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Towards successful bottom-up transitions: Conceptualizing transformative capacities of individuals in social innovations

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Abstract

In socio-technical transitions research, capacities relevant for transformations have primarily been assessed at systemic or niche levels, with capacities of individual actors to engage in transformative activities not yet well-conceptualized. This paper draws on theories of power in transitions, transformative social innovation and social practice theory to develop a conceptual framework for transformative capacities at the level of the individual citizen. We argue that in order to change social practices and foster successful bottom-up transitions, different forms of capacities – with regards to the elements of a social practice (meanings, competences and materials/resources) – are required.

As a next step, the framework developed based on different literatures from transitions research and sociology will be tested empirically in an online-survey targeted at individuals engaged in social innovation. The objective is to better understand social processes of change and the conditions for them, in order to support the development of participatory governance models.
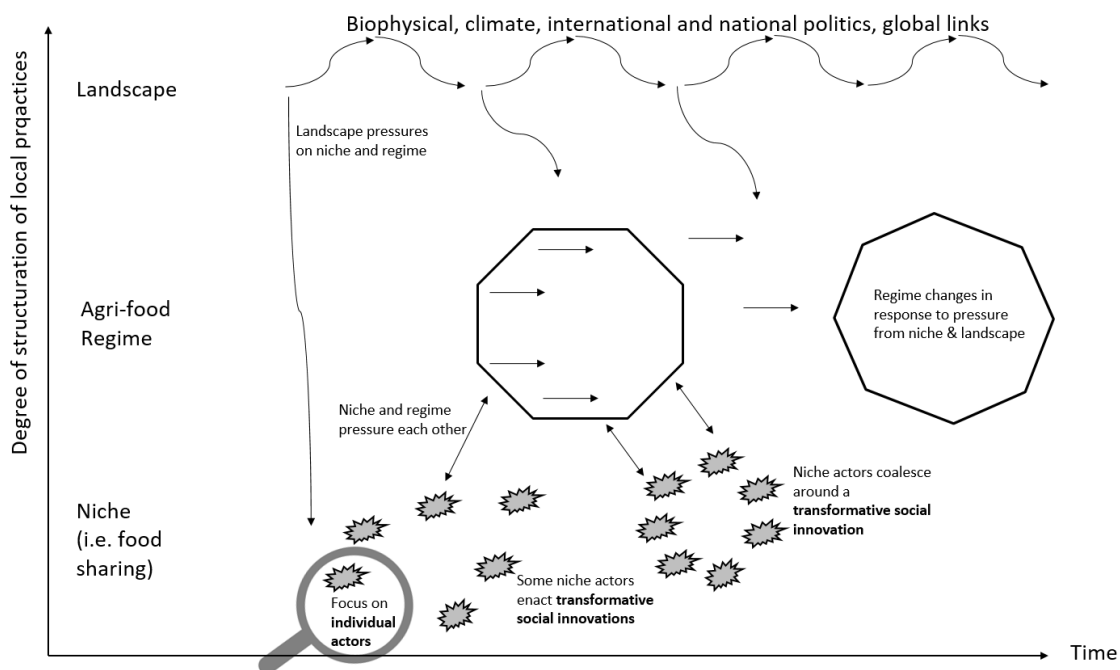
Contents

1   Introduction

In the current academic discussion on how to address society's 'grand challenges' (e.g. the climate and ecological crises), a growing number of scholars argue that social innovations may exceed technological innovations in their ability to initiate fundamental change processes in socio-technical systems (Howaldt and Kopp 2012; Avelino et al. 2019). Urgently needed societal transformations towards more sustainable ways of living require the active participation of citizens in transition processes, e.g. by creating new social practices and engaging in social innovation initiatives. Calls for reflexive and adaptive governance, for instance through transition management, have highlighted the need to include civil society in the governance of transitions (Frantzeskaki et al. 2012; Loorbach et al. 2017; Chilvers et al. 2018). In order to support and foster transitions driven by individuals and bottom-up actors, such as civil society and grassroots movements, transitions research needs to gain a better understanding of the complex social mechanisms and capacities underlying transformative social practices.

One of the central frameworks of socio-technical sustainability transitions research is the Multi-Level Perspective (MLP). As Figure 1 illustrates, the MLP theorizes change as coming from the alignments of trajectories and on-going processes between the three analytical levels (niche, regime, landscape). Innovations emerge in niches, which strive to change the regime – the established rules and institutions that define 'the normal way of doing things'. The landscape refers to influences from broader contexts and outside of the daily reach of most actors, e.g. climatic and biophysical conditions, international agreements and trade, or war. In terms of the MLP, our focus of analysis is on the micro-level of individuals inside the niche.

Figure 1: Situating our research in terms of the MLP

Social innovations usually emerge from bottom-up actors (e.g. citizens, social movements, social entrepreneurs, local communities, cooperatives), and can be regarded as intentional new configurations of social practices to solve societal problems (Howaldt and Schwarz 2010). Creating social

innovations involves new skills beyond the entrepreneurial basics; a key issue in the research on transformative social change is gaining a better understanding of the transformative capacities of individuals for the creation and transfer of social innovations to other individuals in the process of generalization. As a theoretical approach the concept of power in transitions becomes relevant, because the required transformative capacities for social innovations and the engagement in sustainability transitions closely relate to the kind of power bottom-up actors have and need (Avelino et al. 2017; Pel et al. 2020). Therefore, actors can influence and engage in transformational processes depending on their position of power. When it comes to governance of transitions, emphasis should be put on actors' power and capacities rather than solely their inclusion in the process.

The relationship between agency (defined as the capacity of an actor to act (Giddens and Sutton 2014)) and structure in the MLP has long been a point of debate. The MLP has been criticized for being too structural, based on deterministic mechanisms, and neglecting the complexity of emergent social processes on the ground (Smith et al. 2005; Howaldt and Schwarz 2017). Addressing these criticisms and framing the dichotomy between agency and structure in terms of the MLP, Geels (Geels 2020, p. 4) argues that because the MLP conceptualizes technologies as socially constructed, "the emergence of a technological trajectory can [...] be conceptualized as a socio-cognitive process". Individuals' agency is situated in and shaped by structural contexts, and which in turn are shaped and conditioned by actors' actions (Geels 2020). Individuals' agency – specifically, their ability to change social practices and enact innovative and transformative power in transition processes – is essential for enabling transitions 'from below', where citizens play an active role, have ownership and can engage in social innovations. Such transformative capacities of individuals have not yet been well conceptualized in the transitions literature, which has focused on capacities at higher organizational levels such as for network, cities, firms and governance institutions (Borrás 2011; Wolfram 2016; Castán Broto et al. 2019; Strasser et al. 2019; Wolfram et al. 2019; Strasser et al. 2020; Yasmin et al. 2020). An exception is research on individuals' learning processes and reflexivity in systemic innovations and transitions processes (Moore et al. 2018; Goyal and Howlett 2020; van Mierlo and Beers 2020; van Poeck et al. 2020) and the role of leadership (Martiskainen 2017).

