Relics and Resources: Representing complexity in service and systemic design

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Relics and resources: Representing complexity in service and systemic design

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This paper explores designerly tools for visualising insights, generative creativity and mirroring complexity. As designers are increasingly facilitating complex and wicked problems, making sense of and communicating large amounts of insights becomes a challenge (Kolko, 2010; Talgorn & Hendriks, 2021). We focus on the potential and importance of such tools for designers, as well as highlighting potential pitfalls for design as designers' good intentions meet the demands and complexities of "the real world". We address the issue of representation through discussions of the expert power of designers and the power of design tools, as well as organisational and wider system components. We believe that a key challenge is developing and applying approaches to design based on non-representational foundations. In the last part of the paper, we explore some existing approaches and potential directions for research and practice. Here, we highlight non-human lenses that acknowledge more than human agency and narrative and reflexive approaches that might acknowledge bias and a multiplicity of presents and futures. Further, we briefly explore the topic of transdisciplinary action as well as organisational and industrial transformation to address what we call a "resource/relic dichotomy." While we do not claim to have many answers as of now, we raise some key questions we believe will be of importance for system and service design practice and research.

KEYWORDS: systemic design, complexity, gigamaps, personas, visualisation, representation, power

RSD: Methods & Methodology

Introduction

Our society is facing increasingly complex and wicked problems, which require the work and commitment of different experts and disciplines. In this paper, we focus on designers, who, instead of "shaping plastics and metal, doorknobs and medical instruments," increasingly "set out to shape interactions, systems and people" (Wetter-Edman, 2014, p. 30). This is especially true for service and system-oriented designers, gradually moving into the realm of strategy and policy, areas in great need of design-driven innovation approaches (Barbero, 2017).

The emerging field of Systemic design bridges design and systems thinking in order to better deal with the multifaceted issues facing people, organisations, governments and the planet as a whole. This means that designers have an arsenal of tools which can potentially help deal with complexity, design new relationships, and collaborate and visualise hidden potentialities (Barbero, 2017). However, it is important to remember that designers have expert power (Bratteteig & Wagner, 2014) and that design can give "material form and directionality to the ideological embodiment of a particular politics" (Fry, 2011, p. 6). This means that design can, for example, unintentionally (or intentionally) uphold and even create inequality (Goodwill, Bijl-Brouwer, & Bendor, 2021).

In addition, systemic design is characterised by openness and innovation in regard to its methods, theoretical approaches and tools, with the aim to "ensure that the field achieves its vision without settling into a fixed paradigm or methodology" (Sevaldson & Jones, 2019, p. 75).

In this paper, we question the expert power of designers and the role of non-humans implicated in designing for/in/with complex problems. We focus on gigamapping and other methods/tools for visualising insight and complexity as examples in this paper, as they are increasingly applied as sensemaking tools for designers and other changemakers – and handed over to their clients.

Designing in and with complex problems

All problems designers face in contemporary society are part of complex systems (Nelson & Stolterman, 2012). Complex systems (e.g., health care, education) are very difficult to change, as they are made up of many different components, entangled to the point where emergent effects of their relationship, and the system itself, go beyond individual attributes. The problems which emerge from and in these systems are wicked (Horst & Webber, 1973), constantly mutating, networked and defying definitions and simple solutions. As such, to address wicked problems in complex systems, it has been argued that designers should approach the entire system as the object of design – and work with incremental changes targeting multiple components over time (Jones, 2014; Norman & Stappers, 2015).

However, approaching the system as an object of design means making sense of it. In the following part of the paper, we explore the topics of visual sensemaking, the emergent expert power of designers and the role played by non-humans in complex design projects. Here, the reader should note that this is by no means a comprehensive literature review but a curious exploration for future research and practice.

Visual sensemaking

Designers´ practices are part of material culture, populated with personas, customer journeys, Post-its, Play-doh, and so much more (Julier & Kimbell, 2019). Many of the material and visual practices of designers aim for generativity, where the designers' thinking evolves as part of creating and visualising—alone or with co-designers.

In aiming for change, designers must have a deep understanding of the problems and situations they face, often requiring collecting a vast amount of data/insight (Kolko, 2010; Lurås, 2016b). Kolko (2010, p. 19) suggests the term "externalisation." Designers

cannot keep all the collected information in their heads or the confinements of the technological realm: making it tangible in the physical realm in one cohesive visual structure (the wall); the designer is freed from the natural memory limitations of the brand and the artificial limitations of technology.

In order to map out and make sense of research material, Kolko (2010) further believes that designers partake in *abductive* sensemaking, the process of "manipulating, organising, pruning, and filtering data in the context of a design problem, in an effort to produce information and knowledge" (p. 27). Abduction means making creative inferential leaps based on best guesses and experience, which drive innovation. This kind of sensemaking is a unique and ongoing process, as what is discovered at one time in the design endeavour will not necessarily hold at a different point in the process; it is created and later updated based on interpretation and experience (Lurås, 2016b).

