexive approach to evaluation that avoids greenwashing and cherry-picking results, with 'failures' recognized as valuable learning opportunities. This is important because TFE requires a major shift in mindset from traditional forms of evaluation, not least to recognize evaluation as intrinsically part of transformation efforts rather than an isolated, technical exercise [91,92]. Furthermore, without a sufficiently critical and humble approach, the deeper, more useful forms of learning – that truly inform us how to more effectively navigate and steward transformations – are unlikely to occur. Making the learning of Food for the Future explicit and transparent also aids the initiative in sharing its lessons with like-minded organizations and initiatives to positively influence their behavior.

Lastly, the TFELS would be maintaining hope and transformational intent. These are all too easily lost without dedicated effort to maintain them. Transformations are hugely challenging; the complexity of a food system and its resistance to fundamental change can feel overwhelming, and lead to paralysis, hopelessness, and a temptation to resort to smaller-scale, isolated interventions where actors can regain a sense of control [92,93]. This calls for an approach that works with existing positive action and momentum, builds on strengths, celebrates successes, and continually reiterates the motivation for systemic transformation, and supporting joined-up domains of action (Table 3). Through maintaining the initiative's hope, transformational intent and momentum, and ultimately its success in supporting transformation, the TFELS and the initiative more widely would be continuously enrolling new actors, maintaining the system's integrity over time.

2. Evaluation questions

Asking the right questions, and ensuring that they continue to be asked, is essential for an initiative to remain transformation-focused [5,72,87,94]. The evaluation questions frame the whole purpose and focus of Food for the Future as a learning- and transformation-oriented initiative. They focus attention on enabling conditions for a successful and transformational initiative ('enablers'); transformative actions that the initiative should choose to support ('actions'); impacts of the initiative and their contribution (in light of contributions from other sources) to food system transformation and regeneration ('impacts'); and deeper reflections on the initiative's processes and learning ('process'), which, if framed appropriately, could lead to more transformational forms of learning that spotlight the underlying conditions and paradigms needed for effective transformation (Figs 4 & 5). These questions would be addressed in a roughly cyclical way (enablers to actions to impacts to process to enablers, and so on) but also concurrently and continuously. The four strands feed into answering the overarching evaluation question for Food for the Future: 'How do we build and maintain a movement towards our desired food system transformation in North Yorkshire?'.

First, enablers include Food for the Future's partnership of stakeholders and their buy-in (financial or otherwise), the extent to which the partnership represents the North Yorkshire food system and the agency within it, the diversity of voices shaping the initiative, emerging food system opportunities and challenges to utilize or be wary of, and the partnership's fidelity to core values and principles (e.g. the focus on transformation). Answering these questions helps the initiative to maintain its potential to stimulate food system transformation, and contributes to the intended TFELS outcome of an agile, adaptive initiative.

Second, evaluation questions related to actions deal with how to choose priority actions for the initiative to resource, how effectively the chosen actions potentially reinforce each other and synergize with other food system action in Yorkshire and beyond, how priority actions are progressing, and how best to keep them moving. Key to this action evaluation is an understanding of 'H2+' actions: in the Three Horizons framework, these are transformative innovations that creatively disrupt the current food system and enable a radically different future food system to emerge, as opposed to 'H2-' actions that are captured by the current food system and extend its lifespan [94] (Fig 1). H2+ actions are those prioritized by Food for the Future. An example of this prioritization exercise took place at the initiative's launch event on 14 November 2024 (hereafter referred to as the 'launch event'), where participants selected two to three priority actions per action domain (Table 3) based on a set of H2+

criteria. Continually revisiting these questions contributes to the intended TFELS outcome of more effective transformative action.

Third, impact evaluation questions ask about the initiative's impacts on the food system and beyond, the extent to which the initiative and other factors are contributing to food system transformation and regenerative dynamics. Answering these questions informs us whether the initiative is being effective in supporting desired food system transformations. If appropriate learning takes place, this should also inform the design of more effective transformative action.

Fourth, process evaluation questions reflect on the initiative's learning journey and the key 'pivot points' (points of inflection where important learning occurred and resulted in a significant shift in behavior), whether its governance and evaluation approaches remain fit for purpose, and whether its values, principles, vision, goals, or story of change need updating (see 'Goals and guides' below). Examples of pivot points have included: realizing the need for a stronger community voice in the initiative (October 2023), resulting in the Let's Talk Food survey in spring 2024, with over 2000 respondents [95]; seeing the initiative more as a fluid, adaptive movement and 'action framework' [58–60] than a discrete strategy (early 2024); seeing the initiative's governance and evaluation as more intertwined (April 2024); and diverting the focus of the ELWG towards supporting the Core and Partnership Groups more directly in implementing the TFELS (November 2024). Dedicating time to these process-focused questions and making learning explicit helps not only to keep the initiative's goals and guides, TFELS and governance relevant and effective, but also for sharing its insights with other like-minded initiatives and organizations to enhance their effectiveness in supporting food system transformation. At their most effective, the process evaluation questions would be enabling 'triple-loop learning' or 'transformative learning' [58] about the underlying assumptions, beliefs and paradigms at play and whether they remain relevant and appropriate, and learning about *how to learn*. In effect, while the enablers, actions and impact evaluation questions encourage single-loop learning ('are we doing things right?') and double-loop learning ('are we doing the right things?'), the process evaluation questions additionally encourage triple-loop learning ('how do we decide what's right?' or 'what are we learning about how to learn?') (Fig 5) [88].

The TFELS then needs to ensure that mechanisms are in place for this plurality of questions to be continually revisited, and that the learning from them is taken forward. It does this for instance by explicitly integrating the questions into templates for meetings of the actors

involved (see ‘Integration with actors’ organizing for transformation’ below), elevating the prominence of the evaluation questions within the overall TFELS (S1-S2 Figures), and trying to support reinforcing cycles between the different dimensions of the TFELS (see ‘Reinforcement between the dimensions of the TFELS’ below).

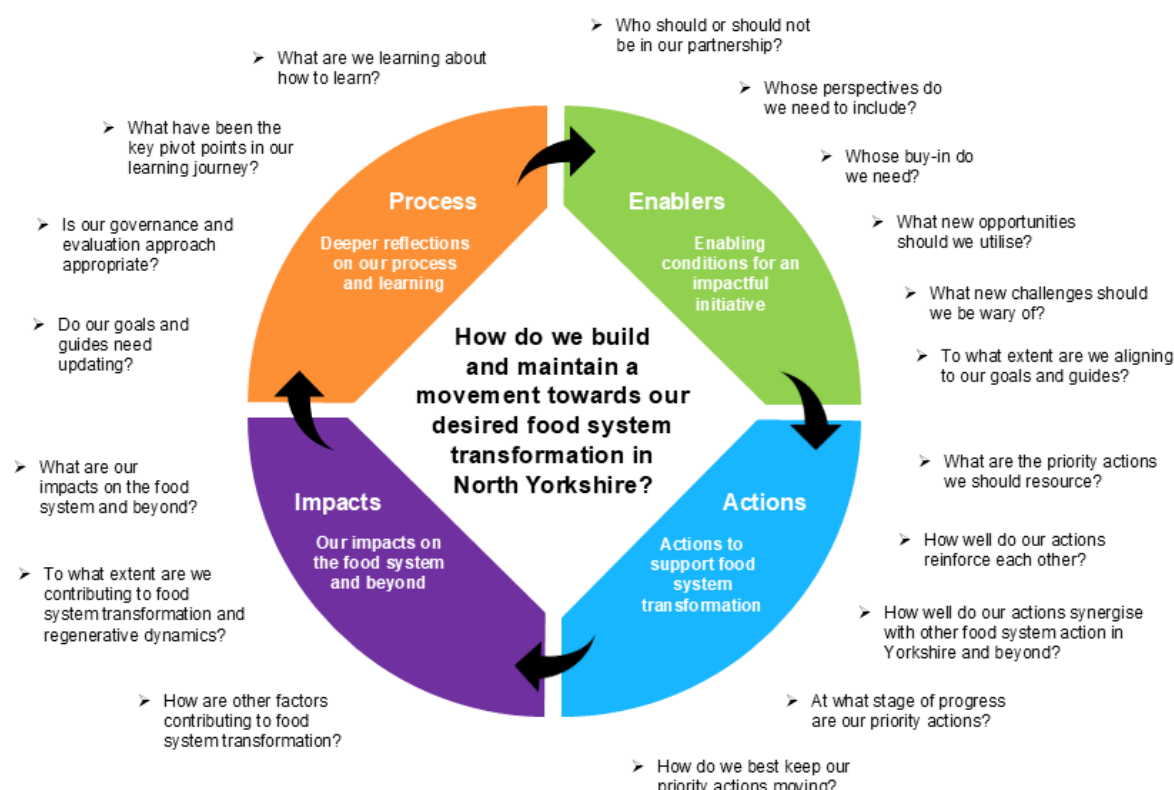


Fig 5 | The core evaluation questions of the Food for the Future in North Yorkshire transformation-focused evaluation and learning system. Image produced by Sam J. Buckton.

3. Goals and guides

As well as the core evaluation questions, several key ‘goals and guides’ anchor and orient the initiative and therefore the TFELS, including the values and principles (both explicit and implicit) that the participating actors stand for, the initiative’s Three Horizons findings, the goals of each of the seven action domains, the initiative’s story of change, and the TFELS itself (Fig 4; Table 3; S3 Figure). These ‘north stars’ are also powerful ways of maintaining hope and a focus on transformation, assuming that they are salient, understood, and genuinely embodied by Food for the Future actors. Making them explicit also makes them

evaluable: we can then ask, for instance, whether they remain relevant and effective (see the ‘process’ evaluation questions above), and ultimately whether they continue to encourage transformative, joined-up action and learning feedbacks.

Values (statements based on beliefs and moral reasoning [89]) that orient Food for the Future include four values agreed upon by stakeholders during a series of workshops exploring transformation-focused modes of governance (Fig 3): 1) we are inclusive and value the diverse perspectives of our community; 2) we are ambitious and encourage creativity; 3) we are reflexive and create space for learning; and 4) we are collaborative and support each other to achieve our shared goals. These values are largely based on NYC’s four core values (inclusive, ambitious, creative, and together, abbreviated to ‘I ACT’) [96], and intend to shape the conduct of actors in the initiative. Other explicit values include those from a ‘value contrasts’ exercise in the Three Horizons process [32], which contrasted the values, assumptions, beliefs and worldviews underpinning the current problematic food system with those underpinning the desired future regenerative food system [32]. For instance, whereas current food system values were seen as overly profit- and cost-driven, empowering large businesses at the expense of smaller ones, dependent on volatile globalized supply chains, reactive, and distanced from nature, in the future food system these values were seen as transformed to being driven by purpose and health for people and planet, empowering smaller purpose-led businesses, built around local food self-sufficiency, proactive, and connected to nature [88]. These value contrasts are a short-hand way of describing the desired transformation, and help to evaluate the kinds of action that will support such value shifts and thus stimulate transformation. Indeed, an important overarching value of Food for the Future, foregrounded particularly by the Three Horizons framing, is transformational intent (i.e. focused on supporting major, fundamental, systemic change, not just superficial change).

Principles are more actionable statements based on various forms of reasoning (including values) that provide more concrete guidance on how to act [89]. Orienting principles arise in Food for the Future from various sources. Many of the values described above are effectively principles when they suggest more explicit ways of acting, such as transformation-focused values that shape the criteria for evaluating possible actions that the initiative should invest in (Fig 4). The initiative also strives to align to principles for TFE [96,97], and various other principles from different evaluation approaches and frameworks inspired its TFELS design (Table 2), along with a set of principles to guide the design identified by the ELWG (S2 Table).

Other more implicit values and principles play a role in guiding the work of the TFELS actors. One example is *reciprocity*, which is reflected in the mutual reinforcement between action domains in the initiative's story of change (S3 Figure), and is also an aspiration for stakeholder relationships, whereby stakeholders actively benefit from their involvement in the initiative as well as contributing their time, effort and expertise. One such benefit reported by stakeholders is that some of the food system action they are already undertaking has been given a new strategic home within the initiative, increasing its credibility and significance (Supporting information). Other examples of implicit values and principles include the initiative's enterprising and opportunistic approach to taking action – characterized by 'imperfect action rather than perfect inaction' and avoiding 'paralysis by analysis' (i.e. getting into action to respond to the urgent need for food system transformation, even if such action is incompletely planned, rather than losing time and momentum by waiting to craft more refined action; an idea popularized by Henry Mintzberg [97,98]), and working with existing momentum in the food system rather than continually creating something entirely new. Overall, Food for the Future's explicit and implicit values and principles guide decisions and choices in the initiative, play into various aspects of evaluation, particularly of enablers and actions (see 'Evaluation questions' above), and shape the ongoing design of the TFELS (Figs 4 & 6; S2 Table). Evaluating the fidelity to values and principles is the remit of Principles-focused Evaluation [89], and is important for keeping the initiative and its partnership transformation-focused and aligned to its other core values and principles.

Another important guide is the findings of the Three Horizons process that helped to shape the priorities of Food for the Future [32]. As well as the value contrasts described above, these findings include a more detailed vision of the desired future regenerative North Yorkshire food system (Horizon 3) [32]. While the aim of Three Horizons is not to create a perfect future vision, the role of Horizon 3 is more to establish a radical contrast to current patterns, in order for people to make better choices about the kinds of action needed to stimulate transformative, systemic change. Horizon 3 was summarized as 'everyone has affordable, nutritious and sustainable food in North Yorkshire, for North Yorkshire' [14]. This statement remains a useful guiding star for the initiative. The Three Horizons process also identified seven 'action domains' critical for supporting food system transformation (Table 3), which are fundamental in informing the actions resourced by the initiative – the goals of these individual action domains, and consideration of how they reinforce each other (S3 Figure), are important guides in themselves. Lastly, this TFELS design itself is a guide for Food for the Future, providing an integrated framework in which to situate and make sense of the

initiative's evaluation activity. In considering the reinforcing effects between its components in a successful TFELS (see below), the TFELS also in effect provides a higher-level theory of change that complements the envisioned story of how Food for the Future's actions will support food system transformation (Table 1; S3 Figure).

In a well-functioning TFELS, these goals and guides would be strongly steering Food for the Future to focus on stimulating transformative change towards a regenerative food system, and maintain fidelity to this and its other values and principles, aided by frequent Principles-focused Evaluation. The initiative's actors would all feel familiar and comfortable working within the guiding framework of the TFELS itself, which would be helping people to appreciate how their individual activity feeds into the wider TFELS and initiative. The initiative's goals and guides (including the ongoing iterative design of the TFELS itself) would also be kept up-to-date, relevant and effective through frequent review.

4. Sense-making, learning, and their feedback into decision-making

Food for the Future would be 'flying blind' if it had no way of monitoring its progress and impact, making sense of what this collectively shows, and using that learning to alter its activities accordingly. In contexts of transformation in complex systems, particular care is needed to: draw on diverse perspectives and monitoring methods to obtain a richer, more robust picture of the system and how interventions influence it; shift thinking from causal *attribution* (which implies certainty and control) to the *contribution* of an initiative to system change, taking into account other contributing factors outside the initiative's control; focus attention on systemic 'signals' of transformation and regeneration, which might integrate many different indicators; and ensure that learning is fed back into decision-making and action at a speed and timeliness appropriate to the dynamism of the system in question [98,99]. These considerations shape the fourth component of the designed TFELS: the different forms of feedback from Food for the Future's actors, the food system, and beyond (including horizon-scanning and signals, reflexive practice, ripple effects mapping, quantitative food system indicators, Principles-focused Evaluation, public consultations, modeling future scenarios, and contribution analysis), how they are made sense of, and how they enable learning about the initiative's enabling conditions, actions, impact, and fitness for purpose of its processes (Figs 4 & 5).

Some feedback derives from horizon-scanning or collective sense-making by the groups in the initiative, including to assess broader signals of transformation and regenerative

dynamics. This involves group members sharing anecdotal evidence and their overall sense of significant trends and emerging opportunities and challenges relevant to the North Yorkshire food system. More routine feedback might include: staying abreast of new policy initiatives and priorities that Food for the Future could align to (such as the UK National Food Strategy and priorities of the York and North Yorkshire Combined Authority); upcoming opportunities to network or showcase the initiative's work; upcoming funding opportunities; emerging food system crises that the initiative should urgently address; and upcoming events that might affect partners' capacity to engage with the initiative. The PESTLE analysis framework is a helpful reminder of the different political, economic, social, technological, legal and environmental changes to remain wary of [99,100]. Groups would also periodically embellish their horizon-scanning with frameworks such as the Signals of Transformational Change [28,101] (Table 2) to identify evidence of systemic shifts rather than more isolated, smaller-scale change, and the Regenerative Lens [101] or 4 Returns Framework [102] to help identify evidence of regenerative dynamics. Such analysis would ideally take into account *all* of the various other strands of the initiative's evidence-gathering, and discern the broader story that they collectively tell, as well as people's more intuitive sense of the change taking place in the food system. Participants of these groups therefore matter greatly. In theory, by ensuring a more diverse range of members from different parts of the system, as well as relatively well-connected people with a good overview of substantial parts of the system, a more complete, accurate and up-to-date picture of the system can be obtained. This is important for the initiative to remain adaptive and agile, exploit new opportunities, and pivot to avoid or navigate new challenges – as characterizes a more developmental approach to evaluation, in which evaluation is more continuous and responsive to emerging needs rather than at relatively few discrete time points [86,87]. This enables adaptation to dynamic, unpredictable, and constantly shifting system conditions. Staying attentive to emerging change and signals of more systemic shifts also raises awareness of other factors influencing change in the food system, which are important to take into account when evaluating the initiative's relative impact and contribution to food system transformation (see contribution analysis below).

Reflexive practice more generally is also intended to be a routine part of Food for the Future's activities. The initiative treats reflexive practice as a deeper form of reflection that continually and critically re-evaluates the values, assumptions, structures and processes underpinning its actions [81], helping them to remain relevant, appropriate and effective. This is particularly important for the process evaluation questions and encouraging triple-loop learning (Fig 5;

see 'Evaluation questions' above). Ideally this would include periodic updating of the Three Horizons findings, particularly the future vision (Horizon 3) and value contrasts between Horizon 3 and the current food system (Horizon 1), as well as the action domain goals and story of change. Reflexive discussions around the process evaluation questions (Fig 5) could be facilitated and framed by prompts like: 'Considering everything that's going on, do we feel our assumptions about how we're going to achieve transformation are still broadly correct, or are we actually telling a different story of change?'.

Ripple effects mapping is a more structured feedback process employed by Food for the Future, used to capture emergent outcomes and impacts of the initiative (both positive and negative) regardless of whether they were planned or expected. An example of this exercise applied at the initiative's launch event asked participants to write their answers to the question: 'What outcomes or impacts have you noticed already from the food strategy development and your involvement in it?'. Subsequent analysis of the results provided a useful snapshot of positive outcomes already emerging from the initiative (such as the space it provided for discussion, networking, and learning about the food system, and its influence on other ongoing strategy development within NYC), suggesting aspects to continue and build on, as well as areas that needed improvement, such as including the under-represented voices of young people, farmers, and healthcare representatives, and ensuring stronger buy-in and commitment from senior levels in the council (Supporting information). Like horizon-scanning, ripple effects mapping helps Food for the Future to remain agile and adaptive.

Quantitative indicators complement the qualitative dimensions of food system feedback. A centralized, accessible, interactive, quasi-real-time, digital dashboard visualizing key quantitative 'Sentinel Indicators' [90] of food system health and their change over time is currently in development, with the intention of making it available to Food for the Future stakeholders. The indicators, including measures of dietary health, food economy and security, carbon emissions, biodiversity, environmental health, etc., would be updated as new data became available. This dashboard would enable frequent and rapid 'pulse checks' of the North Yorkshire food system and illustrate trends in its health over time. Realistically, linking Food for the Future actions to changes in broad-brush food system indicators will be extremely difficult, if not impossible. To do so would require experimental randomized controlled trials with counterfactuals and/or in-depth contribution analysis (see below). The proposed dashboard is nevertheless likely to be useful as a complementary source of information about the state of the food system and what this suggests the initiative should prioritize.

Less routine feedback-gathering includes consultations, scenario modeling, Principles-focused Evaluation, and contribution analysis. Surveying or interviewing North Yorkshire's food citizens provides important qualitative feedback on food system challenges and priorities, an example being NYC's Let's Talk Food survey [95]. In future, such consultations might also directly comment on interventions undertaken by Food for the Future. Methods such as Qualitative Impact Protocol (QulP) and Most Significant Change could be used to structure feedback in such cases [103,104]. Another form of quantitative feedback comes from modeling future food system scenarios, which is possible using FixOurFood's AgriFood Calculator [41,105]. For instance, greenhouse gas emissions from different dietary changes in the UK can be modelled. This could help to gauge the scale of changes needed in the North Yorkshire food system to achieve desired outcomes. Principles-focused Evaluation [89] is required to assess whether Food for the Future remains faithful to its values and principles, and whether these remain relevant (see 'Goals and guides' above). Lastly, contribution analysis is a rigorous, qualitative, deductive evaluation of the initiative's contribution to observed food system change [14]. This analysis might assess whether the initiative made minor or major contributions to an observed food system change, for instance. Contribution analysis is based on a previously articulated theory of change or contribution story and iteratively refines it in the process, highlighting the importance of a well-defined story of change (S3 Figure).

In a well-functioning TFELS, horizon-scanning, reflexive practice and ripple effects mapping would be a routine part of every meeting of all groups involved and enabling deeper forms of learning to occur. This would not only be helping Food for the Future actors make sense of their own experiences and transform their ways of working, but also to communicate these insights with other initiatives on similar journeys. An easily accessible dashboard would be providing quantitative updates on food system health, and regular consultation with North Yorkshire's food citizens would be providing qualitative feedback on Food for the Future activities, impact stories, and updates on food system challenges and priorities. Scenario modeling would be helping to keep ambitions high and sense-check priority actions.

Periodically (e.g. every other meeting), the initiative's Partnership Group (see below) would use Principles-focused Evaluation techniques to check whether the initiative's values and principles remain relevant, and whether they are being adhered to (particularly the focus on transformation). Contribution analysis would be a central activity at annual celebration events, and the initiative's story of change would be continuously updated throughout the year as new evidence of its impact arises. These many forms of feedback would be analyzed both

individually and collectively – by diverse representatives of the initiative and those more external to it – to make sense of what, overall, they are telling the initiative about the signals of transformation and regeneration in the North Yorkshire food system, and the initiative's direction, progress, and impact. Food for the Future actors would also remain sensitive to what forms of feedback are *missing* and necessary for deeper learning to occur.

Overall, this use of diverse forms of feedback would be keeping Food for the Future agile and adaptive, providing a rich picture of food system conditions and the initiative's impact, keeping the initiative true to its transformation focus and its other important values and principles, and refining the initiative's story of change. Sharing evidence of positive impact would be keeping morale and motivation high, while negative impacts would be seen as equally valuable opportunities for learning and adaptation.

5. Integration with actors' organizing for transformation

TFE rests on the assumption that all actors within an initiative, in some way, need to take part in the evaluation and learning that supports the desired transformation [33] – in other words, that evaluation must be considered an integral part of change processes – even if some actors are focused more on taking action, and others more on the evaluation itself.

Conversely, appropriate governance-related processes – such as the membership of groups, how partnerships are coordinated, the frequency and structure of meetings and workshops, how decisions are taken, etc. – are essential for producing the desired outcomes of a TFELS. For example, even something as simple as the frequency of meetings has major implications for how momentum and transformational intent can be maintained, and how quickly an initiative can adapt to changing conditions. As such, any TFELS design needs to be closely integrated with an initiative's wider governance and organizing for transformation. The Food for the Future TFELS therefore considers how evaluation hinges on the effort, interaction and evaluative activity of the various groups of people involved (Fig 4).

Ten groups are central to the TFELS, with various other groups playing important peripheral roles. The 40-strong Partnership Group plays more of an advisory and peer support role in steering the initiative. The Core Group, with 12 members, comprises the leaders of the groups associated with each action domain (seven Action Domain Groups), and is more heavily involved in coordinating the activity of the Action Domain Groups and the initiative's priority actions. Having some overlap in the membership of these groups is important for the coherence of the initiative. The Coordination Group, consisting of four NYC Public Health

officers, attends all Core and Partnership Group meetings, prepares meeting agendas and minutes, organizes events, and generally coordinates the initiative, the TFELS design, and evaluation and learning activities, supported by three University of York researchers from the FixOurFood programme [105]. Each group plays an evaluative role in the TFELS (Fig 4) and provides, collates and shares different forms of feedback for the initiative.

Several other actors play important, more peripheral, roles in the TFELS, albeit using significantly different evaluation criteria to actors within Food for the Future. One example is the main executive bodies of NYC. Any Food for the Future actions that significantly affect NYC services or require substantial financial investment must be escalated and approved through a hierarchy of directorates, boards and other decision-making bodies in the council, which can be time-consuming. Having the regular engagement of one NYC Councillor in the Action Domain, Core and Partnership Groups, and strong buy-in of another, has helped to legitimize Food for the Future and increase the likelihood of its actions obtaining wider senior-level approval and committed resourcing. Less substantive actions, particularly if they update an existing action or strategy, can obtain more informal sign-off. A second peripheral group is the York and North Yorkshire Combined Authority, which has significant financial resources, provides a link between NYC and City of York Council, and whose strategies are important for NYC to align to. Strategies and policies of the UK Government that intersect with food (e.g. the ongoing National Food Strategy) also have a bearing on what actions Food for the Future prioritizes. The initiative's wider partners also influence its decision-making. Finally, North Yorkshire's food citizens more generally [106] – a term used here to include consumers, producers, food businesses, and so on – provide feedback to the initiative via consultations and more informal channels.

In a well-functioning TFELS, the Food for the Future groups would be meeting regularly to maintain momentum, enable more regular assessments of, and rapid adaptation to, dynamic food system conditions, and continually reiterate commitment to supporting transformation. Action Domain Groups would be meeting at least fortnightly, the Core Group at least monthly, and the Partnership Group at least quarterly (with group member activity continuing in the interim), alongside an annual celebration event involving all groups, and more continuous, flexible engagement of the Coordination Group. Annual celebration events would offer an opportunity to take stock of progress and impact during the year, examine overall signals of system change, celebrate successes to maintain hope and commitment, reiterate the cross-system intent and reinforcement of actions, and revise key aspects of the TFELS (e.g. the initiative's story of change, or how the its action domains are expected to reinforce each other

to support food system transformation; see S3 Figure and 'Goals and guides' above). There would be relatively low member turnover, enabling consistency and the development of strong, trusting working relationships, and reflecting actors' commitment to support the initiative over time, although a co-leadership approach (e.g. at least two people spearheading an Action Domain Group) would be ensuring some resilience in cases of people having to drop out (e.g. due to illness).

Reinforcement between the dimensions of the TFELS

The intended outcomes of the TFELS (Fig 4) would be arising not just from its five components individually, but also through reinforcement between them (Fig 6). Eight positive reinforcing loops are key (Fig 6). First, the TFELS would encourage deeper reflexivity and 'learning how to learn', informing improvements of the TFELS and its goals and guides that further facilitate learning (R1). Second, more effective learning means that FFNY actors provide more useful feedback on the initiative (e.g. that addresses the initiative's underlying paradigms and assumptions), resulting in more effective learning (R2). Third, the initiative's actors improve the TFELS based on feedback and learning, thus identifying more useful forms of feedback that need to be gathered (R3). Ensuring that the 'process' evaluation questions are embedded in initiative's activities, that they draw attention to deeper kinds of learning and what kinds of feedback are *missing*, and that there are clear mechanisms for how this learning is used to adjust the TFELS and the initiative's activities, will be key for generating these reinforcing effects.

Fourth, the TFELS increases and maintains the initiative's transformational intent, leading to more effective action that via feedback and learning shapes a TFELS that more effectively encourages transformational intent (R4), e.g. because actors see that effective transformative action is possible. Fifth, more effective action generates more useful feedback and learning about what is needed for food system transformation, leading to design of more effective action (R5). While learning from ineffective action is also useful, this only reveals what *does not* work, whereas effective action reveals what *does* work (in a particular context).

Generating these reinforcing effects will require Food for the Future actors to be strongly action-oriented and prepared to take risks, and also to share and celebrate successes and progress.

Sixth, as more Food for the Future actors appreciate the usefulness of the TFELS, more are encouraged to get involved in its continuous improvement, further enhancing its usefulness

(R6), e.g. because it will better reflect the diverse needs of the actors involved. Seventh, greater involvement of Food for the Future actors in designing the TFELS increases their familiarity with applying it, resulting in more actors generating useful feedback that deepens learning and encourages more actors to engage with the TFELS (R7). These reinforcing effects will require a 'minimum viable pattern' to be created where a critical mass of actors are familiar with the TFELS and can start enrolling others, and therefore substantial effort initially to normalize use of the TFELS amongst Food for the Future actors.

Eighth, dissemination of Food for the Future's learning improves the effectiveness of other actors' actions in supporting food system transformation (e.g. the food strategies of other local authorities and cities), in turn generating useful external feedback for the initiative that enhances its learning (R8). Supporting this reinforcing effect will require good cross-system communication and transparency between different initiatives. Overall, these eight reinforcing dynamics would be 'spiralling up' the effectiveness of Food for the Future and its TFELS in supporting food system transformation (S3 Table).

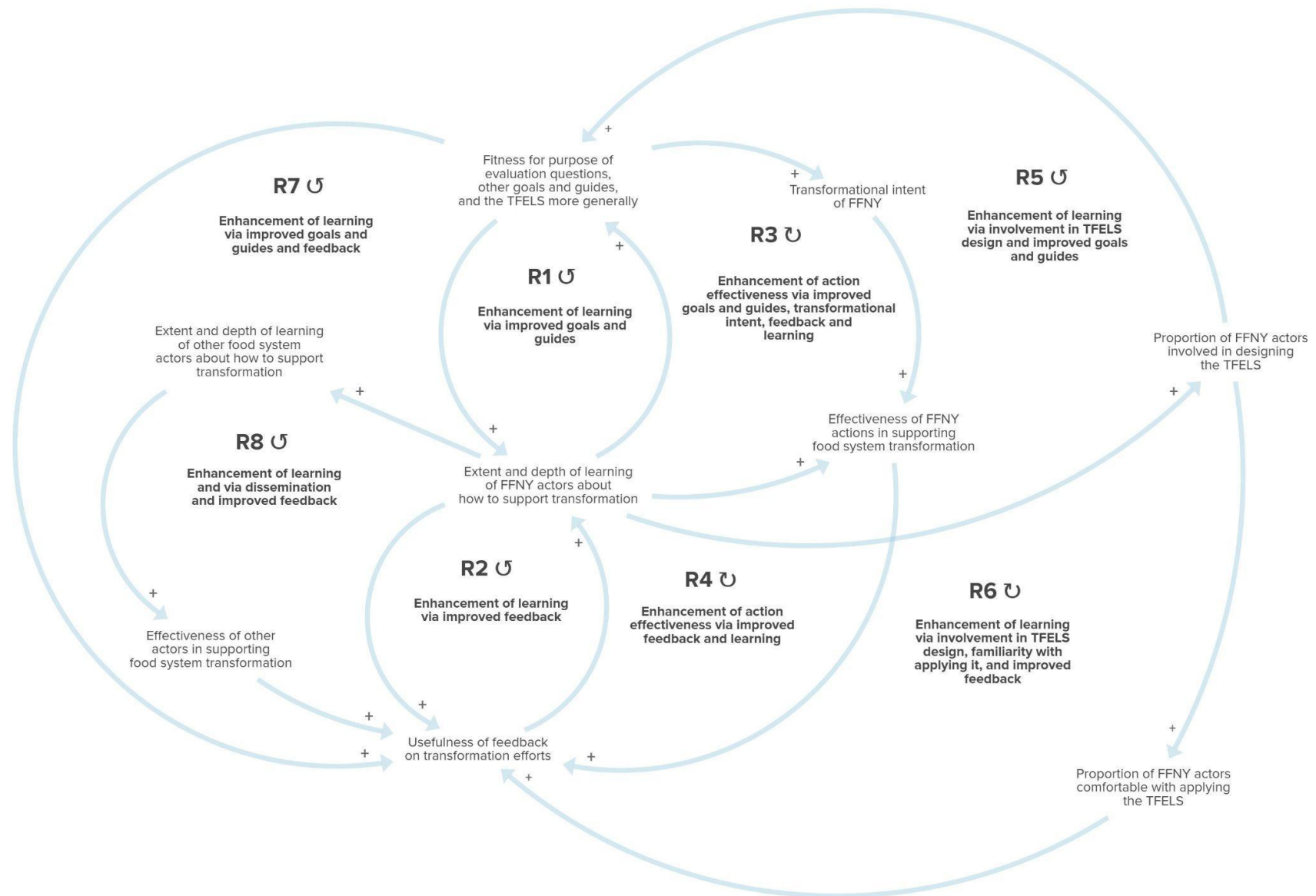


Fig 6 | Causal loop diagram for the different components of the Food for the Future in North Yorkshire (FFNY) transformation-focused evaluation and learning system (TFELS), and their reinforcing dynamics assuming a successful TFELS. The diagram shows 'variables' (e.g. 'Usefulness of feedback on transformation efforts') connected by arrows that denote causal influence. A '+' sign at an arrow tip denotes that when the variable at the tail of the arrow increases, the variable at the arrow tip is also expected to increase. 'R1', 'R2', etc. denote reinforcing loops, where arrows can be followed directionally from and back to the same variable. Text in bold underneath a reinforcing loop name characterizes the loop's dynamics. Figure created by Sam J. Buckton in Kumu (<https://kumu.io/>).

Discussion

The movement towards transformation-focused evaluation (TFE) is a relatively recent chapter in the evolution of the evaluation field, a major and challenging departure from mainstream evaluation practice, and lacking in case studies of its design and application [106–110]. Our study provides a rare insight into the collaborative process of designing, and starting to implement and embed, TFE in the context of large regional-scale food system change. Food systems are major contributors to global crises and require urgent transformation [107–111]. A growing number of initiatives across the world are taking up this challenge and evaluating the effectiveness of their efforts [112–115]. The Food for the Future in North Yorkshire transformation-focused evaluation and learning system (TFELS) shows how core evaluation questions, goals and guides, and different forms of feedback could be integrated within an ecosystem of actors striving to support food system transformation (Figs 4 & 6). The TFELS also illustrates how reinforcing dynamics would be set up between its different components, driving desired outcomes that support food system transformation (Fig 6; S3 Table).

Innovations, progress and challenges in the Food for the Future TFELS

Two aspects stand out as innovative in our study. First is its consideration of evaluation in a holistic way, interwoven with the wider governance and work culture of a change initiative, rather than an isolated technical exercise or focusing primarily on measuring and monitoring indicators of change. Most existing evaluation frameworks for food system transformation focus on specific metrics, for instance [113,115–117]. Instead, Food for the Future considers these as components of a higher-level TFELS. This resonates with the recent ‘explosion of interdisciplinary hybridization’ [18,116] combining evaluation, monitoring and learning with other professional fields, including strategy, impact, and futures studies, which has been characterized by some as a move towards ‘SMILE’ frameworks (Strategy, Monitoring, Impact, Learning and Evaluation) [18,118].

The relatively autonomous, integrated nature of the Food for the Future TFELS is partly a reflection of context. Although aspects of TFE are now more frequently being applied to evaluate the impact of major funders such as multilateral development Banks, e.g. the Climate Investment Funds and philanthropic foundations [117], such evaluation is usually carried out periodically by an independent evaluation team in order to hold the organization in question to account. In the case of Food for the Future, several factors made a more embedded, user-

empowering approach appropriate. One is cost: NYC (and its wider partnership) would struggle to afford external expert evaluations. Another is the speed of contextual change: the dynamic conditions of NYC and the North Yorkshire food system necessitated relatively continuous, developmental forms of evaluation that could be called upon immediately in response to emergent needs. The third factor is that it was considered possible for the initiative to fairly hold itself accountable. It then became imperative to build the initiative's capacity to reflectively self-evaluate, and to weave evaluation into the fabric of the initiative's networked governance. In this sense our case study resonates with ideas about 'adaptive management' [119] and 'dynamic capabilities' [120], and bears similarity to the various exemplars of Developmental Evaluation and Empowerment Evaluation applied around the world [76,121] (see also Table 2), but emphasizes the focus on large-scale transformation and systemic change not necessarily present in those examples.

A second innovative aspect of our study is that it is, to our knowledge, the first to show how Three Horizons could be integrated into a wider evaluation and learning system of an ongoing transformation effort. Most case studies use Three Horizons only as an initial scoping and strategy exercise [120–123], whereas here we show the implications of Three Horizons for choosing what system interventions to resource, shaping a story of change, ensuring fidelity to transformational values and principles, evaluating impact, and overall as a key guide for the TFELS. Overall, these advances mean that our findings are likely to be most relevant to other relatively ground-up, transformation-focused, networked, emergent change initiatives, particularly those coordinated by or otherwise involving local authorities at regional or city levels. In the UK, this scale of governance is becoming an important frontier for innovative food system change [122–125], despite the financial constraints faced by local authorities.

The TFELS design has now effectively become one of the goals and guides of Food for the Future, and an important orientation towards actually implementing transformation-focused evaluation (TFE). Some aspects of the TFELS are already being implemented and embedded. Most of TFELS' key groups of actors are in place, and the TFELS has been used to create templates for structuring meetings of the Action Domain, Core and Partnership Groups, including suggested periodic activities such as horizon-scanning, reviewing membership of the Food for the Future partnership, evaluating progress on priority actions, mini ripple effects mapping exercises, identifying any evidence of impact or feedback mechanisms that need to be put in place to gather evidence, and reviewing the initiative's story of change. Meetings are already starting to use these templates and the Coordination Group is trialling how best to implement them. All four strands of the evaluation questions (Fig 5) are already being

addressed to some extent, with particular attention given to enablers and actions (reflecting the early stage of the initiative). For example: the initiative's groups are already adept at horizon-scanning thanks to their high connectivity and attunement to activity affecting the food system (enablers); multiple stages of H2+ action prioritization have taken place, including at the launch event (actions); there is precedent for ripple effects mapping (impacts); and the Coordination Group is familiar with reflexive practice, such as recording pivot points (process). Food for the Future is also strongly guided by many of its values, Three Horizons findings and action domain goals, and is doing reasonably well in its attempts to apply principles of TFE (Table 2). Alongside horizon-scanning, reflexive practice and ripple effects mapping, it is already clear how feedback could be obtained via public consultations (such as the Let's Talk Food survey). It can thus be seen how key actors, evaluation questions, goals and guides, and various forms of feedback are starting to fall into place as building blocks of a functioning TFELS in Food for the Future. We are struck by how concepts such as transformation, H2+ actions, and ripple effects are now strongly part of the initiative's mutual language and understanding – which has enabled a more sophisticated level of conversation, planning and organizing to occur in support of transformation, as identified by participants at the initiative's launch event (Supporting information).

Some of the intended outcomes of the TFELS are also becoming apparent. Food for the Future is already heavily engaged in action, and is already rapidly sensing and adapting to observed changes in the food system. At least amongst the Coordination Group and ELWG, we have also started to develop a transformed understanding of the role of evaluation that aligns with transformation-focused evaluation [120]. We still have trust in the initiative's ability to hold itself to account, in a fair and critical way, for maintaining its focus on food system transformation. The TFELS also appears to be enabling deeper forms of learning, at least amongst the Coordination Group, as evidenced by the various pivot points since the initiative's inception, for instance, and the initiative has been actively sharing its insights more widely, both within and outside North Yorkshire Council (e.g. with Bradford City Council, Birmingham City Council and Sheffield City Council, and via other regional connections through the Office of Health Improvement and Disparities Community of Improvers Food Systems Network). Collectively writing this paper, for example, has consolidated and is disseminating our learning.

The initiative has even started to have wider positive ripple effects, many of which were not foreseen. An interesting example was a fundamental shift from seeing Food for the Future as a relatively discrete strategy to seeing it as more of an adaptive 'framework for action' [124],

which we feel reflects a more fluid, developmental approach to action and evaluation that has already been embraced by the initiative. Furthermore, the sharing of emerging findings of the ELWG at one of NYC's 'Lunch and Learn' sessions in June 2024 has since led to a new transformation-focused collaboration between the University of York, NYC Public Health, and the council's Transformations Team that oversees innovation, thus disseminating new approaches more widely within the council. Food for the Future has also informed and inspired other ongoing strategy development, such as NYC's Green and Blue Infrastructure Strategy (Supporting information), as well as a new transformation-focused initiative, Moving North Yorkshire (coordinated by NYC in collaboration with North Yorkshire Sport), to create a physical activity and movement framework supporting people in North Yorkshire to be 'stronger for longer' in mind and body through movement, play, and sport. Moving North Yorkshire is applying a similar Three Horizons-informed approach which, notably, is being facilitated primarily by NYC and North Yorkshire Sport rather than FixOurFood facilitators, reflecting a substantial degree of normalization and confidence in applying transformation-focused methods within these public service providers.

Nevertheless, Food for the Future still has considerable work to do to refine, apply and embed its TFELS before it reaches the level of sophistication that the TFELS design describes. For instance, only the Partnership Group and Coordination Group currently meet at the frequency considered necessary for an optimally functioning TFELS. The Action Domain and Core Groups meet less frequently because of members' other time commitments (members contribute to the initiative in a voluntary capacity), and/or some Action Domain Groups are still in the process of establishing themselves and finding their way into a meeting pattern that works for their members. A more realistic frequency of engagement at present is monthly meetings per Action Domain Group, and bimonthly meetings for the Core Group (Fig 4). Food for the Future has also had to adapt to significant member turnover (e.g. due to people changing jobs) and some members having to miss scheduled meetings and events, e.g. due to illness, holidays, and clashes with other commitments. For instance, the 'Welcoming innovation in food industry' and 'Raising Yorkshire pride in food businesses' action domains (Table 1) have occasionally been merged (e.g. at the launch event) due to insufficient representation of the former group. Overall this highlights the challenge of achieving the necessary level of commitment and consistency from people in the busy reality of their working lives, which might become easier as the initiative moves more deeply into phases of action and impact. In practice, the priority becomes more about ensuring a relatively small critical mass of people remains committed and keeps the initiative ticking over.

