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Designing Transitions Bottom-up.  
The agency of design in formation and proliferation of niche practices

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Abstract: Sustainability transitions are generating comprehensive learning spaces, which yield substantial reconfigurations not only in our practices and actions, socio-technical systems, but also in our cognitive constructs. This article tackles the agency of design in transitions, by particularly focusing on bottom-up and emergent learning processes at niches. An overview on common lines of inquiry from (1) design theory, (2) multi-level perspective (MLP) of system innovations and (3) practice theory (PT), which commonly address the agencies of design and learning in transitions, is presented. Consequently, we propose an integrative analytic-theoretical framework, and describe it with an exemplary analysis of a community-led transition project.

Keywords: sustainability transitions, design theory, practice theory, multi-level perspective, learning space.

1. Introduction

Adverse environmental consequences of society’s established ways of living are increasingly evident in daily patterns and experiences. Environmental, social, economic and technological dimensions of our society are coupled with each other in complex, dynamic and continuously evolving relationships in sustainability problems. Consequently, the problem space continues to grow, and needs to be urgently intervened at multiple levels of socio-technical systems if we are to avoid irreversible trajectories of unsustainability. In this growing problem space, global reports underline the urgency and timeliness of collective action to tackle mitigation of and adaptation to climate change (IPCC, 2018). Moreover, research indicates the necessity for deliberating essential reconfigurations in our institutions, economies, technologies, values, behaviours and practices (Steffen et al., 2018).

Consequently, a common ground arises for reconsidering the socio-technical systems that meet societal needs and the patterns they generate and pursue. Therein lies an opportunity for us to revisit our philosophies of being with and within, to rediscover our relationships with environment and our organizations at material and non-material levels.

Persistent and wicked sustainability problems generate a comprehensive learning space which is situated at the intersection of problem framing and solution formation (Jonassen, 2000; Jones,
Design has long been operating in such learning space, where solutions to wicked problems are sought for (Buchanan, 1992; Cross, 1990; Jones, 2014). Buchanan (1998) interprets design as a culture of learning, operating neither in a sole problem or solution space but in a third space, where knowledge is built by means of systematic, creative and experimental thinking. Sustainability transitions inhabits a similar space of learning, where neither one but both problems and solutions are to be rediscovered.

In this paper, we explore the learning spaces interrelated to design and sustainability transitions with the aim of developing an integrative, analytic-theoretical framework. We start our exploration by weaving together two diverse approaches towards transitions i.e. multi-level perspective (MLP) on socio-technical system innovations and social practice theory (PT). MLP prioritizes niche socio-technical experiments and configurations as drivers of change, which are triggered by learning and networking (Geels, 2010; Geels & Schot, 2007). On the other hand, PT scrutinizes elements, dynamics, processes and connectivities that emerge practices and shape systems (Reckwitz, 2002; Røpke, 2009; Schatzki, 2001; Shove et al., 2012).

Although they seem to be controversial and disparate approaches to transitions, both MLP and PT address ‘learning’ as fundamental processes of transitions. They both allocate agency to the quasi-objects of design in assisting societal transformations. However, the material conceptions of design in the literature need to be revisited by reinterpreting design as a process and that of learning. In line with our aim for building an integrative understanding on learning in Design for Transitions, we identify and analyse the concepts and processes signified in design theories, PT and MLP. Consequently, we theorise the agency of design in the formation and proliferation of niche practices with focus on learning; and, finally, we present an integrative analytic-theoretical framework with an ongoing case study as an example.

2. Learning Space of Design and Transitions

As a ‘discipline of integration’ and a ‘culture of learning’ (Buchanan, 1992, 1998, 2001), design holds the potential to undertake a pivotal role in transitions. Dealing with working solutions for particular situations in complex real-world contexts, design has discovered unconventional approaches of knowing the structure and dynamics of problems and deliver tailored solutions (Cross, 2006). Working with complexity, design pursues non-linear, multi-dimensional and experimental modes of thinking and knowing. The scope of design in the context of sustainability has encompassed an evolution from efficiency-oriented product development to service systems reconfiguring production and consumption patterns, to interventions aiming social innovation and behavioural change, while recently expanding its matter of subject to sustainability transitions (Ceschin & Gaziulusoy, 2016). Design has started to address structural and systemic transformations (Gaziulusoy & Brezet, 2015; Gaziulusoy & Ryan, 2017) built on holistic understandings of our life systems (Irwin, 2015; Kossoff, 2015). In this emerging field of designing for transitions, the complexity of systemic design is further increased by integrating a time aspect, consequently considering dynamics evolving within and contingencies between socio-technical systems (Ceschin, 2014; Gaziulusoy & Erdoğan Öztekin, 2018; Irwin, Tonkinwise, & Kossoff, 2015; Vezzoli, Ceschin, & Kemp, 2008).

