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## **Essays on User Integration in the Sustainability Innovation Process**

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## List of Abbreviations

BSTE	Bounded socio-technical experiment
EV	Electric vehicle
GPS	Global positioning system
MAW	Mehr als Wohnen (“more than living”)
NGO	Non governmental organization
R&D	Research & development
UK	United Kingdom

## Summary

The aim of this dissertation is to shed light on the emerging phenomenon of user integration in company-driven sustainability innovation. For this purpose, it includes three essays that address different research questions empirically, and uses different conceptual and theoretical approaches to analyze the phenomenon. The first essay draws on institutional theory to understand how companies shape societal norms and behaviors by directly and indirectly interacting with users throughout the sustainability innovation process. The second essay analyzes how user integration affects sustainability innovation in incumbent firms, and the third essay puts emphasis on the role of cooperatives and cooperative networks, an organizational form that transcends the traditional divide between producers and users, for organizing and implementing user integration in sustainability innovation.

## Zusammenfassung

Diese Dissertation beleuchtet das Phänomen der Nutzerintegration in Nachhaltigkeitsinnovationen und setzt sich aus drei Forschungsaufsätzen zusammen. Die Aufsätze nutzen unterschiedliche konzeptionelle und theoretische Ansätze, um drei spezifische Fragestellungen zu beantworten. Der erste Aufsatz untersucht vor dem Hintergrund der Institutionentheorie, wie Unternehmen durch direkte und indirekte Interaktion mit Nutzern gesellschaftliche Normen und Verhaltensweisen während des Innovationsprozesses beeinflussen. Der zweite Aufsatz skizziert die Auswirkungen von Nutzerintegration auf Nachhaltigkeitsinnovationen in etablierten Firmen, und der dritte Aufsatz analysiert die Rolle von Genossenschaften und genossenschaftlichen Netzwerken, einer Organisationsform, die die traditionelle Trennung von Produzent und Nutzer aufhebt, in der Organisation und Implementierung von Nutzerintegration in der Entwicklung nachhaltiger Innovationen.



# 1 Introduction

## 1.1 Motivation

Against the backdrop of climate change, resource scarcity and ecosystem degradation, there is widespread agreement that a shift towards more sustainable production and consumption patterns is needed. Innovation, which involves the creation and diffusion of new products and services, processes and methods, is often portrayed as a critical part of the solution to the challenges of the 21<sup>st</sup> century. Accordingly, international organizations and business organizations increasingly call on governments and the private sector to create a favorable business environment to foster innovations that contribute to economic growth and address environmental or social problems at the same time (OECD, 2015). This call in public policy and thinking has been accompanied and influenced by a growing body of literature on the academic side, focusing on the link between innovation and sustainable development (Irwin & Hooper, 1992; Markard, Raven, & Truffer, 2012; Schaltegger & Wagner, 2011). Researchers have highlighted business opportunities in the context of sustainability (Ambec & Lanoie, 2008) as well as the moral obligation and fundamental need of the corporate sector to promote sustainable development by means of innovation, in order to be successful in the long term (De Medeiros, Ribeiro, & Cortimiglia, 2014).

Since sustainability challenges are complex, they often require collaboration across different organizations to realize substantial breakthroughs (Eisenhardt, Graebner, & Sonenshein, 2016; Slotegraaf, 2012). In consideration of the wide distribution of knowledge in the 21<sup>st</sup> century, researchers have investigated different forms of collaboration between market and non-market actors such as companies, suppliers and research institutes (Enkel, Gassmann, & Chesbrough, 2009; Korsunova, Goodman, & Halme, 2016). This open innovation paradigm, advocating the integration of external knowledge in corporate innovation processes, has eroded the traditional closed innovation paradigm, which emphasizes the creation of innovation within the boundaries of the firm (Chesbrough, 2010). In the sustainability context, the integration of end users in innovation processes seems to be of particular importance, since products and services that are sustainable from an economic, ecological and social point of view often require changes in consumption behavior

(Heiskanen, Kasanen, & Timonen, 2005; Hoffmann, 2007; Ornetzeder & Rohracher, 2006). User integration in sustainability innovation holds the promise to facilitate the success of an innovation (Brown & Vergragt, 2008). It allows companies to tap new creative ideas, think “out of the box”, anticipate potential changes in user behavior, and tailor their products and services to latent consumer needs, thereby increasing the chances of market success (e.g. Piller & Walcher, 2006; Von Hippel, 2007; West & Bogers, 2013). Thus, user integration in sustainability innovation processes holds the potential to contribute to more sustainable ways of production and consumption (Schrader & Belz, 2012).

Although both areas “sustainability innovation” and “user integration” receive a lot of attention in the public as well as in the scientific community, empirical evidence on company-driven sustainability innovation projects integrating users is still scarce (Nielsen, Reisch, & Thøgersen, 2016). In fact, prior research has highlighted the innovative potential of users in sustainability contexts (Heiskanen et al., 2005; Hoffmann, 2007; Ornetzeder & Rohracher, 2006), but existing studies mostly investigate independent user innovations where users act as entrepreneurs (e.g. Hyysalo, Juntunen, & Freeman, 2013; Ornetzeder & Rohracher, 2006; Seyfang, 2007) or cases where external actors such as non-governmental organizations, research institutes or government agencies initiate user integration projects on a punctual basis, implementing and testing, for instance, a particular method of user integration for sustainable new product or service development (e.g. Füller, Hutter, & Fries, 2012; Hoffmann, 2007; Schrader & Belz, 2012). There is less research on user integration throughout the overall innovation process of sustainability innovations led by the private sector, in particular by large companies. This is surprising, since due to their market presence and broad influence large companies hold a high potential for transforming industries towards sustainable development. At the same time, they face difficulties to develop radically new sustainable products or services. (Hockerts & Wüstenhagen, 2010; Schaltegger & Wagner, 2011). In their case, the potential benefit of user integration might therefore be particularly high. Against this background, the main objective of this thesis is to advance our understanding of the phenomenon by offering scientific evidence on company-driven sustainability innovation integrating users and using different conceptual and theoretical approaches to analyze it.

The findings of this thesis do not only advance research on the topic, but also entail several implications for policy makers and the private sector alike. In particular, the insights from in-depth case studies point out different approaches to integrate users along the innovation process of sustainable new products and services and highlight the underlying rationale to do so. By diffusing the learning processes across the boundaries of the cases under investigation, the findings suggest organizational factors, conditions and practices that make user integration a successful tool to tackle sustainability challenges in the corporate world, and hence contribute to the transition towards a more sustainable future. Ultimately, this dissertation contributes to the large scale European research project „Sustainable Lifestyles 2.0: End-user Integration, Innovation and Entrepreneurship“ (EU-InnovatE), which investigates the active role of end users in shaping sustainable lifestyles and the transition to a green economy in Europe (Belz, 2013).

The introduction continues by situating this doctoral thesis within the two main streams of literature, i.e. sustainability innovation and user integration, providing for the definition of the main concepts. It then goes on to develop the three research questions addressed in the three essays included in this thesis, and to outline the overall research design and structure of the thesis.

## 1.2 Conceptual Framework

### 1.2.1 Sustainability Innovation

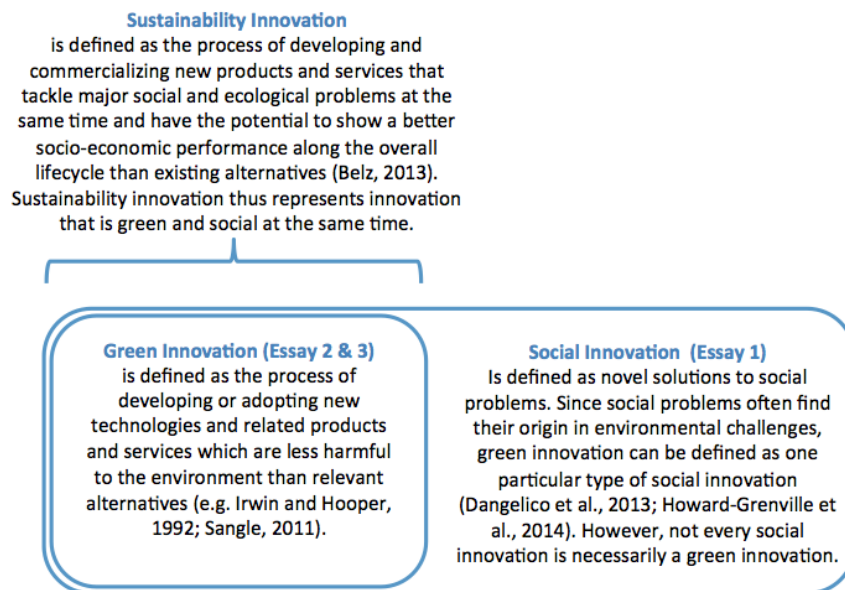
Innovation is considered a key factor for business success. The distinction between innovation and invention emphasizes that there is more about innovation than discovering something novel (Schumpeter, 1934). Innovation can be understood as “the process of turning ideas into reality and capturing value from it” (Tidd & Bessant, 2009, p. 19). Whereas most scholars acknowledge that the innovation process is iterative in nature, the majority of innovation models are framed as linear processes of several phases. The phases commonly include the strategy setting phase, followed by the idea generation and testing phase, the development phase and ultimately the commercialization phase (Holahan, Sullivan, & Markham, 2014). There are several categorization schemes on innovation, which

include, for instance, the distinction between product, process and system innovation as well as the differentiation between incremental and radical innovation (Tidd & Bessant, 2009). Since the raise of the concept of sustainable development (Brundtland, 1987) and the triple bottom line (Elkington, 1994), which promote the alignment of economic, social and environmental goals, the success of innovations has not only been measured against the economic dimension, but also increasingly against the social and environmental dimensions.

Sustainability innovation can be broadly defined as any innovation that contributes to sustainable development, i.e. development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). The concept of sustainable development acknowledges the fact that the environmental, social and ecological dimensions are highly interdependent. As such, social problems such as hunger crises often find their origin in environmental challenges such as climate change. Accordingly, green or environmental innovation, representing a novel solution to an environmental problem, can be defined as one particular type of social innovation, i.e. a novel solution to a social problem (Dangelico, Pontrandolfo, & Pujari, 2013; Howard-Grenville, Buckle, Hoskins, & George, 2014). The rise of the terms “sustainability innovation” (Klewitz & Hansen, 2014) acknowledges for the fact that many innovations address social and environmental problems at once. Against this background, this thesis focuses on “sustainability innovation” and defines it as the process of developing and commercializing new products and services that tackle major social and ecological problems and have the potential to show a better socio-economic performance along the overall lifecycle than existing alternatives (Belz, 2013). The essays included in this thesis still also refer to the related concepts of “green innovation” and “social innovation”, as illustrated in *Figure 1*, since they aim to emphasize different dimensions of the innovations under review. All three essays take a process view to innovation and focus on product and service development only, excluding other forms of innovation such as process innovation, since the latter offers fewer possibilities for user integration projects. The essays draw on five different cases, namely the development of a new sustainable neighborhood, an electric vehicle, an e-mobility charging network, a shared bicycle system, and a smart housing solution. The new products / services

all show environmental and social benefits at the same time, and can therefore be defined as sustainability innovations.

**Figure 1:** Definitions used across the thesis with regard to innovation



Past research has identified several particularities with regard to sustainability innovation on both the production and on consumption side. At the production site, it has been highlighted that sustainability innovation represents a market opportunity, but also raises new risks and insecurities (Dangelico & Pujari, 2010). On the one hand, researchers have shown that the increasing calls for sustainable products and services on the political and legal level as well as the a rise of conscious and more responsible consumption trigger new business ideas and opportunities for sustainability innovation (Nidumolu, Prahalad, & Rangaswami, 2009; Schaltegger & Wagner, 2011). Consequently, a sustainability oriented business model can attract new customers and employees, sparking better economic performance. It has also been shown that corporate actors can overcome growth limits posed by the environment by adopting environmentally sustainable business practices, which alter or replace traditional business models (e.g. Belz, 2013; Berchicci & Bodewes, 2005). On the other hand, past research has put forward that sustainability innovation also

poses new risks and challenges to businesses. An increasing public demand for environmental and social information raises transparency requirements (Dangelico & Pujari, 2010). Some companies also stumble in view of the pure complexity of sustainability issues, which goes along with the understanding that sustainability challenges are too broad to be tackled by one single company alone (Driessen & Hillebrand, 2013). Several scholars have therefore put forward the idea that the development of new sustainable products and services often requires additional resources, knowledge and competencies, which are often located outside of the company's boundaries and need to be internalized (Dangelico & Pujari, 2010). This requires new activities in the innovation process, such as the formation of new partnerships and networks and the integration of external knowledge. The collaboration with external actors both within and outside the supply chain is meant to facilitate the identification of sustainability issues (Klewitz & Hansen, 2014), to enable companies to gain access to additional resources (Chesbrough, 2012), and to help them to legitimize their innovation efforts (Holmes & Smart, 2009). The integration of sustainability aspects in the innovation process thus adds new complexity to traditional innovation processes on the production side (Dangelico & Pujari, 2010) (Berchicci & Bodewes, 2005), which often results in the opening of the innovation process.

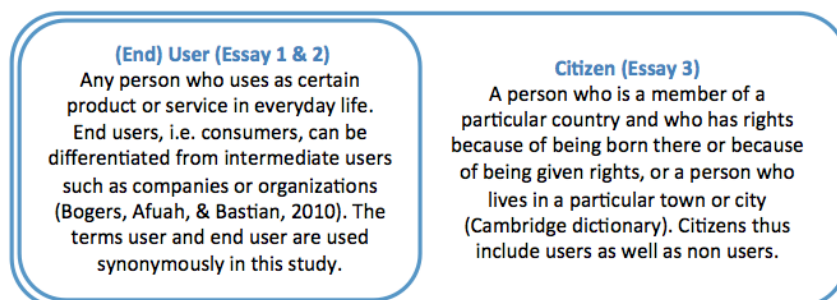
Sustainability innovation also shows some peculiarities at the consumption side. Past research has shown that new sustainable products and services often require changes in consumer behavior and lack market acceptance (Heiskanen et al., 2005; Hoffmann, 2007; Ornetzeder & Rohrer, 2006). The newly developed sustainable products or services compete with conventional products and services on the market, which do not include sustainability criteria, posing challenges in terms of price and quality. Customers often lack the awareness and willingness to pay a premium price for environmental or social product attributes (Belz, 2013). Unless new sustainable products or services demonstrate a better sustainability performance without comprising customer benefits, they have little chance of lasting market success. In addition, the sustainability performance of the products often depends heavily on user behavior in the use and post-disposal phase, and often requires adaptation processes (Heiskanen et al., 2005; Johnson & Suskewicz, 2009; Vergragt & Brown, 2007). This makes user acceptance particularly challenging and requires the analysis of

factors that facilitate the adoption of sustainable new products and services and market acceptance. In sum, sustainability innovation reflects a shift in innovation literature and practice, which is linked to new challenges on the production and consumption side. The next section will elaborate on the role of user integration in the innovation process in general, and in sustainability innovation processes in particular.

### 1.2.2 User Integration

Technology and related new products and services alone will not be able to solve current ecological and social problems, but innovating companies have to anticipate the overall acceptance of new sustainable products and services among (future) users (Vergragt, Akenji, & Dewick, 2014). This is reflected in the increasing body of research on the role of users in innovation processes in general, and sustainability innovation processes in particular. A user can be defined as any actor who uses as certain product or service. Literature distinguishes generally between end users, i.e. consumers, and intermediate users such as companies or organizations (Bogers, Afuah, & Bastian, 2010). This doctoral thesis focuses on end users only and defines them as persons who use a product or service in everyday life. Across the different chapters, the terms end user and user are used synonymously. In addition, Essay 3 also refers to “citizens”, since the study analyzes the development of a new sustainable neighborhood, which involved users, i.e. people that later moved in the neighborhood, as well as non users, i.e. people that did not move in. *Figure 2* gives an overview of the definitions used across this thesis.

**Figure 2:** Definitions used across the thesis with regard to users



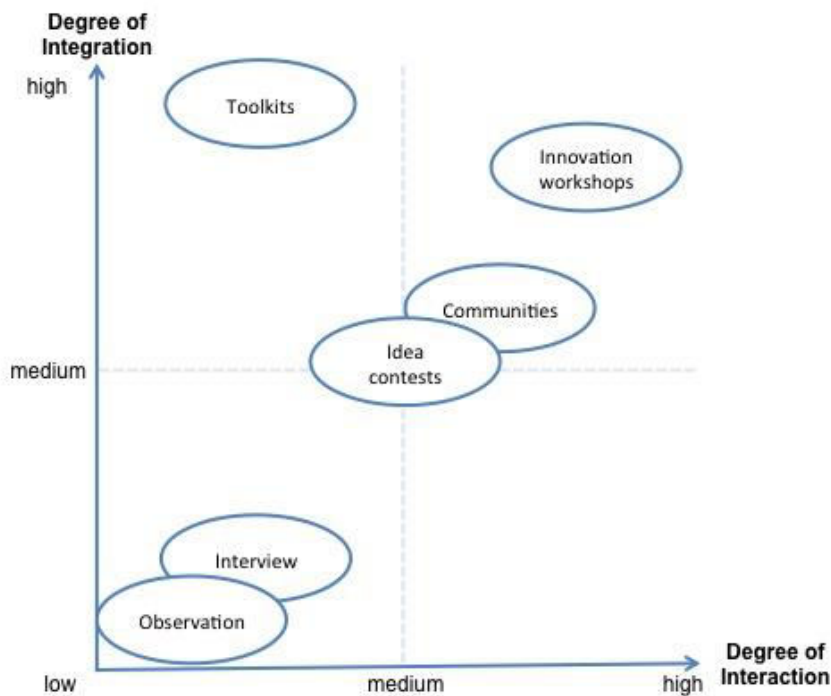
Management research has seen a changing role of end users in innovation over time. Traditionally, the role of users has been described as peripheral, since innovation activities were located mainly inside a company. The ability to develop new products and services was attributed to the company's R&D department, in particular to engineers and designers (Poetz & Schreier, 2012). Users, as consumers of goods and services, in contrast, were mainly framed as pure adopters of innovations. If they became involved in the innovation process, they provided information on user needs, which served the company to develop corresponding new products or services (Von Hippel, 1986). The key assumption behind this view was that users lacked the required knowledge, experience and creativity to generate truly novel ideas and contribute to innovation (Lettl, Herstatt, & Gemuenden, 2006; Poetz & Schreier, 2012). However, this traditional paradigm of the passive user in innovation began to wane, when scientific evidence proofed that users, in particular lead users, sometimes represent the main source of product innovation (Von Hippel, 1986). Increasingly, users became understood as contributors to innovation (e.g. Bogers et al., 2010; Ornetzeder & Rohrer, 2006). In the age of digital information and communication technologies, scholars started to describe users as co-innovators, co-producers and co-designers, and discussed, which type of users should be integrated by which methods in corporate innovation processes (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010; e.g. Kortmann & Piller, 2015).

Given the rising importance of users in the development of new products and services, diverse methods to leverage user input have been analyzed and discussed in literature (for an overview of methods see *Figure 3*). In general, one can differentiate between rather traditional methods, which focus on the generation of need knowledge of users, and methods that give users a more active role, tapping not only need, but also solution knowledge of users. The first category is mainly constituted by traditional market research methods, which have the objective to gain an in-depth understanding of users and their current and future needs and preferences. They include qualitative methods such as personal interviews and focus group discussions as well as quantitative methods such as customer surveys (Priem, Li, & Carr, 2011). By providing access to information inherent in users, their use enables companies to gain a strategic resource, which would otherwise be unavailable to the company (Bogers et al., 2010). However, the backward focus of these



methods, which mainly center on past experiences with a product or service, assigns users a rather passive and reactive role as receivers of innovations (Belz, Schrader, & Arnold, 2011).

**Figure 3:** Overview of methods to integrate users in innovation processes (Source: Pobisch, Eckert, & Kustermann, 2007)



Given the growing recognition of users ability to contribute more actively to innovation, several methods have been discussed in literature, which go beyond traditional market research. Methods such as lead user workshops, idea contests and user toolkits enable companies to not only learn about user needs and wants, but also to integrate their ideas on solving a certain problem or responding to a certain need (Poetz & Schreier, 2012). Among the most famous ones is the lead user method, which is mainly based on the work of Von Hippel (1986). He found that certain users are particularly valuable for innovation activities, since they experience needs well ahead of the general market and possess the creativity and drive to find a way to satisfy this need. With the help of lead user workshops, companies try to identify market trends and future needs in a given searching field, and aim to develop in cooperation with lead users a corresponding solution (Poetz & Schreier, 2012). Whereas this method often involves the physical presence of users, other methods such as

idea contests and user toolkits are often organized online, in order to leverage the creativity and skills of the masses (Jeppesen & Frederiksen, 2006). These methods to integrate users transfer certain development tasks from companies to users, allowing for a more active role in the innovation process and also changing the dynamics between producer and consumer.

However, previous research has also pointed out that active user integration might not only entail benefits but also costs for the innovating actor. Leveraging external sources of innovation often implies additional costs and resources for coordinating the activity and integrating its output (West & Bogers, 2013). Companies also face the challenge to identify the right users to participate in the innovation activity, motivate them to participate and keep the motivation level high throughout the overall user integration process (Schrader & Belz, 2012). Thus, user integration can be time consuming and expensive. In addition, with the rise of social mass media, there is also a risk of loss of control and issues concerning intellectual property rights noted with regard to open innovation and user integration (Enkel et al., 2009).

