

Peer Review Article

Cybernetic Lookbooks:

An Emerging Visual Approach for Organizational Understanding

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Abstract

Academic research often privileges written language in both production and dissemination of knowledge. However, language exists alongside visual and material artifacts in the definition, sensemaking, transportation, and stabilization of organizations (Boxenbaum et al., 2018). In contrast, a focus on language is not as prominent in the realm of fashion, where visuals, aesthetics, and materiality are core (Castaldo Lundén, 2020; Jenß & Hofmann, 2019; Julier, 2006; Pecorari, 2021). This paper demonstrates how an appropriation of a commonly used visual artifact in fashion—the lookbook—can promote the surfacing, sensemaking, and co-creation of new organizational realities. The cybernetic lookbook compiles a series of visual representations of the organization, created through cybernetic diagramming practices—diagrams that reflect feedback loops, scales, thresholds, leverage points, and cybernetic

awareness. These visual representations emerged in the context of intervention research with three organizations—two early-stage startups and one responsible technology ecosystem-enabler. Reflections on the process suggest that cybernetic diagramming afforded three types of convening spaces—conversation spaces, co-production spaces, and reflection spaces—prompting new shared understanding about the products being built, new product innovation ideas, and potential new ways to communicate organizational stories as well as that of the research itself. It is hoped that this contribution may open novel avenues for visual methods experimentation for organizational understanding.

Keywords

Cybernetics, organizational understanding, visual approach, diagramming practices

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Introduction

Organizations all develop their own languages and types of conversations, which increases efficiency. However, these can become constraints that limit future vision.

— ANU School of Cybernetics (2022, p. 29)

As organizations emerge and grow, so too does language—language that describes organizational activities, articulates organizational values and identity, and makes promises about what will be delivered, to whom, and how. In the earliest stages of an organization, these languages are nascent, emerging, and sometimes fragile, and there is frequent pressure to standardize language in order to achieve scale and efficiency. In doing so, language can become a constraint that limits future vision (ANU School of Cybernetics, 2022). Conversely, adopting new types of language can open previously unseen pathways for action (Krippendorff, 2023).

Language provides one path to organizational awareness, but many other forms of knowing deserve attention and that are often present before language can even be articulated. Heron's extended epistemology, for example, proposes four interwoven ways of knowing: experiential (from direct encounters), presentational (exploring through aesthetic responses such as art, images, movement, music), propositional (focused on concepts and propositions), and practical (focused on action) (Coghlan & Brydon-Miller, 2014). The creation of visual artifacts can touch on each of these extended ways of knowing—for

example, by drawing upon action and experiences in the real world to identify concepts and present them aesthetically as diagrams.

In many cases, visual artifacts are said to represent tacit knowledge that guides organizational behavior (Taylor & Hansen, 2005). Non-explicit ways of knowing are also at the core of Theory U (Scharmer, 2009), particularly ideas around co-sensing and listening from the emerging future. Visual artifacts act as boundary objects (Leigh Star, 2010), creating relational spaces for dialogue, suspending habitual patterns of thought through engagement with different visual representations, and for co-sensing emerging possibilities (Scharmer, 2009). In this way, visual artifacts are not static objects but mediating objects that facilitate abductive reasoning, helping to surface new organizational understandings and stabilize provisional interpretations for further testing and revision (Peirce, 1931-1958; Stjernfelt, 2000). Often, new possibilities emerge in relation to a change in how distinctions are made, and visual representation can assist with that—for example, making a distinction that brings form into existence, redrawing boundaries to indicate a new or different relationality, and making explicit the influence of previously implicit power dynamics; that is, visual artifacts can create space for conversation that leads to transformation.

Similarly, Shaw (2002) posits that sensemaking conversations can ultimately shift constraints, opening new future possibilities. Sensemaking involves creating boundaries around specific instances from the dynamic, changing system and reducing uncertainty around them (Weick et al., 2005), and is also a generative process that creates new knowledge artifacts (Weber & Glynn, 2006). “Messy sensemaking” emphasizes the looseness often involved in such processes. Shaw (2002) claims leaders drive messy sensemaking by creating spaces for convening conversations that may not otherwise occur, ensuring conditions for team members to meaningfully participate, and opening areas for reflective inquiry. This paper explores the role of cybernetic visual practices in affording these messy sensemaking spaces—specifically, conversation, co-production, and reflection spaces.

By engaging with two early-stage startups and one responsible tech ecosystem enabler, all grappling with how to enact their responsibility in practice, this paper explores an emerging visual artifact—the cybernetic lookbook—and its role in affording conversation, co-production, and reflection spaces. The cybernetic lookbook combines and appropriates elements from two different realms: cybernetics and fashion. Cybernetics is engaged through the creation of artifacts that reflect feedback loops (Wiener, 1950), scales (Brand, 2000), thresholds (Ashby, 1956; Midgley, 2000), leverage points (Meadows, 2008), and what I term here “cybernetic awareness”—an understanding that one is an active part of the system, not a passive observer of it (von Foerster, 2003).

It is proposed that these artifacts be combined into a lookbook, appropriating the idea of lookbooks from fashion (for an overview of lookbooks, see Wong & Rud, 2011). Lookbooks are generally used to curate and communicate a fashion designer’s aesthetic, vision, and style to external audiences (e.g., marketers,

buyers, etc.). More than just a collection of images, lookbooks aim to tell a story in a coherent way and convey an underlying understanding of the designer's identity and what they wish to be known for. The aesthetic of a lookbook also communicates a tacit level of knowledge that guides the designer's brand and decision-making.

In this case, the idea is adapted to communicate the underlying cybernetic dynamics of an organization's vision, purpose, and product for a common understanding internally—and perhaps, in the future, for external audiences such as funders or prospective new employees. A lookbook goes beyond simply collecting diagrams to meaningfully curating and communicating the essence of an organization's identity, aspirations, and decision-making. In this way, it adopts Taylor and Hanson's (2005) perspective that aesthetic knowledge (captured in diagrams, for example) “provides a means to express that tacit knowledge that guides much of organizational behavior” (p. 1226). Further, I posit there may be merits in adopting a cybernetic lookbook to describe the dynamics sitting behind academic research itself. I believe there are many learnings to be harnessed from both the realms of fashion and cybernetics, where visual representations have a rich history, and hope this paper serves as an interesting starting point for further investigation.

This paper explores the idea of a cybernetic lookbook as an approach to understanding organizational possibilities. Specifically, it discusses the spaces a cybernetic lookbook can afford: spaces for conversation, co-production (including thought experimentation and product innovation), and reflection. By focusing on the value of cybernetic concepts such as feedback loops, scales, thresholds, leverage points, and cybernetic awareness, this paper aims to demonstrate an emerging set of visual artifacts that may assist not only with researchers' organizational understanding but also with organizations understanding themselves differently, fueling awareness-based systems change. Further, I speculate that the cybernetic lookbook is a valuable accompaniment to intervention research, assisting in articulating and testing rational myths.

Research Context and Approach

This section provides broader context for the wider research agenda within which cybernetic lookbooks have emerged. The visual approaches shared in this paper were used in intervention research with two early-stage startups (OrgB and OrgT) and one responsible technology ecosystem-enabling organization (OrgH). Intervention research (Baskerville & Myers, 2004; Hatchuel & Molet, 1986; Susman & Evered, 1978) positions the researcher as an insider-outsider of the organization and, far from being a passive observer, requires the researcher to form, test, and iterate upon “rational myths” in a specific organizational context. In this case, a series of rational myths were formed around some of the conditions needed for organizations to act on their motivation to “be responsible” as they built their artificial intelligence (AI)-enabled products.