Such externalisation can also engage a mode of participation, where participants in co-design processes are involved and help validate or make the aforementioned inferential leaps. In designing for complex problems and systems, the designer´s main function can be facilitating processes and creating facilitation tools, "aesthetic experiences intentionally crafted by design facilitators that can be seen, smelled, touched, heard, or tasted by participants" (Aguirre, Agudelo, & Romm, 2017, p. 202). The gigamap, for example, can be a useful visual tool for making collective sense of, thinking about and understanding complex problems and systems (Sevaldson, 2012). Information can be based on experience and fieldwork (Lurås, 2016a). The practice of gigamapping is the attempt to make super-complexity visible in order to facilitate the emergence of new insight and knowledge[1] (Sevaldson, 2011). It is not meant for passive communication, such as conventional diagrams, but is a design practice for designers and other changemakers. Gigamaps can also help define the boundaries of a system, for example, in time, according to a theme, a phenomenon, or actors. It can work as a "visualization and communication of the final projects" and a base for designing and testing solutions (Lurås, 2016a; Sevaldson, 2011, p. 7).

[1] along with new ways of depicting information.

Sevaldson (2014) sees what Kolko (2010) refers to as externalisation as a type of internalisation of large amounts of data by the designer (or others): when creating the map, there is no longer a divide between thinking, sensing, and designing. The map gives an overall feeling for the situation – and having made it, the creator has greater insight and understanding of the phenomenon than a random viewer. These are processual tools based on the inferential leaps of "not-always-knowing-what-one-is-doing", the important serendipity of design processes (Sevaldson, 2011, p. 4).

The expert power of service and systemic designers

Because systems and service designers aim to form "interactions, systems and people" (Wetter-Edman, 2014, p. 30), they also carry a huge responsibility (Sangiorgi, 2009). Goodwill et al. (2021, p. 56) recently argued that "we need to turn our attention to how systemic notions of power play out in design practice in order to prevent the reproduction of inequity and injustice by design". One aspect of power that has yet to be fully explored is the power of design artefacts in such design processes (Hvidsten, 2020). Services and systems are mostly invisible (Penin, 2018), made comprehensive through narratives, visualisation and other types of representation in order to become objects of analysis and (re)design. This means that we design, and design with, artefacts as part of the process. This also raises questions about the power designers have in these representations of problems, services and systems.

Goodwill et al. (2021) explored how service design practitioners experienced power in their practice. Looking to social theory, they defined it as such in the context of design:

> [P]ower can be understood as an actor´s ability to influence the outcome (power to), enabled by asymmetry if their relationship with other social actors (or stakeholders) involved in the design process (power over), and structurally built into the design project itself. (p. 47)

They further argue that expert designers mostly have a privileged role in society, which might render other, less privileged viewpoints invisible. This means that designers need to be aware of privilege and oppression, including their own. Kolko (2010, p. 21) believes that during design synthesis, the designer "must decide that one piece of data is more

important than another," what is relevant for the current problem-solving context, as well as forge connections between (often previously unrelated elements). This gives the designer power.

Designers have expert power, (partly) power in designing the project, and to a large degree, to define access, roles and rules for the process as well as defining the solution (Goodwill et al., 2021). Designers frame and re-frame issues in order to explore, test solutions and move towards solutions (Buchanan, 1992); however, even when these frames are iterative and flexible, framing affects, for example, the attention given or financing of endeavours, who/what is included and not (Jones, 2014).

The power of design tools

Results from social, services, and systemic design are not predominately physical artefacts but focus on organisational and policy change, re-configuring relationships, new services and systems, etc. However, exploring and designing for such change requires physical and digital artefacts, which are part of the material culture of designers (Julier & Kimbell, 2019). Designers' authority (and identity) is, as such, somewhat embedded into their tools of the trade (Julier & Kimbell, 2019) and can emerge through, for example, gigamapping. The approaches can be difficult to apply, for example, adapting the mapping approach to the current situation, handling the emergence of the map as a design artefact in the process, and dealing with the lack of a set starting point (Lurås, 2016a; Sevaldson, 2012).

In processes of co-creation and participatory design, visual and written artefacts can serve as forms of communication and shared cognition between team members (Bechky, 2003b; Henderson, 1991) and express and capture tacit knowledge (Henderson, 1995). For transdisciplinary design efforts, visualisation is important for communication and ideation across specialisations. For example, the persona (Massanari, 2010) and the gigamap have been investigated as boundary objects for current (Kvam, 2021) and future situations (Lurås, 2016b): translation devices between actors and teams with unique, specialised knowledge (Star & Griesemer, 1989).

