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Framing scenario thinking in a mode of futures by design inquiry

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Abstract: In Transdisciplinary Design inquiry, the conceptual and ideational need to be clarified when relational and qualitative methodologies are enacted. This is crucial concerning complex, emergent, and urgent matters of climate change, sustainability, and collective citizenship. Theoretically, this paper covers conceptualizing scenarios as part of future-orientated envisioning and sits between design, anticipation, and foresight studies. We then propose three scenario thinking devices based on initial literature review and conceptual positioning to engage scenario thinking. The paper proposes a reframing of scenario thinking by design research as a means to inform clearer scenario building for long term sustainable collaborative futures. Methodologically, we draw on explorative and compositional methodology to reposition scenario thinking as anticipatory scenario building. The three scenario thinking devices are work-in-progress and will be investigated in the field through a series of ongoing research activities.

Keywords: scenario thinking; compositional methodology; anticipation; collaborative futures

1. Introduction

1.1 Scenarios abound

Renata Tyszczuk, an architect and researcher, who uses Culture and Climate Change as a framework for a series of research and public engagement projects on the cultural dimensions of climate change writes that Climate Change is a scenario (2019: 7). William Gibson, the renowned cyberpunk fiction writer, proclaims that “the future is already here …it is just not evenly distributed” (Cuff, 2021: 19). Taken together, these two statements point to a need to look at the role of scenarios and how it may shape cultural and situated futures in the context of climate change. This paper takes this up through presenting and reflecting on the development of three scenario thinking devices that are positioned within a theory frame of compositional methodologies and related to an emerging practice of using scenario futures thinking to explore matters of collaborative governance.

This paper is contextually situated in Stellenbosch, South Africa, a commercial wine producing region that is recovering from a recent drought in 2017. Stellenbosch is also in transformative processes of realising an integrated society that responds to former policies and practices of segregation and marginalization in apartheid South Africa. During apartheid, rivers were used to segregate racial groups. Today, we look at rivers as a means of public engagement around the cultural dimension of collective futures, whether it is commercial or existential. Given these matters, we have been interested to develop tools, knowledge and meaningful collective action in which shaping futures through scenario thinking in cultural settings and climatic contexts.

How design practitioners, educators and researchers position and realize their work regarding design and futures is now under considerable pressure and arguably in need of radical transformation in the wider and urgent contexts of climate change, decarbonisation, environmental justice and collaborative governance, amongst others. In all of the contexts and scale of change, and the conditions and complexities of their relations and emergencies, in terms of phenomena and events, dynamics and discourses, what is very clear is that scenarios abound. They are often presented to mediate rising sea levels, project dystopian futures with noteworthy strife, and communicate latent and looming disasters. Similarly, scenarios are used to argue for limits to mitigation due to motivations for special interests, such as the fossil fuel industry, or leverage reticence and resistance to shifts to renewable energy sources. Scenarios are used rhetorically and informationally; they champion alternative future events and processes, and they are articulated performatively through a range of distributed and social media, not without fake facts and news, conspiracy theories and disasters, climate and pandemic deniers. Scenarios are imaginary and cultural resources, and they are put to use in power dynamics and geopolitics. They are used for policy promotion and cast back to provoke us to look differently at our prospective lives within our current conditions.

Yet, are we that clear as to how these scenarios are scripted and where their origins lie and what mechanisms they draw on to achieve their ends? In this paper, we argue that there are opportunities for how we go about the very thinking and conceptualisation of the early phases of scenario development, often referred to as scenario thinking (Sarpong, 2011, 2016). Furthermore, we suggest that it may be fruitful and indeed important to elaborate on the methodological aspects of scenario thinking in a mode of non-representational methods (Vannini, 2015). Thus we further propose that this may be done from within a specific design methodological view related to what has recently been advanced as Anticipatory Design (Celi & Morrison, 2017; Morrison et al., 2021a, 2021b).

The paper takes up recent work in compositional methodology that extends the conceptualisation of methodologies in methods in a diversity of related endeavors: digital design (Mörtberg et al., 2010), design approaches to making with tools and techniques (Brandt et al., 2013; Sanders & Stappers, 2014), material methods focus (Woodwards, 2020) on researching with things, decolonising methodologies (Tuhiwa Smith, 2021) and relations

between new materialities, design, methods and research assemblages (Fox & Alldred, 2015).

In this paper, we ask: How can a design based, situated, cultural and non-representational approach to shaping futures through scenario thinking be developed? To address this question, our paper proposes an approach to shaping futures through scenario thinking that we term "Compositional Methodology by Design Research". It does so through the crafting of socio-material compositional affordances and articulations by design. This approach is offered as a design methodological move to support the development of alternative situated, cultural and non-representational approaches to scenarios. We illustrate our proposed compositional methodology through a series of paper-based scenario thinking artifacts designed to allow designers and citizen-designers, policy makers, NGOs and community-based environmental activists to engage in conceptualizing their situated futures.

In a heuristic process of "methodological composition by design", we present a design based compositional methodology in a mix of media and methods developed through designing and researching it to rethinking scenario thinking. This is offered as a design methodological move to support the development of alternative situated, cultural and non-representational approaches to scenarios on design futuring (Selin et al., 2016), as compared with foresight methodology (Popper, 2008). This has taken place in the context of futures as being understood to be plural (Augé, 2014), imagined (Beckert, 2016), ephemeral and emergent (Gidley, 2017) and located, increasingly, in post-normal times (Sardar, 2021).

1.2 Contextual matters

We point to a research problem where design does not explicate scenario thinking in relation to anticipatory futures by design. This is where anticipation's aspect is to imagine how to introduce a non-existent future into the present context and where anticipatory futures by design is a futures framing (Voros, 2017; Poli, 2019: 3). If a driver for anticipation is the contextual positionality of futures and design, then it is from the contexts within which scenarios work. Scenarios comprise scenario thinking (our focus here is based on practice and theory) and scenario building (the follow-through of this work into practice and participation).

In keeping with the focus on contexts and changing conditions of the human-nonhuman relations in the Anthropocene, the future phase of our work concerns collaborative governance around water access and resources in a South African town. Greenwood (2021) defines collaborative governance as a means to collectively navigate contested interests in a highly focussed and democratic way through a model for inter and transdisciplinary coordination of interdependent collaborative action.