The broader research objective is to investigate responsible AI as a site of organizational practice. Specifically, three proactive responsible AI prototypes were developed to address three questions. The first prototype—a pledge-making process (Ruster & Daniell, 2025)—examines how organizations can get started with responsible AI practice. The second prototype—the Dignity Lens (Ruster et al., 2025)—focuses on how organizations can embed human-centered values such as dignity in AI development. The third prototype—a series of reflective practices (including Ruster, 2023) explores how organizations can sustain their commitment to responsible AI practice over time. The cybernetic lookbook emerged principally in the context of developing the first and third prototypes with OrgB, OrgT, and OrgH.

The two early-stage startups—OrgB and OrgT—were both united in their motivation to be responsible in the ways they developed their AI-enabled products. Although they operate in different industries—media tech and sustainability tech—they were both seeking early-stage (seed or Series A¹) funding, had at least one Australian founder, and were leveraging (or planning to adopt) Large Language Models (LLMs) within their recommender algorithm products. OrgB seeks to simplify sustainability actions that small to medium enterprises can take through its sustainability tech platform, which recommends actions alongside relevant suppliers and tracks progress over time. OrgT aims to burst users' media news bubbles by recommending alternative news sources to diversify their news diet and build critical thinking muscles. Similarly, OrgH was also committed to being responsible in its activities. OrgH is an initiative incubated within a large humanitarian organization, working to promote responsible tech practices with startups building humanitarian-focused technologies.

Although this is not an empirical paper, its explorations are rooted in 47 hours of recorded participatory workshops and interviews (along with some unrecorded interactions) across three organizations (see Table 1).

¹ Seed funding refers to early-stage funding (ranging from \$10,000 to a few million dollars) raised by a business to validate its idea and build an initial product. Series A funding is more substantial (typically \$2–\$15 million) and is generally raised to help startups scale their operations. See Reiff (2025) for more details.

Characteristics	OrgB	OrgH	OrgT
Type of organisation	Early-Stage Startup	Responsible Tech Ecosystem Enabler	Early-Stage Startup
Data collected	16 participatory workshops; 19 individual interviews	8 individual interviews; internal and external documents	20 participatory workshops; 4 group interviews; 3 individual interviews
Timing of interactions	June 2022 – November 2024	April 2023 – December 2023	June 2021 – April 2024

Table 1: Overview of the organizations involved in the study

In the case of OrgB and OrgT, these interactions centered on participatory workshops where we explored challenges related to responsible AI practice. The approach to these workshops was emergent; rooted in pragmatism (Dewey, 1938; James, 1890; Peirce, 1935/1978), it drew on relevant resources as needed. For OrgT, the starting question for exploration was how to meaningfully engage with responsible AI principles that made sense in its context. One-hour workshops were held online once or twice a month over 18 months, with various follow-ups conducted for about a year afterward. The workshops included thought experiments on what particular principles could mean in practice, detailed sharing of how their product worked and what decisions had shaped how it worked, as well as reflective practices regarding the impact of previous decisions on their ability to meaningfully engage in responsible AI practice.

For OrgB, interactions initially focused on updating its existing organizational values in light of new founders joining the team; they were interested in being future-ready and aligned on what was important before building their AI systems. Data collected in this case included one-on-one reflective practice interviews to understand how their values were already reflected in decision-making (or not), and participatory workshops to align the co-founders around what was really important to them and how they would express it through product design decisions. In both OrgB and OrgT, a practical result of these interactions was the crafting of responsible AI pledges (see Ruster & Daniell, 2025 for further details on the process undertaken). In the case of OrgH, the primary mode of data collection was eight individual interviews where we discussed the meanings of responsible AI practice in their context and analyzed various organizational documents. I coupled all these interactions with my own reflective practice to make sense of the decisions made over time and, in many cases, reflect, test, and iterate upon what was heard through the creation of visual artifacts.

During and outside the participatory workshops and interviews, a series of visual artifacts were created—some directly by me and tested and iterated upon with the organizations involved, and some by one or more of the participants and refined through our interactions. The visual artifacts were analyzed, taking into account how and when they were created, the purpose for which they were

created, who created them and participated in their iteration, and the audience for which they were intended. Artifacts created to assist the organization in understanding its own context, products, services, and/or decision-making processes were further coded according to cybernetic concepts (described below) and compiled into a lookbook. The impetus for selecting visual artifacts for OrgT's lookbook arose from a pragmatic reason: wanting visual aids to support individual reflective practice interviews. In that context, the visuals were chosen to reflect the depth and breadth of organizational dynamics captured throughout the interactions to date and foster reflective conversations with the co-founders. Following this, I began to review visual artifacts created in other organizational contexts and compiled a lookbook across the three organizations, organized by cybernetic dynamics. Many of these artifacts appear in the remainder of this article.

It is important to note that I do not identify as an artist but am influenced by the “generative scribing” practices developed by Kelvy Bird. Bird became known to me while I was a participant in *u-lab: Leading From the Emerging Future*, in 2021–2022—a course focused on learning Theory U (Scharmer, 2009), an awareness-based method for transforming systems. I then took an online introduction to generative scribing facilitated by Bird. Bird's approach emphasizes visual representation as “a distinct social art form that facilitates group learning and cultural memory” (Bird, 2017, para. 1). Bird's (2018) focus on generative scribing's translation capacity, systems-based perspective, and orientation towards reflection and aiding decision-making was appealing to the purposes of my broader research agenda, which investigates and prototypes responsibility practices in early-stage AI startups.

Cybernetic Diagramming Practices

From the late 1940s to the 1960s, cybernetics was a popular framework through which mathematicians, physicists, philosophers, anthropologists, computer scientists and others explored notions of thinking machines, autonomous systems, and neural networks. Cybernetics preceded the term “artificial intelligence” (Cordeschi, 2002). Over time, cyberneticians split into multiple communities with different underlying epistemologies—for example, those concerned with communication and control of technical systems, and those interested in how humans are part of modeling, intervening in, and/or evaluating those systems of interest (see Rid, 2017). These different approaches to researching and acting in relation to systems became known as first- and second-order cybernetics, respectively. Cybernetician, Heinz von Foerster (2003) distinguished between first-order cybernetics described as “the cybernetics of observed systems” (p. 299) and second-order cybernetics described as “the cybernetics of *observing* systems” (p. 303, emphasis added). The crucial differentiator in second-order cybernetics is that those involved in the system are not considered separate, detached, or objective, but are actively part of it, shaping and stewarding its evolution and development. For the purposes of this

paper, “cybernetic awareness” refers to the ability to perceive systems—including oneself and others—as part of them, which aligns with the second-order form of cybernetics. I posit that the creation of visual artifacts may assist in building cybernetic awareness.