Research shows us that artefacts can also be control gates for participation (Henderson, 1995), delegation and expression of legitimacy and power (Bechky, 2003a) and triggers for controversy (Barrett & Oborn, 2010). Further, it highlights a need to explore facilitation and co-design tools as they might make participants "perceive complex problems differently and get a feeling of change [original emphasis]", and there is a danger that the work "ends up as some really nice Post-it notes on a wall somewhere"[2] (Julier & Kimbell, 2019, p. 18). The emerging effect is then the illusion of change, and the promise of the design process becomes "encapsulated and sealed into the Post-its and their representation [original emphasis]" (Julier & Kimbell, 2019, p. 18). Designerly artefacts become representational artefacts between stakeholders and can help to avoid (but also result in) tokenism: where affected stakeholders are included in the design process, but their contribution has no real impact (Morrison & Dearden, 2013).

Representational epistemologies are built on beliefs that we can represent the objects of the world and their relationships and that our representation reflects reality. The observer becomes an external rational processor of information, and "objects are presumed to exist and be governed by laws independently from observation by subjects" (Lorino, Tricard, & Clot, 2011, p. 771). Objects are always moving, and we can never really pin them down – they continually elude our attempts to give them a clear definition (Engeström, 2006). The contextuality of our definitions means that they will probably not hold in another spatial and social context (Lorino et al., 2011).

In design, there is a need to explore the dynamic between the static (sealed in) and dynamic capabilities of designerly tools in terms of representation, especially when representing user insights and complexity. Design can become an arrogant and dominant way of knowing that does not acknowledge that there are not only different perspectives—but different ways of being in the world (Law, 2015). Often, "[d]esign knowledge, process and methods are imagined as universal, so it can move easily

[2] Here, Julier and Kimbell cite Sophia Parker (2015), "Lab Notes interview with Sophia Parker, founder of Social Innovation Lab for Kent". Nesta. https://www.nesta.org.uk/blog/lab-notes-interview-with-sophia-parker-founder-of-social-innovation-lab-for-kent/

between places and people", for example, the double diamond and design thinking (Akama & Yee, 2016, p. 5).

Vink (2022) highlights how the user journey focuses on the individual experience, which undermines cultures and local contexts that value and stress collectively. Design can, as such, strip away certain aspects that should be included (Akama & Yee, 2016). Another design tool which has received particular critique in this regard is the user persona. Personas are fictional characters, or profiles, based on aggregated or shared attributes of people and groups (Stickdorn & Schneider, 2011). This means that, while fictional, personas are based on the feedback and insight of real people. As visual and/or narrative tools, personas "facilitate empathy between designer and user", bringing the characters to life and communicating important information that might otherwise be lost to the design process (Massanari, 2010, p. 407; Stickdorn & Schneider, 2011). Personas can become powerful boundary objects that facilitate communication and connection between people in the design process (Star & Griesemer, 1989). It has been suggested that materialising personas, for example, by printing their pictures (Garrett, 2002; Mulder & Yaar, 2006), brings them into the office and into the daily dialogue of the organisation. However, being representations of users, personas have also been called "political tools that may oversimplify important differences between individuals" (Massanari, 2010, p. 407). As such, materialising the persona makes it a static tool, a finished output of the design process: a powerful material representation. Julier and Kimbell (2019, p. 19)[3] argue that persons are actual and personas are virtual, and "abstract accounts of individual behaviour or social and economic activity become the accepted model of how things should be, regardless of how they would play out in actuality".

The power of organisational and industry (wider-system) components

Handed over visualisations can bring the past into offices and boardrooms of non-designer clients, hanging on the wall as relics—a snapshot of how the system, problem and or insight once was: how the future is depicted in the past, and in a certain context. When put up on walls, the materiality of Post-its—and especially

[3] Drawing on Carrier and Miller (1998).

Adobe-generated and large-scale printed visualisations no longer represent the complexity of the “here and now” but represent “what we know we know” about the past. We become biased in our search for new solutions. While this is not the philosophy behind reflective and academic approaches to visualisation tools, designers must adjust to the real demands of the real world.

The gigamap, for example, should be “information clouds” from where the designers and participants can derive innovative and creative solutions, and it is not supposed to be used to communicate outside the immediate stakeholders of the project (Sevaldson, 2011). However, it can also be used to communicate finished projects and contributions to the legitimacy of (systems) design as case studies and can even become important strategic tools for management (Lurås, 2016a; Sevaldson, 2011).