Prior to the current focus on scenario thinking methodologies, in the town of Stellenbosch, the concept of collaborative governance has been explored with multi-stakeholder engagement in activity workshops (an NGO network partner group) through narrating scenarios through serious board game designs. This work built on Bruno Latour's Actor Network Theory as a rhetorical critique of human-nonhuman relations in the Anthropocene (Latour, 2018). Scenarios are positioned as central components to mediate the anticipative futures by design (De Smet, 2016: 2762) within the context of complex and dynamic socio-environmental systems (Ramalingham et al., 2008: 44). There are now emerging research practices on visual redress as a transformational practice by design to address the socio-political, racial, marginalization and issues around diversity and inclusion in public spaces (Costandius, 2021: 70), and critical citizenship as transformative transitions to position collaborative actions from decolonized contexts (Costandius et al., 2015: 547).

This public participation in addressing and responding to socio-environmental systems policies is where transformative collaborative governance (Marais, 2016: 114) is being positioned as an emerging practice-based research domain in Stellenbosch and has led to the recent establishment of a non-profit NGO called CoGo: Collaborative Governance for water security. CoGo aims to promote responsible water stewardship in the water, energy, food and health nexus by rethinking how transformative collaboration might build better socio-environmental collective futures. We, therefore, see intrinsic value in the mediational role of scenarios (Sarpong, 2011: 1156) as ways to think with and through contexts.

2. On scenarios

2.1 Introduction

This section underlines literature on scenarios and illustrates how scenarios have historically been used, developed, and implemented in different disciplinary fields. It also shows diagrams and paper-based resources that are currently available in a How to Future handbook. Following this section, we will describe how we conceptualized paper-based scenario thinking artifacts that take into account the cultural and contextual framing of scenarios.

2.2 Conceptualizing scenarios

Scenarios are an age-old human construct, device, and schema used in narrative and performances and in thinking ahead for the dramaturgical and prospective articulation of human activity, engagement, and expression. Since WWII, scenarios have been adopted and adapted as a key feature in the emerging domain of Futures Studies (Inayatullah, 2012). Emblematic of the context, conditions and epistemologies and world views of these times, scenarios have been closely pinned to Foresight approaches and methods with legacies in strategic planning and strategic decision-making (e.g. Ringland & Young, 2006; Hines & Bishop, 2016), then taken up in business and innovation.

In contrast, Selin (2015: 4) undertakes a practice-led approach to framing the relations between scenario planning and design as two futures-oriented domains that generate intersectional configurations that she describes as five archetypes (2015: 15): intersections (exemplified by nine themes), feed in (materiality and agency), bridge (Methods framing), tension (several exhibits) and repulsion (Ministry of design futures). Selin's practice-led workshop (2015: 9) that sought ways of collaboration towards shared futures through scenarios and design delivered nine themes in the archetype of intersections. These themes are presented descriptively, analytically and critically as different from how scenarios are framed by strategic foresight's practice-based orientations. These themes are more diverse, interpretive and guiding directions to position a focus of scenarios by design.

2.3 Scenarios in and over time

Scenarios may take a contextual focus (Shackley & Deanwood, 2003: 71) by presenting the concept of social futures towards climate change through both qualitative and quantitative scenario development to mediate policy deliberations on climate change. In addition, Stuart Candy (2010: 7) offers a concept of nature futures through stakeholder participation in order to bring futures visioning forward through iterative, participatory and creative approaches to scenario development. What these two contributions to scenarios within context exemplify is the collaborative, mediative, human - non-human focus and compositions of scenarios to inform strategic decision making through explicating scenarios as a scalable foresight tool to address phenomenological concerns despite the divergence in world views in order to visualize futures where concepts of social foresight are positioned in relation to emergent critical views on the power structures, decolonization and marginalization in how futures are shaped.

Within these participatory approaches to futures, scenarios are used to mediate and situate temporal narratives in the present by being turned into devices and tools within strategic foresight domains (Mietzner, 2005: 221), as well as being an embedded concept and working method in conceptualizing, visualizing and mediating in design thinking processes (Selin et al., 2015: 10). Scenarios are designed, developed and performed (Zentner, 1982:12; Holmqvist, 2006: 155; Sarpong, 2011: 1156; Angheloiu et al., 2019: 108). For scenarios to be offered to others (via scenario building) and then put into play (through scenario enactment), and ideally through processes of reflexive design co-creation, reflection and revision, attention is needed to their ideation and conceptualization.

Scenarios are, therefore, not just designed, developed and performed through processes of building and enactments but need to be clarified and informed, critically and reflexively by scenario thinking (Sarpong, 2016). There is a need to critique the framing of scenarios in design and futures work, practice and theory as scenarios are being archetyped, theorized and conceptualized and positioned disciplinarily without prior critical reflexive work on scenario thinking.

One example of how scenarios are being theorized is offered by Stuart Candy and Jake Dunagan (2017:137), who write of experiential futures as a transmedia practice at the intersection of futures and design, and position experiential scenarios as the thinking behind co-created social foresight (2017: 151). This is visualized (Figure 1) in the form of their "Experiential Futures Ladder" in the recent manual *How to Future* by Scott Smith (2020). Smith shows how Candy and Dunagan's framework moves from abstract concepts to concrete manifestations of futures through scenarios (Candy & Dunagan, 2017: 149).

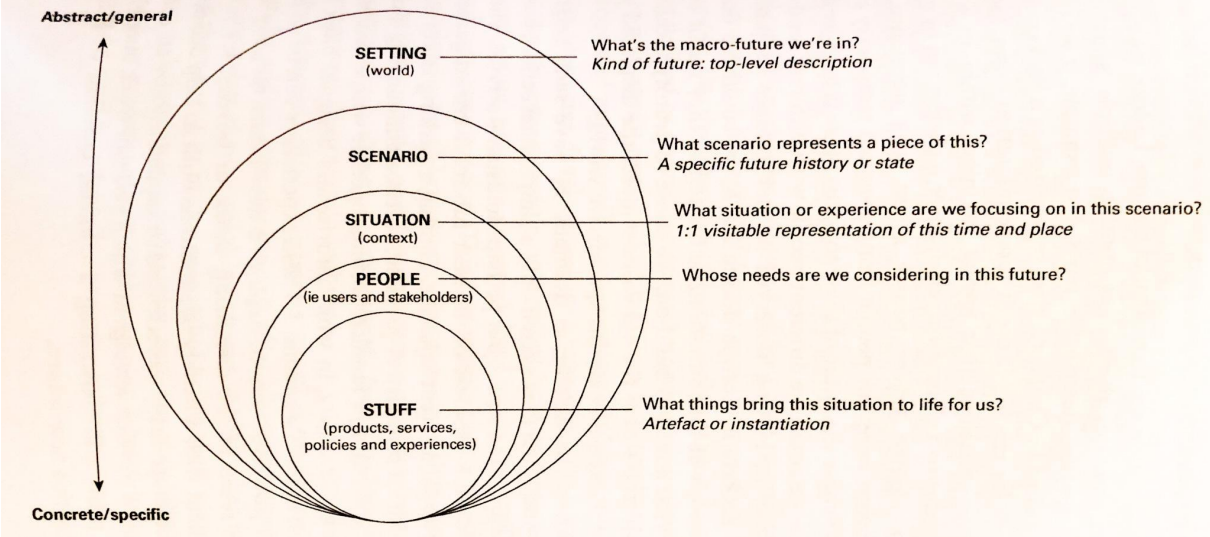


Figure 1. Experiential Futures Ladder, as presented in How to Futures (Smith, 2020: 30).