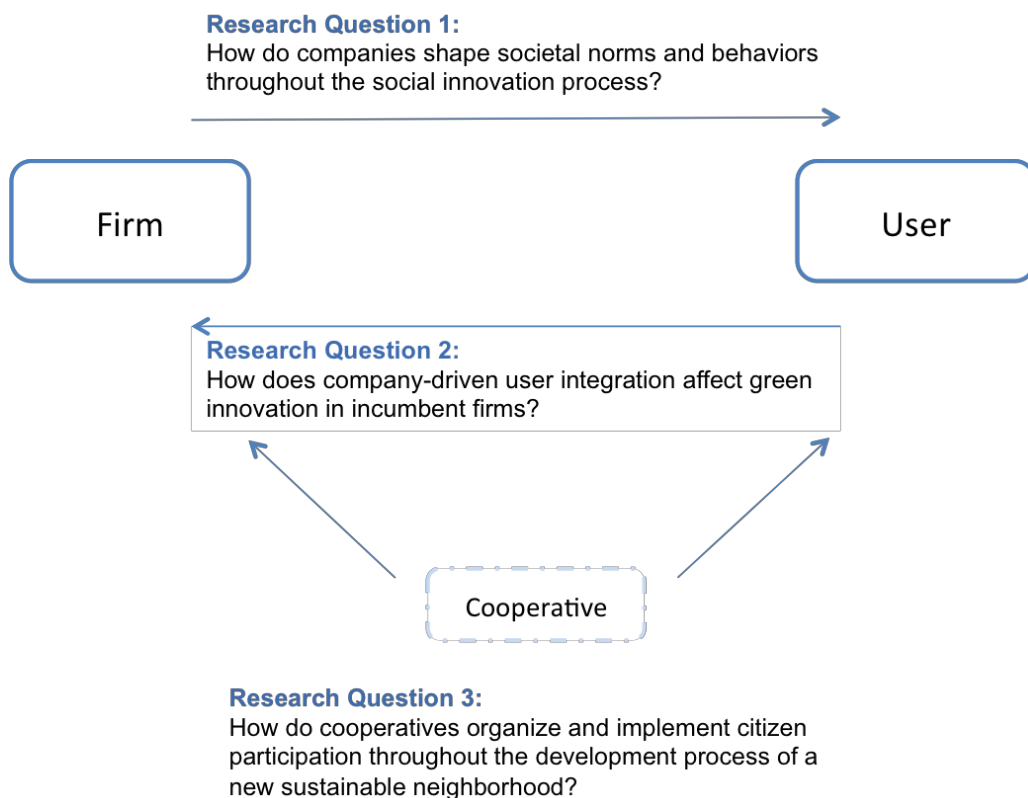
Still, researchers propose that the two shifts outlined above, i.e. the increasing attention to sustainability innovation on the one hand and the opening of the innovation process to users on the other hand, might be synergistic (Carrillo-Hermosilla, del Río, & Könnölä, 2010; Slotegraaf, 2012). As outlined above, sustainability innovation is often systemic in nature and imply changes in consumer behavior (Vergragt et al., 2014). Several scholars have therefore called for integrating users into the sustainability innovation process, in order to spot user needs more accurately, give consideration to user ideas for developing and improving sustainable new products and services, anticipate changing behavior, and facilitate market acceptance (Heiskanen et al., 2005; Hyysalo et al., 2013; Slotegraaf, 2012). Scientific evidence shows that user integration in sustainability innovation processes indeed triggers individual and organizational learning and promotes sustainable technology development (Heiskanen et al., 2005; Hoffmann, 2007). However, most studies focus on independent or facilitated user integration, where users act as entrepreneurs or cases where third parties initiate user integration projects with companies on a punctual basis. Scientific evidence of company-driven sustainability innovation integrating users, in contrast, remains scarce (Carrillo-Hermosilla et al., 2010; Heiskanen et al., 2005; Hyysalo et al., 2013; Slotegraaf,

2012). Due to the important role of the private sector for reaching a sustainable future, it therefore offers fertile areas for future research, as further described in the next section.

### 1.3 Development of Research Questions

On a general level, this thesis aims to shed light on the emerging phenomenon of company-driven sustainability innovation integrating users. It will present the results of three separate studies, each of them dedicated to a different research question, as illustrated in *Figure 4*. In addition, *Table 1* at the end of this section gives an overview of the three essays with regard to the research question addressed, key findings, contribution and implications.

**Figure 4:** Overview of research questions addressed in this thesis



**Essay 1** analyzes user integration throughout the innovation process from an institutional theory lens. The success of every innovation depends not only on the innovating actor itself, but also on a supportive institutional environment. The institutional environment can be defined as the “rules of the game in society”, being composed by three different sets of elements (Scott, 2007). Explicit, formalized rules provide for the regulative element, values and norms that guide societal behavior constitute the normative element, and shared conceptions and beliefs of social reality represent the cultural-cognitive element of the institutional environment (Scott, 2007). A supportive institutional environment can therefore include, for instance, government incentives as well as positive expectations among customers. In the case of sustainability innovation, the creation of a supportive institutional environment is particularly challenging, since novel products and services that aim to address social or environmental problems inherently challenge the institutional system that created these problems (Westley, Antadze, Riddell, Robinson, & Geobey, 2014). This is why sustainability innovation often has to be accompanied by changes in the institutional environment.

New institutional theory emphasizes the idea that companies do not only adapt to institutional pressures arising from these institutions, but also respond to them by strategically influencing them, and ultimately changing them (Greenwood & Hinings, 1996; Hargrave & Van de Ven, 2006; Oliver, 1991). Scholars have referred to these activities as ‘institutional change processes’ or ‘institutional work’, i.e. “the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions” (Lawrence & Suddaby, 2006, p. 215). Institutional work often involves interacting with policy makers, the general public or social movements (Hargrave & Van de Ven, 2006; Penna & Geels, 2012).

Innovation literature focuses mostly on institutional work targeting formal institutions, such as the emergence of technology standards and regulations (e.g. Garud, Jain, & Kumaraswamy, 2002; Musiolik & Markard, 2011; Smink, Hekkert, & Negro, 2015). Although informal institutions have been found to be “the deeper foundations of institutional forms” (Scott, 2007, p. 429), there is less research on how innovating actors attempt to influence values, norms, binding expectations, common beliefs, habits and routines among the wider

public. Existing studies either touch upon informal institutions in a broader analysis of formal institutions (e.g. Binz, Harris-Lovett, Kiparsky, Sedlak, & Truffer, 2016; Garud & Karnoe, 2003; Kukk, Moors, & Hekkert, 2016; Walker, Schlosser, & Deephouse, 2014) or focus on discursive strategies and framing activities of the innovating actor after market introduction of the new product or service (Khair & Wadhvani, 2010; Munir & Phillips, 2005). This view, however, ignores the fact that a common understanding of new products and services emerges over time long before the commercialization phase of the innovation process and depends heavily on the interaction of innovating actors with future users (Ansari & Phillips, 2011).

Against this background, the first essay (i.e. chapter 2) responds to calls for more research on how direct and indirect interaction between producers and other stakeholders shapes informal institutions (Ansari, Garud, & Kumaraswamy, 2016; Kaplan & Tripsas, 2008) and looks at the interaction of companies with users as the main actor of the informal institutional environment. As illustrated in *Figure 4*, the research question addressed in the first essay is the following:

**RQ 1:** “How do companies shape societal norms and behaviors throughout the social innovation process?”

**Essay 2** still focuses on the relationship between companies and users, but takes on a different perspective. Instead of looking on how companies shape the institutional environment, this essay investigates the reverse relationship and looks at how user integration affects sustainability innovation in incumbent firms. As mentioned before, there is widespread agreement that the development of sustainable new products and services is more complex than conventional innovation and requires the integration of external knowledge, due to its systemic character and technological uncertainties (e.g. De Marchi, 2012; Driessen & Hillebrand, 2013). The largest body of literature in this area, however, focuses on the collaboration with suppliers (Lee & Kim, 2011; Mlecnik, 2013), universities and R&D institutes (Castaldi, Faber, & Kishna, 2013; Trencher, Yarime, & Kharrazi, 2013), and not with users.

Against the background that green products often require changes in consumption behavior and lack market attractiveness, a number of scholars propose that the integration of users in the development process of new sustainable products and services is a pre-condition for a lasting transition to sustainable consumption patterns (e.g. Heiskanen et al., 2005; Hoffmann, 2007; Ornetzeder & Rohracher, 2006). Still, empirical evidence on the prospects of user-integration in company-driven sustainability innovation processes is scarce and shows mixed results, in particular with regard to rather radical innovation. Laperche and Picard (2013), for instance, find that user integration is key for the success of green product service system innovations in manufacturing firms, whereas De Marchi (2012) finds no increased importance of user integration to environmental innovations at all, due to a lack of sophisticated technical knowledge on the part of the users.

The second essay (i.e. chapter 3) thus has the objective to empirically investigate the role of users in the development of novel green products and services. By focusing on the overall innovation process in incumbent firms and not only on an individual method that is applied on a selective basis, the essay stresses an approach to green innovation in incumbent firms, which has not been given much attention in literature before. As illustrated in *Figure 4*, the second research question is the following:

RQ 2: “How does company-driven user integration affect green innovation in incumbent firms?”

**Essay 3** focuses on the role of cooperatives and cooperative networks as an organizational form that transcends the traditional divide between producers and users. Cooperatives are traditionally organized as democratic associations, acting on behalf and working very close with their members that often share a joint vision or goal (Menzani & Zamagni, 2010; Novkovic, 2008). For this reason, they seem to be a favorable organizational form for organizing user integration in sustainability innovation processes and are often put forward as a vital organizational form to promote sustainable lifestyles (Boone & Ozcan, 2013; Dorado, 2013; Mont, Neuvonen, & Lähteenoja, 2014; Sagebiel, Müller, & Rommel, 2014; Sanders, 2002; Viardot, 2013).

Researchers have analyzed the role of cooperatives in very different contexts, such as energy, agriculture and housing (Boone & Ozcan, 2013; Ornetzeder & Rohrer, 2006; Viardot, 2013), and identified organizational challenges related to the democratic nature of cooperatives. Studies have shown, for instance, that cooperatives often struggle with the downsides of consensus-based decision making such as infinite discussions and time delays (Cunningham & Wearing, 2013), and can improve their innovation capacity by cooperating with outside actors (Smith, Fressoli, & Thomas, 2014). To the best knowledge of the author, however, little is known about the innovation process within cooperatives and their collaboration with inside and outside actors, as well as about their role as catalytic agents for promoting participatory processes for sustainable lifestyles (Novkovic, 2008; Penna & Geels, 2012; Seyfang, 2007; A. Smith et al., 2014). This, however, is important to unlock the potential of the cooperative business model for user integration and sustainable development.

The third essay (i.e. chapter 4) thus has the aim to empirically investigate participatory formats, i.e. formats to integrate users and other stakeholders, applied by a cooperative in the different phases of the development process and the role of cooperative's characteristics that affect the participatory development process. As illustrated in *Figure 4*, the third research question is thus the following:

RQ3: "How do cooperatives organize and implement citizen participation throughout the development process of a new sustainable neighborhood?"

**Table 1:** Overview of essays with regard to research question addressed, key findings, contribution and implications

	<b>Research Question</b>	<b>Key Findings</b>	<b>Contribution</b>	<b>Implications</b>
<b>Essay 1</b>	How do companies shape societal norms and behaviors throughout the social innovation process?	<p>The study finds that user integration is a means to shape societal norms and behaviors:</p> <ul style="list-style-type: none"> <li>• All innovating actors under study engage in different sets of practices to challenge and shape societal norms and expectations as well as user habits and routines throughout the innovation process.</li> <li>• The generation of physical experiences and positive emotions such as joy and excitement plays a particular important role for the behavioral embedding of new products and services.</li> </ul>	By emphasizing that informal institutional work happens all along the innovation process, the study links literature on innovation and institutional theory, a connection that has been found to be still too weak. It provides for a nuanced view of how companies, which aim to bring technologies with different characteristics of innovativeness to the market, shape the informal institutional environment.	Results suggest that sustainability innovation must be embedded in the everyday lives of potential users. An organizational design that allows for and promotes the interaction with users and other stakeholders in the innovation process might be helpful for firms in this regard.
<b>Essay 2</b>	How does company-driven user integration affect green innovation in incumbent firms?	<p>The study suggests that user integration promotes green innovation in incumbent firms:</p> <ul style="list-style-type: none"> <li>• By uncovering behavioral changes and confirming internal ideas, early and constant user integration helped the companies under review to overcome risk aversion towards the development of genuinely new green products and services.</li> <li>• Field trials similar to living labs proved to be of particular importance for gaining insight into the everyday lifestyle of users.</li> </ul>	By outlining different approaches to involve users along the corporate innovation process as well as corporate motivations and benefits, the study advances existing literature on the role of users in sustainability innovation processes, which has so far mainly focused on independent user innovation and the testing of particular methods at one point in time.	Companies experienced organizational learning when integrating users, resulting in a changing perception of the innovative potential of users and an intensification of user integration efforts. It also became evident that the provision of public funding for user integration projects in the present also triggered firms to intensify these efforts in the future.
<b>Essay 3</b>	How do cooperatives organize and implement citizen participation throughout the development process of a new sustainable neighborhood?	<p>The study shows that cooperatives are powerful actors to promote participatory development approaches in the sustainability context:</p> <ul style="list-style-type: none"> <li>• Cooperative and cooperative network characteristics create an environment conducive to citizen participation at all stages of the development process of new sustainable neighborhoods.</li> <li>• The participatory approach induced social learning among member cooperatives and other participants, promoting the transition towards sustainability.</li> </ul>	The study adds new insights to the literature of sustainability transitions by highlighting the cooperative network as a powerful actor for promoting participation in sustainable development, inducing learning processes among all actors involved.	Our findings show that participation in the development processes of the new sustainable neighborhood has led to a changing perception of the innovative potential of citizens among participants from the member cooperatives. This study can therefore serve as an example and diffuse the learning processes across the boundaries of the cooperative under investigation



## 1.4 Research Design

This dissertation adopted a qualitative research design. Qualitative research offers the unique opportunity to gain rich and detailed data, thereby shedding light on a particular situation or phenomenon, and studying it in depth (Eisenhardt, 1989). Since research on the phenomenon user integration in sustainability innovation is still in a nascent stage, a qualitative research design seems to be most suitable. As Edmondson and McManus (2007) point out, “the less that is known about a phenomenon in the organizational literature, the more likely exploratory qualitative research will be a fruitful strategy” (p.1177).

Case studies can be defined as empirical inquiries of a contemporary phenomenon within its real-life context where the boundaries between phenomenon and context tend to be blurred (Stake, 1994; Yin, 2009). Therefore, case study analysis is particularly suitable to understand the dynamics present within single settings (Eisenhardt, 1989, p. 534). The research questions outlined in this study require the deep understanding of the different phases of the innovation process, the role of the different actors in this process and over time, and the impact of user integration in sustainability innovation within and beyond the corporate setting. Since case studies excel at explicating processes and related ‘how’ research questions (Langley, 1999), the method was found to be most appropriate to answer the defined research questions and ensure “methodological fit” (Edmondson & McManus, 2007, p. 1160).

In general, one can differentiate between single and multiple case study designs. Single case studies tend to be used when the case is critical to test existing theory, represents rare or unique circumstance, can be identified as a representative or typical case, or serves a revelatory or longitudinal purpose (Yin, 2009, p. 52). Multiple case studies, in contrast, allow for replication and are often considered to be more compelling and more robust (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). At the same time, multiple case studies are often incompatible with the rationale for single case designs, since by definition, a critical, rare or revelatory case involves a single case only. This thesis includes two comparative case studies and one in-depth single case study, as further outlined in the different essays (for an overview see *Table 2*).

**Table 2:** Overview of essays with regard to research questions, methodology, data collected

	<b>Research Question</b>	<b>Methodology</b>	<b>Cases analyzed</b>	<b>Unit of Analysis</b>	<b>Data analyzed</b>
<b>Essay 1</b>	How do companies shape societal norms and behaviors throughout the social innovation process?	Comparative case study analysis	<ul style="list-style-type: none"> <li>• Shared Bicycle System</li> <li>• Electric vehicle</li> <li>• E-mobility charging network</li> <li>• Smart housing technology</li> </ul>	Companies' green innovation process	<ul style="list-style-type: none"> <li>• 28 interviews</li> <li>• Documents (project reports, presentations, scientific articles, press releases, company website, annual and sustainability reports)</li> <li>• Video material</li> </ul>
<b>Essay 2</b>	How does company-driven user integration affect green innovation in incumbent firms?	Comparative case study analysis	<ul style="list-style-type: none"> <li>• Electric vehicle</li> <li>• E-mobility charging network</li> <li>• Smart housing technology</li> </ul>	User-centered innovation process for green products and services in the three companies.	<ul style="list-style-type: none"> <li>• 22 interviews</li> <li>• Documents (project reports, annual reports, press releases, media articles)</li> </ul>
<b>Essay 3</b>	How do cooperatives organize and implement citizen participation throughout the development process of a new sustainable neighborhood?	In-depth single case study	<ul style="list-style-type: none"> <li>• New sustainable neighborhood</li> </ul>	Participatory development process within and around the cooperative network	<ul style="list-style-type: none"> <li>• Five interviews</li> <li>• Documents (annual reports, progress reports, documents from meetings and public forums, monthly newsletters from July 2008 to February 2015, presentations and conceptual reports, newspaper and magazine articles)</li> </ul>

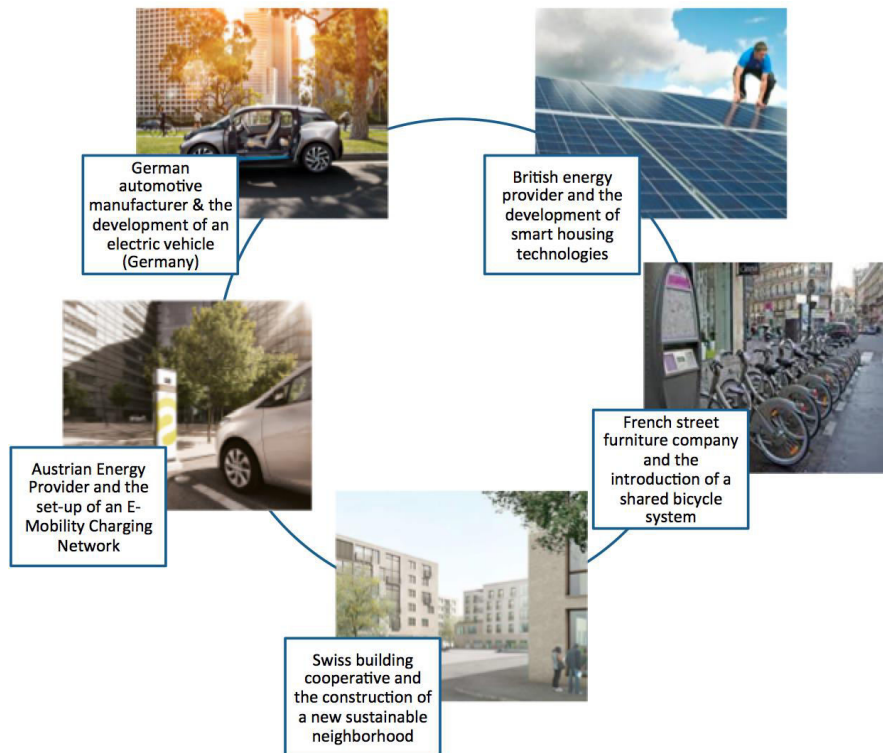
The cases considered in this thesis were collected in the framework of the EU-InnovatE research project, which limited the geographical scope of the cases to Western Europe. Considering that the mobility, energy, food and housing sectors have the highest environmental impact related to final consumption within the European Union (Tukker et al., 2006), these sectors have been chosen as empirical contexts for this study. In a first step, cases were purposefully selected on the basis of the empirical phenomenon to meet the initial selection criteria (Patton, 1990):

- (1) The innovation has reached market commercialization and creates economic as well as social and ecological value
- (2) There is a certain extent of user integration in the sustainability innovation process
- (3) The case comes from one of the four domains outlined (mobility, energy, food, housing)

Accordingly, a total of eighteen cases from twelve European countries was sampled. For the purpose of the three essays, a smaller set of five theoretically sampled cases was chosen from this larger set of purposefully selected cases as further described in the methods section of the three essays, following the sampling strategy “theoretical sampling out of purposeful sampling” (Belz, 2017). The unit of analysis, defined as the “heart of the case” (Grünbaum, 2007, p.88) is in all three essays the innovation process of the new sustainable product or service. The five cases under review include the development of an electric vehicle, the set-up of an e-mobility charging network, the development of smart housing technologies, the introduction of a shared bicycle system, and the construction of a new sustainable neighborhood, as shown in *Figure 5*.

Data collection in the five cases involved interviews with company representatives, users and third parties that have been involved in the innovation process as well as the profound analysis of documents provided by the case companies and public sources. Documents analyzed included project and progress reports, meeting documents, presentations and scientific articles, the company website, annual and sustainability reports, press releases, newspaper and magazine articles. In one case study (Essay 1) video material was also included in the data analysis. Data collection and analysis for the three essays is further explained in the respective methods section of the essays.

**Figure 5:** Overview of cases and case companies analyzed in this thesis



## 1.5 Structure of the Thesis

The thesis is divided into five chapters, as illustrated in *Figure 6*. Following the **introduction**, the thesis continues by presenting the three different essays that each address one of the three research questions outlined in the previous section.

The **second chapter** investigates how innovating actors shape informal institutions such as societal norms, values and expectations as well as user habits and routines throughout the innovation process. By drawing on the literature on social innovation and institutional theory, the essay analyzes four case studies in the energy and transportation sector. This inductive research approach allows identifying certain sets of practices to influence informal institutions throughout the sustainability innovation process.

The **third chapter** sets out to answer how user integration affects sustainability innovation in incumbent firms. By analyzing user integration in the context of e-mobility and smart housing, the essay outlines the methods used by three incumbent firms in Europe to

integrate users throughout the innovation process as well as their motivation and benefit. The comparative case study analysis shows that user integration helped the companies under review to uncover behavioral changes in the consumption phase and overcome risk aversion towards the development of novel green products and services, thereby promoting sustainability innovation in incumbent firms.

The **forth chapter** examines the role of cooperatives and cooperative networks in the context of user integration in sustainability innovation processes. By conducting an in-depth single case study of a cooperative-led development process of a new sustainable neighborhood in Switzerland, the essay shows how users participated in the different phases of the development process and the extent to which cooperative characteristics influenced participation.

The fifth and **final chapter** provides for an overall discussion of the results from the three individual essays and reflects on the implications for theory and practice. It also outlines the limitations of this thesis as well as areas for future research.

**Figure 6:** Structure of this thesis

<b>1. Introduction</b> <ul style="list-style-type: none"> <li>• Motivation</li> <li>• Conceptual framework</li> <li>• Development of research questions</li> <li>• Research design</li> <li>• Structure of the thesis</li> </ul>	<b>2. Essay 1:</b> Embedding Social Innovation: Shaping Societal Norms and Behaviors throughout the Innovation Process	<b>5. Conclusion</b> <ul style="list-style-type: none"> <li>• Summary of results and implications for theory and practice</li> <li>• Limitations</li> <li>• Areas for future research</li> </ul>
	<b>3. Essay 2:</b> End-Users as Co-Developers for Novel Green Products and Service: An Exploratory Case Study Analysis of the Innovation Process in Incumbent Firms	
	<b>4. Essay 3:</b> Cooperatives as Catalysts for Sustainable Neighborhoods: A Qualitative Analysis of the Participatory Development Process toward a 2000-Watt Society	

## 2 Essay 1: Embedding Social Innovation: Shaping Societal Norms and Behaviors throughout the Innovation Process<sup>1</sup>

### **Abstract**

New products and services that tackle grand societal challenges often require changes in societal norms, values and expectations. This research investigates the question of how innovating actors shape these informal institutions throughout the innovation process by drawing on the literature on social innovation and institutional theory. In a comparison of four case studies, we observe that all innovating actors under study engage in a diverse set of practices to challenge and shape societal norms and expectations as well as user habits and routines throughout the innovation process. These activities can be clustered into unilateral, bilateral and multilateral change processes, depending on the number of actors involved. Our findings highlight how different types of direct and indirect interactions between innovating actors and users along the innovation process shape the understanding of social innovation, and stress the central role of physical experiences and positive emotions among (future) users. Thereby, we provide for a more nuanced view of how companies that aim to bring technologies with different characteristics of innovativeness to the market shape the informal institutional environment throughout the different phases of the innovation process.