From PT perspective, building effective responses against climate change in sustainability transitions requires profound changes in our social practices (Shove & Walker, 2007). Accordingly, interpretation of technology as the ultimate driver of change is inadequate to capture the complexity of transitions. Rather the connections, relations and the co-evolutionary dynamics between various material systems and everyday life practices should be brought to the focus of transitions (Cass, Schwanen, &
Shove, 2018). Depending on this understanding, PT researches for building a deeper understanding of what constitutes practices, how they form, relate and change.

PT acknowledges the inseparable entanglements behind practices by recognizing the agency in designed infrastructures, devices and artefacts (Shove et al., 2007), and the agency in practices as they transpire material arrangements of spaces, fields, environments (Schatzki, 2002; Hui, Schatzki & Shove, 2017). Shove, Pantzar and Watson (2012) define practices as networks of social and material arrangements; and they identify three fundamental elements constituting practices as (i) material, (ii) competence, and (iii) meaning. Practices are carried out once these elements are accessible and their links are established. Practices do complement and compete with each other in multiple dynamics, and eventually form ‘bundles and complexes’, systematically giving directions to lifestyles (Shove et al., 2012).

On the other hand, MLP provides a macro understanding of path dependencies and complex dynamics with a focus on socio-technical system transitions. Taking technology as a crucial constituent of transitions, MLP recognises three levels in global socio-technical systems i.e. (1) landscape, (2) regime, (3) niche. The model proposes that accumulated niche practices of social, economic, technological innovations are initiators of transformation in established socio-technical regimes (Geels & Schot, 2007). Furthermore, Deuten (2003), Deuten and Rip (2000), and Geels and Deuten (2006) integrate a socio-cognitive perspective on MLP, looking into learning within and across niches at early and later phases of transitions. MLP concentrates on the dynamics between local niches while building their links to large-scale and long-term transitions. In MLP, niches are mainly framed as institutional test fields, which support and subsidise incubation, development and diffusion of innovative sustainable technologies. However, niches also arise from bottom-up, community-led initiatives that experiment with alternative sustainable lifestyles (Longhurst, 2015; Seyfang & Haxeltine, 2012; Smith & Raven, 2012).

Although PT and MLP handle multiple scales in their case studies to derive empirical findings, they both assign agency to the designed such as objects, technologies, infrastructures, environments either in generating niche practices or in premediating path dependencies. Both acknowledge that transitions are coupled with learning processes between niche practices, technologies and actors, which enable formation and proliferation of niches. Their common inquiry is into replacements of practices and/or socio-technical systems, and their processes of change and emergence. At the intersection of transitions, social practice and design theories, we have encountered parallel concepts of learning, which emphasize the associations between action and abstract thinking, between meaning and purpose, in embedded complexities of societal and systemic contexts.

2.1 Action (contextual) and Code/Logic (abstract)

Ill-defined, urgent and complex nature of current sustainability problems have initiated a search for reconsidering our knowledge construction patterns and learning modes. Complex systems thinking has offered new understandings on how information unfolds and how knowledge is constructed. Morin (2008) introduces the concepts of “intellectual complexity” and “lived complexity”, and refers to their complementary roles in knowledge construction. An enhanced understanding of our sustainability problems will potentially emerge from the junction of practical experiences and intellectual framings, where intellectual complexity and lived complexity are both embraced (Rogers et al., 2013).