This "ladder" shows a nested approach in moving between abstract and general futures to more concrete and specific ones. The former is positioned with a focus on world views and phenomenology. The latter is centered on experiences and realized through artifacts as points of contextual engagement with futures. However, the diagram is not showing how this framing of scenarios works across time.

Let's suppose design futures scenarios are about thinking with and through futures. In this case, we need to also attend to how we think about scenarios in a mode of *anticipatory* thinking that takes care ahead of time (Zou & Morrison, 2022). That is, they are being built, used, assessed and interpreted. Naturally, this entails time.

2.4 Time, scenarios and futures

Accordingly, we can make sense of scenarios as being temporally situated to bring the future into action (Adam & Grove, 2007: 126). Adam and Grove (2007) frame temporality as the "present future" and as an existential temporality to take ethical care of the future. Motti (2019: 16) argues that "a) the future is not trivial, b) the future has priority now, and c) the future is open to critique."

On temporality, Kontopodis (2009: 7) refers to a multiplicity of pasts, presents and futures. The concept of plurality refers to the multiplicity of potentialities in how we frame pasts, presents, and futures as constructivist, narrative and postmodern approaches inform it to time and memory (Brockmeier, 1999: 22; Gergen, 2004: 2; Hasenfratz, 2003: 149) that disregard materiality, materialization and embodied aspects of temporal and memory-related phenomena (Haraway, 2013; Latour, 2012: 42). After Kontopodis, the past will be born, i.e. organized (Law, 2004: 15), fabricated (Latour, 1996: 173), objectified (Middleton et al., 2001: 123), materialized (Haraway, 2018: 97) and stabilized (Law, 1992: 380; Middleton & Brown, 2005: 149) in the future.

The future is today seen as plural - futures. Futures are intrinsically connected to our sense of time as they stretch over past, present, and futures (Middleton & Brown, 2005: 65). Languaging these time dimensions brings forward tenses as states of the in-betweenness where we have past-present and the present-future (Angheloiu et al., 2020: 106). The introduction of tenses as states of time is an example of how the critical use of literacies and language shapes an understanding of futures concerns (Morrison et al., 2020: 116). When we look at design futures literacies we end up with a transdisciplinary framing of design´s performative and locative relation both tense and aspect takes of futures (Morrison et al, 2020: 121).

2.5 Positioning the use of scenarios in futuring processes

However, scenarios are often positioned (Candy & Dunagan, 2017: 149), theorized (Sarpong, 2011b: 8), described (Smith, 2020: 30) and archetyped (Hunt et al., 2012: 743) by foresight literacies and used in the disciplinary practice of design to navigate world events and its relation to situated contexts (Suri & Marsh, 2000: 151), with specific sets of people in order to perform the design making and shaping of artifacts, products, services and systems. There remains, however, a gap in research on clarifying conceptual, anticipative and ideational dynamics (Morrison et al., 2020: 117) and how scenario thinking by design might inform scenario building and scenario development (Smith, 2020: 134).

Scenarios are framed as approaches, models, abstractions and schema in various ways. This variety is typically not connected in discussions on the framing of scenarios as a key part of a broader design to the implementation process for contextual work in the present for possible, probably, preferred or projected futures in contexts of need and action. David Sarpong (2011b: 8) identifies scenarios and, more specifically, scenario thinking in relation to the foresight field as a methodological approach. Archetypes of scenarios are theorized and presented by Thomas Lee (2021: 3) in the field of futures fiction. Furthermore, Scott Smith (2020: 32) frames scenarios as narrative sensors that inform phases of understanding in applied foresight. Smith (2020: 32) also describes scenarios as “sensing” futures through narratives and acts of making and rethinking. He frames scenarios as present phases of understanding social and collaborative rich narratives that provide the seeds through which to provoke and imagine futures (Smith, 2020: 30-32). Scenarios, in this sense, are viewed as

a collaborative act in the process of developing futures narratives over time (Smith, 2020: 133). Here, the investigation may be geared toward understanding the 'how' of scenario thinking, emphasizing ''the relational processes of interaction between and among identities" (Somers, 1998: 767).