Regarding the TFELS' evaluation questions and other goals and guides, there has been limited normalization beyond the Coordination Group of the kind of reflexive practice required for the 'process' evaluation questions (Fig 5). Moreover, some of the initiative's values and principles remain relatively aspirational, identified as crucial to achieve food system transformation but not necessarily well-reflected in actual behavior. Two important examples are remaining transformation-focused (i.e. focused on supporting major, fundamental, systemic change, not just superficial change, and embodying this focus in action and how the initiative holds itself to account through evaluation), and supporting the health of non-human nature. Both are at high risk of being overridden by people's tendency to opt for whatever is easiest, quickest, cheapest and least contentious, and to focus on human needs, often at the expense of wider nature. Although undertaking Three Horizons has left transformation at the forefront of the Coordination Group's minds, like many other initiatives [126] Food for the Future risks losing sight of its transformational imperative and systemic, joined-up nature of its action, there having been limited engagement with its story of change to date (S3 Figure). More generally, there has been little effort thus far to revisit the initiative's goals and guides to assess their continued relevance, and the TFELS as a whole is only a recently cohered framework that has had limited sharing and habituation across all of the initiative's stakeholders, particularly outside of the Coordination, Core and Action Domain Groups. Overall, this highlights the importance of continually reiterating the initiative's transformative intent, actively embedding frameworks such as the Regenerative Lens [31,124] in the initiative's goals and guides to maintain a focus on regenerative dynamics and ecological flourishing beyond merely human health, and helping stakeholders understand the value of a more developmental, and adaptive and reflexive approach to evaluation, ideally through applying and experiencing the TFELS themselves.

While some forms of feedback are well-established, in practice others are not yet familiar or embedded across all actors in the TFELS. Many priority actions are in pre-implementation phases, so one of the key forms of feedback in the TFELS – namely, feedback about the effectiveness of Food for the Future's food system interventions – is not yet provided. Aspects like Principles-focused Evaluation, scenario modeling and contribution analysis are still relatively unfamiliar and require considerable competency- and capacity-building to implement, and a dashboard of quantitative indicators has yet to be materialized. It is also currently unclear how multiple sources of feedback would be integratively analyzed to reach overarching evaluative judgements about signals of transformational change and regenerative dynamics, and about the initiative's effectiveness in a way that avoids over- or

under-playing its impact. Ultimately, although many aspects are already in place, the TFELS also highlights the importance of reinforcing dynamics between these aspects (Fig 6), which are not yet well underway. But this is where the TFELS design can continue to act as a guiding star that pushes the aspiration and ambition of Food for the Future, and a template for continual assessment of the initiative's progress in embedding the various dimensions of the TFELS.

A key challenge for the TFELS' dimensions of sense-making, learning, and their feedback into decision-making, is the balance between monitoring and adapting to emergent food system outcomes, and accountability for actually stimulating a desirable transformation as described by the initiative's theory of change. On the one hand, TFE requires us to relinquish our assumption that we can easily control systems' behavior, but on the other hand it still requires initiatives to remain transformation-focused in their thinking and action, intent on reaching regenerative futures and building on existing regenerative practice in the present, and attentive to whether desirable transformations are indeed occurring, and what contribution the initiative has made to such changes. The latter is particularly important for maintaining the trust and commitment of an initiative's partnership of stakeholders, and would include some reflecting back to the initiative's original Three Horizons findings and the extent to which these match reality, including the regenerative food system of 2043 (i.e. 20 years into the future) that it envisioned. Overall, this highlights the importance of maintaining some accountability for the *efficacy* of Food for the Future, whilst also broadening its accountability to include wider developmental learning and adaptation to unpredictable conditions.

These challenges, indicative of the early stage of Food for the Future as a whole, highlight some of the caveats in the presented TFELS design. Our study nonetheless provides valuable insights particularly for similar emerging system change initiatives navigating their design phases. Future research with Food for the Future will focus on identifying key enablers for implementing system transformation and maintaining commitment, transformational and regenerative intent, and transformation-focused evaluation, through appropriate communication, dissemination, engagement, and valorization activities with respect to the TFELS. More broadly, we suggest that future research and practice could usefully investigate aspects such as: when and how powerful actors of the status quo (e.g. supermarkets) can be strategically enrolled so that they become active players in supporting transformation rather than holding it back; the most effective forms of governance for transformation-focused partnerships and their evaluation; and how organizations and initiatives can adopt more transformation-focused evaluation even whilst dealing with deepening crises and institutional,

ecological or societal collapse [31,126], or possibly even taking advantage of these conditions [127]. Our study also suggests an important hybrid role for action-oriented collaborating researchers embedded in change initiatives, acting flexibly as facilitators, mentors, advisors, stakeholders and advocates as well as researchers. In Food for the Future, this relationship between academia and policymakers has been a win-win. We would even question whether an initiative like Food for the Future would have been possible to get off the ground without the combination of an ‘anchor institution’ like NYC in a coordinating position and committed to taking action forward (including buy-in from the Council’s leadership and executive bodies), and the support of action researchers. For local authorities with fewer resources, and even more competing demands, it may be more difficult to create the same level of accountability, cooperation, oversight and influence. Nonetheless, the hope is for Food for the Future to eventually become independent from NYC (although still with NYC’s involvement), and perhaps associated more strongly with the Sustainable Food Places network [128]. This shift towards more distributed leadership will be a key challenge for the initiative.

Wider lessons for designing, implementing and embedding transformation-focused evaluation

The process thus far of designing, and starting to implement and embed, a TFELS in Food for the Future suggests five important lessons for what is needed to make this process possible, learning from what has worked well in addition to shortcomings. The first is the need to broaden appreciation of evaluation beyond metrics and impact. Evaluation is commonly understood in relatively narrow terms, being associated particularly with quantitative metrics and indicators, and evaluating projects’ impact. This has been the case within NYC but is also a more widespread phenomenon, and a legacy of conventional positivist modes of evaluation [126]. In Food for the Future, we have had to continually emphasize that the scope of evaluation goes beyond only metrics and impact. For instance, it encompasses evaluation of processes, enabling conditions, and the plan of interventions as well as their impact, and considers qualitative as well as quantitative indicators. We have also tried to broaden appreciation of evaluation as a whole continuous way of thinking and acting, rather than merely a discrete technical exercise. This shifted understanding of evaluation is important for designing and embedding TFE because: it helps to set more realistic expectations of what evaluation can achieve in complex systems (rarely is it possible in such contexts to conclusively, causally link system interventions to observed changes in quantitative indicators); it highlights the more diverse kinds of feedback and evidence needed for system

change initiatives, drawing on qualitative as well as quantitative sources (e.g. impact stories and horizon-scanning) and interrogating the strategic and planning stages of an initiative as well as its impacts, in order to maximize the initiative's potential and gain a richer picture of its effects; and it helps people to see evaluation as a developmental culture of working that enables feedback and adaptation at a speed appropriate to the dynamic conditions of complex systems.

The second lesson is that we found it helpful to draw attention to relatively developmental evaluation practice already being implemented by Food for the Future actors, even though they were not recognizing it as such and applied it intuitively, without much conscious effort to evaluate in a particular way. For instance, SJB noticed that the Public Health officers of the Coordination Group were already adept at working in an agile way, responding rapidly to stakeholder feedback and frequently adapting or pivoting their approach and communication materials, which in their case consisted primarily of a continually updated slide deck. It was also noted that the well-connected members of the Core and Partnership Groups were already enabling rich horizon-scanning discussions in their meetings. Drawing attention to these aspects was important because they were not otherwise being seen as examples of the kind of evaluation approach the initiative needed to cultivate; the evaluation was instead still being treated as a separate, isolated exercise. Showing participants that useful evaluative practice already existed in their culture of working, was considered to make TFE seem more tangible, familiar and feasible, and itself part of an empowering positive deviance or appreciative inquiry approach that builds on potential rather than picking apart problems, and characterizes Developmental Evaluation [128].

The third lesson arising from this work was the need to iterate towards a minimum viable product of the TFELS design rather than aim for perfection, and keep the design as simple as possible but also focused and purpose-led. The design went through seven main iterations (S4-S10 Figures) before the version presented in this paper, which is still being continually updated and refined. After all, the TFELS design will never be an entirely finished product, given the ever-changing nature of the North Yorkshire food system and the initiative's goals. During early iterations (S4 & S5 Figures) it became clear that fleshing out the design in detail was not going to be useful until its core elements and purpose were settled, resonating, and gaining some familiarity with the initiative's stakeholders. We therefore focused on refining the main strands of the initiative's evaluation questions as a starting point (S6 Figure), before bringing in other dimensions of the TFELS (e.g. feedback mechanisms) (S7-S10 Figures). Thus, rather than creating a perfectly complete iteration each time, the most effective iterations

were ‘minimum viable products’ [129] with enough information to feel tangible and be discussed, critiqued, and then further iterated if necessary, but simple enough to be quickly understood.

We also found it helpful to think of the TFELS design in terms of ‘memes’ that would feel intuitive or stick in people’s minds, as well as what accurately described the initiative’s needs. For instance, it was considered important for actors to be able to describe the evaluation questions simply as the four main strands of enablers, actions, impact, and process (Figs 4 & 5), and a visually engaging representation of the TFELS was attempted for each iteration, regardless of how much detail had been fleshed out (S4-S10 Figures). This made it easier to start visually seeding the TFELS with wider stakeholders, e.g. in PowerPoint presentations. A key skill required here was sensing when something ‘landed well’ (or not) with people, which might be expressed implicitly (verbally and non-verbally) as well as explicitly. As an often intuitive exercise, our conclusions were not necessarily always correct but could be continually and frequently sense-checked through dialogue. In general, we assumed that an overcomplicated design would discourage buy-in and use, whilst also recognizing the need for a holistic TFELS (Fig 5 remains a useful shorthand illustration of the crux of the TFELS, with Fig 4 providing greater detail, and other versions providing intermediate detail which are routinely used in the initiative’s communications – see S1-S2 Figures). Overall, this approach bore similarities to the ‘double diamond’ design approach of iterative divergent activity (investigating, developing, testing) and convergent activity (defining, refining, implementing) [130], albeit with a more continuous chain of ‘diamonds’. SJB played a role of iteratively reflecting back to Food for the Future actors how he observed them to be evaluating, as well as updates following the last round of feedback, and growing clarity about what TFE would need to look like for the initiative based on collective sense-making and SJB’s individual observations. If the design process ever felt in danger of becoming bogged down or waylaid by debating details, we found it helpful to continually draw attention back to the underlying purpose, values, principles, goals, and guiding questions of the process and the TFELS, and particularly the overarching aspect of the TFELS design and whether these remained accurate or appropriate – trusting that the details would emerge in due course when the TFELS’ more substantive elements had become clearer.

In keeping with the iterative, developmental design process, a fourth lesson was that the design team needed a ‘bricolage’ approach that drew on knowledge of a wide variety of tools, frameworks and methods (Table 2), and remained responsive to emerging needs of the evaluation users. This enabled us to make better decisions about what would suit a particular

context, as further elaborated by the Blue Marble Evaluation Bricolage Methods Principle [130], given conditions of limited time (e.g. SJB's PhD timescale, or the speed at which Food for the Future moved into action) and expertise, uncertainty (e.g. of which groups would end up coordinating the initiative), and the fact that no single tool, framework or method was entirely satisfactory for the initiative's purposes. A more efficient use of time was to apply and adapt contextually appropriate existing tools rather than reinvent the wheel. As such, the TFELS drew inspiration from multiple sources, including many focused on transformation (Table 2). Some of these were not incorporated from the outset but rather as new needs and gaps became apparent along the way. Examples included the need for clearer story of change and application of contribution analysis, Principles-focused Evaluation, and an understanding of the limitations of especially quantitative indicators (Table 2). More broadly, the coordination and direction of the TFELS design itself were shifted in response to emerging events and realizations, like the formation of the Core Group, and the need to link the initiative's evaluation more closely to its governance (see 'Evaluation questions' above). Ultimately this bricolaged, responsive approach was important for keeping the TFELS utilization-focused and useful for its end users, even in changeable circumstances, as well as providing opportunities to weave in key concepts and frameworks related to transformation. Utilization-Focused Evaluation was itself one of the foundations of the TFELS (Table 2). This approach has been challenging for TFELS actors to become used to, presumably because of an ingrained tradition of applying standardized methods because they are familiar, 'the done thing', and have precedent, rather than continually question their fit to the situation at hand and creatively adapt, develop and apply new approaches.

A fifth important lesson was to make the process as experiential as possible, whereby participants learn by doing and directly experience applying the TFELS. This enables the TFELS to become more familiarized, for more salient feedback on the TFELS to be generated, and in general to support a more adaptive, experimental way of working. This follows the well-researched phenomenon of practice usually facilitating more powerful forms of learning than more abstract knowledge-gathering [131]. Examples include the application of ripple effects mapping and action evaluation (Figs 4 & 5) at the launch event, or subtler things like adopting a more emergent agenda or routinely sharing good news in ELWG workshops. Another aspect of this experiential approach was basing the TFELS on what was already being applied and experienced by Food for the Future actors, as described above. Overall, these five lessons suggest that design work should be treated not only as a preliminary exercise, but as an ongoing journey and one that is also key for embedding TFE. Like any

form of culture change, embedding TFE requires the building of trust, common purpose, and shared language, which take considerable time and effort to grow. Designing the TFELS has been a vital, often experiential component of bringing people on a shared journey and reinforcing a new culture of working, aided by making explicit the useful practices already being applied.

Conclusions

Our study shows that the design of a transformation-focused evaluation and learning system for Food for the Future needs to integrate core evaluation questions, other goals and guides, and different forms of feedback, sense-making and learning within an ecosystem of actors striving to support food system transformation. It would need to establish reinforcing dynamics between its components to drive the intended outcomes of rapid adaptation to food system change, more effective transformative action, a transformed understanding of evaluation and a critical, reflexive approach that avoids greenwashing and cherry-picking, deeper forms of learning and its dissemination, the maintenance of transformational intent and hope, and a system that maintains its integrity over time by continuously drawing in new actors. The process of effectively designing, implementing and embedding TFE is likely to require: a holistic appreciation of evaluation beyond only metrics and impact; an approach that is iterative, bricolaged, responsive and experiential, combines the actual with the aspirational, and works from existing strengths; and ultimately treating design work as an ongoing and vital part of embedding TFE within a wider culture of working and organizing. We are all apprentices at the end of the world as we know it [132]; in other words, we are entering an unprecedented era of change and uncertainty where old paradigms are no longer fit for purpose, and which all of us are learning to navigate [133,134]. This underscores the vital importance of learning how to embed more developmental and transformation-focused evaluation approaches fit for our dynamic world.

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Supporting information

Evaluation and Learning Working Group information

This section lists the members of the Evaluation and Learning Working Group (S1 Table) and the initial set of principles identified by the group to guide the design process (S2 Table).

S1 Table | Members of Food for the Future in North Yorkshire's Evaluation and Learning Working Group.

Member	Job title
Leo Beacroft	Senior Public Health Intelligence Specialist, Public Health Intelligence, North Yorkshire Council
Sarah Bridle	Professor, Chair in Food, Climate and Society, Department of Environment and Geography, University of York
Sam J. Buckton	PhD researcher in Human Geography and Environment, FixOurFood programme, Department of Environment and Geography, University of York
Jennifer Cassarly	Behavior Change Officer, Public Health, North Yorkshire Council
Angela Crossland	Head of Healthier Lives, Community & Economy, Public Health, North Yorkshire Council
Juan Pablo Cordero	Postdoctoral Research Associate, FixOurFood programme, Department of Environment and Geography, University of York
Dena Dalton	Head of Health Collaboration, Community First Yorkshire
Ruth Everson	Public Health Manager, Public Health, North Yorkshire Council
Alan Graver	Managing Director, Skyblue Research Ltd
Paul Haslam	Councillor, North Yorkshire Council
Tom Hind	Chief Executive Officer, North York Moors National Park Authority
Claire Lawrence	Public Health Officer, Public Health, North Yorkshire Council

Member	Job title
Rebecca Newman	Research Fellow, FixOurFood programme, Department of Environment and Geography, University of York
Amber L. Reed	Strategy and Performance Manager, Public Health Intelligence, North Yorkshire Council
Michelle Saunders	Public Health Manager, Public Health, North Yorkshire Council
Susan Symonds	Public Health Manager, Public Health, North Yorkshire Council
Jenny Thompson	Public Health Officer, Public Health, North Yorkshire Council
Eleanor Whittaker	Public Health Officer, Public Health, North Yorkshire Council

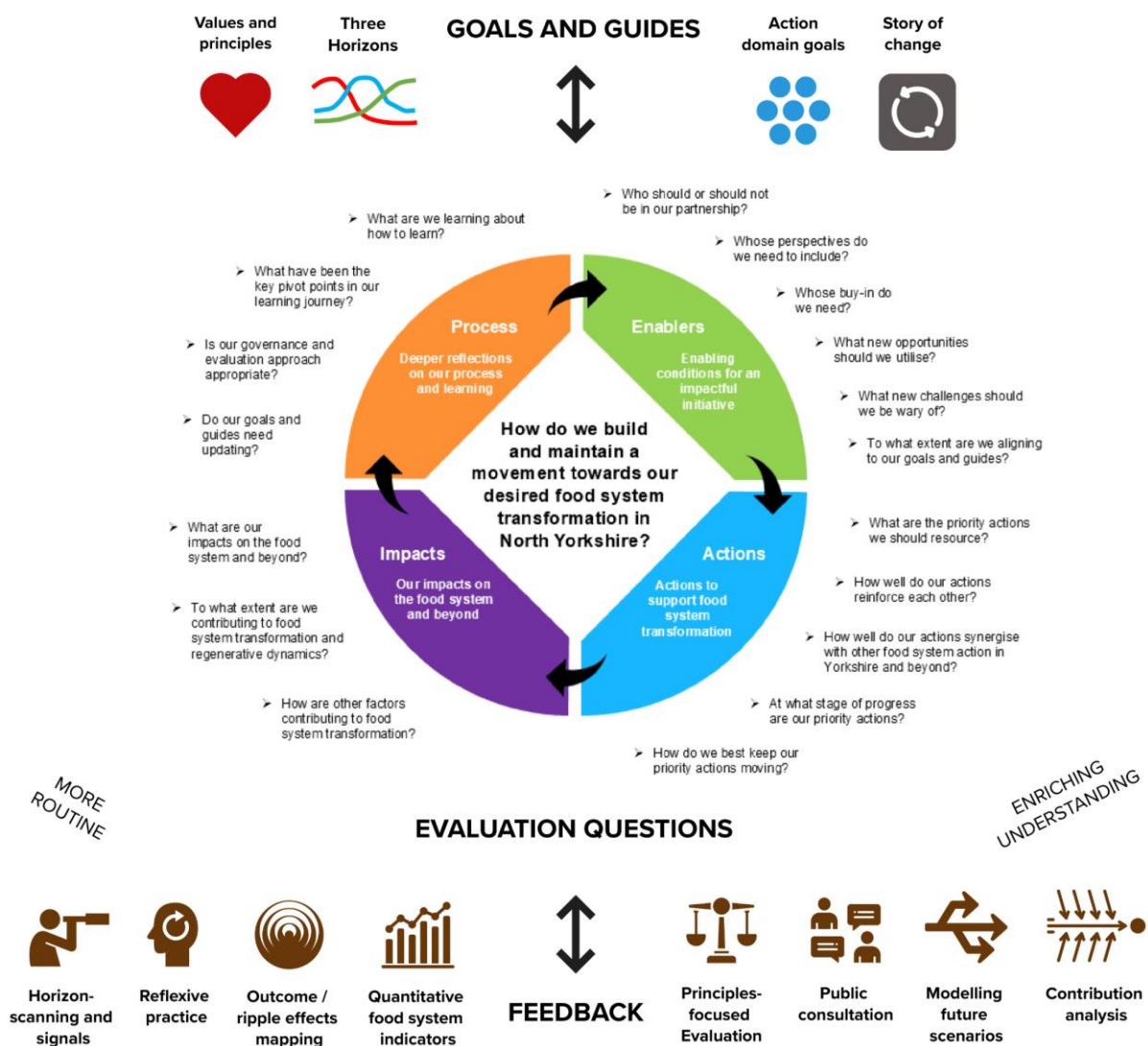
S2 Table | The Evaluation and Learning Working Group's principles for the TFELS design process.

Principle title	Explanation
Transformation-focused evaluation	Moving away from more traditional forms of formative and summative evaluation, and towards more ambitious, creative, developmental and reflexive evaluation better-suited to contexts of systemic transformation.
Embeddedness	A continuous process of self-evaluation that is integral to food strategy development activity.
Functionality	Evaluation that is genuinely useful, and not done merely for the sake of it.
Focus	Remaining focused on the most important things and avoiding becoming overly complicated, thus remaining an engaging process.
Honesty	Avoiding a culture of silence, and saying the things that really need to be said.
Trustworthiness	Built on trust and trustworthiness, with an inclusive approach to the design.
Coordination	Maintaining attention on how the Food for the Future action framework aligns with NYC's other workstreams, such as its climate change and growth strategies

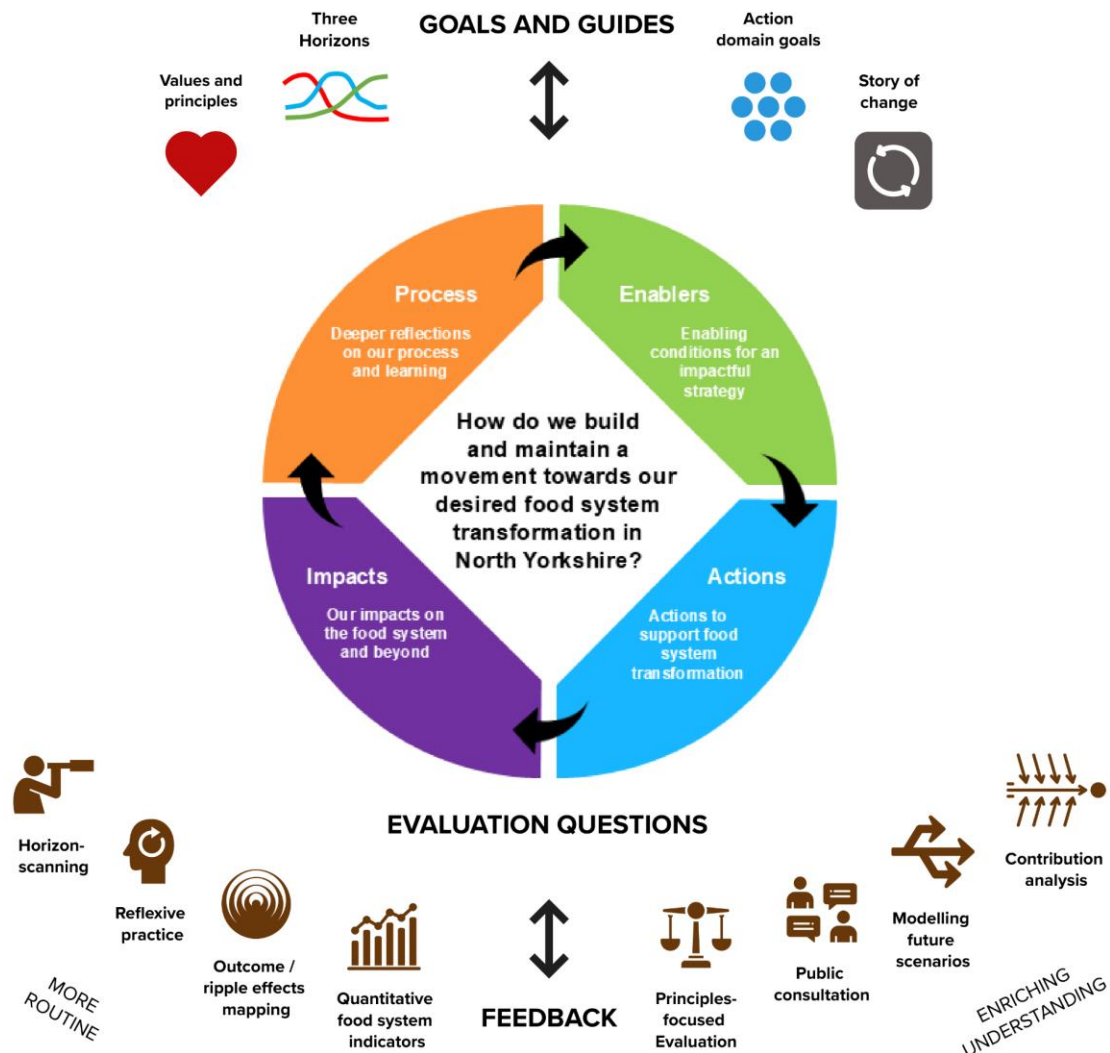
Principle title	Explanation
Outcome-orientation	Guided by the desired outcomes we want to see, both in the shorter-term and in the longer-term future of our Horizon 3.

Concise TFELS illustrations

More succinct versions of the TFELS illustration focused on dimensions 2, 3 and 4 are used for communication within and beyond Food for the Future (S1-S2 Figures).



S1 Figure | Concise illustration of selected dimensions of the Food for the Future in North Yorkshire transformation-focused evaluation and learning system. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).



S2 Figure | Even more concise illustration of selected dimensions of the Food for the Future in North Yorkshire transformation-focused evaluation and learning system. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

Summary of intended TFELS outcomes and how they are expected to arise

S3 Table | Intended outcomes of the transformation-focused evaluation and learning system (TFELS) for Food for the Future in North Yorkshire, if it were functioning successfully.

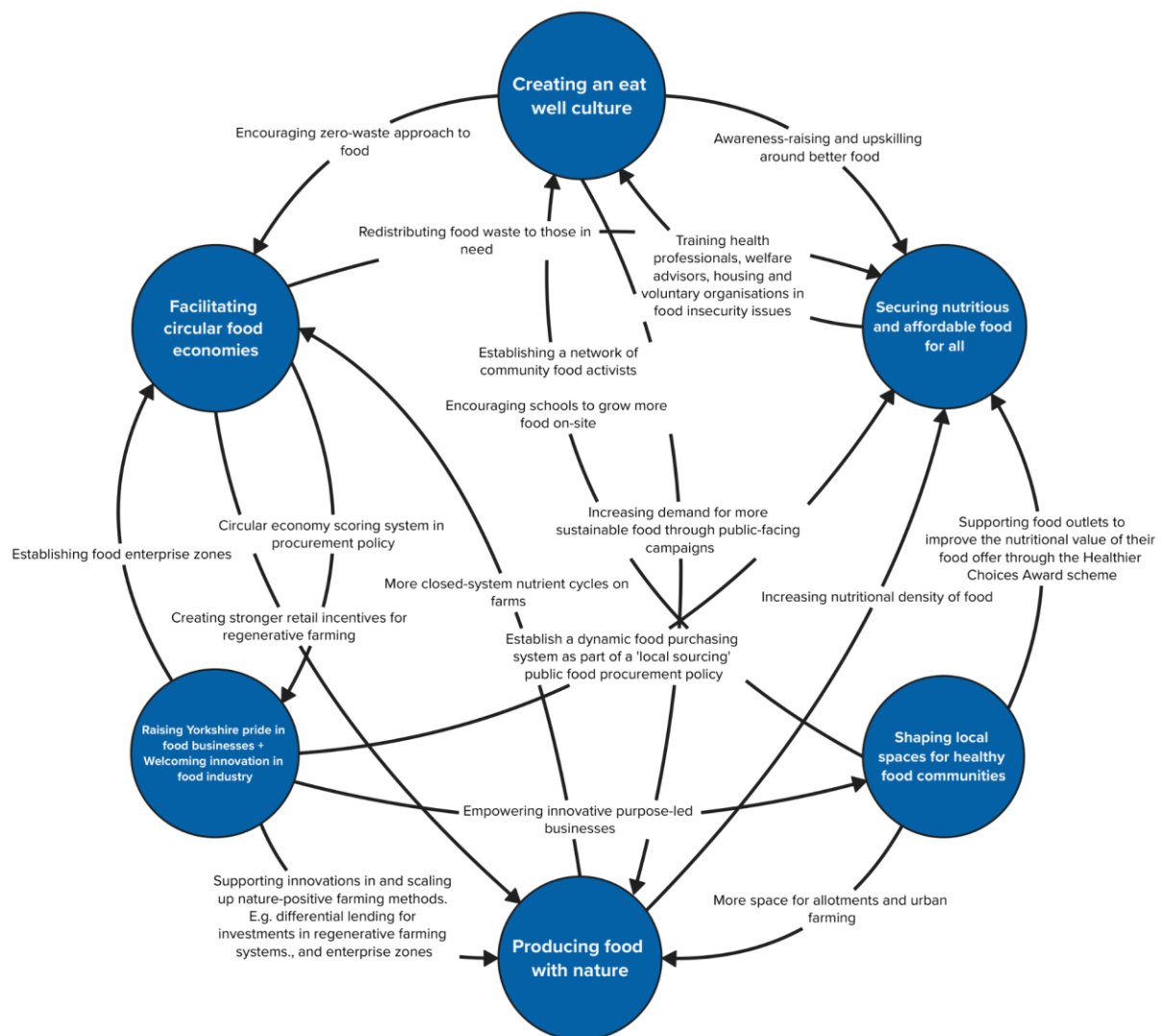
Intended outcome	Explanation of outcome and how it arises from the TFELS
Keenly sensing food system conditions, enabling rapid adaptation	● Food for the Future is able to keenly and rapidly sense changing food system conditions in North Yorkshire and more widely, enabling the initiative to be agile and adapt to new conditions to maintain its effectiveness in supporting food system transformation ● Encouraged by the ‘enablers’ and ‘impact’ evaluation questions (Fig 5); enabled by horizon-scanning, ripple effects mapping, tracking quantitative food system indicators, public consultation, and contribution analysis (Fig 4); reinforced by virtuous cycles R2, R3, R4, R5, R7 and R8 (Fig 6)
More effective transformative action	● Food for the Future supports food system interventions that are more effective in driving transformation of the food system towards regenerative dynamics. ● An ultimate goal of all four strands of the evaluation questions, and particularly encouraged by the ‘actions’ and ‘enablers’ questions (Fig 4); informed by feedback about the outcomes and impacts of the initiative and its actions, e.g. from ripple effects mapping, public consultation and contribution analysis (Fig 4); reinforced by virtuous cycles R4 and R5 (Fig 6)
Transformed understanding of evaluation	● Food for the Future actors have a transformed understanding of the role that evaluation plays in supporting transformation. They no longer equate evaluations with discrete, externally and infrequently applied activities, meeting predetermined objectives under accountability or statutory requirements, a narrow focus on impact and quantitative indicators, and linear views of how impact is achieved with insufficient appreciation of system complexity [14]. Instead they

Intended outcome	Explanation of outcome and how it arises from the TFELS
	recognize transformation-focused evaluation as a more continuous, developmental culture of working where evaluation is part of the change process, focused on enabling conditions, actions and processes as well as impact, drawing on many different forms of feedback, and with a complexity-informed approach to evaluating impact based on contribution analysis [14]. ● Arises from the active involvement of Food for the Future actors in designing and applying the TFELS, and encouraged particularly by the ‘process’ evaluation questions (Fig 5) and reflexive practice (Fig 4); reinforced by virtuous cycles R6 and R7 (Fig 6)
Critical, reflexive approach to evaluation maintained, avoiding greenwashing and cherry-picking results	● Food for the Future actors remain self-critical and reflexive as they self-evaluate their progress, avoiding the temptation to greenwash and cherry-pick results to present a misleadingly positive picture of their effectiveness. ‘Failures’ are recognized as valuable learning opportunities. ● Encouraged particularly by the ‘process’ and ‘impact’ evaluation questions (Fig 5), with ripple effects mapping and contribution analysis encouraging the initiative to take heed of negative outcomes as well as positive ones and remain realistic when it comes to evaluating the initiative’s impact in light of many other external factors influencing the food system; also arises from the initiative’s actors appreciating the usefulness of the TFELS for their learning, reinforced by virtuous cycles R6 and R7 (Fig 6)
Deeper forms of learning, shared with like-minded organizations and initiatives to positively influence their behavior	● The TFELS enables deeper forms of learning for Food for the Future actors, i.e ‘triple-loop learning’ or ‘transformative learning’ [58–60] about the underlying assumptions, beliefs and paradigms at play and whether they remain relevant and appropriate, and learning about <i>how to learn</i>. This would not only be helping actors make sense of their own experiences and transform their ways of working, but also to communicate these insights with other initiatives on similar journeys to enhance their effectiveness in supporting transformation in food systems and other systems. ● Encouraged particularly by the process evaluation questions (Fig 5) and reflexive practice (Fig 4); reinforced by virtuous

Intended outcome	Explanation of outcome and how it arises from the TFELS
	cycles R1-8 (Fig 6)
Transformational intent and hope maintained	● The TFELS maintains Food for the Future actors' intent and focus on supporting large-scale food system transformation in North Yorkshire towards a regenerative future, and a sense that such a transformation is possible ● Encouraged particularly by the 'actions' evaluation questions (Fig 5) and the guides of Three Horizons, the action domain goals and the initiative's story of change (Fig 4; S3 Figure); also arises by building on strengths and celebrating and drawing inspiration from successes, e.g. from ripple effects mapping and the annual celebration events; reinforced by virtuous cycle R4 (Fig 6)
The momentum and success of the TFELS and the initiative more widely continuously draws in new actors, maintaining the system's integrity over time	● The momentum and success of the TFELS and Food for the Future more widely continuously draws new actors into the initiative and involvement in designing and applying the TFELS, maintaining the system's integrity over time even as some actors move on ● Reinforced by virtuous cycles R6 and R7 (Fig 6)

Food for the Future's story of change

As well as a more narrative version of Food for the Future's story or theory of change [32], a version in the form of a concept map, based on 'requests and offers' exercises to explore the mutual support and reinforcement between the initiative's seven action domains, was created (S3 Figure).



Reinforcement between action domains

Arrows represent supportive relationship

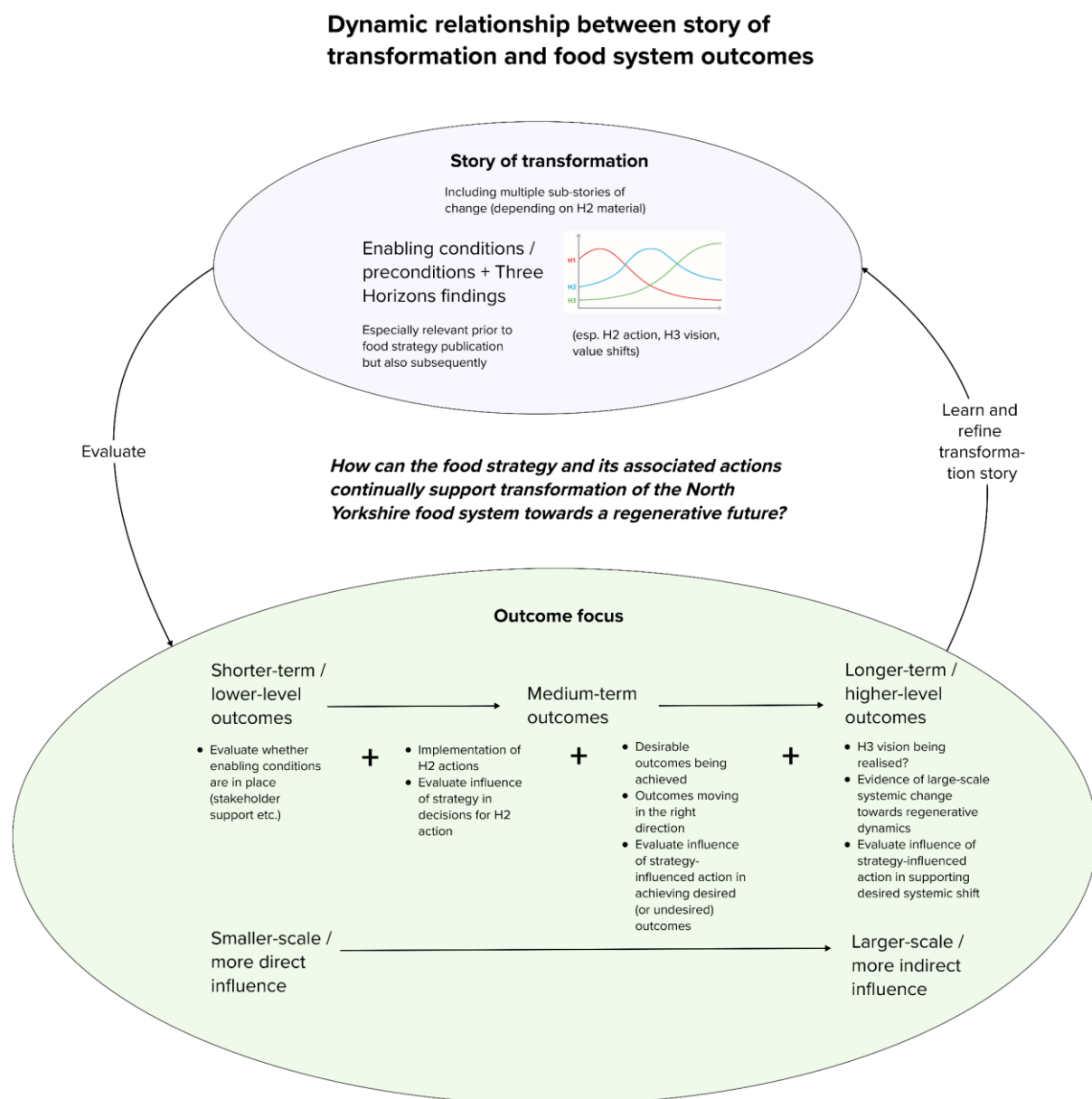
S3 Figure | The story of change of Food for the Future in North Yorkshire in the form of a concept map showing mutual support and reinforcement between its action domains. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

Ripple effects map

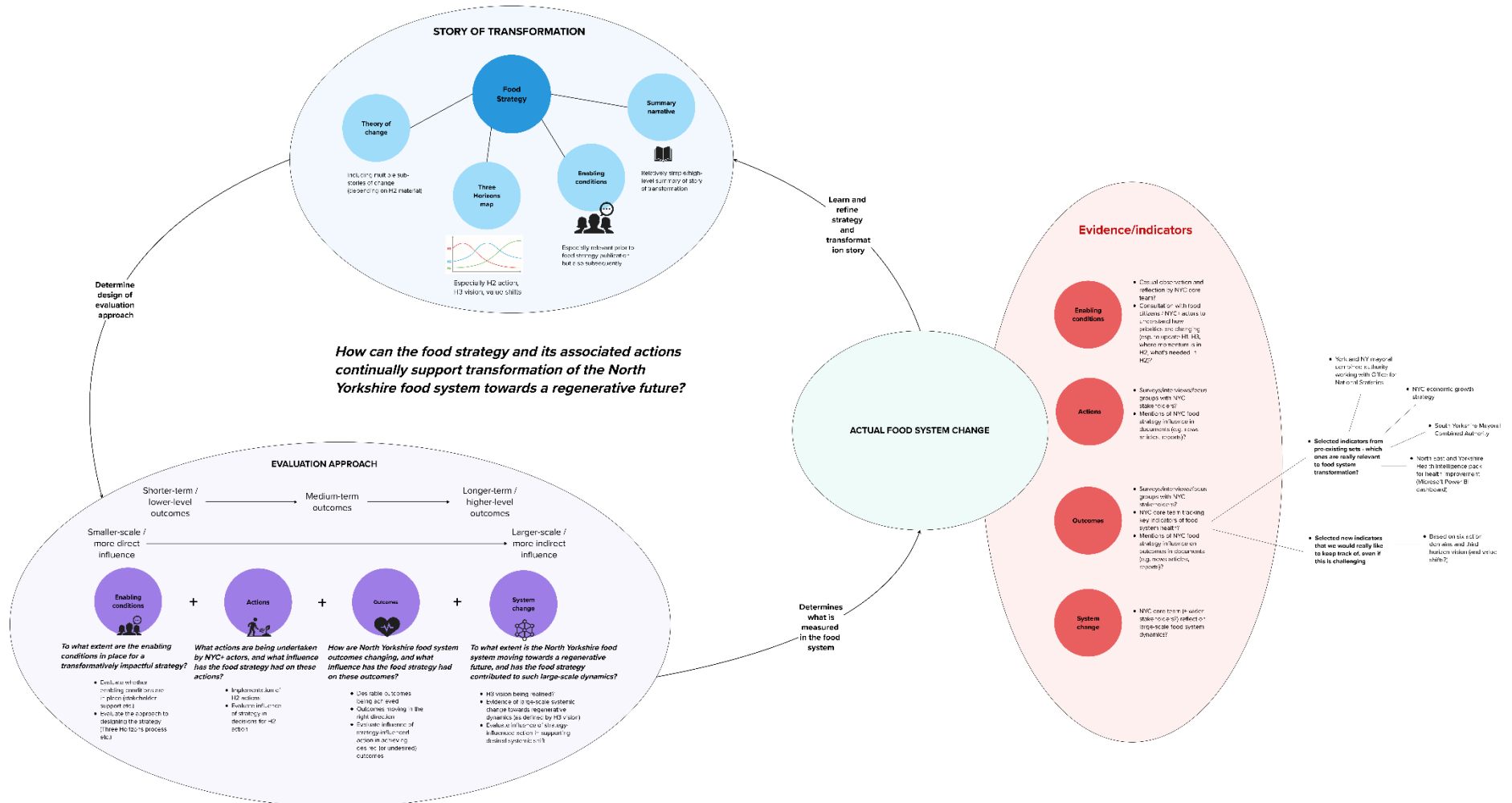
The results of the ripple effects mapping exercise at Food for the Future's 14 November 2024 launch event are displayed in an [online mural](#).

TFELS design iterations

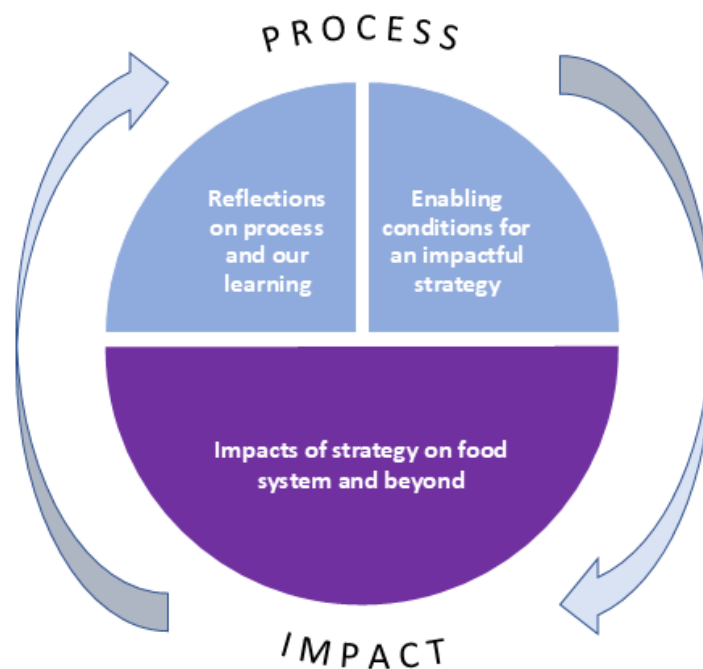
The TFELS design went through around seven main iterations before the version presented in this paper (S4-S10 Figures).



