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(UN)WEAVING (UN)SUSTAINABILITY

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ABSTRACT

The spatio-temporal scale of design for sustainability has come full circle. What started within a technology-oriented global outlook, later evolving into a people-oriented and local view on change, now urges for a holistic, broad extent and multilevel design for sustainability. This paper enquires into the theories of social change that govern different approaches within the field, and positions the adhesion of socio-technical system innovation and transition design to classical modern theory, against an emergent design paradigm anchored in practice theory. By drawing on the literature of the field and comparing various models, a conceptual framework is suggested where "practice" serves as an alternative scale. In broadening the scope of analysis in design, this frame of thought can solve the inherent incompatibility of geographical, jurisdictional and institutional hierarchies as vessels to conceptualize the complex and dynamic processes through which social change is (can be) brought about.

INTRODUCTION

Today, sustainability is an inescapable issue. This, while relieving the researchers from the previously draining task of debating the reality of our deteriorating environment, is a constant reminder of the rapidly closing window for us to change and the sheer magnitude of the inevitable catastrophe should we fail to do so.

The extensive reach and profound depth of the current social, ecological and economic crisis, has made transformation to anything resembling sustainable ways of life immensely difficult, casting a long shadow over our alleged ability as a species not only to organize in but also to understand scale. Having gone through the modernist unyielding, linear expansion, and the relatively inconsequential counter movement of localism, the growing awareness of the potential consequences of going small (Sennett, 2012, pp. 3-4) in a world increasingly fragmented by conflict, and the inescapable entanglement of sustainability issues across space and time, has brought us full circle – to the almost "ritualistic" (Shove, 2010, p. 1276) reference to the need for a holistic approach in sustainability literature, of which design does not stand exempt.

TRACING THE SCALE OF DESIGN FOR SUSTAINABILITY

Since its inception, design for sustainability (DfS) has undergone quite an evolution of scale. Gibson and colleagues (2000, p. 218) define scale as the "spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon" (see Figure 1). In close relation to scale are the notions of extent and level; where the former indicates the size of the dimensions in question, the latter points to units of analysis located at similar positions along the scale

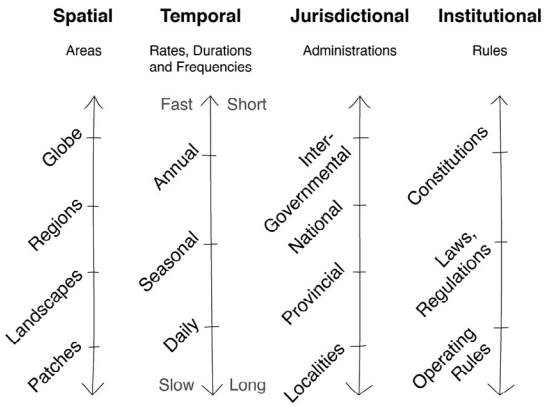

Figure 1: Selected scales often drawn on in sustainability literature (adapted from Cash et al., 2006).

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Building on the analysis of Joore and Brezet (2015) and Ceschin and Gaziulusoy (2016), this section illustrates a general overview of the spatio-temporal scale of DfS during its brief history, and distinguishes three main outlooks within the field.

THE GLOBAL, SHORT-TERM OUTLOOK

DfS merged within a broader movement concerning the impacts of human life on the environment during the 1970s. Although its early scholars like Fuller and Papanek took note of the economic and social unsustainability of modern societies, DfS for the most part is and has been retaining a narrow focus on ecology and improving technical efficiency of the status quo. Early approaches such as green design and ecodesign in the 1990s (Ceschin & Gaziulusoy, 2016) mainly subscribe to this perspective.

The first major change came when the consumption patterns and consideration of users surfaced in the field in the early 2000s (Ibid.). This resulted, on the one hand, (i) in approaches such as emotionally durable design and design for sustainable behaviour (DfSB) which focused on eliciting more sustainable patterns of consumption from users, and on the other, (ii) in product-service-system design (PSS) which reoriented focus from products toward function and access.

In spatio-temporal terms, although the outcome of DfS within this outlook was small in size (usually a product), its focus was global and short-term as it aimed for mass production and generalization. However, it began to evolve in the direction of shrinking spatial extent, as more cultural dependency and longer term involvement was triggered in DfSB and PSS.