2.6 Scenarios and tools

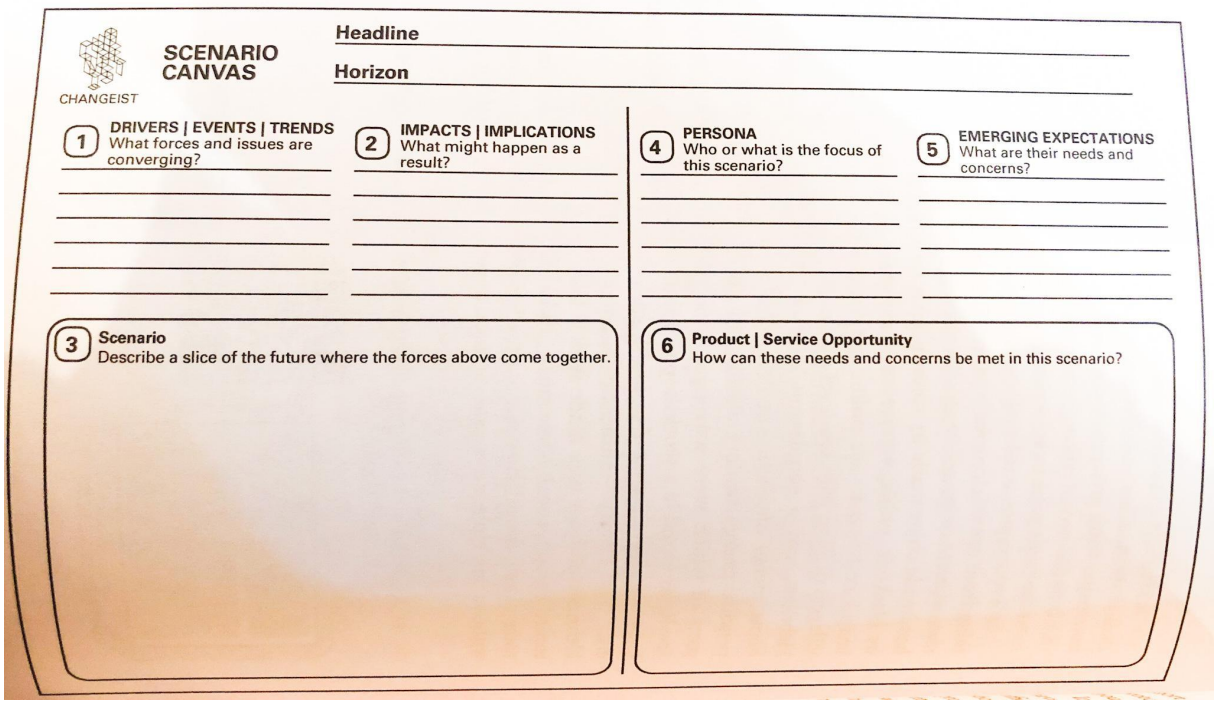


Figure 2. Experiential Scenario-to-Artifact Canvas, as presented in How to Futures (Smith, 2020: 120).

Existing resources on scenario thinking are cast with a frame of futures foresight with an attendant methodology of strategic decision making. In such approaches and their tools, design is often assumed to be a matter of providing solutions. There is a methodological tension in resources on offer between seeking to address needs and processes that lie ahead while limiting the means to do so via frames centered on procedures geared to linear confirmation and directed resolution.

The manual *How to Future* (Smith, 2020) offers one of the few pragmatic canvases for conceptualizing and forming scenarios prior to their being built and enacted. While engaging and systematic, the text is still methodologically cast and scripted in a frame and mode of business and management centered innovation. Nevertheless, the manual contains valuable devices and tools to consider further scenario thinking for scenario building. One of these is the paper-based tool, the SCENARIO CANVAS (Figure 2).

Given the concerns outlined above, a number of key questions arise. What methodological approaches are used when scenario tools and resources are being conceptualized and

designed? How might scenarios afford collective and collaborative processes to futures making when scenarios are theorized as cultural probes through narrative discourse? In reply, we suggest a methodological approach to conceptualize scenario thinking artifacts in relation to literature on scenarios.

3. Exploring compositional methodology

3.1 From design to design-ing

Design is claimed to have "designerly ways of knowing" (Cross, 2007: 7). Lury (2018) further argues that we would be well advised to see research in non-representational methodological views (Vannini, 2015) in terms of design-*ing*. Here the emphasis is on the gerund form '-ing'. This accentuates that design-ing is centered on action and transformation. It is a non-linear mode of shaping knowledge through making interwoven culture and artifacts with reflexive assessment and intersectional critique. This is akin to Thrift's (2008) characteristics or markers of non-representational theory and their uptake by Vanninni (2015) in terms of non-representational methodologies. This includes attention to processes and activities, human and non-human actors and agency, relational views, situated experience, and the emergence of knowledge, including design in our view. A design orientation to non-representational methodologies includes equal attention to dynamic and situated co-creation flows and their mediational articulations.

While along with Lury (2018), we argue that what is missing is attention to the very means and mechanisms of making, that is, design-ing. However, few of the chapters in that ground-breaking co-edited collection, despite being occupied with the activity of knowing by design-ing, are themselves methodologically centered, situated as studies of design research methodologies (Mainsah & Morrison, 2013). By this, we mean that they are seldom analytically situated as studies of how the methodologies of design-ing are located as modes and means of knowing. It has been suggested that what is before us is an interplay of complex multi-relations between research methodologies and research methods, and design techniques and design tools (Raymond et al., 2019). In short, there is a need to "stay with the trouble" (Harraway, 2016), and methodologically so.

3.2 Problem spaces, compositional and methodology

In *Problem Spaces*, Lury (2021) reconceptualises notions of problem spaces and methodology and adopts problem spaces to frame novel ways of knowing by what she labels Compositional Methodology. This approach reflects on staying with your problems by acknowledging that problems change and interact with our views and uses methods as practices of articulation as we interact with problems over time. This approach builds on earlier conceptualisations of composition in the epistemologically oriented collection *Inventive Methods* in which Lury and Wakeford (2012) wrote that:

> When the term composition is used in the visual and performing arts the emphasis is on the creativity of this action of putting things together. It is used here… to describe a

> methodology in which the focus is on the ways in which a problem is put together, how it is formed and transformed, inventively.

In *Problem Spaces*, Lury pursues this thinking further. She locates such understanding of form by pointing to the work of Dorothea Rockburne´s installation piece "Arc" in a series called: *Drawing Which Makes Itself* (Lury, 2021: 4). Where she explains her analysis of how a piece of paper may represent a phenomenon, problem, setting or situation, and once the activity (methods) of folding, rotating and scoring happens to the material´s topology, it moves "the problem" through another dimension of (trans)form(ation) (Lury, 2021: 5). What is central here, Lury (2021: 5) motivates, is to understand that a problem is a form of how fundamental relational processes are being transformed and composed, again and again.

Design's necessary preoccupation with the "hows of making and shaping futures", as well as related processes and research into inventive compositions of course appear in design research in domains such as Participatory Design and Co-Design (Brandt et al., 2013; Sanders & Stappers, 2013). Publications and conferences address matters of Research Through Design (RTD) (Frayling 1993; Koskinen et al., 2010; Stappers & Giaccardi, 2017). connections between social science approach to inventive methods, speculation and futures (Wilkie, et al., 2017). A co-edited collection by Lury and colleagues (Lury et al., 2018) does gather a diversity of design specific relations between designing and social science methodologies but does not significantly extend to design centered conceptual rethinking methodologies by design.

3.3 Design compositional methodologies

We position Lury's work on Compositional Methodology in relation to non-representational ways of knowing in a mode of research through design. In such a view, the methods related to the transformation of problem spaces concern the notion of morphogenesis as it is embedded in design praxeology (Cui & Jiang, 2014: 109). This refers to the study of the practices and processes of design (how), and design phenomenology as the study of the form and configuration of artifacts (what) (Cross, 2007: 6). Other and multiple ways of knowing, such as the disentanglement of settled and disciplinary knowledge, offer ontological and epistemic differences in ways of knowing from positivistic procedures or colonial metrics of power. However, positioning Compositional Methodology in relation to ways of knowing through designing allows designer-researchers to situate and work dynamically with design tools, mediations, experiences and uses.