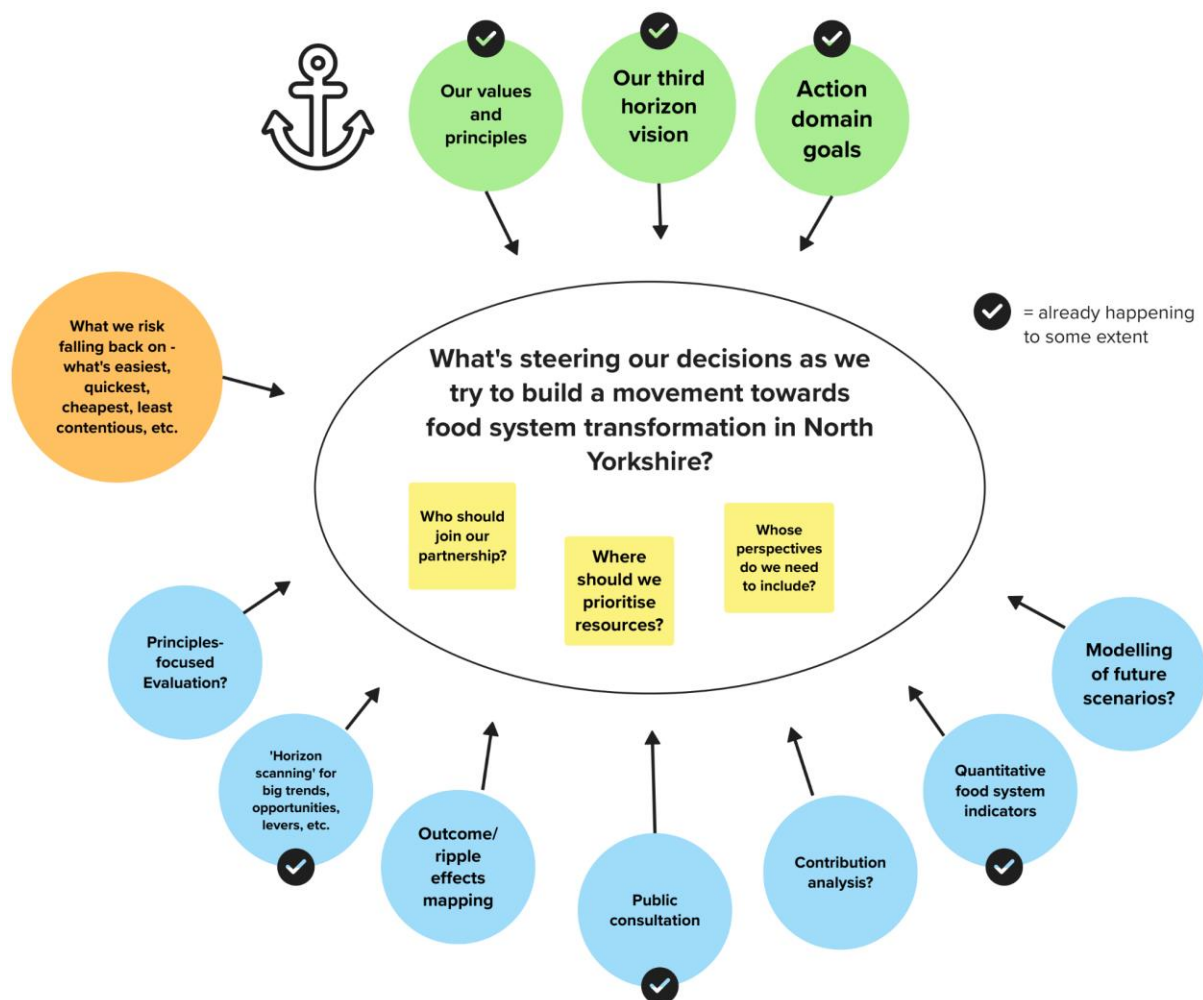
S4 Figure | First main iteration of the TFELS design, from September 2023. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural). See the [mural](#) for details.



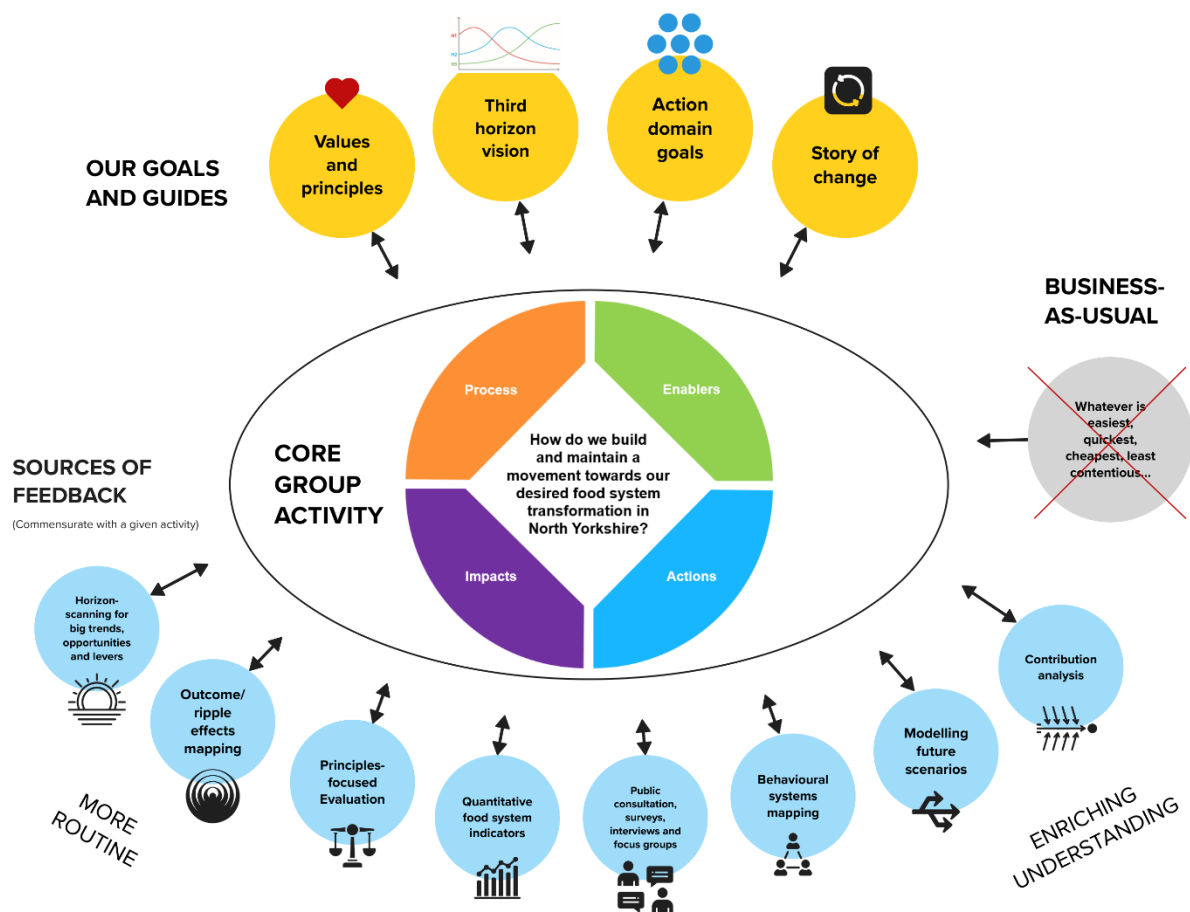
S5 Figure | Second main iteration of the TFELS design, from October 2023. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural). See the [mural](#) for details.



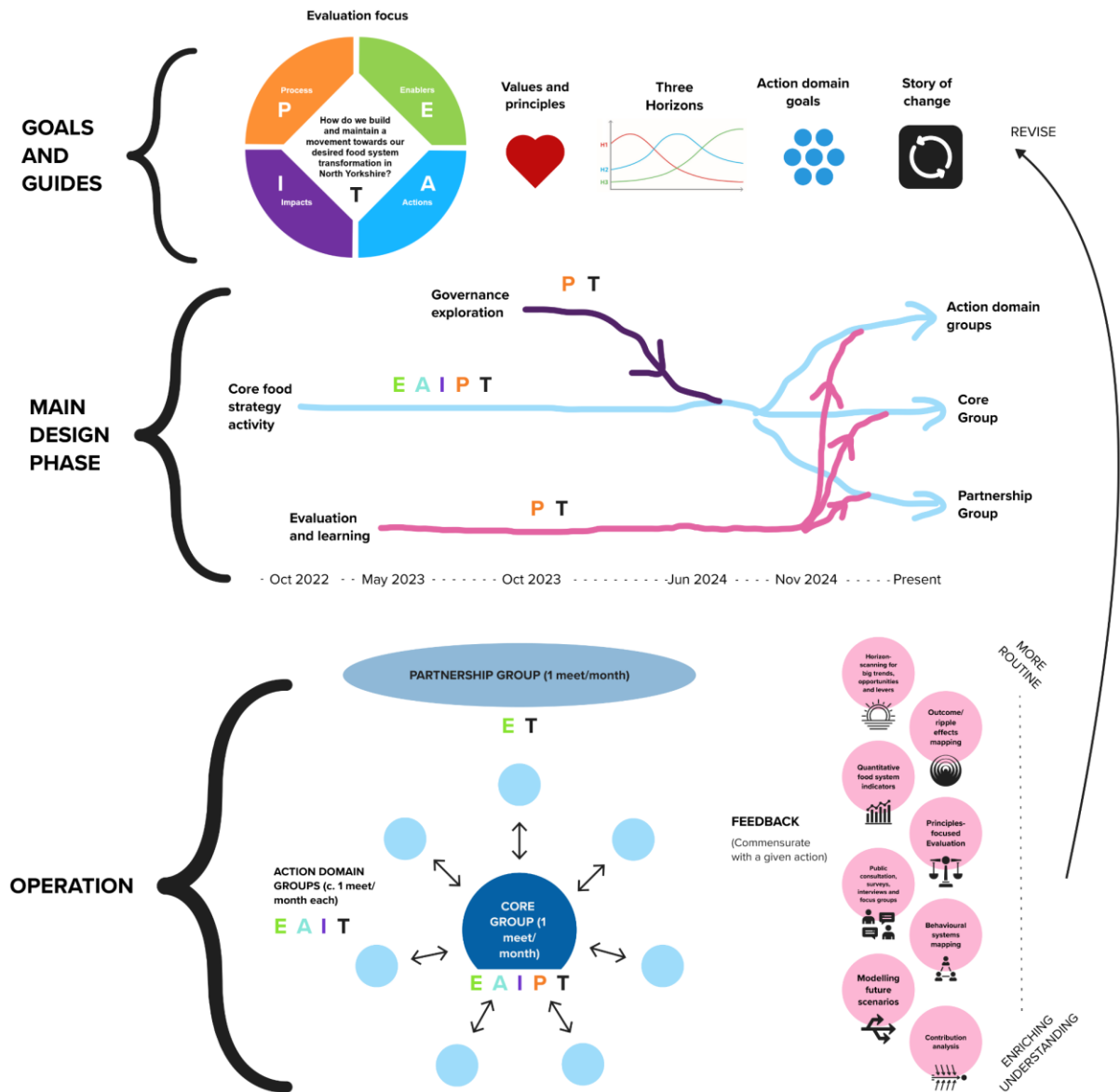
S6 Figure | Third main iteration of the TFELS design, from November 2023. Figure created by Sam J. Buckton in PowerPoint.



S7 Figure | Fourth main iteration of the TFELS design, from June 2024. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

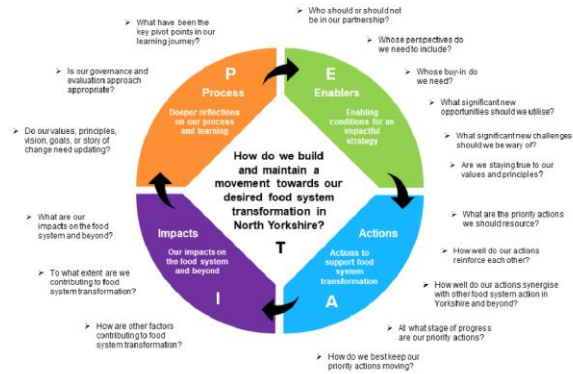


S8 Figure | Fifth main iteration of the TFELS design, from June 2024. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

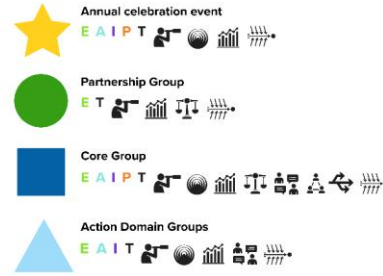


S9 Figure | Sixth main iteration of the TFELS design, from February 2025. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

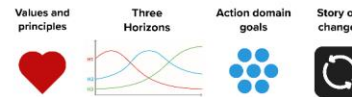
CORE EVALUATION QUESTIONS



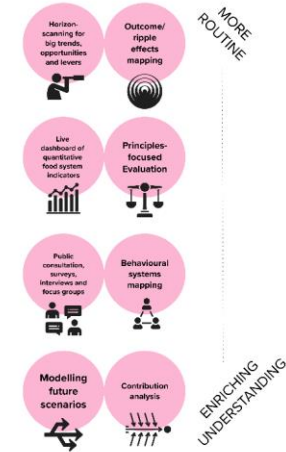
KEY EVALUATION ACTIVITIES



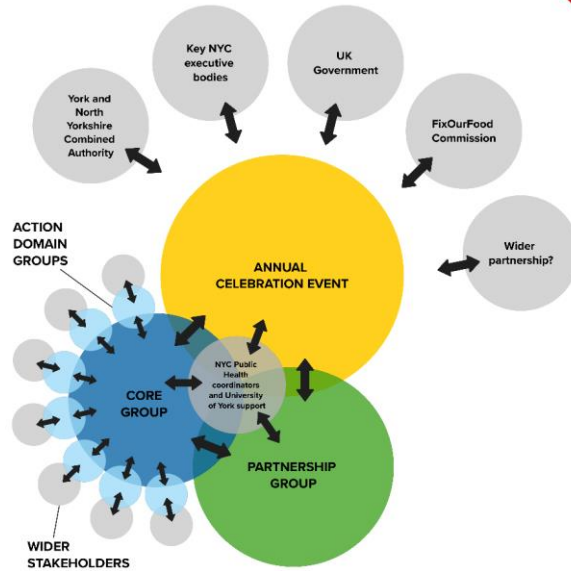
GOALS AND GUIDES



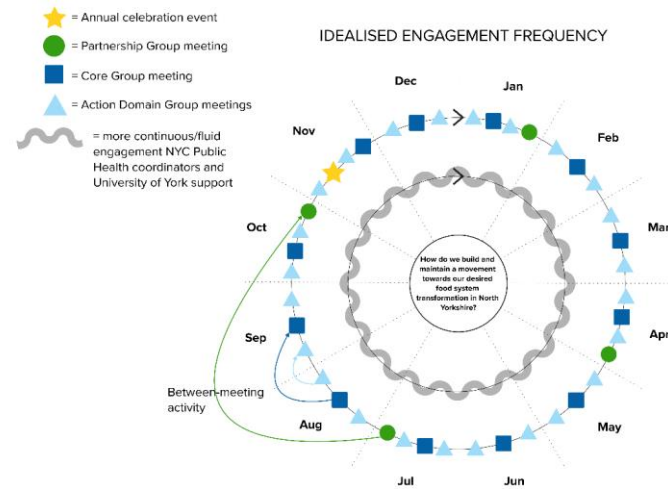
FOOD SYSTEM FEEDBACK (Commensurate with a given action)



KEY ACTORS, THEIR DYNAMICS, AND INFORMATION FLOWS



IDEALISED ENGAGEMENT FREQUENCY



S10 Figure | Seventh main iteration of the TFELS design, from February 2025. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural). See the [mural](#) for details.

Chapter 5: Synthesis: How can evaluation practice catalyse transformations towards regenerative futures?

Chapter 2 sought to increase conceptual clarity on the kinds of regenerative futures that transformations need to orient towards, while Chapter 3 deepened understanding of the kinds of evaluation that would support such transformations. Chapter 4 then explored how these ideas might be embedded in transformation efforts. It found that the design of a transformation-focused evaluation and learning system for a transformation initiative – in this case, Food for the Future in North Yorkshire – would need to integrate and reinforce core evaluation questions, other goals and guides, and different forms of feedback, sense-making and learning within an ecosystem of actors striving to support system transformation. These would drive intended outcomes that include rapid adaptation to system change, more effective transformative action, a transformed understanding of evaluation, a critical, reflexive approach that avoids greenwashing and cherry-picking, deeper forms of learning and its dissemination, the maintenance of transformational intent and hope, and a system that maintains its integrity over time by continuously drawing in new actors. More broadly, Chapter 4 found that the effective design, implementation and embedding of transformation-focused evaluation is likely to require a holistic appreciation of evaluation beyond only metrics and impact, a design approach that is iterative, bricolaged, responsive and experiential, and builds on existing strengths, and ultimately treating design work as an ongoing and vital part of embedding transformation-focused evaluation within a wider culture of working and organising.

Chapter 5 then synthesises the findings from across Chapters 2-4 and directly responds to the overarching question of the thesis: ‘How can evaluation practice catalyse transformations towards regenerative futures?’. It also presents an action-oriented agenda for future research and practice to accelerate the mainstreaming of transformation-focused evaluation.

How can evaluation practice catalyze transformations towards regenerative futures?

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Abstract

Evaluation – the process of assigning quality, value or importance to something – is a universal human activity and profoundly influences the action we take in the world. The modern professionalized discipline of evaluation has been strongly shaped by Western worldviews and approaches. However, our complex, volatile and transforming world demands very different kinds of evaluation to enable regenerative futures where people and planet can flourish together. Conventional evaluation is now at best inadequate, and at worst actively contributing to global crises and holding us back from transformation. A critical question is then: how can evaluation become a genuine ally in desired transformations, rather than remain part of the problem? In this perspective, we identify three important aspects that must accordingly be addressed. First, the new roles and capabilities demanded of evaluation practice by the needs of our transforming world must be recognized. Second, stepping fully into those new roles requires an existential shift in the complexity awareness, power relations, and purpose of evaluation practice. Third, a number of wider cultural enabling conditions are essential to cultivate in order to accelerate the mainstreaming and embedding of transformation-focused evaluation in transformation efforts. If we successfully address these three aspects – especially if reinforced by financial power-holders in global evaluation systems – evaluation could play a vital role in building on existing regenerative practice to catalyze transformations towards regenerative futures.

Introduction

Evaluation – the process of assigning quality, value or importance to something^{1,2} – is one of society's most fundamental activities.^{3,4} It is both mundane and profound; some suggest that evaluation underpins reality itself.^{5–8} While evaluation is a cognitive and embodied sense-making process carried out in different ways by many living organisms,^{8–12} in humans it has developed new levels of sophistication and nuance. We are constantly evaluating ourselves and the world around us, consciously and unconsciously.^{3,4,8} In fact, the 'predictive processing' paradigm in contemporary neuroscience reveals that no raw sensory input exists independently from our subjective experience and evaluation of it, and suggests that our brains are physically wired for rapid, iterative, adaptive, continuous, developmental evaluation.¹² When we choose what to buy, whom to vote for, where to live, and whom to make our partner, when we state our desires, likes, dislikes and priorities, when we create,

design, and plan – we are evaluating.^{3,4,13} Evaluation determines the functioning of our finance, legal, healthcare and education systems, and our economies more generally.^{3,4,13} Our evaluative choices are underpinned by our personal and cultural criteria, shaped by our values, morals, assumptions, beliefs, experiences, and worldviews.^{3,14,15} How we evaluate thus has deep implications for the action we choose to take in the world.

Evidence of relatively systematic, formal methods of evaluation in human culture can be traced back at least 6000 years,¹⁶ but only within the last century has evaluation been developed into its own discipline and profession.^{13,17} The Western model of evaluation – which grew primarily from the need to financially audit efforts to rebuild better societies in the wake of World War II^{17,18} – has become the dominant one globally.¹⁹ This is largely due to pragmatic and political reasons rather than its inherent merit: notably the requirements of international development cooperation, aid and impact investing in the Global South, combined with theories developed in relatively well-resourced academic institutions in the Global North and West.^{19,20} This evaluation model grew up supporting discrete, isolated projects in service of a ‘delivery mode of governance’,²¹ underpinned by assumptions of certainty and predictability, focused on quantification and financialization, assessing progress on predetermined objectives in linear theories of change, and encouraging relatively marginal and superficial improvements to existing systems.^{14,22,23}

Yet this model is a poor fit in today’s volatile, uncertain and rapidly transforming world.^{14,15,21,24,25} Societal transformations – major, fundamental, systemic changes – are urgently required to address interconnected and compounding global challenges, including climate change, biodiversity loss, increasing poverty and social inequality, disinformation, and neofascism;^{26–34} indeed, whether we like it or not, many transformations are already underway, from ecosystem collapse to the rise of Artificial Intelligence (AI).^{35–38} Conventional modes of evaluation are now at best inadequate, and at worst actively contributing to global crises and holding us back from transformation.^{14,15,21,22,25,39}

A critical reason is that the criteria, framings and orientations that shape our evaluation practice (and by extension societal change) are failing to drive change at the speed, scale and depth required, and are held in place by power structures and political agendas.^{40–46} Mainstream approaches to achieving sustainability often assume that it is sufficient to simply reduce anthropogenic harm to more acceptable levels through incremental improvement (e.g. in efficiency) and adaptation of existing processes, such as ‘green growth’ and a ‘net zero’ approach to reducing carbon emissions.^{41,44,47–49} However, this ‘weak sustainability’ paradigm

fails to shift problematic underlying drivers of unsustainability,^{47–49} including the extractive dynamics of capitalist economic models focused on material growth,^{28,44,45} and a prevalent worldview of human separation from, and superiority over, the rest of nature.⁴¹ Such approaches are also insufficient given that we have already transgressed critical thresholds of planetary resilience.^{40–42,50,51}

The Sustainable Development Goals (SDGs) provide a specific example of an influential but flawed societal orientation: although many of the SDGs are laudable in their ambition, they have also been criticized for their neoliberal and material growth-based underpinnings,^{52–55} as being universalist, oversimplifying, and imposing Western values upon the actual multidimensionality and diversity of development,^{39,56,57} and distracting from the deeper causes of development issues.^{39,51,58} Societies are also largely failing to meet the goals in the first place.^{39,59,60} Limitations of the SDGs are reinforced by other widely used evaluation criteria for development projects, particularly the OECD Development Assistance Committee (DAC) criteria, which assess evaluands' relevance, coherence, effectiveness, efficiency, impact, and sustainability.¹⁴ These criteria have also been criticized for their narrow view of sustainability, which is defined primarily as the likelihood of intended, beneficial project outcomes continuing after donor funding is withdrawn.^{14,22} The criteria thus send a message of accountability for fixed outcomes, conservative continuity and 'business-as-usual' incongruous with the complexity, instability, magnitude and urgency of transformation.^{14,22}

A more radical *regenerative* orientation is therefore increasingly advocated to encourage more transformative action and transcend global crises.^{33,61–63} Broadly speaking, regenerative social-ecological systems (communities, businesses, economies, cities, regions, etc.) maintain positive reinforcing cycles of health within and beyond themselves,⁶¹ such that 'life creates conditions conducive to life'.⁶⁴ For example, a regenerative business would not only support the health of its finances and employees, but also care for the wider ecosystems and life-support systems upon which the business depends.^{61,65} Regenerative approaches go beyond merely reducing harm, or even restorative approaches of 'humans doing things to nature', by humans actively participating, collaborating and co-evolving *as* nature to spiral up human and planetary health in mutually reinforcing ways.^{41,61}

There has been extensive work to characterize regenerative systems, dynamics and practices across a wide variety of disciplines.^{33,61,63,66–69} This points out how life is inherently regenerative, and that its health is intrinsically linked, across nested scales – from cellular and individual to collective, ecosystemic and planetary^{70,71} – and that regenerative practice is

sustained by many Indigenous and local cultures.^{66,67,69} Common features of regenerative systems include their mutualistic and reciprocal relationships (summarized in the Black African philosophy of *Ubuntu* as ‘I am because we are’⁷²), ecological and cultural diversity, rootedness in the unique features and stories of particular places (e.g. bioregions), and capacity for continuous reflexivity, learning, adaptation and evolution.⁶¹ A regenerative framing also emphasises the importance of justice for humans and non-humans, including agency to develop regenerative relationships, decolonization and honoring the regenerative practices of Indigenous and local communities, more ground-up or self-organizing forms of participatory governance, upholding the rights of nature, and enabling conditions for human wellbeing that go beyond just meeting basic material needs.^{61,73} In food systems regeneration is often associated with relocalizing foodsheds, commoning, agroecology, and food sovereignty.⁶⁶ Particularly in its justice intentions, regenerative practice has been linked to the urgent need for development, notably in the Majority World, to rapidly improve living standards, infrastructure, and economic opportunity for billions of people in ways that enhance rather than degrade social-ecological systems (sometimes referred to as ‘regenerative development’ or ‘flourishing’).^{74–76}

Overall, regenerative orientations have the potential to bring into view many ideas that powerfully challenge the unsustainable status quo and encourage more transformative action – including ideas about radically different system dynamics, human-nature integration and interdependence, decolonization and elevation of Global Majority knowledge and practice, and multi-species care and justice. A critical question is then: how can evaluation practice embrace the ‘regenerative turn’⁷⁷ (also conceptualized as a ‘relational turn’^{78,79}), and become a vital ally in supporting desired transformations, rather than continue to reinforce problematic societal patterns and outmoded notions of how change comes about? In this perspective, we explain how three key aspects – namely, the new roles and capabilities demanded of evaluation, the fundamentally different evaluation approaches needed, and broader cultural enabling conditions – must be considered if evaluation practice is to maximize its potential to catalyze transformations towards regenerative futures.

We put our ideas forward as researchers, evaluators, facilitators and practitioners with many decades of collective experience working at the nexus of evaluation, regeneration and transformation, as well as global citizens deeply concerned for the wellbeing of the planet and future generations. Our proposals are aimed at those working in evaluation cultures in a broad sense, albeit primarily those originating from the Global North and West, and their colonial reach across wider geographies. On the one hand there are people of the evaluation

profession: not only those who conduct evaluations per se, and networks of evaluators, but crucially also other actors upon whom evaluation practice greatly depends, including funders, sponsors, commissioners and managers of evaluations, and international networks that set evaluation standards (such as the Evaluation Cooperation Group, United Nations Evaluation Group, and OECD Development Assistance Committee). On the other hand, we are *all* evaluators, and all carry responsibility to orient our own practice towards regeneration. No-one is exempt from the transformational challenge we face – we are all in the same boat, all with ‘skin in the game’ of safeguarding the health of our planet.^{14,80} In this camp we would include the social movements and initiatives actively seeking to support transformations. AI is also increasingly a key player in evaluation.⁸¹ To encompass this diversity, we use the collective term of ‘evaluation actors’. Our paper serves as both an overview of the ‘state of the field’ in transformation-focused evaluation, and a bold action-oriented agenda for future research and practice.

How can evaluation practice catalyze transformations towards regenerative futures?

There are three important aspects that need to be addressed if evaluation practice is going to step up to the ‘transformational imperative’⁸² – the urgent need for societal transformations towards regenerative futures demanded by our crisis-hit world (Figure 1). First, the new roles and capabilities urgently demanded of evaluation practice by the needs of our transforming world must be recognized. Second, stepping into those new roles requires fundamental shifts in the complexity awareness, power relations, and purpose of evaluation practice – in other words, an existential transformation of more traditional Western modes of evaluation and how it is implemented. Third, a number of wider cultural enabling conditions are essential to cultivate in order to accelerate the mainstreaming and embedding of transformation-focused evaluation in transformation efforts. Without addressing these key aspects, we are likely to perpetuate relatively superficial and marginal forms of change that by themselves insufficiently tackle the underlying drivers of global crises, and transformation-focused evaluation is likely to remain a niche practice. The next sections of our paper explain these three aspects in turn.

How can evaluation practice catalyze transformations towards regenerative futures?



Figure 1. How evaluation practice can catalyze transformations towards regenerative futures. Base image (concentric circles) created by ChatGPT image generator 4o. Figure created by Sam J. Buckton in [Mural](#) (Tactivos, Inc. dba Mural).

Transformations urgently demand new roles and capabilities for evaluation practice

If evaluation practice is to catalyze transformations towards regenerative futures, evaluation actors (and particularly the financiers, commissioners, and other power-holders of global

evaluation architectures) must first wake up to the new roles and capabilities that are urgently demanded of evaluation to shape the design, actions and learning of organizations, governments and initiatives working in contexts of transformation^{35,83–86} (Figure 1). As illustrated by *transformation catalysts* (actors that catalyze system change by aggregating, cohering and amplifying actions of individual transformation initiatives⁸⁴) and *transformation systems* (the more-or-less self-aware systems of initiatives, organizations and people aligning their efforts to transform a particular issue or geography in a common direction⁸⁵), transformations are increasingly characterized by large-scale, system-wide, diverse partnerships and networks striving to coordinate for collective change, alongside (or sometimes despite or in resistance to) national governments – a far cry from the isolated projects and piecemeal, top-down government policymaking that molded traditional Western evaluation practice.²¹ At the same time we are seeing a global proliferation of organizations supporting regenerative practice, including funders and incubators (e.g. BioFi Project and Unearthodox), thinktanks (e.g. Capital Institute), networks and educators (e.g. Regenesys Institute and Bioregional Learning Alliance), as well as regenerative initiatives themselves. These all present new arenas and spatially expanded scales for evaluation – with evaluands diversified from isolated projects, policies and programs to additionally include wider initiatives, partnerships, portfolios, strategies, communities, regions, sectors, and societies – alongside more traditional state-led policymaking grappling with the transformational imperative.

Firstly, evaluation will need to maintain initiatives' focus and intent on transformation and regenerative futures, as well as the hope that such change and futures are possible.^{86,87} These aspects can easily fall away without dedicated attention, or become watered down by greenwashing.^{35,88} Systems' complexity and resistance to transformation can become overwhelming and lead to defeatism, paralysis, and a temptation to resort to smaller-scale, isolated interventions where actors feel a greater sense of control.^{89,90} Mitigating this challenge calls for an evaluation approach that nurtures existing regenerative practices and dynamics, builds on momentum and strengths, celebrates successes, seeks out sources of inspiration, and continually reiterates the motivation for systemic transformation and supporting joined-up cross-system action.⁸⁷ The importance of hope and inspiration has been noted for sustaining regenerative dynamics across ecological, social and financial domains.⁹¹ Evaluation can hold initiatives to account for their transformational fidelity: whether their action matches their rhetoric, whether they remain true to their guiding star of regenerative

futures, and ensuring that transformational intent is reflected throughout initiatives' design and decision-making.^{14,92}

Second, evaluation will need to enable agility and rapid adaptation to dynamic conditions.^{86,87} Complex systems are never static, and much of their behaviour is beyond our control; today's objectives may be redundant tomorrow. This calls for evaluation not only to aid navigation of particular challenges and opportunities as they arise, but also to build initiatives' wider capacity and flexibility to experiment, adapt, evolve, and anticipate possible futures and scenarios.^{87,92,93}

Third, evaluation will need to play a crucial sense-making role, making sense of complex system changes and how initiatives influence them, and recognizing important signals and patterns in seas of data.^{86,87} Our modern predicament is typically a case of 'information overload' rather than a lack of data.^{94,95} We will need to know if transformations are occurring, desired or otherwise, how our interventions are contributing to them, and what their impacts are: their synergies, trade-offs, and ripple effects; who benefits, who loses out.^{87,96,97} There will be dilemmas and tensions to be navigated.⁹⁸ We will need to recognize signals of regenerative or degenerative dynamics and potential, and resilience.^{14,87} Overall, transformation efforts need evaluation that helps them think like detectives or Polynesian wayfinders⁹⁹ capable of integrating diverse perspectives and forms of knowledge and evidence, remaining mindful of the bigger picture, interrelationships and boundaries as well as the detail.^{87,100}

Fourth, evaluation would support transformations by encouraging critical reflexivity and deeper forms of learning.^{86,87} Many transformation frameworks highlight the importance of shifting the assumptions, paradigms, values, worldviews and mental models as deep leverage points for inner and outer transformation^{36,101–104} – particularly to shift from perspectives of human-nature separation and control towards more relational ontologies that appreciate the connection and interdependence of all life (as long-emphasized in many Indigenous ways of knowing),^{61,79,105,106} and from conventional Western modes of evaluation towards understandings of transformation-focused evaluation, including from pluralist and decolonizing perspectives.^{87,107} Transformations therefore call for evaluation that can draw attention to and encourage us to question those underlying dimensions, as well as supporting shifts towards the mindsets of regenerative practice and transformation-focused evaluation.

Ultimately – by maintaining transformational intent, supporting agility, sense-making in complexity, and encouraging deeper forms of learning – effective transformation-focused

evaluation would enable us to take wiser and more effective action to navigate our transforming world, nurture regenerative practice in the present, support regenerative development of human societies, and stimulate desired transformations towards regenerative futures.^{86,87} Such action would include system interventions that allow radically different regenerative patterns and paradigms to emerge and spread, rather than more superficial interventions that become co-opted by the status quo,^{108,109} as well as the coordination of multiple interventions and initiatives to enable synergistic rather than discordant action towards transformation. Overall, the transformational imperative demands evaluation that not only analyzes transforming systems, but is also a ‘critical friend’ of transformation-focused partnerships (whether in more embedded or more external positions), and actively contributes to transformation, particularly by encouraging reflexivity and shifts in mental models that lead to wiser action – in other words, evaluation *of, for, and as* transformation.^{110,111}

This requires transforming the complexity awareness, power relations and purpose of evaluation practice

Mainstream modes of evaluation, with their criteria, assumptions, methods, and values rooted in Western thought, are greatly limited in their ability to fulfil the roles and capabilities highlighted above for numerous reasons^{21,22,87} (Table 1). These approaches derive from an Enlightenment worldview assuming a single universal reality or truth that can be measured objectively by a neutral, independent observer and understood by breaking it into its constituent parts, and that every outcome has a clear, measurable cause.^{15,112–114} This reductionist, deterministic and mechanistic perspective encourages ideas that: change processes can be controlled and predetermined; approaches can be standardized and replicated; systems can be adequately understood by treating them in isolation; ‘value-free’ quantification and causal attribution via experimental controlled designs are the gold standard of evidence; and evaluations at infrequent fixed timepoints (e.g. formative and summative evaluation), drawing on retrospective evidence from the past and present, provide sufficient information about projects’ success and its likelihood to continue into the future.^{15,21,22,112–114} Such perspectives have also grown out of a much longer history of Western thought – from Ancient Greek philosophy to later thinkers like René Descartes, Francis Bacon and Thomas Hobbes – which reinforced dualistic worldviews, particularly of humans as separate from and dominant over the rest of nature, that lie at the heart of humanity’s unsustainable relationship with Earth’s biosphere.^{41,115,116}

These legacies inherently limit the ability of traditional evaluation practice to respond to the transformational imperative and embrace a regenerative orientation – both of which are characterized by recognition of the complexity, nestedness, interdependence, uncertainty, subjectivity, contention, and place-based uniqueness of social-ecological systems.^{22,61,87} Although complexity-informed approaches have become more common in evaluation, particularly since the 2010s in response to global initiatives like the United Nations' 2030 Agenda for Sustainable Development,²² 'bad habits are hard to break'²² and positivist approaches remain deeply entrenched in many areas of evaluation and policymaking.^{22,117}

Further dimensions of the power relations and purpose of mainstream evaluation are also problematic in the context of the transformational imperative (Table 1), and reinforce the kinds of worldviews highlighted above. Because evaluation is typically treated as a discrete technical activity by experts outside of system change processes, evaluation actors are constrained from also playing more supportive, developmental, facilitative roles within transformation initiatives,⁸⁷ often inappropriately impose Western knowledge and perpetuate the marginalization of non-Western wisdom and ways of knowing beyond scientific rationality,^{15,21,112,113,118} and treat inequalities and discrimination as contextual issues outside the remit of evaluation.¹¹¹ Moreover, evaluations have tended to be shaped primarily by their funders and committed to neoliberal economic ideas that are strongly implicated in global social and environmental crises,^{21,44} narrowing accountability to focus on value for money, encouraging risk-aversion, and shortening time horizons to match budget cycles.²² At the same time, evaluators have rarely 'bitten the hand that feeds them' and challenged their funders and commissioners, even if evaluations serve vested interests in the unsustainable status quo.^{119–121} Overall, Western evaluation is conventionally geared towards improving existing interventions with minor adjustments and reforms, treating 'sustainability' largely as the continuation of the same outcomes.^{14,122} In these ways, traditional evaluation approaches reinforce structures that maintain a subordinating hierarchy of knowledge and power, and constrain the potential of evaluation to be a driving force for more fundamental change.

If evaluation is to meaningfully contribute to regenerative transformations, it must therefore transform its complexity awareness, power relations, and purpose to develop necessary capabilities (Figure 1; Table 1).^{14,22,87} Transformation-focused evaluation must embrace a more relational worldview informed by understandings of complexity science and the long-term dynamics of transformation and regeneration. It must also be: strongly contextualized to place, recognizing the unique needs of each evaluand; responsive and agile, applying evaluation as a more continuous process or when needs arise, and adapting approaches in

response to changing circumstances; and epistemologically and methodologically pluralist, decolonizing and partnership-building, drawing on diverse forms of knowledge and ways of knowing – including foresight methods alongside retrospective evidence, and embodied, tacit, practical and intuitive knowledge as well as rational – and weaving transdisciplinary partnerships of knowledge-sharing. Its criteria for assessing change would focus on evidence for large-scale, systemic transformation and regenerative dynamics (and contributions to these), not only smaller-scale adjustments and reforms.

If evaluation is to truly *catalyze* transformations towards regenerative futures – suggesting a more active and normative role in seeking and encouraging desired transformations rather than merely passive support – then it must also be: ethically grounded, with evaluation actors as activists for justice, transformation and regeneration who are prepared to challenge inequalities, discrimination, and evaluations that serve vested interests in the unsustainable status quo; embedded in system change processes, with evaluation actors playing much more collaborative, co-creative, reflexive and facilitative capacity-building roles rather than adopting only directive or externally judgemental stances; and primarily accountable to the flourishing of planetary life for current and future generations. A key focus would be recognizing regenerative practice in the present and evaluating how to best enable the spread of such practice. It is worth clarifying that a more embedded role for evaluation in transformation efforts does not preclude evaluators from offering relatively independent, critical perspectives.¹²³ More ‘external’ evaluations still play a vital role, however, particularly given risks of ‘transformation-washing’ or outright retreats from Environmental, Social and Governance (ESG) and Diversity, Equity and Inclusion (DEI) commitments in many governments and businesses, and for intergovernmental financial institutions that otherwise lack democratic accountability.^{87,124}

Overall, transformation-focused evaluation in its most committed sense would need to embrace an existential shift and fundamentally different purpose and stance of catalyzing transformations towards regenerative futures, with evaluation actors as connectors, conveners, designers, activists, critical friends, facilitators, and guardians of transformational and regenerative integrity, as well as assessors (Table 1). This echoes and builds on a growing number of voices in the evaluation field and beyond calling for a transformation-focused purpose across evaluation,⁸⁷ including the Prague Declaration on Evaluation for Transformational Change¹²⁵ and the associated Earth Day Evaluation Declaration.¹²⁶ Without this transformational purpose, evaluation will continue to prop up more superficial, marginal or

isolated action that fails to alter the underlying dynamics, power structures, and paradigms behind unsustainability.

There is now a plethora of frameworks, tools, methods and approaches available that support this shift towards transformation-focused evaluation.⁸⁷ Broader evaluation approaches that embed ideas about complexity, justice and transformation include the African and Aotearoa Evaluation Principles, Blue Marble Evaluation, Culturally Responsive Evaluation, Developmental Evaluation, Dynamic Evaluation, Empowerment Evaluation, Feminist Evaluation, Footprint Evaluation, Inclusive Systemic Evaluation for Gender equality, Environments and Marginalized voices (ISE4GEMs), Indigenous Evaluation, Made in Africa Evaluation, Reflexive Monitoring in Action, Transformative Evaluation, Utilization-focused Evaluation, and Visionary Evaluation, amongst many others.⁸⁷ There are also many specific methods that aid different dimensions of transformation-focused evaluation.⁸⁷ These include ripple effects mapping and outcome mapping (for capturing emergent, unpredicted outcomes and impacts), Qualitative Impact Protocol (QulP) and Most Significant Change (for gathering qualitative causal narratives in impact evaluations), process tracing, Bayesian Updating and contribution analysis (for deducing an initiative's relative contribution to observed outcomes, and updating theories of change and transformation), and Three Horizons (for envisioning transformed futures, cohering transformative action, and planning for different stages and archetypes of transition),^{35,67,127–129} alongside advances in AI and Big Data that could aid more rapid, timely evaluations.¹³⁰

Various other frameworks provide evaluation criteria relevant to transformation-focused evaluation. They include the Orders of Outcomes,¹³¹ the Signals of Transformational Change¹²³ and Five Dimensions of Transformational Change¹³² frameworks from the Climate Investment Funds and its Transformational Change Learning Partnership, and transformative outcomes of experimental policy engagements.¹⁰⁸ These focus attention on the *enabling conditions* and *design* for transformative action, and broader *signals* and megatrends of large-scale systemic change (which may integrate many individual quantitative and qualitative indicators). Other evaluative frameworks including the Inner Development Goals,^{103,104} the Regenerative Development Goals,¹³³ Regenerative Development Evaluation Tool,¹³⁴ Regenerative Lens,⁶¹ Biomimicry DesignLens,¹³⁵ Permaculture Design Principles,¹³⁶ Ecovillage Map of Regeneration,¹³⁷ and Commonland's 4 Returns Framework,⁹¹ draw attention to regenerative qualities and *dynamics*, and the interdependence of inner and outer transformation.^{63,67,138} Overall, although these examples illustrate a rich toolbox for transformation-focused evaluation, it is more than just about applying specific approaches – evaluation practice must

also deeply embody a regenerative orientation and purpose if it is to maximize its potential in catalyzing desired transformations.

Table 1. Examples of the shifts required for evaluation practice to fulfill the new roles and capabilities demanded by transformations. See Supplemental information for details and references.