When dealing with complex systemic issues, designers are called to make small-step incremental and iterative approaches, as large systems and wicked problems are resistant to change (Norman & Stappers, 2015). Design initiatives can become compromises due to the overwhelming influence of political, economic, cultural and organisational issues (Norman & Stappers, 2015). It is difficult to keep an iterative and flexible approach when facing the realities of deadlines and budgets, generating linear design processes “reflecting the management and notions of goal-directed problem solving” (Shove, Watson, & Ingram, 2006, p. 3). For example, as Lurås (2016a) experienced:

> We initially wanted to make a paper-based and interactive map. We were unable to find an ‘out of the box’ interactive solution, however, and due to limited time and project resources, we decided at that stage only to make a non-interactive version. (p. 139)

How do designers deal with commercialisation and the problematic designer/client dyad, as well as the need to be scientific/evidence-based (Jones, 2014; Julier & Kimbell, 2019; Sevaldson, 2014)? What happens when gigamaps, personas and customer journeys become handovers and the designers/facilitators all leave the premises (Almqvist, 2017)? These handovers are often beautiful pieces of graphic design, professional large-scale printed and already decorating many an office and boardroom

in the Norwegian public sector. Here, it might represent the expert power of the designer—and often the insight and ideas generated in the past, sealing in any process or attempt of radical change. Indeed, Lurås (2016a, p. 146) found that in her case, "[t]he map has been used as a resource in other projects within Ulstein, and the company now considers the map to be a business-critical resource".

> *The question becomes: do these handovers encourage change, or do they unintentionally hinder change by creating new and static established truths?*

Relics and resources

In the section above, we explored how designers, tools and organisational and industry/societal components might influence design processes (and beyond). We zoomed in on the gigamap (and the persona), but the challenge emerged with many tools used to represent problems and insight. Systemic design has a huge potential to bring about positive impact and the transdisciplinary action needed to make systemic changes (Jones, 2014). The gigamap, as an example, has proven to be a generative tool for designers' and other changemakers´ abductive sensemaking, which rests on a solid conceptual foundation (Sevaldson, 2011, 2012). How might we defend their and other tools of visual generativity's potential without making them relics in the face of the "real world" compromises and, indeed, multiple "worlds"? This is difficult in the face of commercialisation (Sevaldson, 2014), the need for handovers (Almqvist, 2017), boardroom gigamaps and personas, and milestone outputs from designers and consultancies. How might gigamaps and other tools take part in the incremental innovation suggested for addressing complex systemic issues, the "muddling through" (Norman & Stappers, 2015)?

While we do not have the answer to these questions, in the following section, we explore topics related to the relic/resource dichotomy of the static and generative. Again, we kindly remind the reader that this is not a comprehensive overview but a curious exploration which can inspire discussion, future research and practice.

Understanding the power of non-humans: extending goodwill and colleagues

As illustrated in the early parts of the paper, we must keep working to understand the power of designers, expanding on the important work of scholars such as Goodwill et al. (2021). One way of expanding is by questioning who/what is counted as participants and at what time in design endeavours. Co-designing is an open-ended ongoing endeavour where different participants engage at different times and in different spaces – sometimes in contrasting ways (Björgvinsson, 2008; Ehn, 2008; Manzini, 2015). Design has no set beginning or end, and there is never one singular design (Garud, Jain, & Tuertscher, 2009).

In complex systems, emergent effects of the system are more than the sum of its parts (Norman & Stappers, 2015). Following post-human scholars of Science and Technology, we can extend Goodwill and colleagues´ important work and their notion of power to include non-humans: all actors can be the potential source of influence (Latour, 2005). This means that material, digital and spoken representations, tools, stories, deadlines, strategy and policy documents are all actants in any design process; they express power (Henderson, 1995; Hvidsten, 2020). It is not a question of intention but a question of agency. It is not an attempt to push human agency to the side but can be a way to explore more in-depth the "unarticulated frustrations and felt oppressions of human agency" (Krippendorff, 2021, p. 27).

For example, in the example of the persona and the gigamap, we can apply such a lens to explore how it might translate the power of designers, clients, policymakers funding of human-centred design etc., into material/digital form. By another example, tracing relationships all the way "back" to policy making, we see how post-decisions influence present and even future action (Hvidsten, 2020).

As such, perhaps designers should be mindful of the relationships they design between human and non-human actants, focusing on making some future outcomes more likely than others. This requires the understanding of how such actors relate to each other across time and space: both what is seen as "tools", "things", and "humans".

Key questions: Non-human lenses can sensitise us to, e.g. the power of tools, how designerly artefacts have unexpected effects in practice and how they might carry the past into the present. How can we then translate this acknowledgement into design practice?

Dialogue: multiple presents and futures

Several tools and mapping approaches attempt to tackle challenges of representation, such as those based on massive-multiplayer online games, depicting multiple event and implementation scenarios and more (Sevaldson, 2011). Collectively made open-ended future scenarios collectively can bring flexibility to design and change processes (Lurås, 2016a). Storytelling can support complex systems thinking by gathering, embedding, and making tangible and intangible data memorable and understandable (Lurås, 2016a; Talgorn & Hendriks, 2021). Scenario- and story-based approaches can have flexibility, room for interpretation, creativity, emotion and more: they provoke new ideas (Susanne Bødker, 1999; S Bødker & Christiansen, 1993).