When approaching the framings of scenarios in terms of thinking and thinking with and through what we see as socio-material compositional affordances and articulations that entail design, attention may be given to how these processes and expressions are made material. Regarding scenario thinking, this process diagrams, objects, and activity canvases that inform an applied scenario-driven approach to futures by design.

We refer to this approach as "Compositional Methodology by Design Research". This view brings forward an epistemological perspective of relational ontologies between objects,

settings and actors, where an event-as-process is part of 'becoming together" (Deleuze, 1988: 49). An applied scenario-driven approach to futures by design is not a matter of just "being together" but acknowledges and works with the emergent relationality of relations as they come into play through interventions, interactions and emergence (Raymond et al., 2019: 2).

As we show in the following main section, we move toward a series of transformational actions and present the pragmatics of morphogenesis by making a series of diagramming, artifacting, folding, abstracting, abducting, transducting, and transposing. These methods by design are directed to shaping devices related to scenario thinking (as the problem space) in order to frame scenario thinking by design research and using a *design futures lexicon* as an anticipatory content and discursive resource and an abductive prompt in shaping the composition of the framing scenario thinking. This is materialized as a set of interlinked compositional layering. Moreover, this layering opens out for devising elements and motions of "becoming together" to annotate the devices, by critical textual analysis, as part of this qualitative design futures research inquiry.

Next, we outline three devices developed through a "Compositional Methodology by Design Research" approach. We do this methodologically by framing how they have been selected, positioned, conducted, communicated, and critiqued to shape futures by design knowledge.

4. Scenario thinking and futures by designing

4.1 Three devices for scenario thinking by design

As part of connecting prior design research, teaching design and futures inquiry to master's students, and in design futures facing research projects, devices were developed in conjunction with following processes outlined by Lury in her compositional methodology. This research work is part of a series of PhD research activities. The next phase would be to develop, test, and implement these scenario thinking devices in the non-governmental CoGo with its network partners to develop and shape scenario building within the situated context.

This section outlines these in terms of designing and relation making through form making and visual techniques. The devices are: 1) Identifying temporal scenario thematics, 2) Configuring temporal scenarios and 3) Assembling scenario configurations. These devices have been arrived at through the interplays of contextual and qualitative enquiry, including collaborative ethnography and design based techniques such as sketching, layering and form giving techniques, spliced together with research literature reviews, co-writing and cross-design research project participation.

Using what we call "Compositional methodology by design research", we draw attention to how we think about and implement processes of shaping scenario thinking to frame that thinking and related action. Our view is located not only in a RTD approach and critical reflexive design-research practice but also within a wider view of Anticipatory Design that is

realized methodologically and dynamically through a mode of what we term “anticipatory futuring by designing”.

In the next section we show and describe the three scenario thinking devices and how they were designed using a design compositional methodology. We propose that these devices are used in groups as resources for collaborative workshop activities. This approach might be useful for design practitioners and students of design, policy makers, NGO’s working on collaborative processes around notions of governance, and community activists concerned with climate futures. Pragmatically, the scenario thematics we include (Figure 3) are descriptive indicators for the compositional configurations (Figure 5). The configurations are then translated to a paper-based scenario canvas (Figure 7) that uses prompts to help the user fill in different types of scenarios. Each configuration of a scenario would lead to different types of scenarios being identified in the canvasing device.

4.2 Identifying temporal scenario thematics

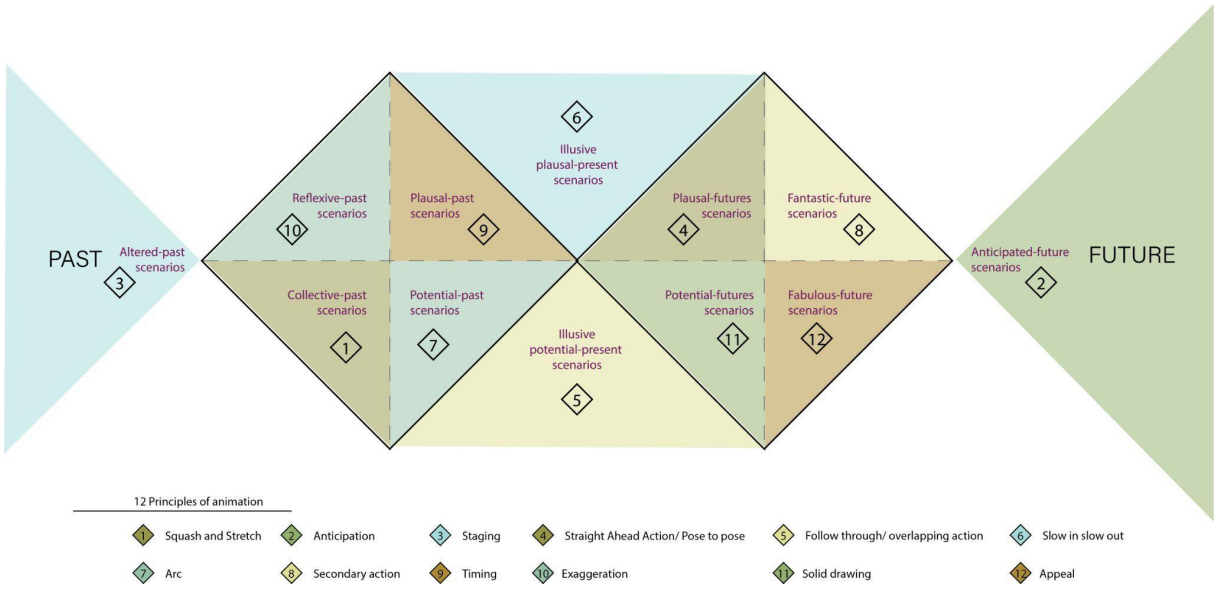


Figure 3. Adapting and Nesting the Twelve Principles of Animation to Identify Temporal Scenario Thematics (Raymond, Morrison & Mainsah, 2022).

The first device is that of “Temporal scenario thematics”. Methodologically, this refers to what Lury presents as *“becoming topological”* (2021). By this, spatial composition, realized through placement, labeling and numbering, brings forward relational positionalities. It does so through using geometric boundaries as conceptual representations (Figure 4).