Cybernetics, and its close connection with Complex Adaptive Systems, Soft Systems Methodologies, and other systems-thinking approaches, has an interesting history with visual forms (see Ison, 2008, for a visual representation). For example, there are a range of diagramming practices associated with systems dynamics, such as stock-and-flow diagrams or causal loop diagrams. This study draws particularly on the work of Donella Meadows (2008) in her creation of such diagrams. In addition, Rich Pictures are a common practice in Soft Systems Methodologies and, despite their widespread use, only began to appear in the literature in the 1970s (Checkland, 1972; Churchman, 1979). Rich Pictures refers to the output of a process where participants free-form draw a situation or system under consideration, often in groups, in workshop settings, and on large pieces of paper (see Ison, 2008). Rich Pictures are often used to reflect situational awareness of the system and, through discussion, generate a shared representation of it. The approach is very flexible, usually with minimal prompts. In a way, the pictures developed in this research could be considered Rich Pictures in that they were often created in a participatory way—but online and not around a large piece of paper. Further, as outlined below, the pictures are less free-form because they use specific cybernetic concepts as framing.

In the sections that follow, a range of cybernetic diagramming practices—centered on feedback loops, scales, thresholds, leverage points, and cybernetic awareness—are outlined, with examples from the research provided. It should be noted that the term “cybernetic diagramming practices” is introduced in this paper to refer to the curation of visual practices with cybernetic roots that I have found helpful throughout my doctoral research.

Feedback Loops

A central preoccupation of cybernetics has been “feedback” in mechanical, social, and biological contexts: how its presence, disruption, or distortion serves to stabilize or destabilize a system’s behavior, and the effects of these feedback loops over time. Although feedback is a common concept today, the language of feedback loops only became prominent in the 1940s as scientists, in the context of the World Wars, sought to solve the mechanical anti-aircraft problem. Norbert Wiener, often considered the forefather of cybernetics, places feedback at the center of the cybernetic worldview; for him, feedback “described the ability of any mechanism to use sensors to receive information about actual performance, as opposed to expected performance” (Rid, 2017, p. 41). He recognized a fundamental dynamic influencing the behavior of any acting system: that the output of a system is also one of its future inputs (Bell, 2021; Wiener, 1950). Since then, the concept of feedback loops has become commonplace in systems mapping practices—for example, causal loop diagrams and systems dynamics

represented as stocks and flows (see Barbrook-Johnson & Penn, 2022). The role of feedback loops as places to intervene to change systems dynamics is also considered part of Donella Meadows' (2008) leverage points model (see section below).

Thinking in feedback loops was used at various parts of the research process with the different organizations. Figure 1 shows one example that surfaced when trying to understand how OrgB's "Environmental Social Governance Financials Score" (ESGF) might influence user activity and incentives on their platform. For example, it was important for OrgB to realize that "break even activities"—ones that manage to a predefined target—exist in a balancing feedback loop: the more activities recommended, the more activities done, the higher the ESGF score, the less activities left to do. In contrast, for "positive pursuits" activities—those that do not manage to a target but are more open-ended—the score can go up and up without restraint. Seeing their scoring system in this visual format led to conversations about how to manage the ESGF score over time, what the numeric value of scores will really mean, and the barriers that may get in the way of the logic behind the scoring system.

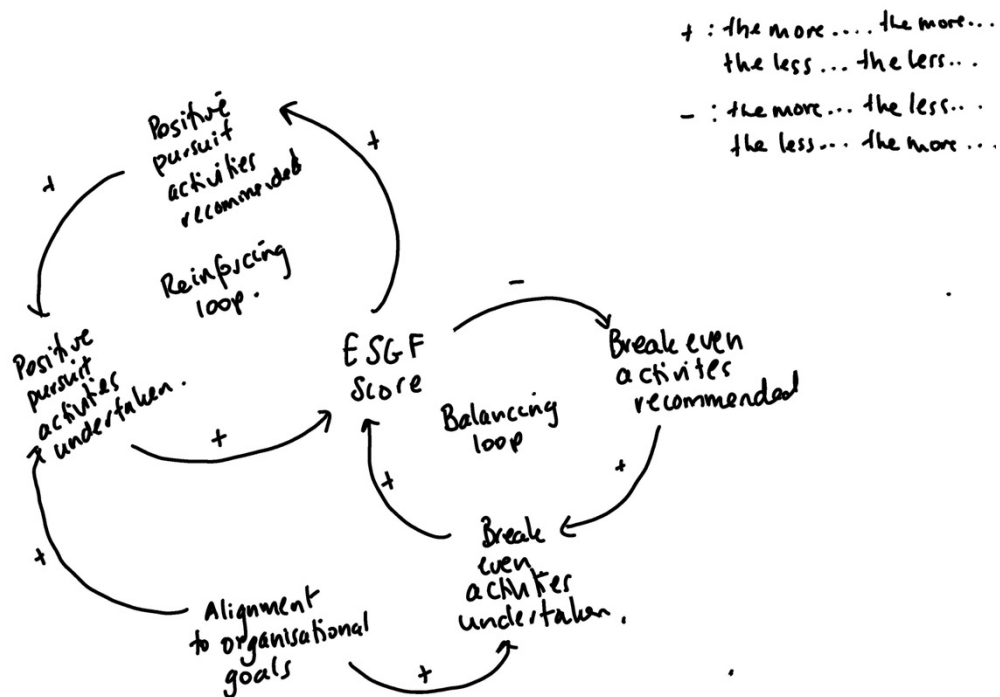


Figure 1: Visual representation of how OrgB's "Environmental Social Governance Financials Score" (ESGF) interacts with customer activities. Created as a summary of conversations with OrgB and tested with OrgB. Positive feedback loops (+), also known as reinforcing loops, indicate that a change in a particular direction prompts changes in the same direction (i.e., the more something changes, the more something else changes; or the less something changes, the less something else changes). Negative feedback loops, or balancing loops, indicate that a change in one direction prompts changes in the opposite direction (i.e., the more something changes, the less something else changes, and vice versa).

Scales

Scales can be thought of as “the spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon” (Gibson et al., 1998, p. 9). Scales and levels (locations on a given scale) are relevant to a variety of phenomena across different disciplines, making them a ripe concept for cyberneticians who often work in transdisciplinary contexts². For example, Daniell and Barreteau (2014) expand upon Cash et al.’s (2006) schematic illustrations of scales and levels critical in understanding and responding to human–environment interactions to describe eight different scales and their associated levels relevant to water governance. These scales are spatial, temporal, administrative, institutional, management, networks, knowledge/information and stakes/issues. Further, Brand (2000) talks at length about the importance of scales:

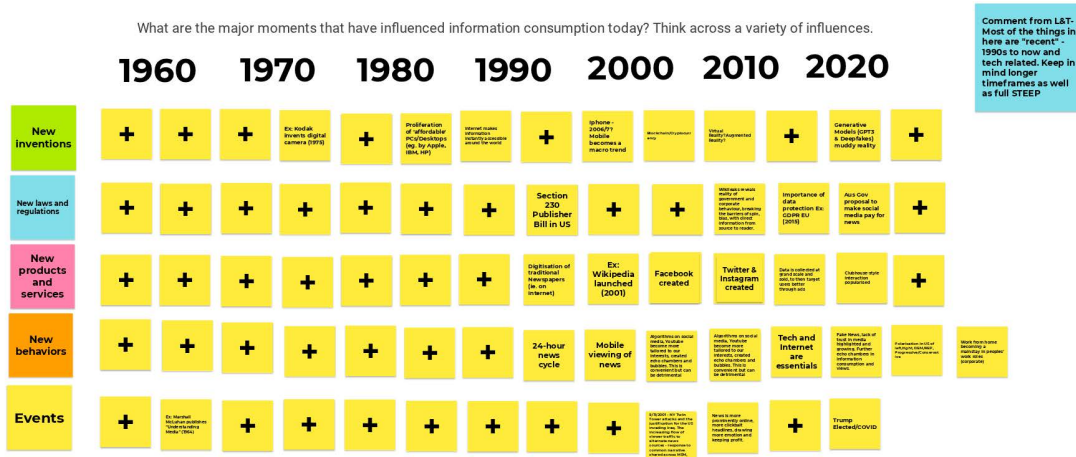
Consider, for example, a coniferous forest. The hierarchy in scale of pine needle, tree crown, patch, stand, whole forest, and biome is also a time hierarchy. The needle changes within a year, the tree crown over several years, the patch over many decades, the stand over a couple of centuries, the forest over a thousand years, and the biome over ten thousand years. The range of what the needle may do is constrained by the tree crown, which is constrained by the patch and stand, which are controlled by the forest, which is controlled by the biome. (Brand, 2000, p. 34)

Unsurprisingly, time is an important scale during my interactions with the early-stage startups. On the one hand, they are operating in ever-present short timescales: what might happen tomorrow, be shipped by the end of the week, or targeted for the next month or quarter. Concurrently, there are discussions about longer timescales—for example, for garnering investment and for exiting the business altogether. These longer timescales are driven by investors, particularly venture capitalists, who want to see growth trajectories in metrics such as revenue, customer acquisition/retention, and/or profit across a portfolio of companies over the lifespan of their fund (usually 7–10 years). This combination of short timescales for product development and delivery and longer timescales for profitable exits is very characteristic of startup environments.

For the early-stage startups I have been working with, the “fail fast” mentality is deeply ingrained in what it means to be a “good entrepreneur.” Short timescales, however, as Brand (2000) discusses, can often be at odds with

² The transdisciplinary nature of cybernetics was especially prevalent in the 1940s and 1950s with the Macy Conferences—a series of meetings where mathematicians, physicists, anthropologists, sociologists, psychologists, psychiatrists, and others gathered to discuss a general science of the workings of the human mind. See American Society for Cybernetics (n.d.) for further information on the Macy Conferences.

responsible behavior. To assist in shifting the perspectives of OrgT’s co-founders towards longer timeframes, we engaged in futures and forecasting activities, which helped them place their efforts in a much wider historical and future context. We used the Institute for the Future’s (2021) exercise “Look Back to Look Forward,” which prompted OrgT to think about the major moments that have influenced the wider industry that they are operating in: information consumption. This consideration was made over time as well as through the lenses of new interventions, laws and regulations, products and services, behaviors, and events (Figure 2).



LOOK BACK TO LOOK FORWARD
 Instructions: edit a sticky note to write down what you consider to be the major inventions, laws, events, behaviors and products/services that have influenced information consumption & media

Figure 2: Visual representation of major moments that have influenced information consumption, placing OrgT’s activities within a longer historical time horizon. Co-created output as part of futures and forecasting workshops undertaken with OrgT.

We also collected signals—surface-level phenomena—and drivers—longer-term trends unlikely to change—and combined them in different ways to prompt the creation of different forecast narratives (see Appendix B6 of Bell et al., 2021, for an example of this process). Armed with these narratives, we considered their impact on OrgT’s users in 10 years’ time. We created profiles of different users operating within some of the forecast scenarios and using OrgT’s products. Although OrgT believed they were building a “neutral platform” at the beginning of our interactions, by the end of these futures and forecasting activities they had changed their perspective: “We are well aware of the impacts that a ‘growth at all costs’ mentality can have. We take our responsibility as entrepreneurs seriously to ensure that we don’t make the same mistakes of the past.” (Org T Cofounder)

Thinking across different scales was also brought into a variety of product-based conversations. For example, with OrgT, there was clear importance placed on time, communication, and knowledge scales through their *storylines* and *storyspaces* product features. In an effort to understand what was involved both

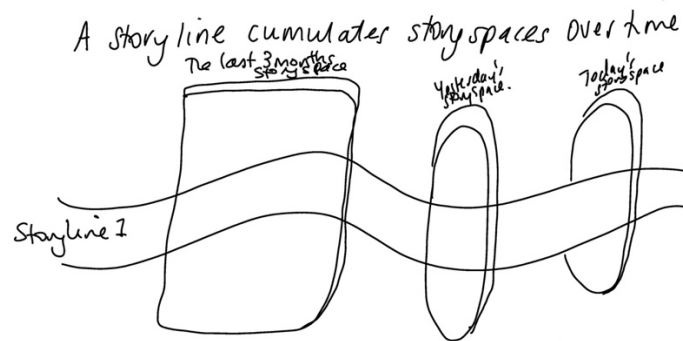
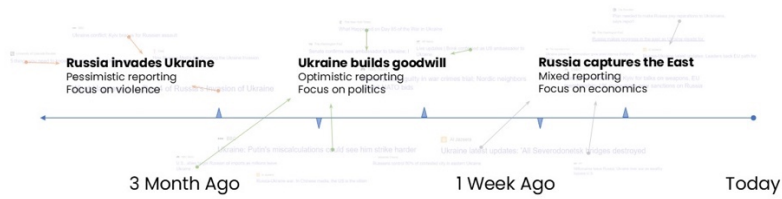
conceptually and algorithmically in these features, we drew several iterations of how storylines and storyspaces were connected over time and also used metaphors such as a beaded necklace to bring further understanding (Figure 3 A–C).

What is a Storyline?

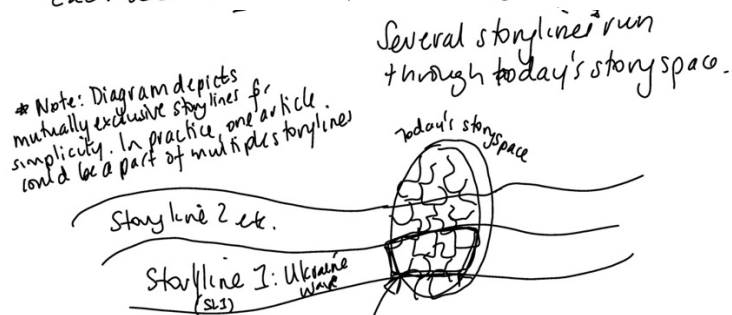
A timeline of news coverage...

... with thousands of articles across history...

... analyzed with AI to build a coherent narrative.



Think of a storyline as beads on a necklace. Each bead is a time-specified storyspace.



This slice of today's storyspace (SS_t) is relevant to storyline 1 (ukraine war). This slice is today's storyspace for storyline ($SS_t, SL1$)

Figure 3 A, B & C (top to bottom): Visual representations of OrgT's storylines and storyspaces and their interrelation over time.

Various iterations were created and discussed in OrgT participatory workshops. 3A was created by developer co-founder. 3B and 3C were created by the primary researcher. All representations discussed within participatory workshops.

We also considered the impact of OrgT's products over time from the user's perspective (Figure 4). These conversations prompted different prototyping ideas regarding how a user might track their progress over time—for example, in a dashboard showing their changing news diet.