With this paper, we address the research gap regarding transformative capacities of individual citizens as bottom-up-actors in transition processes. Specifically, we focus on individuals' capacities to engage in changing social practices, in civil society organizations, initiatives of social innovation and or other movements with transformative objectives. Hence, this paper's main research question is: What capacities and capabilities do citizens need for the generation and uptake of transformative social innovations?

This paper contributes to the micro-foundation of transitions research by theoretically assessing the required forms of capacities for social innovation. It moreover builds the basis to empirically validate the theoretically derived framework. Thereby, we aim to bridge the gap between the transitions and sociology literature. To create the framework, we took an iterative approach between the literature and empirical data. First, we reviewed the literature from sociology, transition studies and resilience research with regards to individual capacities needed for generating social innovations. On this basis, we conceptualized a framework for individual transformative capacities. In the next phase of our study, we are testing this framework in an empirical case study on social innovation actors in the food system, where we ask if and to what extent the capacities we identified from the literature are present or required and if other types of relevant capacities can be identified. Thus, the current state of the paper reflects the theoretical framework and shows the work-in-progress.

The paper continues with the theoretical basis on which we constructed the framework. We draw on work on power in transitions (Avelino and Rotmans 2009; Avelino 2017), transformative social innovation (Haxeltine et al. 2017; Avelino et al. 2019; Pel et al. 2020), social practice theory (Reckwitz 2002; Shove et al. 2012) and sociological concepts of social innovation (Howaldt and Schwarz 2010). Section 3 presents our framework for transformative capacities of individuals and details the individual elements of the framework. The paper finishes with reflections on the conceptual framework and next steps concerning its empirical implementation.

2 The need for capacities for transitions from below

In order to find solutions to systemic challenges, the collective intelligence of every-day-transitions actors needs to be harnessed to develop new participatory transformative governance approaches. As Van Pöck and Ostman put it, "after all, even major transitions are always made [...] in action, in people's day-to-day practices" (2021, p. 156). In the following, we will explain why we choose the analytical level of the individual citizen to explore transformative capacities for social innovations.

2.1 Citizens and social innovations in transitions

It is increasingly acknowledged that a diversity of actors, especially from the "third sector" of civil society, play an important role in sustainability transitions (Avelino and Wittmayer 2016; Fischer and Newig 2016). Moreover, it is stressed that social equity and social cohesion in these large transformational processes have to be balanced by collective decision-making and the inclusion of different interests (Frantzeskaki et al. 2012).

Civil society consists of a mix of complex, heterogeneous actors that influence social change outside of the family, market or government spheres. It includes social movements, NGOs, unions, business associations, and civil associations as well as third sector associations (e.g. co-operatives, mutual societies, professional associations and voluntary community groups) (Howaldt et al. 2014; Haxeltine et al. 2017). Hence, civil society actors usually do not represent one homogeneous view, but have contested views of potential pathways of sustainability transitions and therefore can act as a source of reflexivity for governance. These dynamics can contribute to new forms of bottom-up-governance (Smith 2012).

Civil society actors are becoming more and more important in the governance of sustainability transitions and they often bring about their own way of implementing transition ideas and processes, for example in so-called grassroots innovations (Seyfang and Smith 2007). This kind of innovation is often developed by consumers at personal expense, during their free time, and within their networks (e.g. family, neighborhoods and civil society). It is not protected by its developers and can be used or implemented by anyone without payment (Hippel 2016).

In the transitions and innovation research community, social innovations are recognized as important drivers for sustainability transitions, even if the conditions under which they can lead to fundamental change are still understudied (Howaldt and Schwarz 2017; Geels 2020). New practices and ways of living, un-invited participation, protests and social movements can influence the creation of new niches and show that the core of transitions can be non-technological. The importance of understanding practices and the every-day side of transitions is explained by Van Pöck and Ostman (2021, p. 157), who argue that as unsustainable patterns "increasingly emerge as a crisis that disturbs our habitual ways of thinking and acting, we are faced with the challenge of finding new ways of inhabiting the world – new regimes".

Our perspective on the individual level in transitions is also inspired by the capabilities approach as discussed in the context of a new research agenda for social innovation by Ziegler (Ziegler 2021). In the capability approach as shaped by Sen (1999) and Nussbaum (2000), human development is viewed from the perspective of the opportunities and freedoms people have (Sen 1999; Nussbaum 2000). In Ziegler's view, this can enable research on social innovations to think about these from the "perspective of its beneficiaries" (Ziegler 2021: 117). Individual humans as participants of development – such as in a transition process – have different opportunities and very different conditions and capabilities. The concept of capability is defined as "the freedom of a person to enjoy various functionings that they value and have reason to value" (Ziegler 2021: 119). Continuing with this

notion, this means that different people have different "conversion functions", that is to say the ability to transform a resource into a functioning. Existing social innovation research on the intersection with the capability approach often tries to find out how social innovations can have impacts on the beneficiaries' or users' capabilities. For example, the social innovation study following the capability approach of Von Jacobi et al. (2019) shows that social innovations can make a contribution to the capabilities of their participants or users, particularly through enhancing technical know-how and the ability to share and network with like-minded people (Jacobi et al. 2019). In this way, the capabilities approach can help to improve evaluations of social innovations. As Mahah (2016) argues, a list of central capabilities (biological, personal and social) would allow dialogue with beneficiaries in social innovation processes, especially marginalized or excluded groups. However, the capabilities and resources necessary to engage in social innovations are still under-researched.

2.2 Social innovation as the power to create and change practices

Avelino's theory on power in transitions (Avelino and Rotmans 2009; Avelino 2017) is a fundamental theoretical background for this framework of transformative capacities of individuals. It highlights the different power dynamics between actors that are inherent in intended and unintended transition processes (Avelino and Rotmans 2009; Avelino 2017). According to the framework, actors need power to create and change practices for transformative social innovations.

Avelino and Rotmans (2009, p. 556) define power as "the ability to mobilize resources". Hence, the conditions for exercising power depend on access to resources; strategies or methods to mobilize resources; skills to apply these specific methods and the willingness to do so (Avelino and Rotmans 2009). Knowledge is a condition to exercise power. Avelino et al. (2017) state that multiple different forms of powers are important for social innovations or the creation of niches in transitions. In this view, "regimes do not necessarily have power over niches" (Avelino and Rotmans 2009, p. 559), because niches are able to mobilize different forms of power (that is to say resources).

Following Foucault, Avelino (2017, p. 508) assumes that power is always exercised and not possessed and that the power to change a social practice or the power to create something new is qualitatively different from the "power to reproduce". In arguing so, she proposes a distinction between reinforcive, innovative and transformative power (Avelino 2017). Reinforcive power is the power to reinforce and reproduce existing structures, which is exercised from the level of the regime (e.g. political institutions, executive). In contrast, innovative power is the capacity of actors to create new resources, which can "make actors less dependent on existing resources (e.g. fossil fuels)" (Avelino 2017, p. 509), and so they can become less dependent on the existing regime of the system. However, a new resource is powerless if not visible to multiple actors, which means it has to be used or enacted by groups of actors or networks in multiple alternative niches.