THE LOCAL, LONG-TERM OUTLOOK

A radical change came in the second half of the 2000s, with growing emphasis on social innovation in design (Meroni, 2007). Decoupling social change from the previously indispensable innovation in technology, this turn redefined the role of designer as a facilitator in the process that is fuelled by the engagement of local people in creative activity, i.e. creative community, to "reorganise the existing state-of-things" (Ibid., p. 14).

In parallel (and possibly mutual reinforcement) to this development, a new perception of user engagement in design was emerging from the field of collaborative and participatory design. This has been described as a move away from "use before use" conception of participation, which aims to anticipate future use scenarios, toward a "design after design" approach that blurs the formerly distinct boundaries between design(er) and use(r) (Ehn, 2008).

Thus, DfS spatially condensed to match the newly achieved height of engagement with its codesigning users over a longer period of time. Yet since then, in a rapidly deteriorating social and ecological landscape and with the regressive potential of isolation revealed, a growing number of scholars are reconsidering the need for broader scope of design, with terms such as "synergies" (Meroni, 2007), "acupunctural planning" (Jégou, 2011), "amplification" (Penin, 2013) and "planning by projects" (Manzini, 2015), suggesting that a combination and connection among multiplicity of community-based efforts is needed for transition to sustainability.

MULTILEVEL SPATIO-TEMPORAL OUTLOOK

The developments of the last decade have been oriented toward a holistic outlook for sustainability, pivoting design toward the civic realm. Designers are thus taking up the task of building connections and relations among different local initiatives, and between various actors in the public and private sphere. This is exemplified in the work of "living labs" like that of Malmö university (Björgvinsson, et al., 2012) and Manzini's "public innovation places" and "enabling infrastructure" (2015, pp. 119, 154) that create a broader bedding to foster social innovation.

In the same direction, there is a new body of work known as "socio-technical system innovation" (Joore & Brezet, 2015) and "transition design" (Irwin, et al., 2015) being developed, which argues for an expanded design scope encompassing socio-technical systems[1] that fulfil a societal need such as transport, healthcare, energy, education, etc.

While Ceschin and Gaziulusoy (2016) view this as a new level of design following social innovation, Irwin and her colleagues (2015) perceive it as a new kind of design, which is different from social innovation as it does not merely challenge the existing socio-economic and political paradigm, but is a design within and of new paradigms.

Furthermore, Joore and Brezet (2015) insist on another scope of design, namely "societal system", described as "the community of people living in a particular country or region and having shared customs, laws, and organizations" (Ibid., p. 96), and position it above the socio-technical system scope in that it spans over several domains and societal functions (see Figure 2).

[1] A more detailed account is provided in the next section.

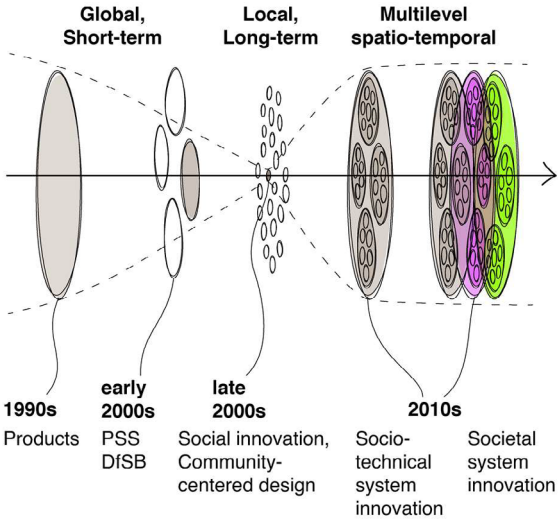

Figure 2: The evolution of three spatio-temporal outlooks within DfS (source: authors).

While DfS spans across these outlooks today, the call for a holistic approach to support broad–extent and multilevel transformation, is gaining wide acceptance in the design community. And though some authors have entertained the incorporation of a top–down approach (Manzini, 2015, p. 83), most conceptions of such "nested" structures (see Figure 3) aim to conceptualize grassroots social change toward sustainability (Irwin, et al., 2015; Kossoff, 2015; Vassão, 2017; Escobar, 2018).