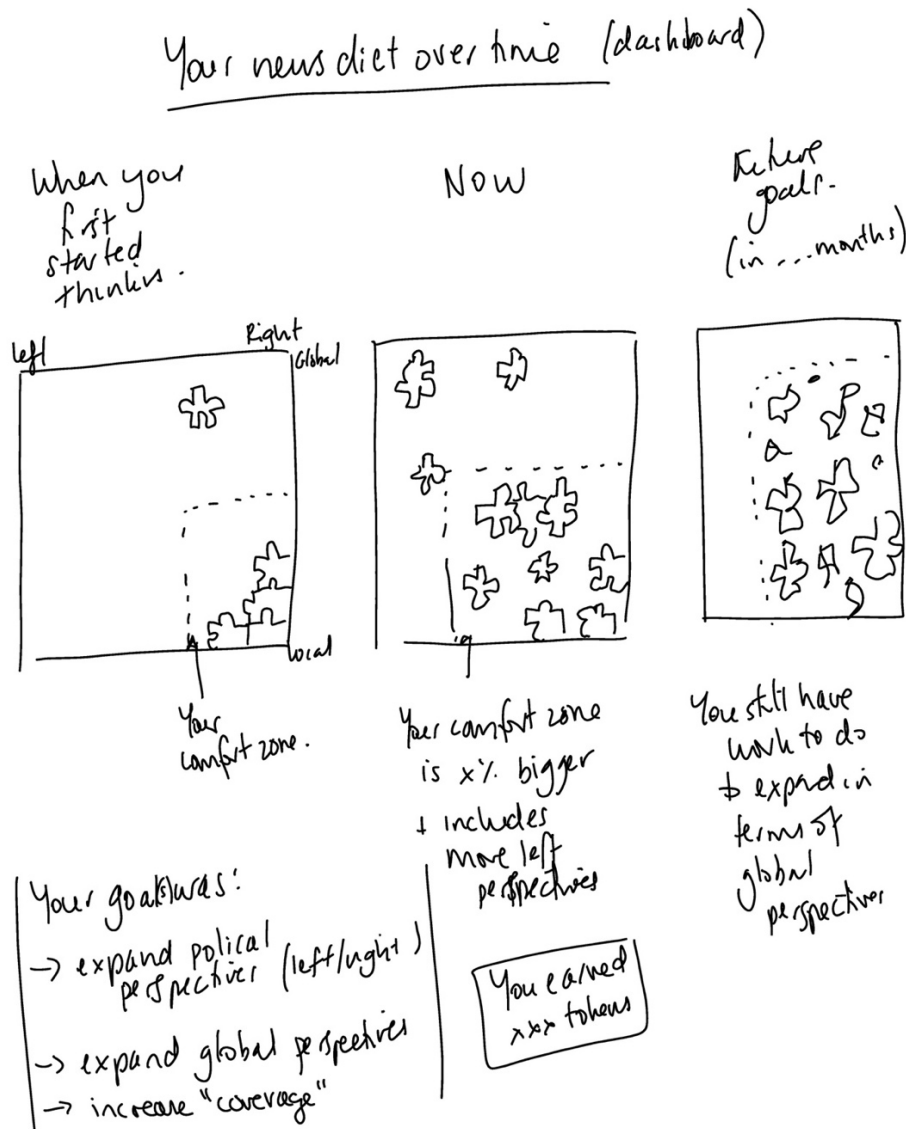


Figure 4: Visual representation of the intended change in users' "media diet" from using OrgT's product. Discussed in OrgT participatory workshops. Puzzle pieces represent news articles.

Thresholds

Thresholds can be thought of as a point that, once passed, catalyzes some sort of change. The concept of thresholds and their importance to cybernetics can be connected to ideas around homeostasis. For Claude Bernard (1957), homeostasis referred to the steadiness of the internal environment as a condition for free and independent life. Over time, these ideas have been recast into the language of thermodynamic systems to describe the persistence of a living system in the face of specific and dynamic disequilibrium (Pross, 2016). Wiener brought homeostasis into cybernetics, drawing upon the self-regulatory capabilities of organisms (Rosenblueth et al., 1943). Further, cybernetician W. Ross Ashby (1960) describes the brain as a homeostat -and observes the existence of a threshold as when “the variable shows no change except when the disturbance coming to it exceeds some definite value” (Ashby, 1956, p. 66)—a phenomenon ubiquitous in our nervous systems. Cybernetician Gordon Pask turns the notion of thresholds into art through the design and creation of the Musicolor machine, which used the sound of a musical performance to control a light show, incorporating “adaptive threshold devices” (Pickering, 2014). In more recent times, systems scientist Gerald Midgley (2000) discusses at length the power associated with setting, questioning, and critiquing boundaries (which one can think of as a type of threshold).

Thinking in thresholds became a helpful visual device for organizational understanding in this research. In the case of OrgT, thresholds were an important way to articulate some of the deepest fears about the potential impact of their product—namely, the risk of radicalizing their user base:

Any content feed that’s a modern content feed you start getting into filter bubbles... but our very business offering is to pop people’s filter bubbles. So I guess we have to be aware of going in the other direction as well...we don’t want to push people away from our platform because none of it’s relevant...and we don’t want to radicalise people as a result of popping their filter bubble. (OrgT Co-Founder B, participatory workshop March 23, 2022)

Visual representation was used to assist OrgT in ensuring that users’ media bubbles are expanded, but not “too much,” as represented in Figure 5.

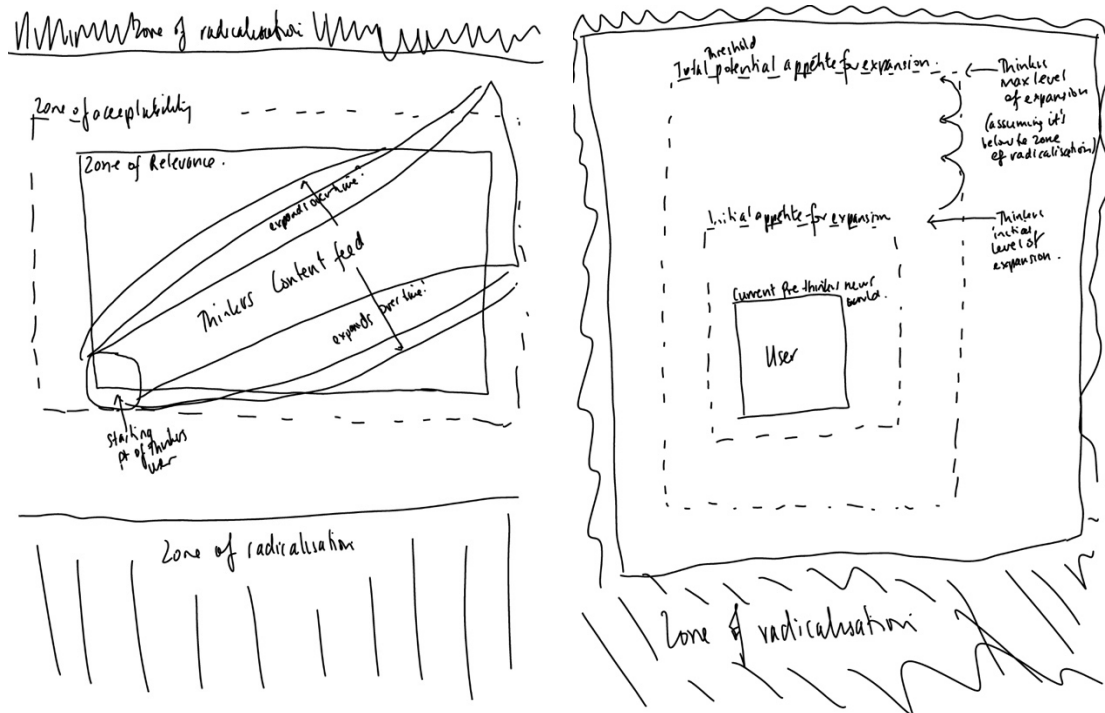


Figure 5: Thresholds-based view of OrgT's product goal. Left: Centering the User. Right: Centering the content feed of OrgT's product. Created after participatory workshops with OrgT and discussed in follow-up sessions.