When actors not only develop new resources, but also new structures and institutions that significantly challenge, alter and or replace existing institutions by recombining, transposing and reinventing specific elements, they can develop transformative power concerning interactions between niche and regime (Avelino 2017; Haxeltine et al. 2017). Avelino (2017) argues that the renewal of structures is an inherently different capacity in comparison to the power from reinforcing structures. However, it is possible that all forms of powers have to work together for a transformation of societal structures/institutions in the long-term, because for instance reinforcing power may be needed for stabilizing new structures and institutions.

The landscape includes not only exogenous elements (e.g. natural catastrophes) but also trends endogenous to human intervention. These endogenous macro-trends can be split up in dominant macro-trends and counter-macro-trends, whereas the first refers in terms of power to the collection of regimes across societal systems and the second refers to the collection of interactions between

niches and regimes across systems, i.e. transformative powers exercised e.g. by social movements (Avelino 2017). Smith argues that some niche elements are transferred to the mainstream, while other, more radical components of the niches continued to be advocated for and are experimented with by certain radical actors (Smith 2012). In terms of power, a distinction between more radical and less radical or moderate niches can be made, in order to explain that radical elements challenge the dominant macro-trends (e.g. capitalism) and support countertrends (e.g. collectivism). Radical niches are defined by Avelino (2017, p. 511) as the „exercise of innovative power that challenges dominant macro-trends and strengthens counter-macro-trends". Moderate niches instead rather reproduce dominant macro-trends.

2.3 The relevance of individual capacities for transition governance

Depending on how a social innovation is enacted, imitated and diffused in wider systems and beyond niches (thus exercising transformative power), it can take on different transition pathways. The different transition pathways of Geels and Schot (2007) depend not only on the timing and strength of coordination but also on the availability from internal and external resources (Geels and Schot 2007). Among these resources figure factor endowments, knowledge and capabilities. We argue that by looking at what individuals can do and contribute towards the transformative change of current systems, and by unpacking the individual capacities needed for this transformative work, marginalized perspectives and actors with less power in the system can be empowered. By opening the door towards a participatory governance approach where collective intelligence is the source of steering a socio-technical system, we need to study how individuals can be transformative agents and bring their knowledge together in social innovation collectives.

Frantzeskaki et al. (2012) criticize the transition management approach as partly elitist and exclusive, because only *frontrunners* of innovation can participate in the transition arenas and in co-constructing pathways for sustainability. In the past decade, the inclusion of new actors such as civil society in transition governance processes has been improved, as this can be a source of reflexivity for governance by offering new paradigms to societies stuck in old ways (McCright 2016). Such new suggestions can aid socio-technical transitions in breaking out of their locked-in trajectories (Smith 2012). Civil society actors can also act as advocates for the development and diffusion of niches, spanning the niche-regime boundaries. Chilvers et al. (2018) observe a change of participatory forms as outcome of processes of technologization or standardization and identify three types of interrelations between participatory collectives: assistance, resistance and transformation. In this view, participation is a constitutive force of socio-technical system change. Chilvers et al. (2018) assume that there is a need to develop systems of governance that can respond and include the diverse, emerging and ongoing forms of participation.

To enable such forms of participatory transition governance, investments in individual and organizational capacities are needed to mobilize resources and knowledge for transitions (Yasmin et al. 2020). The capacities of society must be nurtured by interaction, participation and collective decision-making. Critical attributes are features such as bottom-up-learning, experimentation and self-organization (Yasmin et al. 2020). Coming from the perspective of an individual citizen, with an on-the-ground perspective of individual and practical transition activities, we can overcome limited thinking of top-down governance approaches that build up a dichotomy between one set of actors that is governed by another (Shove and Walker 2010). Instead, transformative governance should ask what interested individuals could do and contribute to collectively find solutions.

2.4   Definition of transformative capacities for social innovation

Although social innovations have been analyzed concerning their transformative potential, there is a lack of theory-building concerning dynamic interactions and social innovations in the context of broader innovation processes and transformative change (Haxeltine et al. 2017). Transformative social innovations are described by Haxeltine et al. (2017, p. 3) as "the process of challenging, altering, or replacing the dominance of existing institutions in a specific social and material context". However, this definition assumes that we have information concerning whether or not existing institutions were changed by a social innovation. But when institutions are understood as established and dominant social practices, this definition is quite near to the practice theory-oriented approach on social innovation (Howaldt and Schwarz 2010). The main difference for us is that Howaldt and Schwarz provide a non-normative definition of social innovation. They define a social innovation as a new configuration or combination of social practices triggered intentionally by certain actors or actor groups, with the objective of solving problems and addressing needs in a way that was not possible based on prior established practices (Howaldt and Schwarz 2010, p. 54). propose a similar definition of social innovation, but with the distinction that we try to describe *transformative* social innovations – i.e., social innovations in the context of bottom-up-sustainability transitions. **We define transformative social innovations as new configurations of social practices initiated and enacted by (groups) of citizens, with the objective to change existing regimes of practices (and institutions) that underlie the societal problems addressed by the new solution.**

Following Howaldt and Schwarz 2010, we take a non-normative approach concerning evidence for transformative elements of social innovation by placing actors' motivations to change social practices at the center of our considerations (as opposed to searching for a real-world transformative impact of a social innovation, which may sometimes become evident only in the long term – see (Mihci 2020)). The relational, emergent and embedded character of transformative social innovation is inherent, because distributive agency is central for social innovations to emerge (Kaletka et al. 2016; Pel et al. 2020). Analyses of niches of social innovation have shown the emergent character of social innovations, because they are constructed through social relationships and can change their (perceived) character and external dynamics over time (Pel and Kemp 2020). As with assessments of technological innovations, social innovations may have unintended consequences and dark sides (Fougère and Merilainen 2021). Further, it is important to have in mind the ambiguous character of social innovations, which can transform but also reproduce the status quo (Avelino et al. 2019; Strasser et al. 2019).