**Keywords:** Social innovation, institutional change, users, informal institutions

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<sup>1</sup> This chapter is based on the article *Embedding Social Innovation: Shaping Societal Norms and Behaviors throughout the Innovation Process* revised and resubmitted (2nd round) to *Business & Society*, co-authored with Daniel Arenas. In 2015, the journal was ranked “B” (VHB) and had an impact factor of 2.1. My contribution to the article is summarized in Appendix 2. A prior draft of the article was accepted for presentation at *VHB Tagung 2016* and the *Annual Meeting of the Academy of Management 2016*.

## 2.1 Introduction

The successful development and diffusion of new technologies and related products or services does not depend on the private sector only, but also on a supportive institutional environment such as government incentives and positive expectations and acceptance among future users. In the case of social innovation, the requirement of institutional change is even more challenging, since any novel solution to societal problems such as climate change, poverty alleviation and income inequality ultimately attempts to challenge the very institutions that created the societal problem it addresses. In this way social innovation has been defined as “a complex process of introducing new products, processes or programs that profoundly change the basic routines, resources and authority flows, or beliefs of the social system in which the innovation occurs” (Westley & Antadze, 2010, p. 2).

New institutional theory has put forward the idea that firms are able to change the institutional environment rather than merely adapting to it (Lawrence & Suddaby, 2006; Maguire, Hardy, & Lawrence, 2004; Oliver, 1991). The institutional environment is constituted by formal institutions such as laws and regulations on the one hand, and informal normative institutions, such as norms and value systems, as well as cultural-cognitive institutions like shared conceptions of reality, binding expectations and common beliefs on the other hand (Scott, 2007). Scott (2007) points out that institutions cannot be analyzed in isolation from associated activities and behaviors, since the latter produce, reproduce, change and sustain them. Firms can induce institutional change, defined as any change in form, quality or state over time in an institution, by interacting with policy makers, the general public or social movements (Hargrave & Van de Ven, 2006; Penna & Geels, 2012). Scholars have referred to these activities as ‘institutional change processes’ or ‘institutional work’, i.e. “the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions” (Lawrence & Suddaby, 2006, p. 215).

Most research on institutional change in the area of innovation and new product development focuses on formal institutions, such as the emergence of technology standards and regulations (e.g. Garud et al., 2002; Musiolik & Markard, 2011; Smink et al., 2015). These regulative features might be the most visible institutions, but informal institutions provide

“the deeper foundations of institutional forms” (Scott, 2007, p. 429). Against this background, it is surprising that there is little research on how innovating actors attempt to influence informal institutions, such as values, norms, binding expectations, common beliefs, habits and routines, among the wider public. Existing studies either touch upon informal institutions in passing when analyzing attempts to change formal institutions (e.g. Binz et al., 2016; Garud & Karnoe, 2003; Kukk et al., 2016; Walker et al., 2014) or focus on discursive strategies and framing activities that are used after the market introduction of a new product or service (Khair & Wadhvani, 2010; Munir & Phillips, 2005). These approaches overlook the fact that the understanding of novel technologies emerges long before new products or services are commercialized and depends heavily on the interaction of innovating actors with future users (Ansari & Phillips, 2011).

Against this background, we respond to calls for more research on how the interaction between producers and other stakeholders shapes institutions (Ansari et al., 2016; Kaplan & Tripsas, 2008) by looking at how innovating actors interact with users as the main player of the informal institutional environment in the pre-commercialization stage. The research question is: “How do companies shape societal norms and behaviors throughout the social innovation process?”. By focusing on innovations that address climate change only, we focus on one particular type of social innovation, i.e. environmental or green innovation. Since social problems often find their origin in environmental challenges, green innovation, i.e. innovation to environmental problems, can be defined as a subcategory of social innovation (Dangelico et al., 2013; Howard-Grenville et al., 2014). Green innovation is particularly suitable as an empirical context to study institutional change processes targeting informal institutions, since often environmentally-friendly products and services do not only show a high degree of innovativeness and imply changes in norms and behaviors, but in many cases also face major skepticism and doubts about the new technology among (future) users. Users need to be convinced that the new product has not only an added value for society and the environment, but also for them (De Marchi, 2012; Heiskanen et al., 2005; Hoffmann, 2007). Accordingly, change processes targeting informal institutions are expected to be more evident and easier to investigate in the case of green innovation.



We find evidence that all four innovating actors studied in this paper make use of different types of practices to influence societal norms and expectations as well as user habits and routines, in order to achieve societal embedding of their new product / service. These activities take place at different stages of the overall innovation process and much earlier than in the commercialization phase, where one would expect it according to current literature. Our study makes three important contributions to existing studies. First, we link literature on innovation and institutional theory, a connection that has been said to be still too weak and offer a fertile area for further study (Munir & Phillips, 2005), by emphasizing that informal institutional work happens all along the innovation process. Second, by covering multiple technologies with different characteristics of innovativeness in a comparative case study, we highlight how different dimensions of innovativeness influence corporate activities to target informal institutions. Third, we draw attention to the unilateral, bilateral and multilateral nature of institutional change processes targeting informal institutions, highlighting the interactive nature of these processes as well as the role of physical experiences and positive emotions, which has not been identified in institutional literature before.

## 2.2 Literature Overview

### 2.2.1 Institutional Work in Innovation Studies

Innovation literature has identified four different processes that are key for inducing change in the institutional environment when bringing new products and services to the market (see Hargrave & Van de Ven, 2006). First, innovating actors often engage in political activities to legitimize a new innovation (Hargrave & Van de Ven, 2006). These processes are mainly constituted by efforts to persuade other actors that hold a central role for developing and commercializing an innovation, such as government officials and financial investors. Institutional work in these processes commonly includes, for instance, the attempt to influence policy makers and the general public through direct lobbying, research reports, positioning papers, advertising and the setting of technical standards (e.g. Geels, 2014; Penna & Geels, 2012; Slager, Gond, & Moon, 2012).

Second, innovating actors often construct networks and bundle their complementary skills and resources in order to develop and commercialize an innovation. This supports the view that breakthrough innovations are often the results of networks of learning and collaboration rather than the merit of one single firm (Garud & Karnoe, 2003). In this context, collaborations between the public and the private sector, research institutions, universities and industry associations have been identified as particularly important for bringing a new product or service to the market (e.g. Jolly & Raven, 2015; Pinkse & Kolk, 2011; Reay & Hinings, 2009; Walker et al., 2014). Recent work has shown that uncommon forms of collaboration, such as collaboration between incumbents and nongovernmental organizations and activists, can also be key for putting an idea forward (Den Hond, De Bakker, & Doh, 2012; Van Wijk, Stam, Elfring, Zietsma, & Den Hond, 2012).

Third, in cases of very novel technologies, innovating actors often engage in activities to construct the market for the related products and services. Studies on this topic have demonstrated that individual innovating actors or networks of actors need to devote efforts to build the institutional infrastructure needed to realize an innovation (e.g. Van de Ven, 1993). The main elements of institutional infrastructure include “formal governance, collective interest organizations, informal governance, field configuring events, status differentiators, organizational models or templates, categories and labels and norms” (Hinings, Logue, & Zietsma, forthcoming). New technologies and innovations therefore require the advancements in scientific knowledge and the establishment of new formal regulations that regulate and standardize a new technology (Garud et al., 2002; Van de Ven & Garud, 1993) as much as the emergence of new categories, norms and meanings, which allow (future) users to value new products, services, and industries (Khaire & Wadhvani, 2010). Literature on the sociology of markets further points out that, in the end, markets are socially constructed worlds with regular exchanges between buyers and sellers (Fligstein & Dauter, 2007, p. 113) that lack definition, coherence and understanding at the beginning (Khaire, 2014).

Lastly, and related to the third process, innovating actors engage in purposive efforts to create and manipulate the meaning of new technologies, products and services. This process

mainly involves discursive elements and rhetorical strategies, supporting the idea that meanings and understandings of new technologies are shaped over time (Garud, Hardy, & Maguire, 2007; Green Jr & Li, 2011; Khaire & Wadhvani, 2010; Suddaby, Elsbach, Greenwood, Meyer, & Zilber, 2010). By strategically producing and disseminating texts and making use of discursive devices, such as categories (Grodal, Gotsopoulos, & Suarez, 2015; Khaire & Wadhvani, 2010), frames (Werner & Cornelissen, 2014), narratives (Garud, Gehman, & Giuliani, 2014) and stories (Seidel & O'Mahony, 2014; Zilber, 2007), innovating actors attempt to develop discourses that fit their interests and advance an innovation on the market.

### **2.2.2 Shaping Informal Institutions**

All of these four processes are relevant for bringing about change both in the formal and informal institutional environment. They are also important in different moments during the course of institutional change, as several studies on the sequence of different practices to induce institutional change over time indicate (e.g. Fuenfschilling & Truffer, 2016; Kukk et al., 2016; Walker et al., 2014). Responding to calls for more dynamic models on how institutions form, change and decline (Granqvist & Gustafsson, 2016; Greenwood & Suddaby, 2002; Hargrave & Van de Ven, 2006; Perkmann & Spicer, 2007), Walker et al. (2014), for instance, have developed a process model of how companies engaged in strategic efforts to overcome institutional constraints, such as limited grid access and political uncertainty in the embryonic solar industry. However, most of these studies just touch upon the informal institutional environment in a broader analysis of practices to shape formal institutions, pointing, for instance, to the importance of educating or framing activities when bringing a new product or service to the market (e.g. Fuenfschilling & Truffer, 2016; Garud & Karnoe, 2003; Walker et al., 2014).

Few empirical studies focus exclusively on the processes that aim to shape informal institutions, i.e. normative systems of values and norms and cultural-cognitive systems of shared conceptions of reality and meaning, as well as related habits and routines. These studies mainly investigate how innovations are embedded in existing understandings to promote the product or service's uptake by users (e.g. Garud & Rappa, 1994; Hargadon & Douglas, 2001; Van de Ven, 1993) and analyze the discursive tools utilized by the innovating

firm to influence informal institutions (Khair & Wadhvani, 2010; Waldron, Fisher, & Pfarrer, 2016; Zilber, 2007). Munir and Phillips (2005), for instance, show how Kodak managed to engage in discursive strategies to frame photography as an integral, taken-for-granted part of everyday life, ultimately changing the meaning of a new technology, i.e. the roll-film camera, from a professional practice to a popular one.

Khair and colleagues analyze in more detail how the meaning of new products and the collective perception of value of these are socially constructed (Khair, 2014; Khair & Hall, 2016; Khair & Wadhvani, 2010). By focusing on entrepreneurs and their broader field, the author investigates how the new industry was defined and described to generate shared meaning, i.e., how its worth was constructed for a broader audience (Khair, 2014). Using the examples of modern art and high-end fashion in India, the scholars identify several socio-cognitive processes that enable users to make sense of the new industry and comprehend its worth, including, for instance, the definition of boundaries, the development of criteria, and the provision of information, instructions and critique (Khair, 2014; Khair & Wadhvani, 2010). This is done not only by the innovating actors, i.e. producers, but also by intermediary actors such as educational institutions, art historians and critics (Khair, 2014; Khair & Wadhvani, 2010).

The role of intermediaries in shaping informal institutions for market development has also been studied in the context of low-income markets (e.g. Mair & Marti, 2009; McKague, Zietsma, & Oliver, 2015). In their study on the development of the dairy sector in Bangladesh, McKague et al. (2015) show how an NGO can play a crucial role for the successful development of a nascent market. This intermediary actor introduced market actors to new knowledge, initiated new relationships among them, and invited them “to experiment with new practices on the basis of altered beliefs” (p. 1082-3), thereby laying the groundwork for new market practices to emerge. Contextual bridging, defined as “the transfer of new meanings, practices and structures into a given context in a way that is sensitive to the norms, practices, knowledge and relationships that exist in that context” (McKague et al., 2015, p. 1083) emerges as a particularly important process. However, the authors find that a new market does not only require an altered understanding among market participants, including the acceptance of new or changing norms and meanings, but

that these newly negotiated norms and emerging meanings need to be materially embedded. In this context, material embedding means that market participants adopted and used practices that reflected the new norms and values, integrating them in their daily life, and thereby reinforcing them (McKague et al., 2015). This finding again highlights the interdependence of values, norms and a shared understanding of reality and meaning on the one side, and habitual use, rituals and daily practices on the other side, as two sides of the same coin of informal institutions, mutually depending on and reinforcing each other (e.g. Garud & Rappa, 1994; Scott, 2007).

Most of these studies on informal institutions, however, focus exclusively on one technology only (e.g. Munir & Phillips, 2005; Walker et al., 2014), the time period after market introduction (e.g. Khaire, 2014; Khaire & Wadhvani, 2010; Munir & Phillips, 2005), or the intervention of intermediary actors (e.g. Mair & Marti, 2009; McKague et al., 2015). As such, they often position consumers or users as pure adopters of innovations (Ansari & Phillips, 2011; Munir & Phillips, 2005). This view neglects, on the one hand, activities in the prior phases of the innovation process and, on the other hand, the interactive nature of institutional change processes, in particular between producers and users. In this way, Kaplan and Tripsas (2008, p. 802) argue that “the institutional literature has shed light on the role of institutional actors as shapers of outcomes, but this has not been integrated with producer and user perspectives“. One potentially fruitful, yet unexplored avenue in this context is therefore the different types of interaction with users, the most prominent actors of the informal institutional environment, throughout the innovation process (Ansari & Phillips, 2011).

## 2.3 Methodology

### 2.3.1 Research Design

Against this background, the aim of this research is to answer the following question: “How do companies shape societal norms and behaviors throughout the social innovation process?” and puts the interaction between producers and users at the center of analysis, starting before the phase of market introduction of the product or service. Given the

explorative nature of the study, the research project involves a qualitative study consisting of a comparative case analysis that, in contrast to existing studies, covers multiple technologies with different characteristics of innovativeness and at different stages in the innovation process. The cases were theoretically sampled and are treated as a series of independent units (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Yin, 2009). Theoretical sampling encompasses the purposeful selection of cases at the initial stage of research. For the purpose of this research, we created a heterogeneous sample of four cases of green innovation in different companies. All companies have recently brought a product or service to the market that has a reduced environmental impact along the lifecycle compared to competing offerings, i.e. a shared bicycle rental system, an electric vehicle, a charging network for electric vehicles and smart housing technology (for an overview see *Table 3*).

**Table 3:** Overview of cases under review in Essay 1

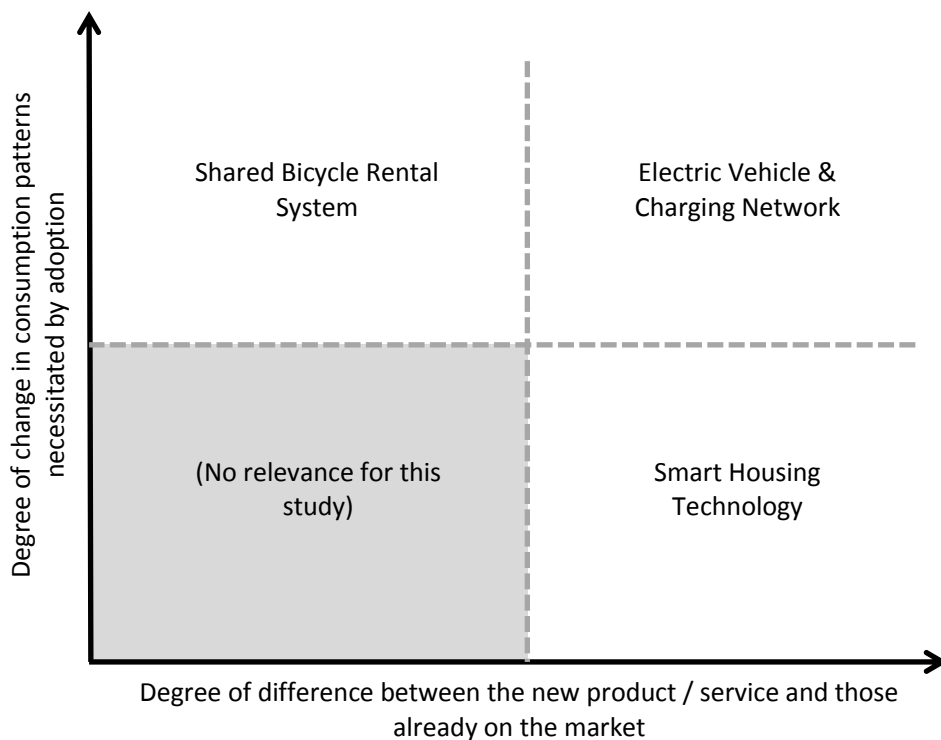
<b>Company</b>	<b>Innovation</b>	<b>Description of the Company and Innovation</b>
Automotive Manufacturer, Germany	Electric Vehicle	In 2007, the multinational automotive manufacturer based in Germany launched an initiative to explore future mobility solutions. The project team soon decided to focus on the development of a series electric vehicle. Seven years later the automotive manufacturer launched its first electric vehicle in series production, although market acceptance was not clear and infrastructure still lacking. Potential users doubted the practicability of electric vehicles with a limited range, and perceived e-mobility as a form of deprivation and incompatible with pleasurable driving. The development process was characterized by close collaboration with universities, users and policy-makers.
Shared bicycle system provider, France	Bicycle rental system	The multinational corporation headquartered in France is one of the most successful providers of public bicycle rental systems. In 2005, the company signed the contract to implement a bicycle sharing system in one of the main capitals in Western Europe. Faced with skepticism and security concerns among a large part of the population as well as a lacking infrastructure, the development process involved formal and informal collaborations with the public sector and civil society.
Energy Provider, Austria	Electric Vehicle Charging Network	The company under review is one of Austria's leading electricity companies. In cooperation with a multinational engineering and electronics firm, it set up a new company establishing the first nationwide network of charging stations for e-vehicles. Against major doubts and skepticism towards e-mobility among the public, the development processes included close coalitions with industry partners as well as interaction with (future) users and research institutes.
Energy Provider, UK	Smart Housing Technology	In 2011, the multinational company based in the UK launched the development of new technologies that are meant to manage energy use in housing, reduce energy consumption and ultimately lead to cost savings among house owners. The innovation process included close interaction with the public sector, research institutes and users along the overall development process, in order to convince users of the benefits and functionality of the new technology.

The four cases were selected because the newly developed products/services illustrate distinctive dimensions of innovativeness, representing different theoretical categories that are likely to generate rich information on the type of phenomena under study (Eisenhardt, 1989; Miles & Huberman, 1994). Past research has shown that the innovativeness of a product depends crucially on two dimensions: (1) the degree of change in the user's consumption patterns necessitated by adoption, and (2) the degree of difference between the new product/service and those already on the market (Garcia & Calantone, 2002; Lawton & Parasuraman, 1980). The four cases under review respond to different degrees to these criteria as shown in *Figure 7*. The shared bicycle rental system requires users to change their consumption patterns, planning bicycle trips more accurately and taking for instance the location of the rental stations into account (high degree of change in consumption pattern). However, the product on offer does in the end not differ much from existing bicycles on the market (low degree of difference to existing products). In contrast, smart housing technologies face the challenge that people do not know much about the technology and cannot imagine any benefits (high degree of difference to existing products), but once installed users do not have to change their behavior and can live in their house in the same manner than before (low degree of change in consumption pattern). Electric mobility, again, implies changes in consumption behavior with regard to the limited range and more frequent and longer rest periods to recharge the battery (high degree of change in consumption patterns) and can also be differentiated from conventional combustion engine cars in terms of technology functioning (high degree of difference to existing products). The analysis of the cases according to this categorization allows us to investigate the different practices used to shape societal norms and behaviors more accurately and draw conclusions on the interdependence between the practices chosen and the nature of the newly developed product.

Since the development of electric vehicles goes hand in hand with the development of respective charging stations (Abdelkafi, Makhotin, & Posselt, 2013), we decided to include in our analysis both the case of an automotive manufacturer and an energy company that aimed to bring a new product / service related to electric mobility to the market. In contrast, we did not consider any case in the bottom left field, since a product or service implying only

a small change in consumption pattern and with little difference with respect to existing alternatives will most probably not require any changes in societal norms and behaviors. Therefore, its inclusion in our analysis would not generate relevant insights to answer our research question.

**Figure 7:** Different characteristics of innovativeness of new green products / services analyzed in Essay 1



Furthermore, the companies under review come from the transportation and the energy sector, and are located in different Western European countries, i.e. Germany, France, UK and Austria. The analysis of companies in different sectors and countries enhances the generalizability of our findings. Rather than demonstrating that firms applying a certain institutional approach are more successful in creating a new market for the newly developed green products and services, the aim of this research is to understand how they seek to influence their informal institutional environment throughout the innovation process, and how the different practices relate to the innovativeness of the product / service at hand. The analysis and comparison of the cases provides a first picture of the different practices to



shape informal institutions and their combination. Hence, the unit of analysis in our case studies is the companies' green innovation processes.

### 2.3.2 Data Collection

We conducted semi-structured interviews with company representatives as well as external parties involved in the innovation process of the respective companies, such as universities, research institutes, and service agencies. Although our focus lies on the companies' activities to shape norms and behaviors and not on the changes induced in societal norms and behaviors, we acknowledge the fact that the one cannot be studied and fully understood in total isolation from the other. Therefore, we also conducted interviews with two users per case that were involved in the innovation process in order to mirror and verify company statements regarding user expectations, norms and behaviors. In total, interviews with 28 individuals were conducted (for an overview of all interviews see *Table 4*). The companies' representatives interviewed came from different departments, such as innovation, strategy, research and development and market research. Interviewees were chosen based on position and insight in the green innovation process. The overall selection of interviewees was meant to provide the researchers with a detailed understanding of the innovation process and related attempts to influence the informal institutional environment.