Design research, PT and MLP take similar positions in the way that they conceptualise the associations between the action and theory, particular and general, contextualized and codified.
Operating within the particularity of situations and contexts, design seeks for alternatives by exploring reconfigurations of practical and theoretical relations, material and immaterial matters of subject. Buchanan (1992, 1998) argues that design activity requires a conception of its subject matter both at the levels of general (abstract) and particular (contextual) (Figure 1). While the ‘working hypothesis’ of the design idea operates at the level of general, the specific solutions and action on-ground constitute the level of the particular (Buchanan, 1992). Moreover, general and particular co-constitute and shape each other during the process of design in such a way that design exploration turns into a means for learning both at the level of general and particular.

![Figure 1. Levels of subject matter in design (Schematized by the authors from Buchanan, 1992)](image1)

For practices, cognitive (abstract) know-how and physical (contextual) know-how are essential in their formation and proliferation. Shove, Pantzar and Watson (2012) define abstraction and reversal as central cognitive processes enabling migration of competences from one practice, context, or actor to another i.e. Abstraction refers to decontextualizing knowledge of know-how, while reversal refers to the process of recontextualizing this knowledge in distinct settings and/or practices (Figure 2). Parallel to migration, MLP studies connote aggregation as the process of transforming local (contextual) knowledge from the niches into generic ‘learning trajectories’ (Deuten, 2003; Grin, Rotmans, & Schot, 2010). Through aggregation, tacit knowledge built in niches gains capability to ‘travel between different practices’ (Geels & Deuten, 2006), while its experience-driven and context-specific properties are abstracted into codified and generic knowledge.

With a specific focus on learning, van Mierlo and Beers (2018) enounce reflective action and discursive interaction as the shared processes encountered in transitions. In reflective practice, “iterative process of action and reflection involves activities of planning, action, and evaluation, which may give rise to the emergence of changing practices” (p.12). Reflective action is a learning approach where learning takes place with full commitment to action and within a long timeframe enabling use of feedbacks between local experiences and theoretical constructs (Beers & van Mierlo, 2017; van Mierlo & Beers, 2018). Since therefore, niche learning does not only serve as ‘learning trajectories’ for applicable policies, but it is a means for establishing emergent and evolving practices while providing diffusion in terms of both ‘scaling-out’ and ‘scaling-up’.
2.2 Meaning (making) and Purpose (seeking)

As discussed in the previous sections, we interpret design as a process of learning and the enabler of expanding learning spaces for sustainability transitions. In words of Buchanan (1998), design cultivates a culture for learning and plurality through an “ongoing search for values and understanding” by means of deliberate action. Hence, design is furthermore a discursive activity besides being a solution-oriented practice, where replacements and reconfigurations are coupled with an exploration into meanings and purposes:

Categories have fixed meanings that are accepted within the framework of a theory or a philosophy, and serve as the basis for analysing what already exists. Placements have boundaries to shape and constrain meaning, but are not rigidly fixed and determinate. The boundary of a placement gives a context or orientation to thinking, but the application to a specific situation can generate a new perception of that situation and, hence, a new possibility to be tested. (Buchanan, 1992, pp. 12-13)

Therefore, the learning space of design emerges not only around building new material and immaterial configurations in the contextual and abstract but also around meaning-making processes and consequently around designating purposes of design action. Jones (2014) differentiates between purposeful and purpose-seeking processes in systemic design. While purpose-seeking design action implies rather an open path towards a clearer vision and ideal, purposeful design action refers to fixed ends and flexible means. It is noteworthy to remind here that in wicked problems such as climate change neither the problem framing nor the solution is definite. Hence, designing of sustainability transitions gets intertwined with an exploration into learning which corresponds to both meaning making and purpose seeking (Figure 4).

Discourse in PT addresses meaning and motivation as a backbone of practices (Shove et al., 2012; Reckwitz, 2002; Schatzki, 2001). Schatzki (2001) defines practices as sets of actions, which are conveyed by sense-making. He suggests the concept of ‘teleoaffecitivity’ underlying practices, which refers to “the mental phenomena of teleology and affecitivity, by orientations toward ends and by how things matter” (Schatzki, 1996; 2001, p. 55). Thus, beyond yielding contextual action and
abstract understandings, practices yield framings about their meanings and purposes within the time and space where they take place.