In the literature, the term transformative capacity is most often referred to in terms of organizational change or regarding capacities of the state (Borrás 2011; Wolfram 2016; Castán Broto et al. 2019). Capacities have been widely theorized in the literature on resilience, particularly adaptive capacities. This term is used as an umbrella concept to describe generic capabilities that strengthen resilience (meaning the ability to live with change and uncertainty); nurture diversity and socio-ecological memory for reorganization; combine different types of knowledge for learning and create opportunities for self-organization and flexible problem solving (Folke et al. 2010). However, the concept of adaptive capacities is insufficient because these only help to adapt to existing problems, without addressing the root causes. This is why transformative capacities are inherently different – because they aim to „create fundamentally new systems" (Walker et al. 2004, p. 4). It is thus very important to distinguish between capacities allowing for adaptation and those allowing for transformation. Therefore, **we define transformative capacities as the individual motivations, abilities, competencies and resources present and needed for engaging in transformative SI by creating or changing social practices and contributing to their spread beyond the own social group.**

3 Conceptualization of transformative capacities of individuals

Research on socio-technical transitions towards sustainability has focused very much on questions of supply (e.g. of new technologies or resources) and has paid less attention to patterns of demand. However, the "socio" in its central term "socio-technical" as put by Shove and Walker (2010) "does refer to forms of practical know-how and to routines and expectations that sustain and are part of incumbent regimes" (Shove and Walker 2010, p. 471). This is why we want to enlarge that perspective and adopt a theoretical approach of social practices, where social innovation for transitions are seen as new combinations or configurations of social practices with the objective to address societal challenges or social needs (see Howaldt and Schwarz 2010). Social practices theory is the fundament on which we build our framework of transformative capacities for social innovation actors (see section 2.2). In the following, we first outline the theory of social practices, before we introduce our framework of transformative social capacities.

3.1 The theory of social practices

Social practice theory, which evolved from cultural theories and was shaped by authors such as Bourdieu, Giddens, Taylor, Foucault and others, is oriented towards everyday realities (Reckwitz 2002). Reckwitz defines a practice as follows:

> "A 'practice' (Praktik) is a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of metal activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice – a way of cooking, of consuming […] forms so to speak a 'block' whose existence necessarily depends on the existence and specific interconnectedness of these elements, and which cannot be reduced to any one of these single elements." (Reckwitz 2002, p. 249f)

In practice-theoretical oriented research on social innovations, it is assumed that these emerge and diffuse in practice fields (Radadjieva and Butzin 2020) In this broad theoretical approach, social innovations are seen as newly emerging social practices (Howaldt and Schwarz 2010). If practices can diffuse at a certain location is strongly dependent upon the needs of the actors and their capacities to receive, connect, imitate or adapt elements of a practice (Radadjieva and Butzin 2020).

According to Shove et al. (2012), a social practice is constituted of three elements: meaning, competences and materials. The diverse elements of social practices circuit within and between many different practices – creating a "connective tissue that holds complex social arrangements in place and potentially pulls them apart" (Shove et al. 2012, p. 36).

The relationships between co-existing and similar practices can be described as practice fields. The potential of practices to spread and develop partly depends on the available elements for making new links between practices, or breaking them (Shove et al. 2012). However, the elements themselves also change during the course of the integration into a new practice. Shove et al. (2012) describe the fundamental emergent character of social practices as a "process of formation, re-formation and de-formation" (p. 44). Compared to social practices, the single elements are more stable and can travel over time and space under certain circumstances. The emergence of a practice is thus influenced by the distribution of requisite competences, the access to necessary materials and the prevalence of certain meanings.

After presenting our framework of transformative capacities, based on this theoretical approach, we will give more detail about what capacities are relevant for the three elements of meanings, competences and materials.

3.2 Draft framework for transformative capacities of individuals

For conceptualizing and ordering different capacities needed for social innovative actions in the context of bottom-up transitions, we use the three elements of a social practice as defined by Shove et al. (2012). We understand a social innovation as a transformation of the different elements of a social practice. For every element of the practice, different capabilities, competencies and resources are relevant. For the development of new social practices with transformative impact, certain capacities belonging to the three elements of a practice are needed. These capacities then allow for the development of innovative and transformative power as described by Avelino (2017). When the capacities are the right ones to develop innovative power, new resources and competences – but also meanings – can be created, therefore fostering the transformative capacity of social innovation actors. For example, a social innovation initiative (e.g. a community agriculture project) finds access to material infrastructures, rooms and land by integrating new members. To put it simply, there is a bidirectional relationship between social innovation and individual capacities (Howaldt and Kopp 2012; Kirwan et al. 2013).

Figure 1 shows our draft framework for transformative capacities of individuals engaged in SI. The three building blocks of meaning, competences and materials (or resources) are taken from social practice theory of Shove et al. (2012). They structure the capacities identified in the literature review. These capacities are embedded in the environment of framework conditions, which include drivers and barriers. Together these different capacities can lead to the creation of novel social practices, and when developed further a social innovation can be the outcome. Depending on whether this social innovation can generate innovative or transformative powers (e.g. by diffusing in wider contexts), it can influence the framework conditions and also the transformative capacities themselves.

Figure 2: **Framework for transformative capacities of individual actors** (overall framework inspired by Shove et al. 2012 and Avelino et al. 2019, subcategories based on literature cited below)
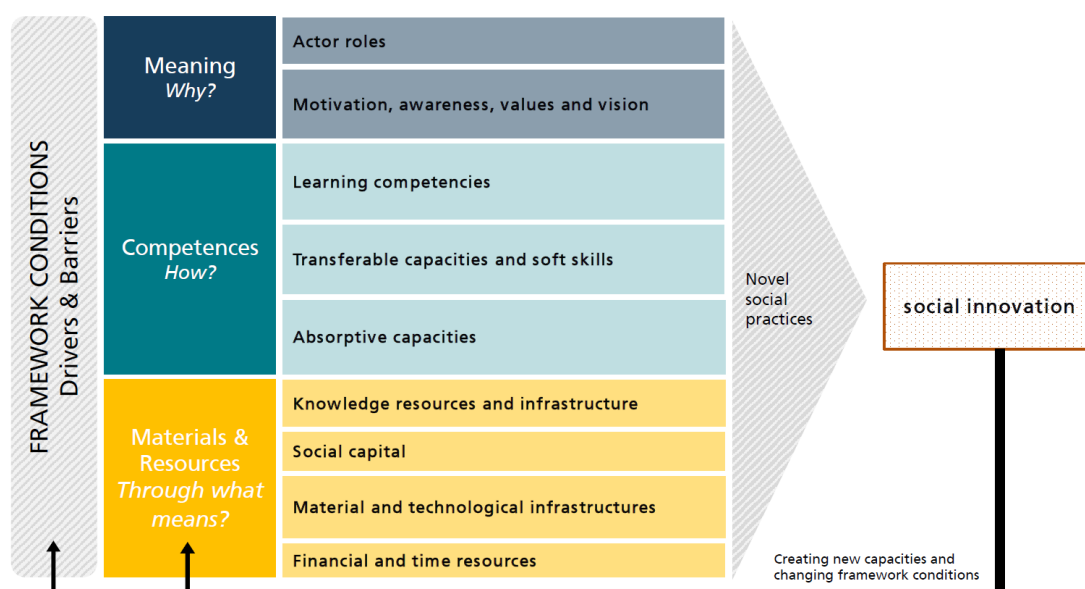
It is highly probable that other forms of capacities are needed for innovations beyond the mainstream or the regime, as there are no established ways of doing or organizing or financing and there is a higher level of uncertainty as to whether or not a certain new practice will be successfully adopted by others. Also, there is often another kind of inherent motivation, as there is no direct

economic compensation for innovating on the horizon. We assume that for transformative capacities to be developed, it is very important to establish interaction and relationships between actors, with network-building and trust creation as key resources for cooperation. Westley et al. 2014 suggest that social innovators require different skills to move from scaling out their social innovation (i.e. engaging more people over a larger geographic area) to scaling up (achieving social and institutional change of the system itself) (Westley et al. 2014). Different kinds of capacities may be needed at different points in time during the development of a social innovation.