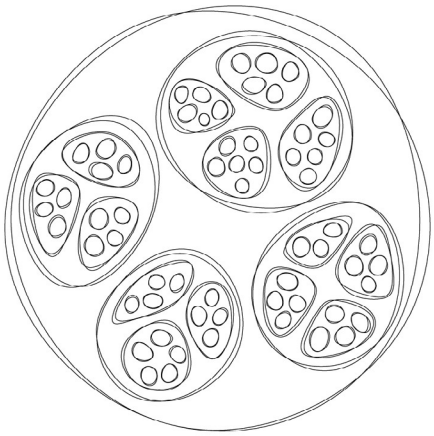

Figure 3: Nested structure, often referred to in relation to holistic perspectives (source: authors).

Here, another distinction by Gibson and colleagues (2000, p. 218) comes to the fore; inclusive and constitutive hierarchies. While in the former, higher level entities contain lower level ones within them, in the latter they are the emergent outcome of interdependence between lower level entities (Ibid.).

Taking insights from complexity theory and living systems theory, design literature draws on constitutive hierarchies by references such as "holarchy" (Kossoff, 2015) and the sequential levels of life from cells all the way to the planet (Ibid.; Vassão, 2017). From a sociology perspective, there are references to "cosmopolitan localism" (Irwin, et al., 2015; Manzini, 2015, p. 202) as a suitable structure for a sustainable society in which interdependent social entities on a multitude of levels exist within each other.

Given the relative novelty of this line of thought in design, there are basic questions regarding the use of these structures in order to understand broad–extent social change. Starting with what these entities are, how higher level entities emerge from the composite of lower level ones and how they act and relate to one another as high level entities? Placing individuals at the root of the hierarchy, some authors view households (Kossoff, 2015) as the next level, while others consider communities (Manzini, 2015; Escobar, 2018). But what comes after these small entities? Districts, municipalities, states and nations? Given that until recent times, much of the world's population couldn't accurately indicate on which side of these arbitrary "lines" they belonged, are they suitable structures for understanding social action? Furthermore, how can their action and interdependence be understood as higher level entities without the reduction and abstraction that lies at the basis of an inclusive, jurisdictional hierarchy? And beyond the spatial, how do these entities relate to the temporal scale of social change?

What limits our capacity in answering these and further questions does not lie in how DfS has evolved in its spatio-temporal scale over these outlooks, but indeed how it has not.

THE SOCIAL IN DESIGN FOR SUSTAINABILITY

Across the three main outlooks, stabilising common ground for understanding the "social" hardly seems a prerequisite for the discussing DfS as the field continues to exist almost entirely within the bounds of classical modern thinking. In relation to the approaches discussed in the previous section, adaptation of social theory in DfS can be discussed around two dualities of technology-society and structure-agency, which are used to outline four paradigms within the field. By no means a comprehensive analysis, this section only attempts to sketch a wider range of possibilities.

1. TECHNOLOGICAL PARADIGM

The first school of thought within DfS, and quite possibly the most dominant one to date, is "technological determinism". This paradigm views social change as the result of innovation in technology, and significantly undermines the role of people and other elements in the process of transformation. Therefore, it compasses approaches such as green

design and ecodesign[2] that remain focused on technical efficiency.

2. SOCIAL[3] PARADIGM

Within DfS, the "social" can be interpreted in two ways; either focusing on the non-technical aspects of designing for sustainability, or expanding the scope of sustainability beyond impacts on the environment to also consider socially unsustainable issues such as poverty, lack of access to health care, etc. While the emergence of these two interpretations has been quite interrelated in design, since the aim is to unveil how the challenge of sustainability, whether perceived as a narrow ecological issue or beyond, is framed and addressed within design, the former is in focus here.

Similar to sustainable policy literature (Shove, 2010), the social paradigm in DfS includes a multitude of approaches that draw on one or a combination of two schools of thought within classically modern social theory; economics and social psychology. The former holds the agency of rational autonomous individuals as the sole source of social change (Reckwitz, 2002, p. 245) in a purpose-oriented theory of action. In contrast, the latter depicts individuals as "norm conforming" and shifts focus to the structures that govern social order and action, which amounts to a norm-oriented theory of action (Ibid.).