**Table 4:** List of interviews conducted per case included in Essay 1

#	Name	Date	Length
<b>German automotive manufacturer:</b>			
1	Company representative #1	May 13, 2014	60 minutes
2	Company representative #2	May 16, 2014	75 minutes
3	Company representative #3	June 5, 2014	60 minutes
4	Company representative #4	June 18, 2014	60 minutes
5	Company representative #5	December 12, 2014	60 minutes
6	Research institute involved	June 10, 2014	60 minutes
7	Open innovation agency involved	May 27, 2014	45 minutes
8	User #1	June 28, 2014	30 minutes
9	User #2	July 29, 2014	30 minutes
<b>Austrian energy provider</b>			
1	Company representative #1	July 14, 2014	60 minutes
2	Company representative #2	July 14, 2014	60 minutes
3	Research institute involved	August 7, 2014	60 minutes
4	Open innovation agency involved	August 8, 2014	60 minutes
5	User #1	August 8, 2014	60 minutes
6	User #2	October 10, 2014	45 minutes

<b>British energy provider</b>			
1	Company representative #1	August 20, 2014	90 minutes
2	Company representative #2	November 12, 2014	45 minutes
3	Company representative #3	November 05, 2014	15 minutes
4	Company representative #4	December 3, 2014	90 minutes
5	Research institute involved	October 17, 2014	60 minutes
6	User #1	October 30, 2014	45 minutes
7	User #2	January 22, 2015	40 minutes
<b>French shared bicycle system provider</b>			
1	Company representative #1	December 17, 2014	95 minutes
2	Company representative #2	December 17, 2014	40 minutes
3	Cycling association involved #3	December 17, 2014	60 minutes
4	Research institute involved	January 19, 2015	50 minutes
5	User #1	December 16, 2014	50 minutes
6	User #2	December 17, 2014	50 minutes

All interviews were conducted by two researchers, face-to-face when possible. This allowed one researcher to conduct the conversation and the other one to note down observations. An interview guide was used to conduct the semi-structured interviews, focusing on the innovation process and the role of (future) users and other stakeholders in the different process phases. Open-ended questions allowed the interviewees to elaborate their stories on the particular innovation process. We also asked probing questions to further clarify details regarding the process (e.g. time of a particular event, etc.). On average, interviews lasted 55 minutes per person. All interviews were digitally recorded, transcribed and documented in a standardized form in order to enhance the reliability of the study.

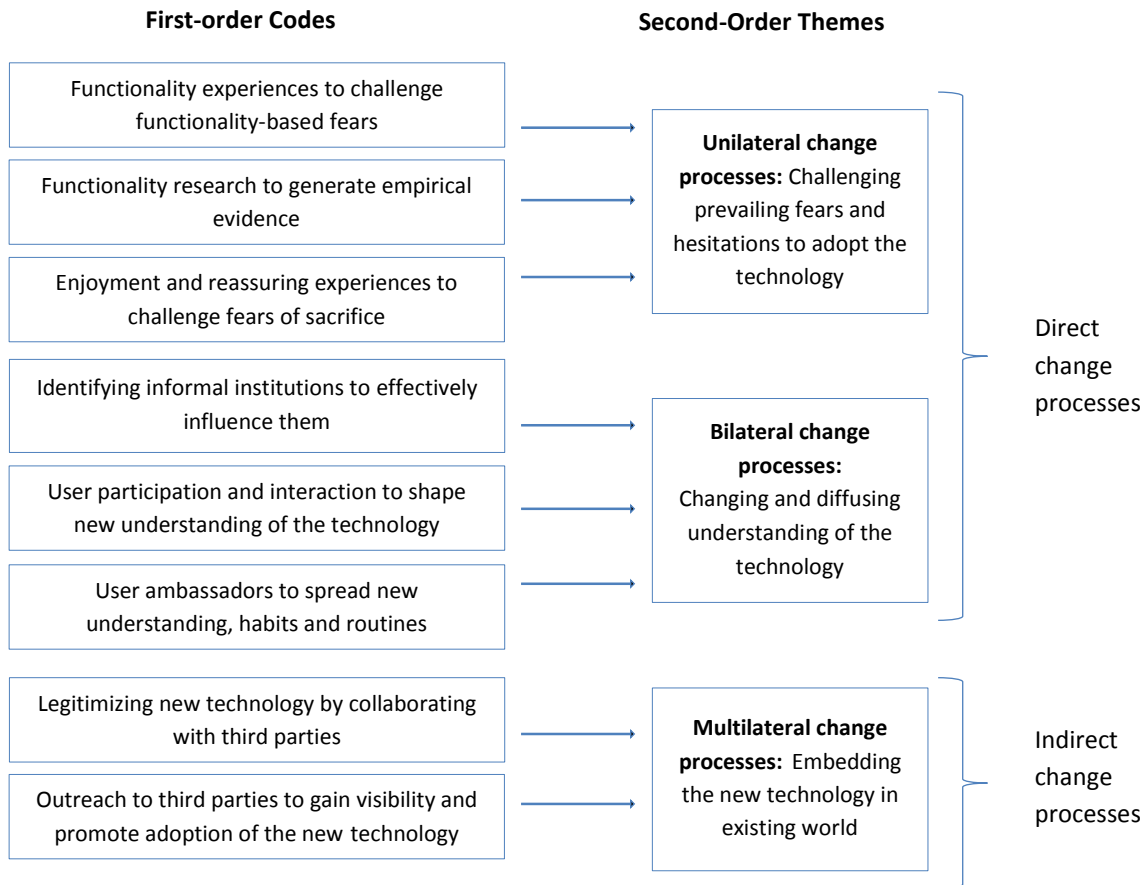
Interview data was triangulated with a thorough analysis of documents and video material that were provided by the interviewees or public sources (Bowen, 2009). As Merriam (1988) pointed out, “Documents of all types can help the researcher to uncover meaning, develop understanding, and discover insights relevant to the research problem”. In our analysis, we included project reports, presentations and scientific articles drafted by company representatives, press releases, the company website, and annual and sustainability reports. Thereby, the analysis of documents and video material analysis provided us with supplementary research data as well as information on the context within which our interviewees operate, and served as a means to corroborate evidence and verify our findings (Bowen, 2009).

### 2.3.3 Data Analysis

In line with common practice in inductive research, we first analyzed the data by building individual case studies and then systematically compared the data across cases (Eisenhardt, 1989). In a first step, we wrote down case reports for each case in isolation, noting down the overall timeline of the innovation process as well as important features and concepts. The second interviewer read through the cases to crosscheck the emerging story and make modifications, if deemed necessary. The case-writing process took about four months to complete. It included backtracking to prior interviews in order to clarify open questions. We also asked our main contacts in all four companies to review the case reports. When writing the cases, we had already noted similarities and differences between them. However, we completed the case reports without integrating a comparison to the other ones in order to maintain the independence of the replication logic (Brown & Eisenhardt, 1997). This step served to assure that our understanding of the four innovation processes analyzed aptly reflected the reality.

In a second step, and in preparation of the cross-case analysis, we documented and coded all interviews and documents with software for qualitative data analysis. We followed an inductive coding process based on the categorization and theme analysis technique suggested by Miles and Huberman (1994). Codes referred to the different phases of the innovation process as well as the approaches aiming to influence informal institutions during this process. The codes relating to the different phases of the innovation process were set from the very beginning (thematic coding), and helped us mainly to structure our large amount of data and understand the institutional change processes over time. Codes focusing on the different types of practices to induce institutional change only emerged throughout the coding process (inductive coding). As we discovered codes that were similar, we collated them into second-order themes that represent the sets of practices identified (see *Figure 8*). The main outcomes of the analysis are presented in the following section.

Figure 8: Overview of inductive coding structure of Essay 1



## 2.4 Empirical Findings

According to our analysis, the companies under review chose among different sets of practices targeted towards shaping informal institutions, which we explain in this section. We start by describing activities that involve companies as active actors only (unilateral change processes), then continue by describing processes that involve company actors as well as users interacting with each other, where users hold a role that goes beyond the consumption of the new product or service (bilateral change processes), and finally describe processes involving not only companies and users, but also third party actors (multilateral change processes). Whereas the first two categories of processes described have a direct influence on informal institutions, the influence of the last category is indirect. We map the practices identified against the different phases of the innovation process, i.e. strategy setting, idea generation and testing, development, and the commercialization phase (Holahan et al.,

2014). *Table 5* provides an overview of the identified processes to shape informal institutions with illustrative citations in order to embed the newly developed product or service.

#### **2.4.1 Unilateral Processes: Challenge Prevailing Fears regarding the Technology**

In order to challenge prevailing fears among potential users concerning the new technology, in particular doubts about its functionality and fears of sacrifice, the firms attempted to generate functionality experiences as well as enjoyment and reassuring experiences. First of all, all four firms aimed to familiarize (potential) users with the new technology, its functioning and related products and services. One of the clearest examples of this kind of functionality experiences among the cases under review is the installation of demonstration points prior to market introduction in the case of the French shared bicycle system provider. As one of our interviewees explains, the company aimed to change the perception of bicycle riding and show that it can work:

“This is about revolutionizing urban culture. (...) For a long time cars were associated with freedom of movement and flexibility. What we want to show people is that in many ways bicycles fulfill this role much more today.”

[Company representative, French Street Furniture Manufacturer, December 2014]

According to our data, users criticized that it was “*stressful and dangerous*” to cycle in the city, since the “*streets were too narrow for people to cycle safely*”, and that they had “*not even thought of buying a bicycle, since there was no place to park it*”. The company reacted by implementing far-reaching awareness and demonstration campaigns in the commercialization phase, explaining to (future) users how the bike sharing system works and what measures were taken to increase road safety. These campaigns often associated bicycling with freedom and health issues in order to contrast the negative image of risks and danger.

In a similar way, the Austrian electricity provider aiming to introduce a new e-mobility charging network in Austria pointed out that users had serious concerns about the functioning of electric vehicles, particularly with regard to the limited driving range:

“At the beginning, there was the tendency among people to say ‘well, I will probably not get along with this [range].’”

[Company representative, Austrian Energy Provider, July 2014]

**Table 5:** Overview of types of practices to influence informal institutions throughout the green innovation process identified in Essay 1

Set of practices	Example	Additional Citations from Interviews and Documents analyzed
<p><b>Unilateral:</b> Challenging prevailing fears and hesitations to adopt the technology</p>	<p>Functionality experiences to challenge functionality-based fears</p> <p>Functionality research to generate empirical evidence</p> <p>Enjoyment and reassuring experiences to challenge fears of sacrifice</p>	<p>“Another thing we learned is that there is a real customer journey to go on. (...) People need to be informed first, what is happening, before you can start to nudge them, or sort of point them in the right direction. And only then can you talk about full automation (i.e. smart homes).” [Company representative, British Energy Provider, August 2014]</p> <p>“The aim of these pilot projects was to basically understand - at a very early point in the development, far before we started with the development of it [the electric vehicle] - how e-mobility works and what interpretation of e-mobility make sense.” [Company representative, German Automotive Manufacturer, May 2014]</p> <p>“The online platform allows users to accompany test-drivers on their maiden drive in an electric car. Unstaged situations and unscripted dialogue convey the authentic reactions and enthusiasm of drivers and their passengers. “We realized right away, after the first test-drives, that we should utilize the excitement of test-drivers for a really authentic and unique form of communication,” explains [a company representative].” [Press release, German Automotive Manufacturer, April 28, 2014]</p>
<p><b>Bilateral:</b> Changing and diffusing new understanding of the technology</p>	<p>Identifying informal institutions to effectively influence them</p> <p>User participation and interaction to shape new understanding of the technology</p> <p>User ambassadors to spread new understanding, habits and routines</p>	<p>“The focus groups and interviews really help us to understand how people actually use the appliances, and also we got information back on what they actually value, so we can sort of explain better to the wider customer base the benefits of smart home technology.” [Company representative, British Energy Provider, November 2014]</p> <p>“The focus group was good for deep diving at a group and getting collective discovery, creation and discussion, that’s what was going on. (...) And I think, it also contributed to transparency. How can I put this? There is a very good opportunity in the energy space to undo some myths and some misinformation. So we kind of know all these myths that even [our company] it has promoted for many years. Actually a lot of them aren’t as true as they might have been years ago. It’s the same with turning off lights. If you have a modern LED, to turn it off saves some energy, it does not really save you any money. Of course, we would never say: ‘Leave it on’, because the world’s resources are scarce and important, but when you give that information to people, they can suddenly make informed decisions about what is important to them. Is it the environment, is it cost saving, is it comfort improvement?” [Company representative, British Energy Provider, August 2014]</p> <p>“We (members of the user committee) then explain to other users ‘OK you dislike this but you have to understand that behind this decision on the bike or on how the system works, there has been really a lot of work and a lot of pain behind and that’s maybe not the ideal solution but at least it’s a good compromise, and we can be ambassadors of the decision.” [User, French Shared Bicycle System Provider, December 2014]</p>
<p><b>Multilateral:</b> Embedding the new technology in existing world</p>	<p>Legitimizing new technology by collaborating with third parties</p> <p>Outreach to third parties to gain visibility and promote adoption of the new technology</p>	<p>“We asked the ministry of transportation to draft a letter jointly with us to all potential participants, in order to stress the importance of participating in this study, that they make a substantial contribution for the development of electric mobility. Thereby, we wanted to show appreciation, and stress the importance of the topic.” [Company representative, Austrian Energy Provider, July 2014]</p> <p>“The program [of the NGO], which aims to change citizen behavior through playful interactions, seemed extremely promising and very complementary to our approach.” [Company representative, French Street Furniture Manufacturer, December 2014]</p>

Our interviewee highlighted that users needed to be educated, especially regarding the functioning of electric vehicles:

“There are quite new services where customers eventually have to change their behavior or where you have to explain a lot to the end user, what he needs to do, so he is safe.”

[Company representative, Austrian Energy Provider, July 2014]

The German automotive manufacturer aiming to bring the electric vehicle to the market faced the same challenge. From the very beginning of the innovation process, educational activities therefore included information on the functioning of the new technology, and, in particular, on the range as well as the charging times and charging network. The innovating actors thus aimed to provide (future) user with the necessary skills and knowledge to use and support the new technology.

In the three cases that showed a high degree of difference to existing products and services, these informational activities went hand in hand with the generation of empirical evidence on the functionality of the technology as well as the dissemination of research findings. The German automotive manufacturer and the Austrian energy provider implemented several field trials to prove that electric mobility is suitable for everyday use, as the following citations shows:

“The aim of the study was to fundamentally prove the suitability of the overall electric mobility system for daily use. (...) After completion of the project, the results and findings generate a strong feeling of optimism. Before the project, the users specified in a survey that they expected constraints relating to the range and charging times. In fact, these were perceived as such just in very few applications. Thus, the study in Berlin showed that over 90% of participants are not affected in their usual mobility behavior by an available range of 150 kilometers. Also the charging time does not represent a constraining factor.”

[Company representative, German Automotive Manufacturer, April 2013]

“To summarize the findings of the study very briefly: electric mobility was perceived very positively and it works.”

[Company representative, Austrian Energy Provider, July 2014]

The field trial of the automotive manufacturer on the practicability of electric mobility also triggered another field trial, which was implemented in rural areas, in order to challenge the view that electric vehicles are only appropriate for urban areas, as the following citation shows:

“... to challenge in a way this view that electric mobility is [only] optimal for the city, that there are attempts to take it even further. That is why we looked at rural mobility with another research project.”

[Company representative, German Automotive Manufacturer, May 2014]

By providing scientific evidence that users in the countryside can, in most of the cases, manage an electric vehicle and its limited range, the company showed new domains of application to the public.

Similarly, the British Energy Provider initiated pilot studies in order to raise public awareness and display the benefits of smart home technology. The company faced general skepticism among users towards smart energy technologies, originating from data protection concerns:

“A lot of literature in the industry is very, very enthusiastic, you know, that fully automated smart houses are the future. That might come one day, but many customers are not in a position to accept that. They, I mean, even for a utility, they don’t really trust us to do the right thing with their bill. Not alone the right thing with their house.”

[Company representative, British Energy Provider, August 2014]

The implementation of pilot studies and demonstration sites aimed to lower these fears, raise public awareness, and convince (future) users of the benefits of the new technology, as the following citation shows:

“At the same time, many customers don’t understand what is really possible, and when you talk to them about smart home or even something as simple as smart meter, they don’t really get what it is, and how it can help them. So we also learned that people need to use these systems before they believe in them. (...) So, you know, we have to get people using them, whether in demonstration sites or trial periods.”

[Company representative, British Energy Provider, August 2014]

Our interviews with users indicated that the generation of functionality experiences with the new technology did indeed have an impact on their expectations and behaviors, as the following citation from one of the users participating in the pilot studies on smart housing shows:

“I have gained a deeper understanding of where electricity is used in the house (...) and I think I have gained an understanding of the pattern of my household, my family’s energy behavior, which then lets me do things like shift things, shift



consumption when I can, and limit consumption to things I know can be limited switching things off early, when I no longer need it.”

[User, British Energy Provider, October 2014]

In the cases showing a high degree of difference to existing products, the companies did not only generate functionality experiences and research, but also aimed to offer enjoyment and reassuring experiences to users. This became particularly visible in the cases on e-mobility, where companies did not only face functionality-based fears such as range anxiety among future users, but also fears of sacrifice. Users assumed, for instance, that electric mobility was incompatible with pleasurable driving and represented a form of deprivation of user convenience and enjoyment in favor of environmental benefit, which is a common skepticism that green products or services face. One of the company representatives of the automotive manufacturer explains:

“We had to persuade people that the future is not a negative thing and that it can be enjoyable - the future of driving works with alternative engines and sustainable products, too. It's not mutually exclusive.”

[Public Interview with company representative, German Automotive Manufacturer, December 2013]

The implementation of the field trials and pilot studies described above represented one form of making potential future customers experience the technology in the development phase. These first attempts to generate enjoyment and reassuring experiences among users were complemented by further activities in the development and commercialization phase that aimed to bring potential customers into contact with the new technology. The Austrian energy provider and the German automotive manufacturer, for instance, started to implement test-drives with electric cars for their customers so they would overcome their threshold fears and negative expectations.

“We had the offer for our electricity customers to borrow a car, to just try an electric car. We understood quite quickly from other test regions that we first have to overcome peoples’ inhibitions, something like ‘wah’, this does not work or it is too complicated, it stops and then everything is terrible. And it helps a lot to overcome these inhibitions, if you just sit in an [electric] car, and let them drive.”

[Company representative, Austrian Energy Provider, July 2014]

“Now we have built electric vehicles that are not boring at all - and one has to experience this! (...) Most people expect that it is going to be very environmentally friendly, but also very boring. Then they drive it for the first time and are totally

surprised: the vehicle is not only dynamic, but also quiet and comfortable. (...) And then comes the enthusiasm.”

[Company representative, German Automotive Manufacturer, April 2013]

Our interviews with users who participated in the test drives showed that the experience with the technology did indeed have an effect on the perception of electric driving and user behavior:

“The electric vehicles educates you as a driver. (...) It prods you to get as far as possible with what is there (in terms of charging level).”

[User, Austrian Energy Provider, October 2014]

“It (electric driving) is less aggressive than normal driving, one has to think ahead, and one quickly gets used to it, and then it is kind of fun.”

[User, Austrian Energy Provider, August 2014]

As the citations show, users quickly started to adopt new behaviors such as forward-looking and energy-saving driving. In addition, words such as “fun” indicate that the physical experience with the new product triggered positive emotions among users, such as joy, interest and excitement, or, at least, reassurance and comfort. The role of positive emotions becomes even more visible in several short films that the automotive manufacturer displays on a webpage. In the commercialization phase, the automotive manufacturer started to invite bloggers, social media critics and other interested people in different European capitals to drive an electric car for free under the condition that they allowed the company to film their first experiences with e-mobility. The films are available online and show that many of the people experienced joy and happiness, excitement, inspiration, and surprise about the quietness, comfort and acceleration, as indicated by the following quotes:

“Oh wow, I like that, I really like that! (...) Wow, brilliant electric car. So good, so fast! It feels smooth and powerful, really cool.”

[Test driver, German Automotive Manufacturer, 2014]

“Oh, it is so easy to drive, it is fantastic. I am so relieved. I can’t believe how quickly I have gotten used to it.”

[User, Austrian Energy Provider, August 2014, 2014]

“Oh my god, this is amazing... Wow! It is super smooth and quiet, I love it. I did not even realize that I put it on. It is like we are gliding. This is the future. Imagine how quiet London would be with electric cars only. Usually, I am always stressed by the noise when driving my (combustion engine) car.”

[User, Austrian Energy Provider, August 2014, 2014]

These exemplary citations indicate that the generation of enjoyment experiences and positive emotions has been successful in changing the initial negative perception of the new technology. This finding fits with the observation of one user interviewed for this study, who finds that physical experience has a different effect on the user than the pure offering of information:

“I think by experiencing the technology, one gets a different feeling for this technology, which would not be the case if one only reads an article about it.”

[User, German Automotive Manufacturer, July 2014]

In sum, it becomes evident that throughout the innovation process, especially in the development and commercialization phase, all companies aimed to generate functionality experiences with the new technology among (potential) users in order to dismantle preconceived beliefs, challenge initial fears regarding the functioning of the new technology and to provide users with the skills and experience necessary for generating market acceptance. Whereas the French bicycle provider only provided information to potential users on the new technology and its use towards the end of the innovation process, the three other companies, which developed products / services with a high degree of difference to existing alternatives on the market, engaged also and much earlier in the innovation process in the generation of functionality research to counter functionality-based fears as well as enjoyment and reassurance experiences among users, in order to counter fears of sacrifice.

#### **2.4.2 Bilateral Processes: Changing and Diffusing User Understanding and Behaviors**

The case companies did not only engage in unilateral change processes, but also interacted directly with users in different phases of the innovation process, allowing them to take on a more active role, which went beyond the consumption of the newly created product or service. User participation took place in different forms: the shared bicycle provider set up a user committee in the commercialization phase, the other companies included focus group discussions and interviews in the field trials, and the automotive manufacturer and the Austrian energy provider also organized an online idea contest and a lead-user workshops in the idea generation phase. As in most innovation projects, the central aim behind the

extensive participatory development approach was to understand how users see and perceive the new technology and to uncover users' ideas regarding its design and use, as illustrated by the following citations:

"[We wanted] to see what ideas exist out there, in which directions do the people think outside of our company's network? Of course, there are many [internal employees] that have thought about the topic before – for sure. But there are also other ideas, how do they overlap, are there possibilities to include external suggestions, and combine them with existing ideas."

[Company representative, German Automotive Manufacturer, June 2014]

User feedback allowed the companies aiming to bring a new product or service with a high degree of difference to existing products or services to the market to not only uncover needs and wants and new ideas, but also to identify underlying informal institutions such as taken-for-granted beliefs, assumptions and expectations. A company representative of the e-mobility charging network provider, for instance, highlights how the results from the lead user study influenced the company's institutional change processes in the latter stages of the innovation process:

"From the results of the lead user study, we basically learned the main needs and fears of users. (...) Against the needs that we identified in the lead-user study, which represented very fundamental things like the need for security, range-security, service, simplicity, and also an ecological mobility consciousness, we implemented concrete offers that were tested in the field trials."