Shift theme	Features of more conventional Western evaluation practice that limit its ability to support desired transformations	Features of transformation-focused evaluation practice that enable it to catalyze transformations towards regenerative futures
Complexity awareness	A reductionist Enlightenment worldview that treats evaluated systems as isolated projects	A relational, complexity-informed worldview that appreciates evaluated systems as nested and interconnected
	Evaluating against static, linear logic models and theories of change	Continually supporting revision of complexity-informed, adaptive theories of change and transformation
	Seeking causal attribution	Seeking relative contribution to change
	Evaluations at fixed, predetermined timepoints (e.g. formative and summative evaluation)	Evaluation more continuous and/or applied when needs arise
	Primarily concerned with evaluating outcomes and impact	Demonstrating wider value of evaluation across all stages of initiatives, including in design
	Judging evaluands mainly by their specific outcomes	Judging evaluands by their potential, adaptive/learning capacity, and transformative/regenerative intent as well as specific outcomes
	Criteria for assessing change focus on relatively minor, small-scale, superficial adjustments and reforms	Criteria for assessing change also focus on evidence for large-scale, systemic transformation and regenerative dynamics, and how interventions contribute to these
	Short- to medium-term time horizon	Long-term time horizon, appreciating how short- to medium-term horizons contribute
	Sustainability seen primarily as	Sustainability seen primarily as the

Shift theme	Features of more conventional Western evaluation practice that limit its ability to support desired transformations	Features of transformation-focused evaluation practice that enable it to catalyze transformations towards regenerative futures
	continuation of the same outcomes	capacity for resilience, adaptation and regeneration in response to changing conditions
	Focus on evidence from the past and present	Also draws on foresight methods
	Focus on monitoring quantitative metrics and 'cold data' (describing behaviour of isolated parts of systems)	Mixed-methods approach to data collection that emphasises 'warm data' (describing interrelationships of system changes)
	Focused on finding quick, safe answers and (re)solutions	Comfortable in ambiguity, uncertainty, and audacious but well-informed experimentation
	Recommending improvements based mainly on what is failing	Recommending improvements based mainly on what is already successful, whilst recognizing the importance of contextualization
	Standardization and assumption of replicability	Contextualization and continual questioning of external validity
Power relations and purpose	Assumption of humans as separate from the rest of nature	Humanity recognized as inextricably part of nature
	Evaluation seen as discrete, formal, technical activity	Evaluation understood as a fundamental, universal, continuous human activity, as well as formal and systematic activity
	Evaluation seen as outside system change processes	Evaluation recognized as an intervention that is part of system change processes
	Evaluation assumed to be value-neutral/objective	Evaluation actors recognize their moral responsibility as members of the system

Shift theme	Features of more conventional Western evaluation practice that limit its ability to support desired transformations	Features of transformation-focused evaluation practice that enable it to catalyze transformations towards regenerative futures
		in question, and are activists promoting values of regeneration and justice
	Evaluation design shaped mainly by funders and commissioners	Evaluation design shaped mainly by primary stakeholders of evaluated interventions
	Accountability mainly to funders (value for money)	Broader accountability to the flourishing of society, nature and the planet, future and past generations, etc.
	Evaluators don't 'bite the hand that feeds them'	Evaluators challenge, and if necessary refuse to engage with, evaluations that are mainly for cosmetic purposes and serve vested interests in the unsustainable status quo
	Evaluators are primarily directive experts who assess others	Evaluators also position themselves, with humility and reflexivity, as embedded or external facilitators who build others' evaluative capacity
	Elevation of Western and epistemic forms of knowledge	Draws on diverse epistemologies and wisdom
	Treats inequalities and discrimination as contextual issues outside evaluation's remit	Problematizes and contributes to addressing inequalities and discrimination
	Asks if we are doing things right, or doing the right things	Also asks how we decide what is right
	Isolated individual evaluations	Engaged dialogue and partnerships between different evaluations
	Encouraging 'change to keep things the	Building on regenerative practice to

Shift theme	Features of more conventional Western evaluation practice that limit its ability to support desired transformations	Features of transformation-focused evaluation practice that enable it to catalyze transformations towards regenerative futures
	same'	catalyze transformations towards regenerative futures

Wider enabling conditions are needed to accelerate the mainstreaming of transformation-focused evaluation

In the previous sections we explained how our transforming world demands new roles and capabilities of evaluation, and how this in turn requires us to transform conventional Western evaluation approaches. We characterized what evaluation practice would look like if it took its new regeneration- and transformation-focused purpose to heart, in terms of its broader principles, purpose and ways of working as well as the kinds of methods it would apply. But despite increasing interest and applications, transformation-focused evaluation remains an uncommon practice.^{22,87,111,119} In this section we therefore identify a number of critical wider cultural enabling conditions that would be needed to accelerate the mainstreaming of transformation-focused evaluation (Figure 1).

A growing number of initiatives are actively putting transformation-focused evaluation into practice and raising its profile across the evaluation field. Examples include: the Prague Declaration on Evaluation for Transformational Change¹²⁵, Earth Day Evaluation Declaration,¹²⁶ and Wolastoq Declaration on Indigenous Evaluation¹³⁹; networks such as EvalIndigenous, Blue Marble Evaluation network, and the International Evaluation Academy; the evaluation of various multilateral development funds such as the Climate Investment Funds^{123,140} and philanthropic organizations such as the Global Alliance for the Future of Food;¹⁴¹ and the evaluation of specific initiatives such as coastal and regional food system transformation,^{86,131,142} the Biodiverse Landscapes Fund,^{87,143} the Podong Indigenous Peoples Initiative,¹⁴⁴ and the bioregioning initiatives of the Collaborative for Bioregional Action Learning and Transformation (COBALT).¹⁴⁵ Many more actors are likely applying transformation-focused evaluation implicitly. Valuable learning about the design, implementation and embedding of transformation-focused evaluation is already emerging

from these kinds of initiatives,^{86,87,111} such as the importance of evaluating alignment to *principles* as criteria that provide anchors in complex contexts,¹⁴⁶ transdisciplinary evaluation teams,¹⁴⁷ evaluating the alignment of many different initiatives towards supporting transformation,¹⁴ and treating evaluation design work as key for shifting mindsets towards transformation-focused evaluation.⁸⁶ Transformation-focused evaluation remains a relatively niche practice, however, particularly in westernized societies.^{22,87,111,119} It is far from being the norm across our businesses, organizations, communities, governments, social movements and institutions – particularly in the deeper sense of reconfigured power relations and purpose of evaluation (Table 1).

A regenerative orientation is not in itself a silver bullet. Mainstreaming transformation-focused evaluation requires readiness and capacity at organizational, institutional and societal levels – a wider cultural shift beyond just the approaches of external teams of evaluators, including those who fund, commission and manage evaluations as well as those who use them.⁹² Evaluation has always been political¹⁴⁸ – the political economy shapes the industry of evaluation²² and can be constraining or enabling for more transformative approaches. While evaluators themselves have an important responsibility for such wider evaluation capacity development,^{149,150} broader responsibility also lies with other societal actors, including educators and facilitators, researchers, funders, business managers, governments and government agencies, and advocacy groups. Below we therefore outline six key wider enabling conditions for accelerating the mainstreaming of transformation-focused evaluation (Figure 1). We cannot yet provide all the answers for how such conditions can be most effectively cultivated; rather, we present them as areas that deserve significant attention and further research. Only with such efforts will evaluation maximize its potential in catalyzing desired transformations.

Overturn misconceptions and reaffirm the power of evaluation

A first key enabler for mainstreaming transformation-focused evaluation is the need to overturn outdated expectations and misconceptions of what evaluation is and should be, and to reaffirm the fundamental and essential power of (particularly human-mediated) evaluation. Transformation-focused evaluation is a major shift from convention (Table 1), and traditional perspectives on evaluation remain widely institutionalized in organizations, policymaking and funding architecture.^{21,22} ‘Rigor’ in evaluation is often still equated with quantification, purportedly value-free designs, standardization, and controlled counterfactuals.²² In

transformation-focused evaluation, however, rigor is more apparent from its methodological pluralism, contextualization, reflexivity, and a strong ethical foundation – that is, its normative and moral stance towards transformation, regeneration and justice. Evaluation is also widely understood to be an externally applied technical exercise, rather than additionally being appreciated as a universal and continuous way of making sense of the world, limiting the potential for transformation-focused evaluation to become more deeply embedded as a culture of working that enrolls *all* actors.⁸⁷ Last but not least, evaluation has gained a bad reputation in populations disillusioned by extractive, technocratic, colonialist evaluation processes that are often associated with compliance and punishment, in contrast to the more dialogic, community-led processes that might accompany transformation-focused evaluation and regenerative development.^{15,42,74}

A key challenge for enabling transformation-focused evaluation is therefore overturning engrained understandings and narratives of evaluative rigor, relevance and purpose in the political economy and institutional cultures of evaluation – otherwise, transformation-focused evaluators will continually meet resistance in the contexts where they work. Crucial enablers would include more flexible terms of reference for evaluations that allow for continuous adaptation, and more sustained, long-term resourcing of evaluation rather than as relatively short-term discrete projects.¹⁵¹

In a world becoming rapidly suffused with AI, the challenge also becomes one of reaffirming the power of evaluation not only as a catalyst for desirable transformations, but as a fundamental and essential element of our humanity. This means reclaiming and honoring human gifts of empathy, intersubjectivity, interpretation through the lens of lived experience and contextual understanding, integrative judgement shaped by ethical reasoning, sensitivity to power and other tacit as well as explicit information, and the relational skills necessary to build legitimacy for evaluation findings among diverse stakeholders – whilst learning how to use AI as a powerful tool to extend our analytical reach and efficiency. It also means bridging the artificial schism between more formal, systematic evaluations (especially the more technical and ‘value-free’ designs that are often still venerated as a gold standard), and the innate, intuitive, informal evaluation that every one of us applies day in, day out, instead seeing these as mutually supportive parts of a continuous spectrum of evaluation practice.

Develop and embed new evaluation competencies

Second, the mainstreaming of transformation-focused evaluation requires the development and normalization of new evaluation competencies.^{92,152} This is particularly pertinent to the many forms of capacity development and social learning around evaluation, both for evaluators and the wider systems in which evaluation takes place – including evaluation education and training, communities of practice, conferences and other peer-to-peer learning, living labs, intermediary agencies and networks facilitating transdisciplinary exchanges,¹⁵³ and evaluation practice itself.

For example, key competencies for transformation-focused evaluation include fluency and unfazedness in complexity thinking, a knack for pattern-spotting in complex systems, and strategic, adaptive and diverse methodological practice that includes awareness of different frameworks and criteria relevant to transformation and regeneration (see previous section), a futures and foresight orientation, and ethical use of technologies such as AI.⁹² Further competencies include: boundary-spanning and bridge-building collaboration and insight-sharing; localization and participatory engagement; sensitivity to power dynamics and injustices; and emotional intelligence and resilience (becoming trauma-informed may be vital for working with populations affected by conflict, discrimination, and other harms).⁹²

Transformation-focused evaluation also implies a firm understanding of transformation, regenerative practice and design, and a caring attitude towards nature.⁸⁷ Perhaps more important than training in any particular doctrines or methods is developing an openness and flexibility to new ideas, along with an ability to reflexively question one's underlying assumptions; moreover, individual evaluators need not be self-sufficient in their competencies, but rather ensure that all competencies are represented in their evaluation teams, reinforcing the importance of competencies in transdisciplinary collaboration and partnership-building (Figure 1; Table 1), as well as strategic use of AI tools.

Overall, these competencies emphasize the need for building *facilitator* skills as well as *assessor* skills in evaluation actors, closer coupling between evaluation practice and regenerative practice (see below), and embedding the development of these evaluative competencies more widely in pedagogical, training and social learning architectures in our societies. Without addressing this point, evaluation actors will lack the readiness to apply evaluation in ways that fulfill its vital roles in supporting desired transformations.

Increase engagement between the evaluation field and regenerative practice

Third, increasing engagement between the evaluation field and regenerative practice is an important step for mainstreaming transformation-focused evaluation, and an important dimension of the transdisciplinarity called for in evaluation practice more generally.¹⁴⁷ To date there has been little engaged dialogue between the evaluation field and the various fields of regenerative practice, including regenerative design, development, sustainability, economics, food systems, and tourism,⁶¹ an exception perhaps being the growing movement to decolonize evaluation and elevate its Indigenous voices.^{19,25,105,139}

This is despite a regenerative orientation being fundamental to the reframed purpose of evaluation (as explored above), and regenerative practice carrying distinctive and important implications for evaluation. Regenerative cultures past and present engage in evaluation as a way to inform appropriate participation in the nested complexity and flow of life rather than seeking to control it, embracing rather than resisting uncertainty, ambiguity, and emergence as they continuously evaluate how their actions are creating conditions conducive to life.^{67,154} Such evaluation is accordingly associated with: attunement to the cycles and processes of nature; a relational lens that appreciates the interconnection and interdependence of all life; an alignment to justice for human and non-human nature alike; honoring and strongly contextualizing to local places (e.g. bioregions); drawing on diverse forms of knowledge (with particular effort to elevate Indigenous and local ecological knowledge); and treating areas of tension, contradiction and indeterminacy as sources of creativity.^{61,63,67,105,115,155,156} Regenerative practice suggests different kinds of indicators and criteria for monitoring, with a greater focus on holistic measures of human and system health and resilience, and systems' wider capacity to adapt and evolve, rather than specific outcomes.^{61,134,157,158}

These points resonate strongly with principles for transformation-focused evaluation,⁸⁷ yet the evaluative dimensions of regenerative practice rarely feature in evaluation discourse, and nor is there much recognition in regenerative practice of the diverse array of transformation-focused evaluation methods that could support it. Addressing this enabler would accelerate the mainstreaming of transformation-focused evaluation by allowing evaluation practice to leverage the growing momentum of the regenerative movement, raising awareness of how they mutually enhance each other, and reinforcing the notion of evaluation as a living process that connects us not only to our humanity (as explored in the first enabler above) but also to the wider cosmic web of life and existence.

One way of linking these practices would be to focus on the arena of economics – which underpins so much of our other activity, including our food, energy, health, financial and political systems, international development, and so on – as an increasingly fertile space for consolidating the nexus between evaluation, transformation and regeneration in the coming decades. This arena is characterized by increasingly exposed fragilities and injustices of mainstream economic systems, a neoliberal hegemony in decline, the form of its reconfiguration as-yet-uncertain, and a diversity of ‘new economics’ approaches (including many inspired by regenerative thinking, such as Doughnut Economics and Ecological Economics) clamoring to be heard.^{28,44,159} Evaluation reminds us that all economic activity is essentially evaluation activity, with that evaluative question at the heart of all economics – ‘What do we value?’ – providing a leverage point to shift economic values and activities towards the regeneration and flourishing of life.^{79,106,160} A recent review identified ten principles for transforming economics in this way, providing clear opportunities for evaluation practice,²⁸ and the more strongly normative regeneration-oriented stance increasingly advocated in economics^{28,79} clearly echoes the stance advocated for transformation-focused evaluation.

Focus on supporting human-nature reintegration

Fourth, perhaps the most important paradigmatic shift underpinning transformation-focused evaluation is from a culture of human-nature separation and hierarchy towards cultures underpinned by relational worldviews of human-nature interconnectedness and interdependence^{78,79,106,161} – underscoring the need to weave human civilizations back into the web of life.¹⁶² We have effectively been ‘ignoring the systemic view of life that has been the philosophical grounding of the majority of societies over millennia’,⁹⁹ and which is embedded in many non-Western and Indigenous cultures to this day.⁷⁸ This shift is also a multi-dimensional one: human-nature separation has been compellingly associated with other forms of separation and dualism in human culture, including trends towards reductionism, patriarchy and the fetishization of masculinity, left brain hemisphere dominance, and mind/inner treated as separate from matter/outer.^{78,163–165} One interpretation of capitalist and consumerist behaviour is that it seeks, in vain, to satiate the void left by our culture of separation and loneliness.^{67,115,165,166} Without this deep cultural shift towards human-nature reintegration – particularly in our education systems – we risk perpetuating careless and domineering attitudes towards nature that hasten its continued destruction and ultimately our ‘collective suicide’,¹⁶⁷ and we will struggle to develop regenerative relationships between

human societies and wider ecosystems that go beyond cosmetic efforts.^{164,165} If successful, this shift would mainstream a culture of multi-species care, where human activities are realigned to the inherently regenerative processes of life,⁶⁷ making transformation-focused evaluation a natural and obvious choice.

This shift to reintegration will have to be experiential, not just conceptual, if it is going to take root. It might involve finding ways to helping people recognize how regenerative dynamics show up all around them and within them on a daily basis,^{67,127} re-enchancing people with inspiration from nature¹⁶⁸ and regenerative design practices,¹⁶⁹ learning from different cultures where human-nature connection remains embedded in worldviews,¹⁷⁰ and reawakening our wider suite of senses and sense-making capacities – our ‘whole-body intelligence’¹¹⁵ or ‘bodymind’¹⁷¹ – including emotional, somatic, intuitive and practical ways of knowing as well as rational.^{21,115,172} It will also require closer engagement between the evaluation field and the ‘onboarding nature’ movement to give nature a stronger voice in organizational decision-making, including by making nature an advisor, board member, shareholder, CEO or Director of businesses,¹⁷³ and the ‘rights of nature’ movement, where the rights and personhood of non-human entities are upheld in legal systems⁷³ – as well as regenerative practice more broadly, as highlighted above. Ecocentric and transpersonal practices, such as shamanic practice, potentially offer much deeper ways of bringing nature into our psyche and governance structures.^{174–176}

Learn how to ‘let go’

The need for fostering these cultural enabling conditions implies a fifth essential ‘meta-condition’: our ability to let go of old paradigms, values and mental models, and let new ones germinate. Transforming the way we evaluate implies profound shifts in our worldview, identity, and how we relate to the world. An important example, emphasized across regenerative practice and in transformation-focused evaluation, is the need to relinquish our illusion of control, and adopt a more exploratory, adaptive, experimental approach to navigating and stewarding transformations that tolerates ambiguity and uncertainty and increases alignment to natural cycles,^{154,169} as epitomized by the Taoist philosophy of *wu-wei*.^{99,177} Only by cultivating such openness to change and engaging with more developmental ways of working⁹³ will we be able, at wider cultural scales, to let go of our misconceptions and outdated expectations of evaluation, mindsets of separation, and fear of uncertainty and losing control – to embrace diverse ways of knowing, the messiness of

transformation, and a regenerative orientation that weaves humanity back into the web of life, and respond with sufficient speed to the accelerating transformations taking place around us.

This enabling condition is perhaps the most challenging to address of all the ones we outline. Nonetheless, there is surely much more to learn from recent advances in neuroscience, psychology and traumatology, as well as ancient mindfulness and spiritual practices, in how to cultivate our neurological plasticity^{178–181} and overcome ‘cultural inertia’.⁷⁴ More broadly, the current ‘liminal space’¹⁸² of human civilization – characterized by some as a ‘Gramscian interregnum’¹⁸³ in which the old world order is dying while the new struggles to establish itself – potentially presents both opportunities and challenges for such paradigmatic shifts. On the one hand, our era is chaotic, dangerous, and highly uncertain – underscored by the astonishing speed of AI’s evolution and roll-out, seismic shifts in global geopolitical power, climate change, and extractive growth-centered economic models increasingly crashing into the hard reality of planetary boundaries. On the other hand, it is often times of crisis and collapse that provide spaces and opportunities for transformations.^{28,184}

Apply second-order, collaborative, transdisciplinary and action-oriented research

A final enabling condition for mainstreaming transformation-focused evaluation is the role that research can play. There is now abundant research on regenerative concepts, the shifts required in evaluation to meet the transformational imperative, and the kinds of methods that support transformation-focused evaluation. Research now needs to focus on the learning from implementation, using social science methods to enhance our understanding of key enabling conditions and barriers for the wider systemic shifts needed to embed regenerative and transformative orientations in how we organize for change (Table 2).

Research has many overlaps with evaluation practice;¹⁸⁵ indeed, evaluators are often also researchers, as attested by many evaluation-focused academic journals such as *Evaluation*, *New Directions for Evaluation*, *Journal of MultiDisciplinary Evaluation*, *American Journal of Evaluation*, and *Evaluation and Program Planning*. Research has value in its structured, analytical approach to answering questions of interest, how it can bring additional methodological rigor and transparency to enhance learning (where ‘rigor’ includes building on prior theory and research, reflexivity around methodological appropriateness, the role and influence of the researcher, and the underlying cognitive dimensions of what activities are taking place), and its influence on public discourse, policymaking and practice.^{185–188} The most effective forms of research for mainstreaming transformation-focused evaluation will be

collaborative, transdisciplinary, and action-oriented,^{96,189,190} where researchers work closely alongside transformation efforts and evaluation teams. A powerful approach for such research is to learn from exemplars where transformation-focused evaluation is being successfully applied, and not only from where application is less successful. This approach, aligning with methods such as positive deviance analysis¹⁹¹ and appreciative inquiry,¹⁹² is itself one of the shifts advocated for the more developmental approach of transformation-focused evaluation (Table 1). In effect, researchers should mirror many of the shifts advocated for transformation-focused evaluators – including by recognizing research as a system intervention in itself rather than an independent process (i.e. ‘second-order’ rather than ‘first-order’), bridging multiple disciplines and forms of knowledge, and more flexibly adopting different roles, including ‘change agent’, ‘process facilitator’ and ‘knowledge broker’ as well as reflective and self-reflexive scientist.^{189,193}

Table 2. Key implications for research and future research questions in supporting the mainstreaming of transformation-focused evaluation.

Enabling condition for mainstreaming transformation-focused evaluation	Implications for research	Key research questions
Overturn misconceptions and reaffirm the power of evaluation	● Researchers could usefully investigate what factors enable or inhibit shifts towards transformation-focused evaluation in the cultures of organizations and initiatives, paying particular attention to cognitive dimensions. ● Second-order design research could be treated as an important aspect of transformation processes, and shifting perceptions of what evaluation is and could be. ● Qualitative comparative analysis could be used to cross-examine multiple case studies of implementing transformation-focused evaluation. ● The implications of AI for evaluation is a crucial factor that researchers should engage with when exploring how evaluation might reaffirm its power in catalyzing desired transformations.	● What factors enable or inhibit shifts towards transformation-focused evaluation in institutional cultures? ● How can we shift outdated notions of what constitutes rigor in evaluation? ● How can evaluation become appreciated as a universal and continuous way of making sense of the world that enrolls all actors in transformations, as well as a formal exercise? ● How can the reputation of evaluation be healed in disillusioned populations? ● How can the vital roles of transformation-focused evaluation be most effectively communicated? ● How can human evaluators and AI work together most effectively to catalyze desired transformations?
Develop and embed new evaluation competencies	● Researchers could usefully investigate the skills, cognitive factors, structures and mechanisms that underpin effective transformation-focused evaluators or transformation-	● What characterizes the most effective transformation-focused evaluators? ● What characterizes organizations that are able to embed

Enabling condition for mainstreaming transformation-focused evaluation	Implications for research	Key research questions
	focused evaluation, monitoring and learning systems, and how these might be translated to other contexts.	transformation-focused evaluation as a routine way of working? ● How can transformative and regenerative competencies be effectively brought into mainstream education and training programs? ● How does the rise of AI shape evaluation competencies for the transformational imperative?
Increase engagement between the evaluation field and regenerative practice	● Researchers can play an important role in bridging divides between the evaluation field, regenerative practice, and ‘new economics’, and understanding what they can learn from each other or how they can support one another.	● What can the evaluation field learn from regenerative practice? ● What can regenerative practice learn from the evaluation field? ● How can regenerative design be effectively brought into the way economies function at national and international scales? ● How can transformation-focused evaluation most effectively support new economics? ● What opportunities and challenges does economic transformation bring for transformation-focused

Enabling condition for mainstreaming transformation-focused evaluation	Implications for research	Key research questions
		evaluation?
Focus on supporting human-nature reintegration	● Researchers can investigate and review the most effective approaches for human-nature reintegration, and how this relational lens can be brought more strongly into evaluation practice. ● Research can increase collaborative engagement between the evaluation field and other movements and disciplines focusing on human-nature reintegration.	● What are the most effective approaches for human-nature reintegration in different contexts? ● Can human-nature reintegration influence other dualisms in Western worldviews? ● How can evaluation practice support human-nature reintegration? ● What are the implications of the ‘onboarding nature’ and ‘rights of nature’ movements for transformation-focused evaluation? ● What roles can ecocentric and transpersonal practices play in bringing nature into our psyche and governance structures? ● How can reawakening our wider suite of senses and sense-making capacities aid human-nature reintegration?
Learn how to ‘let go’	● Researchers can help us understand the conditions conducive to ‘letting go’ of old paradigms and how these could be brought into futures methods, building on	● How can we effectively ‘let go’ of old paradigms in transformations, including our illusions of control? ● How can societies collectively heal from traumas of

Enabling condition for mainstreaming transformation-focused evaluation	Implications for research	Key research questions
	previous theory such as Otto Scharmer's Theory U framework. ¹⁹⁴	injustice, violence, and separation? ● What can we learn from recent advances in neuroscience, psychology and traumatology, as well as ancient mindfulness and spiritual practices, in how to cultivate our neurological plasticity and overcome cultural inertia? ● What opportunities or barriers do contemporary crises and system collapse present for transforming outdated paradigms?

Conclusions

Evaluation has a tremendous but under-appreciated power and potential to catalyze transformations towards regenerative futures. As a growing body of exemplars are demonstrating, evaluation could maintain an orientation towards transformation and regeneration, enable agility, make sense of complexity, stimulate deeper learning, and ultimately guide us towards wiser and more effective transformative action and development that builds on existing regenerative practice. Evaluation also carries a responsibility to transform its own practice in order to fulfill that potential. The risks, and the burden of injustice, of continuing business-as-usual evaluation – where evaluation remains reductionist, siloed, linear, bureaucratized, commodified, risk-averse, and a removed, technical exercise, which perpetuates a colonial monoculture of knowledge and an illusion of stability and continuity – are too great.^{14,25} Our crisis-hit and transforming world demands much more from evaluation.

Transformation-focused evaluation can be understood as a diverse set of approaches in service of understanding transformation and enabling transformations towards regenerative futures, featuring a spectrum from more passive to more activist approaches.^{87,111} In this way it is distinct from, albeit potentially encompassing, Donna Mertens' Transformative Evaluation paradigm, whereby evaluation explicitly aims to advance social justice.¹⁹⁵ In this perspective we have characterized transformation-focused evaluation in its most committed sense as a relational, complexity-informed, contextualized, agile, methodologically pluralist, decolonizing and partnership-building practice, where evaluation actors are activists for just transitions to regenerative systems and accountable to the flourishing of planetary life, as well as reflexive, collaborative facilitators building capacity for transformation-focused evaluation and learning in the initiatives in which they are embedded or otherwise engaging with. Importantly, transformation-focused evaluation would be closely integrated across organizing for transformation, and recognized as an intervention that is itself part of transformation efforts, not independent from them.

The challenge now is not so much a lack of knowledge or appropriate tools for transformation-focused evaluation – these are in abundance.⁸⁷ Nor is it fundamentally new – it is more about reconnecting to the innate evaluative and sensorial capacities that underpin the regenerative impulse we share with all life,^{67,115,196} and learning from the cornucopia of cultures, philosophies and worldviews beyond Western perspectives which have maintained transformation- and regeneration-focused ways of thinking and being for millennia.^{16,99}

Today's challenge is more about how to diffuse and mainstream transformation-focused evaluation across the westernized world, across private, public and third sectors, across our economies and development agendas, and weave it into our processes of governance and organizing. With support from second-order, collaborative, transdisciplinary and action-oriented modes of research, this challenge requires overturning deep-seated mindsets, expectations and misconceptions about evaluation, developing and embedding new evaluation competencies, accelerating engagement between the evaluation field and regenerative practice, weaving ourselves back into the web of life (both metaphorically and practically), and cultivating our broader capacity to 'let go' of our old ways of knowing and being. It also requires us to relearn the kind of continuous, daily evaluation practice found in regenerative cultures that informs our appropriate participation in the ever-changing flow of life.^{67,154} The challenge is immense – but if we seek futures where life can flourish, we have no choice. This is what the beleaguered Earth calls us to do. It is time for evaluation to live up to the sacred, wise, profound, reconnective, transformative and life-enhancing practice that it has the power to be.

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Author contributions

Conceptualization, S.J.B. (lead) and I.F. (supporting); writing – original draft, S.J.B.; writing – review and editing, S.J.B., I.F., P.B., S.C., J.C., A.P.H., J.O.K., Z.O., G.G.P., B.S., S.W. and D.C.W.; visualization, S.J.B.; supervision, I.F. and P.B.; project administration, S.J.B. (lead) and I.F. (supporting); funding acquisition, I.F. and P.B.

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Supplemental information

Table S1 presents a more detailed and referenced version of Table 2.

Table S1. Shifts required to transform from more conventional Western evaluation practice towards transformation-focused evaluation (TFE). For further references, see Buckton et al.¹

Shift theme	Shift no.	Features of more conventional Western evaluation	Features of transformation-focused evaluation	Explanation of shift	Why the shift is needed
Complexity awareness	1	A reductionist Enlightenment worldview that treats evaluated systems as isolated projects	A relational, complexity-informed worldview that appreciates evaluated systems as nested and interconnected	TFE would treat all evaluands (initiatives, organizations, sectors, regions, etc.) as part of an interacting, nested holarchy of systems that show interdependence across scales (including local-to-global linkages), rather than treating them as closed systems and maintaining a ‘micro focus’ on interventions, encouraged by a reductionist Enlightenment worldview. ^{1,2} This shift brings into view complex system dynamics such as emergent and unanticipated outcomes, trade-offs,	This shift brings evaluation closer to the reality of how complex systems behave in transformations. ¹ Transformations take place in open systems that transcend political borders and specialized interests. ²

Shift theme	Shift no.	Features of more conventional Western evaluation	Features of transformation-focused evaluation	Explanation of shift	Why the shift is needed
				spillover effects, synergies, feedbacks, rebound effects, lock-ins, and tipping points.	
	2	Evaluating against static, linear logic models and theories of change	Continually supporting revision of complexity-informed, adaptive theories of change and transformation	TFE would evaluate initiatives in ways that support continual revision of their objectives and expected activities, outcomes and impacts, in alertness and adaptation to emergent and unpredicted system changes, rather than evaluate against predetermined objectives, key progress indicators (KPIs) and theories of change fixed from the outset without questioning their continued fitness for purpose. ^{1,2} Transformation-focused theories of change would also be complexity-informed, incorporating possibilities of complex system dynamics (e.g. feedbacks) rather than assuming linear pathways to results. ³ Theories of transformation might incorporate multiple interwoven theories of change. ⁴	Complex system conditions are never static, and much of their behaviour is beyond the control of individual transformation-focused initiatives. So initiatives need to frequently adapt their objectives and theories of change as new information arises, to avoid them losing relevance. ³ Linear theories of change are also poorly reflective of how change actually occurs in complex systems. ³

Shift theme	Shift no.	Features of more conventional Western evaluation	Features of transformation-focused evaluation	Explanation of shift	Why the shift is needed
	3	Seeking causal attribution	Seeking relative contribution to change	Whereas evaluation has traditionally focused on attributing the cause of observed outcomes in target populations to particular interventions, using experimental or quasi-experimental designs and statistical analysis (e.g. randomized controlled trials), TFE leans towards a 'contribution analysis' approach that seeks to understand an initiative's relative contribution to change, accounting for the influence of multiple factors on multiple (including unintended) outcomes. ^{2,5}	While experimental controlled designs can enable more certain conclusions about the impact of an initiative, they typically fail to capture the effects of other influences and unintended outcomes which characterize complex systems change. ²
	4	Evaluations at fixed, predetermined timepoints (e.g. formative and summative evaluation)	Evaluation more continuous and/or applied when needs arise	Evaluation is traditionally applied at fixed predetermined timepoints (e.g. formative evaluations during project design and summative evaluations following project implementation). TFE would additionally be applied as a more continuous way of working, and/or as a more formal, in-depth exercise as and when needs arise, which are	Without this shift, initiatives will struggle to respond and adapt with the speed required to match the dynamism of system change. ¹

Shift theme	Shift no.	Features of more conventional Western evaluation	Features of transformation-focused evaluation	Explanation of shift	Why the shift is needed
				generally unpredictable at the initial stages of initiatives. ¹	
	5	Primarily concerned with evaluating outcomes and impact	Demonstrating wider value of evaluation across all stages of initiatives, including design	Evaluations are widely equated with evaluating outcomes and impact. ^{6,7} However, TFE would be demonstrating the wider value of evaluation throughout the design and implementation of initiatives, for evaluating enabling conditions, enabling deeper forms of learning, maintaining transformational or regenerative intent and fidelity, etc. ¹	Without this shift, initiatives will fail to maximize the value of evaluation for catalyzing transformations towards regenerative futures. ¹
	6	Judging evaluands mainly by their specific outcomes	Judging evaluands by their potential, adaptive/learning capacity, and transformative/regenerative intent as well as specific outcomes	In Western modes of evaluation there has conventionally been a culture of judging evaluands primarily according to whether they met predetermined, specific outcomes. ^{1,2} In TFE, the focus is more on judging evaluands' <i>potential</i> for transformation and regeneration, their capacity for continued adaptation, evolution and learning, and their transformational	See shifts 2 and 4.

Shift theme	Shift no.	Features of more conventional Western evaluation	Features of transformation-focused evaluation	Explanation of shift	Why the shift is needed
				intent or fidelity (e.g. using approaches such as Principles-focused Evaluation ⁸), as well as whether particular objectives were met. ^{1,9}	
	7	Criteria for assessing change focus on relatively minor, small-scale, superficial adjustments and reforms	Criteria for assessing change also focus on evidence for large-scale, systemic transformation and regenerative dynamics, and how interventions contribute to these	TFE's criteria for assessing change (e.g. of systems, and how interventions contribute to such change) would be geared towards identifying evidence of large-scale, systemic transformation and regenerative dynamics, rather than the relatively minor, small-scale and superficial adjustments and reforms that tend to be looked for in conventional evaluation, ^{1,9} exemplified by the OECD Development Assistance Committee (DAC) criteria, for instance, ⁹ and arguably also the criteria of the influential United Nations Evaluation Group and Evaluation Cooperation Group.	To overcome global crises, large-scale, systemic, societal transformations are urgently required; more marginal or superficial change alone is insufficient. ^{10–17}
	8	Short- to medium-term time horizon	Long-term time horizon, appreciating how short-	The time horizon of an evaluation affects how long the effect of system interventions	Transformations are typically long-term phenomena, taking place

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			to medium-term horizons contribute	is considered post-implementation – whether they are sustained, remain effective, and so forth. It also affects the extent to which foresight methods shape evaluation alongside evidence from the past and present (see below). Conventionally, evaluation funding cycles have constrained time horizons to short- and medium-term scales. ² TFE would adopt much longer time horizons, with more ex-post evaluation, ² whilst appreciating how action in the short- to medium-term contributes to longer-term change.	over decades. ¹⁸ Moreover, circumstances are forever changing, so an initiative's outcomes are by no means guaranteed to continue being effective or relevant into the future ^{2,19} – and today's actors have a duty to support the health of future generations. ²⁰ Foresight methods (see below) could increase initiatives' resilience to future changing conditions. ²⁰
	9	Sustainability seen primarily as continuation of the same outcomes	Sustainability seen primarily as the capacity for resilience and adaptation in response to changing conditions	Conventional perspectives on sustainability, e.g. in the widely used DAC criteria, emphasize the continuation of the same outcomes. ⁹ TFE takes a more dynamic view of sustainability, treating it more as the capacity for resilience, adaptation and	See shift 2.

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				continued relevance in response to changing conditions. ⁹	
	10	Focus on evidence from the past and present	Also draws on foresight methods	TFE would draw on a range of futures and foresight methods as well as retrospective evidence from the past and present, enabling exploration of desired futures and possible or feasible future scenarios. ^{1,20}	Evaluation based only on evidence from the past and present has been likened to driving a car forwards whilst looking in the rearview mirror. ²¹ Drawing on foresight makes initiatives more likely to remain effective and relevant into the future. ²⁰ Exploring desired regenerative futures with radically different dynamics could also inspire hope and more transformative action in the present. ²²
	11	Focus on monitoring quantitative metrics and 'cold data'	Mixed-methods approach to data collection that	In keeping with a traditionally value-neutral approach (see shift 18), many evaluations have fixated on monitoring quantitative	This shift provides a much richer picture of systems and their transformation, helping initiatives

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			emphasises 'warm data'	metrics of change. ² These also tend to represent 'cold data', or the behaviour of isolated parts of systems. ²³ TFE would adopt a much more mixed approach to data collection, using quantitative indicators as just one aspect of a suite of evidence, which would emphasize 'warm data' or the interrelationships of system changes. ²³ This would additionally feature: qualitative data including narratives and values (along with whether and how they are shifting); indicators that include <i>dynamics</i> (e.g. regenerative dynamics) and <i>signals</i> of large-scale systemic change, which might integrate many individual quantitative and qualitative indicators; and more of a spectrum from independent and external evaluation to participatory and stakeholder-driven evaluation ²³ (see also shift 16).	to navigate the inherent complexity and uncertainty of complex systems. ^{1,23} There are also multiple subjective realities in a complex system, emphasizing the importance of obtaining multiple perspectives on system change to gain a more holistic and robust understanding ²⁴ (see also shift 23). Focusing on quantitative indicators distracts from a wider spectrum of learning opportunities, ² and often brushes over the value judgements inherent in choosing indicators. ²⁵

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	12	Focused on finding quick, safe answers and (re)solutions	Comfortable in ambiguity, uncertainty, and audacious but well-informed experimentation	A key shift for TFE is from a tendency to seek quick, safe answers, solutions and resolutions, to being navigate continuously through ambiguity, uncertainty, risk, liminality, ²⁶ and audacious but well-informed experimentation ²³ – in other words, ‘living the questions together’, ²⁷ treating the process of evaluation and asking the right questions as important as the answers, learning by doing, ^{2,23} and seeing ‘failures’ as opportunities for learning. ²³ TFE would also pay attention to dilemmas, contradictions, tensions and biases, examine how they interact, and use these as fertile areas for informing transformation rather than seeking weak compromises or simply leaving issues unresolved. ^{28,29} This shift does not preclude TFE from also identifying ‘quick wins’ and immediate opportunities in service of transformation.	Focusing on quick wins and answers risks overlooking wiser transformational action that might arise from spending longer in an exploratory or experimental mode. ²⁷

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	13	Recommending improvements based mainly on what is failing	Recommending improvements based mainly on what is already successful, whilst recognizing the importance of contextualization	TFE shifts from recommending improvements in an evaluand based mainly on where failures are occurring, towards a more strengths-based approach and appreciative inquiry that recommends improvements based mainly on where success is already occurring, and understanding the conditions that enable that success and the extent to which they might be translated to other contexts. ¹	Focusing on problems and weaknesses can reinforce power inequalities and marginalization, along with an association between evaluation and punishment for poor practice, which detracts from evaluation's potential to support transformation. ¹ 'Failures' should nonetheless be treated as valuable opportunities for learning. ²³
	14	Standardization and assumption of replicability	Contextualization and continual questioning of external validity	TFE shifts from an obsession with standardized methods, underpinned by assumptions of replicability, towards adapting methods and designs to suit and honor the stories and qualities of particular places and cultures, and continually questioning the external validity of any	All evaluands are unique, and blindly applying standardized methods because they are the 'done thing' or recognized as a 'gold standard' without consideration of their suitability to context risks applying

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				frameworks and methods applied. ^{1,23}	inappropriate methods that fail to maximize the transformational potential of an initiative. ¹ Regenerative practice in particular emphasises the importance of deeply understanding the relationships, dynamics, needs and potential of particular places, including bioregions. ²²
Power relations and purpose	15	Assumption of humans as separate from the rest of nature	Humanity recognized as inextricably part of nature	An underlying assumption prevalent in many evaluations, and indeed across the westernized world, is that humans are separate from and dominant over the rest of nature. ^{22,27} TFE would align to more relational worldviews, prevalent in many other cultures, that recognize humans as inextricably part of nature and the wider cosmos, with a duty of care for life as a whole. ^{22,27,30}	The worldview of human-nature separation, itself a fallacy, is acknowledged as one of the key drivers of global crises. ³¹ It risks careless damage and destruction of nature that ultimately threatens human survival. ²²

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	16	Evaluation seen as discrete, formal, technical activity	Evaluation understood as a fundamental, universal, continuous human activity, as well as formal and systematic activity	Evaluation has tended to be seen as a discrete technical activity applied by experts. ¹ TFE tries to shift this perspective towards understanding evaluation as a fundamental, universal, continuous human activity and way of being, with more of a spectrum from informal to systematic evaluation approaches. ¹	This shift helps to catalyze transformations by enrolling <i>all</i> actors into transformation-focused evaluative activity and enhancing reflexivity. ¹ See also shift 22.
	17	Evaluation seen as outside system change processes	Evaluation recognized as an intervention that is part of system change processes	Evaluators are conventionally assumed to be external to the system under evaluation, from which they can objectively judge the system from the outside looking in. ⁹ In TFE, evaluators are embedded in transformation systems and recognize evaluation as an intervention that is part of system change processes, not external to them. ¹ Note that this does not preclude TFE from conducting relatively independent evaluations of initiatives (e.g. as in the independent	This shift opens up far more opportunities for evaluation to play supportive, developmental or even transformational roles in transformation systems rather than only remotely judging initiatives. ¹

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				evaluation of the Climate Investment Funds and other multilateral development funds). ²³	
	18	Evaluator assumed to be value-neutral/objective	Evaluators recognize their moral responsibility as members of the system in question, and are activists promoting values of regeneration and justice	Traditionally, rigorous evaluation has been equated with ‘value-free’ designs where evaluators are objective observers, which is often associated with a lean towards quantitative metrics ^{2,32} (see shift 11). TFE instead recognizes the fallacy of value-neutrality; in their more relational stance as members of systems under evaluation, transformation-focused evaluators recognize their moral responsibility, and the explicit purpose of TFE is to support the realization of regenerative systems and multi-species justice, and shifts towards associated values of regeneration, justice and care. ¹ In part, this might be reflected by closely involving traditionally under-represented groups in evaluations, such as youth, Indigenous and	This shift enables evaluation to play a much more direct role in stimulating desired transformations. ¹ It also addresses concerns about the unclear value proposition of evaluation. ³⁴

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				vulnerable communities. ²³ This relatively activist stance does not excuse evaluators from remaining reflexive, aware of their positionality, and contextually adaptive. ³³	
	19	Evaluation design shaped mainly by funders and commissioners	Evaluation design shaped mainly by primary stakeholders of evaluated interventions	This shifts evaluation from imposing designs shaped mainly by funders and commissioners of evaluations, to a more utilization-focused approach ³⁵ that enables the primary stakeholders of evaluated interventions (e.g. those receiving development aid) to play major roles in shaping evaluation designs to suit their needs. ^{1,2}	This helps to combat colonialist approaches that (sometimes inadvertently) impose certain worldviews without considering their appropriateness to the context at hand. ³⁶ This shift is also likely to increase the usefulness and utilization of evaluations for intended transformation-focused users. ³⁵
	20	Accountability mainly to funders (value for money)	Broader accountability to the flourishing of society, nature and the planet, future and past generations, etc.	Traditionally, evaluations have been primarily accountable to funders, encouraging a focus on value for money as the primary indicator of success. ² This intensified following the rise of neoliberalism in the 1980s. ³⁷ In TFE,	Funder-centered accountability underpins many of the other limitations of conventional Western evaluation, including a tendency to replace rounded

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				there is a much broader accountability to the primary intended users and the health of society, nature, the planet, future and past generations, etc. as well as the funders and commissioners of evaluations. ^{1,2}	judgment with standardized quantitative measurement (see shift 11), as well as risk-aversion and a pressure to demonstrate success (rather than potentially more useful learning from experimentation and failure), ² limiting audacious transformative action (see also shift 12). It can also distract from the deeper mission of transformation-focused initiatives. ²
	21	Evaluators don't 'bite the hand that feeds them'	Evaluators challenge, and if necessary refuse to engage with, evaluations that are mostly for cosmetic purposes	This shift characterizes TFE as a more autonomous and professionalized practice, where evaluators take stronger ethical stances in support of transformation and if necessary stand up to, or even refuse to engage with, evaluations that serve vested interests in the unsustainable status quo,	This avoids evaluation continuing to prop up and legitimize unsustainable and unethical activities that hold back desirable transformations. ¹

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				and/or are primarily for cosmetic purposes, greenwashing and social washing, unless evaluators are given a genuine platform to challenge these issues in their evaluations. ^{38–40}	
	22	Evaluators are primarily directive experts who assess others	Evaluators also position themselves, with humility and reflexivity, as embedded or external facilitators who build others' evaluative capacity	The role of evaluators in TFE shifts from directive experts and assessors whose main job is to give judgment on evaluands, to more power-sensitive, humble and reflexive facilitators whose main job is to build initiatives' capacity to self-evaluate in transformation-focused ways. ¹ This does not preclude evaluators from also passing judgment.	This shift increases the likelihood of initiatives' long-term effectiveness and momentum, with lower dependency on short-term evaluator contracts, and also reinforces the nature of evaluation as a universal practice ¹ (see shift 16).
	23	Elevation of Western and epistemic forms of knowledge	Draws on diverse epistemologies and wisdom	Accompanying evaluations that focus on objectivity, quantification and standardization is often an elevation of Western and epistemic forms of knowledge (e.g. scientific, abstract or conceptual	As well as enriching understanding of systems change (see shift 11), this shift is also important for decolonizing evaluation and ensuring that

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				knowledge), and positivist rationality, with the exclusion of other forms of knowing. ^{41–44} TFE, in contrast, draws on much more diverse forms of knowledge, which additionally include more embodied, tacit, practical and intuitive knowledge, and different forms of logic and rationality more prevalent in non-Western cultures. ^{1,45} TFE would therefore cultivate cross-generational, multi-, inter- and transdisciplinary partnerships and evaluation teams, ^{1,46} and encourage endogenously led evaluations (e.g. as in Made in Africa Evaluation ^{47,48} or South-South cooperation in international development evaluation ⁴⁹).	certain worldviews are not inappropriately imposed on evaluated systems, perpetuating the marginalization of non-Western (e.g. Indigenous, African, Eastern) wisdom. ¹
	24	Treats inequalities and discrimination as contextual issues outside evaluation's	Problematizes and contributes to addressing inequalities and discrimination	Whereas many evaluations in the past have treated inequalities and discrimination as contextual issues beyond the scope or remit of evaluation practice, TFE instead explicitly	This shift means that evaluation plays a much more active part in engaging with the power structures that must be

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		remit		problematizes and contributes to addressing these injustices. ⁵⁰	reconfigured in transformations to regenerative futures. ¹
	25	Asks if we are doing things right, or doing the right things	Also asks how we decide what is right	Many evaluations have supported relatively shallow forms of learning focused on improving existing interventions and understanding causal mechanisms – in other words, asking if we are doing things right, or doing the right things. ^{51,52} TFE goes further by additionally challenging us to reflect on underlying assumptions and values, the things we value most and why, and who gets to choose – in other words, asking how we decide what is right. ^{1,53}	This shift is important for enabling deeper, more transformative forms of learning that open up previously unimaginable possibilities, and disrupting power relations. ¹
	26	Isolated individual evaluations	Cross-talk and partnerships between different evaluations	Many evaluations have historically treated their findings as proprietary, with limited sharing between different evaluations. ⁵⁴ In TFE the default approach is that evaluation insights will be transparently and accessibly shared, unless they contain genuinely	This shift helps to avoid duplication and incongruence between initiatives and their evaluations, and instead builds much stronger partnerships of transformation catalysts aligned to

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				sensitive information, alongside greater awareness of other initiatives and evaluations and how they can align and reinforce each other to support transformation. ¹	driving transformation towards regenerative futures. ¹
	27	Encouraging ‘change to keep things the same’	Building on regenerative practice to catalyze transformations towards regenerative futures	A key difference between many mainstream evaluations and TFE is that evaluation has traditionally encouraged minor adjustments and reforms to essentially enable continuity of the same activities ⁹ – in other words, ‘change to keep things the same’. On the other hand, TFE is wholeheartedly geared towards spurring more fundamental, systemic, and just transformations towards regenerative futures, especially through nurturing existing regenerative practice in the present – embodying this stance not only in its evaluation criteria (see shift 7), but also its core purpose. ¹	Tweaking the status quo is unlikely to generate the depth, scale and speed of change necessary to overcome global crises. ^{55–60} By infusing its very purpose with ideas about transformation and regeneration, evaluation becomes less of a passive exercise and more an active <i>catalyst</i> of desired transformations, as argued in this paper.