Much of what falls under design for sustainable behaviour imply a classical view that focuses on "choice", "attitude" and "subjective norm" and aims at directing individuals' behaviour toward a more sustainable path with strategies such as providing information, incentive schemes, etc. (Shove, 2010; Kuijer & de Jong, 2012). Design for social innovation also draws on the same vocabularies in explaining social change. While awareness building is an inherent part of social innovation processes to persuade individuals, there is significant emphasis on reorganizing the local social networks as well as the creation of visions and even norms to be drawn on in the transition of the community toward sustainability (Meroni, 2007; Manzini, 2015).

Furthermore, the social paradigm of DfS can be viewed within a larger humanization movement that has been unfolding in design since the 1990s, which places (groups of) individual(s) in the focus.

3. SOCIO-TECHNICAL PARADIGM

Socio-technical systems, a term used to describe dynamic interplay between the social and technical side of systems (Bots, 2007), was founded in the field of science and technology studies (STS), the development in which over the past few decades has led to the emergence of a new area of research known as "transition studies" (Shove & Walker, 2007).

According to Geels, socio-technical systems can be perceived at different levels (2005, p. 1). On a small level it refers to the interdependence between the social and technical side of an organization (ibid.) which in design translates to the work of Baek and colleagues (2015; 2018) and Manzini (2015) on "collaborative services[4]", where in addition to the service or technical system, the social network associated with provision and use of it are also studied. However, the dominant understanding of the term, in transition studies (Geels, 2005, p. 1) as well as design, refers to the socio-technical systems through which a societal function such as transport, health care, energy, etc. is fulfilled (Ibid.). Therefore "system innovations and transitions" are changes in how these functions are carried out on a societal level (Ibid., p.2).

The adaptation of this research in design, known as "socio-technical system innovation" (Joore & Brezet, 2015), "transition design" (Irwin, et al., 2015) or "design for system innovation and transitions" (Gaziulusoy, 2015), is relatively novel and rapidly evolving (Gaziulusoy & Oztekin, 2019).

Early references to socio-technical systems include the work of Bots (2007) that addresses the need to combine the design of tangible (technical system) and intangible (rules that guide social interaction) artefacts in a framework integrating system design, decision process design and institutional design. Moreover, drawing on complexity theory, Herder and colleagues (2008) discuss an integrated approach that looks at actor networks as well as physical networks in infrastructure design. In later development, a group of scholars have been exploring the intersection between sustainable PSS and socio-technical system innovation (Ceschin, 2013; Vezzoli, et al., 2015).

Furthermore, there is another cluster of work anchored in multi-level perspective (MLP) model in technology transition (Rip & Kemp, 1998; Geels, 2002), which recognizes three levels to a socio-technical system, i.e. niche, regime and landscape, and discusses transition

[2] Although it has been increasingly escaping the strictly technological view.

[3] Here, "social" is used in its conventional meaning; relating to people.

[4] Collaborative services (a subset of collaborative organizations) describe local services in which the final users engage in collaborative design and production of the service they use (Manzini, 2015, p. 88).

processes in terms of interplay of elements within and between these levels. Ceschin (2014) has introduced a strategic multi-term design model in managing a path for innovations at lower levels to create changes in the broader landscape. In parallel, Gaziulusoy (2015) has put forth a framework of design for system innovation and transitions across levels, and Joore and Brezet (2015) have combined MLP with the iterative cycle of design models to develop a multilevel design model (MDM) that integrates product, service, system and societal levels of change. More recently, Öztekin and Gaziulusoy (2019) have introduced a model at the intersection of design theory, MLP and practice theory to discuss learning dynamics across multiple levels of transitions[5].

In relation to theories of social action, the approaches within this paradigm are characteristic in their attempt at bridging the technical and social elements of systems in their analysis. Yet, the lack of perceived necessity to discuss what the "social" is, along with descriptions placing "social" (Herder, et al., 2008), "social, organizational and institutional" (Ceschin & Gaziulusoy, 2016, p. 138) or "institutional and socio-cultural" (Gaziulusoy, 2015, p. 561) changes in comparison to the conventional, "technical" innovation of systems, alludes to the same classical dualities as the two previous paradigms. In other words, the "social" and the "technical", while admittedly interdependent and requiring simultaneous intervention, are two separate and inherently different entities that are being brought together as the joint unit of analysis, thus placing the socio-technical paradigm within a classical school of thought (see Figure 4).