In the next sections, we will outline what kinds of capacities belong to the three elements along the guiding questions of: Why do we do something, how do we do it and through what means? In doing this, we are not claiming to give an extensive and all-comprehensive list of capacities needed for transformative social innovation – rather to give a first sketch on the basis of the reviewed literature, which will later be tested and enlarged by the empirical study.

3.3 Meaning

Meaning, describes the "social and symbolic significance of participation at any one moment" (Shove et al. 2012, p. 23) Meaning orients a practice. This element includes symbolic meanings, ideas and aspirations. Shove et al. (2012) state that meanings cannot travel in the same way as competences can. However they move and spread between practices through association and classification (Shove et al. 2012). For Shove et al. (2012), meaning constitutes the third element of social practice, besides competences and materials. For instance, the practice of driving a bicycle, which involves the bike as a physical object (materials) and knowing how to cycle (competences), also consists of the values and ideas which we connect to it, e.g. biking as a means of transportation, biking as an exercising activity or biking as an act of environmentalism. Changing social practices towards sustainability is also linked to altering the meaning, values or discourses that are attributed to them (Shove et al. 2012).

Meaning-making is, of course, crucial in gaining awareness of different societal challenges, in creating a vision of a better future or in motivating oneself to become part of a transformative movement. We also believe, however, that the ideational sphere is inherently tied to the social construction of different actor roles and that, in turn, each actor role is connected to different capacities. The following two subsections look at how individual capacities to create transformative social innovations are linked to actor roles, motivations and visions as well as awareness of social challenges.

3.3.1 Roles

In the Multi-Actor Perspective, Avelino and Wittmayer (2016) acknowledge the complex diversity of actor roles in transition dynamics. Individual actors perform different roles within different sectors (e.g. the state, civil society, market or private sector) following different sector logics. A policymaker can simultaneously be a consumer, a parent, an environmental activist and/or run their own business (Avelino and Wittmayer 2016). According to Collier and Callero (2005, p. 47) these actor roles are "social constructions that are widely recognized as legitimate and normal features of the social world" (Collier and Callero 2005). Hence, the meaning individuals attribute to social practices is never fixed but also tied to and shaped by the different roles actors take. At the same time, actors' capacities to shape transformative social innovations are deeply connected to the specific role(s) performed by that actor. And given to this actor? An individual actor in the role of the policymaker has different access to materials or knowledge infrastructure in comparison to a fulltime stay-at-home-dad who wants to develop a consumer cooperative.

3.3.2 Motivations, values and awareness over societal challenges

Why an individual chooses to perform a certain practice in a specific way is closely related to their personal motivations. Often, a motivation and starting point for citizens to engage in social innovation initiatives is the perception of socio-ecological problems (Kropp 2018), i.e. the development of a certain level of awareness concerning societal challenges. Social innovations are therefore shaped by actors' framings of societal problems (Haxeltine et al. 2017). An empirical study on urban food movements showed that many individuals in movements see "change of consciousness as [the] starting point for any structural transformation" (Kropp 2018, p. 417). Awareness-building is also closely related to learning processes and thus to the competences of actors involved in social innovations (Kropp 2018). Processes and dynamics of empowerment and disempowerment come into play concerning actors' motivations, with empowerment giving actors an intrinsic motivation to act and disempowerment leading to loss of the feeling that one is able to achieve something (Avelino et al. 2019). Personal objectives related to one's engagement are also important: for example, in the case of urban food movements, actors' goals may be to transform a lifestyle perceived as unsustainable or rather to protect the environment (Kropp 2018). Beyond motivations, actors' engagement also depends on the strategies available to them and their willingness to apply these (Avelino and Rotmans 2009). Additionally, it is important to note that actors are not always conscious of the motivations they act upon (Giddens 1984).

Individual's motivations also relate to the values they espouse. Values reflect individuals' dominant attitudes that drive their behavior and worldview (Balundė et al. 2020). Values are a key for meaning and motivation to create or enact a new social practice: e.g., volunteers in urban food movements stress their objectives to reach more fairness, solidarity and transparency (Kropp 2018). The choice to relate to others (with similar values) and engage in collectives depends on actors' values as well: when people discover common values, they can build trust and act together for the creation of new social practices. Connected to the dimension of values, the building of shared identities and shared alternative narratives of change and resistance are also important transformative capacities for social innovation actors (Pel et al. 2020; Pel and Kemp 2020).

3.4 Competencies

The element of "competence" constitutes a mix of multiple forms of understanding, specific know-how and background knowledge (Shove et al. 2012). Competencies differ between local knowledge for performing specific practices, and so-called cosmopolitan knowledge, which is constituted of global-level cognitive constructs, has been disembedded from its local context and can travel widely between local practices (Disco and van der Meulen 1998; Geels and Deuten 2006). For social practices to be changed, the element of competence has to travel and become part of new social practices or social innovations. To enable the traveling of knowledge and competences between local and global contexts, capacities that accumulate and transform knowledge, such as de- and recontextualization, are necessary (Geels and Deuten 2006).

3.4.1 Learning competencies

Learning is a key capacity for social innovation (Rossi 2017; Pel and Kemp 2020) and sustainability transitions, where it is seen as a prerequisite for system change and the development of alternative innovations and pathways (van Mierlo et al. 2020; van Poeck and Östman 2021). As Figure 3 illustrates, a plethora of learning processes and competences are of central importance to turn local, contextualized, specific knowledge into robust, mobile, generic, global knowledge ('cosmopolitan') that can travel between local practices (Geels and Deuten 2006).