Building on the concept of migration elaborated in the previous section, Shove, Pantzar and Watson (2012) highlight the crucial function of setting commonalities “at the level of ideas and discourses before related forms of know-how could be transferred” (2012, p. 52). They acknowledge most social and symbolic associations such as emotions, motivations and values; and they coin it as “meaning” - one of the three fundamental elements of practices (Figure 5). Outstanding from other elements, meanings have flexibility to co-evolve with existing and changing practices, plus ability to move far and fast from one context to another. Thus, meaning-making carries a potential to accelerate diffusion of practices with its tendency for mobility and its inferences for collectivity.

In MLP, interactions and learning processes between niches are of particular concern, since they are interpreted as catalysts of change in the established regime of technologies, policies, science, market, culture and industry (Geels & Schot, 2007; Schot & Geels, 2008). However, besides their role in ‘learning trajectories’ as reviewed in previous section, there has been limited research into the essence of interactions and learning processes taking place at the niche level. On the other hand, MLP acknowledges social inertia as one major counter dynamic hindering transitions (Li & Strachan, 2017) in addition to the lock-in of socio-cognitive patterns (Farla, Markard, Raven, & Coenen, 2012; Kemp, Schot, & Hoogma, 1998; Longhurst, 2015), and puts forward social alignment plus user preferences, practices and lifestyles as constituents of transitions. Therefore, MLP implies that purposes, values, beliefs, and feelings are matters of transition processes; and yet the scale of MLP stays inadequate as a theoretical lens to discuss how these get shaped and accompanied in niche learning and interactions.

As mentioned, van Mierlo and Beers (2018) suggest discursive interaction as one other main mode of learning accompanying reflective action (Figure 6):

Learning in this sense can be seen as predominantly cognitive, while being informed by diverse knowledge, values, and interests, in a process of meaning making. At times, this may result in convergent problem orientations and common ground. At other times, discussion partners may gain a better view of the grounds upon which their opinions differ. In both cases, the result is a shared cognitive basis. (van Mierlo and Beers, 2018, p.12)

As they argue, reflective practice and discursive interaction inseparably co-evolve through transitions by generating both the ‘cognitive’ and ‘relational’ capitals effective in directing radical system changes (van Mierlo & Beers, 2018). Hence, the social understandings built through discourse and dialogue could open up a learning space to re-associate meanings, values and purposes to ways of doing things (Mezirow, 1997), but they also may create cultural lock-in situations where orientations towards transitions get congested.

In conclusion, all three fields of inquiry i.e. design theory, PT and MLP acknowledge purpose orientation and meaning association as continuous and fundamental processes to in learning and building understanding about new practices or new lifestyles shaped around the designed. These processes expand our conceptualization of a ‘learning space’ by enhancing its complexity and adding another line of framing, which integrates purpose and meaning to actions and codes by embracing the role of changing values, beliefs, and feelings in building revised interpretations, understandings, and reframings of the whole phenomena.
2.3 Embedded Situatedness

Following the shared understandings on the dynamics driving change and learning from design theory, PT and MLP, we are proposing four anchor points of thinking correlated in the learning space of Design for Transitions:

1. the particular action taken in the specifics of a context;
2. the code/logic that builds an abstract understanding of systemic relationships tangled in the particular;
3. the meanings where feelings, emotions, values are associated to the action;
4. the purpose that is decisive on setting priorities, process orientation, and decision-making.

Design theory, particularly the discourse on design for sustainability and transitions, acknowledges the iterative and explorative processes leading design processes. The pathways towards solutions are defined as co-evolutionary and holistic (Irwin, Tonkinwise & Kossoff, 2015), recurrent and spiral (Wahl & Baxter, 2008). Correspondingly, we adopt a multidimensional understanding of learning, especially when transitions are the matter of concern. Transitions facilitate multiple iterations to reframe actions, code/logic, meanings, and purposes before, during and after the design takes place, resulting with enhanced understandings. However, we would like to integrate one more aspect related to design and learning; and that would be their situational nature and contextual embeddedness. Young (2007) suggests an embedded understanding of content and context regarding three levels and their interconnectivity:

- **Design in context**, which refers to the conventional world of design of artefacts, components and products, operating at the level of product configuration and detailing;
- **Designing context**, which refers to the design of systems and services at the level of systems thinking;
- **Design of context**, which refers to the creation of meaning and purpose, at the level of policy.