Figure 3 was developed through an iterative process of inverting "The Design Foresight Model" by (Raymond et al, 2016) This model was reflexively developed based on a practice-based product design case for sustainable futures in situated cultural contexts (Raymond et al, 2016: 70).
This took the form of a stylized representation of the well worn double diamond in a new visualization generated by inverting "The Design Foresight Model" and applying line weight and colours to the triangular shapes that emerged.
Next, a transductive process of using concepts and terms from the *Design Futures Lexicon* (Morrison et al, 2020) was carried out in relation to twelve principles of animation.
These twelve principles were situated in relation to the notion of "becoming" through emergence in the present where the sequencing of frames in the present is to give life to pasts and futures (Lasseter, 1987: 35).
A designation of key temporal categories and the descriptive labelling, seen in purple in Figure 4, of scenario thematics, drawn from the Design Futures Lexicon´s 50 futures words words and descriptions (fuel4design.org; Morrison et al, 2021a) and David Sarpong´s theorisation of scenario thinking, was then developed.
In reading the diagram from left to right, scenarios are described in relation to past, present and futures (Adam and Goves, 2007) and embed notions of counter factual narratives (Latour, 1996: 173; Sarpong, 2011b: 8), reflexive and collective, potential and plausible, fantastic and fabulation, sensorial and anticipatory (Voros, 2008; Zou & Morrison, 2022: 12).

Figure 4. Methodological and theoretical considerations informing Temporal Scenario Thematics (Raymond, Morrison & Mainsah, 2022).

Figure 3 and 4 positions scenario thematics that reflect on the literature on framing time by Kontopodis (2009: 7) where the past is constructed in the future. Therefore scenarios are to be considered as animus in the present to give life to futures and pasts through notions of becoming as emergence (Lasseter, 1987: 35).

4.3 Configuring temporal scenarios

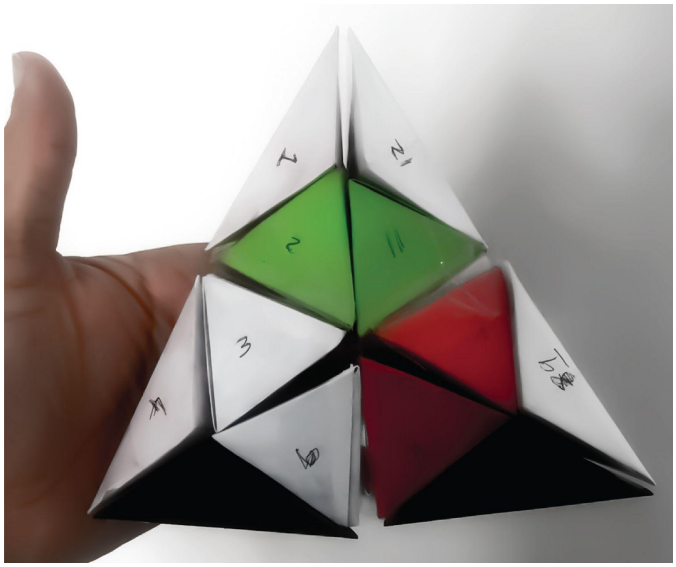


Figure 5. Building a Model to Animate the Relational Configurations Between Temporal Scenario Thematics (Raymond, Morrison & Mainsah, 2022).

The second device labeled "Configuring temporal scenarios" may be understood as what Betti Marenko (2014) refers to as animism of performative objects, environments and technologies in human and nonhuman synergies. The device is concerned with the relational and multimodal methodological mapping and translation of configurations between temporal scenarios and themes.

The twelve temporal thematics was translated to three dimensional prisms that fold and interlock with each other to generate what we call a ScenTO - a Scenario Topological Object - that is a three-dimensional artefact that rotates, inverse, and transforms into several configurations. The numbers on the facets of each prism correspond with the scenario temporal thematics.
By photographing each configuration and overlaying the photos with digital illustrations a series of configurations was coded, based on the relationality of each prism from the center outwards.
This offered an orientation to position the focus of each ScenTO configuration over a timeline of past, present and future.
This process informs the performativity of a Compositional Methodology by Design Research where (trans)form(ation) occurs through reflecting, folding and inversing. This is underpinned by compositional methodology that is about problematizing the problem (Lury, 2021: 17) as well as "designerly ways of knowing" (Cross, 2016: 6).

Figure 6. Methodological and theoretical considerations informing Configuring Temporal Scenarios (Raymond, Morrison & Mainsah, 2022).

A ScenTO is a scenario thinking device that animates and articulates temporal thematics of scenarios relationally to each other and across time. The intended use of a ScenTO is to think of scenarios based on the focus of each configuration. This implies that a single scenario might be informed by several ScenTO configurations related to different time concepts.