Figure 3: **Capacities and learning processes to translate between local practices and external knowledge** (based on Geels and Deuten 2006; Gebauer et al. 2012; Shove et al. 2012; van Mierlo and Beers 2020)
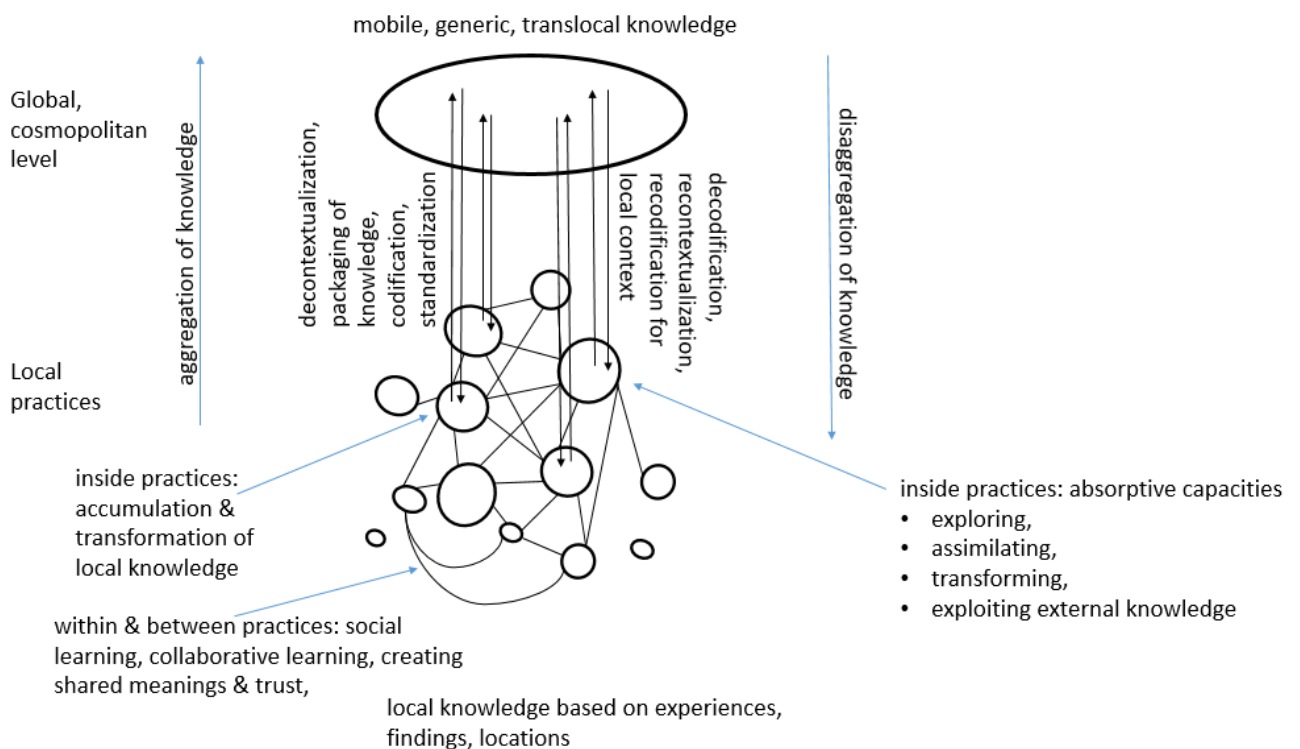
Often, the differences between processes and outcomes of learning are not disentangled – but we need to distinguish between learning processes themselves, and the changes in groups and societies that result from them (van Poeck and Östman 2021). Concerning learning processes, the aggregation of knowledge is necessary to transform it from a 'local' state, in which new artefacts and knowledge emerge in a specific context, to a 'global' one, in which it can be made to work in other practices and places (Geels and Deuten 2006). For local knowledge to be able to be applied to other practices and in other contexts, it needs to be transformed into robust, general knowledge that has been abstracted from its original context and packaged to be widely understandable and applicable (Geels and Deuten 2006). This happens through processes of accumulation and transformation of local experiences into generic, translocal findings (Geels and Deuten 2006). Regarding outcomes, aims of learning may concern practical learning outcomes (e.g. about a certain technology or practice), conceptual learning outcomes (e.g. new knowledge or visions) or relational learning outcomes (e.g. new network-connections) (van Poeck et al. 2020).

Collaborative and social learning are key competences for actors in transition processes (van Mierlo and Beers 2020), particularly those involving transformative social innovations. Collaborative learning goes beyond the mere sharing and co-creation of practical knowledge and can be conceived as a negotiation of meanings and sense-making, as discussed in section 3.3 (van Mierlo and Beers 2020). It takes into account how social and cultural interactions shape learning processes, with communication within groups seen as crucial for learning (van Mierlo and Beers 2020). Social learning emphasizes the importance of integrating knowledge from multiple perspectives and sees actor diversity as an important resource for managing complex issues (Ison and Watson 2007). During social learning processes, heterogeneous actors share knowledge in an interactive process to produce new learning and trust, which in turn form the basis for joint actions (Pahl-Wostl 2006). Linking to the discussion of transition governance in section 2.4, stakeholder diversity can be seen as an

input into social learning processes, with the development of novel solutions to complex societal problems being the output (Beers et al. 2016).

Other central competences are second-order learning and reflexivity. While first order learning (or single loop learning) is based on observing reality and assessing the results, second order learning (or double loop learning) is when one's own interpretations, underlying assumptions, convictions etc. are called into question (van Mierlo and Beers 2020; van Poeck and Östman 2021). Second order learning is a strongly reflective process and occurs but infrequently, while first order learning happens on a daily basis (van Mierlo and Beers 2020). The ability to enhance the reflexivity of a system or practice is linked to second order learning and social learning (Beers and van Mierlo 2017). Both reflexivity and social learning are key capacities to initiate change (Beers and van Mierlo 2017). Hence, regarding transformative capacities, second order learning and reflexivity are fundamental to call into question established practices and ways of thinking and foment change (Beers and van Mierlo 2017; Moore et al. 2018; van Mierlo and Beers 2020).

Further important transformative capacities with regards to learning are experimentation and self-organization (Yasmin et al. 2020). This is also reflected in the literature on protective niches, grassroots and sustainability experiments, which focus on developing innovative capacities in protected, experimental spaces (Smith and Raven 2012).

3.4.2 Transferable skills and soft skills

Transferable skills are helpful to exercise power through applying certain strategies or methods across different practices (Avelino and Rotmans 2009). Following social practice theory, the concept of transferable skills means that specific competencies are common or common enough to a number of different practices so that they can be used and adapted in different situations (Shove et al. 2012). They may be hard skills, gained through education or training, or soft skills, gained from experiences one has made in the past and learned on a more implicit, practical basis. Hard skills gained through education or training include "legal or financial education, language and computer skills, public speaking, writing, rhetoric, argumentation, rationalization, improvising, creativity, acting, informal conversation, and so on" (Avelino and Rotmans 2009, p. 557).

Several specific soft skills are especially relevant to develop and transfer new social practices. For example, the ability to mobilize resources (discussed in section 3.5) is a fundamental soft skill for social innovation. An important unknown here is how exactly resources are mobilized and used by actors of civil society in order to innovate (Howaldt et al. 2014). In the theory of power in transitions, the ability to mobilize resources is defined as a power actors have. However, to exercise this power, actors need not just access to resources but awareness on where those resources exist; strategies, methods and skills to mobilize them; and the willingness to do so (Avelino and Rotmans 2009). When actors are able to develop innovative power, they can not just access but create new resources and so make themselves less dependent on established practices and the regime (Avelino 2017).