This interpretation suggests that design activity operates throughout micro to macro scales, outlining tangible as well as intangible contexts (Young, 2008). Linking back to our discussion, Young’s model suggests that meaning and purpose constitutes the overarching context, which orients cognitive constructs and subsequently to concrete actions and products. We suggest that this embedded configuration is helpful in unpacking the complexities of transition processes, with improvements in order to better grasp the full complexity of transitions and their embedded situatedness.

2.4 Integrative Framework of the Learning Space

The three research fields we have overviewed signify parallel dynamics and processes about learning processes in transitions: (1) design theory by looking into the processes of designing anew within ill-defined problems, (2) PT by taking emergence and disappearance of practices as its unit of analysis, (3) MLP by specifically investigating socio-technical system transitions. They have a commonality around how (i) they associate agency to the quasi-object of design in the way that the designed triggers transitions by forming practices and building new understandings, as well the way that (ii) they notify agency to the process of designing in the way that its open-ended, continuous and iterative nature becomes a means to discover unexplored relationships and possibilities leading to transitions.
Design theory addresses change in the relationships that we construct both concretely and in abstract, and places actual doing and systematic experimentation at the core of this change. PT points to change in the practices linked to meanings, competences, materials. It locates participation for building competence, dialogic interaction for sense-making and accessibility to material arrangement as generators of such change. On the other hand, MLP tackles change in the socio-technical systems and regimes, while it highlights networked learning and discursive interactions between niche experiments as drivers of change. This multiplicity of addressing change sheds light onto the learning space that humanity travels through sustainability transitions.

When these approaches are integrated together, they signify an enriched understanding of what the processes and dynamics of forming new placements/practices/socio-technical systems are, and how transitions to re-placements/practices/socio-technical systems do occur. When integrated, they do not only illustrate how change in thoughts, practices, systems occur in and around design, but also, they build an understanding of how design has multiple agencies in transitions for its local to global, individual to societal, and from its pragmatic to cognitive implications.

We have encountered similar lines of inquiry around learning emerging in all three fields: one of them is affiliated around the socio-cultural aspects and situatedness of learning, which is underpinned by discursive and dialogic meaning making and purpose seeking processes; the other is
affiliated around learning-by-doing and cognitive learning, which is underpinned by the correlations between contextual and codified, tacit and explicit, lived and intellectual interpretations. Although these two lines are tackled in distinction, they are majorly interpreted as co-evolutionary, non-hierarchical and adaptive to each other.

Succeeding this understanding, we distribute these four anchors of learning i.e. (1) action, (2) code/logic, (3) meaning, (4) purpose as equally distanced, equally connected, and equally accessible cornerstones of the learning space of transitions. Furthermore, we propose a spatial layout which juxtaposes the embeddedness of context, which has been conceptualized in design theory (i. Designing in, ii. Designing, iii. Designing of). Towards the outskirts of this embedded learning space we foresee a less-explored and challenging area where learning yields substantial refractions of (1) action, (2) code/logic, (3) meaning, (4) purpose. At the core of this embedded learning space, we placed the designed as the actual solution, which has the potential to proliferate and evolve if the context it is located gets reframed (Figure 7). By this analytic-theoretical framework, we aim to facilitate holistic understandings of learning dynamics, patterns and processes which lead transitions and form subject matters of Design for Transitions inquiries.

3. Testing the Framework with an Exemplary Case: Community-led Holistic Water Management Transitions

In this section we present a preliminary analysis of an on-going case study to exemplify the use of the proposed analytic-theoretical framework. Through this process, we also reflect on the theoretical basis of the framework and identify empirically-informed improvement points.

3.1 Methodology and Methods

The data for this study has been collected at the eco-settlement Tamera Research and Education Centre. For the purposes of this article, we focus on a particular community-led transition project - water retention landscape and water management of Tamera. We followed a qualitative case study methodology (Yin, 2003) to analyse data composed of (1) participant observations from (a) a 9-day seminar course, (b) a 4-hour open event, (c) daily community practices and events, and (2) documents from (d) recorded thematic speeches, (e) semi-structured interviews, (f) community publications.