Future scenarios have the ability to spark "what if?" questions and induce critical thinking and creativity. However, it is also important to understand the contextual, interpretive and temporal aspects of scenarios and stories as a type of sensemaking (van der Heijden, 2011). Talgorn and Hendriks (2021) present the idea of systemic storytelling, where parallel stories show multiple interpretations, non-linearly, on different levels of the system. This can engage stakeholders, comprehend and communicate the intangible and complex, trigger transformative action, reveal conflicting narratives, highlight temporalities and bias and spark unthought-of aspects of future systems. However, it is not only the future that is open-ended.

Law (2015, p. 126) argues that while we seem to believe that we do, we do not actually "live in a single container universe, but partially participate in multiple realities or a fractiverse". Design needs to engage with plurality and "cultivate the unique design capabilities of [...] individuals and communities so that they might take up a more active role in shaping their worlds in their own way" (Vink, 2022, p.58). Recognising and appreciating the incommensurability of different epistemologies and ontologies (plurality) is central to design (Akama & Yee, 2016; Vink, 2022).

A potential way to face representational epistemologies could be by giving accounts "of time as the continuous flow of experience" (Lorino et al., 2011). For example, the non-logical ways of thinking if narrative approaches can overcome representational epistemologies by appreciating context, novelty, bias, unpredictability and emergence in complex systems (Czarniawska, 1997; Talgorn & Hendriks, 2021; Tsoukas & Hatch, 2001, p. 1007):

> … a narrative approach to complexity theory suggests that our understandings of complex systems and their properties will always be grounded in the narratives we construct about them.

Narratives might sensitise us to our own storyteller bias and the existence of multiple presents and futures. Reflexivity, as postulated by Vink (2022), is a promising perspective for dialogue and cultivating transformative action.

> *Key questions: How can we utilise the known strengths of generative visualisation tools in the face of multiple presents and futures? How will such tools relate to, e.g. project deliverables and industry dynamics?*

Transdisciplinary and self-correction

Designers are increasingly facilitating complex processes and doing them well (Aguirre et al., 2017; Wetter-Edman, 2014). Designers cannot be, do or own every aspect of a project. In order to address complex issues, we must work inter- and transdisciplinary (Norman & Stappers, 2015). Designers both have expert power in defining (parts of) projects and through the use of tools; however, when tools become handovers, they often lack feedback or self-correcting aspects as projects end and time passes.

Some scholars, such as Lomas, Patel, and Forlizzi (2021, p. 139), believe that there might be "untapped potential" for integrating systemic design practices with "science tools" in order to foster transformative action. Others argue for the use of Artificial Intelligence (AI) and cybernetics, such as Lomas et al. (2021) exploring if data feedback loops can improve meaningful outcomes in complex sociotechnical systems. They found that designers can help set visions and data-informed feedback loops to help stakeholders reach them incrementally. As there are dangers to qualitative informed metrics and

feedback loops, they argue that designers can inform the much-needed reflection on goals and values. Further, it is no secret that user-generated data and algorithms play an important part in people's lives and the design and delivery of services (Orlikowski & Scott, 2015; Sangiorgi & Prendiville, 2017). However, it is seemingly yet to be applied to the practices such as gigamapping or other generative visualisation processes. When conducted with all beneficiaries of service, it is more likely to help as a tool for communication in strategy, but even a transdisciplinary approach could be hindered by maps of a static nature.

Physical and digital design artefacts allow different actions. Lurås (2016a) found that printed maps on walls afforded annotation, and remote sharing through PDF posed a challenge for cooperation. Several scholars see the digitalisation of mapping as an important and significant development (Lurås, 2016a; Sevaldson, 2011). Today, there are no digital design tools able to mirror or simulate the complexity of the real world (Davidova, 2017; Kolko, 2010). Digital design tools might simulate complexity and illustrate change as it happens in real time. There might be potential in the use of technology, maybe even AI[4], to digitise and make dynamic and fluid representations that never remain a static photograph at a specific moment in time. Or, it might be a matter of exploring and including other disciplines and other tools (or actants, if you will).

> *Key questions: If diverse experts work together, can we develop and work with tools that account for a multiplicity of presents and futures? How can we understand the role of designers in transdisciplinary efforts? What if "all that is solid melts into air" (Berman, 1982)?*

Organisational and industrial transformation?

Challenges such as designerly artefacts being transported out of their thought context are not simply an issue of and with the artefacts – but of network/relational effects. If designers must prove themselves and their profession, a beautiful map, customer journey, or persona can be the ultimate handover, even though they might be "process

[4] Possibly opening a new "can of worms" – but it does that mean we should not explore it?

tools and not meant to communicate outside of the involved stakeholders or owners of the maps" (Sevaldson, 2012). Rather, they can become trophies (and relics) of design, "a business-critical resource" at another time and place than intended by the design project (Lurås, 2016a, p. 146). For clients, it might be easier to latch on to the material as handovers, symbols of change, than to step into the unknown in pursuit of the uncomfortable – which requires resources and uncertainty and entails more complexity. This might, for example, be a question of organisational culture, design maturity and/or related to the discussion of multiplicity in a previous section (Duan, Vink, & Clatworthy, 2020).