Among the most important capacities for bottom-up transitions is the ability to create and maintain social relationships and networks – i.e., social capital (Rossi 2017; Pel and Kemp 2020). Certainly, cooperative ability is required to work together with others in collectives, associations, initiatives or movements and larger networks. Martiskainen (2017) stresses the role of community leadership, based on voluntary actions and the creation of social capital, for social innovations. She highlights that within grassroots innovations, soft skills and tacit knowledge, e.g. about working with groups, facilitating meetings, enabling groups to make decisions or to operate effectively as a team are pivotal (Martiskainen 2017). Leadership, defined by Avelino and Rotmans (2009, p. 558) as "the

capacity to influence and convince other actors" is important in order to gather more actors willing to strive for a specific, shared goal.

Rediscovering and readapting old knowledge and practices is another capacity mentioned for transformative social innovation (Pel and Kemp 2020). For transformative competencies in social innovation initiatives to be increased it can be helpful to create experimental learning spaces, where also forgotten practices of the community can be (re)learned (Kropp 2018) or established practices "unlearned".

3.4.3 Absorptive capacities

Absorptive capacities refer to the specific tools with which actors can explore, assimilate, transform and exploit external ('cosmopolitan') knowledge for local contexts (Gebauer et al. 2012; Howaldt and Schwarz 2017). Building on Geels and Deuten (2006), absorptive capacities hence play important roles in the translation of generalized to local knowledge and are central to the disaggregation of codified cosmopolitan knowledge for use in local practices and contexts (see Figure 3). Absorptive capacities are cumulative and depend on past experiences, hence they are not static, but rather evolve through learning processes (Gebauer et al. 2012). Actors acquire external knowledge through exploratory learning, i.e. using the resources at their disposal to push beyond their quotidian information bubble, and apply it through exploitative learning processes (Gebauer et al. 2012). Transformative and assimilative learning processes mediate between the acquisition of new knowledge and its exploitation. Through transformative learning processes – combining existing knowledge with newly generated knowledge – external knowledge is adapted to local contexts and practices (Gebauer et al. 2012). New knowledge is integrated into existing information and practices through assimilative learning processes (Gebauer et al. 2012).

Decontextualization, the packaging of knowledge, recontextualization and standardization are important abilities for the absorption and diffusion of social innovations, particularly concerning the transfer of practice elements (e.g. specific knowledge or know-how, also defined as procedural knowledge). When a practice prototype exists in a certain place, its local knowledge has to be decontextualized and codified in order to be transferrable to other communities of practice. To be applicable in other communities of practice, this knowledge then must be decodified and recontextualized for a new context and as a basis for a new social practice. However, the know-how necessary to decode packages of cosmopolitan knowledge strongly depends on the prior experiences of an individual or community and therefore the "distribution and extent of the capacity to decode is itself dynamic and practice-based" (Gebauer et al. 2012; Shove et al. 2012, p. 49). These processes of abstraction, reversal, lateral migration and cross-practice exchange are based in actors' adaptive capacities.

3.5 Materials and resources

Similar to Shove et al. (2012) we understand materials and resources as the means through which a certain practice can be enacted. Following Avelino and Rotmans (2009), resources are not only assets, materials or capital but also persons. Materials and resources are external to the individual person, but still the individual can dispose of different kinds of access to these capacities that can enable them to perform a certain practice. For example, a car, a bank account, an internet platform and a certain knowledge of traffic rules are necessary to be able to enact the practice of shared mobility.

3.5.1 Knowledge resources and infrastructures

As knowledge is an input and outcome of learning and competences, it needs to be made accessible through codification. Such codified knowledge can be found in books, programs, internet platforms and databanks, online and offline libraries, but also personal memories which are referred to as knowledge reservoirs in practice theory (Shove and Walker 2010; Shove et al. 2012). Shove et al. (2012) state that codified knowledge "can be contained for a time in virtual and actual reservoirs, depots and memories, persisting in this form between and beyond moments of practical enactment" (p. 52).

Following the line of thinking of social practice scholars, our hypothesis is that digital platforms can serve as instruments for creating "knowledge reservoirs" (Shove and Walker 2010) in order to store competence elements (cosmopolitan knowledge) over time and provide it to potentially interested new carriers or adopters of a social practice.

3.5.2 Social capital and networks as resources

Following Bourdieu's definition of social capital that revolves more around the individual, people obtain resources through their personal networks (Bourdieu 1986), i.e. more or less institutionalized relationships with shared values. Communities and networks have an important role for the carrying of social practices (Shove et al. 2012). Practices come into being by networks, through which its carriers are recruited – hence, social capital, social relationships and personal networks are important resources for engaging in social innovation. These networks are often formed by previous interests and affiliations, which connects them to the element of meaning. However, this resource is also deeply linked to the element of competences, as it is a capability itself to bring such networks to life in order to contribute to the success of social innovation initiatives in constructing and cultivating communities of practices (Shove et al, 2012).

Often communities of practices are cross-cutting (e.g. technical specialists) and not bound to organizational or institutional boundaries. So, from a social innovation perspective, networks can be seen as a way to gain resources: accommodation, subsidies, legitimacy and critical mass of memberships (Pel et al. 2020).

3.5.3 Material and technological infrastructures

Besides basic material infrastructures, such as rooms for meetings or paper to print communication materials, specific technologies are needed for enacting social practices (e.g. printers, cars, machines etc.).

Much has been written on how digital technologies influence the development of social movements and may enhance their capacities. Information and communication technologies (ICT) improve instantaneous communication and help to link actors at different levels, as well as giving new actors access to resources (Howaldt et al. 2014). It is assumed that technology reduces participation costs, promotes collective identity and creates a community for such social movements; technology seems to be particularly relevant for mobilizing individuals and resources (Garett 2006). According to Eckhardt et al. (2018), ICT are a strong catalyst in the development, strengthening and conserving of initiatives of social innovation (Eckhardt et al. 2018). Supporting the active participation of concerned individuals seems to be easier via digital platforms, e.g. through community building on such platforms (Cuypers et al. 2018).

In the literature on transformative social innovations it is also assumed that ICT enable digital niche networks of certain bundles of innovation and therefore can have a decisive influence on the emergence of trans-local networks of similar initiatives of social innovations. Technologically-enhanced

communication infrastructures are mediating the discourses formed by social innovations (Pel et al. 2020) and can enhance their outreach to potential new members or "carriers" of a social practice. We hypothesize that the ability to communicate new social practices via the internet and to coordinate via social media channels is an important capacity for the transfer of social innovations.

Social innovations are not independent on technology in most cases, and therefore need very specific skills and practical know-how, as Ziegler (2021) suggests. Here the capability approach points to the conversion differences between people. Taking the example of a bicycle, its utility for each individual can be different and depends on personal factors and the context (Ziegler 2021).