3.2 Findings and Discussion

Initial phases of Tamera (est. in 1995 in Portugal) went under isolation and resource shortage, which accelerated a search in the community for a deeper understanding and systematization of natural resources and land management. Since 2007, targeting self-sufficiency, the settlement went through successive change while its systems of water, energy, food and waste got restructured and relinked with contributions from invited experts, consultants and volunteers. In this process, the settlement became an experimental test field and learning platform for holistic settlement design, implementation of regenerative design principles, and alternative lifestyles. Due to such dynamic exploration into environmental, social, and technological dimensions of sustainability, Tamera attracted interest from individual actors, communities, institutions, local and regional authorities.

From the very beginning, Tamera settlement has been established to build a model for decentralized and autonomous community life. By experimenting and learning alternative ways of living, Tamera community has intended to demonstrate possibilities for self-sufficiency, sustainable management of
local resources, and empowerment of social life serving to the community vision of global peace. When the first group settled to the temperate climate of Portugal from mid-Europe, Tamera landscape was interpreted as “desert-like”. In the following years, inadequate water supply grew to be a vital community concern. The problem oriented the community towards alternative water management approaches. Taking consultancy from Sepp Holzer-a permaculture and water retention expert, local patterns of rain and the rain water catchment capacity of the land were assessed; and then, it has been revealed that Tamera’s unbalanced yet plenteous rainfall per year is actually as much as mid-Europe. Since then, there has been a realization that it was not the climate “desert-like” conditions on land but the way that water resources was not managed.

The initial water retention landscape has started with 10 lakes for water collection at the lowest points, swales throughout the land to ‘Slow, Spread and Sink’ water, and multiple land-terraces scattered around the topography for agriculture (Holzer, 2015). In 2007, community constructed the plan, which then has started to support rainwater catchment, raise ground-water levels, cultivate natural vegetation. Consequently, local water resources and soil started to restore supporting environmental comfort and well-being in community and environment. Eventually, Tamera has experienced immense improvement in the environmental conditions on its land. According to the
narratives of the community, biodiversity has been regenerating. Birds “has come back” reaching over 65 species. Cultivated fish have adapted well to the lake fauna, even emerging an overpopulation problem at the moment. And land has grown “lush”, equipping a fertile base for agriculture.

**Figure 9. Process of learning space generation, in time and by experience.**

Water management transitions of Tamera could be interpreted as a smooth transition process, since it has followed a designated path rather than an experimental one. Nevertheless, we have encountered indications of how this specific project has triggered learning and building reframings related to codes, actions, meanings, and purposes. The mediated processes of groundwater generation, water maturation/purification and ‘green water’ released by plants got integrated in the water cycle understanding of community. Moreover, such a complete understanding of how water travels, delivered conscious decisions for avoiding water and soil contamination, restricting chemicals in food production and agriculture, avoiding black water by using dry toilets and hot compost systems, and only utilizing biodegradable products in grey water systems. In other words, water
management transitions arouse shifts in community practices and consumption patterns as well as reconfigurations in parallel systems such as waste and food.

Experiencing water transitions has even stimulated meta-level reframings (Figure 9). Community has begun building deeper interpretations on complex adaptive systems underlying the water cycles, and their interwoven role in “the webs of life”. This has resulted in deep transformations in the community vision, where sustainability transitions and whole systems change got integrated with social innovation. Consequently, a research has opened up for the community in this expanded learning space to improve their settlement technologies and community practices by experimentally exploring for multiple transitions in mutual systems.

Hence, by experience, the water management transitions has leaded the community (1 – code/logic) to reframe their understandings related to the roles of water in living systems, (2 – meaning) to associate new meanings, values, feelings about water for its potential to restore, heal, and supply life, (3 – action) to plan the integration of supportive settlement systems and redefine community practices, (4 – purpose) to research models for decentralized and autonomous communities by focusing on sustainability transitions and systems change (Figure 5). By living through this transition, Tamera has expanded its focus on social cooperation in community living and redefined cooperation as with all beings - human and non-human, environmental processes and living systems. Since 2009, solar village test field has been experimenting with renewable (solar and biogas) energy systems integrated to its pilot solar kitchen and greenhouse, while exploring new community practices. Recently, Tamera has set its targets to self-sufficiency in local food, and continues to strive for this goal by increasing its local food production and expanding its collaborative networks in the region. Such emerging community-led endeavours for transitions are building on the learning space, which was initially evoked by water management transitions.