[Company representative, Austrian Energy Provider, July 2014]

In this example, the results from user participation, which revealed, among other things, the value of security and related fears of a limited range, triggered the company to generate functionality research showing that the limited range is not an issue for most parts of the Austrian population. This shows that customer feedback gained in bilateral processes served as a major input to counter technology-related fears in unilateral change processes, and possibly also multilateral change processes.

However, our data indicates that the innovating actors did not only engage in dialogue with (potential) customers to identify prevailing norms, values, behaviors and fears, and, ultimately, to be able to effectively influence informal institutions. There is evidence that the companies under review also tried to take advantage of user participation to change users'

understanding of the new technology and diffuse the newly emerging understanding with the help of user ambassadors.

The intention to change users' understanding became most obvious in the case of the user committee of the shared bicycle provider. In this committee, a representative selection of users meets on a regular basis in order to discuss recent developments affecting the shared bicycle system with company representatives. The two company representatives interviewed describe the purpose of the committee as twofold. On the one hand, the discussions enabled the company to gain in-depth user feedback on the technology as described above, and also already gave rise to numerous ideas on how to improve and further develop the cycling service. On the other hand, they allowed company representatives to explain their point of view to the users. The company representative interviewed stresses these two directions of communication in the user committee as follows:

“The feedback of the users' committee is very important to us, very important because it allows for a dialogue. But also the other way around, because they better understand what we can do and what we cannot do. If you don't explain it, it is very difficult.”

[Company representative, French Street Furniture Manufacturer, December 2014]

The citation indicates that regular interaction with users can provide them with background information and thereby alter their understanding of the new technology. The interviews with the users illustrate that the changing understanding was well noted on the part of the users too:

“Something I really get from this committee is that we get fed with a lot of background information on how the project came to life, what happens behind the curtains and also what's behind each and every decision. This really gives us all the details and we can now better understand why things are like they are.”

[User, French Shared Bicycle System Provider, December 2014]

According to the company representatives, the new technology has not only changed the mobility behavior of users, but their overall lifestyle:

“All these sharing applications, from car sharing to the sharing of all kinds of objects, very valuable things and small things, all these applications that exist today and that function quite well – in my opinion they would not have been possible without the bike sharing system, which was such an important and groundbreaking project

creating a new sort of living, a new sort of thinking. Without it, I doubt that these sharing applications would be such a success, not in France at least. It has helped to dissolve inhibitions about a number of topics, like 'sharing' and 'community'."

[Company representative, French Street Furniture Manufacturer, December 2014]

This experience of a changing understanding was also evident in the other cases under review, as shown by the citation of one of the users, who had participated in the focus group discussions organized by the German Automotive Manufacturer:

„I would like to stress that you get really in touch with new ideas and the new technology. And this makes you think about yourself, questioning one's own, long-held assumptions. It (participation in the focus group) is not only about developing a new product, but also about developing as a person, about questioning yourself."

[User, German Automotive Manufacturer, July 2014]

The citation indicates that forms of interaction, in this case the experience of participating in a focus group, did not only challenge the user's traditional understanding of the technology, but also assumptions about his broader self and attitude.

In addition, our data shows that many of the users who became involved in the development process did not only change their understanding of the new technology, but also saw themselves as ambassadors for it, particularly in the cases with products / services that imply a high degree of change in consumption pattern. One of the employees of the automotive manufacturer interviewed described that many users who had participated in the field trials wanted to share their experiences in the project with the wider public, and posted about them on social media websites. A group of users even developed a new sticker that identified their pilot electric vehicle as such to outside actors. One of the users interviewed stressed that the company purposefully assigned him this role as a disseminator:

"In the selection process, they told me that they expected me to be an ambassador for it (e-mobility). This was clear for me from the very beginning. Very often I was asked: What kind of vehicle is that, how does it work, where can I buy it? (...) I have always tried to take the time to speak with these people. (...) Students and colleagues also asked me [a university professor] about what I am doing there and how it works. There were many conversations. Student representatives of the university and from a related institute, where they teach a course on e-mobility, also conducted interviews with me. It was clear to me that one takes on the role of a multiplier."

[User, German Automotive Manufacturer, July 2014]

Similarly, another user participating in the user committee of the shared bicycle provider highlights his promoting activities in social media and the number of conversations that he had in real life with friends, family, colleagues and even strangers on the bicycle system, when the latter learned about the individual's role in the user committee:

“We have this knowledge now and we tend to spread it as much as we can, either based on our personal circles, family, or through social media (...) we are encouraged to spread the good word I would say to everyone we know and there is also a blog and we are encouraged to post on this blog.”

[User, French Shared Bicycle System Provider, December 2014]

In summary, it becomes clear that direct interaction with users served the company by not only to uncovering its users' values, beliefs, assumptions and behaviors, in order to target informal institutions effectively, but also by directly influencing, shaping and spreading the users' understanding of the new technology, by engaging with them in dialogue, and attributing them the role as multipliers. Comparing the cases along the two dimensions of innovativeness, it becomes evident that cases with products and services showing a high degree of difference to existing alternatives rather relied on user interaction to identify informal institutions, in order to address them effectively. Cases with a high degree of change in consumption pattern, in contrast, rather took advantage of user participation and interaction to alter users' understanding of the technology and make participating users ambassadors for the new technology, in order to spread the new understanding to the wider public.

### **2.4.3 Multilateral Processes: Embedding the New Technology**

The firms under study also increased the legitimacy of their innovation efforts and enhanced trust among future users by collaborating with well-respected external parties throughout the innovation process and engaging in processes that involved users and third parties at the same time. For instance, when developing smart home technologies, the British Energy Provider partnered with the municipality in order to address data protection concerns among the population when searching for participants for field trials:

“We were very concerned, because people don't trust the company, that they would think it was some kind of scam or an attempt to trick customers. So we partnered with the local council, the municipality and also with a local charity that was energy efficiency-focused. (...) A lot of people later told us that it was because we used the

municipality logo, because of the phone number of the council, that they trusted the letter to be valid. And they have said if it had not been there, they would have ignored it.”

[Company representative, British Energy Provider, August 2014]

The other companies also stressed the necessity of trust-building measures. The electricity company in Austria, for instance, searched governmental support for their innovation initiative in order to increase the number of participants for a survey that was conducted for the development of the nationwide e-mobility charging network.

However, the companies under review did not only reach out to third parties to generate trust in their innovation efforts and the novel technology under development, but also to gain visibility and accelerate market adoption. The automotive manufacturer included, for instance, electric vehicles in car-sharing systems to enable potential future users to easily make first contact with the new technology. Whereas this initiative already started in the development phase with prototypes of electric vehicles, the cooperation with car sharing companies continued in the commercialization phase. In a press release one and a half years after the market introduction of the electric vehicle, the company stated that car sharing is developing into a precursor for electric mobility:

“Electric car sharing acts as a catalyst for electric mobility. Another key element for the Group is the important role electric car sharing has to play in driving forward electric mobility as a whole in Germany. (...) This rapidly makes electric mobility visible and more easily accessible to local people, turning it from a niche activity into an everyday reality. It breaks down barriers and eases the pathway into electric mobility.”

[Press release, German Automotive Manufacturer, July 2015]

According to the press release, the inclusion of electric vehicles in car-sharing schemes has enabled the company to put around 3,000 people per month behind the wheel of an all-electric vehicle for the first time in Germany, *“and, in doing, spark their enthusiasm for electric mobility”*. Our interviews with users showed that the inclusion of electric vehicles in car-sharing schemes indeed triggered them to question their mobility needs and even their lifestyle, as the citations show:

“I am always of the opinion that I already live in quite an environmentally conscious way, but mobility was suddenly an issue for me. I always assumed that I need a (combustion engine) vehicle in front of the door. And now I question this assumption. (...) I simply reconsidered my mobility chain.”



[User, German Automotive Manufacturer, June 2014]

“You learn that there are alternatives. In my case, it is a long-term development. In this respect, the single event was not so crucial now, but over the years, it represents one building block, that you see it can work, that there are alternatives, that you can have an impact on climate change with alternative forms of living.”

[User, German Automotive Manufacturer, June 2014]

The second citation, however, illustrates that a one-term experience might not be enough. The company seemed to have anticipated this and also included other multilateral forms of collaborations in the commercialization phase such as, for instance, supermarket chains and holiday destinations, which were meant to demonstrate new fields of application for electric mobility to users.

The two companies in the electric mobility sector also set up formal networks and alliances with other established business companies in order to increase visibility of the new innovation, as the following citation from the Austrian energy provider shows:

“And then a core group [of companies] was formed, who said, firstly, we establish an association, which does something like industry representation and lobbying, which is called 'Austrian Mobile Power'. (...) We also tried to situate the topic in 'Österreich Energie', which is the association of Austria's electricity companies.”

[Company representative, Austrian Energy Provider, July 2014]

Whereas these forms of cooperation primarily served to lobby in the public sector, they also contributed to raising awareness for the new technology in the wider public, thereby indirectly influencing the perception among (future) users. The shared bicycling provider, in contrast, did not enter into collaborations with business partners, but with non-profit associations such as a cycling association, artists and a green start-up aiming to promote environmentally-friendly behavior, in order to encourage the adoption of the new bicycle service, as the following citation from one interviewee shows:

“The cooperation with us [a cycling association] was not to improve the service, because it was already very good, we just wanted to, let's say, catalyze or accelerate its adoption. It's not thanks to us that the service is working, it's thanks to us that the community has accelerated its use.”

[Representative of cycling association cooperating with the French Street Furniture Manufacturer,

December 2014]

The start-up developed a program that enabled subscribers of the shared cycling system to track their mobility behavior and link it to an incentive system.

In sum, it becomes clear that third party actors took on a key role in shaping societal norms and expectations as well as user habits and routines throughout the green innovation process in two major ways. When the newly developed product / service showed a high degree of difference to existing market solutions, multilateral activities to embed the new technology can be found primarily at the beginning of the innovation process in order to increase trust among (future) users and legitimize the innovation efforts. When the new product / service implies a high degree of change in consumption patterns, multilateral activities take place rather towards the end of the innovation process and have the aim to increase the visibility of the innovation and promote its adoption with the help of third parties.

## 2.5 Discussion

This study set out to answer the question how companies shape societal norms and behaviors throughout the social innovation process, by putting the direct and indirect interaction with users as the main actor of the informal institutional environment at the center of analysis. In contrast to earlier studies on this topic, our analysis included cases that cover multiple technologies with different characteristics of innovativeness, i.e. (1) different degrees of change in consumption patterns necessitated by adoption and (2) different degrees of difference between the new product / service and those already on the market. These two characteristics can be combined in different ways. Our data allows for us to therefore draw conclusions on the relevance of the different sets of practices to influence informal institutions according to the different combinations of innovativeness, as shown in *Figure 9* and *Table 6*.

Figure 9: Types of change processes targeted towards informal institutions along the innovation process identified in Essay 1

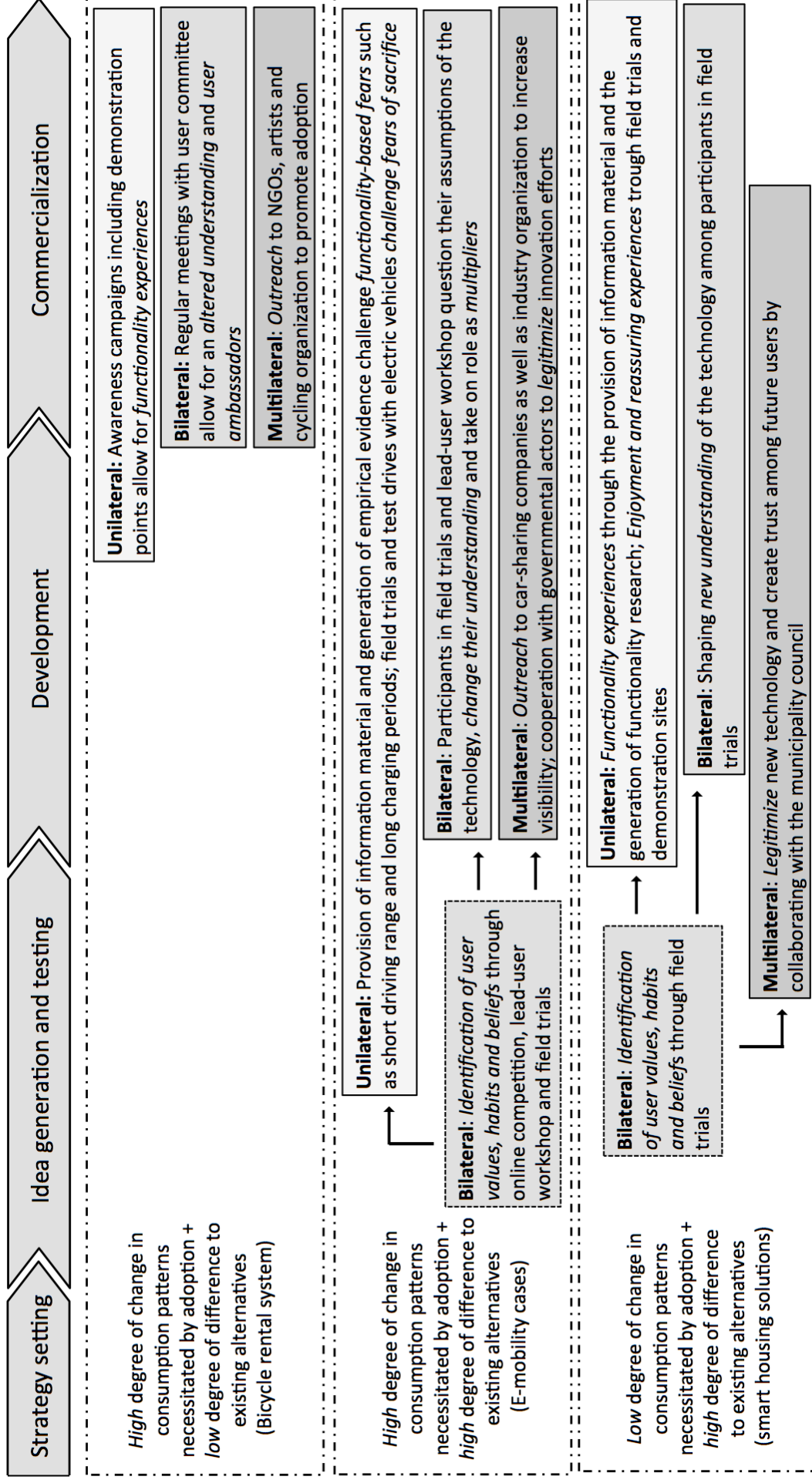


Table 6: Practices identified per case in Essay 1

Set of practices	Example	German Automotive Manufacturer	Austrian Energy Provider	British Energy Provider	French Shared Bicycle Provider
<b>Unilateral: Challenge prevailing fears regarding the technology</b>	Functionality experiences to challenge functionality-based fears	✓	✓	✓	✓
	Functionality research to generate empirical evidence	✓	✓	✓	
	Enjoyment and reassuring experiences to challenge fears of sacrifice	✓	✓	✓	
<b>Bilateral: Changing and diffusing new understanding of the technology</b>	Identifying informal institutions to effectively influence them	✓	✓	✓	
	User participation and interaction to shape new understanding of the technology	✓	✓	✓	✓
	User ambassadors to spread new understanding, habits and routines	✓	✓		✓
<b>Multilateral: Embedding the new technology in existing world</b>	Legitimizing new technology by collaborating with third parties	✓	✓	✓	
	Outreach to third parties to gain visibility and promote adoption of the new technology	✓	✓		✓

The findings suggest that companies with products and services that differ highly from existing alternatives on the market engage more actively and earlier in unilateral change processes in order to challenge prevailing fears about the functionality of the technology and fears of sacrifice, as well as in bilateral change processes that aim to change users' understanding of the new technology by directly interacting with them. The reason for this is probably that products and services that are not familiar to users, as it is the case with many green technologies, are more likely to evoke fears, doubts and misunderstandings among users, since the meaning of the technology as well as its benefits are not clear due to a lack of similar alternatives on the market. Accordingly, there is a bigger need for information and research that outlines how the new technology works and that it functions well (Binz et al., 2016; Hargadon & Douglas, 2001). The generation of physical experiences and positive

emotions seems to play a particular role in dismantling fears of functionality and sacrifice among (future) users in this regard. These findings suggest that earlier work to influence informal institutions in multiple ways can compensate for a greater degree of difference of the product / service compared to existing alternatives on the market.

It is interesting to look at the differences in bilateral change processes among the four companies in more detail. Innovating actors with products / services with a high degree of difference to current market solutions already approach (future) users in the idea generation and testing phase of the innovation process in order to better understand what informal institutions they can tap and modify to legitimate their technology, as was also highlighted in prior research (Mair, Marti, & Ventresca, 2012), but also in order to directly shape and alter users' understanding of the technology. Actors with products / services that imply changes in consumption patterns use bilateral processes primarily to turn users into ambassadors or multipliers for the innovation. This finding is in line with earlier research on the role of non-commercial agents for the acceptance and spreading of new technologies. Early innovation literature has outlined the equal importance of commercial and non-commercial agents for the diffusion of new technologies. Whereas salesmen are found to have a strong impact on the diffusion of knowledge about a new technology, experiences and valuation of the technology among other users has been proven to have a much bigger effect on overall market acceptance (Ryan & Gross, 1943). This leads us to suggest that users are particularly suited to work towards the spreading of social innovation, since it often requires changes in consumption behavior.

In terms of multilateral change processes, it becomes evident that all innovating actors cooperated with third parties in order to embed the new technology or the respective product or service. However, the companies pursued different strategies to do so. Companies with innovations that differ greatly from existing market solutions searched for trust-building measures early in the innovation process. Since users were not familiar with the new product / service due to a lack of similar alternatives on the market, the cooperation with third party actors served to convince (potential) users of the legitimacy of the innovation efforts. Companies with products and services that trigger changes in consumption patterns, in contrast, rather required the support of third-party actors towards the end of the innovation

process. In these cases, the cooperation with third parties pursued the aim to promote visibility and market adoption. This differentiation between legitimization and outreach further defines the role of intermediary actors outlined in prior research (e.g. Khaire, 2014; Khaire & Wadhvani, 2010; Walker et al., 2014), suggesting that the purpose of partnerships with other actors in influencing informal institutions is motivated by the different characteristics of innovativeness of the new product or service.

Taken together, the findings in this paper thus illustrate that the practices that companies take to influence informal institutional, i.e. normative and cultural-cognitive systems of values, norms shared conceptions of reality and meaning as well as related habits and routines, highly depends on the different characteristics and combinations of innovativeness of the new product / service as outlined above. Thereby, the findings complement and refine prior research on social innovation and institutional work in innovation literature in three additional ways. First of all, by portraying the different practices to induce institutional change over time for multiple technologies, we provide for a process view of institutional work targeting informal institutions according to the different characteristics of innovativeness, as shown in *Figure 9*. We show that companies start to challenge and dismantle fears about the functioning of the new technology and fears of sacrifice among users from the very beginning of the innovation process. In the development and commercialization phase they aim to change users' understanding of the new technology and reach out to third parties in order to legitimize and diffuse new products or services in the existing world. This process view shows that actors start to shape informal institutions much earlier than in the commercialization phase, as it is often documented in exiting literature (e.g. Kukk et al., 2016; Munir & Phillips, 2005). In addition, our process view extends the findings of Walker et al. (2014) on the emergence of green industries. These authors investigate how market players in the solar industry worked to overcome constraints in the formal institutional environment by engaging in multi-stakeholder collaborations and new product partnerships. By including multiple technologies with different characteristics in our analysis and by focusing exclusively on informal institutions, our work complements this perspective showing that institutional constraints also exist on the user side and shows how companies attempt to overcome these. This is not meant to deny the importance of formal

institutions. In fact, our data and the analysis of our cases also revealed some strategies used by companies to tackle them and it even becomes apparent that some change processes targeted towards informal institutions are even highly intertwined with the change processes targeting the formal institutional environment. Among the most obvious ones are, for instance, the generation of empirical evidence and the cooperation with public actors to generate trust among users. In the end, however, the social innovation can only reach its full potential when societal norms and values espouse it, and habits, routines and behaviors reinforce the legitimacy of its existence.

Second, the fact that there are also bilateral and multilateral change process stress the social dynamics of institutional work. Existing literature on the societal embedding of new products and services mainly highlights unilateral change processes, in which users are portrayed as adopters of the newly created product or service. Prominent examples of unilateral processes include innovating actors' engagement in educational activities (e.g. Binz et al., 2016; Fuenfschilling & Truffer, 2016) as well as rhetoric strategies and discursive means used by innovating actors to influence the informal institutional environment (e.g. Munir & Phillips, 2005; Seidel & O'Mahony, 2014; Werner & Cornelissen, 2014; Zilber, 2007). Our data shows that these unilateral change processes also play a central role in the case of social innovation. However, our analysis finds that bilateral change processes, in which producers interact directly with users and attribute them a role that goes beyond the consumption of the new product or service, in order to change their understanding of the new technology, and multilateral change processes, which also involve third party actors and have an indirect influence on users, are equally important for shaping societal norms and behaviors. Although we put producers and users at the center of our analysis, it becomes evident that other actors, such as public authorities, civil society organizations and market partners, were heavily involved in the change processes, indicating that institutions are co-created and emerge through the interplay of different actors (Zietsma & McKnight, 2009). This fact has also been stressed by the concept of "distributed agency", introduced by Garud and Karnoe (2003), which acknowledges the fact that technology emergence often involves the efforts of a diverse set of actors. Since social innovation requires the abandonment of deeply entrenched norms and practices and the replacement with more socially beneficial

arrangements, it might require even more than conventional innovation the cooperation and interaction of different parties.