4. PRACTICE PARADIGM

In parallel within DfS, there is a body of work that takes a more radical approach to bridging the putative society-technology divide. As part of a broader movement in the field of design that is "decentring the human" (Forlano, 2016), these studies have their ideological roots in practice theory.

Theories of practice are a family of theories that first emerged in the work of Pierre Bourdieu and Anthony Giddens (Reckwitz, 2002; Chaffee & Lemert, 2009; Shove, et al., 2012). In opposition to both norm-oriented and purpose-oriented theories of action, these authors argued for a dynamic interplay between structure and agency as the source of social action (Reckwitz, 2002; Chaffee & Lemert, 2009); accepting the existence of structures we draw on constantly in our daily lives yet conditioning their existence upon continuous reproduction through our action. To Reckwitz (2002), practice theory is part of a larger group of theories known as "cultural theories[6]" that followed the cultural turn in social studies, which he contrasts to classical theories in their emphasis on the role of "symbolic structures of knowledge" (Ibid., p. 245) in social order and action.

Practice theory explains the social as "a temporally and spatially dispersed nexus of saying and doing" (Schatzki 1996, p. 89 cited in Shove, et al., 2012) by placing it in practices. There is an often cited definition of practice offered by Reckwitz as "routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (2002, p. 249).

Practice theory entered design from the field of consumer studies by Elizabeth Shove in a series of workshops that led to a "manifesto of practice-oriented product design" in 2006 (Scott, et al., 2009). One of the most prominent models of practices used in design is the simplified model developed by Shove and colleagues (2012) including three elements of "meaning, material and competence" (Ibid., p. 14). Thus, rejecting the dualities of not only society and technology, but also structure and agency (see Figure 4), the practice paradigm takes "practices", in their irreducibility to their constitutive elements (Reckwitz, 2002), as the unit of analysis and design (Ingram, et al., 2007; Kuijer, et al., 2013; Pierce, et al., 2013). Rather than individuals, this paradigm focuses primarily on practices and then their "carriers" who are bodily and mental agents carrying them out (Reckwitz, 2002). The notion of "individual" in practice theory is understood as "unique crossing point of practices" (Ibid., p. 256) since each agent carries a multitude of different practices.

Attempts at merging the "behaviour" and "practice" perspective or mere interchangeable use of the two phrases (Shove, 2010) has led to sharp contrast being drawn between them (Ibid.; Kuijer & de Jong, 2012; Scott, et al., 2012); as the former focuses on causal factors and external drives to certain behaviours where the latter reconstructs the dynamics between "stuff, images and skills" (Scott, et al., 2012, p. 282) from which practices emerge. More generally, over recent years practice-oriented design has been expanding in human-computer interactions (HCI) design (Pierce, et

[5] The work of Öztekin and Gaziulusoy (2019) is discussed here as their insights from practice theory do not breach the dualities that govern this paradigm which are explained at the end of this section.

[6] Cultural theories also include Mentalism, Textualism, and Intersubjectivism (Reckwitz, 2002) which are beyond the focus of this paper.

al., 2013; Redström, 2013), Mylan (2015) has explored adaptation of practice theory in design for PSS, and Scott and colleagues (2009; 2012) and Pink (2015) have looked at a practice-oriented codesign.

This body of work that often identifies with the term "socio-material" (Redström, 2013), comes in close proximity to another growing cluster of work that draws on actor-network theory (ANT) and the writings of Bruno Latour, in fields such as architecture (Yaneva, 2009; Forlano, 2016), participatory design (Bannon & Ehn, 2013), HCI and political design (DiSalvo, 2012) and communication design (Venturini, et al., 2015). Also developed within the field of STS (Sayes, 2014), ANT has been placed in close proximity with practice theories (Reckwitz, 2002), and in the same rejection of dualities, describes the world as "made up of hybrids, assemblages, and collectives that are composed of human and nonhumans that act and organize together, sharing the delegation of power and agency" (Forlano, 2016, p. 47).