Threshold thinking has also been helpful in my own distillation around what I am learning about responsible AI practices—specifically, how different modes of responsibility operate in relation to zones (or thresholds) of un/acceptability. Figure 6 depicts one attempt to show the difference between protective/remedial responsibility—which either prevents a system from moving into a zone of unacceptability or remedies it when it does occur—and proactive responsibility, which operates within and beyond the known threshold of acceptability, prompting innovation and new thinking in the process.

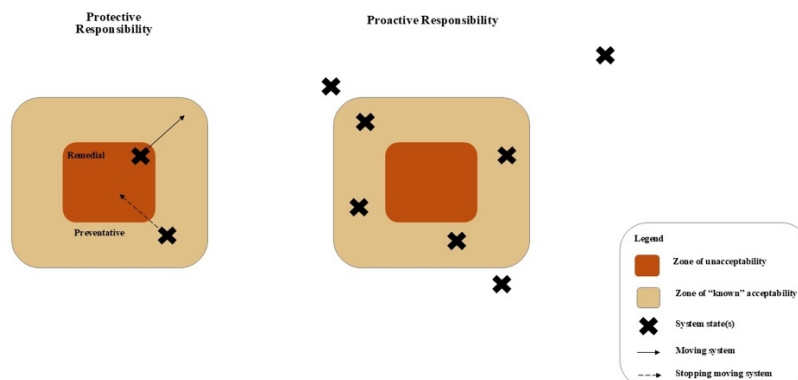


Figure 6: Descriptive, protective/remedial, and proactive responsibility in relation to the thresholds of un/acceptability. Created as a part of my own reflective practices as a researcher.

Leverage Points

According to Meadows (2008), a system comprises elements, a function or purpose, and interconnectedness—and is always more than the sum of its parts. Meadows (2008) identifies twelve places to intervene in a system in order to change its dynamics and calls these “leverage points.” The most challenging leverage point to intervene at, and the one likely to yield the biggest shift in systems dynamics, is the power to transcend paradigms (Leverage Point 1, LP1). This is followed by the mindset out of which the system arises (LP2), the goals of the system (LP3), the power to add, change, or self-organize system structure (LP4), the rules of the system (such as incentives and constraints) (LP5), the structure of information flows (LP6), the gain around driving positive feedback loops (LP7), the strength of negative feedback loops (LP8), the length of delays relative to the rate of system change (LP9), the structure of material stock and flows (LP10), the size of buffer stocks relative to their flows (LP11), and finally parameters (LP12)—the easiest place to intervene and least effective to create system-wide change.

Since Meadows’ (2008) influential work, various authors have adapted the notion of leverage points. For example, Abson et al. (2017) group the twelve points of leverage into four larger categories: intent leverage points (LP1–3), design leverage points (LP4–6), feedback leverage points (LP7–9), and parameter leverage points (LP10–12). Similarly, Malhi et al. (2009) adapt Meadows’ leverage points into an Intervention Level Framework with five categories: paradigms (LP1–2), goals (LP3), system structure (LP4–6), feedback and delays (LP 7–9), and structural elements (LP10–12). Given the broader research agenda is based on intervention research, I have adopted the Malhi et al. (2009) structure as a way to think through how the different interventions trialed in my PhD research are tackling different leverage points. As shown in Figure 7, my PhD has three prototypes—a pledge-making process, a Dignity Lens tool and a reflective practice approach—which directly intervene in different ways across goals, system structure, and feedback and delays. Indirectly, these prototypes are contributing to paradigm shifts around engaging with both protective and proactive forms of responsibility as well as fostering cybernetic awareness; these indirect interventions are aimed at shifting paradigms of the system of responsible AI.

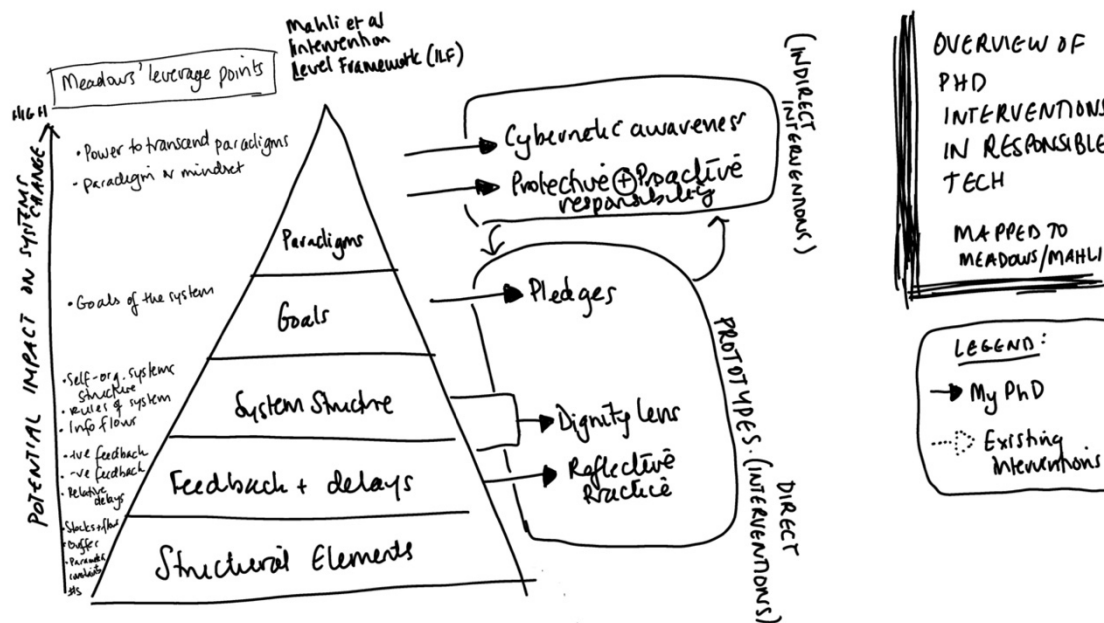


Figure 7: Overview of my PhD intervention research, organized by leverage points. Created as part of my researcher reflective practices.

Cybernetic Awareness

Von Foerster (2003) commented that people could generally be separated into two types: discoverers, who saw themselves as citizens of an independent universe, whose customs and rules would eventually be uncovered; and inventors, who recognized themselves as “participants in a conspiracy, a world whose customs, rules and regulations [they] were inventing” (von Foerster, 2003, p. 5). This distinction in worldview—as observer or participant, discoverer or inventor—lies at the heart of the distinction between first-order and second-order cybernetics. This paper adopts the term “cybernetic awareness” to encapsulate the second-order, participant, inventor approach to seeing oneself as part of the system, not merely observing it.

