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A Designerly Approach for Transitioning the Construction Industry

A case study of cross-sectoral innovation for sustainability

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The systemic nature of sustainability challenges from construction activity necessitates a fundamental rethinking of their operations. However, current value chains for such industries and sectors are deeply entrenched in existing business logic through vested interests and path-dependent regimes. In this sense, actors are locked into business paradigms that are resilient to change.

In response, innovation practitioners seek to address such systemic complexity by exploring opportunities within designerly approaches (i.e. design thinking and systemic design) in the planning and facilitation of systemic innovation, with the ambition of transitioning entire industries to more sustainable futures. Knowledge of the applicability and effect of such approaches is still nascent, and studies of underlying theories are lacking in the literature, suggesting a practice-theory gap in this respect.

[1] https://www.sustainabilitylab.uio.no

ByggFloken, a prominent systemic innovation initiative in the Norwegian construction industry, was studied as a case of a cross-sectoral, multi-actor project supporting the transition towards more sustainable business models. A multi-level perspective was used to evaluate the project's potential for sociotechnical change or, more specifically, sustainability transitions.

The subsequent investigation into the methodology informing the innovation project identified challenges in applying dominant innovation methods and tools in such systemic contexts. In conclusion, the study proposes generalisable considerations in the planning and framing of multi-actor systemic innovation projects.

KEYWORDS: systemic innovation, transitioning, sociotechnical systems, systemic design

RSD TOPIC(S): Methods & Methodology, Sociotechnical Systems

Presentation summary

The construction industry is often termed the “40 per cent industry”, responsible for approximately 40% of global CO2 emissions (UNEP, 2022) with similar numbers for energy use and waste generation. The industry itself is increasingly engaging with a broad spectrum of measures spanning from circular strategies for resource use to energy efficiency. However, there is a growing acknowledgement of the structural conditions that resist large-scale sustainable change within the sector. The last decade has seen significant interest in rethinking the fundamental business logic in light of the systemic challenges at hand. From this perspective, we observe the proliferation of business model innovation, with proponents arguing for so-called (strong) sustainable model innovation (Bocken & Geradts, 2020). However, such endeavours to improve industry-wide dynamics suggest the necessity for a holistic approach to innovation; challenges and opportunities for sustainable business are arguably embedded in the interconnected nature of the construction sector. The complexity that arises from the networked, multi-stakeholder context calls for interventionist approaches that can engage with macro, meso and micro perspectives as a whole. Relevant theoretical

framing can be found in the systems theory (Checkland, 1999) and, specifically for this article, the concepts of sociotechnical systems.

Sociotechnical systems perspective and sustainability transitions

Change at the system scale have been thoroughly investigated, including industrial and technological transitioning at the societal level. Scholars have developed several systemic theories by examining sociotechnical systems such as transport, energy, and goods production through historical data. Notable contributions are the theories of multi-level perspective (Rip & Kemp, 1998) and sociotechnical transitions (Geels, 2002) that aim to describe the dynamics involved in the transition from one sociotechnical system to another. The increasing, universal interest in such theories is arguably attributed to the sustainability agenda. Challenges such as climate change (IPCC, 2021), ecological degradation (Steffen et al., 2015), and social injustice are systemic in nature in that they are complex, interconnected across sectors and actors, and highly resilient to change (Holling, 2001).

Additionally, the lengthy timeframes and engagement with policy levels have given rise to a growing community of researchers investigating how one could strategise and steer such transitions in a just and acceptable manner that acknowledges planetary and social boundaries (Raworth, 2017); Or, as it has come to be described, sustainability transitions (Loorbach et al., 2017; Markard et al., 2012).

Systemic, multi-actor innovation initiatives

Current research reflects the understanding of systems transitions as interconnected, highly collaborative and interdisciplinary endeavours; new technologies and infrastructures are needed, but attention must also be given to social dynamics and practices that constitute human elements of sociotechnical systems. Focus is also given to the organisation and facilitation of processes among multiple stakeholders that influence systemic interventions (Van Huijstee et al., 2007). These new modes of collaboration are deemed essential for enabling systems-level change as they bring new ways of dialogic learning and sharing, legitimacy and, ultimately, solution innovations (Adams et al., 2016).