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Chapter 6: Conclusion

This thesis set out to answer the question: ‘How can evaluation practice catalyse transformations towards regenerative futures?’. It recognises the fundamental role that evaluation can play in enabling urgently needed societal transformations, responding to limited clarity around what transformations should orient towards, what would make evaluation practice fit for this task, and how a regenerative orientation and transformation-focused evaluation can be effectively implemented and embedded in practice. In this final chapter, the key conclusions, conceptual advances and methodological advances of the thesis are summarised, along with recommendations for next steps in future research.

6.1 Key conclusions of the thesis

As detailed in Chapter 5, the main conclusions of this thesis are that three important aspects must be addressed if evaluation practice is going to step up to the ‘transformational imperative’ (Chaplowe and Mukoma, 2023) – the urgent need for societal transformations towards regenerative futures demanded by our crisis-hit world.

First, the new roles and capabilities urgently demanded of evaluation practice by our transforming world must be recognised. These include the need to maintain an orientation towards transformation and regeneration, enable agility and rapid adaptation, make sense of complexity, encourage reflexivity and deeper forms of learning, and ultimately guide us towards wiser and more effective transformative action and development that builds on existing regenerative practice. As described in Chapter 2, a regenerative orientation includes recognising regenerative social-ecological systems as those that maintain positive reinforcing cycles of health both within and beyond themselves, including between humans and wider nature, to create conditions conducive to the flourishing of life.

Second, stepping fully into those new roles requires fundamental shifts in the complexity awareness, power relations, and purpose of evaluation practice – in other words, an existential transformation of more traditional Western modes of evaluation and how it is implemented. Such ‘transformation-focused evaluation’ must embrace a more relational worldview, informed by understandings of complexity science and the long-term dynamics of transformation and regeneration that infuse its assessment criteria. It must also be strongly contextualised to place, recognising and honouring the unique needs of each evaluand; responsive and agile, applying evaluation as a more continuous process or when needs arise,

and adapting approaches in response to changing circumstances; and epistemologically and methodologically pluralist, decolonising and partnership-building, drawing on diverse forms of knowledge and ways of knowing, and weaving transdisciplinary partnerships of knowledge-sharing.

If evaluation is to truly *catalyse* transformations towards regenerative futures – suggesting a more active and normative role in seeking and encouraging desired transformations rather than merely passive support – then it must additionally be: ethically grounded, with evaluators as activists for justice, transformation and regeneration who are prepared to challenge inequalities, discrimination, and evaluations that serve vested interests in the unsustainable status quo; embedded in and as part of system change processes, with evaluators playing much more collaborative, co-creative, reflexive and facilitative capacity-building roles rather than adopting only directive or externally judgemental stances; and primarily accountable to the flourishing of planetary life for current and future generations. A key focus would be recognising regenerative practice in the present and evaluating how to best enable the spread of such practice (as explored in more depth in Appendix 2).

Third, a number of wider cultural enabling conditions are essential to cultivate in order to accelerate the mainstreaming and embedding of transformation-focused evaluation in transformation efforts. These include the need to: overturn deep-seated mindsets, expectations and misconceptions about evaluation and reaffirm its power; develop and embed new evaluation competencies through teaching, training and social learning systems; increase engagement between the evaluation field and regenerative practice; focus on supporting human-nature reintegration; and cultivating our broader capacity to ‘let go’ of our old ways of knowing and being.

Without addressing these three key aspects, we are likely to perpetuate relatively superficial and marginal forms of change that insufficiently tackle the underlying drivers of global crises, and transformation-focused evaluation is likely to remain a niche practice. If addressed, evaluation could be a powerful catalyst of transformations towards regenerative futures.

6.2 Key conceptual advances of the thesis

The chapters of this thesis provide a number of notable conceptual advances, and their wider impact is already becoming apparent (see Appendix 3 for details). Selected examples are summarised below.

- The paper in Chapter 2 has already been widely cited and recognised as a seminal work in regenerative fields and for transformations research more broadly (IPBES, 2025; Fischer et al., 2024; Gorissen et al., 2024; Gosnell and Gordon, 2025). As well as providing the most comprehensive review to date of concepts related to regeneration, the Regenerative Lens framework itself has been appreciated in how it distills important dimensions of regenerative systems (Gorissen et al., 2024; IPBES, 2025). The study was the first to undertake a relatively broad, cross-disciplinary review of regenerative systems literature to explore common themes, and the resulting framework is novel particularly in its broad applicability (with pre-existing frameworks tending to focus on particular fields such as business or economies) as an orienting tool, and its close attention to the outcomes and dynamics of regenerative systems at larger social-ecological scales, which had remained relatively under-theorised.
- Chapter 3 has provided the most comprehensive review to date of evaluation literature in transformation contexts, and the twelve principles framework that resulted remains the most holistic and multidimensional treatment of transformation-focused evaluation to date, both in terms of its principles and the different approaches, methods, frameworks and tools that support it. It has also been recognised as a seminal work in the evaluation field (Ofir and Buckton, 2025; Colvin et al., 2024; Chaplowe et al., under review), and may have even helped to coin a new term or nascent field ('transformation-focused evaluation') (Colvin et al., 2024; Transformations Community, 2024).
- The co-designed transformation-focused evaluation and learning system for Food for the Future in North Yorkshire, presented in Chapter 4, is innovative in its holistic consideration of evaluation as interwoven with the wider governance and work culture of a change initiative, and as a spectrum from more informal to more formal and systematic evaluation – rather than merely an isolated technical exercise or focusing primarily on measuring and monitoring indicators of change. The framework is also innovative as apparently being the first to show how Three Horizons (Sharpe et al., 2016) – an increasingly widely adopted framework for planning transformations – could be integrated into a wider evaluation and learning system of an ongoing transformation effort, whereas most case studies use Three Horizons only as an initial scoping and strategy exercise.
- Along with its novel framework to inform future research and practice, Chapter 5 provides a key conceptual advance in helping to build bridges between multiple

disciplines – notably, between the evaluation field, regenerative practice, and ‘new economics’ beyond capitalism and neoliberalism – that have hitherto remained relatively disparate, despite their mutual resonance and potential to strengthen each other in service of catalysing transformations towards regenerative futures.

6.3 Key methodological advances of the thesis

Chapter 4 provides the most notable methodological advances in the thesis. The chapter provides a rare example of collaborative, second-order, action-oriented research that bridges and interweaves approaches of design and evaluation in complementary ways: an approach that the chapter argues is a vital part of embedding transformation-focused evaluation within a wider culture of working and organising. It is one of very few case studies of applying transformation-focused evaluation to a large-scale system transformation initiative, let alone those that do so in a reflective and transparent way that communicates learning from a co-design process, and the first to apply the twelve principles for transformation-focused evaluation framework described in Chapter 3. This approach, alongside its conceptual advances highlighted above, is likely to be of significant interest and provide inspiration to those involved in other large-scale system change initiatives and associated action research.

6.4 Next steps

One of the main limitations of this thesis is its limited exploration of how transformation-focused evaluation and intent can be sustained into more action- and impact-rich stages of initiatives, including the evaluation of evidence for systemic transformation and regenerative dynamics, and initiatives’ contributions to change. This is largely reflective of the early stage of the initiative (Food for the Future in North Yorkshire) that provided a case study for the thesis.

Future research should therefore focus on investigating the implications of achieving long-term implementation and embedding of regenerative orientations and transformation-focused evaluation within the working cultures of transformation efforts. As detailed in Chapter 5, this will require second-order, collaborative, transdisciplinary and action-oriented forms of research, which should also address critical research questions related to the wider cultural enabling conditions for transformation-focused evaluation.

This thesis nonetheless provides valuable conceptual clarity about regenerative futures and transformation-focused evaluation, as well as important efforts to put these ideas into practice and draw out learning from real-world application. Additional research in Appendix 2 enables others to bring ideas from the thesis into their own practice, through an accessible and utilisation-focused tool guide. The thesis is already demonstrating significant contributions to advancing the fields of evaluation, regenerative practice, and transformations research, and has accelerated our learning about how evaluation practice can catalyse transformations towards regenerative futures.

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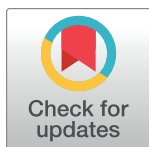
Appendix 1: Additional rationale and context for the thesis

This appendix is a paper that provides additional rationale and context for the thesis. It introduces the Yorkshire food system context that features in Chapter 4, as an important exemplar of where transformation of complex systems is urgently needed. It explains the kind of transformation that evaluation must enable (see Chapter 3) and contextualises what a regenerative future might look like, applying ideas from Chapter 2. Its publication details and author contribution statements are provided in Appendix 4 along with those from the other thesis chapters.

RESEARCH ARTICLE

Transformative action towards regenerative food systems: A large-scale case study

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Data Availability Statement: More detailed Three Horizons results can be found in FixOurFood's freely accessible subsystem reports [74–76].

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Original material (post-it notes etc.) is stored on a number of murals in FixOurFood's Mural (<https://www.mural.co/>) account. Data are available from fixourfood@york.ac.uk or the University of York Open Research team (lib-open-research@york.ac.uk) for researchers who meet the criteria for access to confidential data.

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Abstract

We urgently need to foster regenerative food systems that mutually reinforce human and ecological health. However, we have limited understanding of the action pathways that could encourage the emergence of such systems. Here we report on an extensive Three Horizons futures process, conducted with diverse participation from food system researchers and practitioners, to identify core domains of action for transforming the food system of Yorkshire, UK, towards a regenerative future. After establishing the contrast between the current degenerative and envisioned future regenerative food system, six core action domains were identified that require support to enable transformation: 1) enhancing supply chain connectivity and innovation to support diverse hybrid business ecosystems; 2) scaling environmentally beneficial and regenerative farming; 3) empowering citizens to reshape food demand; 4) providing trusted, accessible knowledge support for standards and incentives; 5) supporting schools and young people as drivers of long-term change; and 6) ensuring coordination and mutual support across domains. Our results highlight the importance of efforts to cohere synergic action, ambitious visioning, and addressing issues of power. Overall, our study sets an ambitious standard for co-developing action priorities to encourage regenerative futures.

Author summary

We urgently need to foster regenerative food systems that mutually reinforce human and ecological health. However, we have limited understanding of the kinds of actions that could help such systems to emerge. Here we report on an extensive 'Three Horizons' futures process, conducted with diverse participation from food system researchers and practitioners, to identify core domains of action for transforming the food system of Yorkshire, UK, towards a regenerative future. After establishing the contrast between the current degenerative and envisioned future regenerative food system, six core action domains were identified that require support to enable transformation: 1) enhancing supply chain connectivity and innovation to support more diverse, purpose-led businesses; 2) scaling environmentally beneficial and regenerative farming; 3) empowering citizens to reshape food demand; 4) providing trusted, accessible knowledge support; 5) supporting schools and young people as drivers of long-term change; and 6) ensuring coordination and mutual support across domains. Our results highlight the importance of efforts to cohere actions with impacts greater than the sum of their parts, ambitious visioning, and addressing issues of power. Overall, our study sets an ambitious standard for co-developing action priorities to encourage regenerative futures.

Introduction

Today's dominant food systems produce highly problematic outcomes for people and planet. They are the leading cause of global biodiversity loss and a major contributor to climate change and pollution, leave billions with poor dietary health, cause conflict, encourage spread of pathogens, and create major power imbalances [1–4]. As such there is growing recognition that marginal improvement of existing food systems is insufficient. Instead, extensive and

by North Yorkshire Council. Allison Kane is Business Development Manager at Deliciously Yorkshire and a FixOurFood Commissioner. Tom Scrope is the co-founder and CEO of Soil Benchmark. Kim Smith is a Trustee of TastEd. Jessica Wilson was employed by Sheffield City Council.

deep transformation across the many facets of food systems is required [1,5,6]. Transformation involves going beyond changing technologies, policies and behaviors, to include change in underlying structures, power relations, beliefs, values, paradigms and worldviews of unsustainable systems [7–9].

A powerful orientation for such transformation in food systems is towards regenerative patterns, dynamics and cultures [5,10–12]. Being ‘regenerative’ can encompass a range of aims, practices and outcomes that mean different things to different people [13], but for the purpose of this article we refer to regenerative systems as maintaining positive reinforcing cycles of wellbeing both within and beyond themselves, especially between humans and wider nature, such that ‘life creates conditions conducive to life’ [13,14]. Conceptually, regenerative systems can be considered to go beyond simply reducing anthropogenic harm to acceptable levels, to actively ‘spiraling up’ social and ecological health, and aim to overcome failures of dominant mindsets around commodification, GDP-based economic growth, and separation of humans from nature [5,12,13,15,16]. The regenerative movement is well-established in agriculture, where its interpretations are diverse although its focus is primarily on regenerating soil health that in turn supports delivery of ecosystem services [17–20]. Regenerative *food systems*, however, would need to consider regenerative dynamics across, for example, models of governance, business and education, in addition to farming [5,10]. While interest in transforming food systems is growing, there has been very limited critical analysis of *how* such change at scale can be brought about [21,22].

This paper aims to understand how transformation to regenerative futures could be supported in a real-world large-scale food system. The work focuses on the food system of the extensive 15,420 km² Yorkshire and Humber region (hereafter abbreviated to ‘Yorkshire’) in the UK, with a human population of around 5.5 million. Yorkshire has a diversity of soils, land cover and farming systems (Fig 1), extends across urban and rural environments (Fig 1), and contains the highest concentration of food and drink businesses in the UK [21]. Yorkshire is also a hotbed of food system innovation, as highlighted by a number of recent local food strategies and action plans [23–26], and its networks of innovative farmers and food and drink businesses, such as Yorkshire Agricultural Society’s Farmer Scientist Network [27], Grow Yorkshire [28], and Deliciously Yorkshire [29]. Yorkshire’s food system also shares many challenges with other food systems, such as high rates of food insecurity [30]. These features make Yorkshire a useful case for establishing lessons about regional-scale food system change and well-suited to participatory processes drawing on a diversity of innovative actors, and explains the county’s selection as the focus of the FixOurFood research program [21].

Our work used an in-depth multi-stakeholder co-creation approach using the Three Horizons (3H) futures process [31] (Fig 2), with multiple surveys and workshops engaging 114 experts from three food subsystems spanning production to consumption: 1) agriculture; 2) food economies; and 3) food in schools and early years settings. The results depict what participants identified as the contrast between current systems and normative ideas of what a radically different desired future food system should look like, and the interrelated domains of action needed to support the desired systemic shift.

Results

Current challenges, desired futures, and value contrasts

Participants identified positive aspects of the current Yorkshire food system, such as family-run farms with a long-term stewardship approach and a Yorkshire artisan food identity that has potential to strengthen rural food economies. Yet the current system was perceived by most to be degenerative in some form, reinforcing ecological degradation, social

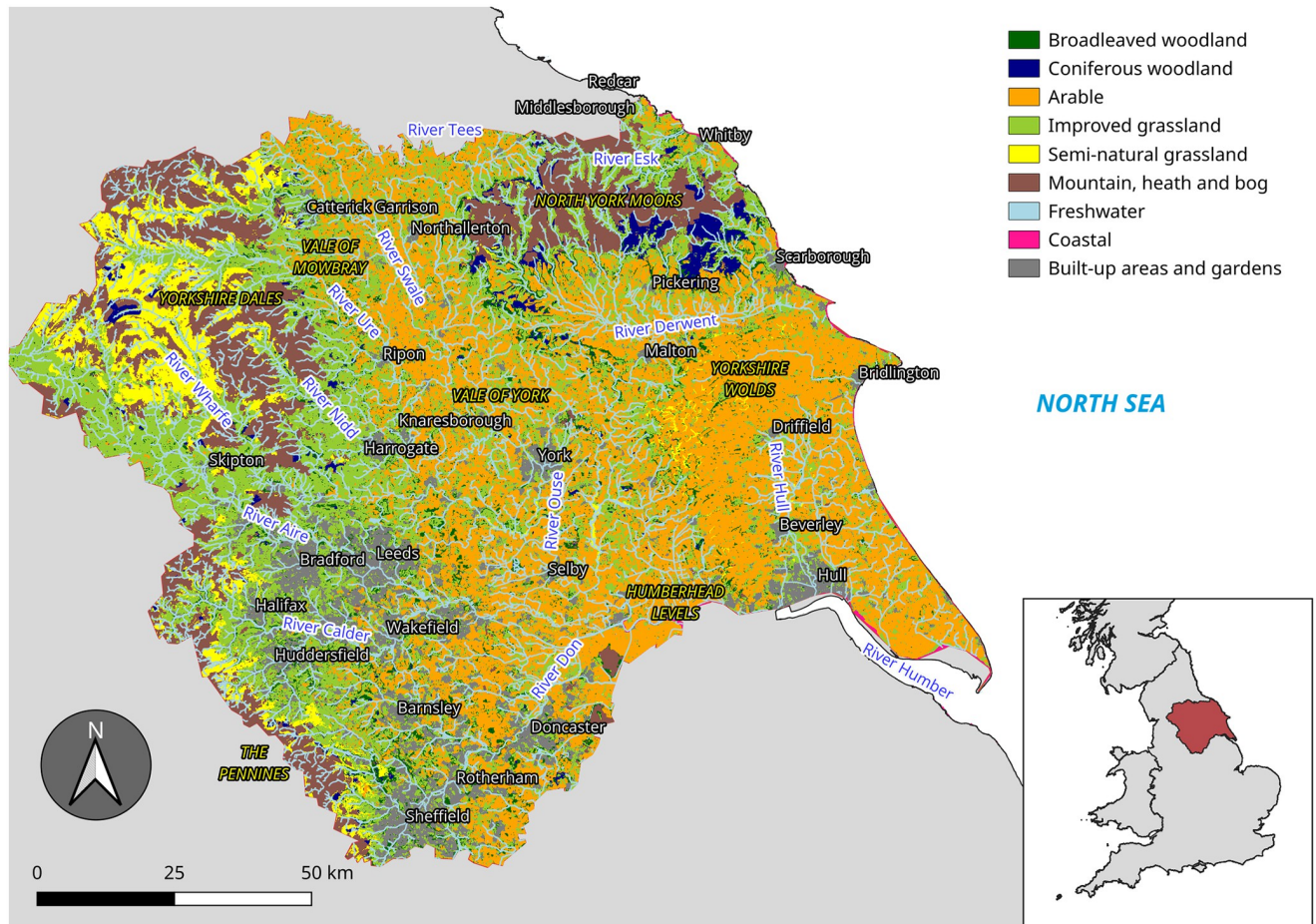


Fig 1. Land use map of the Yorkshire region, UK. The original pixel scale is 25 m. Image produced using AgriFoodPy [32] and QGIS, based upon Land Cover Map 2023 © UKCEH 2024. Contains Ordnance Survey data © Crown Copyright 2007, License number 100017572.

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marginalization and inequalities, eroding human health and wellbeing, and with economic power held by several large retail, processing and agri-tech companies, limiting agency of smaller purpose-led enterprises (Fig 3, Table 1). These problems were thought to be perpetuated by mindsets focused on profit and efficiency at the expense of ecological health and resilience, lack of public awareness and skills around better food, lack of political leadership and agency or resources for transformation, and a constant environment of crisis that was discouraging long-term sustainable thinking and behavior (Fig 3, Table 1).

In contrast, the envisioned system was considered to be much more regenerative, including greater localization, honoring of regional food identity, greater biological and cultural diversity, equality of access to food, agency to produce food regeneratively, and public reconnection to nature and food production that encouraged caring attitudes (Fig 3, Table 2). It was envisioned by participants as having thriving regenerative farming and supported by holistic and ambitious government and business policy. It would be contributing to high regional self-sufficiency, resilience, biodiversity and carbon sequestration, and affordable nutritious food for all (Fig 3, Table 2).

The current and envisioned food systems are underpinned by contrasting values and world-views (Table 3). For instance, in the desired future: food is embraced for its multifaceted social

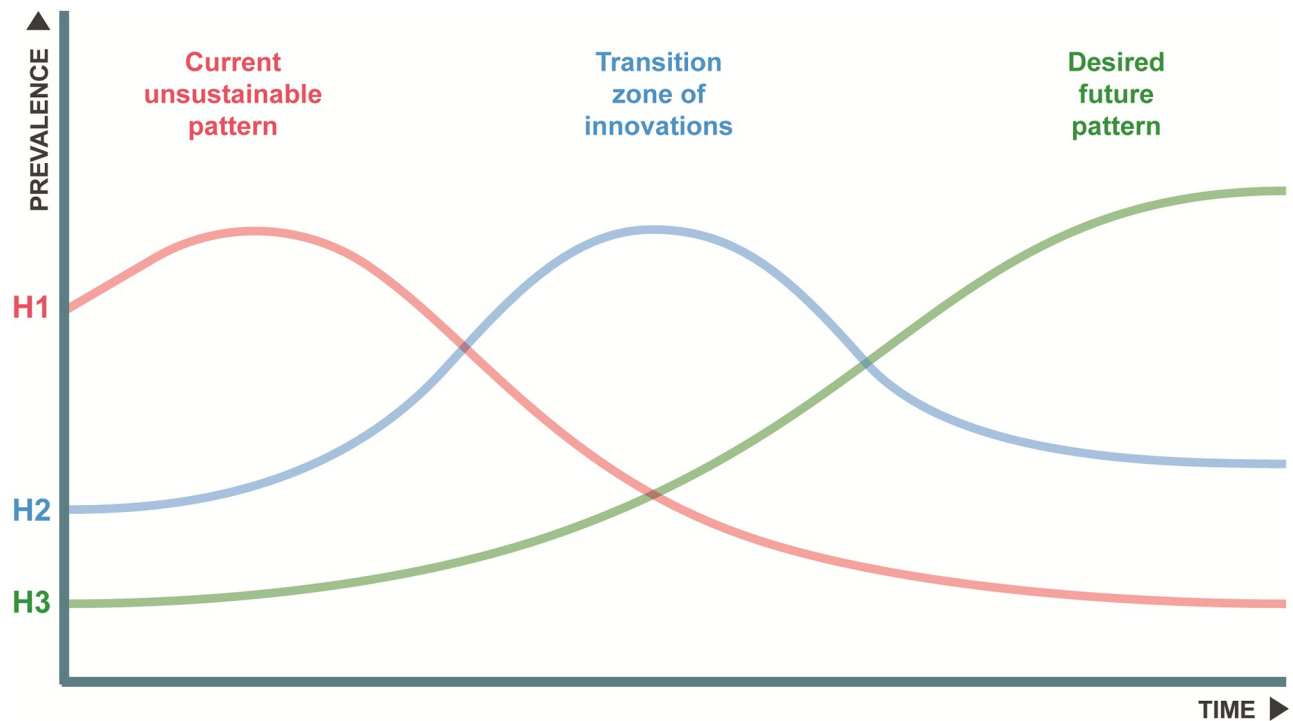


Fig 2. The Three Horizons framework. In this framework, the future is viewed as three horizons, or societal patterns. Horizon 1 (H1) is the pattern that dominates the present, but which is declining as many aspects of it—ways of working, values, assumptions, technologies and so on—increasingly become less fit for purpose as the wider environment changes. Horizon 3 (H3) then represents an envisioned, radically different future—the sense of what a collective wants to bring into being. Horizon 2 (H2) is the transitional zone where actions are strategically oriented to help create space for the longer-term third horizon to emerge. The scaling used in the graph is not intended to be taken literally, but rather for rough qualitative comparison. ‘Prevalence’ describes the relative prevalence of a horizon in the food system (e.g. the amount of resources it holds or transmits, or the proportion of human activity taking place that is related to the horizon). Time flows from left to right: the present is found where H1 is dominant, and all information to the right of this is in the future. Figure originally created in Mural (<https://www.mural.co/>) and rendered by Dave Gledhill of 1790 Creative (<https://autografic.art/>).

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benefits rather than typically being viewed in more utilitarian terms of nutrition and fuel; there are appropriate financial rewards for regenerating and maintaining ecosystem services in farming; and economic power is distributed rather than concentrated (Table 3).

Action needed to support transformation

The contrast between current and envisioned future food systems (Fig 3, Tables 1–3) enabled in-depth exploration, in systemic terms, of the kinds of existing and new initiatives that could support a transformational shift and avoid reinforcing the status quo. Six core domains of action and policy were identified that were deemed to provide critical entry points for cohering change to support transformation. Each of the domains of action—a cluster of many different reinforcing initiatives—would need support and cohering to build momentum, support disruption of the current system, and enable a new, envisioned pattern of activities to emerge.

1. Enhance supply chain connectivity and innovation

The first action domain identified was a need to establish and strengthen new supply chain platforms and networks that can support hybrid businesses generating environmental and social benefits beyond profit. This would require reconfiguring supply chains to support more

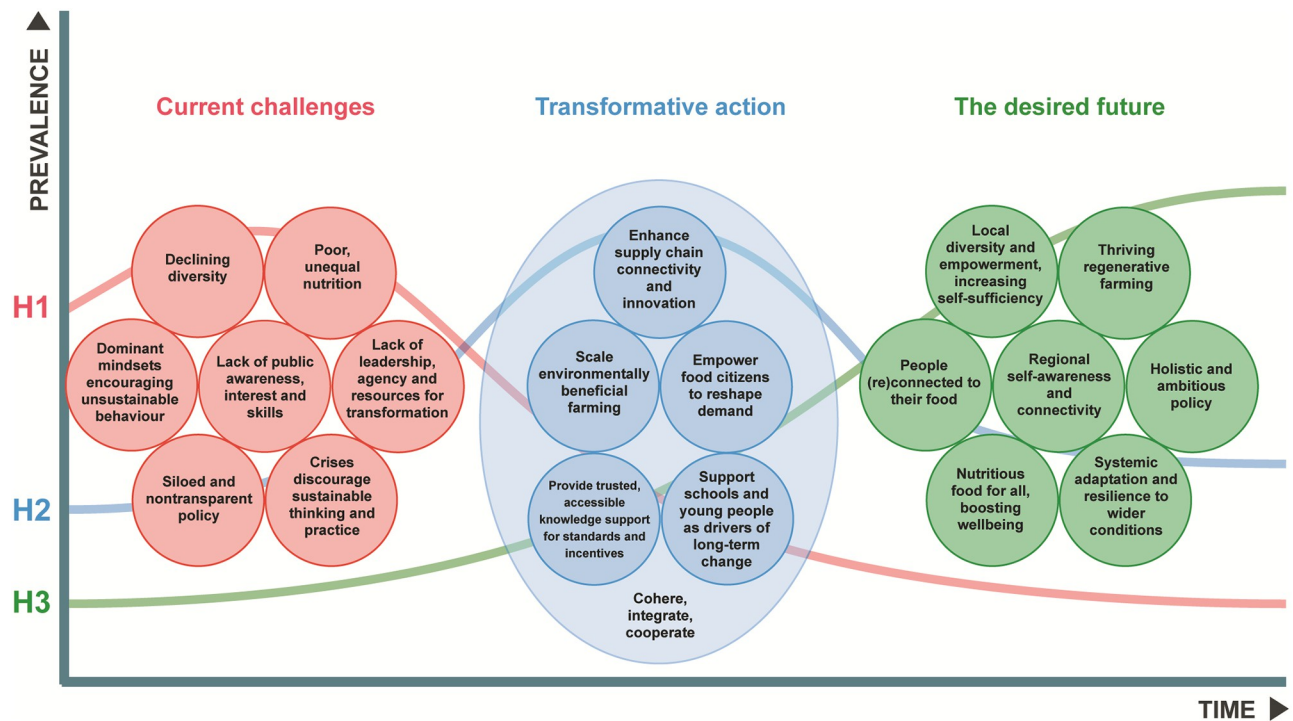


Fig 3. Three Horizons map of current Yorkshire food system challenges (Horizon 1, H1), the desired regenerative future food system (Horizon 3, H3), and key domains of action for supporting the transformation from H1 to H3 (Horizon 2, H2). The scaling used in the graph is not intended to be taken literally, but rather for rough qualitative comparison. 'Prevalence' describes the relative prevalence of a horizon in the food system (e.g. the amount of resources it holds or transmits, or the proportion of human activity taking place that is related to the horizon). Time flows from left to right: the present is found where H1 is dominant, and all information to the right of this is in the future. The exact placement of the circles vertically and horizontally is not intended to reflect differences in prevalence or time—the important aspect is the circles' association to a particular horizon. Figure originally created in Mural (<https://www.mural.co/>) and rendered by Dave Gledhill of 1790 Creative (<https://autografic.art/>).

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direct sales, local and seasonal sourcing (e.g. via dynamic food procurement platforms and food hubs), and more generally enhancing connections between food system actors (including stronger farmer sharing networks), helping to move beyond innovation in isolation by bringing different actors together to develop shared solutions to challenges. As emergency responses to acute food insecurity, such supply chains and networks could redirect surplus and otherwise wasted food to food banks and other food access structures [33,34]. Inspiring alternative food and innovation networks were pointed out as already active in Yorkshire, such as Food Circle York (a social enterprise bringing together a community of customers and organic and regenerative farmers, growers and producers, with twice-weekly markets in York) [35] and Yorkshire Agricultural Society's Future Farmers of Yorkshire (a platform for innovative farmers, vets and industry supporters in Yorkshire that runs conferences and other large-scale events, workshops, mentoring schemes and industry visits) [36], providing opportunities to learn from, replicate and scale up innovative practice, and share ideas and skills.

This action domain has potential to support a fundamental shift in power and agency towards a diversity of marginalized food system actors with a more regenerative ethos, disrupting current patterns of relatively uniform and unequal food procurement. It would support value shifts towards more networked, cooperative action, and the accessibility and convenience of healthy and sustainable food. Bringing multiple actors and system parts together to work cooperatively, rather than working in silos, would enable pooling of resources, sharing risk across partnerships and making investment more attractive, as well as facilitating peer-to-

Table 1. Challenges in the current Yorkshire food system that make it degenerative and inhibit transformation to a regenerative system, according to Three Horizons participants.

Challenge	Explanation
Declining diversity	Biodiversity is declining particularly as a result of harmful farming practices, impairing ecosystem functioning and the richness of people's experience of nature. Meanwhile, innovation and organizational diversity (e.g. of producers and sellers) are limited, and diverse smaller enterprises on local high streets are failing under the dominance of big food retail.
Poor, unequal nutrition	There is widespread and rising food insecurity, food poverty, and inequality of dietary nutrition and health. The relative availability, accessibility and affordability of ultra-processed food and food high in fat, sugar and salt is contributing to an epidemic of malnourishment and obesity, with those on lower incomes disproportionately affected. Unhealthy diets are being exacerbated by advertising and the food environment surrounding schools (e.g. due to the prevalence of fast food outlets).
Dominant mindsets encouraging unsustainable behavior	In the food system overall there is often a narrow focus on profit, price, efficiency and convenience, which pushes healthy nutrition and environmental wellbeing low down on people's agendas. In farming there is a deep-seated 'conventional' farming mindset focused on producing high yields at the expense of ecological health and resilience. This contributes to a degenerative reinforcing cycle, whereby high inputs (e.g. fertilizer) and short rotations can reduce soil health, making farmers even more dependent on high inputs to maintain yield, further degrading soil.
Lack of public awareness, interest and skills	A lack of holistic understanding and interest around food drives degenerative dynamics. This is apparent in many schools, where food's social, environmental and nutritional importance is under-appreciated with school meals under-funded, food education insufficiently holistic, school food standards weakly enforced, and high levels of food wastage. Stressful school dining environments contribute to students developing negative attitudes towards school food. More generally there is a lack of public food awareness—including an understanding of what a healthy or environmentally friendly diet is, how food is produced, and the costs of food production—and skills (e.g. cooking with seasonal produce).
Lack of leadership, agency and resources for transformation	There has been a lack of political leadership, agency and resources for transforming the food system and implementing regenerative practice. There is insufficient agency particularly at local or small scales to enact major positive change, given the concentration of power in a small handful of food retail and processing businesses (e.g. Tesco, Sainsbury's, Asda, Morrisons, Arla Foods, Nestlé, etc.) and high costs constraining SMEs' ability to invest, for instance. For schools, healthier and more sustainable food is harder for institutions to access, whilst farmers have little incentive or support to transform their practice. In general, there was felt to be insufficient skills, tools and resources to facilitate healthy eating practices.
Siloed and nontransparent policy	Policy and organizations lack joined-up thinking and transparency, and policies are typically reactive, siloed and disjointed. This includes limited transparency in land governance, and organizations' asset use tends to be for isolated purposes, so skills and infrastructures are under-utilized.
Crises discourage sustainable thinking and practice	The environment of stress and crisis discourages long-term sustainable thinking and practice. For example, product shortages (due to factors such as COVID-19, Brexit and the Russo-Ukrainian war) encourage the procurement of more unhealthy processed, cheap school food, and transforming farming practices can be seen as financially too risky, with the hardships associated with farming discouraging young people from viewing it as a sustainable career. Labor shortages place further pressure on farms.

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Table 2. Themes of the desired future regenerative Yorkshire food system envisioned by Three Horizons participants.

Theme	Explanation
Local diversity and empowerment, increasing self-sufficiency	The food system has high local diversity and empowerment, with a thriving diversity of small organizations (e.g. producers, processors and retailers) and urban and small farms. These organizations are supported by fair and inclusive market arrangements such as dynamic food procurement platforms for supplying the public sector, as well as new, more direct supply chains between regenerative farmers, schools and businesses. This is contributing to high resource circularity and self-sufficiency, with lower reliance on food imports and less food waste.
Thriving regenerative farming	Viable regenerative farming practices have been embraced as the inspiring choice, not least due to a culture of sharing best practice between farmers, and farmers are well-paid via supply chains to produce food regeneratively. A result of these supply chains is that regeneratively sourced school food has a positive environmental impact. Young people and innovators are motivated and well-supported to enter the farming sector, ensuring the sustainability of its workforce. Thanks to the wide range of public services that farms produce in addition to food, we live in biodiverse landscapes, and the food system is carbon-negative.
People (re)connected to their food	People in the food system are empowered, knowledgeable, skilled and engaged, and school students, staff and families have high levels of food literacy, with a reconnection of people to nature integral to education and policymaking. Consumers embrace the opportunities offered by the new food choice realities of more localized and seasonal food sourcing, with a greater proportion of plant-based meals, but also a diversity of new foods (e.g. grain and fruit varieties). Care and appreciation of food and its importance contributes to a zero-waste approach to food.
Regional self-awareness and connectivity	There is high awareness and connectivity of food system actors, including an integrated land use strategy at national and regional levels, and awareness and recognition of good farming practice that is already occurring. Moreover, Yorkshire food is distinctive and desirable across the UK.
Holistic and ambitious policy	Joined-up, long-term policy with a systemic perspective prioritizes healthy, sustainable food, with rewarding of good practice and a right to food enshrined in local and regional policy. School food is understood as integral to the wider food and education system, and there is accordingly clear enforcement and communication of ambitious school food standards. Socio-environmentally responsible business models are the norm.
Nutritious food for all, boosting wellbeing	Healthy neighborhood food environments (foodscapes) support a high proximity of healthy food for all demographics, which is at the heart of a preventative health system. Schools have sufficient resources to provide high-quality food for all, and even support wider community wellbeing via food partnerships and pastoral support. As a result, people in school communities are healthy in body and mind, and the wider wellbeing of producers and food citizens is increasing.
Systemic adaptation and resilience to wider conditions	Farming decisions improve livelihoods and resilience (e.g. to climate change and associated extreme weather events), not only yield, and high international trade standards mean Yorkshire does not externalize impacts when importing. Creativity is thriving from a diversity of perspectives and backgrounds in schools, and developmental evaluation and futures methods are embedded in food system activity to aid adaptation to a complex, uncertain and constantly shifting environment.

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peer learning. Hybrid business models are known to keep value distributed within local food systems, rather than accumulation by the few (e.g. shareholders), reinforcing local agency [36]. By strengthening farmer sharing networks and creating new supply chains, this action domain was considered to have potential to enhance capacity for regenerative farming and resilience to external shocks.

Table 3. Contrast between the values of the current Yorkshire food system and the desired future system, identified by Three Horizons participants.

Current food system value	Future envisioned food system value
Low diversity	High diversity
Healthy and sustainable food is exclusionary	Healthy and sustainable food is universally accessible and affordable
Concentrated power	Distributed power
Actors work in isolation	Actors work in a culture of networking, cooperation and sharing
Reactive policy	Proactive policy
Disjointed policy	Holistic policy
Minimal support for public goods and ecosystem services	Appropriate financial rewards for regenerating and maintaining ecosystem services
Transformation seen as too risky	Transformation seen as essential and inspiring
Good practice talked about but rarely applied	Good practice normalized
Focus on maximizing crop yields at the expense of ecological health and resilience	Profitable farming that also improves social and ecological wellbeing and resilience
Limited public food awareness and skills	High public awareness and connection to food system
People typically have restricted diets	People typically have varied diets that boost nutrition
People used to huge freedom of food choice	People embrace new constraints (but also possibilities) of seasonality, more local sourcing, etc.
Convenience means ultra-processed and fast food	Convenience means fresh local unprocessed food available to all
Food typically viewed in more utilitarian terms of nutrition and fuel	Food embraced holistically for nutrition, culture, social engagement, health, education and environment

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Supporting this domain was thought to require good awareness of where hybrid businesses and networks already exist, as well as proactive attempts to attract funding, support local authorities and other organizations in funding applications, and provide capital for establishing such platforms, hubs, consortia and cooperatives. Care would also be needed to ensure platforms do not have excessive charges that raise prices for consumers or reduce producer incomes, and that they genuinely increase convenience for consumers to purchase food from hybrid businesses (see action domain 3).