From the perspective of undertaking research, cybernetic awareness is closely connected to ideas around researcher positionality or researcher stance (Corlett & Mavin, 2018) as well as critical cybernetics. Researcher positionality begins with the premise that subjectivity is inherent in research, particularly social sciences research, and is used to make explicit the influences that have shaped the research itself. Critical cybernetics pays attention to the ways we name, describe, and model systems and the role of power, values, and systems in doing so (Krippendorff, 2023). I have used diagramming practices as a way of building my own cybernetic awareness as a researcher (Figure 8 and Figure 9).

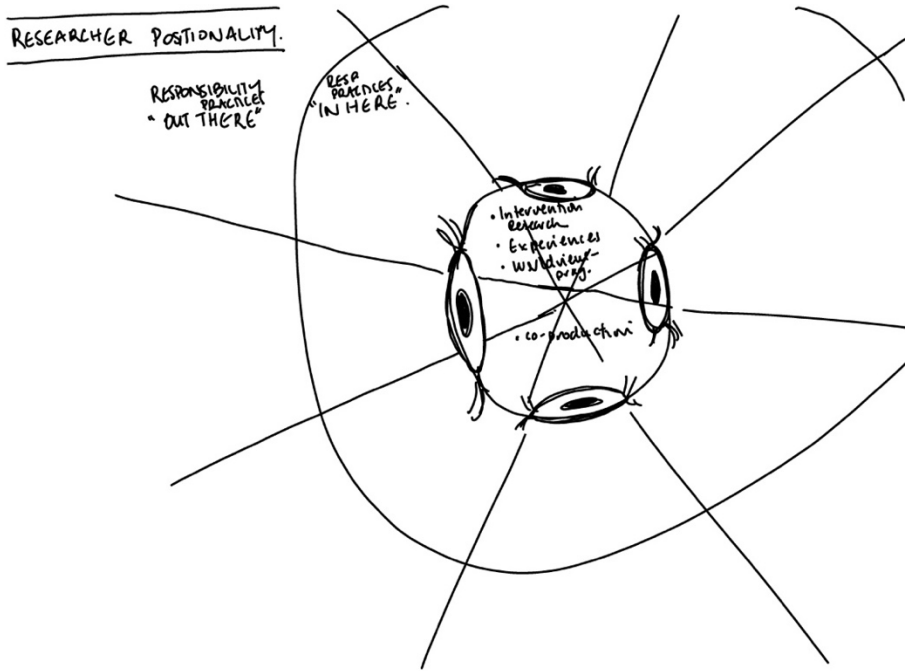


Figure 8: My researcher positionality, representation 1.

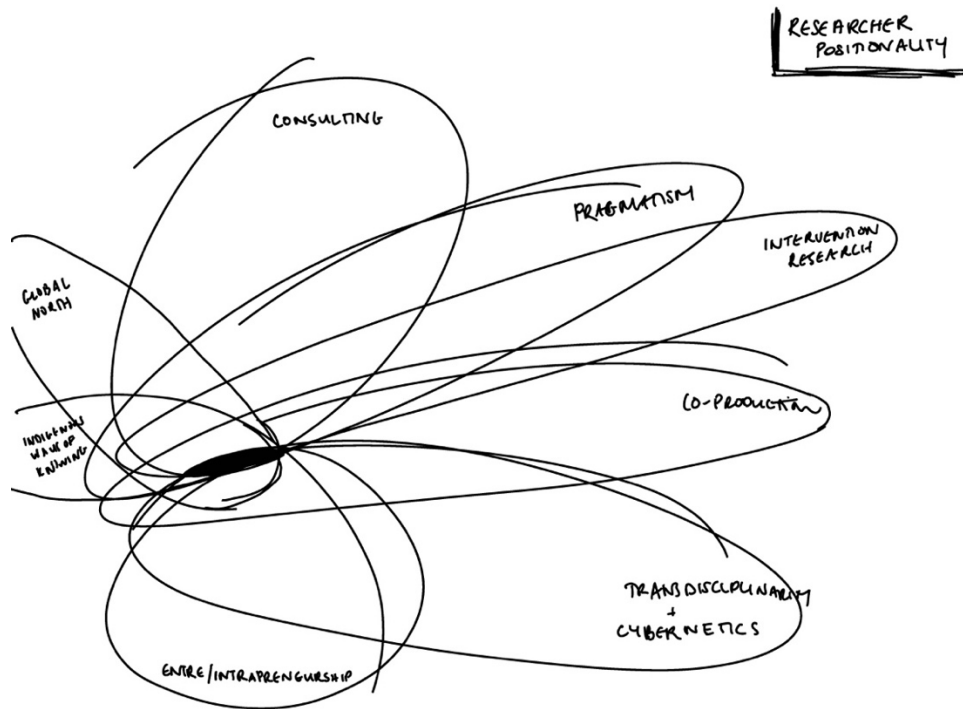


Figure 9: My researcher positionality, representation 2.

I have also created positionality diagrams when working with OrgH to outline broader systems dynamics at play. Eventually, a version of this diagram became the organizing structure for a report for OrgH reflecting our research findings (Figure 10).

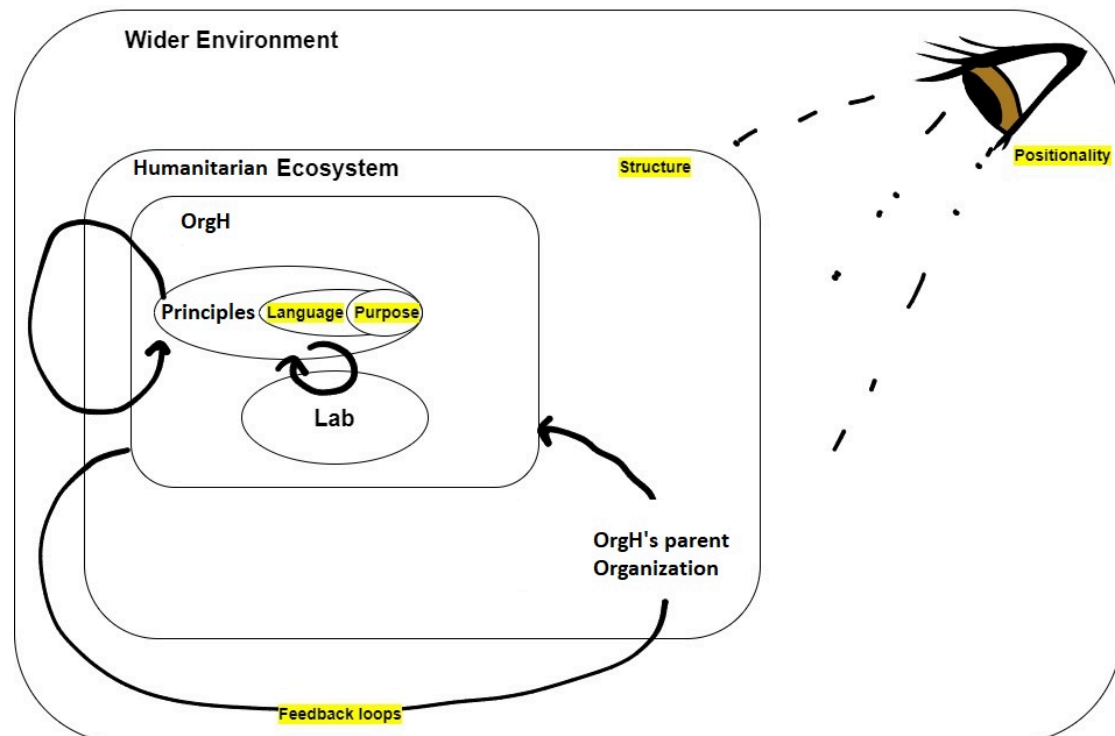


Figure 10: Positionality of OrgH. Aspects of this diagram have been anonymized. Yellow highlighting indicates the high-level structure of the research report created for OrgH

Spaces Afforded by Cybernetic Diagramming Practices and the Cybernetic Lookbook

In the case of OrgT, the above cybernetic diagrams (and others) were compiled into a “lookbook.” In this section, we focus on OrgT’s lookbook and the different spaces it affords—conversation, co-production, and reflection spaces.