Maps, personas, and other representations of problems and complexity communicates beyond the project – namely, the competency of designers - and can attract attention, funding, jobs and other resources for both designers and clients. As such, there currently are different and conflicting narratives around gigamaps and other tools[5], not all in line with that proposed by its creators.

Designers need to visualise, to make the invisible visible in order to make change – and visualisations are someone's interpretation. This is a paradox that can and needs to be explored further. In this paper, we tried to explore some lenses and topics that might bring representational issues to the fore, such as acknowledging the existence of multiple presents and futures, non-human agency and temporality.

These are not simply issues for designers, who must focus on the temporality and power of their designerly artefact (as they have a life of their own after-design, in practice (Kimbell, 2009), but when artefacts change from back-stage resources to front-stage handovers to (most often) non-designers, receivers must be empowered to make changes and understand when the map is a relic, not a resource. Designers might believe they are delivering generative and creative work (e.g., gigamap) that will be iterated on; however, the recipient must understand this, how it integrates into the ways of working, and how it can carry the deliveries further. These are tasks for clients, who must know what they are "buying" – change, not handovers. This requires a fundamental shift in organisations. They must know what to do with it and avoid

[5] We still see them as actors; however, "tools" is a more recognisable label.

pushing deliveries into a descriptive format and neglecting the generative and creative potential and role of these tools.

> *Key question: How might we challenge industry and organisations in the face of the resource/relic dichotomy?*

Conclusions

So, how might we help organisations to avoid creating newly established truths from the materiality of visual tools, such as the gigamap? Are these back-stage tools for professional designers - not something to hang in every board room? If they should be deliverables, how can we experiment with multiple presents and futures, and how are they received? How do we deal with the analytical and synthesising use of data (from the past) while acknowledging that human action and complex problems can never be fully predicted and that information only becomes knowledge when applied (Richards, 2019)? How do we expand our understanding of maps/artefacts and their role as important designerly artefacts and actors shaped by their physical and/or digital format, as well as communication devices (intended or otherwise)? How can we handle the tension between static visualisations and the need for dynamic visualisations that change with measures and time?

We raise many questions in this paper and currently do not have many answers; however, we believe that we can dive into the issue from multiple perspectives, such as some of those presented in this paper. Designers and design scholars can apply different lenses and approaches (purposefully) that are both complementary but also challenge each other (Hvidsten & Almqvist, forthcoming; Lorino et al., 2011; Nicolini, 2009). A challenge is moving from analytical and “after the fact” explanations (which we are also somewhat guilty of in this paper) towards developing and applying approaches based on non-representational foundations and understanding and appreciating the idea of multiplicity.

References

1. Aguirre, M., Agudelo, N., & Romm, J. (2017). Design Facilitation as Emerging Practice: Analyzing How Designers Support Multi-stakeholder Co-creation. *She Ji: The Journal of Design, Economics, and Innovation,* 3(3), 198-209. doi:https://doi.org/10.1016/j.sheji.2017.11.003
2. Akama, Y., & Yee, J. (2016). Seeking stronger plurality: Intimacy and integrity in designing for social innovation. In *Proceedings of Cumulus Hong Kong: Open Design for E-very-thing,* 21st-24th of November 2016, Hong Kong.
3. Almqvist, F. (2017). The fuzzy front-end and the forgotten back-end: User involvement in later development phases. *The Design Journal,* 2524–2533.
4. Barbero, S. (2017). *Systemic Design Method Guide for Policymaking: a Circular Europe on the Way.* http://porto.polito.it/2685125/
5. Barrett, M., & Oborn, E. (2010). Boundary object use in cross-cultural software teams. *Human Relations,* 63(8), 1999-1221.
6. Bechky, B. A. (2003a). Object Lessons: Workplace Artifacts as Representations of Occupational Jurisdiction. *American Journal of Sociology,* 109(3), 720-752.
7. Bechky, B. A. (2003b). Sharing Meaning Across Occupational Communities: The Transformation of Understanding on a Production Floor. *Organization Science,* 14(3), 321-330.
8. Berman, M. (1982). *All that is Solid Melts Into Air: The Experience of Modernity.* New York, NY: Simon & Schuster.
9. Björgvinsson, E. B. (2008). Open-ended participatory design as prototypical practice. *Co-Design,* 4(2), 85-99.
10. Bratteteig, T., & Wagner, I. (2014). *Disentangling participation: power and decision-making in participatory design.* Berlin, Germany: Springer.
11. Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues,* 8(2), 5-21.
12. Bødker, S. (1999). Scenarios in User-Centred Design—setting the stage for reflection and action. Paper presented at the *32nd Hawaii International Conference on System Sciences,* Hawaii, US.
13. Bødker, S., & Christiansen, E. (1993). *Deliverable D 1.1: The EuroCODE Conceptual Framework.*
14. Carrier, J. G., & Miller, D. (1998). *Virtualism: a New Political Economy.* Oxford: Berg.