Third, we further refine the concept of educational activities in institutional work by pointing out the role of physical experiences and positive emotions for the behavioral embedding of the new products and services. Three of the four innovating actors under review, the ones that offer a product / service with a high degree of difference to existing alternatives on the market, aimed to make users experience the new technology in order to challenge existing assumptions, remedy reservations and induce behavioral changes. The innovating actors stressed the fact that the generation of physical experiences and positive emotions, such as joy and excitement, were more effective in countering long-held assumptions and beliefs about the new technologies and trigger behavioral changes than the pure offering of information or the dissemination of scientific proof. This finding is in line with an emerging stream of literature on the role of emotions in institutional processes. Following a call to include the analysis of emotional processes in the study of institutional work (Voronov & Vince, 2012), several scholars have begun to investigate the ways in which emotions such as shame (Creed, Hudson, Okhuysen, & Smith-Crowe, 2014) or betrayal and anger (Toubiana & Zietsma, 2016) contribute to create, maintain or destroy institutions. In a recent article, Moisander, Hirsto, and Fahy (2016) identify different rhetorical strategies and discursive practices through which actors mobilize and regulate emotions for institution work. They call these practices “emotional work” and show that they include both eliminating and invalidating emotions that drive resistance as well as evoking and promoting emotions that enable actors to gain support for their institutional objectives. The generation of physical experiences constitutes, beyond discursive practices and explicit appeals to positive or negative emotions, another mean to evoke and mobilize emotions for a certain objective, in our case the embedding of the newly created product / service. Our data suggests that the generation of physical experiences might even be more effective in generating positive emotions than other forms. Thereby, our findings contribute to a more detailed understanding of the range of means to evoke and mobilize emotions in institutional work.



## 2.6 Conclusion

This research aimed to investigate how innovating actors shape their informal institutional environment when trying to introduce a new product or service that tackles grand societal challenges to the market. The context of green innovation is particularly suitable to study this research question, since novel environmentally friendly products and services often imply changes in societal norms, user expectations, routines and behaviors, and face major skepticism among the public. By studying four cases in the energy and transportation sector with different degrees and combinations of innovativeness, we show that the innovation process of novel green products and services included, in all cases, different practices to influence user norms and expectations as well as user habits and routines. The identified practices can be subsumed in three different sets: unilateral, bilateral and multilateral processes, depending on the number of actor groups involved.

Our analysis stresses how practices to shape informal institutions targeting (future) users take place in all phases of the innovation process, and further refines the model of institutional change proposed by Walker et al. (2014), stressing institutional constraints relating to user habits and expectations as well as the company's attempts to overcome these. We show that the generation of physical experiences and positive emotions plays a particularly important role in this process. Since we focus on green innovation only, future research might want to investigate whether the identified practices also hold true for other categories of social innovation. One important differentiating factor might be that green innovation often finds a high degree of political support in Western countries, facilitating multilateral change processes, whereas this might not hold true to the same extent in the case of other types of social innovation or innovation in general.

It has to be acknowledged that in all four cases, the newly developed product or service was only recently introduced to the market. By applying this criterion for case selection, we assured that all relevant employees involved in the innovation process were still available for interviews, and could remember the overall innovation process from the very beginning. The downside of this approach is that we cannot neither draw any final conclusion yet about the degree of change in norms and behaviors as well as the market

success and profitability of the innovations, nor relate it to the change processes identified. As said before, the focus of our work lies on the companies' activities to shape norms and behaviors and not on the changes induced in societal norms and behaviors. Thus, it remains to be seen to what extent these practices result in lasting changes in taken for granted assumptions, norms, values and behaviors, and spread throughout society. Future research might therefore want to revisit the cases in a couple of years' time and investigate which types of institutional change processes were most successful in paving the way for green innovation and under what conditions. It might also be interesting to compare successful green product introduction with cases where a product has failed on the market.

Furthermore, our cases also include two ambidextrous organizations that engage in activities to protect the traditional business model and, at the same time, act as agents of change by promoting and developing novel green technologies. The German automotive manufacturer develops the electric vehicle in parallel to a business model that is based on combustion engine cars. And the British energy supplier is one of the largest energy suppliers in Europe that also extracts energy from non-renewable sources. Without doubt, the two companies also engage in institutional work that seeks to protect the conventional business model. Nevertheless, our empirical data shows that conservative practices aiming to maintain current institutions and defend entrenched interests are not the only ones that can be found among the case companies. The firms under review also influence, probably for different reasons, their social environment to put forward green innovation, thereby trying to disrupt current institutions and create new ones. In this regard, future research might want to investigate how ambidextrous organizations combine or align institutional work that aims to protect the traditional business model with institutional work promoting new green business models. It might also be interesting to look in more detail at the role of ambidextrous organizations and incumbents in general in promoting social innovation.

From a managerial point of view, this study also provides some important insights. First and foremost, it illustrates how social innovation must be embedded in the everyday lives of potential users that will determine the final success of the new product or service on the market. By outlining three sets of practices to induce change in informal institutions throughout the different phases of the green innovation process and according to the

different characteristics of innovativeness, it can help managers to visualize that informal institutions need to be taken into account from the very beginning. An organization design that allows for and promotes the interaction with users and other stakeholders in the innovation process facilitating the generation of physical experiences with the new product or service might be helpful in this regard.

## 2.7 References

- Abdelkafi, N., Makhotin, S., & Posselt, T. (2013). Business model innovations for electric mobility: What can be learned from existing business model patterns? *International Journal of Innovation Management*, 17(1), 1-41.
- Ansari, S., Garud, R., & Kumaraswamy, A. (2015). The disruptor's dilemma: Tivo and the US television ecosystem. *Strategic Management Journal*, 37(9), 1829-1853.
- Ansari, S., & Phillips, N. (2011). Text Me! New Consumer Practices and Change in Organizational Fields. *Organization Science*, 22(6), 1579-1599.
- Binz, C., Harris-Lovett, S., Kiparsky, M., Sedlak, D. L., & Truffer, B. (2016). The thorny road to technology legitimation — Institutional work for potable water reuse in California. *Technological Forecasting and Social Change*, 103, 249-263.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40.
- Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1), 1-34.
- Creed, W. E. D., Hudson, B. A., Okhuysen, G. A., & Smith-Crowe, K. (2014). Swimming in a Sea of Shame: Incorporating Emotion into Explanations of Institutional Reproduction and Change. *Academy of Management Review*, 39(3), 275-301.
- Dangelico, R. M., Pontrandolfo, P., & Pujari, D. (2013). Developing sustainable new products in the textile and upholstered furniture industries: Role of external integrative capabilities. *Journal of Product Innovation Management*, 30(4), 642-658.
- De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy*, 41(3), 614-623.
- den Hond, F., de Bakker, F. G. A., & Doh, J. (2012). What Prompts Companies to Collaboration With NGOs? Recent Evidence From the Netherlands. *Business & Society*, 54(2), 187-228.
- Eisenhardt, K. M. (1989). Building theory from case study research. *The Academy of Management Review*, 14(4), 532-550.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25-32.

- Fligstein, N., & Dauter, L. (2007). The sociology of markets. *Annual Review of Sociology*, 33, 105-128.
- Fuenfschilling, L., & Truffer, B. (2016). The interplay of institutions, actors and technologies in socio-technical systems — An analysis of transformations in the Australian urban water sector. *Technological Forecasting and Social Change*, 103, 298-312.
- Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology. *Journal of Product Innovation Management*, 19(2), 110-132.
- Garud, R., Gehman, J., & Giuliani, A. P. (2014). Contextualizing entrepreneurial innovation: A narrative perspective. *Research Policy*, 43(7), 1177-1188.
- Garud, R., Hardy, C., & Maguire, S. (2007). Institutional Entrepreneurship as Embedded Agency: An Introduction to the Special Issue. *Organization Studies*, 28(7), 957-969.
- Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal*, 45(1), 196-214.
- Garud, R., & Karnoe, P. (2003). Bricolage versus breakthrough: distributed and embedded agency in technology entrepreneurship. *Research Policy*, 32(2), 277-300.
- Garud, R., & Rappa, M. (1994). A socio-cognitive model of technology evolution: The case of cochlear implants. *Organization Science*, 5, 344-362.
- Geels, F. W. (2014). Reconceptualising the co-evolution of firms-in-industries and their environments: Developing an inter-disciplinary Triple Embeddedness Framework. *Research Policy*, 43(2), 261-277.
- Granqvist, N., & Gustafsson, A. (2015). Temporal institutional work. *Academy of Management Journal*, 59(3), 1009-1035.
- Green Jr, S. E., & Li, Y. (2011). Rhetorical Institutionalism: Language, Agency, and Structure in Institutional Theory since Alvesson 1993. *Journal of Management Studies*, 48(7), 1662-1697.
- Greenwood, R., & Suddaby, R. (2002). Theorizing change: The role of professional associations in the transformation of institutionalized fields. *Academy of Management Journal*, 45(1), 58-80.
- Grodal, S., Gotsopoulos, A., & Suarez, F. (2014). The Co-evolution of Technologies and Categories during Industry Emergence. *Academy of Management Review*, 4(3), 423-445.
- Hargadon, A. B., & Douglas, Y. (2001). When innovations meet institutions: Edison and the design of the electric light. *Administrative Science Quarterly*, 46(3), 476-501.
- Hargrave, T., & Van de Ven, A. H. (2006). A collective action model of institutional innovation. *Academy of Management Review*, 31(4), 864-888.
- Heiskanen, E., Kasanen, P., & Timonen, P. (2005). Consumer participation in sustainable technology development. *International Journal of Consumer Studies*, 29(2), 98-107.
- Hoffmann, E. (2007). Consumer integration in sustainable product development. *Business Strategy and the Environment*, 16(5), 322-338.

- Holahan, P. J., Sullivan, Z. Z., & Markham, S. K. (2014). Product development as core competence: How formal product development practices differ for radical, more innovative, and incremental product innovations. *Journal of Product Innovation Management, 31*(2), 329-345.
- Howard-Grenville, J., Buckle, S. J., Hoskins, B. J., & George, G. (2014). Climate change and management. *Academy of Management Journal, 57*(3), 615-623.
- Johnson, M. W., & Suskewicz, J. (2009). How to jump-start the clean-tech economy. *Harvard Business Review, 87*(11), 52-60.
- Jolly, S., & Raven, R. P. J. M. (2015). Collective institutional entrepreneurship and contestations in wind energy in India. *Renewable and Sustainable Energy Reviews, 42*, 999-1011.
- Kaplan, S., & Tripsas, M. (2008). Thinking about technology: Applying a cognitive lens to technical change. *Research Policy, 37*(5), 790-805.
- Khaire, M., & Wadhvani, R. D. (2010). Changing Landscapes: The Construction of Meaning and Value in a New Market Category--Modern Indian Art. *Academy of Management Journal, 53*(6), 1281-1304.
- Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: A systematic review. *Journal of Cleaner Production, 65*, 57-75.
- Kukk, P., Moors, E. H. M., & Hekkert, M. P. (2016). Institutional power play in innovation systems: The case of Herceptin®. *Research Policy, 45*(8), 1558-1569.
- Lawrence, T. B., & Suddaby, R. (2006). Institutions and institutional work. In S. R. Clegg, C. Hardy, T. B. Lawrence & W. R. Nord (Eds.), *Handbook of Organization Studies* (2nd ed., pp. 215-254). London: Sage.
- Lawton, L., & Parasuraman, A. (1980). The impact of the marketing concept on new product planning. *Journal of Marketing, 44*, 19-25.
- Maguire, S., Hardy, C., & Lawrence, T. B. (2004). Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. *Academy of Management Journal, 47*(5), 657-679.
- McKague, K., Zietsma, C., & Oliver, C. (2015). Building the Social Structure of a Market. *Organization Studies, 36*(8), 1063-1093.
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. San Francisco: Jossey-Bass.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis* (2nd ed.). London: Sage Publications.
- Moisander, J. K., Hirsto, H., & Fahy, K. M. (2016). Emotions in Institutional Work: A Discursive Perspective. *Organization Studies, 37*(7), 963-990.
- Munir, K. A., & Phillips, N. (2005). The Birth of the 'Kodak Moment': Institutional Entrepreneurship and the Adoption of New Technologies. *Organization Studies, 26*(11), 1665-1687.

- Musiolik, J., & Markard, J. (2011). Creating and shaping innovation systems: Formal networks in the innovation system for stationary fuel cells in Germany. *Energy Policy*, 39(4), 1909-1922.
- Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16(1), 145-179.
- Penna, C. C. R., & Geels, F. W. (2012). Multi-dimensional struggles in the greening of industry: A dialectic issue lifecycle model and case study. *Technological Forecasting and Social Change*, 79(6), 999-1020.
- Perkmann, M., & Spicer, A. (2007). 'Healing the Scars of History': Projects, Skills and Field Strategies in Institutional Entrepreneurship. *Organization Studies*, 28(7), 1101-1122.
- Pinkse, J., & Kolk, A. (2011). Addressing the Climate Change--Sustainable Development Nexus: The Role of Multistakeholder Partnerships. *Business & Society*, 51(1), 176-210.
- Reay, T., & Hinings, C. R. (2009). Managing the Rivalry of Competing Institutional Logics. *Organization Studies*, 30(6), 629-652.
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222-237.
- Scott, W. R. (2007). *Institutions and Organizations: Ideas, Interests and Identities* (3rd ed.). Thousand Oaks: Sage.
- Seidel, V. P., & O'Mahony, S. (2014). Managing the Repertoire: Stories, Metaphors, Prototypes, and Concept Coherence in Product Innovation. *Organization Science*, 25(3), 691-712.
- Slager, R., Gond, J. P., & Moon, J. (2012). Standardization as Institutional Work: The Regulatory Power of a Responsible Investment Standard. *Organization Studies*, 33(5-6), 763-790.
- Smink, M. M., Hekkert, M. P., & Negro, S. O. (2015). Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. *Business Strategy and the Environment*, 24(2), 86-101.
- Suddaby, R. R., Elsbach, K., Greenwood, R., Meyer, J., & Zilber, T. (2010). Organizations and Their Institutional Environments - Bringing Meaning, Values, and Culture Back In. *Academy of Management Journal*, 53(6), 1234-1240.
- Toubiana, M., & Zietsma, C. (2017). The message is on the wall? Emotions, social media and the dynamics of institutional complexity. *Academy of Management Journal*, (forthcoming).
- Van de Ven, A. H. (1993). A community perspective on the emergence of innovations. *Journal of Engineering and Technology Management*, 10, 23-51.
- Van de Ven, A. H., & Garud, R. (1993). Innovation and industry emergence: The case of cochlear implants. *Research on Technological Innovation, Management, and Policy*, 5, 1-46.

- van Wijk, J., Stam, W., Elfring, T., Zietsma, C., & den Hond, F. (2012). Activists and Incumbents Structuring Change: The Interplay of Agency, Culture, and Networks in Field Evolution. *Academy of Management Journal*, 56(2), 358-386.
- Voronov, M., & Vince, R. (2012). Integrating Emotions into the Analysis of Institutional Work. *Academy of Management Review*, 37(1), 58-81.
- Walker, K., Schlosser, F., & Deephouse, D. L. (2014). Organizational ingenuity and the paradox of embedded agency: The case of the embryonic Ontario solar energy industry. *Organization Studies*, 35(4), 613-634.
- Werner, M., & Cornelissen, J. P. (2014). Framing the change: Switching and blending frames and their role in instigating institutional change. *Organization Studies*, 35(10), 1449-1472.
- Westley, F., & Antadze, N. (2010). Making a difference: Strategies for scaling social innovation for greater impact. *The Innovation Journal*, 15(2).
- Westley, F., Antadze, N., Riddell, D. J., Robinson, K., & Geobey, S. (2014). Five configurations for scaling up social innovation: Case examples of nonprofit organizations from Canada. *Journal of Applied Behavioral Science*, 50(3), 234-260.
- Yin, R. K. (2009). *Case Study Research: Design and Methods* (5 ed.). London: Sage Publications.
- Zietsma, C., & McKnight, B. (2009). Building the iron cage: Institutional creation work in the context of competing proto-institutions. In T. Lawrence, R. Suddaby & B. Leca (Eds.), *Institutional Work: Actors and Agency in Institutional Studies of Organizations* (pp. 143-177). Cambridge: Cambridge University Press.
- Zilber, T. B. (2007). Stories and the Discursive Dynamics of Institutional Entrepreneurship: The Case of Israeli High-tech after the Bubble. *Organization Studies*, 28(7), 1035-1054.

### 3 Essay 2: End-Users as Co-Developers for Novel Green Products and Services - An Exploratory Case Study Analysis of the Innovation Process in Incumbent Firms<sup>2</sup>

#### **Abstract**

Studies focusing on green innovation have shown that companies can gain a competitive advantage by collaborating with multiple stakeholders in the innovation process. Since novel green innovations are often systemic in nature and require changes in consumption behavior, end-user integration along the innovation process may be particularly relevant for their success of such products and services. The main aim of this paper is therefore to add to our understanding of the role of users in the green innovation processes of incumbent firms. The comparative case study in the context of e-mobility and smart housing outlines the methods used by three European incumbent firms to integrate users at different stages of the innovation process as well as their motivation and benefit.

The findings show that users were basically co-developing the novel green product or service from the beginning. In the cases under review, early and constant end-user integration served as a risk-management tool, since it uncovered behavioral changes induced by the innovations among potential future users. This helped companies to overcome risk aversion towards the development of genuinely new green products and services and to bring these to the market. Field trials similar to living labs proved to be of particular importance for gaining insight into the everyday lifestyle of users. Thereby, the paper stresses an approach to green innovation in incumbent firms, which has not been given much attention in literature before.

**Keywords:** Green innovation, User-centered development, Field trials, Co-developer

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<sup>2</sup> This chapter is based on the publication *End-Users as Co-Developers for Novel Green Products and Services: An Exploratory Case Study Analysis of the Innovation Process in Incumbent Firms* published in *Journal of Cleaner Production, Special Issue on Innovative Products and Services for Sustainable Societal Development* (forthcoming), co-authored with Eric Zimmerling & Isabell M. Welp. In 2015, the journal was ranked "B" (VHB) and had an impact factor of 4.9. My contribution to the article is summarized in Appendix 2. Drafts were presented at the *Annual Meeting of the Academy of Management 2015* and *R&D Conference 2015*.



### 3.1 Introduction

During the last decade, innovation has increasingly been put forward as a means to address the challenges of the 21st century and foster sustainable development (e.g. Carrillo-Hermosilla et al., 2010; De Medeiros et al., 2014). There is widespread agreement that so-called green or environmental innovation requires the integration of external and internal knowledge, due to its systemic character and related technological uncertainties (e.g. De Marchi, 2012; Driessen & Hillebrand, 2013). Most research in this area focuses on the collaboration with R&D institutes and universities (Castaldi et al., 2013; Trencher et al., 2013) or suppliers (Lee & Kim, 2011; Mlecnik, 2013). The role of end-users in green innovation processes is less understood (Carrillo-Hermosilla et al., 2010; Slotegraaf, 2012). This is surprising, considering the fact that authors focusing on the transition to sustainable consumption and production propose that the collaboration with users in the innovation process is key for the success of final products or services, since they often lack market attractiveness and require changes in consumption behavior (Heiskanen et al., 2005; Hoffmann, 2007; Ornetzeder and Rohracher, 2006).

Existing literature on the role of users in green innovation processes mainly focuses on independent user innovation (e.g. Hyysalo et al., 2013; Ornetzeder & Rohracher, 2006; Seyfang, 2007) and cases where non-governmental organizations, research institutes or government agencies implemented and tested a particular method of developing environmentally-friendly products and services (e.g. Füller et al., 2012; Jerneck & Olson, 2013). Empirical studies on the role of users in company-driven green innovation processes are rather scarce and the few existing studies show mixed results, in particular with regard to very novel and rather radical innovation. Whereas Laperche and Picard (2013) find that user integration is a precondition for the success of green product service system innovations in manufacturing firms, De Marchi (2012) discovers no increased importance of user integration to environmental innovations at all, due to a lack of sophisticated technical knowledge on the part of the users.

Against this background, the objective of this article is to empirically investigate the role of users in the development of novel green products and services in incumbent firms,

focusing on the overall innovation process and not only an individual method that is applied on a selective basis. The research question therefore is: How does company-driven user integration affect green innovation in incumbent firms?

To investigate this research question, we analyzed the innovation process of three European firms in the automotive and electricity sector, considering that the ecological impact of these industries' products and services throughout the overall lifecycle is among the highest across all industries (Tukker et al., 2006). Investigating the possible influence of user integration in this context is particularly suitable, since the innovations under investigation hold the potential to reduce the environmental footprint of the industries, mainly by inducing behavior changes in the consumption phase. We give special attention to the methods used to integrate users, the underlying company's motivations as well as the benefits associated with the approach. The results of the qualitative comparative analysis show that the companies collaborated intensively with users at different stages of the innovation process. This extensive user integration helped incumbent firms to gain distance from more incremental innovation and overcome risk aversion towards genuinely new environmentally friendly innovations. These results contribute to the understanding of users in the context of green innovation in incumbent firms and the identified practices and conditions might serve as a roadmap for companies and policy makers alike.

## 3.2 Theoretical Background

This chapter gives an overview of the theoretical background of green innovation on one hand, and user integration into the innovation process on the other. We will further elaborate previous findings of user integration into green innovation processes only. The aim of the chapter is to not only to outline the status quo of the relevant literature, but also to specify and define the relevant terms used in the subsequent chapters, in order to set the stage for the case study analysis.

### 3.2.1 Green Innovation

New environmentally friendly products and services are often put forward as a central means to achieve a sustainable economy (Del Río González, 2005; Sangle, 2011). Ever more

companies therefore focus their innovation efforts on developing or adopting new technologies and related products and services which are less harmful to the environment than relevant alternatives (e.g. Irwin & Hooper, 1992; Sangle, 2011). Authors increasingly refer to "sustainability innovation" (Schaltegger & Wagner, 2011), "green innovation" (Olson, 2013) or "eco-innovation" (Carrillo-Hermosilla et al., 2010) in order to allow for the fact that a newly developed technology adds value across the economic, ecological and / or social dimensions of products and services. This paper focuses on environmental and ecological value only and therefore mainly uses the term "green innovation".

Several scholars have noted that the transition to green technologies such as electric vehicles (EVs) and smart homes is systemic in nature, since the technology cannot be anchored onto existing systems (e.g. Abdelkafi et al., 2013; Johnson & Suskewicz, 2009). Against this background, the collaboration with external actors and the opening up of the innovation process is found to be key to the successful development of sustainable technologies (e.g. Dangelico et al., 2013; Driessen & Hillebrand, 2013; Laperche & Picard, 2013). Research has shown that green innovations require a higher degree of cooperation with external actors such as suppliers, knowledge-intensive business services and research institutes than conventional innovations (De Marchi, 2012).

Green products and services do not only break down the barriers between existing industries and require cross-industry collaboration (Dangelico et al., 2013), but in many cases also imply changes in consumer behavior (Vergragt et al., 2014). Companies face the challenge of translating environmental benefits of novel green products and services in consumer benefits, which makes customers' acceptance a particularly challenging and crucial topic to green products and services (Heiskanen et al., 2005). Several scholars have therefore called for a deeper integration of end-users into the green innovation process (Hysalo et al., 2013; Slotegraaf, 2012; Vergragt et al., 2014), since it enables companies to spot customers' needs more accurately and customers to experience new technology and raise ideas for product/service development and improvement.