Conversation Spaces

Working through what responsible AI could look like in practice for early-stage startups was a non-trivial exercise. For OrgT, it became clear that, to have a conversation around what responsibility looks like in practice, the group needed to discuss the decisions made to date in the work-in-progress product. To assist with this, various visual artifacts were produced to unpack what was meant by certain terms. For example, I created visual artifacts to clarify the organization’s use of the terms “storyline” and “storyspace” (Figure 3). In doing so, these

clarifying conversations served not just my understanding but that of the other co-founders as well.

Further, the technical co-founder of OrgT produced various data maps to explain how data flows occurred within the product, including the feedback loops involved. Some of these were digitally animated. These visual artifacts enabled a wide range of conversations, particularly when they revealed that several responsible AI principles that OrgT were considering adopting were in tension with the current design. For example, OrgT often discussed the importance of its products in providing access to a plurality of perspectives. However, examining the data flow maps in detail revealed that the sources of data used as algorithmic fuel were scraped from quite limited sources, driven in part by the economics of using GPT-3 (which charges by tokens or pieces of words used for natural language processing). These conversations then transitioned into a co-production space. As summarized by one of the OrgT co-founders,

[We're] being reminded to pay attention...we've gone from just chatting to keeping documents and writing things down and drawing the sorts of structures and systems that we're building... what are the extra questions we should be asking? (OrgT Co-Founder B, interview, August 26, 2022)

Co-production spaces

In response to input from the different co-founders and from me, co-production was encouraged through the visual artifacts. For example, in creating data maps, one technical co-founder of OrgT often contributed first, and the other co-founders and myself added further information. Seeing the product's dynamics through different lenses—such as the cybernetic perspectives of feedback loops and thresholds—opened new ways of designing, configuring, and communicating their product. For example, following the conversation space enabled by the data flow maps and the surfacing of tensions, the co-founders then moved into solutions mode, prompting product innovation ideas to tackle the tensions inherent in providing access to a plurality of perspectives. As a result, they devised a way to enable better representation of sources while maintaining similar economics. One co-founder reflected: “A lot of our biggest product breakthroughs have been in these sessions rather than in our weekly check-in call. (OrgT Co-Founder B, interview, August 26, 2022)

Similarly, visual artifacts employing the cybernetic concept of thresholds also led to product innovation ideas. For example, in **Error! Reference source not found.**, I crafted a visual representation of OrgT's content feed as navigating zones of relevance, acceptability, and radicalization. This prompted product feature ideas to help guardrail the zones in which the content feed operated—for example, through features that encouraged additional user input and feedback.

Reflection Spaces

Many of the artifacts produced over the course of the participatory workshops were compiled into a lookbook for OrgT with an initial goal of prompting reflection. In its first iteration, this was far from a polished document, but served as a starting point to bring the different parts of OrgT's product story together. This lookbook was particularly used during one-on-one reflection interviews with each co-founder. It helped visualize the evolution of ideas over time and prompted a range of reflections from the co-founders on what they had learned and how helpful these visual artifacts had been in generating a shared understanding of what they were really building and the potential implications for various stakeholder groups. One of OrgT's co-founders shared how reflective space was afforded through the drawings captured in Figure 3, for example:

The storylines and story spaces development [seen in Figure 3] ... drawing them ... [and] pushing the questions about ... general ways to think of them [has been helpful]. I think because we get so wrapped up in specifics ... having to write down into a document and having to draw it out in a sort of abstract way is really nice versus most of my drawings or our [OrgT] drawings are user interface and mockups and so it doesn't let you step back and think, okay, what is this system? What is the structure of this thing? (OrgT Co-Founder B, participatory workshop, August 26, 2022)

In the future, I envision a version of the cybernetic lookbook sitting alongside other entrepreneurial visual tools, such as the Business Model Canvas (Osterwalder & Pigneur, n.d.), as a way of capturing organizational understanding. Further, I speculate that the lookbook could have additional relevance as a visual artifact to help startups track the evolution of their models over time, fuel reflective practice, and potentially play a role in accompanying storytelling to attract prospective new hires or funders.

A compilation of the various cybernetic diagrams is also being curated for my doctorate. A cybernetic lookbook may be useful for conveying the values, perspectives, and approaches that have been taken in the research, enhancing understanding of my own research practices and building cybernetic awareness. This approach may be particularly relevant for intervention research and other action-oriented methodologies, where reflective practices are core (Bradbury, 2010; Costello & Costello, 2011; Ison, 2008; Schön, 2017).

Conclusions

Grounded in the real-world complexity of organizational change, this paper repurposes the lookbook from the field of fashion to support systems thinking and transformation. Cybernetic lookbooks open new avenues for understanding organizational dynamics by affording several types of spaces: spaces for conversation, co-production, and reflection. By affording conversation spaces,

they allowed different members of the co-founding team, with their varied backgrounds and directions, to surface crossroads in the form of tensions to navigate, decisions to make, or impacts of decisions to rectify. In this way, the cybernetic lookbook fulfilled a role as a boundary object (Leigh Star, 2010), where the co-founders, with their different perspectives, could participate, problem-solve, innovate, and collaborate towards systems change. By affording co-production spaces, the cybernetic lookbook assisted in forging new paths in response to the crossroads surfaced in conversation. And by affording reflection spaces, the cybernetic lookbook enabled the team to distil learnings that may serve for future crossroads. It is hoped that this paper provides a useful starting point for others who may wish to engage with cybernetic diagramming practices and the creation of lookbooks to enhance organizational and research understanding for awareness-based systems change.

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Conflict of Interest Statement

To the author's knowledge, there are no conflicts of interest related to this work.

Ethics Statement

This study underwent formal ethical review through the Australian National University's Human Research Ethics Committee (protocol 2022/051), with all participants providing voluntary consent after receiving comprehensive information about the research. They explicitly authorized the use of their data for academic purposes. To protect the participating organizations from any inadvertent negative consequences, extensive measures were taken to anonymize both institutional identities and individual contributors referenced throughout this document. Additionally, each organization received advance copies of the manuscript sections discussing their involvement, allowing them to verify that confidentiality had been maintained and to provide input. The review process yielded limited comments that did not materially alter the core findings or analysis, and all organizational feedback was incorporated into the final text.

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