4.4 Assembling scenario configurations

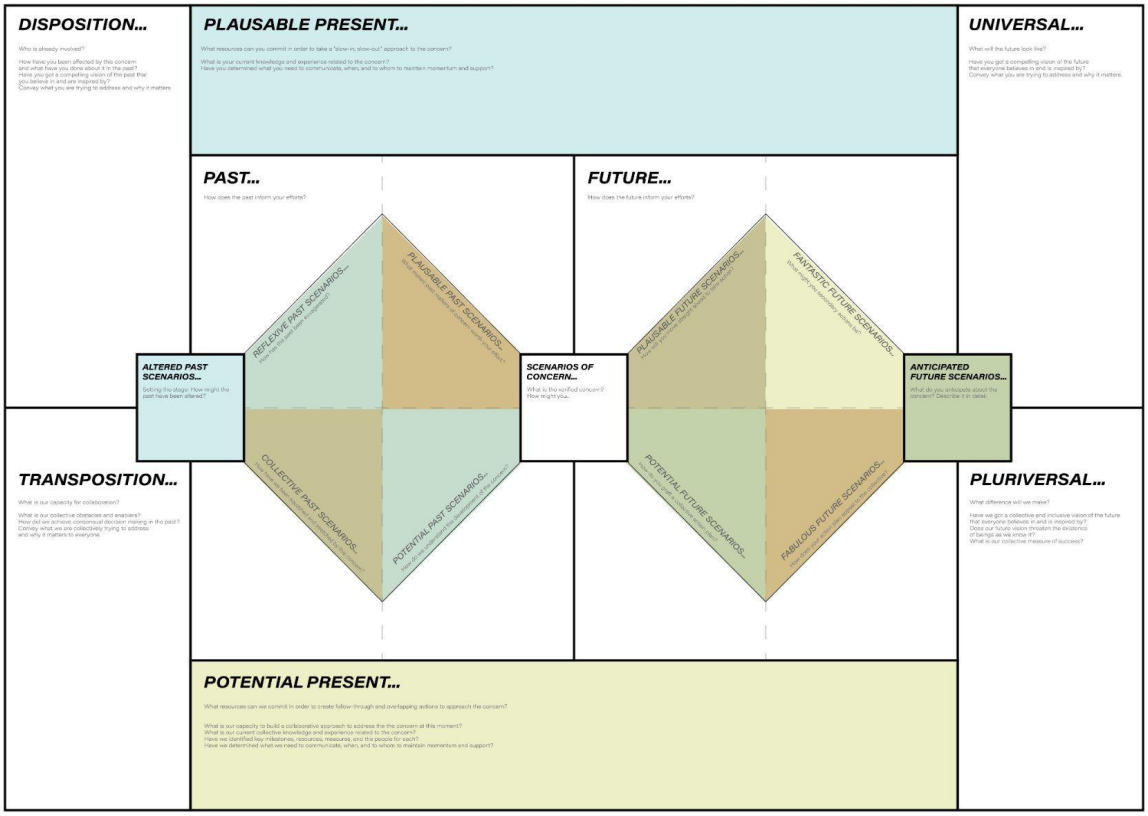


Figure 7. Developing a Scenario Thinking Canvas based on the Design Thinking Canvas (Raymond, Morrison & Mainsah, 2022).

The third device of Assembling scenario configurations emerged through adapting the design thinking canvas. In addition, a related but different scenario thinking canvas was developed. Methodologically, this is what Lury (2021: 13) refers to as "platformatization", wherein Figure 3 is an activity-based scenario narrative prompter.

Figure 7 draws on the recommendations by Smith (2020: 119) that a scenario canvas should be a single page document that collects, translates and informs scenario development.
This embeds collective acts of reflective, anticipative and speculative writing to frame, position and cast scenarios.
It further builds on Lury´s concept of Platformization (2021: 13), that offers an infrastructure of working with complexities.
It brings matters of the temporal thematics to a collective anticipative approach to futures shaping through relationalism (Goffman, 1967: 2; Smith, 2020: 32).

Figure 8. Methodological and theoretical considerations informing Assembling Scenario Configurations (Raymond, Morrison & Mainsah, 2022).

This is a scenario narrative building and collecting platform. The scenario thinking canvas is intended to use both the temporal thematic diagram and singular or several configurations of a ScenTO. Individuals might use this activity canvas to think about scenarios related to the focus of their project. Practically, this canvas was developed and trialed with network partners of the NGO in the conceptual ideation phase of their start-up. It is therefore recommended to be used as a cultural probe and boundary object in contextual settings where collective scenario thinking informs scenario development for further contextual realizations of products, services and systems.

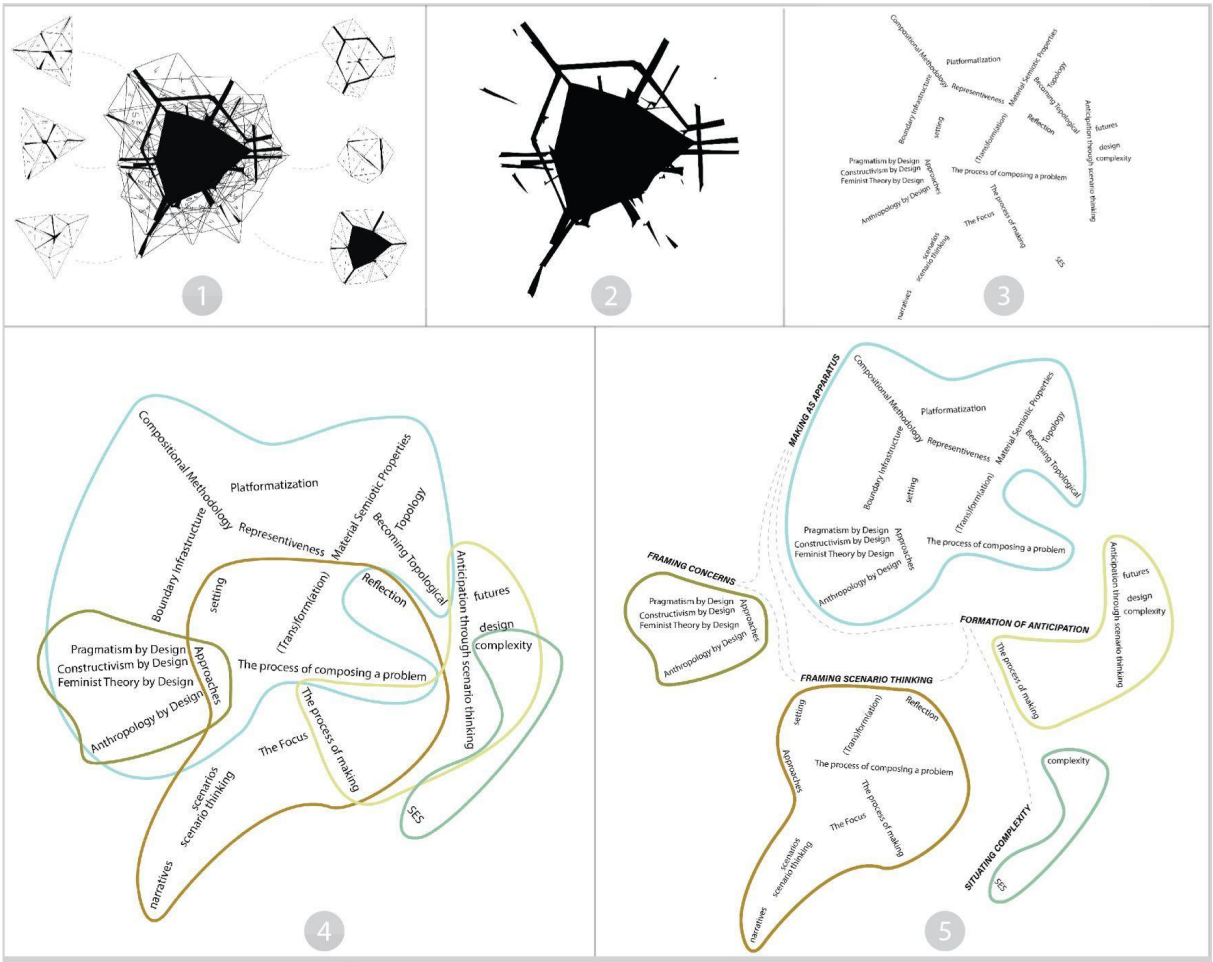
5. Compositional Layering of Methods

5.1 Methodological moves by composition

We may be familiar with the ways thinking happens through designing beyond attention to objects and artifacts. Following on from working with the Scenario Thinking Canvas, next, we move to work with objects in non-literal non-representational ways. The aim here was to see how to materialize further the possibility of layering concepts in thinking about scenario thinking for scenario building, use and evaluation. Layering here refers to using design techniques to superimpose critical views on thinking about materials, processes of scenario thinking.