### **3.2.2 The Role of Users in the Innovation Process**

Authors have shown that companies can gain from collaborating with users (e.g. Bogers et al., 2010; Bosch-Sijtsema & Bosch, 2015; Von Hippel, 1986). Users can be divided into end-users and intermediate or professional users (Von Hippel et al., 2013). The study focuses on end-users only, who use a product and/or service in their everyday life. Often, end-users are also customers (Priem et al., 2011). Traditionally, users play a rather passive role in innovation, giving feedback based on past experiences with a product or service (Bosch-Sijtsema & Bosch, 2015). Two important trends, however, have emerged recently. On the one hand, users have started to innovate by themselves, developing new products independently from corporate actors. This phenomenon is generally called user innovation (Von Hippel, 2007). On the other hand, firms have increasingly recognized the potential of integrating users in a more active way, which is often referred to as user integration (Bogers et al., 2010; Bosch-Sijtsema & Bosch, 2015). By making them co-innovators, co-creators and co-producers, firms not only value knowledge about users' needs, but also tap into users' solution knowledge (Priem et al., 2011; Von Hippel, 1986). Among the most prominent methods used in this context are lead-user workshops (Von Hippel, 1986), user toolkits (Franke & Piller, 2004), idea contests (Piller & Walcher, 2006), innovation labs and communities (Fuller et al., 2014). As one author stresses, end-users have begun to *"participate in the design phase (...) and not just during its refinement phase"* (Weber, 2003, p. 153). Thus, a rich body of literature has shown that users not only can give important feedback for improving existing products, but can also be an important source for ideas and an agent for the diffusion and commercialization of new products and services in many different sectors and industries.

### **3.2.3 The Role of Users in the Green Innovation Process**

The role of users as well as the suitability of conventionally used methods to integrate users in the context of green innovation processes is still unclear. Whereas the characteristics of green innovation call for a user-centric development practice as described above, only few scholars have put the topic at the center of their research (Carrillo-Hermosilla et al., 2010). A large part of the literature in this area focuses on green user innovations that have been developed by independent users outside a company environment (e.g. Feola & Nunes, 2014;

Hyysalo et al., 2013; Ornetzeder & Rohracher, 2013). Among the articles focusing on user integration (in contrast to user innovation), the majority focuses on rather incremental innovation processes with end-users (e.g. Heiskanen et al., 2005; Liedtke, Baedeker, Hasselkuß, Rohn, & Grinewitschus, 2015), the analysis of a particular method such as innovation workshops (Brown & Vergragt, 2008; Hoffmann, 2007) or cases where NGOs, research institutes or government organizations promote and facilitate end-user integration into green innovation processes (e.g. Fam & Mitchell, 2013; Füller et al., 2012; Jerneck & Olson, 2013). The role of users with regard to novel green innovations and user-integration along the overall innovation process has rarely been a subject of research (De Marchi, 2012; Laperche & Picard, 2013; Wagner, 2009).

The few existing studies show mixed results. On the one hand, user integration into the innovation process enables the company to develop the new products and services according to users' needs and wants (Arnold & Barth, 2012), which was found especially important, as sustainable products or services often require a change in behavior and habits (Laperche & Picard, 2013). A close cooperation with users in the innovation process was also found to promote adaptation of the product/service being developed and facilitate market success (Carrillo-Hermosilla et al., 2010; Heiskanen et al., 2005; Hoffmann, 2007). On the other hand, some authors find that the close integration of users can harm companies' innovativeness. De Marchi (2012) finds that cooperation with users in the development of environmental innovation is not particularly important, since users are often tied to existing solutions and cannot deal with the high level of complexity of novel green technologies. This corresponds to traditional innovation literature, which finds that market-led approaches often lead to incremental and less novel innovations (Hargreaves, Hielscher, Seyfang, & Smith, 2013).

Against this background, this paper seeks to clarify the role of users in novel and rather technological green innovations of incumbent firms. The following section introduces the cases of three companies, all of which heavily relied on user input during the development process of a particular green product or service in the area of e-mobility and smart housing.

### 3.3 Methods

Due to the explorative nature of the study, the research project involves a qualitative study conducting a comparative case study analysis (Eisenhardt, 1989; Yin, 2009). Selecting the cases is key – possibly even the most important step – in case-study research (Stake, 1994). Since the purpose of this research is to develop theory, not to test it, theoretical sampling is used as opposed to random or statistical sampling (Eisenhardt & Graebner, 2007). The three cases were selected because they demonstrate user integration in different phases of the innovation process and different methods in the energy and mobility sector. One company is active in the automotive sector and was facing the challenge to develop an electric vehicle for series production. The other two companies are energy providers with the aim to install a nationwide charging infrastructure for electric vehicles (EVs) and to develop new smart home technologies, respectively. The unit of analysis is the user-centered innovation process for green products and services in the three companies under investigation. For an overview of the cases selected see *Table 7*.

**Table 7:** Overview of cases under review in Essay 2.

<b>Company</b>	<b>Innovation</b>	<b>Sustainability Aspect</b>	<b>Methods of user integration</b>
<b>German automotive manufacturer</b>	Electric vehicle	<ul style="list-style-type: none"> <li>• Development of an electric vehicle with significantly less global warming potential than highly efficient combustion motorcars</li> </ul>	<ul style="list-style-type: none"> <li>• Ethnographic study including global site visits and in-depth interviews</li> <li>• Online idea contests</li> <li>• Field trials including interviews, surveys and online questionnaires</li> </ul>
<b>Austria electricity provider</b>	E-mobility charging network	<ul style="list-style-type: none"> <li>• Reduction of climate footprint of electric vehicles due to charging with hydro power</li> </ul>	<ul style="list-style-type: none"> <li>• Lead-user workshop</li> <li>• Survey</li> <li>• Field trials including interviews and GPS data collection</li> </ul>
<b>UK based electricity provider</b>	Smart home technology	<ul style="list-style-type: none"> <li>• Efficient energy use and less energy consumption by users due to visualization of energy consumption and new technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Field trials including online surveys, focus-group discussions and in-depth interviews</li> <li>• Co-creation sessions</li> </ul>

#### 3.3.1 Data Collection

The primary sources of empirical data are semi-structured interviews with company representatives from multiple departments and third parties such as research institutes and

open innovation agencies that took part in the user-integration projects. The authors also conducted interviews with two users per case who participated in the innovation process in order to mirror individual statements of company representatives. In total, 22 interviews were conducted. Interviews with three independent sources per case and the consultation of secondary sources allowed for data triangulation in order to enhance the validity and reliability of this research.

Interviewees were chosen based on position and insight into the process of user integration during the green innovation process. All interviews were digitally recorded, transcribed and documented in a standardized form, in order to enhance the reliability of the study. Interviews were triangulated with a thorough analysis of secondary data provided by the interviewees and the company website such as project reports, annual reports and press releases, as well as by third party actors involved in the innovation process and online and print media. Interviews were conducted by two researchers, if possible, face-to-face. Open ended questions allowed the interviewees to elaborate their stories on user integration into the particular development process. The authors also asked probing questions to further clarify the details regarding the process and crucial events.

### **3.3.2 Data Analysis**

In line with common practice, the data was first analyzed by building individual case studies and then systematically comparing the data across cases, in order to construct a conceptual framework (Eisenhardt, 1989). As a first step, the authors wrote down case reports for each case in isolation, noting important features and concepts. The second interviewer read through the cases to cross-check the emerging story and make modifications, if found necessary. The main contacts in all three companies were asked to review the case reports in order to eliminate some of the biases associated with retrospective interviews (Silverman, 2000). When writing the second and third case, the authors already noted similarities and differences compared to the first one. However, they completed the case reports without referring to the first one in order to maintain the independence of the replication logic (Brown & Eisenhardt, 1997). This step served to assure that the authors' understanding of the two innovation and user-integration processes aptly reflected the reality. In a second step, and in preparation for the cross-cases analysis, all interviews were documented and

coded in NVivo, a software for qualitative data analysis. Whereas the different phases of the innovation process and the methods used to integrate users were clear from the beginning and mainly helped to structure the wide amount of data, codes focusing on the motivation and benefits of user integration as well as its impact on product and service development only emerged in the course of the coding process and guided the presentation of the findings. As the sample size of three cases is too small for a full-fledged cross-case comparison, a more simple comparison analysis of similarities and differences across the cases was applied (Eisenhardt, 1989). The main outcomes of the analysis are presented in the following section.

### 3.4 Results

The manuscript proceeds by presenting the approaches that have been employed by the three companies to involve users in the different phases of the innovation process, i.e. throughout the strategy setting, idea generation and testing, development, and commercialization phase (Holahan et al., 2014). Special attention is given to the company's motivation for involving users, the instruments used and its main impact on green innovations in incumbent firms.

#### **3.4.1 Automobile Manufacturer Headquartered in Germany**

Faced with global climate change, scarce resources, changing consumer behavior and ever-stricter legislation with regard to vehicle emission standards, the German automobile manufacturer started to explore future mobility solutions in 2007. From the strategy-setting phase to the development phase, the company collaborated with end-users in the innovation process. For an overview of the innovation processes, see *Figure 10*.

At the very beginning in the strategy-setting phase, it was still unclear which electric mobility solution the automotive company would offer. The responsible project team conducted an ethnographic study in order to explore the needs and expectations towards sustainable individual mobility for an ever-growing urban population with experts and lead users across the globe. This study, which included site visits in fifteen megacities all over the world and in-depth interviews with mobility experts and lead users, revealed that private



cars would remain an important means of transportation as long as they offered a sustainable alternative to the traditional combustion engine, which set the stage for initiating the development of an electric vehicle.

In the idea-generation phase, the interdisciplinary and independent project team launched an online idea contest in order to capture ideas and topics that were considered relevant outside the company. In total, a technology-oriented user community submitted more than 300 ideas on mobility solutions of the future. For the company *“this contest has shown, once again, how important it is to interact with external sources to develop new services and innovations [...] and proved that our management is heading in the right direction”*. This indicates that, with the idea contest the company aimed to get new ideas and, even more importantly, reconfirmed that it was going in the right direction.

The idea contest was followed by large-scale field trials that started in the idea-generation and testing phase and continued in the development and even commercialization phase, in which several thousand participants in five different countries were leased an electric vehicle for a period of 6 to 12 months. The first field trial had the goal of *“determining in a very early stage, even before starting with product development, how electro-mobility actually works, which approaches for electro-mobility are meaningful and what the customer really needs”*. Interviews, global positioning system (GPS) tracking and online questionnaires enabled the project team to get detailed knowledge on user behavior, fears and expectations. The field trials also revealed ideas regarding additional services needed as the link to green energies or technological issues such as regenerative driving. As the newly developed product took shape, field trials focused particularly on technological functions such as the usability and design of technological functions of the electric vehicle.

#### **3.4.2 Energy Provider Headquartered in Austria**

As one of Austria's leading energy providers, the company established in 2014 the first nationwide network of charging stations for e-vehicles, which is run on renewable energy only. When the decision to set up the e-mobility charging network was taken in 2010, the company soon noticed that *“selling electric mobility services is totally different from selling energy”*, and opted for a different innovation approach rather than conventional product

development. This new approach was characterized by a heavy reliance on user input at different stages of the development process and the integration of the innovation process into a multi-stakeholder research project.

As a first step, i.e. the idea-generation and testing phase, the company performed a lead-user study including a lead-user workshop with 25 participants who all had ample experience with e-mobility, charging or energy storage. The aim of the lead-user study was to gain insights into customer needs and wants as well as ideas for corresponding solutions. The lead-user study was complemented with a large-scale survey with about 1000 participants who had either already collected experiences with e-mobility, or had no experience at all, in order to collect data on the general mobility behavior and requirements in the country. The results of the survey and the insights gained in the lead-user study served as a basis for the specification of the business model and the corresponding services offered on the market.

In a second step, the company gained experience with the newly developed business model in a small-scale field trial during the development phase. The goal of the field trial was to find real customers who make everyday experiences and indicate perceptual and technological problems. In total, 25 interested users participated in the field trial, agreeing to use GPS tracking and to participate regularly in interviews and surveys for a period of one year. Since no major issues were raised in the field trial, the business model was brought to the market with only slight adaptations.

### **3.4.3 Energy Provider Based in the UK**

In 2010, the multinational energy provider identified smart homes at a strategic level as a new business opportunity. At that time, there were no established solutions on the market and the technology was in a very early state. The company soon decided to set up large-scale field trials in order to explore the smart home as a business area. The field trials included online surveys, focus-group meetings as well as in-home interviews, and lasted over two years. In total, 75 households in the UK participated in the trials. The overall objective was twofold. On the one hand, the responsible project team wanted to test if the newly developed technology worked and, on the other hand, it wanted to check whether users saw

the benefit of the technology and whether it could constitute a business case for the company.

Each of the methods applied in the field trials had their particular objective, as the following citation of a company representative illustrates: "

"The survey was very good for getting a general picture over time, because we asked the same questions every time, whereas the focus-group was good for immersing in group and getting collective discovery, creation and discussion. (...) And in the in-home interviews, you can really pinpoint individual user cases in great detail."

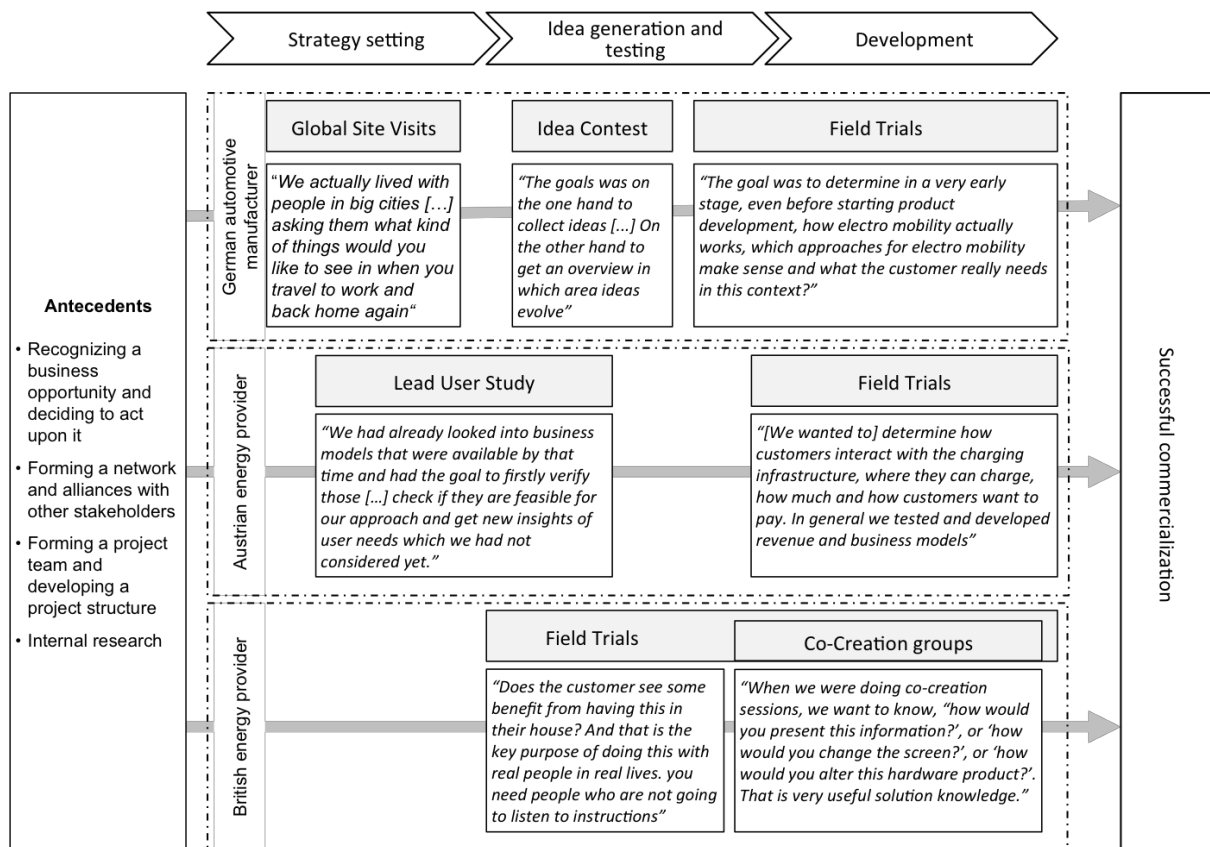
[Company representative, British energy provider, August 2014]

Company representatives also described how the focus-group meetings changed their character over time and turned into real co-creation sessions, where users came up with ideas for new products. The insights gained by applying the different methods had an impact on the final product as they revealed some dead-ends, while at the same time highlighting the need for adjustments and ideas for new solutions, primarily as far as design and technical features were concerned. At the same time, the collaboration with end-users throughout the innovation process also affected the marketing strategy, giving customers the chance for a trial period so that *"before they buy, they are really convinced of its usefulness"*. It becomes evident that the field trials proved not only useful for the development phase, but also gave input for the later commercialization phase.

The timeline per case and an overview of the utilized methods as well as the companies' motivation including direct quotes can be found in *Figure 10*. It is striking that all three companies integrated users throughout the overall green innovation processes, which, to the knowledge of the authors, has not been described in the literature before. Comparing the cases, it becomes evident that, given the different methods applied, the role of users changed in the different phases of the innovation process. In two cases, companies started with integrating the users into a more active role through lead-user workshops and idea contests and moved on to extensive field trials similar to LivingLabs. The third case started with the field trials to get user feedback on needs, preferences and experiences with first prototypes and evolved into a more open approach with co-creation sessions, giving users an increasingly more active role in the innovation process. In two of the cases under review, the companies altered the format and integrated users more actively than initially planned.

Whereas the automotive manufacturer prolonged the field trials and included new topic areas, the British energy provider started to use a method applied in the field trials differently, and to turn focus-group discussions into co-creation sessions.

**Figure 10:** Overview of methods utilized along the innovation process for user integration analyzed in Essay 2



### 3.5 Discussion

The findings show that the companies under review did not only tap knowledge of users' needs, but also solution knowledge. Indeed, the empirical findings have revealed that in all three cases users expressed ideas that provided the basis for new product functionalities or service components. This is in line with the literature stressing the innovative potential of users (Von Hippel, Ogawa, & De Jong, 2013). The company representatives interviewed stated that this heavy reliance on user input was unusual in the company and had never been applied to this extent before: "In this intensity and in this sector I have never seen

*something like this before*". The level of integration in all three incumbent firms also seems to be exceptional compared to cases presented in the literature so far. Users were basically co-developing the novel green product or service from the very beginning of the innovation process, i.e. in the strategy setting and ideation phase, through the development phase to the final stages of commercialization, and thus may be considered as user co-developers.

On first sight, this finding seems to contrast with the findings of De Marchi (2012), who argues that technological innovations often do not stem from user-centered approaches, since users are tied to existing solutions and cannot deal with the high level of complexity of novel green technologies. Indeed, the findings support the assumption that users are often not the origin of the idea for the technology itself. Yet, there is evidence that they still hold a key role in the development of novel green products and services related to the technology in the cases under review. This is an important finding, as it suggests that users can play a crucial role in the green innovation process even though they might not be the initiators of a new technological innovation such as new materials or machineries. The case studies show that user-centric approaches confirm and assure the strategic course of the innovation team in the early stages of the development process. In the later stages, they helped to refine the product or service under development, thus facilitating use and market acceptance.

Company representatives in all three cases highlighted the purpose of early user integration to re-confirm the strategic course of the company. Previous research has shown that green technologies are not easily introduced into the market and challenge firms to translate environmental profits into customer benefits (e.g. Baden-Fuller & Haefliger, 2013; Bohnsack, Pinkse, & Kolk, 2014). Therefore, companies are often uncertain about what novel green products or services might be effective with regard to targeting a profitable overall concept (Kley, Lerch, & Dallinger, 2011). In this respect, path dependency has been identified as impeding radical innovation in incumbent firms, since past experiences and events often guide future action and incumbent firms aim to stay closer to the status quo (Budde Christensen, Wells, & Cipcigan, 2012). Deeply established practices, procedures and operational norms might limit the cognitive capabilities of managers and potential funders to appreciate the potential of novel products and related business models (Hienerth, Keinz, & Lettl, 2011). The findings suggest that the close collaboration with users helped the case

companies to overcome these barriers and strengthened their willingness to invest in green innovation and continued driving their innovations. Therefore, user collaboration throughout the early innovation process seems to be a risk-management tool that incumbent companies can utilize to overcome obstacles for developing novel green products and services and minimize the risk of market failure.

Particularly interesting to see is that all companies utilized field trials, which gave users not only the chance to influence the product / service itself, but also the possibility to learn about the product, exposing ways of using it in everyday life and changing behavioral patterns. This methodology has great similarities to the concept of LivingLab, defined as “an open innovation environment in real-life settings in which user-driven innovation is the co-creation process for new services, products, and societal infrastructures” (Bergvall-Kareborn & Stahlbröst, 2009, p. 357). The living lab approach was recently applied in the context of sustainability, when a research project investigated the potential for developing product service systems in the context of energy and resource efficient housing. The findings show that living labs provide a possibility for stakeholders to participate in social learning processes that will increase later acceptance. The authors conclude that "socio-technical experiments provide an appropriate setting for the collaborative development of solutions and the time required to get used to them" (Liedtke et al., 2015). The field studies among the case studies under review resemble LivingLabs in many aspects. Rather than only testing the pilot version of a product or service in the field, as done in traditional market research, the field trials under review served to investigate (changing) user behavior in relation to a novel green product or service, capturing and triangulating objective data (e.g. GPS tracking), subjective data (e.g. focus-group feedback discussions) and also solution knowledge of the users. It is therefore reasonable to argue that the method represents an important possibility for companies to gain insight into changes in behavior and the everyday lifestyle of users induced by their novel sustainable products. Thereby, it gives the companies relevant insight into how to shape all aspects of the related business models for a successful commercialization.

It is also interesting to note that the company's perception of the benefit of user integration along the innovation process changed over time. The empirical data shows that

only one company implemented the user integration methods as initially planned. The other two companies altered the design of the methods and/or added new methods in the course of the innovation process. As the following citation of a company representative indicates, the initial expectations towards user integration were not really high due to a lack of company experience with it: "

"I guess in retrospective, we were probably a bit naïve, maybe even a bit arrogant, to assume that the customers would not come up with good ideas. I think we thought they would come up with good criticisms, but with few new ideas, you know this doesn't work and then we go away and fix it. But actually they came up with ideas themselves that were valid and worth integrating."

[Company representative, British energy provider, August 2014]

In fact, the findings indicate that by experiencing the innovative potential of users, companies learned how to take it into account and adapted their methodological approach thereupon. The British energy provider and the German automotive manufacturer, for instance, both prolonged their field trials, introducing new methods and expanding them to new topic areas. These findings correspond to the literature on the "not invented here" syndrome, which describes a company's initial rejection of external input and ideas due to the perception that the company itself is the most qualified actor in the particular area of the innovation (Katz & Allen, 1982). It seems as if first experiences with user integration broke down prejudices and triggered further user integration.