However, multi-actor collaborations are fraught with complexities that may ultimately become barriers to lasting systemic change. These include conflicting agendas and interests, business-strategic consideration, intellectual property and other issues related to competitive advantages and fundamental to current business logic and economic paradigms (Dyllick & Hockerts, 2002). In response, we observe an interplay between the sociotechnical systems theories and the emerging practice of systemic design (Sevaldson & Jones, 2020) that could support new forms of systemic, multi-actor collaboration. Research on such multi-actor contexts is lacking, with a few exceptions describing innovative multi-actor collaborations (Medina-García et al., 2021) or systems-oriented innovation (Adams et al., 2016).

This study has identified a unique case in Floke,[2] a privately held societal innovation programme that argues for a designerly, cross-sectoral, open-innovation approach to systemic change. The programme is developed with the conviction that the private sector must take an integral role in solving the grand challenges of our time. Multiple actors participate in a highly collaborative innovation process that seeks to develop a collective portfolio of sustainable business initiatives. To date, the programme has initiated 11 projects in several industries and thematic areas, with challenges ranging from sustainable food to urban mobility. The specific programme project investigated for this study was the second instalment of Byggfloken (translated as construction tangle), an exploration of sustainable, circular business models for the Norwegian construction industry.

The "ByggFloken" project

The project brought together 23 actors and stakeholders in the industry for six months in 2022 to rethink their business models for a more sustainable construction sector. At a glance, the programme might be identified as a traditional innovation process dominated by divergent and convergent phases (Guilford, 1967), much like the double diamond as popularised by British Design Council and adopted by practitioners worldwide. However, the process reveals theoretical contributions from several bodies of knowledge from innovation theory, systems thinking, and designerly facilitation

[2] Floke Innovation Programme, website

combined to meet the complexity at hand sufficiently. An overview of the Floke process elements and its theoretical foundations can be seen in Figure 1 below.

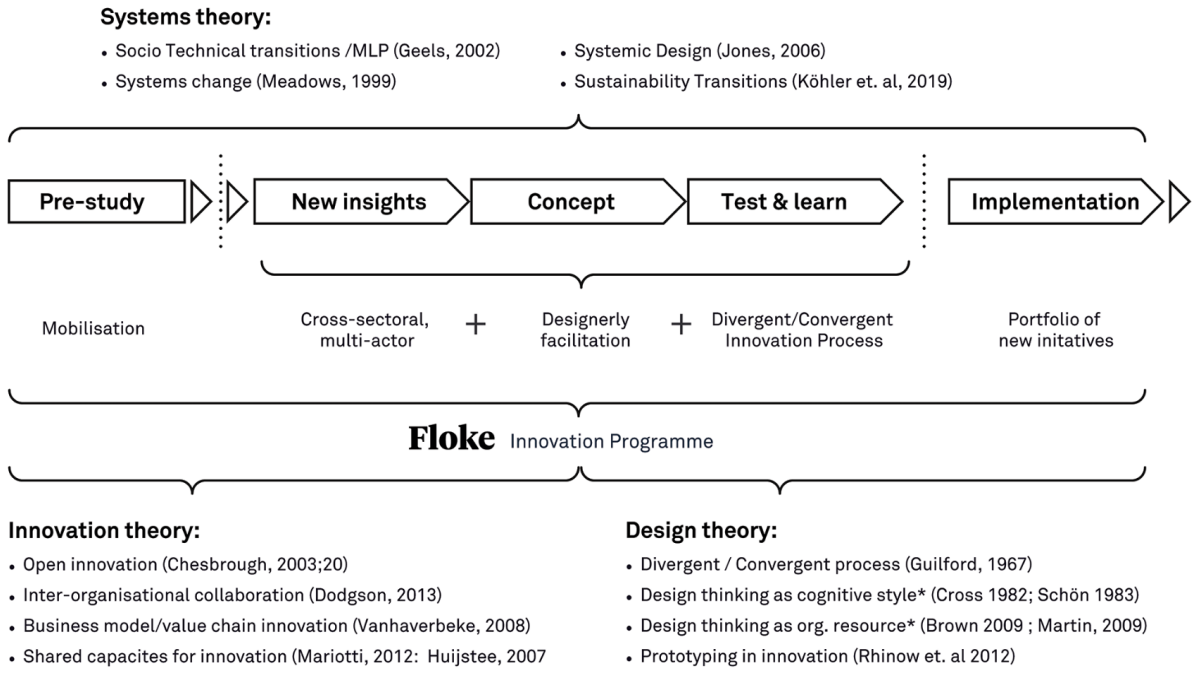

Figure 1. Graphical representation of Floke process with key theoretical foundations.