15. Czarniawska, B. (1997). *Narrating the organization: Dramas of institutional identity.* Chigaco: University of Chicago Press.
16. Davidova, M. (2017). Systemic Approach to Architectural Performance. *FormAkademisk,* 10(1). doi:10.7577/formakademisk.1713
17. Duan, Z., Vink, J., & Clatworthy, S. (2020). Moving towards plurality: Unpacking the role of service design in relation to culture. In proceedings of ServDes. 2020: Tensions, Paradoxes and Plurality, February 2–5, 2021, Melbourne, Australia. *Linköping Electronic Conference Proceedings.*
18. Ehn, P. (2008). Participation in design things. In *Proceedings of the Tenth Anniversary Conference on Participatory Design,* Bloomington, IN, USA, September 30- October 4, Indianapolis, IN.
19. Engeström, Y. (2006). From Well-Bounded Ethnographies to Intervening in Mycorrhizae Activities. *Organization Studies,* 27, 1783-1793. doi:10.1177/0170840606071898
20. Garrett, J. J. (2002). *The Elements of User Experience. User-Centered Design for the Web.* Indianapolis, IN: New Riders.
21. Garud, R., Jain, S., & Tuertscher, P. (2009). Incomplete by Design and Designing for Incompleteness. *Organization Studies,* 29(3), 137–156.
22. Goodwill, M., Bijl-Brouwer, M. v. d., & Bendor, R. (2021). Beyond Good Intentions: Towards a Power Literacy Framework for Service Designers. International Journal of Design, 15(3), 45-59. http://ijdesign.org/index.php/IJDesign/article/view/4120
23. Henderson, K. (1991). Flexible Sketches and Inflexible Data Bases: Visual Communication, Conscription Devices, and Boundary Objects in *Design Engineering. Science, technology, & human values,* 16(4), 448-473.
24. Henderson, K. (1995). The Political Career of a Prototype: Visual Representation in Design Engineering*. *Social Problems,* 42(2), 274-299. doi:10.2307/3096905
25. Horst, W. J. R., & Webber, M. M. (1973). Dilemmas in a General Theory of Planning. *Policy sciences,* 4(2), 155-169.
26. Hvidsten, A. (2020). The hidden 'co-designers' of service: exploring policy instruments in e-messaging. In proceedings of ServDes. 2020: Tensions, Paradoxes and Plurality, February 2–5, 2021, Melbourne, Australia. *Linköping Electronic Conference Proceedings.*

27. Hvidsten, A., & Almqvist, F. (forthcoming). Zooming in and out of complex systems: Exploring frames in incremental participatory design projects. In M. A. Pfannstiel (Ed.), *Human-Centered Service Design for Healthcare Transformation.* Cham, Switzerland: Springer.
28. Jones, P. H. (2014). Systemic Design Principles for Complex Social Systems. In *Social systems and design* (pp. 91–128): Springer.
29. Julier, G., & Kimbell, L. (2019). Keeping the System Going: Social Design and the Reproduction of Inequalities in Neoliberal Times. *Design Issues,* 35(4), 12-22. doi:10.1162/desi_a_00560
30. Kimbell, L. (2009). Beyond design thinking: Design-as-practice and designs-in-practice. Paper presented at the *CRESC Conference,* Manchester, UK.
31. Kolko, J. (2010). Abductive Thinking and Sensemaking: The Drivers of Design Synthesis. *Design Issues,* 26(1), 15-28. doi:10.1162/desi.2010.26.1.15
32. Krippendorff, K. (2021). From uncritical design to critical examinations of its systemic consequences [Keynote presentation]. *Proceedings of Relating Systems Thinking and Design (RSD10) Symposium.* Delft, NL.
33. Kvam, E. (2021). Giga-Mapping and Knowledge of Boundary Object Theory in Sustainable Product Development. Paper presented at the *International Conference on Engineering and Product Design Education,* 9-10 September 2021, Via Design, Via University College, Herning, Denmark.
34. Latour, B. (2005). *Reassembling the Social. An Introduction to Actor-Network-Theory.* Oxford, UK: Oxford University Press.
35. Law, J. (2015). What's wrong with a one-world world? Distinktion: *Journal of Social Theory,* 16(1), 126-139. doi:10.1080/1600910X.2015.1020066
36. Lomas, J. D., Patel, N., & Forlizzi, J. (2021). Designing Data-Informed Intelligent Systems to Create Positive Impact. *Proceedings of Relating Systems Thinking and Design (RSD10) Symposium.* Delft, The Netherlands.
37. Lorino, P., Tricard, B., & Clot, Y. (2011). Research Methods for Non-Representational Approaches to Organizational Complexity: The Dialogical Mediated Inquiry. *Organization Studies,* 32(6), 769-801. doi:10.1177/0170840611410807
38. Lurås, S. (2016a). Layered scenario mapping: A multidimensional mapping technique for collaborative design. *CoDesign,* 12(3), 133-150.