2. Scale environmentally beneficial farming

The second action domain is a need for long-term evidence-based policy and market support for scaling environmentally beneficial and regenerative farming. In addition to creating stronger market incentives (e.g. action domain 1), it also requires institutionalizing long-term commitments to scaling up ‘horizontally’ via city and regional-scale councils, partnerships and networks (e.g. Future Farmers [37]) and ‘vertically’ via national-scale policy working with the UK Department for Environment, Food & Rural Affairs (Defra) to ensure an integrated land use strategy and that environment or agri-environment schemes such as Environmental Land Management (ELM) and carbon credits (a system for financing carbon offsetting via land management that reduces, avoids, or removes carbon emissions) genuinely provide sufficient support. It also requires improving farmer-policymaker relationships via constructive dialogue, and getting big players (e.g. large-scale food producers, processors and retailers) on board for system-wide mainstreaming.

A commitment to such scaling was considered important for supporting transformation by ensuring regenerative and other environmentally restorative farming, and associated mindsets, become mainstream rather than remaining as small-scale, isolated innovation. Concerted

action would also support value shifts towards high biological and agricultural diversity, rewards for good practice, farming that focuses on livelihoods and resilience, and more holistic policy. Mainstreaming could have major positive environmental impacts, from increasing biodiversity and capturing carbon, to improving soil and water quality, benefiting both human health and wellbeing.

Education was seen as key. Many courses in agricultural colleges were considered to focus on machinery and yield, with insufficient emphasis on environmental stewardship or nutritional diversity, highlighting a need for more integrative and holistic education that connects food with the wider Earth system. Giving greater recognition to regenerative farming systems was also considered important, such as by designating 'Areas of Outstanding Natural Farming' in areas lacking existing protection (e.g. outside National Parks and National Landscapes, which designate areas of ecological, aesthetic and cultural importance in the UK). Strong farmer networks would be needed to help farmers navigate the complex array of funding schemes for environmentally beneficial farming, alongside scientific evidence to inform regenerative farming systems and demonstrate their economic, environmental and social potential (see action domain 4).

3. Empower food citizens to reshape demand

Empowering food citizens to encourage demand for regeneratively produced food will be critical for transformation to a more regenerative food system. Participants emphasized that changing policy and governance around food production, processing and distribution must coincide with fostering demand for new supplies and forms of food, inspiring the public to lead a culture change in consumption and shifting emphasis to local, seasonal, and zero-waste. Overall, the goal would be to develop a population of empowered and knowledgeable food citizens (re)connected to their food and its origin, to whom transformation to a regenerative food system becomes a meaningful and desirable change.

Four aspects were seen as particularly important in meeting this challenge. First, extensive efforts will be needed to ensure regeneratively produced food is affordable, whilst also giving producers a high proportion of income from the sale price. Second, much greater awareness of the importance of food will be required. Key to this will be improving food literacy of school staff, students and families (see action domain 5). Using urban space for food-growing and twinning urban and rural farms to establish community links could help to reconnect people with where their food comes from. It also requires helping people move away from seeing food only in utilitarian terms by drawing on the fundamental social, cultural and environmental connections between people and food, as happens in family cooking initiatives in schools. Numerous initiatives doing this work to shift consumer mindsets already exist, such as TasteD (which offers teachers support for taste education lessons that bring fresh fruit and vegetables into classrooms) [38], Rethink Food (which provides resources for schools to introduce holistic approaches to growing, cooking and learning about food) [39], Farmer Time (which connects schoolchildren to farmers via live online chats) [40], and Open Farm Sunday (an annual public open day for UK farms) [41]. Third, food retailers can support food waste reduction, e.g. by removing 'use by' date labeling and selling loose unpackaged fruit and vegetables (including 'wonky' produce), which additionally cuts packaging waste [34].

Finally, regeneratively produced food needs to be accessible. This includes ensuring that physical infrastructure of food shopping for regenerative food is appropriate. This might include local rural branches of large supermarkets prioritizing more local produce, or finding ways to increase diversity of local food suppliers (e.g. near schools). Accessibility also needs to be enabled by ensuring appropriate information (e.g. about food's environmental impact, and

clearer brand differentiation for regeneratively produced food) is readily available to consumers, such as through changing the UK Groceries Supply Code of Practice (which sets out how retailers are expected to fairly manage their relationships with suppliers) and food standards.

4. Provide trusted, accessible knowledge support for standards and incentives

Provision of trusted and accessible knowledge, including transparent data, rigorous scientific evidence, and data-sharing networks, is needed to establish food system standards and policy and incentives for good practice, such as for farmers shifting to regenerative agriculture or hybrid businesses. Here, standardized indicators and tools are needed to facilitate comparison and communication of data from different areas and spatial scales, as well as open and accessible data. Too often, data are collated in extractive ways, kept private, and serve vested interests. An open approach to knowledge and data could support value shifts towards networking and sharing, enhanced public awareness of the food system, and a more consistent, common language and coordinated action. Readily available and accessible information would support more agile and reflexive ways of working, helping producers and policymakers respond to changing food system conditions. A number of organizations are already working to support this action domain (e.g. to help farmers maximize the use of soil data, such as Soil Benchmark [42] and Soilmentor [43], or Take a Bite Out Of Climate Change, which shares in accessible ways the scientific consensus about how food and agriculture contribute to climate change [44], with many additional opportunities to build on such initiatives and share data 'beyond the farm gate'.

5. Support schools and young people as drivers of long-term change

Schools and young people will need to be supported to be drivers and advocates of long-term food system change. Schools are major procurers of food and have significant influence on society through education, and young people are often inspirational and passionate leaders of change with interests in realizing long-term shifts in the food system. The action domain is closely related to domain 3 –empowering consumers—but more specifically focuses on schools and young people as this sector provides key opportunities for leveraging change across the whole of the Yorkshire food system.

Support for this action domain will both address immediate and real challenges facing people as they struggle to contend with difficulties in accessing healthy and affordable food while also bringing about cultural shifts. This can be achieved through taking whole school approaches to food, where food is viewed as an intrinsic part of school life, healthy and sustainable food is provided within and outside the school environment, food becomes integral to curricula, and schools and authorities work in partnership with communities, producers and providers. There are many existing exemplars, such as: school caterers increasing children's dietary diversity and intake of locally produced fruit and vegetables; embedding food in curricula; children growing vegetables in school allotments and cooking with them to create tasty and nutritious meals in school; efforts to ensure free school meals; enhancing atmosphere and culture in school dining to improve relationships to food; inviting families in deprived areas to learn to cook from scratch and eat together as a community; involving students and parents or carers in school food decision-making, such as menu co-design, which motivates students to be champions of food system transformation; and more broadly using food as a focus to empower students to be leaders of change.

Supporting the domain requires: engaging school leadership to enhance demand for whole school food approaches; ensuring new approaches are embedded in mandatory school food

standards and via food award schemes; shifting perceptions about the importance of free school meals; influencing national policy to address constraints in funding; free school meal auto-enrolment; and changing schools' contracting and procurement practices to address, for example, barriers to local farmers more directly supplying schools. Overall, a focus on schools and young people can support value shifts towards more holistic perspectives and universality of food access, with sustainable and healthy eating behaviors being carried with students throughout their lives and reflected back in homes and local communities. Through better school food cultures, major food waste reductions are also possible.

6. Cohere, integrate, cooperate

Food system transformation will only happen when different areas of action reinforce each other to help create a new system dynamic. A critical action domain would therefore be to cohere and integrate the other domains, capitalize on opportunities, and reinforce transformative effects (Fig 4). For instance, participants identified that producer- and consumer-led change go hand in hand, that enabling more localized supply chains would support the scaling of regenerative agriculture, and that supporting schools and young people to be drivers of food system transformation sustains future generations of motivated food system workers (Fig 4). Through greater cohering and collaboration, impacts could be amplified, actions for transformation would be more efficient, and opportunities would be provided for collaborative learning about transformation [45]. A critical enabling condition is then having appropriate cross-system modes of governance, monitoring and evaluation to steward large-scale integrated action [46].

Discussion

Our findings highlight major contrasts between the current degenerative and an envisioned regenerative Yorkshire food system (Fig 3, Tables 1–3). The current food system is degenerative in the way it reinforces continued ecological degradation, power imbalances, social marginalization, and erosion of human health and wellbeing. Many other food systems in the UK and beyond are facing similar challenges, including the concentration of economic power by a handful of food retail companies, soil and other environmental degradation from farming, and increasing food poverty [47–51]. In contrast, our Three Horizons participants envisioned a much more regenerative future food system. For example, participants expressed desire for greater localization and honoring of regional food identity, greater biological and cultural diversity, equality of food access, agency to produce food regeneratively, and public reconnection to nature and food production that encourages caring attitudes. These are common signatures of regenerative food systems highlighted elsewhere [5] and echoed in other envisioned food systems in the UK [23,48]. Notably prominent in our study, however, is the identification of underlying mindsets and values driving unsustainable behavior and how these would have been remolded in the envisioned future, thus establishing the transformative shift that actions would have to support (Table 3).

Supporting this shift will not be easy and will require considerable effort to cohere and support diverse action, including for the six critical interrelated domains of action identified by diverse experts from across the food system (Fig 3, Table 4). These domains show how a transitional system can begin to disrupt a status quo and create space for more regenerative and radical innovation to emerge. Our work also highlights the importance of cohering and connecting actions to enable synergic effects, whereby the overall impact is greater than the sum of effects of individual parts in accelerating transformation. In this case, for example, various



Fig 4. Diagram showing how five action domains strengthen each other to support food system transformation in Yorkshire. Circles represent the action domains, and squares represent how each action domain strengthens another (their color is matched to the action domain they originate from). Figure originally created in Mural (<https://www.mural.co/>) and rendered by Dave Gledhill of 1790 Creative (<https://autografic.art/>).

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pre-existing local food strategies and action plans in Yorkshire [23–26] provide opportunities to elevate transformational efforts if they can be effectively cohered.

This, in turn, needs more effective coordination across local, regional and national policy that enhances local agency and grassroots change. Examples include policies that fund school meals, deliver more effective farming stewardship schemes, and enable dynamic food procurement platforms to be established. Effective cohering will also require new, transformational, forms of organizing and governance [46,52]; support from developmental, empowering,

Table 4. Domains of action identified by Three Horizons participants as necessary for supporting transformation towards a regenerative food system in Yorkshire.

Action domain	Key actions	Why transformative?
1. Enhance supply chain connectivity and innovation	- Reconfigure supply chains to support more direct sales, local and seasonal sourcing, and redirect surplus or waste food to those in need - Strengthen sharing networks (e.g. of farmers to share best practice and resources) - Introduce fairer supply chain arrangements for small supplier organizations, such as dynamic food procurement platforms for public sector institutions	- Encourages higher diversity of organizations and more distributed power in the food system, disrupting the dominance of several big players - Encourages culture of networking and cooperative working - Supports actors (e.g. hybrid businesses) led more by values of human and environmental wellbeing than by price, efficiency and convenience - Helps to change the identity of convenient food to fresh local unprocessed food rather than ultra-processed and fast food
2. Scale environmentally beneficial farming	- Institutionalize long-term, evidence-based commitments to scaling environmentally beneficial farming via city, regional-scale and national-scale policy - Improve the farmer-policy maker relationship via constructive dialogue - Get big players (e.g. large-scale food producers) on board for system-wide mainstreaming - Introduce more integrative, holistic education in agricultural colleges that connects food with the wider Earth system - Give greater recognition to regenerative farming systems	- Commits to making regenerative and other environmentally restorative farming systems (and the mindsets associated with them) truly mainstream rather than remaining as small-scale, isolated innovation - Supports value shifts towards high (biological, agricultural and biocultural) diversity, rewards for good practice, farming that focuses on livelihoods and resilience, and more holistic policy - Would kickstart regeneration of environmental health, including increasing biodiversity, capturing carbon, and improving soil and water quality, which in turn bring benefits for human health and wellbeing
3. Empower food citizens to reshape demand	- Inspire the public to lead a culture change in consumption, shifting emphasis to local, seasonal and zero-waste - Improve the food literacy of school staff, students and families - Use urban space for food-growing and twinning urban and rural farms to establish community links - Food retailers should support food waste reduction, e.g. by removing 'use by' date labeling and selling loose unpackaged fruit and veg (including 'wonky' produce) - Ensure accessibility and clear visibility (e.g. via labeling) of regeneratively produced food	- Works to develop a population of empowered and knowledgeable food citizens to whom a transformation to regenerative food systems becomes a meaningful and desirable change - Taps into the deep social, cultural and environmental connections between people and food, moving away from seeing food mainly in utilitarian terms - Helps the public to understand and appreciate constraints but also opportunities of new realities of food choice relating to seasonality, more local sourcing, etc.
4. Provide trusted knowledge support for standards and incentives	- Provide trusted and accessible knowledge support, including transparent data, rigorous scientific evidence, and data-sharing networks, to food system actors transforming their practice, such as farmers shifting to regenerative agriculture or hybrid businesses, as well as policymakers - Standardize indicators and tools to facilitate comparison and communication of data from different areas and scales	- Approaches knowledge as transparent, dynamic and empowering, rather than gained and hoarded in more extractive, opaque and inaccessible ways that serve vested interests of the status quo - Supports value shifts towards networking and sharing, and public awareness of the food system - Supports rapid feedback and learning for agile adaptation to food system conditions
5. Support schools and young people as drivers of long-term change	- Encourage whole school approaches to food (embracing food's educational as well as nutritional value) - Involve students and parents/carers in school food decision-making, including menu co-design - Embed new approaches in mandatory school food standards and via food award schemes - Support accessibility of tasty, healthy food for all via free school meal auto-enrolment - Change schools' contracting and procurement practices to address, for example, barriers to local farmers more directly supplying schools	- Supports transformation as a sustained, long-term change that gets to the heart of how we learn to relate to food, nature, society and culture - Builds up knowledge and skills in younger generations who will carry the makings of a regenerative food system with them well into the future - Supports value shifts towards more holistic perspectives of food, high awareness of the food system, and universal accessibility rather than exclusivity of healthy, sustainable food - Uses the prominent role of schools in the overall food system (e.g. their substantial throughput of food and universality of provision) to have a major impact in dietary change, improving food equality and waste reduction
6. Cohere, integrate, cooperate	- Ensure all the action domains are working in tandem towards a shared goal - Identify what each action domain can offer to the others to enhance their transformative potential	- Amplifies the impact of individual actors - Makes transformative action more efficient (e.g. avoiding duplication) - Helps actors to understand transformation in a more systemic way

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complexity-aware and transformation-focused modes of evaluation [53]; and transdisciplinary, action-oriented research [46,54].

A good starting point for effective cohering has been the establishment of a new high-profile commission—the FixOurFood Commission [55]—to help drive transformation. The Commission was established as a direct result of this research and involves influential food system actors tasked with building momentum for large-scale food system change in Yorkshire. The six action domains provide a strategic focus for the Commission's work. A second outcome from our research, driven particularly by action domains 2 and 4, has been the installation of a co-designed regenerative farming trial and demonstration platform at the University of Leeds farm, with involvement of a large network of stakeholders, to provide data and evidence informing how to transition to a regenerative farming system [56]. Our work should also directly inform: the ongoing development of regional-scale food strategies, e.g. by North Yorkshire Council [57]; investment priorities of Yorkshire's mayoral combined authorities (MCAs), including the newly created York and North Yorkshire MCA; and the research priorities of the FixOurFood program more generally [21] as it enters its final year.

Our study sets an ambitious standard for co-developing action priorities to encourage regenerative futures. We suspect that transforming food systems elsewhere in the UK will require a similar combination of producer-led, consumer-led, top-down and bottom-up change, building on pre-existing momentum, and cohering, integration and cooperation, to that highlighted by our study. Moreover, the recent disruption to international food supply chains from climate change [58] and geopolitical crises such as the Russo-Ukrainian War [59] will surely focus attention across the wider UK on efforts for greater food self-sufficiency (the UK currently imports around half of its food [60]), which arose as a key topic in our Yorkshire-focused work.

There were, however, two important limitations of our work that will require further effort and work. First, some of our work struggled to establish a truly radical vision. An ambitious vision is important to guide transformation, help actors reframe a sense of what is possible, and ensure that efforts at change address the underlying worldviews, assumptions and mindsets that hold a current system in place [31]. Establishing genuinely ambitious visions is, however, harder than one might think given that people struggle to imagine something they have not yet experienced [61]. Our vision, for example, could be critiqued for still viewing the environment in utilitarian terms; not sufficiently envisioning a future beyond a growth-focused capitalist mindset [62]; or for having limited vision of how inequalities might have been tackled. Use of visioning tools like the Regenerative Lens (which aims to encourage ambition and alignment to regenerative system concepts in futures practice) [13] or Seeds of Good Anthropocenes (which aims to create optimistic, realistic visions of the future based on identifying and growing 'seeds' of pre-existing exemplars of innovative ways of thinking and living) [60], as well as research to support imagination (e.g. Joseph Rowntree Foundation's Emerging Futures [63]) will therefore be important for any transformational initiative going forwards.

Second, significant efforts were made in our work to honor diverse views and include diverse goals and values, and identify systemic action. Yet the process we undertook did not provide the time and space for detailed work that would be needed to creatively address some of the key dilemmas and tensions involved. This included three key aspects: power, innovation, and trade-offs of farming practices and different diets. Clearly, there are dilemmas around the 'power' embedded in the Yorkshire food system, like that held by a handful of large enterprises, such as supermarkets that hold many elements of the current system in place. While the dominance of supermarkets helps to support distribution of food to a large population at low cost due to economies of scale, it can constrain transformation. Our Three Horizons findings also revealed a tension between more bottom-up forms of innovation and change and notions

of disrupting monopolies in the food system (e.g. in action domain 1, ‘Enhance supply chain connectivity and innovation’), and the desire to ‘get big players on board’ for more system-wide impact (e.g. in action domain 2, ‘Scale environmentally beneficial farming’). The trade-offs of different farming practices and different diets must also be further explored to fully understand their impacts on wider ecosystem services. For example, the meat and dairy industry holds significant social, economic and cultural power [64], yet much of its conventional practice will also need to be challenged and downscaled or modified if society is to move towards genuinely regenerative futures [65–67]. The issue is also not straightforward: while there is a growing social movement to reduce meat consumption, integrating livestock is one of the main principles of the regenerative agriculture movement, with farmyard manures key to adding carbon back into the soil and thus helping to restore soil health [17,18,68], and claims that livestock in some regenerative farming systems are carbon-negative [68]. However, livestock are also major contributors to methane emissions [69] and can cause water quality decline [70]. These issues have created tensions between regenerative farmers and the vegan movement, for instance [71]. Thus, while our work began to open up discussion about some of these issues, and set an ambitious overarching direction that had high levels of consensus, much more extensive effort will be needed to find creative ways of working with dilemmas and power imbalances.

Reflecting on our Three Horizons process in light of other applications of this framework, what stands out is our unusually extensive, iterative, multi-step and multi-actor application that integrated results from across multiple food subsystems and considered how action could be systemically cohered. Our approach aligns with recommendations for more second-order, adaptive and reflexive approaches in co-creative research and transformation contexts [72–74], as well as incorporating diverse forms of knowledge in food system transformation research [54,75].

From this approach, we learnt a number of lessons as facilitators. Firstly, the process required high levels of coordination, as well as considerable commitment of time and effort from participants. We found that online platforms, notably Mural (<https://www.mural.co/>)—although many other similar platforms exist—were helpful for collaboratively engaging with large groups of people (e.g. populating Three Horizons maps), especially given the shift to online workshops during the COVID-19 pandemic. However, it was not always easy for participants who were unfamiliar with online meeting forums and collaborative platforms, and poor internet connections particularly for those joining from rural locations impacted their ability to contribute and follow the workshops. Secondly, the process reinforced to us that Three Horizons is an orienting tool: whilst it provides many opportunities for detailed analysis, what participants valued most was that it helped them to work through complexity and distill information down to core messages and narratives. Since applying Three Horizons in this way, we have focused on how food system actors can reinforce one another in service of more regenerative dynamics. While it was outside the scope of our project, there are ways of practicing Three Horizons that focus more on specific, named actors (e.g. organizations, businesses and initiatives) and thus enable even more action-oriented use of the Three Horizons results (e.g. in ‘ambition loops’ to cohere reinforcing action between government policy, business, and civil society [76]) and encourage more direct commitments to action from participants. Nonetheless, our results still provide useful overarching themes, and are being used to strategically orient the work of organizations such as the FixOurFood Commission.

In conclusion, supporting transformation at scale requires cohering and connecting many different disruptive and innovative forms of action while maintaining transformational intent. In this case, six important action domains were identified, focused on supply chains, scaling regenerative farming, empowering consumers, providing open and accessible knowledge,

working with schools and early years settings, and cohering action. Clearly, transformation will require much concerted effort. Yet, through more effective cohering and connecting across different scales, continuing to help reshape the sense of what is possible, and actively attending to power imbalances, the possibility for transformation becomes more tenable. This can be further enhanced with support from transdisciplinary, action-oriented, second-order modes of research to understand how power imbalances might be more effectively navigated, how new ways of organizing and governing can be developed, and how more developmental approaches to evaluation can support and help to drive transformational change.

Materials and methods

Overview

This research aimed to identify and co-create core activities that would begin to support transformation towards a regenerative food system in Yorkshire. It involved working with diverse actors and researchers through a deliberative and adaptive process specifically designed to examine how systemic change can be supported. The methods explain how the research was framed and its approach to knowledge and knowing, followed by the specific methods used. An overview of the process is provided in Fig 5.

Ontological framing

How an issue is framed greatly influences the way research is conducted, including the kind of questions asked and methods [77]. Being explicit about ontological positions—how ‘reality’ is understood—is therefore critical for guiding transdisciplinary research [78]. Our work was carefully framed by four core ontological positions (Table 5).

Food system: Food-related activity was viewed as a complex system, with diverse and dynamic interactions occurring between different system components, including all elements and activities relating to the production, processing, distribution, access, preparation, preservation, consumption, disposal and recycling of food [21,79,80], as well as more broadly between behaviors, technologies, economies, politics, health, environment and society [21,80,81], and the assumptions and worldviews shaping the food system [80].

Transformation: To overcome the many challenges and impacts, many have advocated the need for transformation of food systems [1–4]. We viewed transformation as a process of major, fundamental change, qualitatively distinct to other kinds of change, such as marginal and incremental change, or adjustments or reforms which tend to focus on ‘change to keep things the same’ [22]. Transformations go beyond changing technologies, policies and behaviors within systems to also changing structures, power relations, beliefs, values, paradigms and worldviews [7–9]. As such, to support transformation a different strategic approach is required compared to supporting other kinds of change [22].

Regenerative food systems: Supporting transformation requires clarity about what the transformation is meant to achieve [82]. In this research, the transformational goal was broadly to shift the food system towards one that would be regenerative. We considered such systems to maintain positive reinforcing cycles of wellbeing within and beyond themselves, including between humans and wider nature [13], such that ‘life creates conditions conducive to life’ [14]. Importantly, being regenerative is about going well beyond reducing the harm caused by human activity to acceptable levels [16,83], with a new set of underlying dynamics that result in ‘more good’ rather than simply ‘less bad’, and transformational worldviews and relations of ecological interdependence and mutualism [5,12,13,15,16]. Regenerative food systems apply these ideas to food-related activity, including food production and use, food waste, entrepreneurship, finance, governance, livelihoods, education, and technology [5]. They commonly

Research aim: how can transformation to a regenerative food system be supported in Yorkshire?

Main questions: 1) What are the challenges in the current Yorkshire food system that make it degenerative and inhibit transformation to a regenerative system?
2) What would a future regenerative Yorkshire food system look and feel like?
3) What current and needed innovations could support transformation to the desired future?

Methods: Three Horizons (3H) workshops and surveys; other workshops; inductive thematic analysis

Headline stats: 14 months of data collection from Oct 2021 to Dec 2022; 29 FixOurFood researchers involved; 85 wider stakeholders engaged (45 in workshops); 15 workshops (45.25 hours total); c. 1400 initial individual ideas generated, ultimately coded to 19 themes (7 for H1, 7 for H3, 5 for H2)

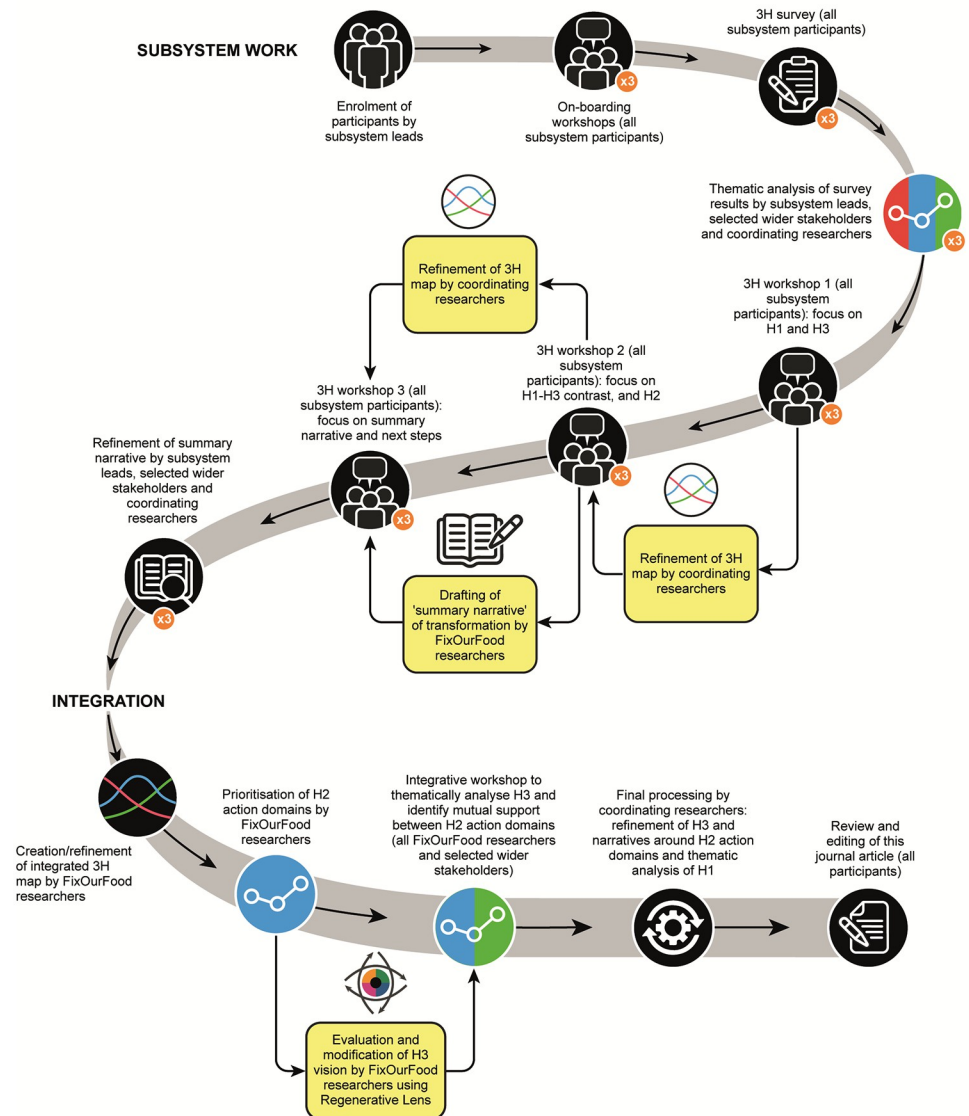


Fig 5. Process diagram for the research underpinning this study. 'Subsystem leads' are FixOurFood researchers coordinating subsystem participants and processes. 'Wider stakeholders' are experts working or studying in their subsystem in the Yorkshire food system who are not FixOurFood-employed researchers. 'Coordinating researchers' are FixOurFood researchers coordinating the entire Three Horizons process. Initial stages worked with FixOurFood researchers and wider stakeholders from three different subsystems of the Yorkshire food system: 1) agriculture, 2) schools and early years settings, and 3) food economies. Findings from these three subsystems were then integrated through further analysis and workshops. Figure originally created in Mural (<https://www.mural.co/>) and rendered by Dave Gledhill of 1790 Creative (<https://autografic.art/>).

<https://doi.org/10.1371/journal.pstr.0000134.g005>

Table 5. The core ontological positions used to frame the research.

Ontological position	Explanation
Food systems	Food-related activity viewed as a complex system, with diverse and dynamic interactions occurring between different system components [21,79–81].
Transformation	Transformation understood as a major, fundamental change qualitatively distinct from relatively marginal or incremental adjustments or reforms [22], which changes a system's underlying structures, power relations, beliefs, values, paradigms and worldviews [7–9].
Regenerative food systems	- Transformation envisaged as being towards a 'regenerative food system'. - Future food system envisioned as a regenerative system—one that maintains reinforcing cycles of wellbeing within and beyond itself, including between humans and wider nature [13], such that 'life creates conditions conducive to life' [14]. - Regenerative food systems seen as encompassing more than just regenerative agriculture, and underpinned by worldviews and relations of ecological interdependence and mutualism rather than dualism and anthropocentrism [5,12,13,15,16].
System transition as Three Horizons	- This is the framing used to explain how an idealized, and deliberately stewarded, systemic change comes about [31]. - The present system is viewed as the first horizon, and the desired future(s) as a more distant third horizon that emerges from strategic action in a second transitional horizon in the medium term [31]. - In the second horizon, an explicit distinction is made between transformative innovations/activities and innovations/activities that are captured by the first horizon to extend its lifespan [31].

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emphasize the importance of re-localizing foodsheds, celebrating the uniqueness of places and regions, food sovereignty, regenerative and agroecological forms of farming, and elevating Indigenous knowledge [5,84]. Framing the future, transformed system, as being a regenerative one provides a powerful concept, aiming to drive ambition, imagination and transformation. We worked with this regenerative framing whilst allowing participants to co-create their own interpretation of what a future regenerative Yorkshire food system would look like.

System transition: Transformation also requires an explicit framing of how transformation is expected to come about. For this, we used the Three Horizons (3H) ontological framework of system transition [46] (Fig 2). This framework has been used to collaboratively explore alternative futures [31,85–89]. It views a transformed future as arising through an interplay of three horizons: the present first horizon that is declining as conditions around it change and it becomes increasingly less fit for purpose (H1); and a desired future third horizon (H3) that emerges from strategic action in a second transitional horizon (H2) in the medium term [31] (Fig 2). This framing helps focus explorations on how transformative innovations and activities ('H2+') can creatively disrupt H1, creating space for H3 to emerge, and on how to avoid reformist or conformist activities ('H2-') that extend the lifespan of H1 [31].

Together, the combination of explicit framings of a *food system*, that requires *transformation*, towards one that is *regenerative* and through a process of *system transition* provided a powerful ontological framework to examine how transformation can be supported.

Epistemology

Epistemological positions—how 'knowledge' and 'knowing' are understood—have a major bearing on the kinds of research methods applied, and thus the nature and form of the knowledge produced. In this research an iterative, action-oriented, and co-creative second-order

Table 6. Core philosophical and epistemological positions shaping the research approach and methods.

Philosophical or epistemological position	Explanation
Second-order science	Investigators viewed themselves as part of, and acting from within, the system they seek to understand and intervene in [73,90,91].
Eliciting multiple forms of knowledge	Three different forms of knowledge elicited: 1. evidence and experience from the past and present to understand challenges in the present; 2. normative imaginations about what kind of future system is desired; 3. creative ideation about how action can strategically support transformation [31,90].
Co-creation	Collective and engaged processes where sharing, reflection and learning could occur through an interactive process of dialogue and sense-making. This is in contrast to a more static and extractive process of data collection and analysis.
Adaptation & reflexivity	The research process adapts the method as new opportunities and insights emerge and as it receives feedback from participants [74]. This enhances possibilities for more creative outcomes and overcomes the limits of an assumption that a process for research can always be effectively predetermined [74].

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approach was applied (Table 6). This was deemed to be important for examining action needed to support large-scale food system transformation, where uncertainty and complexity prevail, there are multiple perspectives and ways the food system is being experienced, yet where information is needed to support urgent action and change.

Philosophically, second-order research is where investigators view themselves as part of, and acting from within, the system they seek to understand and intervene in. This is in contrast to a first-order approach, where researchers assume they can objectively stand from the outside, looking in [73,90,91]. Taking a second-order approach requires researchers and other investigators and actors to continually and critically reflect on how their personal involvement within the system influences observation and interpretation. It also widens scope for inclusion of much more diverse ways of knowing, recognizing in our case the value and importance of expertise and prospective, iterative and generative approaches where multiple actors can collectively explore future, envisioned food systems and co-create ideas about how systemic change might be achieved [31,74,90].

Epistemologically, three forms of knowledge and knowing were collected in the research: (1) experiential knowledge and evidence from the past and present about the challenges in the present (relating to H1); (2) normative imaginations about what kind of future system is desired (H3); and (3) creative ideation about how action can strategically support transformation [31,90] (H2). The first form represents the kinds of ‘truth’ we are more familiar with: truths based on evidence of what currently exists and has existed. The second is a different kind of truth that is often more prospective and subjective, but which is nonetheless a truth about what one desires to see in the world. The third is a more creative kind of knowledge, developed in many different ways but which focuses on bringing something tangible into being (in this case an idea about action). Our approach therefore went beyond the limits of traditional research that can be overly focused on provision of ‘evidence’ from the present or the past. Over-reliance on such knowledge can be like driving forward while looking through a rearview mirror [92]. To support transformation, other prospective, normative and creative forms of knowledge are also required [90].

The research was also co-creative. That is, it included involvement of many different actors in a structured process of dialogue. By working together, and by building on findings produced in different stages and workshops, individual and collective sense-making could be

enhanced, allowing effective strategic ideation to emerge [90]. This was in contrast to applying more static extractive processes that typically emerge from first-order scientific approaches [73] where much of the interpretation is conducted by external researchers. This limits opportunities for collective learning and sense-making needed for working with complex phenomena and where no single person will have a full understanding of the system being explored.

The co-creation was then supported by an adaptive method to the research [74] which allowed for a more iterative, reflexive and flexible approach that could respond to what was being discovered. At times, this allowed for the path of research to be altered to enhance its creative potential [74]. It also allowed the exploration and continued improvement of the process in response to feedback from the participants. While the overall structure of the process was predetermined and maintained, many specific steps were designed based on the results of previous steps. Examples of adaptation to the research process included introducing more narrative-based approaches to illustrate the system while phasing out use of complex system diagrams in workshops, and developing and applying a new Regenerative Lens [13] to help support the envisioning of an ambitious third horizon system.

Overall, the epistemological approach shaped the development and implementation of the methods, including design of workshops, how dialogue was convened, the questions used to stimulate ideation, the sequencing of different tasks, and analysis and interpretation.

Method

Overview

The research included an extensive process of eliciting knowledge, ideas and insights from a diverse range of experts across the food system using surveys and workshops. It included data collection over 14 months (October 2021 to December 2022), from a total of 114 researchers and food system experts. A total of 45.25 hours of workshops were conducted with around 1400 initial ideas generated (Fig 5).

Data collection was structured using the 3H process, focusing on understanding challenges in the present system, establishing future visions, and identifying activities needed to support system change. The process helped participants work with complexity and uncertainty, enabling them to constructively share their different perspectives [31,90].

The work included two main phases: (1) Exploring transformation using a series of surveys and workshops in each of three separate subsystems of the Yorkshire food system; and (2) integrating findings from the different subsystems (Fig 5).

The three subsystems included: agriculture (the subsystem most focused on 'production'); schools and early years (the 'consumption'-focused subsystem, hereafter abbreviated to 'schools'); and food economies (the 'distribution' subsystem). Together, while clearly not capturing every aspect, the three subsystems provided a holistic understanding of the food system, spanning production to consumption.

Activities of the three subsystems were coordinated by six FixOurFood researchers (the 'coordinating researchers'). These included professional facilitators, who designed and led surveys and workshops, and facilitated other participants in the process of analysis and interpretation.

Ethical approval for the research was granted by the University of York's Department of Environment and Geography Ethical Review Committee. Formal written consent was obtained from participants before they took part in the research.

Participants

The expert participants included a total of 85 wider stakeholders and 29 researchers, whose knowledge, ideas, and insights were elicited through surveys and workshops. This included, in

each subsystem, two to four FixOurFood researcher ‘subsystem leads’ who had enrolled a long-list of 20–30 ‘wider stakeholders’ who were experts working in, or studying, their Yorkshire subsystem. These wider stakeholders represented a broad range of organizations and different areas in Yorkshire (S1 Table), and had an in-depth understanding of diverse issues and experience of working with marginalized people. The researchers (e.g. subsystem leads), who also acted as participants, brought additional expertise relating to different aspects of the food system. All participants were tasked not just with providing their own perspective, but also with bringing in many other voices absent from the room.

Diverse participants—traditional researchers and wider stakeholders—were also involved in both the primary workshops to elicit ideas as well as in post-workshop meetings to interpret findings. As such, while there were distinct facilitators and overall process leads who managed and supported the research process (i.e. the coordinating researchers) who did not act as ‘participants’, there were also both ‘researchers’ and ‘stakeholders’ who acted as participants. Both of these participant researchers and wider stakeholders were equally considered to be ‘stakeholders’ and as having important expertise relevant to understanding transformation. Both kinds of participants provided essential understanding of nuances and interconnections of the food system in the process of analysis and interpretation.

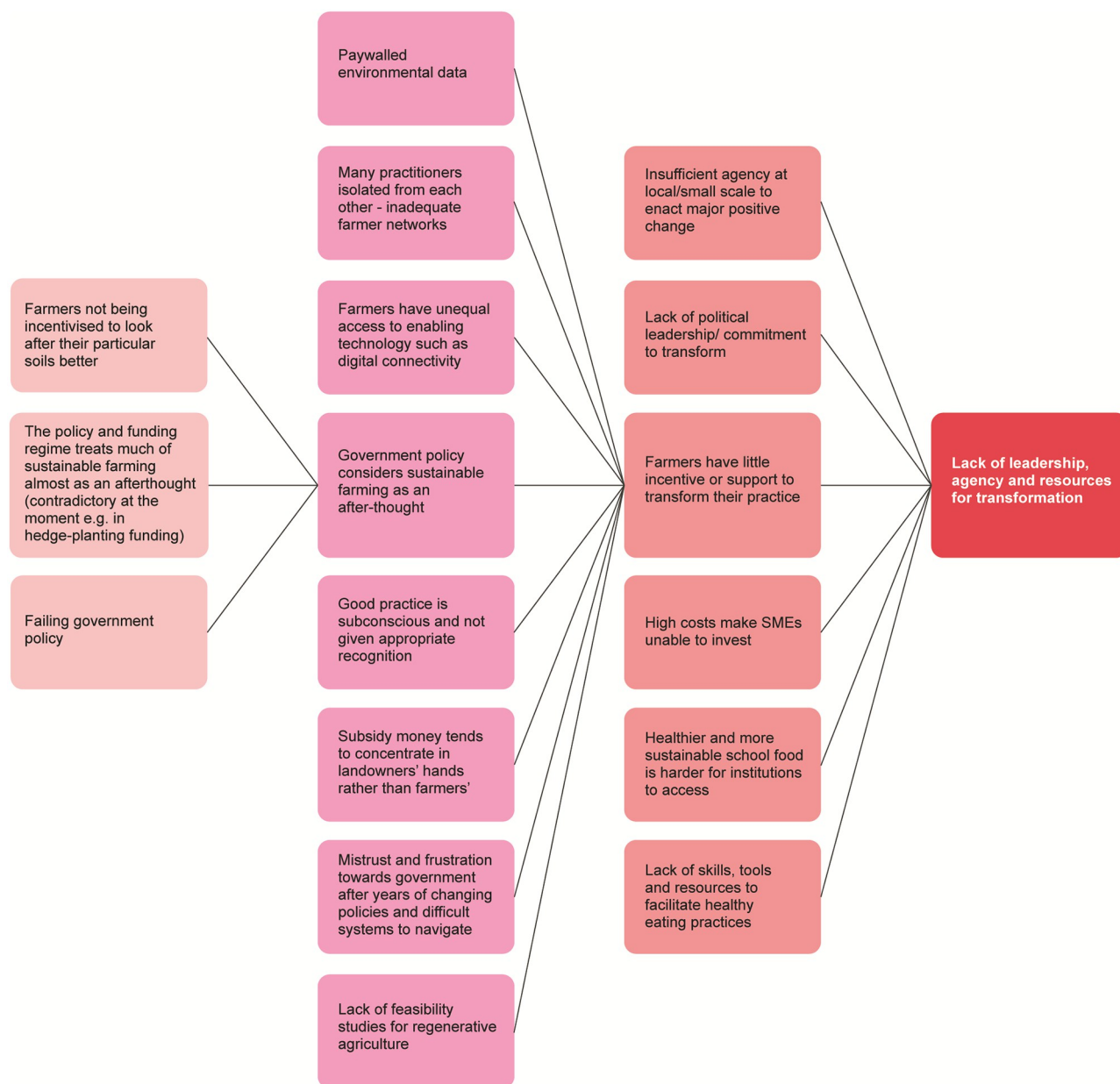
Phase 1: Work in individual subsystems

For each subsystem, a survey and three to four online workshops were held with participants on Zoom, each about a month apart. After an initial on-boarding workshop to introduce participants to each other, discuss the research context, and explain how the process would unfold, participants were sent a survey. This focused on the broad questions about challenges, envisioned systems and activities to support transformation, tailored to each subsystem, with open-ended answers. Survey responses were broken down into distinct points and transferred to post-it notes on the collaborative online whiteboard application Mural (<https://www.mural.co/>), keeping responses separate by subsystem. Post-its were inductively open-coded [93,94], and similar responses grouped (Fig 6). The initial themes were inductively coded to higher-level themes (Fig 6) and added to 3H maps on Mural. This work was facilitated by the overall process leads, with subsystem leads and selected wider stakeholders participating.