Figure 9 illustrates a series of moves in form methods and processes that further informed the compositional methodology by and as a design activity. These moves are together a broader illustration of ideational compositional techniques. This allowed us to not only focus conceptualization on artifacts. Instead, we were able to reverse the direction of focus from objects to layering methods in emergent methodological considerations of scenario thinking. Visualization techniques, such as diagramming (Dudley-Smith & Whiteman (2020), were applied to highlight different ways of knowing. Furthermore, the diagrams inform thinking when relations between them are changed in the nesting of ideas and concepts and visually

enforming the relations between them. Next, we briefly go through the five moves that were central to materializing how to think about thinking in relation to scenario building.



1	Spatial positioning of information in a ' black hole'	Digital illustrations were generated during the design process of Configuring Thematic Scenarios. Through an abductive visualization technique these illustrations were compositionally overlaid and centered during a layering process (Dudley-Smith & Whiteman, 2020).
2	Deductive abstraction	The line weights were removed through a deductive visualization technique and an abstract shape emerged that is a representation of the negative spaces seen in the first compositional illustration (Radnofsky, 1996: 385).
3	Imposing information	The 'black hole' becomes the canvas for positioning and relationally mapping key words that are on theory, approaches, concepts and methods from design, foresight, futures, sustainability and scenario focussed literature (Newbury, 2011: 651).
4	Nesting and creating overlaps	Grouping the key words through boundary lines indicates five distinct overlapping concepts (Newbury, 2011: 651) that relate to their theoretical underpinning of scenario thinking by design.
5	Presenting five methodological concepts on scenarios by design	The positioning of the five concepts with relational lines indicating how they connect to each other. This allows the easy identification of which theoretical underpinning goes with each concept to better direct and focus scenario thinking. These concepts are: making as apparatus, framing concerns, formation of anticipation, framing scenario thinking and situated complexity.

Figure 9. Compositional Methodology by Design Research through Visualization Techniques (Raymond, Morrison & Mainsah, 2022).

These steps indicate how several acts of transduction, rotating, folding, diagramming, and mapping may inform the methodological process of Compositional Methodology by Design Research. They are materialized through a marking of relations by different visual design

means and contribute to qualitative research techniques that advance an anticipative approach to futures shaping by scenario thinking (Radnofsky, 1996: 385; Smith, 2020: 32; Lury, 2021: 5).

6. Implications & conclusion

6.1 Toward coordinated collective action

Scenario thinking by design research takes collaborative processes into consideration, such as co-design, when moving towards scenario building. Scenario building itself becomes a collaborative process that affords the conceptualization of futures geared towards implementation and action. From later 2022, the scenario devices presented above will inform various collaborative design research activities in Stellenbosch, South Africa. In contrast to other scenarios in futures inquiry and practice, emphasis will be placed supporting anticipatory design futures scenarios as part of shared shaping of collaborative governance. This shift is intended to move scenarios into a public problem solving space, which is where NeJaime (2009: 323) positions collaborative governance as a new paradigm of (collective) public problem solving.

First, this will be carried out with a local NGO in Stellenbosch working on collaborative governance for water security to use and explore these scenario thinking devices to develop a situated case for elaboration. Here, the focus will be on scenario building and coordinating collective actions that transition from conceptual work to enacting a mode of applied futures by design. This will be carried out in a spatial and temporal situated setting of the Stellenbosch River Catchment area and involve key stakeholders. Second, three different scenarios will be developed that will be informed by ethnographic and situated inquiry and processes of participative workshopping. The devices we develop further will be applied and evaluated via collaborative design and action research practices.

The three scenario thinking devices that will be developed will also inform scenario building. Where scenario building is conceptualized as collective ways of knowing and making by design and focused on the notion of inclusivity in futures shaping. In the South African context, ‘futuring the rivers’ of Stellenbosch needs to account for the inherited spatial segregation of apartheid where rivers were historically used to exclude and marginalize communities (Cash, 2010: 8). Reaching onward into scenario building as making and shaping more inclusive and democratic futures challenges us to explore the pragmatic and dynamic of relations of specific and wider socio-environmental systems. These are ones within which and through which socio-environmental policies are developed, informed and implemented by local and national decision-makers. We see that the use of scenarios in relation to collaborative governance for contextual public problem solving has potential for further investigation through design based inquiries.

6.2 Envisioning social and environmental challenges

The issue of context is highly central to Lury's conceptualization of composition as the way methods work with problem spaces. Compositionally, we suggest that scenario devices may help us understand and envision social and environmental challenges in a way that positions design methods as approaches to societal complexities and as they align with speculation, anticipation, sustainability and long-term futures. This is so where the scope of futures by design is presented in socio-ecological systems, strategies, services and product innovation. The three scenario devices we framed above align with applied notions of futures by design. They are about thinking about ideas of futures that are informed by, concerned with, and affected by a collective, both human and non-human, related to systems, service and product scales, and where futures are affected and affect multiple sectors of society. Consequently, these three scenario devices bring futures by design back into the present and into the public domain through acts of collective realization, materialization, fabrication, fabulation and the like. Surfacing the issues brought forward from an anticipatory futuring by design approach allows these three scenario devices to be put to work and to perform in ongoing transformations of the public sector.

6.3 Conclusion

This paper has given an account of ways we have positioned scenario thinking by designing. Scenario thinking is presented as a way of positioning collective futures in relation to collective pasts and presents by engaging with scenario thinking devices, such as those presented in this paper. Our scenario thinking devices developed concern identifying temporal thematics, configuring temporal scenarios, and assembling scenario compositions. They are intended to frame how we think about collaborative ways of futures-making and collective anticipative scenario-inspired ideations by design. By way of these devices, scenario shaping echoes Deleuze´s (1988: 49) framing of assemblages as enactments. THey work transformatively as unfolding dynamic processes of arrangements and rearrangements that involve both ordering and disordering through compositional methodology by design research. All in all, compositional methodology by design may be understood as an anticipative approach to futures shaping in and via scenario thinking. Acts of making may then also extend into practices and dynamics of scenario building, use and review - and reflexively back into scenario thinking and new and revisited problem space identification and related and emergent processes of methodological recompositioning.

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