Method

Multi-level perspectives and the four system strategies

The Byggfloke case in question was investigated through the lens of sociotechnical transition theories and accompanying frameworks, which became useful for understanding systemic, structural phenomena that reinforce regimes and resist change. The multi-level perspective suggests that current sociotechnical systems might be understood as dominant regimes that are locked in their current operational logic due to the interdependent, interlinked nature of their investments into knowledge, infrastructure, practices and paradigms. However, exogenous pressure such as climate change, globalisation and digitalisation may exert enough pressure on current regimes

to open up windows of opportunity for niche innovations to engage with and ultimately reconfigure the regime. Thus the multi-level perspectives provide fundamental insight into the structural elements that reinforce path-dependencies and, as such, argue for a broader, strategic approach for sustainability transitions as encapsulated in four system innovation strategies (Geels et al., 2008):

- Establishing learning processes
- Building multi-actor/stakeholder networks
- Sharing foresight visions
- Enhancing green niche innovations

Pereno and Barbero have since adopted these system strategies in their exploration of designerly approaches to Territorial Enhancement (Pereno & Barbero, 2020) – a concept highly analogous to sustainability transitions in that it engages with sociotechnical systems innovation. This study identifies similar transferability of designerly approaches in the Floke process, as can be seen in *Figure 2,* and the following section will reflect on some of its methodological implications.

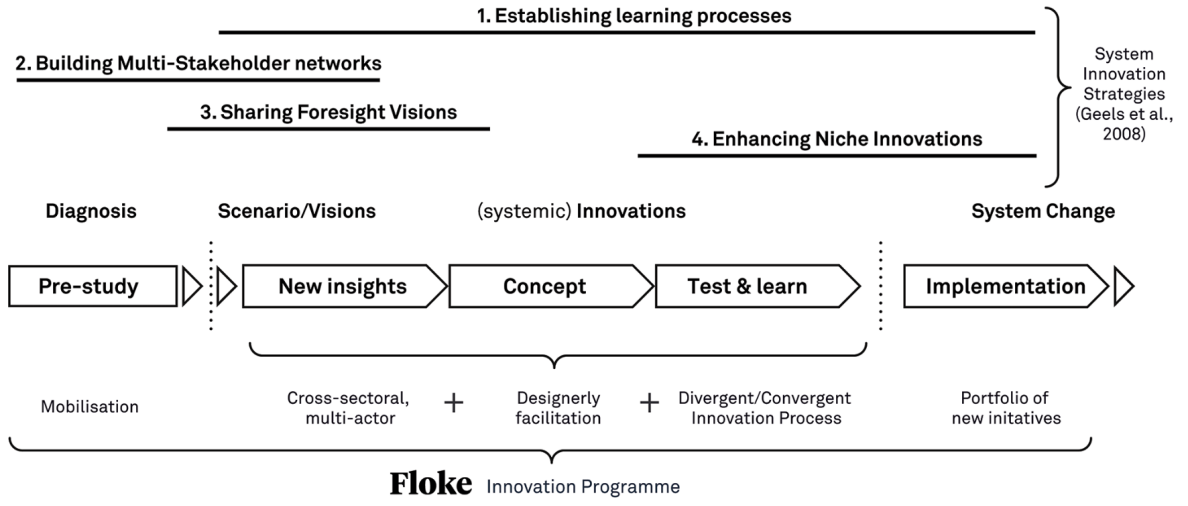

Figure 2. Graphical representation of Floke process relating to system innovation strategies.

Innovation approach: building multi-actor network/sharing foresight visions

The two initial phases of the Floke process are arguably related to the system strategies of building multi-stakeholder networks and sharing foresight visions.
The strategic recruiting of actors in Floke is analogous to the concept of transformative coalitions and argues that actors could also be incentivised to help solve collective challenges within industries. Described as “partnerships of multiple actors that generate innovation through knowledge flows”, Pereno and Barbero argue for such coalitions to be supported by designerly methods and tools developed for the “active engagement of multiple stakeholders” (Pereno & Barbero, 2020, p. 123).