39. Lurås, S. (2016b). Systems Intertwined: A Systemic View on the Design Situation. *Design Issues,* 32(3), 30-41. doi:10.1162/DESI_a_00397
40. Manzini, E. (2015). *Design, When Everybody Designs: An Introduction to Design for Social Innovation* (R. Coad, Trans.). Cambridge, Mass.: MIT Press.
41. Massanari, A. L. (2010). Designing for imaginary friends: information architecture, personas and the politics of user-centered design. *New Media & Society,* 12(3), 401-416. doi:10.1177/1461444809346722
42. Morrison, C., & Dearden, A. (2013). Beyond tokenistic participation: using representational artefacts to enable meaningful public participation in health service design. *Health Policy,* 112(3), 179-186.
43. Mulder, S., & Yaar, Z. (2006). *The User Is Always Right: A Practical Guide to Creating and Using Personas for the Web (VOICES).* New Riders Publishing.
44. Nelson, H. G., & Stolterman, E. (2012). *The Design Way: Intentional Change in an Unpredictable World* (2 ed.). Cambridge, Mass: MIT Press.
45. Nicolini, D. (2009). Zooming In and Out: Studying Practices by Switching Theoretical Lenses and Trailing Connections. *Organization Studies,* 30, 1391-1418.
46. Norman, D. A., & Stappers, P. J. (2015). DesignX: Complex Sociotechnical Systems. *She Ji: The Journal of Design, Economics, and Innovation,* 1(2), 83-106. doi:https://doi.org/10.1016/j.sheji.2016.01.002
47. Orlikowski, W. J., & Scott, S. V. (2015). The Algorithm and the Crowd: Considering the Materiality of Service Innovation. *MIS Quarterly,* 39(1), 201–216.
48. Penin, L. (2018). *An Introduction to Service Design: Designing the Invisible.* London, UK: Bloomsbury Publishing.
49. Richards, L. (2019). Understanding, Design, Models, Dialogue: The Orienting Role of Language. *She Ji: The Journal of Design, Economics, and Innovation,* 5(4), 369-372. doi:https://doi.org/10.1016/j.sheji.2019.11.008
50. Sangiorgi, D., & Prendiville, A. (2017). Conclusions. In D. Sangiorgi & A. Prendiville (Eds.), *Designing for Service. Key Issues and New Directions* (pp. 251-255). London: Bloomsbury Academic.
51. Sevaldson, B. (2011). GIGA-Mapping: Visualisation for complexity and systems thinking in design. Proceedings of *Nordes 2011: Making Design Matter,* School of Art & Design, Aalto University, Helsinki, Finland.

52. Sevaldson, B. (2012). Gigamapping. Retrieved from https://systemsorienteddesign.net/what-is-gigamapping/
53. Sevaldson, B. (2014). Holistic and dynamic concepts in design: What design brings to systems thinking. *Proceedings of Relating Systems Thinking and Design (RSD3) Symposium.* Oslo, Norway.
54. Sevaldson, B., & Jones, P. (2019). An Interdiscipline Emerges: Pathways to Systemic Design. *She Ji: The Journal of Design, Economics, and Innovation,* 5(2), 75-84. doi:https://doi.org/10.1016/j.sheji.2019.05.002
55. Shove, E., Watson, M., & Ingram, J. (2006). Products And Practices: Selected Concepts from Science and Technology Studies and from Social Theories of Consumption and Practice. *Design Issues,* 23(2), 3-16.
56. Star, S. L., & Griesemer, J. R. (1989). Institutional Ecology, Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science,* 19, 387-420.
57. Stickdorn, M., & Schneider, J. (2011). *This is Service Design Thinking: Basics, Tools, Cases.* Amsterdam: BIS Publishers.
58. Talgorn, E., & Hendriks, M. (2021). Storytelling for systemic design. Embedding and communicating complex and intangible data through narratives. *Proceedings of Relating Systems Thinking and Design (RSD10) Symposium.* Delft, The Netherlands.
59. Tsoukas, H., & Hatch, M. J. (2001). Complex thinking, complex practice: The case for a narrative approach to organizational complexity. *Human Relations,* 54(8), 979-1013.
60. van der Heijden, K. (2011). Scenarios: The Art of Strategic Conversation. Wiley.
61. Vink, J. (2022). Designing for Plurality in Democracy by Building Reflexivity. *The Pluralist,* 17(1), 52-76. doi:https://www.muse.jhu.edu/article/848392.
62. Wetter-Edman, K. (2014). DESIGN FOR SERVICE: A framework for articulating designers' contribution as interpreter of users' experience. [Doctoral dissertation, University of Gothenburg].