Design for Transitions, as an iterative, expanding and long-term process, provides implications for reframing (1 -code) how things work, (2 -meaning) what things mean in relation to one another, (3 -action) how to act and do, (4 - purpose) what to strive for - all in all leading to radically different framings and understandings of the sustainability problems themselves and the solutions to be tailored. Thus, the agency of design is not limited to the actions, practices, and lifestyles that it can generate. The agency of design is mostly latent in its power to generate reflections and feedbacks throughout ‘of context’ and ‘in context’, and thus to generate learnings and new discoveries for understanding transitions in its integrity by taking its social, technological, cultural, and cognitive dimensions into consideration.

5. Reflections on the Framework and Future Research

In the previous section, we have exemplified the use of the proposed analytic-theoretical framework by illustrating a preliminary analysis of an on-going case study. Depending on our experiences, we present our reflections on the framework in order to provide insights for improvements and give direction to potential future research.

5.1 Reflections on the structure:

Through the test analysis, we have discovered that elements of transitions tend to relate to multiple categories at a time. Such that, as we get closer to the applications and practices in context, the elements referring to codes, purposes and actions pursue immense interactive relationships with each other. The interlaced nature of connections indicates that a consistent learning space has been succeeded. In such cases, connections achieve to be bounded and mutually supportive, and thus
learning towards transitions are accelerated. Similarly, at the level of designing of context, when we look into the meta-level drivers of transitions, we can encounter a strong link between codes and meanings. Mindsets and philosophies are coupled with global associations, where fundamental meanings and values are formed. The structure of the framework provides a basis to recognize these connections and relationships between categories. However, at the moment, the two-dimensionality of the framework does not provide further possibilities for analysing deeper into such multi-dimensional networks of relationships. Future research should improve the structure of framework in order to increase its representative and analytical capabilities. If the multi-dimensional character of the learning space could be deliberated in the framework, it would enable a richer comprehension of the networks and interconnections underpinning transitions.

5.2 Reflections on the capacity of complexity:

In the framework, embedded levels of context are structured equally around the learning space. Conversely, we have figured out that boundaries between contexts are actually not behaving asymmetrically and distinctly for actions, code/logic, meanings and purposes. For instance, it has been relatively straightforward to distinguish different levels of purposes, whereas it has been challenging to affiliate levels of context to meanings. Meanings intend to follow a floating behaviour throughout all levels of context. In the light of our data, we have identified and applied additional categories in order to pursue analysis in an organized manner. Therefore, this framework integrates distinctive elements of learning within an umbrella logic, but it should not be approached as a tool for reductionist thinking. Forming a basis for integrative analysis, it would necessitate further elaboration and modifications depending on the information and complexity that each case carries. In order to better understand the limitations and possibilities of the framework, a diversity of cases should be applied including transition cases which might be in their preliminary phases, indeterminant, experiential, or unsuccessful. Further inquiry might even advance the framework for analysing mutually evolving (more than one) transition cases by focusing on their interactive dynamics and relationships.

6. Conclusions

Learning processes, which would carry our society towards sustainability transitions, are being researched by multiple fields. Design has a central role in transitions for the alternative experiences, practices, and configurations it delivers, and the learning processes it triggers. On the other hand, designing for transitions requires a complete understanding of the elements and dynamics underlying change processes. With the aim of building integrative understandings, we have researched into three research fields, which acknowledge active and complex processes of transitions are actuated by design and designed. Subsequently, we have developed an analytic-theoretical framework co-constituted (1) by interpretations from theory and (2) by reflections on the framework. Depending on theoretical insights from design theory, PT and MLP of system innovations, we have suggested fundamental lines of learning in transitions as: (1) the actions, which are decisive on our concrete interventions, (2) the codes/logics, which build abstract and theoretical understandings, (3) meanings, which constitute the associated values, feelings, and (4) purposes, which form priorities and orient transitions. The learning expanding around design is highly dynamic and can even stretch across contexts, scales and places. The framework intends to facilitate holistic investigations into such expanding learning spaces of transitions with a perspective from design.
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