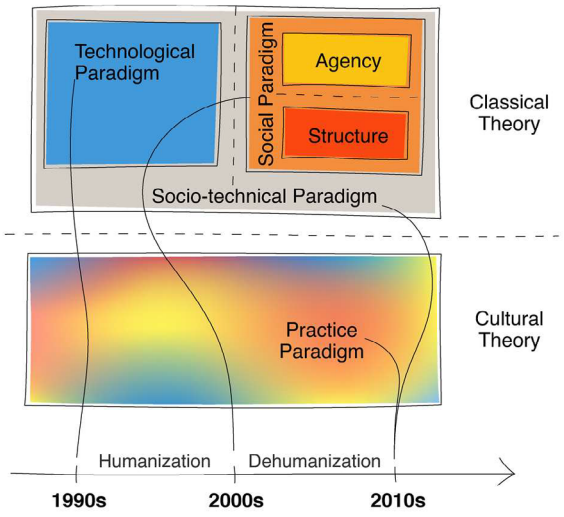

Figure 4: The four paradigms of DfS in relation to social theory (source: authors).

As figure 4 illustrates, the two most recent paradigms, the socio-technical and practice paradigm, while both acknowledging the limited capacity of strictly technology- or human-oriented approaches in the process of transformation, differ significantly in that the former does not breach the bounds of classical modern thought within which DfS mainly resides. While in policy literature, Shove (2010) connects transition studies with practice theory, in prominent models used within the socio-technical paradigm, such as Geel's evolutionary multi-level model (2002), "user practices" are understood as an entity separate from knowledge, symbolic meaning and technology (Ibid., p. 1262), which in practice theory have no separate existence but in the assembly of those elements.

PRACTICE AS SCALE

The assumed dualities of society-technology and structure-agency are modernist habits that persist even as we take bold leaps toward transitions through design. Withdrawing from these traditions, practice theory, as one among a diversity of non-modernist ways to understand social action, can fill the gaps of a holistic conceptualization of scale.

The riddles of a constitutive hierarchy, in which macro level entities result from the interdependence of a multiplicity of lower level entities, dissolve in taking practices as the scale to analyse social action. Far from being novel, this suggestion is only a conceptualization for practice theory's most basic argument. Therefore, these ideas have been explored by scholars like Shove, Watson, Ingram and others for years in various areas such as hygiene, transport and energy-consumption, etc. (See Ingram, et al., 2007; Shove, et al., 2008; Shove, et al., 2012)

Here, it is useful to draw on a distinction between "practice as do-ing and practice as spatio-temporal manifold" (Schatzki, 1996) or "practice-as-performance and practice-as-entity" (Shove, 2010; Shove, et al., 2012); the former refers to practices as enacted by a carrier in specific time and place and the latter the emergent result of a multiplicity of those performances, allowing it to extend over time and space. Thus, in a constitutive hierarchy, which depicts only a certain social practice, each spatio-temporal level is a representation of the same practice that emerges from a plurality of different practices at lower levels, all the way down to a single practice enacted by a carrier in a specific time and place (see Figure 5). The relations between different elements of the practice at each level link them to other practices which creates an upward

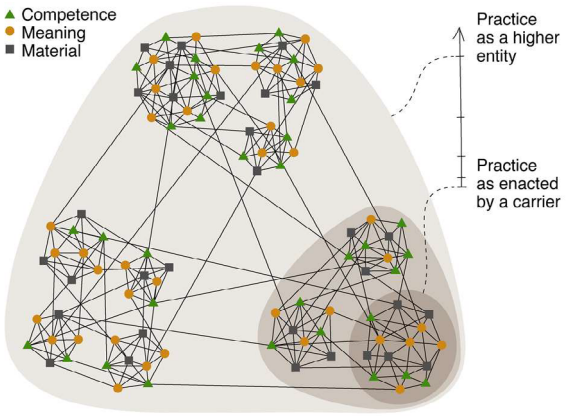

Figure 5: The web of relations that make up the constitutive hierarchy of a practice as a multilevel entity spanning across space and time (source: authors).

and downward causation between the levels of the hierarchy that is inherent to the dynamic nature of social practices.

Bathing, for instance, as a micro level entity is a practice in one of its diverse forms of fast morning shower, long relaxing baths, shower after exercise at the gym, etc., enacted by a carrier which includes a multiplicity of materials, meaning and competence, such as the bathroom space, durable and consumable hygiene products, washing methods and images of "being clean" which are socially learnt, etc.