The Floke projects are presented as open-innovation processes (Chesbrough, 2003), a concept in which organisations move from internal innovation, r&d, and distribution, to an approach where innovation can happen and be realised externally. Furthermore, it is arguably an inter-organisational process (Dodgson, 2013), including stakeholders from all three sectors; private, public and non-governmental. This approach is comparable to the quadruple helix model that recognises four influential groups of actors in an innovation system, with the addition of science (Schütz et al., 2019). The participating organisations were recruited from the entire value chain – a collaboration of actors across the value chains and sectors is considered essential for systemic change (Vanhaverbeke, 2006). Furthermore, inter-organisational knowledge sharing and learning as capacity building for innovation is fundamental in addressing sustainability challenges (Van Huijstee et al., 2007).

However, such an open, multi-actor approach is challenging in onboarding, as the uncertainty of outcome makes establishing a collective, mutual understanding of the brief demanding. Open innovation processes also challenge dominant notions and practices of competitive advantage and intellectual property. Furthermore, the processes must account for strategic concerns that inform the transition in the short-, medium-, and long-term. The collective development of inspiring and promising visions is considered fundamental in bridging such diverse perspectives in the system strategies (Geels et al., 2008, p.12).

Designerly facilitation: establish learning process/enhancing niche innovations

The two latter phases of the Floke process focus on the development of collective insight and the creation of innovation concepts, a reflection of the system strategies of establishing learning process and enhancing niche innovations. The Innovation programme explicitly argues for a designerly approach, in that design is used both as an organisational resource for innovation and a cognitive style (Kimbell, 2011, p. 297) in facilitating the process. As such, it reflects the growing academic interest in connecting designerly approaches to sustainability oriented innovation (Baldassarre et al., 2020; Buhl et al., 2019; Geissdoerfer et al., 2015).

Other contemporary references can be drawn from the design research community through the tools being used in the Floke process – i.e. *Beyond Net Zero* (Design Council, 2021) and *Systemic Design Toolkit* (Ael et al., 2018). The latter reflects the increasing demand for systemic methods and tools that can address the complexity of the issues addressed, and arguably, critically so, as the dominant practices and approaches are assumption-boxed and ill-suited to work with complex sustainability challenges (Sevaldson & Jones, 2020; VanPatter, 2020). Such tools seek to encompass the dynamics of dialogic processes between actors and their individual interests in the generating of requisite variation of perspectives and innovations to address systemic challenges (Weigand et al., 2014) - and are central to the Floke process, included as collaborative worksheets in facilitated workshops

From these considerations, it could be argued that the designerly approach of the Floke process is actively addressing the importance of learning processes across the project participants. Furthermore, the participatory nature of designerly facilitation supports a high degree of co-design in the generative processes– and, ultimately, the capacity for creating niche innovations.

Results

The four system innovation strategies provide an interesting unit of analysis to evaluate further the “Floke” programme’s potential for sustainability transitions. A few prominent attempts have been made to investigate the emergent role of design in sustainability transitions, such as the multi-level design model that seeks to address increasingly

complex design challenges in the context of sociotechnical transitions (Joore & Brezet, 2014).

However, such existing studies are arguably focused on the designers' role as creative problem-solvers and artefact makers and, to a lesser degree, as orchestrators of processes for sustainability transitions. When talking to facilitators, it is evident that in experience, a methodological gap exists: As the design practitioners increasingly find themselves in central, orchestrating roles in projects that aspire to systemic change, the dominant designerly approaches to sustainable innovation are unable to engage with sustainable transitions adequately. The role becomes more that of a transition manager "… analysing change of the sociotechnical and societal situation …" by "… targeting sociotechnical or societal problems, operating from policy and political objectives" with a "Descriptive and analytical process, aimed at understanding sociotechnical or societal questions" (Joore & Brezet, 2014, p. 3). Against this backdrop, perspectives from system theory and transition studies might provide a useful lens for scoping and adapting current design practices to sustainability transition processes.

Finally, further research should be done, investigating the actual uptake of these approaches by practitioners and consequent implications for methodological and processual choices for sustainability transition projects.

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