The three main workshops conducted for each subsystem involved:

- Workshop 1: This introduced and refined the 3H maps resulting from the survey responses, focusing on identifying challenges (H1) and elements in the envisioned systems (H3).
- Workshop 2 focused on understanding the contrast between the present and envisioned future, and identifying the H2+ actions needed to support the transformation. Between workshops 2 and 3, the subsystem leads and process leads drafted a ‘summary narrative’ of transformation: a brief bullet-point prose summary of H1, H2 and H3.
- Workshop 3 refined the summary narrative and identified ideas for next steps.
- In addition to these workshops, a separate in-person 3H workshop was held with secondary school pupils enrolled on FixOurFood’s Leaders for Change program. These are pupils from schools around Yorkshire, whose voices are integral to driving food transformation within their schools and communities, and for priority-setting around school food within FixOurFood.

Reports for each subsystem, including details of participants, questions, framings and results were created [95–97].



Raw survey responses

First-level themes

Second-level themes

Third-level themes

Fig 6. Example of the thematic coding process (Horizon 1). Raw survey responses were inductively grouped into first-level themes—i.e. each first-level theme is underpinned by one or more raw survey response (one example of this hierarchy, 'Government policy considers sustainable farming as an afterthought', is shown, and contains three raw survey responses). First-level themes were then inductively grouped into second-level themes—i.e. each second-level theme is underpinned by one or more first-level themes (one example of this hierarchy, 'Government policy considers sustainable farming as an afterthought', is shown). Figure originally created in Mural (<https://www.mural.co/>) and rendered by Dave Gledhill of 1790 Creative (<https://autografic.art/>).

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Phase 2: Integrating results from different subsystems

Coordinating researchers created an integrated 3H map based on results from all subsystem workshops. The language and content of horizon themes were refined and sense-checked in an online workshop with the wider FixOurFood research team. An online workshop was then held with FixOurFood researchers to critically evaluate and push the ambition of the integrated H3 vision using a 'Regenerative Lens' [13] of key qualities associated with regenerative systems. This resulted in several modifications to the original H3 themes and some new themes added.

In a further online workshop, the main H2 themes were inductively clustered into five overarching priority action domains by FixOurFood researchers, with critical reflection on their potential for supporting systemic change and in relation to where there was considered to be an existing momentum for change. The clustering process brought together themes that supported or reinforced other themes, not just on whether they were similar in their content.

An in-person, two-day professionally facilitated workshop, attended by FixOurFood researchers and wider stakeholders, was then held. Here the five action domains were presented and participants explored: a) why each domain was considered to have transformative potential, and b) what enabling conditions were needed around each area to support them. H3 themes (based on results of applying the Regenerative Lens) were also inductively clustered into six 'meta-themes', with clustering being based on which theme supported or reinforced another. H1 was also inductively grouped into seven meta-themes of similar content (Fig 6). The narratives around the five H2 action domains were refined based on Otter.ai-transcribed audio transcripts of workshop discussions.

To deepen understanding about how the five action domains would work together in a mutualistic way, participants were led through an 'offers and requests' exercise during the two-day workshop. Participants were divided into five teams, one per action domain. Each team identified what its associated action domain could offer, and would require from, the four other domains to support transformation. The offers are reported in this paper (Fig 4). The mutualistic support between the action domains was subsequently treated as its own, sixth, action domain.

Although the process of 'distilling' information throughout the subsystem and integration work inevitably lost some nuance, 3H aims to cohere and distill complexity into something meaningful and motivating that broadly guides action and stimulates critical reflexivity, rather than capture every detail, which would quickly become overwhelming [31,90]. Throughout the 3H process, if tensions or contradictions arose between participants' offerings, these were noted by the facilitators and retained in the final results if there was no objection from participants, rather than fully resolved.

Final authorship of the co-created research

FixOurFood researchers and wider stakeholders contributed to final refinement and sense-checking of the results in drafts of this article. As with other co-created research, it can be difficult to discern the origin of ideas or precise input of those involved. Separation between researcher, author, or participant is not so easy to discern and, in such a process of co-creation, all involved have legitimate claims to the production of knowledge. As such, participants were invited, through an opt-in process, to be authors on this manuscript. Author contributions were categorized according to the CrediT terminology [98].

Supporting information

S1 Table. Full list of organizations represented by participants in this research.
(DOCX)

Acknowledgments

We are exceptionally grateful for the input from all of FixOurFood's stakeholders in shaping this work (see [S1 Table](#) for the list of contributing organizations). We wish to dedicate this paper to the memory of the late Professor Steven Banwart, who was pivotal to this work and the wider FixOurFood project. If you found this paper useful at your institution/organization, please let us know, as we are interested in impact beyond academic citations.

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Appendix 2: Translating concepts from the thesis into tools for regenerative practice

The research described in this appendix built on the findings of Chapters 2-4 (and particularly the concepts explored in the Regenerative Lens in Chapter 2) by translating ideas into tools for regenerative practice. It responds to the need identified in Chapter 2 and Appendix 1 for embedding concepts about regeneration more effectively into transformation efforts. It secondarily responds to another limitation identified in Appendix 1, namely the relatively superficial treatment of tensions and dilemmas that arose during the Three Horizons process, which reinforced the importance of tools to navigate dilemmas in creative ways in service of regenerative practice (e.g. see the World Mandala, dilemma navigation, and Wheel of Wisdom tools). The research is written up in the form of an accessible guide, in the style of other guides published by Transforming UK Food Systems, such as Fazey & Colvin (2023). I am the lead author of the guide, with other major contributions from Ioan Fazey, Bill Sharpe and Daniel Wahl. The guide's publication details and author contribution statements are provided in Appendix 4 along with those from the other thesis chapters.

The guide grew out of a series of four in-person workshops and one online workshop between December 2023 and May 2025, hosted by FixOurFood and facilitated jointly by Bill Sharpe, myself, and Ioan Fazey, to design and test tools for regenerative practice, and co-design a possible structure for the tool guide that resulted. A total of 19 participants attended these workshops, including representatives of North Yorkshire Council, the Soil Association, Good Food York Alliance, Joseph Rowntree Foundation, International Futures Forum, H3Uni, and FixOurFood Commission, as well as a regenerative farmer and various students and researchers from the University of York. As well as co-planning and co-facilitating the workshops, I produced several workshop summary reports that were shared with participants. The guide defines 'regenerative practice' as the continuous, iterative journey of design, experimentation, adaptation and learning that is led by the intention of enabling regenerative systems to emerge and flourish at multiple scales, and embodies regenerative qualities and dynamics as well as encouraging them more widely.

The tool guide was seen as a rare opportunity to translate academic work into a more widely accessible and practice-oriented format. Rather than simply presenting frameworks as rote, they are adapted into tools that invite use, experimentation and adaptation in service of

transformation efforts and regenerative practice. Thirty different tools were selected for inclusion in the final tool guide. These included:

- eight entirely or mostly pre-existing tools reframed in the guide's context of supporting regenerative practice (Future Stewards' regenerative video, structures and flows, mutual qualities of life, the regenerative spiral, Three Horizons, the World Mandala, dilemma navigation, and the Wheel of Wisdom);
- nine tools used previously in practice outside of my PhD research, but never previously written up as a formal tool and facilitation guide (come to your senses, poetry as direct experience, unique qualities of life, three stages of change, H2+ criteria, reinforcement clustering, requests and offers, ambition loops, and adaptive waves of resilience);
- four tools based on frameworks from elsewhere in my thesis (regen-degen quadrants and the Regenerative Lens from Chapter 2, twelve principles for transformation-focused evaluation from Chapter 3, and four strands of transformation-focused evaluation from Chapter 4);
- four novel tools based on pre-existing frameworks outside of my PhD research (principles of life, nested systems, bioregional quiz, and regenerative dynamics with the 4 Returns Framework);
- five entirely or mostly novel tools (The Great (Re)Turning, regenerative descriptions, recognising practices of care, compass directions for bioregional mapping, and regenerative actor mapping).

Overall, the tool guide brought together a variety of novel, adapted and pre-existing tools all (re)framed in the context of regenerative practice.

Three overarching purposes of tools for regenerative practice were identified, and used to structure the tools into three sets: 1) framing and sensitising (tools for framing conversations and sensitising participants to ideas about regeneration); 2) pushing the boundaries of our knowledge, ambition and imagination (tools to enhance our regenerative-based wisdom, deepen participants' understanding of regeneration, widen scope and raise ambition of projects, and open up imagination about what is possible); and 3) getting into action (tools to support planning and organising actors and actions for growing new regenerative systems).

The workshop series that underpinned the development of the tool guide identified and explored three key considerations that tools or a tool guide for regenerative practice should take into consideration: 1) a balance between defining 'regenerative' and recognising its highly contextual and multi-dimensional nature; 2) nurturing capacities and motivations for inner regeneration; and 3) taking a mutualistic, reciprocal and synergic approach to action and partnership-building that maintains momentum and self-enrolment for transformation. These considerations loosely shaped and corresponded to the three sets of tools described above, although they were also woven throughout the guide.

Many other important purposes of tools for regenerative practice were identified. Particularly in the first and second tool sets, tools helped people to: conceptualise regenerative dynamics; gain a more embodied and multi-sensory experience of what it feels like to participate in a regenerative system; reconnect to nature and place (particularly bioregions), and gain inspiration from nature; appreciate the regenerative dynamics that are already occurring around them and due to them, and that regeneration is a core pattern of life itself rather than something fundamentally new; push the ambition, imagination and regenerative alignment of our envisioned futures; and focus evaluation practice on supporting transformations towards regenerative futures. Particularly in the second and third tool sets, tools helped people to: creatively and playfully navigate complexity and cross-scalar linkages; re-perceive systems as the mutualistic, reinforcing and synergistic relationships between actors and domains of action; develop an action-oriented view of regenerative systems focused on enrolling actors into 'minimum viable patterns' of regeneration; assess the readiness of systems for regeneration; use tensions and conflicts as creative opportunities for transformation and regeneration; and tap into collective wisdom.

Creating the guide also clarified the nature of tools themselves and the different forms they can take – including framings, visual aids, audio aids, evaluation aids, exercises, contemplations, or more in-depth methods – and raised some broader lessons about the important components and structure of an effective tool guide. These included the importance of: clearly articulating the purpose and contexts of use of each tool; encouraging more experimental, iterative and relational uses of the tools rather than more instrumental or transactional uses; providing ideas about how each tool could be creatively adapted to different contexts; and clearly showing how the different tools relate to, complement and deepen each other, and how they could be combined in different kinds of sessions or workshops, thus strengthening the coherence of the tool guide as a whole.

The draft guide is available as a Google Doc (note that it is still actively undergoing review and editing, potentially including addition of further co-authors): [*Tools for regenerative practice*](#).

Appendix 3: Academic impact and influence on policy and practice

This appendix provides details on the academic impact and influence on policy and practice already achieved by the thesis, examining each thesis chapter and Appendices 1-2 in turn.

A3.1 Chapter 2 paper

Academic impact

- This paper ('The Regenerative Lens: A conceptual framework for regenerative social-ecological systems') provided a number of significant advances. As well as providing the most comprehensive review to date of concepts related to regeneration, the Regenerative Lens framework itself has been appreciated in how it distills important dimensions of regenerative systems (Gorissen et al., 2024; IPBES, 2025). The study was the first to undertake a relatively broad, cross-disciplinary review of regenerative systems literature to explore common themes, and the resulting framework is novel particularly in its broad applicability (with pre-existing frameworks tending to focus on particular fields such as business or economies) as an orienting tool, and its close attention to the outcomes and dynamics of regenerative systems at larger social-ecological scales, which had remained relatively under-theorised. The study was also timely, being published at a time when interest was growing around the world in regenerative concepts. The paper has since become widely cited and recognised as a seminal work in regenerative fields and for transformations research more broadly (IPBES, 2025; Fischer et al., 2024; Gorissen et al., 2024; Gosnell and Gordon, 2025), and has made important contributions to the development of the field both in academia and practice. This status is evidenced in several ways, described below.
- Since the paper's publication in *One Earth* in July 2023, to date the paper has received a substantial number of citations (71 citations listed in Scopus, 142 in Google Scholar), and at least 3200 reads and 800 downloads across the journal website, ScienceDirect and ResearchGate combined (within the top 2% of highest-interest research items of all time on ResearchGate).
- The Regenerative Lens paper was highlighted and explicitly built upon as a "recent advance in cohering this pluralistic field" by Fischer et al. (2024, p. 1) in their recent

perspective paper on regenerative dynamics in the high-impact journal *Nature Sustainability*. I was invited to peer-review the paper. Fischer et al.'s paper and the Regenerative Lens paper helped to inspire the creation of a 'Regenerative social-ecological systems' working group in the newly established Society for Social-Ecological Systems (SocSES) (Neill, 2025).

- I am now regularly invited to peer-review papers about regenerative systems, completing reviews for *One Earth*, *Ambio*, *Environmental Management* and *iScience* (all 2025).
- In August 2023 I was invited by Anu Veijalainen to help establish a new journal focused on regenerative design and development, for which I agreed to play an advisory role.
- I have received personal communication from a number of researchers and practitioners from around the world, including Curtis Ogden (Food Solutions New England), David Wright (Wellbeing and Health Organisation, Australia), J. David Tàbara (Autonomous University of Barcelona) and Sandra Waddock (Boston College), commenting on the paper's usefulness: "It's comprehensive and a really important perspective, one of the more holistic approaches that I have seen." (Sandra Waddock, pers. comm.).
- In September 2024 Day Davis Waterbury, a US-based regenerative practitioner, and his colleague Kaliya Young requested to reproduce a figure from the paper in a publication about the Internet Engineering Task Force as a regenerative organisation.

Influence on policy and practice

- The Regenerative Lens paper has two policy citations. One is a report about regenerative design and development for the Belgian Federal Public Service for Health, Food Chain Safety and Environment, which cites the Regenerative Lens paper multiple times and refers to it as an important overview of the regenerative systems field, and includes an extended quote from the paper in the report's introduction (Gorissen et al., 2024). The other is in Chapter 2 of the IPBES Transformative Change Assessment (Villasante et al., 2025) as one of five selected examples of ecologically-informed approaches.
- In January 2025 I was invited to become a member of Unearthodox's international Advisory Group for its Regenerative Futures project (Unearthodox, 2025a) after the Unearthodox team read the Regenerative Lens paper, including as a juror of applications to Unearthodox's incubation programme for regenerative initiatives, 'Sparks of Regeneration' (Unearthodox, 2025b), and helping to shape the selection criteria.

A3.2 Chapter 3 paper

Academic impact

- This paper ('Twelve principles for transformation-focused evaluation') provided a number of significant advances. To date it is the most comprehensive review of evaluation literature in transformation contexts, and the twelve principles framework that resulted remains the most holistic and multidimensional treatment of transformation-focused evaluation. It was also timely, being published at a time when recognition of the need for transformation-focused evaluation was growing particularly in the evaluation field, and its cohering of much disparate literature has been appreciated. The paper has been recognised as a seminal work in the evaluation field – see for example the praise of this work by the influential evaluator Zenda Ofir in her popular blog series *Evaluation and Transformation* (Ofir and Buckton, 2025) and the paper's peer-reviewers (see below), and its prominence in other review work (Colvin et al., 2024) – and appears (inadvertently) to have helped to coin a new term and possibly a new nascent field ('transformation-focused evaluation'), with evaluators such as Zenda Ofir and John Colvin picking up and using this term (Colvin et al., 2024), and its use as a whole theme of the TCX-York Conference in June 2025, for instance (Transformations Community, 2024).
- The paper received two highly positive peer reviews, with optional minor revisions suggested. One of the anonymous reviewers commented: "Many books and articles deal with many of the principles identified, but this article is the first to provide an overview that includes all of these principles. This is a major effort to classify recent literature and it has succeeded. Furthermore, the methods used to distill the twelve principles from the literature are innovative, thorough, rigorous and sound and presented in full. The manuscript is well written and accessible for evaluators and, where applicable, their commissioners. The principles are mainly important for evaluators, but could be applied in other efforts to promote transformational change. As such the article would be highly relevant for other circles as well: policy makers, influencers, politicians, civil society organisations, the green private sector, and so on. I would like to congratulate the authors on this article and express the hope that this work will also lead to practical application in the evaluation community and in the many efforts to support transformational change."

- Since the paper's publication in *PLOS Sustainability and Transformation* in April 2025, to date the paper has received eight citations in Google Scholar (one in Scopus), and at least 4008 reads and 1473 downloads across the journal website and ResearchGate platform combined (within the top 2% of highest-interest research items on ResearchGate for 2025). A preprint of this paper was consistently amongst the top-downloaded papers on the SSRN platform prior to the paper's final publication.
- The twelve principles are already informing the evaluation of the FoodSEqual project at the University of Plymouth and a new research programme proposal currently under review (Clare Pettinger, pers. comm.).
- Working on this paper has been pivotal for my academic career development. It linked me to an international network of influential evaluators, including Zenda Ofir, John Colvin, Glenn Page, Barbara van Mierlo, Kelly Parsons, and Adam Hejnowicz. It led to an invitation from Glenn to apply to become a Fellow for his Collaborative for Bioregional Action Learning & Transformation (COBALT) project (Page, 2022); during the fellowship in 2024, I connected with a new network of regenerative practitioners particularly in the USA, and learnt about bioregioning (knowledge that I have since applied in Appendix 2). This research also led to my nomination as a Friend of the International Evaluation Academy by Zenda Ofir and my subsequent successful application, linking me with a network of evaluators striving to support transformational change across the world.

Influence on policy and practice

- After meeting Fern Wickson at the European Hub of the Transformations Conference 2023 in Prague, I was invited to contribute insights from my evaluation research to Chapter 1 of IPBES' Transformative Change Assessment (IPBES, 2025), submitting a contribution co-authored by Glenn Page and Ioan Fazey that helped to shape the final chapter. I am now a named contributing author of this chapter in the assessment, and also reviewed drafts of the whole assessment.
- In July 2023 I shared learning from this research with Tim Howells (Bradford City Council) and Lisa Dowling (Bradford Institute for Health Research), who requested advice for their development of a new local food strategy for Bradford (City of Bradford Metropolitan District Council, 2023). They subsequently chose a complexity-informed and transformation-focused evaluation framework, ENCOMPASS (Luna Pinzon et al., 2022) (Maria Bryant, pers. comm.).

- In September 2024 I was invited to contribute statements based on Chapter 3 for the International Evaluation Academy's Three Horizons Initiative for Evaluation (3HEi) project/survey to help advance deep thinking about the future of the evaluation field in a time of polycrisis (Sithole, 2025). The findings of this initiative are now guiding the strategy of the Academy.
- In October 2024 I was asked to advise on the evaluation strategy for the Regenerative Investing Academy, a new organisation launched by Tobias Fechner, Jessica Groopman and others for cohering funders of regenerative initiatives (atreyu, 2025), based on their awareness of my work on the paper.
- In December 2024 I shared insights from this research as a representative of FixOurFood at a Chatham House workshop aimed at developing pragmatic approaches for monitoring and evaluating government-led food system transformation. This workshop took place on the heels of COP29, with signatories to the COP28 Emirates Declaration and other food system transformation leaders now needing to integrate agriculture and food systems into their Nationally Determined Contributions and other related climate and biodiversity strategies before the convening of COP30. The workshop brought together experts from international institutions, academia, and civil society to discuss monitoring and evaluation frameworks that can effectively measure progress and impact. The workshop will inform the development of Chatham House's Alliance of Champions for Food Systems Transformation (ACF) project (ACF, 2025).
- The twelve principles framework has been adapted as a tool for regenerative practice (see Appendix 2).

A3.3 Chapter 4 paper

Academic impact

- This paper ('Designing, implementing and embedding transformation-focused evaluation: a framework and insights from a regional food system change initiative') provides both conceptual and methodological advances. The co-designed transformation-focused evaluation and learning system (TFELS) for Food for the Future in North Yorkshire is innovative in its holistic consideration of evaluation as interwoven with the wider governance and work culture of a change initiative, and as a spectrum from more informal to more formal and systematic evaluation – rather than merely an isolated

technical exercise or focusing primarily on measuring and monitoring indicators of change. Most existing evaluation frameworks for food system transformation focus on specific metrics, for instance (Béné et al., 2023; Acs et al., 2025; Fanzo et al., 2021; Hebinck et al., 2021).

- The framework is also innovative as the first (to my knowledge) showing how Three Horizons (Sharpe et al., 2016) could be integrated into a wider evaluation and learning system of an ongoing transformation effort. Whereas most case studies use Three Horizons only as an initial scoping and strategy exercise, the TFELS explores the implications of Three Horizons for choosing what system interventions to resource, shaping a story of change, ensuring fidelity to transformational values and principles, evaluating impact, and overall as a key guide for the TFELS.
- Methodologically, the chapter provides a rare example of collaborative, second-order, action-oriented research that bridges and interweaves approaches of design and evaluation in complementary ways. It is one of very few case studies of applying transformation-focused evaluation to a large-scale system transformation initiative, let alone those that do so in a reflective and transparent way that communicates learning from a co-design process, and the first to apply the twelve principles for transformation-focused evaluation framework described in Chapter 3.
- Aspects of the designed transformation-focused evaluation and learning system have been adapted as a tool for regenerative practice (see Appendix 2).

A3.4 Appendix 1 paper

Academic impact

- This study ('Transformative action towards regenerative food systems: A large-scale case study') made a significant advance by setting an ambitious standard for co-developing action priorities to encourage regenerative futures, with an unusually extensive, iterative, multi-step and multi-actor application of Three Horizons that integrated results from across multiple food subsystems and considered how action could be systemically cohered.
- The findings inspired the creation of the FixOurFood Commission (Stewart, 2024), an organisation of influential food system actors tasked with supporting and cohering large-

scale food system transformation in Yorkshire. The six action domains provide a strategic focus for the Commission's work, including project funding applications.

- The study has also shaped the research priorities of the FixOurFood programme, and in particular helped to inspire the installation of a co-designed regenerative farming trial and demonstration platform at the University of Leeds farm, with involvement of a large network of stakeholders, to provide data and evidence informing how to transition to a regenerative farming system (Faculty of Biological Sciences, 2023; Berthon et al., 2024).
- This study accelerated my understanding of how to facilitate Three Horizons processes: learning that I have subsequently been able to apply as a consultant facilitator. I am now gaining recognition as an expert in Three Horizons and food system transformation, receiving invitations to review journal articles on these topics for *Global Environmental Change* (2024) and *Philosophical Transactions of the Royal Society B* (2025). In July 2025 I was invited to submit a chapter about the use of Three Horizons in large-scale system change efforts to a forthcoming Palgrave Macmillan book about Three Horizons (see Appendix 4). The research described in this chapter has thus played an important role in my career development, both academically and more widely.
- Since its publication in *PLOS Sustainability and Transformation* in November 2024, to date the paper has had eight citations listed in Scopus (14 in Google Scholar), and at least 4582 views and 1593 downloads on the journal's website and ResearchGate platform combined (within the top 3% of highest-interest research items on ResearchGate for 2024). A preprint of this paper was consistently amongst the top-downloaded papers on the SSRN platform prior to the paper's final publication.
- In December 2024, the paper was selected to feature in FODDER, the food systems newsletter by TABLE which shares the latest in food system news and research to over 5000 food system professionals (TABLE, 2020).

Influence on policy and practice

- The Three Horizons process described in this chapter inspired Ruth Everson (North Yorkshire Council) to commission a similar process for developing a North Yorkshire food strategy, facilitated by Ioan Fazey and myself, mostly throughout 2023 and 2024 (not part of this PhD research). This has led to the creation of the Food for the Future in North

Yorkshire Framework for Action (Everson et al., 2025 (in press)), currently coordinated by the Council.

- Ruth, Angela Crossland and Jenny Thompson (also from North Yorkshire Council) shared experiences of using Three Horizons in a half-day in-person workshop (facilitated by Ioan Fazey and myself) with the Council's Transformation Team and senior strategy officers to explore how the Council's approach and culture of innovation could be transformed to deliver organisation-wide transformation in a context of Local Government Reorganisation, and respond to the major crises and rapid change facing North Yorkshire. This has since led to a new collaboration between the University of York and the Transformation Team aiming to explore effective transformative approaches for navigating polycrisis.
- Ruth and other officers in the Council, in collaboration with North Yorkshire Sport, are now facilitating their own Three Horizons process for a second project, Moving North Yorkshire, aiming to create a physical activity and movement framework that supports people in North Yorkshire to be stronger for longer in mind and body through movement, play, and sport. I am an advisor for this project. Overall, FixOurFood's Three Horizons process has supported the gradual embedding of this framework and its associated transformation-focused thinking into a large and influential local authority.
- My involvement in this research developed my cross-cutting role within the FixOurFood programme, and I have since been invited to represent the programme in various ways, drawing on the findings of the research to influence policy and practice. In March 2023 I contributed to a policy roundtable discussion on food system transformation for the Labour party's shadow Defra team, including Daniel Zeichner MP, with potential influence of Labour's food strategy in their election manifesto (Labour Party, 2024) (for example, the manifesto contained a target for half of all food purchased across the public sector to be locally produced or certified to higher environmental standards, as well a pledge for an integrated land use framework, all of which resonate strongly with the Three Horizons findings that underpinned FixOurFood's advice). Since December 2024, I have represented FixOurFood in meetings of the newly formed Good Food York Alliance, an organisation evolved from Good Food York and a working group of the York Climate Commission tasked with coordinating food system change in York.

A3.5 Appendix 2 guide

Academic impact

This tool guide ('Tools for regenerative practice: 30 frameworks, exercises and methods for supporting transformations towards futures where people and planet can flourish together') provides a number of important advances. Many of its tools are novel, and it is also the first guide to explain how popular tools such as Three Horizons (Sharpe et al., 2016) can be used in a context of regenerative practice. Other features that make it stand out from other tool guides for regenerative practice (H3Uni, 2020; IFF, 2025; Future Stewards, Leaders' Quest and High-Level Climate Action Champions for UN COP, 2021; Pearson et al., 2018; Broadbent, 2025; Joseph Rowntree Foundation, 2024; Work That Reconnects Network, 2023; Transformative Innovation Policy Consortium, 2022; Bentz and Trajković (Eds), 2025) include its relatively high accessibility (e.g. minimising jargon), the practicality of its facilitation guidance, its strong focus on explaining the purpose of each tool for regenerative practice and the kinds of contexts in which the tools could be used, and its unusual level of clarity in defining regenerative practice itself and situating the tool guide in a wider context of guides and literature related to regenerative practice. Overall, it makes an important advance for the field of regenerative practice by starting to weave together multiple areas that have hitherto had limited integration – including Three Horizons practice and other methods pioneered by H3Uni (H3Uni, 2020), recent conceptual work on regenerative social-ecological systems (see Chapter 2) and transformation-focused evaluation (see Chapters 3 and 5), ideas from regenerative design (Reed, 2007; Wahl, 2016), and ideas about bioregioning – to explain the value they bring for regenerative practice, as well as opening up this field to a wider audience in a way that makes a concerted effort to minimise esotericism whilst preserving the transformational integrity of regenerative practice, which is at high risk of greenwashing (Gordon, Davila and Riedy, 2023; Cole, 2012).

Influence on policy and practice

Some of the facilitation guides in this work have already been used to support a Three Horizons process for the Moving North Yorkshire transformation initiative (see impact of Appendix 1 above).

Appendix 4: Publication and author contribution statements

This appendix lists all publication details and author contribution statements for the papers provided in Chapters 2-5 and Appendix 1, and the guide provided in Appendix 2. In all cases, the CRediT framework (Brand et al., 2015) was used to describe author contributions. Authors were ordered first by the number of distinct contributions in the CRediT framework, and then alphabetically by surname.

A4.1 Chapter 2 paper

Publication details

Permission has been granted by *One Earth* to include this paper in my thesis; the paper has a CC BY licence.

Title of the work (paper/chapter)	The Regenerative Lens: A conceptual framework for regenerative social-ecological systems	
Publication status	Published	x
	Accepted for publication	
	Submitted for publication	
	Unpublished and unsubmitted	

Citation details (if applicable)	Buckton, S. J., Fazey, I., Sharpe, B., Om, E. S., Doherty, B., Ball, P., Denby, K., Bryant, M., Lait, R., Bridle, S., Cain, M., Carmen, E., Collins, L., Nixon, N., Yap, C., Connolly, A., Fletcher, B., Frankowska, A., Gardner, G., James, A., Kendrick, I., Kluczkowski, A., Mair, S., Morris, B. and Sinclair, M. (2023). The Regenerative Lens: A conceptual framework for regenerative social-ecological systems. <i>One Earth</i> , 6(7), 824-842. Available at: doi:10.1016/j.oneear.2023.06.006.

Candidate contributions

Description of the candidate's contribution to the work ¹	Conceptualisation (lead); Methodology (lead); Formal Analysis; Investigation (integrative literature review); Investigation (applying the Regenerative Lens) (lead); Investigation (Three Horizons process) (co-lead); Writing – Original Draft (lead); Writing – Review & Editing (lead); Visualisation; Supervision (equal); Project Administration (lead) (See Appendix 1 for contributions to the Three Horizons process) ● Led the formulation and evolution of the project's overarching research goals and aims.

¹ I had a less refined understanding of the CRediT framework (Brand et al., 2015) at this stage compared to later chapters, which meant that my contribution to Supervision is possibly misleading (although the framework itself is not black and white, and some aspects are relatively open to interpretation). Supervision is described as “Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team” (Brand et al., 2015, p. 153). In my chapters written subsequently, particularly following advice from Jasper Kenter, I have reserved Supervision for my supervisors and mentors, and not myself. So although I did have a degree of oversight and leadership responsibility for the research activity planning and execution for Chapter 3 and other chapters, I would not list Supervision amongst my contributions were I to repeat the study, instead demonstrating my leadership responsibility through my contribution to (for example) Project Administration and Conceptualisation. If I were to repeat the study, I would probably also extend Formal Analysis (‘Application of statistical, mathematical, computational, or other formal techniques to analyse or synthesise study data’) to the application of the Regenerative Lens, rather than only the analysis of literature, and therefore also credit the contributions of Ioan Fazey, Bill Sharpe, Eugyen Suzanne Om, Bob Doherty, and Rebecca Lait to Formal Analysis. Nonetheless, all co-authors were happy with the listed contributions.

	● Led the design of the methodology, including the literature review and workshop applying the Regenerative Lens to Three Horizons material. I was the lead facilitator of this workshop. ● Conducted all of the literature review and all analysis of the literature review findings. ● Wrote the entire original paper draft other than parts of the Introduction, which loan Fazey made substantial contributions to. I therefore estimate that my writing comprises c. 94% of the final paper. I performed c. 75% of all review and editing of paper drafts, with loan Fazey being the other major contributor, and smaller contributions from other authors. ● Designed all original figures, primarily in Mural, before sending these to Dave Gledhill for final rendering and liaising with Dave to review and edit them. ● Had oversight and leadership responsibility for the research activity planning and execution alongside loan Fazey and Bill Sharpe. ● Had the primary management and coordination responsibility for the research activity planning and execution. ● In charge of all communication with journal editors, submitting and resubmitting the paper, responding to reviewers, and reviewing and editing proofs.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	80%
Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	02/07/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

Name of co-author	Ioan Fazey
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Investigation (applying the Regenerative Lens) (supporting); Investigation (Three Horizons process) (co-lead); Writing – Original Draft (Introduction only); Writing – Review & Editing (supporting); Supervision (equal); Project Administration (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Supported Sam in methodological design. ● Attended the workshop applying the Regenerative Lens as a participant. ● Made substantial contributions to the writing of the original draft of the Introduction. ● Contributed to review and editing of paper drafts. ● Had oversight and leadership responsibility for the research activity planning and execution alongside Sam Buckton and Bill Sharpe. ● Supported Sam in the management and coordination of the research activity planning and execution.

	Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	10%
Signature of the co-author	Ioan Fazey
Date (DD/MM/YY)	24/09/25

Name of co-author	Bill Sharpe
Contact details of co-author	International Futures Forum, The Boathouse, Silversands, Hawkcraig Road, Aberdour, Fife KY3 0TZ, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Investigation (applying the Regenerative Lens) (supporting); Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting); Supervision (equal) (See Appendix 1 for contributions to the Three Horizons process) - Supported Sam with the formulation and evolution of the project's overarching research goals and aims. - Supported Sam in methodological design. - Attended the workshop applying the Regenerative Lens as a participant. - Contributed to review and editing of paper drafts.

	● Had oversight of the research activity planning and execution alongside Sam Buckton and Ioan Fazey, including mentorship external to the core team.
Approximate percentage contribution of the co-author to the work	3%
Signature of the co-author	Bill Sharpe
Date (DD/MM/YY)	03/07/25

Name of co-author	Eugyen Suzanne Om
Contact details of co-author	H3Uni, 18 North Street, Glenrothes KY7 5NA, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Investigation (applying the Regenerative Lens) (supporting); Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting) (See Appendix 1 for contributions to the Three Horizons process) ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Attended the workshop applying the Regenerative Lens as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Eugyen Suzanne Om

Date (DD/MM/YY)	15/11/22

Name of co-author	Bob Doherty
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (applying the Regenerative Lens) (supporting); Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) ● Attended the workshop applying the Regenerative Lens as a participant. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Bob Doherty
Date (DD/MM/YY)	19/11/22

Name of co-author	Peter Ball

Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Peter Ball
Date (DD/MM/YY)	07/02/23

Name of co-author	Katherine Denby
Contact details of co-author	Centre for Novel Agricultural Products (CNAP), Department of Biology, University of York, Wentworth Way, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting); Funding Acquisition (equal)

	(See Appendix 1 for contributions to the Three Horizons process) ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Katherine Denby
Date (DD/MM/YY)	25/11/22

Name of co-author	Maria Bryant
Contact details of co-author	Hull York Medical School, University of York, University Road, Heslington, York YO10 5DD, UK Department of Health Sciences, University of York, Seebohm Rowntree Building, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) ● Contributed to review and editing of paper drafts.

	Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Maria Bryant
Date (DD/MM/YY)	01/12/22

Name of co-author	Rebecca Lait
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (applying the Regenerative Lens) (supporting); Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting) (See Appendix 1 for contributions to the Three Horizons process) - Attended the workshop applying the Regenerative Lens as a participant. - Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Rebecca Lait

Date (DD/MM/YY)	21/11/22

Name of co-author	Sarah Bridle
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Sarah Bridle
Date (DD/MM/YY)	09/02/23

Name of co-author	Michelle Cain
Contact details of co-author	Cranfield Environment Centre, School of Water, Energy and Environment, Cranfield University, Cranfield MK43 0AL, UK

Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Funding Acquisition (equal) (See Appendix 1 for contributions to the Three Horizons process) Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Michelle Cain
Date (DD/MM/YY)	04/05/23

Name of co-author	Esther Carmen
Contact details of co-author	Social, Economic and Geographic Sciences, The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, UK
Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting); Writing – Review & Editing (supporting) (See Appendix 1 for contributions to the Three Horizons process) Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%

Signature of the co-author	Esther Carmen
Date (DD/MM/YY)	03/05/23

Name of co-author	Lisa Collins
Contact details of co-author	Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK
Description of the co-author's contribution to the work	Writing – Review & Editing (supporting); Funding Acquisition (equal) ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring the concept of regenerative systems, and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Lisa Collins
Date (DD/MM/YY)	19/04/23

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Approximate percentage contribution of the co-author to the work	<1%
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Date (DD/MM/YY)	22/11/22

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Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Christopher Yap

Date (DD/MM/YY)	29/11/22

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Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting) (See Appendix 1 for contributions to the Three Horizons process)
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Annie Connolly
Date (DD/MM/YY)	04/05/23

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Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting) (See Appendix 1 for contributions to the Three Horizons process)
Approximate percentage contribution of the co-author to the work	<1%

Signature of the co-author	Ben Fletcher
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Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting) (See Appendix 1 for contributions to the Three Horizons process)
Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Date (DD/MM/YY)	19/04/23

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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Simon Mair
Date (DD/MM/YY)	02/12/22

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Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting) (See Appendix 1 for contributions to the Three Horizons process)
Approximate percentage contribution of the co-author to the work	<1%

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Description of the co-author's contribution to the work	Investigation (Three Horizons process) (supporting) (See Appendix 1 for contributions to the Three Horizons process)
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Maddie Sinclair
Date (DD/MM/YY)	30/11/23

Related publications and presentations

The findings of Chapter 2 have been shared in a number of other publications and presentations.

- See Chapters 3-5 and Appendices 1 and 2 for further mentions and use of the Regenerative Lens.
- Material related to this chapter was published in a blog, authored solely by me and published by FixOurFood (Buckton, 2024).

- I am the lead author of an accessible guide in preparation, due to be published by the Transforming UK Food Systems programme in a style similar to Fazey and Colvin (2023), which builds on the material in this chapter (Buckton et al., in prep.) and accompanies the guide in Appendix 2.
- May 2023: poster at Postgraduate Research Conference, Department of Environment and Geography, University of York.
- May 2023: co-facilitated a hybrid workshop with Chris Raymond's research group at the University of Helsinki to share insights and explore collaboration opportunities around regenerative systems and system transformation.
- May 2023: online presentation and panel discussion at the Sustainability Science Days conference in Helsinki.
- July 2023: online presentation and panel discussion for the online component of the Transformations Conference 2023.
- March 2024: invited online presentation to the Complex Systems, Big Data and Informatics Initiative research centre at Lincoln University (New Zealand).
- October 2024: invited talk for Leverhulme Centre for Anthropocene Biodiversity's ABC (Anthropocene Biodiversity Conversations) lunchtime talk series.
- See Appendix 3 for details on further related publications and presentations.

Signed: Sam Buckton

Date: 27/09/25

A4.2 Chapter 3 paper

Publication details

Permission has been granted by *PLOS Sustainability and Transformation* to include this paper in my thesis; the paper has a CC BY licence.

Title of the work	Twelve principles for transformation-focused evaluation	
Publication status	Published	x
	Accepted for publication	
	Submitted for publication	
	Unpublished and unsubmitted	
Citation details (if applicable)	Buckton, S. J., Fazey, I., Ball, P., Ofir, Z., Colvin, J., Darby, M., Hejnowicz, A. P., Leicester, G., Newman, R., Page, G. G., Parsons, K. and van Mierlo, B. (2025). Twelve principles for transformation-focused evaluation. <i>PLOS Sustainability and Transformation</i> , 4, article no: e0000164 [no pagination]. Available at: doi:10.1371/journal.pstr.0000164.	

Candidate contributions

Description of the candidate's contribution to the work	Conceptualisation (lead); Methodology (lead); Investigation; Formal Analysis; Data Curation; Writing – Original Draft; Writing – Review & Editing (lead); Visualisation; Project Administration ● Led the formulation and evolution of the project's overarching research goals and aims. ● Led the design of the review methodology. ● Conducted all of the literature review and led the analysis of the literature review findings, supported by critique from the co-author team. ● Contributed to management activities to clean and maintain research data for initial use and later reuse. ● Wrote the entire original paper draft. I performed c. 80% of all review and editing of paper drafts, with Ioan Fazey and Zenda Ofir being other major contributors, and smaller contributions from other authors. ● Created all figures in Mural. ● Had the primary management and coordination responsibility for the research activity planning and execution. ● In charge of all communication with journal editors, submitting and resubmitting the paper, responding to reviewers, and reviewing and editing proofs.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	90%
Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	03/07/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

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Approximate percentage contribution of the co-author to the work	5%
Signature of the co-author	Ioan Fazey

Date (DD/MM/YY)	24/09/2025

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Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Writing – Review & Editing (supporting); Funding Acquisition ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Supported Sam in methodological design. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal, introduced the notion of exploring transformation-focused evaluation, and supported this research.
Approximate percentage contribution of the co-author to the work	2%
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Date (DD/MM/YY)	26/08/25

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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting); Supervision (supporting) ● Contributed to review and editing of paper drafts, including critique of review findings. ● Had a degree of oversight for the research activity planning and execution as a mentor external to the core team.
Approximate percentage contribution of the co-author to the work	1%
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Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	John Colvin

Date (DD/MM/YY)	07/06/24

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Approximate percentage contribution of the co-author to the work	<1%
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Date (DD/MM/YY)	06/06/24

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Approximate percentage contribution of the co-author to the work	<1%

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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Barbara van Mierlo
Date (DD/MM/YY)	26/02/24

Related publications and presentations

- I contributed sections based on Chapter 3 to three co-authored papers: one by FixOurFood researchers about understanding and applying food systems approaches to improve dietary health (Bryant et al., 2025), and two led by groups of world-leading transformation-focused evaluators, one summarising the results of a panel discussion at the Transformations Conference 2023 (Page et al., 2024), and the other identifying competencies, capacities and capabilities for transformation-focused evaluation (Chaplowe et al., under review).
- Material related to this chapter was published in an invited guest blog for Zenda Ofir's blog series *Evaluation and Transformation*, authored solely by me other than an introduction by Zenda (Ofir and Buckton, 2025).
- May 2024: in-person presentation at Postgraduate Research Conference, Department of Environment and Geography, University of York.
- June 2024: invited online presentations to North Yorkshire Council's Public Health team 'Lunch & Learn' series, and COBALT Fellows (Page, 2022).
- January 2025: poster at the Transforming UK Food Systems Annual Meeting at the University of York.
- March 2025: informally shared insights from this research with delegates at the IDEAS 2025 Conference in Rome.
- June 2025: led a 'practice session' (experiential workshop-like session) at the TCX-York Conference based around the twelve principles. Participants had to find the virtually geocached principles in the app Actionbound along a walking route around the University of York campus, and apply them to a conversation about what a regenerative university might look like. Participants gave positive feedback on the session, commenting that they enjoyed its innovative approach and the 'walk and talk' aspect. The associated bound is publicly and freely accessible (Buckton, 2025).

- See Appendix 3 for details on further related publications and presentations.

Signed: Sam Buckton

Date: 27/09/25

A4.3 Chapter 4 paper

Publication details

Title of the work	Designing, implementing and embedding transformation-focused evaluation: A framework and insights from a regional food system change initiative	
Publication status	Published	
	Accepted for publication	
	Submitted for publication	x
	Unpublished and unsubmitted	
Citation details (if applicable)	Citation details of the draft paper submitted to <i>PLOS Sustainability and Transformation</i> are as follows: Buckton, S. J., Everson, R., Fazey, I., Ball, P., Bridle, S., Crossland, A., Thompson, J., Haslam, P., Hind, T., Mair, S., Reed, A. L., Whittaker, E., Beacroft, L., Beason, R., Cassarly, J., Cordero, J. P., Cousquer, S., Graver, A., Newman, R., Nixon, N., Symonds, S., Edwards, F., Eyre, L., Jackson, D., Lawrence, C., Sumpter, N. and Tyfield, D. (under review) Designing, implementing and embedding transformation-focused evaluation: A framework and insights from a regional food system change initiative. <i>PLOS Sustainability and Transformation</i>. Citation details of the draft paper submitted to the preprint server <i>SSRN</i> are as follows:	

	Buckton, S. J., Everson, R., Fazey, I., Ball, P., Bridle, S., Crossland, A., Thompson, J., Haslam, P., Hind, T., Mair, S., Reed, A. L., Whittaker, E., Beacroft, L., Beason, R., Cassarly, J., Cordero, J. P., Cousquer, S., Graver, A., Newman, R., Nixon, N., Symonds, S., Edwards, F., Eyre, L., Jackson, D., Lawrence, C., Sumpter, N. and Tyfield, D. (2025) Designing, implementing and embedding transformation-focused evaluation: A framework and insights from a regional food system change initiative. <i>SSRN</i>. Available at: doi:10.2139/ssrn.5525038.