On a higher level, these micro practices enacted by large numbers of carriers give rise to a broader order that spans across space and time and is constantly reproduced through those micro level performances. It includes elements such as the temporal order of bathing (appropriate time, frequency and duration), the shampoo and conditioner industry, advertisement and its influence on hygiene perception, impact of gym culture, etc. that together constitute "bathing" at a higher spatio-temporal level. Thus, predetermined boundaries have no role in dictating the extent or level of analysis, but instead they rise as the result of studying elements across micro level practices. For instance, the practice of bathing in northern Sweden might have more resemblance and connection to elements in that of Finland rather than southern Sweden. Furthermore, macro level entities, i.e. practices, are necessarily constituted from a plurality of different or even contrasting micro level entities. For instance, the image and use of animal-derived hygiene products by single carriers as an element that can vary based on geography, culture, religion, income, etc., does not compress into an abstract, homogenized feature of the practice at a macro level, but is instead perceived as an element that runs through different levels of bathing as a practice.

The socio-technical approach, although similarly incorporating a multilevel spatio-temporal analysis is limited by the society-technology dichotomy and the inclusive hierarchies of jurisdictions, industrial networks and institutions that inevitably follow. That is to say, while accounting for the dynamic interplay between these levels, it fails to provide a comprehensive analysis of different elements involved in shaping the social order. In doing so, it undermines the role of the apparently disconnected acts of use by individuals in sustaining and reproducing the system through socially shared ways of understating.

DISCUSSION

Rather than advocating a Totalistic view in design, the conceptual framework of practice presented in this paper is simply an alternative to the scales of populations, jurisdictions, public institutions and industrial networks, designers often resort to in broadening the scope of their analysis. While institutions to deliver design on such massive and comprehensive scale in the public or private sector may exist, the heavy reliance of socio-technical system literature on a post-political, consensual view of sustainability that disregards inherent social conflicts, cannot maintain any genuine form of collaboration with the public. Yet, apart from issues of authority, transparency, homogenization and exclusion that too often follow large–scale initiatives, most of the design that is changing the world today, for or against a sustainable human existence, happens at modest levels. This conceptual framework can hopefully serve as a tool for designers in analysing the resilience of unsustainable practices across various levels by exploring the connection between their elements and that of other practices, to look for points of intervention which can be most effective.

As we grapple with the challenge of scale in the face of ever deepening social, ecological and economic detriment of accumulating crises, it is time for design to break from the hegemonic grip of modern thought. Leaving behind the self-inflicted dualities that have restricted our understanding, a practice perspective on social action can further a much needed holistic view in DfS as it removes "layers of a priori assumptions through the detailed study of what is actually unfolding" (Redström, 2013, p. 10). There is a significant reorientation associated with such undertaking (Ingram, et al., 2007), which not only impacts how we frame challenges within the field, but also the way in which design itself as a practice is understood (Redström, 2013).

The process of changing unsustainable practices is necessarily a dynamic one (Scott, et al., 2009), which makes public engagement and the research on adopting a practice-oriented perspective in collaborative design crucial. In their collaborative model of practice-oriented design, Scott and colleagues (2012) draw on two distinctive modes of consciousness recognized by Giddens, i.e. practical and discursive consciousness (Ibid., p. 285), and cite the continuous alteration between them as a prerequisite to deliberate social change. As such, the role of design is to unveil the practices that sustain the unsustainability of our dwelling on this planet, in processes of reflection that certainly exceed the walls of the studio and classroom, starting with the monopoly of classical modern thinking on how we perceive the social.

CONCLUDING REMARK

This paper has reviewed the evolution of the spatio-temporal scale of design for sustainability across the

three outlooks of (i) global, short-term, (ii) local, long-term and (iii) multilevel spatio-temporal. Moreover, exploring the adaptation of social theories in DfS approaches, four paradigms of technical, social, socio-technical and practice are outlined within the field, of which only the last escapes the bounds of classical modern thought. The suggested conceptual framework of "practice as scale" is as an alternative to geographical, jurisdictional or institutional scales designers often draw on in broadening the scope of their analysis, and it can further a much needed holistic understanding of the complex dynamics of social change. Future work will include the development of a framework based on practice theory that can address some of the challenges of sustaining a mutually enriching collaborative experience between designers and their codesigning users in broad public engagement.

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