3.5.4   Financial and time resources

Although there is scant literature on the financial and time resources necessary to enact social innovations (Schupp et al. 2016) note the importance of these for enabling participation in the social innovation of home gardening. It is clear that without many forms of financial resources, social innovation initiatives could not be established. Often financial capital is needed to fund something specific (e.g. rent of a meeting room for a civil society movement) or it may be needed for everyday practices (e.g. travel costs incurred due to participation in a social innovation). Very good access to finances can mean that other capacities are less needed by an individual to achieve their goals (Avelino and Rotmans 2009).

Individuals' personal economic situations often strongly determine their time resources (i.e. non-income generating time available for voluntary work). Although anecdotally it often seems as though individuals from higher-income households actively engage in social innovation activities, social innovation activities in low-income areas have strengthened in past years (e.g. urbans farms and community-supported agriculture initiatives in low-income urban areas in the USA). Yet it is also clear that if an individual has pressing socio-economic needs, it may be difficult to reflect on social practices and find the time and motivation to create and enact transformative social innovations.

3.6   Conditions, drivers and barriers for transformative capacities

The transformative capacities of individuals are limited by the power of the regime and established institutions (Avelino 2017). Further, what may be a resource for one person can be a constraint for another: following Giddens, one could say that "structure is both constraining and enabling" (Schuitmaker 2010; Giddens 1984)).

Cleary, when social innovations are enacted, actors have to use their capacities and work to change the elements' configuration within the constraints and conditions of the socio-technical and national system they inhabit. Beneficial framework conditions for the development of social innovations provide a good start for their activities (Howaldt and Schwarz 2010; Edmiston 2015). New framework conditions and trends at the landscape level (e.g. climate change) can initiate the development of new meanings, competences and materials for enacting new social practices. Values, for example, exist both at the micro-level of individuals and at the landscape level, as broadly shared social and individual norms, and may be changed over time. As a different landscape trend, digitalization can work as a game changer and driver for social innovations (Avelino et al. 2017).

Public policies can most strongly target the capacities "competencies" and "materials or resources". The lack of funding and limited access to finances for initiatives of a social innovation, which often are started or run by volunteers, is maybe the most obvious barrier for the capacity of accessing resources. In the empirical case analysis of the project SI-DRIVE an important finding was that the upscaling in three out of four initiatives suffered from concrete barriers. In over half of the cases a lack of funding was the main barrier, whereas in one in three initiatives it was the lack of qualified

personnel and knowledge gaps, while legal restrictions and insufficient political support were a third block of barriers (Howaldt et al. 2016). Constraints for social innovations are directly related to the resources at one's disposal (Howaldt et al. 2014). Often social innovations do not fit into established, technology-centered innovation paradigms, as they provide new solutions with a certain level of uncertainty about their impact. Further, in contrast to technical innovations, impact of social innovations is more difficult to measure. Therefore it is more difficult for social entrepreneurs or initiatives to get access to funding programs, credits or loans in order to further develop their innovations (Höll and Oldenburg 2012).

Public policies and investments, e.g. good education, health and social systems, lay the foundations for individuals' abilities to learn and have access to resources for the development of capacities that can be used in transformative social innovations. Furthermore, depending on their thematic openness and orientation, public research and innovation policies and funding programs might have an influence on the development of individual (and organizational) capacity for social innovation. More research is needed to identify how different policies and the state of the social system shape individual capacities.

The most interesting learning from the framework might be, that for performing a new sustainable practice, certain elements and capacities are needed. The availability of these can be supported by policies and new governance frameworks. As practices constitute certain elements, governance can support the "generation and circulation of elements of which variously sustainable practices are made." (Shove and Walker 2010). Shove and Walker (2010) criticize that most of the common governance approaches build on a modernist understanding of governance, where intervention from outside the system, a dichotomy between "us" and "them", and the dominance of one set of actors over others is decisive. A non-modernist governance approach would imply that actors recognize themselves as part of evolving structural patterns which they can modulate (Shove and Walker 2010).

This is only a sketch of what factors influence the development of transformative capacities for social innovation in general. When looking at particular social innovation initiatives, there might be other, more specific relevant drivers and barriers.

4 Conclusions and outlook

Adapting a practice-oriented approach of agency in transitions, we asked what capacities and capabilities are needed for changing established social practices, being able to adapt new social practices to the own context and to diffuse these in the wider system. This literature-based review of relevant capacities to describe the framework showed that theoretically there is a variety of different capacities needed for the generation and uptake of transformative social innovations. While it may be far from being complete, it is a first sketch to develop a capacities approach from the perspective of the individual. However, we also would like to stress the fact that these capacities don't have to be hold by only one person. Especially for transformative social innovations, groups with different individuals and their specific capacities can achieve a good distribution of the needed capacities and bring them into action by their collective power.

This study contributes to transitions literature by developing a conceptual framework of individual transformative capacities for social innovations. The aim is to build a bridge between the transitions and sociology literature to better understand individual capacities needed for transformative social innovations. We argue that social practice theory can bring an added value for conceptualizing individual capacities in transition processes as elements of meaning, competences and materials. We build a link to theories of power in transitions and argue that the relationship between social innovations and its necessary capacities is bidirectional and self-reinforcing. This is in line with the idea of the evolution of social capital and human capacities being strongly linked to social innovation and processes of social change (Howaldt and Kopp 2012; Kirwan et al. 2013). Specific capacities are not only needed to develop social innovations, but can also be created and nurtured by social innovations (Kirwan et al. 2013), especially when they are able to develop innovative and transformative power (Avelino 2017).

The conceptual framework shows that the different capacities involved and needed for transformative social innovation are deeply interconnected and interact with each other. Via the resource of social capital (particularly networks and trust), the elements of a social practice are linked with other practices so that new social practices can become enacted, imitated and diffused in wider societal groups. At the same time, capacities related to the element of meaning (e.g. motivations and values) are important drivers of creating trust between individuals and relating them to each other in larger groups (initiatives and networks), where they can cultivate and transfer a new social practice to wider contexts. Capacities of meaning, competence and material should be regarded as dynamic elements. However, it seems that capacities related to competences are the most dynamic element that can be developed further – with every new exercise of a social practice, one learns from experience. Depending on the competences, motivational and factual knowledge can be best used in order to mobilize resources. This seems to be the locus of innovative power, through which new resources can be created (although of course without the other elements, the enactment of innovative power is not possible). Capacities related to meaning, such as values and belief systems, are relatively stable – however they can be disturbed by shocks or events on the landscape level (e.g. natural catastrophes). Materials and resources are the capacity element that is the most dependent on framework conditions and simultaneously on the ability of an individual to access resources.

As a next step, an empirical, mixed methods case study on social innovations in the food system will follow. Operationalizing the conceptual framework in a questionnaire targeted towards individual citizens engaged in social innovation initiatives in the food system, we ask if and to what extent the capacities identified from the literature are present or would be needed, and if empirically other capacities can be found. Finally, we will bring together the literature-based and empirical parts to develop a more elaborated conceptual framework of capacities necessary for generating social innovations, with the aim of deriving recommendations for a more bottom-up style of governance for transitions.

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