Candidate contributions

Description of the candidate's contribution to the work²	Conceptualisation (co-lead); Methodology (co-lead); Investigation; Formal Analysis; Data Curation; Writing – Original Draft; Writing – Review & Editing (lead); Visualisation; Project Administration (lead) ● Co-developed the project's overarching research goals and aims. ● Co-developed the design research methodology. ● Led the contracting of the design process, and planned all evaluation design workshops and the focus group session for the Evaluation and Learning Working Group (ELWG), with support from Ruth Everson. ● Facilitated all of the ELWG evaluation design workshops. ● Carried out creative design work between evaluation design workshops based on participants' feedback during the workshops, and identified and incorporated relevant evaluation frameworks, approaches and methods into the design process.

² These contributions consider the conceptualisation, methodology, and execution of the *research* and *design* process as interwoven (Easterday et al., 2018) rather than treating them as distinct. Hence, members of the Evaluation and Learning Working Group shaped the methodology of this research in its early meetings.

	● Participated in additional meetings with Ruth Everson and Rebecca Newman to discuss progress and plans for the ELWG and the coordination between the ELWG and the wider governance of Food for the Future. ● Co-designed the 14 November 2024 launch event; co-facilitated the event, lead-facilitated the ripple effects mapping session, and synthesised the event's outputs into a report. ● Analysed the ripple effects mapping results, recorded learning points in Mural, and kept a reflexive diary. ● Contributed to management activities to clean and maintain research data for initial use and later reuse. ● Wrote the entire original paper draft. I performed c. 80% of all review and editing of paper drafts, with Ioan Fazey being the other major contributor, and smaller contributions from other co-authors. ● Created all original figures in Mural, other than the Figure 1 North Yorkshire map, which I created in collaboration with Juan Pablo Cordero. ● Had the primary management and coordination responsibility for the research activity planning and execution. ● In charge of all communication with journal editors, and submitting the paper to the journal.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	80%
Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	18/08/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

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Description of the co-author's contribution to the work	Conceptualisation (co-lead); Methodology (co-lead); Investigation; Formal Analysis; Data Curation; Writing – Review & Editing (supporting); Project Administration (supporting) ● Co-developed the project's overarching research goals and aims. ● Co-developed the design research methodology. ● Supported the contracting of the design process, and supported planning of all evaluation design workshops and the focus group session for the ELWG. ● Chaired the ELWG evaluation design workshops. ● Participated in additional meetings with Sam Buckton and Rebecca Newman to discuss progress and plans for the ELWG and the coordination between the ELWG and the wider governance of Food for the Future. ● Co-designed the 14 November 2024 launch event. ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Recorded learning points in Mural. ● Contributed to management activities to clean and maintain research data for initial use and later reuse. ● Contributed to review and editing of paper drafts. ● Shared some management and coordination responsibility for the research activity planning and execution.

Approximate percentage contribution of the co-author to the work	5%
Signature of the co-author	Ruth Everson
Date (DD/MM/YY)	11/08/25

Name of co-author	Ioan Fazey
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Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Investigation; Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Supported Sam with the development of the design research methodology. ● Co-designed and co-facilitated the 14 November 2024 launch event. ● Took part in the ripple effects mapping exercise as a participant. ● Contributed to review and editing of paper drafts. ● Shared oversight and leadership responsibility for the research activity planning and execution. ● Contributed to the original FixOurFood funding application that supported this research.
Approximate percentage contribution of the co-author to the work	4%
Signature of the co-author	Ioan Fazey

Date (DD/MM/YY)	24/09/25

Name of co-author	Peter Ball
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Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Supported Sam with the development of the design research methodology. ● Contributed to review and editing of paper drafts. ● Shared oversight and leadership responsibility for the research activity planning and execution. ● Contributed to the original FixOurFood funding application that supported this research.
Approximate percentage contribution of the co-author to the work	3%
Signature of the co-author	Peter Ball
Date (DD/MM/YY)	27/08/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Supervision; Funding Acquisition ● Supported Sam with the development of the design research methodology. ● Took part in an ELWG workshop as a participant. ● Shared oversight and leadership responsibility for the research activity planning and execution. ● Contributed to the original FixOurFood funding application that supported this research.
Approximate percentage contribution of the co-author to the work	1%
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Date (DD/MM/YY)	05/09/25

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Description of the co-author's contribution to the work	Conceptualisation (co-lead); Methodology (supporting); Investigation; Supervision ● Co-developed the project's overarching research goals and aims. ● Co-designed and co-facilitated the 14 November 2024 launch event. ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Shared oversight and leadership responsibility for the research activity planning and execution.
Approximate percentage contribution of the co-author to the work	1%

Signature of the co-author	Angela Crossland
Date (DD/MM/YY)	30/07/25

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Description of the co-author's contribution to the work	Conceptualisation (co-lead); Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the project's overarching research goals and aims. ● Co-designed the 14 November 2024 launch event. ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	JF Thompson
Date (DD/MM/YY)	05/08/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Paul Haslam
Date (DD/MM/YY)	09/07/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Tom Hind

Date (DD/MM/YY)	11/07/25

Name of co-author	Simon Mair
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Description of the co-author's contribution to the work	Methodology (supporting); Writing – Review & Editing (supporting); Supervision ● Supported Sam with the development of the design research methodology. ● Contributed to review and editing of paper drafts. ● Shared oversight and leadership responsibility for the research activity planning and execution.
Approximate percentage contribution of the co-author to the work	<1%
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Date (DD/MM/YY)	05/08/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology.

	● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
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Date (DD/MM/YY)	28/07/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Eleanor Whittaker
Date (DD/MM/YY)	30/07/25

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Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Leo Beacroft
Date (DD/MM/YY)	08/09/25

Name of co-author	Richard Beason
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Description of the co-author's contribution to the work	Investigation; Writing – Review & Editing (supporting) ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%

Signature of the co-author	Richard Beason
Date (DD/MM/YY)	26/08/25

Name of co-author	Jennifer Cassarly
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Description of the co-author's contribution to the work	Investigation; Writing – Review & Editing (supporting) ● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Jennifer Cassarly
Date (DD/MM/YY)	23/07/25

Name of co-author	Juan Pablo Cordero
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Description of the co-author's contribution to the work	Investigation; Visualisation (supporting) ● Took part in an ELWG workshop as a participant.

	Created the Figure 1 North Yorkshire map in collaboration with Sam.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Juan Pablo Cordero
Date (DD/MM/YY)	31/07/25

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Description of the co-author's contribution to the work	Methodology (supporting); Writing – Review & Editing (supporting) - Supported Sam with the development of the design research methodology. - Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Stefan Cousquer
Date (DD/MM/YY)	17/07/25

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Description of the co-author's contribution to the work	Investigation; Writing – Review & Editing (supporting) ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Alan Graver
Date (DD/MM/YY)	20/07/25

Name of co-author	Rebecca Newman
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Methodology (supporting); Investigation ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant. ● Co-designed and co-facilitated the 14 November 2024 launch event. ● Took part in the ripple effects mapping exercise as a participant.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Rebecca Newman
Date (DD/MM/YY)	27/08/25

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Description of the co-author's contribution to the work	Investigation; Writing – Review & Editing (supporting) ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Nicola Nixon
Date (DD/MM/YY)	11/06/25

Name of co-author	Susan Symonds
Contact details of co-author	Public Health, North Yorkshire Council, County Hall, Northallerton DL7 8AD, UK

Description of the co-author's contribution to the work	Methodology (supporting); Investigation; Writing – Review & Editing (supporting) ● Co-developed the design research methodology. ● Took part in ELWG workshops as a participant.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Susan Symonds
Date (DD/MM/YY)	25/09/25

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Description of the co-author's contribution to the work	Investigation ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Ferne Edwards
Date (DD/MM/YY)	11/06/25

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Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Methodology (supporting) ● Supported Sam with the development of the design research methodology.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Lee Eyre
Date (DD/MM/YY)	27/08/25

Name of co-author	Declan Jackson
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Investigation ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Declan Jackson

Date (DD/MM/YY)	27/08/25

Name of co-author	Claire Lawrence
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Description of the co-author's contribution to the work	Investigation; Writing – Review & Editing (supporting) ● Took part in ELWG workshops as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Claire Lawrence
Date (DD/MM/YY)	09/07/25

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Description of the co-author's contribution to the work	Investigation ● Took part in the H2+ action prioritisation and ripple effects mapping exercises as a participant.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Nicola Sumpter
Date (DD/MM/YY)	01/09/25

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Contact details of co-author	Lancaster Environment Centre, Lancaster University, Library Avenue, Bailrigg, Lancaster LA1 4YQ, UK
Description of the co-author's contribution to the work	Methodology (supporting) ● Supported Sam with the development of the design research methodology.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	David Tyfield
Date (DD/MM/YY)	29/07/25

Related publications and presentations

See the tool 'four strands of transformation-focused evaluation' in Appendix 2.

Signed: Sam Buckton

Date: 26/09/25

A4.4 Chapter 5 paper

Publication details

Title of the work	How can evaluation practice catalyze transformations towards regenerative futures?	
Publication status	Published	
	Accepted for publication	
	Submitted for publication	x
	Unpublished and unsubmitted	
Citation details (if applicable)	Citation details of the draft paper submitted to <i>Cell Reports Sustainability</i> are as follows: Buckton, S. J., Fazey, I., Ball, P., Chaplowe, C., Colvin, J., Hejnowicz, A. P., Kenter, J. O., Ofir, Z., Page, G. G., Sharpe, B., Waddock, S. and Wahl, D. C. (under review). How can evaluation practice catalyze transformations towards regenerative futures? <i>Cell Reports Sustainability</i>.	

Candidate contributions

Description of the candidate's contribution to the work	Conceptualisation; Writing – Original Draft; Writing – Review & Editing (lead); Visualisation; Project Administration (lead)

	● Developed the project's overarching research goals and aims with support from Ioan Fazey and Peter Ball. ● Wrote the entire original paper draft. I performed c. 80% of all review and editing of paper drafts, with Ioan Fazey being the other major contributor, and smaller contributions from other co-authors. The final text is approximately 95% my own. ● Created Figure 1 in Mural, using a base image created by ChatGPT image generator 4o. ● Had the primary management and coordination responsibility for the research activity planning and execution. ● In charge of all communication with journal editors, and submitting the paper to the journal.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	83%
Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	27/09/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

Name of co-author	Ioan Fazey
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Contributed to review and editing of paper drafts. ● Shared oversight and leadership responsibility for the research activity planning and execution. ● Contributed to the original FixOurFood funding application that supported this research.
Approximate percentage contribution of the co-author to the work	5%
Signature of the co-author	Ioan Fazey
Date (DD/MM/YY)	24/09/25

Name of co-author	Peter Ball
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Supported Sam with the formulation and evolution of the project's overarching research goals and aims. ● Contributed to review and editing of paper drafts. ● Shared oversight and leadership responsibility for the research activity planning and execution.

	Contributed to the original FixOurFood funding application that supported this research.
Approximate percentage contribution of the co-author to the work	3%
Signature of the co-author	Peter Ball
Date (DD/MM/YY)	28/08/25

Name of co-author	Scott Chaplowe
Contact details of co-author	Permission not granted for sharing contact details in this thesis
Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Scott Chaplowe
Date (DD/MM/YY)	15/09/25

Name of co-author	John Colvin
Contact details of co-author	Emerald Network Ltd, The Cottage, Whiteway Bank, Downend, Horsley, Stroud GL6 0PH, UK

Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	John Colvin
Date (DD/MM/YY)	22/09/25

Name of co-author	Adam P. Hejnowicz
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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Adam P. Hejnowicz
Date (DD/MM/YY)	29/08/25

Name of co-author	Jasper O. Kenter

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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Jasper O. Kenter
Date (DD/MM/YY)	26/09/25

Name of co-author	Zenda Ofir
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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%

Signature of the co-author	Zenda Ofir
Date (DD/MM/YY)	24/09/25

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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Glenn G. Page
Date (DD/MM/YY)	25/08/25

Name of co-author	Bill Sharpe
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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Bill Sharpe
Date (DD/MM/YY)	23/09/25

Name of co-author	Sandra Waddock
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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Sandra Waddock
Date (DD/MM/YY)	27/08/25

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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting) ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Daniel Wahl
Date (DD/MM/YY)	29/09/25

Signed: Sam Buckton

Date: 30/09/25

A4.5 Appendix 1 paper

Publication details

Permission has been granted by *PLOS Sustainability and Transformation* to include this paper in my thesis; the paper has a CC BY licence.

Title of the work (paper/chapter)	Transformative action towards regenerative food systems: A large-scale case study	
Publication status	Published	x
	Accepted for publication	
	Submitted for publication	
	Unpublished and unsubmitted	
Citation details (if applicable)	Buckton, S. J., Fazey, I., Doherty, B., Bryant, M., Banwart, S. A., Carmen, E., Connolly, A., Denby, K., Kendrick, I., Sharpe, B., Wade, R. N., Ball, P., Bridle, S., Gardner, G., James, A., Morris, B., Stewart, S., Bremner, M., Chapman, P. J., Cordero, J. P., Geertsema, H., Nixon, N., Om, E. S., Sinclair, M., Thornton, J., Yap, C., Arnott, D., Cain, M., Ehgartner, U., Fletcher, B., Garry, J., Hawkes, C., Kluczkowski, A., Lait, R., Lovett, A., Pickett, K. E., Reed, M., Atkinson, N., Black, F., Blakeston, M., Burton, W., Defeyter, M. A., Duncan, N., Eastwood, G., Everson, R., Frankowska, A., Frenneaux, T., Gledhill, D., Goodwin, S., Holden, H., Ingle, H., Kane, A., Newman, R., Parry, C., Robertshaw, V., Scrope, T., Sellstrom, P., Slater, S., Smith, K., Stacey, R., Stott, G., Trickett, A. and Wilson, J. (2024). Transformative action towards regenerative food	

	systems: A large-scale case study. <i>PLOS Sustainability and Transformation</i> , 3(11), article no: e0000134 [no pagination]. Available at: doi:10.1371/journal.pstr.0000134.

Candidate contributions

Description of the candidate's contribution to the work	Conceptualisation; Methodology; Formal Analysis; Investigation (coordinating researcher); Data Curation; Writing – Original Draft; Writing – Review & Editing; Visualisation ● Supported Ioan Fazey and Ian Kendrick in the formulation and evolution of the project's overarching research goals and aims, although aspects of these had already been decided prior to my involvement in the project. This means that I do not have conceptual ownership over the project's inception. ● I played a greater role in the formulation and evolution of the research goals and aims for the three individual FixOurFood subsystems, although aspects of these for the food economies subsystem had already been decided prior to my involvement in the project. ● Co-designed the methodology with Ioan and Ian, with additional minor input from the subsystem leads (see below). This included co-designing surveys and the structure of workshops, as well as the methodology for data analysis. I led on the design of the methodology of integrating results from all three subsystems. ● I was a 'coordinating researcher' for the investigation, with oversight of the entire Three Horizons process. ● Attended all workshops apart from the on-boarding workshop and Three Horizons workshop 1 for the food economies subsystem, which took place prior to my involvement in the project. ● In most of the workshops I attended, I adopted the role of a co-facilitator, supporting Ioan Fazey, Ian Kendrick and/or Bill Sharpe as lead facilitators by observing group dynamics, taking notes, and facilitating

	breakout groups. I was lead facilitator of a workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2). ● For the food economies subsystem, I supported Ian Kendrick and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings. For the other two subsystems I was the lead facilitator of this analysis, supported by other coordinating researchers, subsystem leads and selected wider stakeholders. ● For all subsystems, I was the original author of ‘summary narratives’ based on the Three Horizons results, which were then reviewed and edited by other coordinating researchers, subsystem leads and selected wider stakeholders. ● Led all analysis associated with integrating the Three Horizons findings from all three subsystems, supported by other coordinating researchers, subsystem leads and selected wider stakeholders. ● Contributed to management activities to clean and maintain research data for initial use and later reuse. ● Wrote the entire original paper draft. Ioan Fazey substantially rewrote sections on ontology and epistemology in the materials and methods during the review and editing process. I therefore estimate that my writing comprises c. 86% of the final paper. I performed c. 75% of all review and editing of paper drafts, with Ioan Fazey being the other major contributor, and smaller contributions from other authors. ● Designed all original figures, primarily in Mural, before sending these to Dave Gledhill for final rendering and liaising with Dave to review and edit them. ● In charge of all communication with journal editors, submitting and resubmitting the paper, responding to reviewers, and reviewing and editing proofs.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	50%

Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	21/01/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

Name of co-author	Ioan Fazey
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Conceptualisation; Methodology; Formal Analysis; Investigation (coordinating researcher); Writing – Review & Editing; Visualisation (supporting); Supervision; Funding Acquisition ● Led the formulation and evolution of the project's overarching research goals and aims, working particularly with Ian Kendrick on this aspect. ● Advised on the formulation and evolution of the research goals and aims for the three individual FixOurFood subsystems. ● Co-designed the methodology. This included co-designing surveys and the structure of workshops, as well as advising on the methodology for data analysis and integrating results from all three subsystems.

	● Ioan was a 'coordinating researcher' for the investigation, and as a Co-PI of FixOurFood also had a supervisory role with oversight and leadership responsibility for the research activity planning and execution of the entire Three Horizons process. ● Attended all workshops apart from the on-boarding workshop and Three Horizons workshop 1 for the food economies subsystem. ● Acted as lead facilitator in all workshops, apart from two workshops facilitated by Bill Sharpe and two facilitated by Sam Buckton, in which Ioan was co-facilitator. ● Supported Sam, Ian, and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings. ● Reviewed and edited 'summary narratives' of the Three Horizons results. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Substantially rewrote sections on ontology and epistemology in the materials and methods section of the paper during the review and editing process, and was a major contributor to review and editing of drafts more broadly. ● Reviewed figures. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	25%
Signature of the co-author	Ioan Fazey
Date (DD/MM/YY)	09/04/25

Name of co-author	Bob Doherty
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, food economies); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Advised on the formulation and evolution of the project’s overarching research goals and aims, and of the research goals and aims for the food economies subsystem. ● Co-designed the methodology for the food economies subsystem. ● Bob was a ‘subsystem lead’ for the investigation in the food economies subsystem and as PI of FixOurFood also had a supervisory role with oversight and leadership responsibility for the research activity planning and execution of the entire Three Horizons process, but with particular focus on the food economies subsystem. ● Attended most workshops as a participant, including the integrative workshops and a workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2). ● Supported Sam, Ian, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the food economies subsystem. ● Reviewed and edited the ‘summary narrative’ of the Three Horizons results for the food economies subsystem. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.

Approximate percentage contribution of the co-author to the work	5%
Signature of the co-author	Bob Doherty
Date (DD/MM/YY)	26/05/23

Name of co-author	Maria Bryant
Contact details of co-author	Hull York Medical School, University of York, University Road, Heslington, York YO10 5DD, UK Department of Health Sciences, University of York, Seebohm Rowntree Building, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, schools and early years settings); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Advised on the formulation and evolution of the project's overarching research goals and aims, and of the research goals and aims for the schools and early years settings subsystem. ● Co-designed the methodology for the schools and early years settings subsystem. ● Maria was a 'subsystem lead' for the investigation in the schools and early years settings subsystem and as a FixOurFood Co-I also had a supervisory role with oversight and leadership responsibility for the research activity planning and execution of the entire Three Horizons process, but with particular focus on the schools and early years settings subsystem. ● Attended schools and early years settings subsystem workshops and the integrative workshops as a participant.

	● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the schools and early years settings subsystem. ● Reviewed and edited the 'summary narrative' of the Three Horizons results for the schools and early years settings subsystem. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	3%
Signature of the co-author	Maria Bryant
Date (DD/MM/YY)	26/05/23

Name of co-author	Steven A. Banwart (deceased)
Contact details of co-author	Not applicable
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, agriculture); Supervision; Funding Acquisition ● Advised on the formulation and evolution of the project's overarching research goals and aims, and of the research goals and aims for the agriculture subsystem. ● Co-designed the methodology for the agriculture subsystem.

	● Steven was a 'subsystem lead' for the investigation in the agriculture subsystem and as a FixOurFood Co-I also had a supervisory role with oversight and leadership responsibility for the research activity planning and execution of the entire Three Horizons process, but with particular focus on the agriculture subsystem. ● Attended agriculture subsystem workshops as a participant. ● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the agriculture subsystem. ● Reviewed and edited the 'summary narrative' of the Three Horizons results for the agriculture subsystem. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	2%
Signature of the co-author	Signature not obtainable from Steven directly as he passed away not long after the workshops for this project were completed. Following conversations amongst the FixOurFood team and with Steven's next of kin, it was considered appropriate for Steven's contributions to be acknowledged in this way. Steven also implied his desire to be named a co-author based on an early draft in an email on 15/05/23.
Date (DD/MM/YY)	27/07/24

Name of co-author	Esther Carmen
Contact details of co-author	Social, Economic and Geographic Sciences, The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, UK

Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (coordinating researcher); Data Curation ● Supported the formulation and evolution of the project's overarching research goals and aims, and for the food economies subsystem in particular. ● Co-designed the methodology, particularly for the food economies subsystem. Esther left FixOurFood after the second workshop of the food economies subsystem (role subsequently filled by Sam), and thereafter did not play a role in designing the methodology. ● Esther was a 'coordinating researcher' for the investigation until her departure from FixOurFood. ● Co-facilitated the on-boarding workshop and Three Horizons workshop 1 for the food economies subsystem. ● Supported Sam, Ian, and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, until her departure from FixOurFood. ● Contributed to data curation until her departure from FixOurFood.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Esther Carmen
Date (DD/MM/YY)	29/05/23

Name of co-author	Annie Connolly
Contact details of co-author	The Food Foundation, International House, 6 Canterbury Crescent, London SW9 7QD, UK

Description of the co-author's contribution to the work	Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, schools and early years settings); Writing – Review & Editing (supporting); Data Curation ● Co-designed the methodology for the schools and early years settings subsystem. ● Annie was a ‘subsystem lead’ for the investigation in the schools and early years settings subsystem. ● Attended schools and early years settings subsystem workshops as a participant. ● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the schools and early years settings subsystem. ● Reviewed and edited the ‘summary narrative’ of the Three Horizons results for the schools and early years settings subsystem. ● Contributed to review and editing of paper drafts. ● Contributed to data curation for the schools and early years settings subsystem.
Approximate percentage contribution of the co-author to the work	2%
Signature of the co-author	Annie Connolly
Date (DD/MM/YY)	26/05/23

Name of co-author	Katherine Denby
Contact details of co-author	Centre for Novel Agricultural Products (CNAP), Department of Biology, University of York, Wentworth Way, Heslington, York YO10 5DD, UK

Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (other FixOurFood researcher); Writing – Review & Editing (supporting); Supervision; Funding Acquisition ● Attended the integrative workshops as a participant and FixOurFood researcher. ● As a PI of FixOurFood, Katherine had a supervisory role with oversight and leadership responsibility for the research activity planning and execution of the entire Three Horizons process. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Katherine Denby
Date (DD/MM/YY)	28/05/23

Name of co-author	Ian Kendrick
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Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (coordinating researcher, supporting); Data Curation ● Supported the formulation and evolution of the project's overarching research goals and aims, and for the food economies subsystem in particular. ● Co-designed the methodology. This included co-designing surveys and the structure of workshops, as well as advising on the methodology for data analysis and integrating results from all three subsystems. Ian left FixOurFood after the second workshop of the food economies subsystem, however (role subsequently filled by Ioan Fazey), and thereafter did not play a role in designing the methodology. ● Ian was a 'coordinating researcher' for the investigation until his departure from FixOurFood. ● Lead-facilitated the on-boarding workshop and Three Horizons workshop 1 for the food economies subsystem. ● Supported Sam, Esther, and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, until his departure from FixOurFood. ● Contributed to data curation until his departure from FixOurFood.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Ian Kendrick
Date (DD/MM/YY)	07/12/23
Name of co-author	Bill Sharpe

Contact details of co-author	International Futures Forum, The Boathouse, Silversands, Hawkcraig Road, Aberdour, Fife KY3 0TZ, UK
Description of the co-author's contribution to the work	Conceptualisation (supporting); Methodology (supporting); Formal Analysis (supporting); Investigation (coordinating researcher, supporting); Writing – Review & Editing (supporting) ● Supported the formulation and evolution of the project's overarching research goals and aims, and broad methodology. ● Bill was a 'coordinating researcher' for the investigation, and lead facilitator of the in-person integrative workshop, where he supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Attended the workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2) as a participant. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Bill Sharpe
Date (DD/MM/YY)	03/07/25

Name of co-author	Ruth N. Wade
Contact details of co-author	Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK

Description of the co-author's contribution to the work	Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, agriculture); Writing – Review & Editing (supporting); Data Curation ● Co-designed the methodology for the agriculture subsystem. ● Ruth was a ‘subsystem lead’ for the investigation in the agriculture subsystem, attending agriculture subsystem workshops and the integrative workshops as a participant. ● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the agriculture subsystem. ● Reviewed and edited the ‘summary narrative’ of the Three Horizons results for the agriculture subsystem. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to data curation for the agriculture subsystem.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Ruth N. Wade
Date (DD/MM/YY)	05/08/24

Name of co-author	Peter Ball
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK

Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Writing – Review & Editing (supporting); Funding Acquisition ● Attended food economies subsystem workshops and the integrative workshops as a participant and FixOurFood researcher. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Peter Ball
Date (DD/MM/YY)	18/10/24

Name of co-author	Sarah Bridle
Contact details of co-author	Department of Environment and Geography, University of York, Wentworth Way, Heslington, York YO10 5NG, UK
Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Writing – Review & Editing (supporting); Funding Acquisition ● Attended food economies subsystem workshops and the integrative workshops as a participant and FixOurFood researcher.

	● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Sarah Bridle
Date (DD/MM/YY)	26/05/23

Name of co-author	Grace Gardner
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Description of the co-author's contribution to the work	Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, schools and early years settings); Writing – Review & Editing (supporting) ● Co-designed the methodology for the schools and early years settings subsystem. ● Grace was a ‘subsystem lead’ for the investigation in the schools and early years settings subsystem. ● Attended schools and early years settings subsystem workshops as a participant. ● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the schools and early years settings subsystem. ● Reviewed and edited the ‘summary narrative’ of the Three Horizons results for the schools and early years settings subsystem.

	Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Grace Gardner
Date (DD/MM/YY)	25/07/24

Name of co-author	Anthonia James
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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Data Curation; Project Administration - Attended most subsystem workshops as technological support and FixOurFood researcher. - Supported analysis associated with integrating the Three Horizons findings from all three subsystems. - Contributed to data curation. - Project administrator for FixOurFood.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Anthonia James
Date (DD/MM/YY)	08/12/23

Name of co-author	Belinda Morris
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Data Curation; Project Administration ● Attended the in-person integrative workshops as a participant and FixOurFood researcher, and lead-facilitated the in-person workshop for school children for the schools and early years settings subsystem. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to data curation. ● Project administrator for FixOurFood.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Belinda Morris
Date (DD/MM/YY)	26/05/23

Name of co-author	Sophie Stewart
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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Data Curation; Project Administration ● Attended the in-person integrative workshop as a participant and FixOurFood researcher.

	● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to data curation. ● Project administrator for FixOurFood.
Approximate percentage contribution of the co-author to the work	1%
Signature of the co-author	Sophie Stewart
Date (DD/MM/YY)	26/05/23

Name of co-author	Myles Bremner
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Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (wider stakeholder); Writing – Review & Editing (supporting) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder. ● Supported Sam, Ioan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the schools and early years settings subsystem. ● Reviewed and edited the ‘summary narrative’ of the Three Horizons results for the schools and early years settings subsystem. ● Contributed to review and editing of paper drafts.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Myles Bremner
Date (DD/MM/YY)	09/10/24

Name of co-author	Pippa J. Chapman
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Description of the co-author's contribution to the work	Investigation (subsystem lead, agriculture); Writing – Review & Editing (supporting); Funding Acquisition ● Pippa was a ‘subsystem lead’ for the investigation in the agriculture subsystem. ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Pippa J. Chapman
Date (DD/MM/YY)	27/07/24

Name of co-author	Juan Pablo Cordero

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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Visualisation (supporting) ● Attended the integrative workshops as a participant and FixOurFood researcher. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Created Figure 1 under the guidance of Sam.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Juan Pablo Cordero
Date (DD/MM/YY)	26/05/23

Name of co-author	Henk Geertsema
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Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (wider stakeholder); Writing – Review & Editing (supporting) ● Attended agriculture subsystem workshops and the in-person integrative workshop as a participant and FixOurFood stakeholder. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Henk Geertsema
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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Writing – Review & Editing (supporting) ● Attended schools and early years subsystem workshops and the in-person integrative workshop as a participant and FixOurFood researcher. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Nicola Nixon
Date (DD/MM/YY)	19/05/23

Name of co-author	Eugyen Suzanne Om

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Description of the co-author's contribution to the work	Conceptualisation (supporting); Formal Analysis (supporting); Investigation (coordinating researcher, supporting) ● Suzanne was a 'coordinating researcher' for the investigation, attending the integrative workshops and the workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2) as a participant, and advising on the formulation and evolution of the project's overarching research goals and aims. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Eugyen Suzanne Om
Date (DD/MM/YY)	05/06/23

Name of co-author	Maddie Sinclair
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Description of the co-author's contribution to the work	Methodology (supporting); Formal Analysis (supporting); Investigation (subsystem lead, schools and early years settings) ● Co-designed the methodology for the schools and early years settings subsystem.

	● Maddie was a 'subsystem lead' for the investigation in the schools and early years settings subsystem, attending schools and early years settings subsystem workshops as a participant, until she departed FixOurFood and her role was filled by Jack Garry. ● Supported Sam, loan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the schools and early years settings subsystem. ● Reviewed and edited the 'summary narrative' of the Three Horizons results for the schools and early years settings subsystem.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Maddie Sinclair
Date (DD/MM/YY)	26/05/23

Name of co-author	Jan Thornton
Contact details of co-author	Yorkshire Food, Farming & Rural Network, Yorkshire Agricultural Society, Harrogate HG2 8NZ, UK
Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (wider stakeholder); Writing – Review & Editing (supporting) ● Attended food economies subsystem workshops as a participant and FixOurFood stakeholder. ● Supported Sam, loan and others in thematically analysing survey results and refining Three Horizons maps based on workshop findings, for the food economies subsystem. ● Reviewed and edited the 'summary narrative' of the Three Horizons results for the food economies subsystem.

	Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Jan Thornton
Date (DD/MM/YY)	24/09/24

Name of co-author	Christopher Yap
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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Formal Analysis (supporting); Writing – Review & Editing (supporting) - Chris attended the online integrative workshop as a participant and FixOurFood researcher, where he supported analysis associated with integrating the Three Horizons findings from all three subsystems. - Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Christopher Yap
Date (DD/MM/YY)	07/11/24

Name of co-author	Dave Arnott
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Description of the co-author's contribution to the work	Investigation (wider stakeholder); Formal Analysis (supporting) ● Attended agriculture subsystem workshops and the in-person integrative workshop as a participant and FixOurFood stakeholder. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Dave Arnott
Date (DD/MM/YY)	08/12/23

Name of co-author	Michelle Cain
Contact details of co-author	Cranfield Environment Centre, School of Water, Energy and Environment, Cranfield University, Cranfield MK43 0AL, UK
Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Funding Acquisition ● Attended agriculture subsystem workshops and the workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2) as a participant and FixOurFood researcher.

	Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Michelle Cain
Date (DD/MM/YY)	26/05/23

Name of co-author	Ulrike Ehgartner
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (subsystem lead, food economies); Data Curation - Ulrike was 'subsystem lead' for the food economies subsystem, attending food economies subsystem workshops, the integrative workshops and the workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2) as a participant. - Contributed to data curation for the food economies subsystem.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Ulrike Ehgartner
Date (DD/MM/YY)	02/08/24

Name of co-author	Ben Fletcher
Contact details of co-author	School for Business and Society, University of York, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher and wider stakeholder); Formal Analysis (supporting) ● Attended food economies subsystem workshops and the in-person integrative workshop as a participant and both a FixOurFood researcher and wider stakeholder. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Ben Fletcher
Date (DD/MM/YY)	20/02/24

Name of co-author	Jack Garry
Contact details of co-author	Permission not granted for sharing current contact details in this thesis
Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (subsystem lead, schools and early years settings) ● Jack was a 'subsystem lead' for the schools and early years settings following the departure of Maddie Sinclair from FixOurFood.

	● Attended the in-person integrative workshop as a participant, where he supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Jack Garry
Date (DD/MM/YY)	08/12/22

Name of co-author	Corinna Hawkes
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Description of the co-author's contribution to the work	Writing – Review & Editing (supporting); Funding Acquisition ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Corinna Hawkes
Date (DD/MM/YY)	29/07/24

Name of co-author	Alana Kluczkovski
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Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher); Writing – Review & Editing (supporting) ● Attended food economies subsystem workshops as a participant and FixOurFood researcher. ● Contributed to review and editing of paper drafts.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Alana Kluczkovski
Date (DD/MM/YY)	09/02/24

Name of co-author	Rebecca Lait
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Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (other FixOurFood researcher) ● Attended the integrative workshops and the workshop evaluating the integrated third horizon vision using the Regenerative Lens (see Chapter 2) as a participant and FixOurFood researcher. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Rebecca Lait
Date (DD/MM/YY)	30/05/23

Name of co-author	Adrian Lovett
Contact details of co-author	Good Food York Alliance, York, UK
Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (wider stakeholder) ● Attended food economies subsystem workshops and the in-person integrative workshop as a participant and FixOurFood stakeholder. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Adrian Lovett
Date (DD/MM/YY)	29/07/24

Name of co-author	Kate E. Pickett

Contact details of co-author	Department of Health Sciences, University of York, Seebohm Rowntree Building, Heslington, York YO10 5DD, UK
Description of the co-author's contribution to the work	Writing – Review & Editing (supporting); Funding Acquisition ● Contributed to review and editing of paper drafts. ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Kate E. Pickett
Date (DD/MM/YY)	30/05/23

Name of co-author	Melanie Reed
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Description of the co-author's contribution to the work	Formal Analysis (supporting); Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops and the in-person integrative workshop as a participant and FixOurFood stakeholder. ● Supported analysis associated with integrating the Three Horizons findings from all three subsystems.
Approximate percentage contribution of the co-author to the work	<1%

Signature of the co-author	Melanie Reed
Date (DD/MM/YY)	26/09/24

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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Nathan Atkinson
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Description of the co-author's contribution to the work	Investigation (wider stakeholder)

	● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Fiona Black
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended food economies subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Mark Blakeston
Date (DD/MM/YY)	24/09/24

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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Wendy Burton
Date (DD/MM/YY)	09/10/24

Name of co-author	Margaret Anne Defeyter
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Margaret Anne Defeyter
Date (DD/MM/YY)	25/07/24

Name of co-author	Naomi Duncan
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Naomi Duncan
Date (DD/MM/YY)	08/10/24

Name of co-author	Glynn Eastwood
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Glynn Eastwood
Date (DD/MM/YY)	09/10/24

Name of co-author	Ruth Everson
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended food economies subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Ruth Everson
Date (DD/MM/YY)	03/09/24

Name of co-author	Angelina Frankowska
Contact details of co-author	Permission not granted for sharing current contact details in this thesis
Description of the co-author's contribution to the work	Investigation (other FixOurFood researcher) ● Attended agriculture subsystem workshops as a participant and FixOurFood researcher.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Angelina Frankowska
Date (DD/MM/YY)	01/06/23

Name of co-author	Tim Frenneaux
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Description of the co-author's contribution to the work	Funding Acquisition ● Contributed to the original FixOurFood funding application that outlined the Three Horizons project proposal and supported this research.
Approximate percentage contribution of the co-author to the work	<1%

Signature of the co-author	Tim Frenneaux
Date (DD/MM/YY)	25/05/23

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Description of the co-author's contribution to the work	Visualisation (supporting) ● Rendered Figs 2-5 based on guidance from Sam.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Dave Gledhill
Date (DD/MM/YY)	15/05/23

Name of co-author	Sian Goodwin
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended food economies subsystem workshops as a participant and FixOurFood stakeholder.

Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Sian Goodwin
Date (DD/MM/YY)	25/07/24

Name of co-author	Harry Holden
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended food economies subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Harry Holden
Date (DD/MM/YY)	25/07/24

Name of co-author	Helen Ingle
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Description of the co-author's contribution to the work	Investigation (wider stakeholder) ● Attended schools and early years settings subsystem workshops as a participant and FixOurFood stakeholder.
Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Helen Ingle
Date (DD/MM/YY)	22/10/24

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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%

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Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	Jessica Wilson
Date (DD/MM/YY)	24/09/24

Related publications and presentations

- A short pamphlet published by FixOurFood (FixOurFood, 2023). I wrote all of the original text, and both I and Ioan Fazey reviewed and edited the document. Belinda Morris and Dave Gledhill designed and formatted the final visual presentation as a pamphlet.
- A report published by FixOurFood for the Three Horizons findings of FixOurFood's agriculture subsystem (FixOurFood, 2022c). I was the lead author of the report. I estimate that I wrote c. 90% of the original text, with the rest being written by Ioan Fazey and Ruth Wade. We all three reviewed and edited the document. Belinda Morris and Dave Gledhill designed and formatted the final visual presentation as a report.
- A report published by FixOurFood for the Three Horizons findings of FixOurFood's schools and early years settings subsystem (FixOurFood, 2022b). I was the lead author of the report. I estimate that I wrote c. 90% of the original text, with the rest being written by Ioan Fazey and Ian Kendrick. We all three, alongside Maria Bryant, Annie Connolly, Grace Gardner and Maddie Sinclair, reviewed and edited the document. Belinda Morris and Dave Gledhill designed and formatted the final visual presentation as a report.
- A report published by FixOurFood for the Three Horizons findings of FixOurFood's food economies subsystem (FixOurFood, 2022a). I was the lead author of the report. I estimate that I wrote c. 80% of the original text, with the rest being written by Ioan Fazey and Ian Kendrick. We

all three, alongside Ulrike Ehgartner and Bob Doherty, reviewed and edited the document. Belinda Morris and Dave Gledhill designed and formatted the final visual presentation as a report.

- The Yorkshire land use map included in this chapter featured in a blog published by FixOurFood (Buckton and Cordero, 2024). I wrote the entire original draft of the blog. Juan Pablo Cordero reviewed the blog and created the map based on my instructions. The blog was taken up by Grow Yorkshire and The Yorkshire Food Farming & Rural Network and shared in the December 2024 issue of their monthly newsletter.
- In October 2024 I published a page about the Three Horizons framework on Wikipedia, drawing partly on the experiences described in Chapter 4 (Wikipedia contributors, 2025).
- Material from this chapter informed a recent book chapter submitted for the forthcoming book *Navigating Possibility Spaces: Three Horizons as a Transdisciplinary Framework for Change*, to be published by Palgrave Macmillan in their Advances in Possibility Studies series (Buckton et al., under review). I wrote the entire original draft of the chapter, with the other authors reviewing and editing drafts.
- In January 2024 I co-facilitated a workshop at Oxford's Saïd Business School for a Transforming UK Food Systems (TUKFS) synergy grant project exploring different concepts and approaches of food system transformation across the different TUKFS projects. I shared learning from the experience described in this chapter of my thesis.

Signed: Sam Buckton

Date: 27/09/25

A4.6 Appendix 2 guide

Publication details

Title of the work	Tools for regenerative practice: 30 frameworks, exercises and methods for supporting transformations towards futures where people and planet can flourish together	
Publication status	Published	
	Accepted for publication	
	Submitted for publication	
	Unpublished and unsubmitted	x
Citation details (if applicable)	Buckton, S., Fazey, I., Sharpe, B., Wahl, D., Crossland, A., Everson, R., Eyre, L., Fearnley, J., Fletcher, B., Fraser, H., Hughes, V., Jackson, D., Leicester, G., Lovett, A., Luthe, T., Lyon, C., McLaven, K., Newman, R., Om, E. S., Rudd, K., Smee, C. and Adams, D. (in prep.) Tools for regenerative practice: 30 frameworks, exercises and methods for supporting transformations towards futures where people and planet can flourish together. Transforming UK Food Systems.	

Candidate contributions

Description of the candidate's contribution to the work	Conceptualisation; Methodology; Investigation; Data Curation; Writing – Original Draft (lead); Writing – Review & Editing (lead); Visualisation; Project Administration (lead) ● Contributed to the formulation and evolution of the project's overarching research goals and aims, supported by loan Fazey and Bill Sharpe. ● Contributed to the design of the workshop methodology, supported by loan Fazey and Bill Sharpe. ● Co-facilitated all five workshops alongside Bill Sharpe and loan Fazey, and led on the collation and summary of all feedback gathered in the workshops. ● Led the design of the structure of the tool guide. ● Contributed to management activities to clean and maintain research data for initial use and later reuse. ● Wrote the majority of the initial draft of the guide (c. 90% of all text). I performed c. 80% of all review and editing of paper drafts, with loan Fazey and Daniel Wahl being the other major contributors, and smaller contributions from other authors. ● Created all original figures in Mural. ● Had the primary management and coordination responsibility for the research activity planning and execution.
Approximate percentage contribution of the candidate to the work (if possible to describe in this way)	70%
Signature of the candidate	Sam Buckton
Date (DD/MM/YY)	26/08/25

Co-author contributions

By signing this Statement of Authorship, each co-author agrees that:

- (i) the candidate has accurately represented their contribution to the work;
- (ii) if required, permission is granted for the candidate to include the work in their thesis (note that this is separate from copyright considerations).

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Approximate percentage contribution of the co-author to the work	10%
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Approximate percentage contribution of the co-author to the work	<1%

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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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	● Contributed to the workshops as a participant (e.g. testing the tools and advising on the tool guide structure). ● Contributed to review and editing of drafts of the tool guide.
Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
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Approximate percentage contribution of the co-author to the work	<1%
Signature of the co-author	David Adams
Date (DD/MM/YY)	26/08/25

Related publications and presentations

- June 2025: invited webinar for H3Uni's Practitioners Forum about the emerging tool guide.

Signed: Sam Buckton

Date: 30/09/25