### 3.6 Conclusion

This paper contributes to the evidence of user integration in the development of novel green products and services by analyzing how user integration in various stages of the innovation process affected green innovation in three incumbent firms. The study adds to the understanding of firms' rationale to integrate users in different phases of the innovation process as well as the firms' benefits of the user integration. The findings suggest that firms can profit from an extensive user input throughout all phases of the innovation process when developing new products and services in the area of e-mobility and smart housing. All three cases show that company representatives collaborated with users in the early stages in order to explore future needs and validate internal ideas. During the latter stages, user

collaboration mainly served to refine the product/service under development, thereby increasing the chances of market success. These findings are particularly interesting, as they contrast with existing findings in the literature that attest to user integration in green innovation in highly technological industries as a rather limited benefit, or no benefit at all. In fact, this work goes one step further than the existing literature and characterizes a new role of users in green innovations as user co-developers, whose feedback and ideas have been crucial along the overall innovation process to strengthen the green innovation efforts of incumbent firms. In all three cases, field trials proved to be of particular importance in developing the novel green products and services. This is a result that has not been highlighted in the literature before and therefore adds valuable insight into that method for practitioners and research alike.

Interestingly, the findings show that the close collaboration with users from the very beginning of the innovation process allowed the case companies to distance themselves from traditional, more incremental innovations and overcome their risk aversion towards very novel innovations. This suggests that extensive user integration represents a form of risk management, as it minimizes the chances of market failure of green products and strengthens the company's willingness to invest in the development of green products/services. It has to be acknowledged that this study is based on a limited sample of three cases only. As it is always the case with case study research, the focus on a limited number of cases only, makes it difficult to generalize its findings. Our findings might be relevant only in the case of incumbent firms and product or service innovations, which induce behavioral changes. However, as Yin (2009) acknowledges much can be learned from a particular case and readers can draw useful conclusions from case results. The strength and limitations of a particular research design are inherently related to the rationale for selecting it as the most appropriate method for studying a certain phenomenon. Case study research offers the unique possibility to study a new phenomenon in-depth and gain a first-hand understanding of it, in our case the role of end-users in green innovation processes, which has not been highlighted before. Thereby, case study research often serves as an inspiration for future research, qualitative and quantitative alike, playing an important role in advancing a scientific field. In order to gain more insight on the role of end-users in green innovation



processes, future research might consider the analysis of further cases and their comparisons with cases in which users have not been heavily involved in the green innovation process.

It is also interesting to note that the companies experienced a learning process during user integration, changing their initial perception and expectations of its benefits and altering their methodological approaches. Whereas collaboration with third parties such as research institutes seems to be widely accepted, company representatives initially had little faith in the benefits of user integration. This might impede companies from engaging in user-centric development practices and hinder the integration of user ideas and suggestions. Future research could therefore investigate how to overcome such entry barriers to user integration in green product development, and how to stimulate the intensification of user integration.

In addition, our research gives insights from a company perspective only, excluding for example country specific factors such as institutional infrastructures or R&D funding. Further, it might be interesting to put the user at the center of analysis and explore whether the integration into the green innovation process had an impact on users' environmental behavior. Another open question is whether the user-centered development has really increased market attractiveness. Since the newly developed product or service of all three cases under review here has only recently been released onto the market, the answer to these questions remains to be given in the future.

From a managerial perspective, this study also provides some important insight. First and foremost, our cases show that users may be valuable sources for green product and service innovation in incumbent firms. This work can therefore serve as an example and convey the learning process across the boundaries of the three companies under investigation. By outlining innovative approaches to green product and service development, it can guide policy makers and managers alike, who are dedicated to bring green innovation to the market.

### 3.7 References

- Abdelkafi, N., Makhotin, S., Posselt, T. (2013). Business model innovations for electric mobility: What can be learned from existing business model patterns? *International Journal of Innovation Management* 17(1), 1-41.
- Arnold, M., Barth, V. (2012). Open innovation in urban energy systems. *Energy Efficiency* 5(3), 351-364.
- Baden-Fuller, C., Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning* 46(6), 419-426.
- Bergvall-Kareborn, B., & Stahlbröst, A. (2009). Living Lab: An open and citizen-centric approach for innovation. *International Journal of Innovation and Regional Development*, 1(4), 356-370.
- Bogers, M., Afuah, A., Bastian, B. (2010). Users as innovators: A review, critique, and future research directions. *Journal of Management* 36, 857-875.
- Bohnsack, R., Pinkse, J., Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy* 43, 284300.
- Bosch-Sijtsema, P., & Bosch, J. (2015). User involvement throughout the innovation process in high-tech industries. *Journal of Product Innovation Management*, 32(5), 793-807.
- Brown, H.S., Vergragt, P.J. (2008). Bounded socio-technical experiments as agents of systemic change: The case of a zero-energy residential building. *Technological Forecasting and Social Change* 75, 107-130.
- Brown, S.L., Eisenhardt, K.M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly* 42, 1-34.
- Budde Christensen, T., Wells, P., Cipcigan, L. (2012). Can innovative business models overcome resistance to electric vehicles? Better Place and battery electric cars in Denmark. *Energy Policy* 48, 498-505.
- Carrillo-Hermosilla, J., del Rio, P., Konnola, T. (2010). Diversity of eco-innovations: Reflections from selected case studies. *Journal of Cleaner Production* 18, 1073-1083.
- Castaldi, C., Faber, J., Kishna, M.J. (2013). Co-innovation by KIBS in environmental services: a knowledge-based perspective. *International Journal of Innovation Management* 17, 1-17.
- Dangelico, R.M., Pontrandolfo, P., Pujari, D. (2013). Developing sustainable new products in the textile and upholstered furniture industries: Role of external integrative capabilities. *Journal of Product Innovation Management* 30, 642-658.
- De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy* 41, 614-623.
- De Medeiros, J.F., Ribeiro, J.L.D., Cortimiglia, M.N. (2014). Success factors for environmentally sustainable product innovation: A systematic literature review. *Journal of Cleaner Production* 65, 76-86.

- Del Rio Gonzalez, P. (2005). Analysing the factors influencing clean technology adoption: A study of the Spanish pulp and paper industry. *Business Strategy and the Environment* 14, 2037.
- Driessen, P.H., Hillebrand, B. (2013). Integrating multiple stakeholder issues in new product development: An exploration. *Journal of Product Innovation Management* 30, 364-379
- Eisenhardt, K.M. (1989). Building theory from case study research. *The Academy of Management Review* 14, 532-550.
- Eisenhardt, K.M., Graebner, M.E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal* 50, 25-32.
- Fam, D.M., Mitchell, C.A. (2013). Sustainable innovation in wastewater management: Lessons for nutrient recovery and reuse. *Local Environment* 18, 769-780.
- Feola, G., Nunes, R. (2014). Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement. *Global Environmental Change* 24, 232-250.
- Franke, N., Piller, F. (2004). Value creation by toolkits for user innovation and design: The case of the watch market. *Journal of Product Innovation Management* 21, 401-415.
- Fuller, J., Hutter, K., Fries, M. (2012). Crowdsourcing for goodness sake: Impact of incentive preference on contribution behavior for social innovation. *Advances in International Marketing* 11, 137-159.
- Fuller, J., Hutter, K., Hautz, J., Matzler, K. (2014). User roles and contributions in innovation-contest communities. *Journal of Management Information Systems* 31, 273-308.
- Hargreaves, T., Hielscher, S., Seyfang, G., Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change* 23, 868-880.
- Heiskanen, E., Kasanen, P., Timonen, P. (2005). Consumer participation in sustainable technology development. *International Journal of Consumer Studies* 29, 98-107.
- Hienerth, C., Keinz, P., Lettl, C. (2011). Exploring the nature and implementation process of user-centric business models. *Long Range Planning* 44, 344-374.
- Hoffmann, E. (2007). Consumer integration in sustainable product development. *Business Strategy and the Environment* 16, 322-338.
- Holahan, P.J., Sullivan, Z.Z., Markham, S.K. (2014). Product development as core competence: How formal product development practices differ for radical, more innovative, and incremental product innovations. *Journal of Product Innovation Management* 31, 329345.
- Hyysalo, S., Juntunen, J.K., Freeman, S. (2013). User innovation in sustainable home energy technologies. *Energy Policy* 55, 490-500.
- Irwin, A., Hooper, P.D. (1992). Clean technology, successful innovation and the greening of industry: A case-study analysis. *Business Strategy and the Environment* 1, 1-11.

- Jerneck, A., Olson, L. (2013). A smoke-free kitchen: initiating community based co-production for cleaner cooking and cuts in carbon emissions. *Journal of Cleaner Production* 60, 2018-2215.
- Johnson, M.W., Suskewicz, J. (2009). How to jump-start the clean-tech economy. *Harvard Business Review* 87, 52-60.
- Katz, R., Allen, T.J. (1982). Investigating the not invented here syndrome: A look at the performance, tenure and communication patterns of 50 R&D project groups. *R&D Management* 12, 7-20.
- Kley, F., Lerch, C., Dallinger, D. (2011). New business models for electric cars: A holistic approach. *Energy Policy* 39, 3392-3403.
- Laperche, B., Picard, F. (2013). Environmental constraints, product-service systems development and impacts on innovation management: Learning from manufacturing firms in the French context. *Journal of Cleaner Production* 53, 118-128.
- Lee, K.-H., Kim, J.-W. (2011). Integrating suppliers into green product innovation: An empirical case study in the semiconductor industry. *Business Strategy and the Environment* 20, 527-538.
- Liedtke, C., Baedeker, C., Hasselkuß, B, M., Rohn, H., Grinewitschus, V. (2015). User-integrated innovation in Sustainable Living Labs: an experimental infrastructure for researching and developing sustainable product service systems. *Journal of Cleaner Production* 97, 106-116.
- Mlecnik, E. (2013). Opportunities for supplier-led systemic innovation in highly energy-efficient housing. *Journal of Cleaner Production* 56, 103-111.
- Olson, E.L. (2013). Perspective: The green innovation value chain - A tool for evaluating the diffusion prospects of green products. *Journal of Product Innovation Management* 30, 782-793.
- Ornetzeder, M., Rohracher, H. (2006). User-led innovations and participation processes: Lessons from sustainable energy technologies. *Energy Policy* 34, 138-150.
- Ornetzeder, M., Rohracher, H. (2013). Of solar collectors, wind power, and car sharing: Comparing and understanding successful cases of grassroots innovations. *Global Environmental Change* 23, 856-867.
- Piller, F.T., Walcher, D. (2006). Toolkits for idea competitions: A novel method to integrate users in new product development. *R&D Management* 36, 307-318.
- Priem, R.L., Li, S., Carr, J.C. (2011). Insights and new directions from demand-side approaches to technology innovation, entrepreneurship, and strategic management research. *Journal of Management* 38, 346-374.
- Sangle, S. (2011). Adoption of cleaner technology for climate proactivity: A technology-firm-stakeholder framework. *Business Strategy and the Environment* 20, 365-378.
- Schaltegger, S., Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment* 20, 222-237

- Seyfang, G. (2007). Cultivating carrots and community: local organic food and sustainable consumption. *Environmental Values* 16, 105-123.
- Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. London: Sage Publications.
- Slotegraaf, R.J. (2012). Keep the door open: Innovating toward a more sustainable future. *Journal of Product Innovation Management* 29, 349-351.
- Stake, R.E. (1994). Case Studies, in: Denzin, N.K., Lincoln, Y.S. (Eds.), *Handbook of Qualitative Research*. pp. 236-247, Thousand Oaks: Sage Publications.
- Trencher, G.P., Yarime, M., Kharrazi, A. (2013). Co-creating sustainability: cross-sector university collaborations for driving sustainable urban transformations. *Journal of Cleaner Production* 50, 40-55.
- Tukker, A., Huppel, G., GuineBee, J., Heijungs, R., De Koning, A., van Oers, L., Nielsen, P. (2006). *Environmental impact of products: Analysis of the life cycle environmental impacts related to the final consumption of the EU-25*, Main Technical Report, Brussels: European Commission.
- Vergragt, P., Akenji, L., Dewick, P. (2014). Sustainable production, consumption, and livelihoods: global and regional research perspectives. *Journal of Cleaner Production* 63, 1-12.
- Von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science* 32, 791-805.
- Von Hippel, E. (2007). Horizontal innovation networks: By and for users. *Industrial and Corporate Change* 16, 293-315.
- Von Hippel, E., Ogawa, S., De Jong, J.P.L. (2013). The Age of the Consumer-Innovator. *MIT Sloan Management Review* 53, 26-35.
- Wagner, M. (2009). The links of sustainable competitiveness and innovation with openness and user integration: An empirical analysis. *International Journal of Innovation and Sustainable Development* 4, 314-329.
- Weber, K.M. (2003). Transforming large socio-technical systems towards sustainability: On the role of users and future visions for the uptake of city logistics and combined heat and power generation. *Innovation: The European Journal of Social Sciences* 16, 155-175
- Yin, R.K. (2009). *Case study research: Design and methods*, 5ed., London: Sage Publications.

## 4 Essay 3: Cooperatives as Catalysts for Sustainable Neighborhoods - A Qualitative Analysis of the Participatory Development Process toward a 2000-Watt Society<sup>3</sup>

### **Abstract**

Studies on the adoption of sustainable consumption patterns have shown that citizen participation in the development of new products, services and systems, such as eco-towns, can, among other things, increase the legitimization, market acceptance and sustainability impact. Cooperatives that traditionally act on behalf of and work very closely with their members may be particularly well suited to leading participatory development processes. By exploring the cooperative-led development of a new sustainable neighborhood in Switzerland, we analyze how citizens participated in different phases of the development process and the extent to which cooperative characteristics influenced this participation. We find empirical evidence that cooperatives and cooperative networks are a promising organizational form for involving citizens in all phases of the development process of new sustainable neighborhoods. Our findings add new insights to the literature of sustainability transitions by highlighting the cooperative network as a powerful actor for promoting participation in sustainable urban development, inducing learning processes beyond the boundaries of the newly developed neighborhood.

**Keywords:** Cooperatives, Participatory development, Sustainable neighborhoods, Higher order learning

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<sup>3</sup> This chapter is based on the publication *Cooperatives as catalysts for sustainable neighborhoods: A qualitative analysis of the participatory development process toward a 2000-Watt Society* published in *Journal of Cleaner Production* (134), *Special Issue on Transitions to Sustainable Consumption and Production within Cities*, pp. 112-123, co-authored with Eric Zimmerling and Isabell M. Welpe. In 2015, the journal was ranked "B" (VHB) and had an impact factor of 4.9. My contribution to the article is summarized in Appendix 2.

## 4.1 Introduction

The current transition toward sustainable lifestyles has often been criticized as being too slow and incremental (e.g. Markard et al., 2012; Vergragt et al., 2014). The lock-in effects of unsustainable consumption and production patterns can be attributed to financial, cultural, institutional, political and socio-psychological aspects (Vergragt et al., 2014). With regard to consumption patterns, green products and services often require, for instance, changes in citizens' behavior, practices and lifestyles (e.g. Heiskanen et al., 2005; Vergragt et al., 2014; Vergragt & Brown, 2007). Several scholars have therefore called on the private and the public sectors to involve citizens in the green development process to ensure that green products and services correspond to citizens' expectations and can ultimately unfold their positive impact on the environment (Heiskanen et al., 2005; Hoffmann, 2007; Laperche & Picard, 2013; Ornetzeder & Rohracher, 2006; Owens, 2000; Stirling, 2008). This argument has also been put forward in the context of eco-towns and the development of new sustainable neighborhoods (Bayulken & Huisingh, 2015a; Doyle & Davies, 2013).

One way to involve citizens in the development process of new sustainable neighborhoods may be through cooperatives, which traditionally act on behalf of and work very closely with their members. Although some studies suggest that the cooperative business model is suitable for promoting sustainable lifestyles (Boone & Ozcan, 2013; Dorado, 2013; Sagebiel et al., 2014; Sanders, 2002), there is surprisingly little research on how cooperatives innovate and collaborate with inside and outside actors in this context (Penna & Geels, 2012; Seyfang, 2007; A. Smith et al., 2014). Against this background, this article empirically investigates how cooperatives organize and implement citizen participation throughout the development process of a new sustainable neighborhood. More specifically, we will look at the participatory formats applied by the cooperative in the different phases of the development process as well as the cooperative's characteristics that affect this participatory development approach.

We answer this question by analyzing the case of Mehr Als Wohnen (MAW - "more than housing"), a housing cooperative that developed an entirely new sustainable neighborhood in Zurich, Switzerland. The neighborhood called Hunziker Areal was finalized at the beginning of

2015, offers living and working space for approximately 1300 people and sets new standards in terms of ecological, economic and social sustainability (MAW, 2015b). This single case is interesting and unique for three main reasons. First, MAW was established as an experimental and learning platform to explore, test and learn from new participatory formats and sustainable future living solutions, which had not been done before (BWO, 2010). The case, therefore, shows a very high degree of participation throughout all phases of the development process. Second, MAW was founded and established by 34 Swiss cooperatives that aimed to consolidate their financial and non-financial resources to create a new sustainable neighborhood. MAW also represents a type of cooperative network, which adds additional peculiarities to the cooperative's characteristics and has been given little attention by researchers (Novkovic & Holm, 2012). Finally, MAW aims to reach the 2000-Watt Society. The vision of the 2000-Watt Society<sup>4</sup> is a leading principle in Swiss municipal policy that foresees a society that only consumes as much energy as worldwide energy reserves permit without damaging the environment (i.e., 2000 watts of primary energy per resident compared to today's average of 5000 watts in Switzerland (City of Zurich, 2011)). By investing in new materials and building technologies as well as providing the necessary infrastructure (e.g. electric mobility stations), MAW ultimately seeks to empower the residents of the Hunziker Areal to change their lifestyle and reach the 2000-Watt Society (BWO, 2010, 2013). This objective, as well as the cooperative's focus on an entire neighborhood, makes the potential contribution of this case to urban sustainability exceptionally high.

The results of our analysis show that cooperatives represent powerful actors to promote participatory development approaches for the adoption of sustainable lifestyles. By highlighting the potential of cooperative actors in this context, our research adds to the literature on sustainability transitions that has often been criticized for a lack of actor perspective (Farla, Markard, Raven, & Coenen, 2012). We argue that the participatory development approach, which was led by MAW, induced social learning among the member cooperatives and other participants in the process and thus can be described as a bounded socio-technical experiment that promotes the transition toward sustainability (Vergragt et al., 2014).

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<sup>4</sup> For more information on the concept of the 2000-Watt Society, please see: <http://ourworld.unu.edu/en/2000-watt-society>.



After reviewing and summarizing the key findings of the relevant literature on green innovation and the role of citizen participation and cooperatives for sustainable development, we describe our research methodology. Based on the empirical results, the discussion and conclusion sections present the key insights and supporting evidence as well as discuss the implications of our findings.

## 4.2 Literature Overview

### 4.2.1 Green Innovation and the Development of Eco-towns

In light of climate change, resource scarcity and environmental degradation, newly developed products and services promise to reduce the environmental impact in the overall life cycle (Del Río González, 2005; Sangle, 2011). The public and private sector therefore increasingly focus their contribution to developing and diffusing new technologies and related products and services, which are less environmentally harmful than commonly used alternatives (e.g. Irwin & Hooper, 1992; Sangle, 2011). In an increasingly urbanized world, the development of eco-towns has a particularly important role in achieving the transition to sustainability (Bayulken & Huisingh, 2015a). Since the early 1980s, concepts such as sustainable development and ecological modernization guide many urban policies, as cities represent an ideal context for experimenting with new environmentally friendly concepts and technologies and disseminating the results and findings of innovation efforts (Bayulken & Huisingh, 2015b; UN-Habitat, 2011).

One factor that influences the success of these innovation efforts is the opening up of the development process (e.g. Bayulken & Huisingh, 2015a; Dangelico et al., 2013; Laperche & Picard, 2013). Scholars stress the necessity of collaboration between professionals from different backgrounds such as the public, private and educational sector (e.g. De Marchi, 2012). In addition, there is widespread agreement that the processes and methods to increase transparency, deliberation and participation in sustainability-oriented research, policy and innovation projects are crucial for fostering legitimacy and creating a pluralistic and socially situated understanding (Bäckstrand, 2003; Owens, 2000; Stirling, 2008). Accordingly, the involvement of end-users — i.e., citizens — and civil society actors plays a particularly

important role in making sustainable development a success, as further explained in the next section.

#### **4.2.2 The Role of Citizens in the Development of Green Products and Eco-towns**

The empirical findings show that collaboration with citizens allows for the development of products and services that correspond to citizens' needs and wants and the generation of awareness of novel technologies (Arnold & Barth, 2012; Bayulken & Huisingsh, 2015a; Carrillo-Hermosilla et al., 2010; Heiskanen et al., 2005; Hoffmann, 2007). This is particularly important in the context of green products and services as their adoption often requires changes in peoples' behaviors, values or daily habits (Brown & Vergragt, 2008; Doyle & Davies, 2013; Laperche & Picard, 2013; Vergragt et al., 2014). As Vergragt et al. (2014) show, it is becoming increasingly recognized that technology alone will not be able to solve current ecological problems and that innovators have to anticipate the overall acceptance of new technology among society actors.

The positive impact of participatory approaches on market success has also been highlighted with regard to the development of ecological cities (e.g. Brown & Vergragt, 2008; Doyle & Davies, 2013). In a recent literature review on the lessons learned from eco-town projects, Bayulken and Huisingsh (2015a) identify stakeholder involvement in the planning and implementation process as one of the key factors for long-term success of eco-towns, as it creates a culture of consensus and commitment (Bayulken & Huisingsh, 2015a). With regard to citizens, Sanders (2002) emphasizes participatory design approaches "for" and "with" citizens. Constant and early involvement of citizens increases interest in and commitment to the project and leads to social learning effects as well as lasting changes in behaviors (Bayulken & Huisingsh, 2015a; Brown & Vergragt, 2008; Kronsell, 2013). In sum, Bayulken and Huisingsh (2015a) stress that both the width and depth of citizen participation, defined as the diversity of opportunities for participation and the extent to influence the decision-making and outcomes, have a positive impact on eco-town developments.

Irrespective of the positive effects of citizens' contributions in the development of eco-towns, participatory development processes can also have shortcomings such as time delays, increased coordination efforts and related costs (Solitare, 2005). For this reason, governments

and local city administrations — who, in most cases, are the drivers behind urban development projects — often appoint public bodies as catalytic agencies to ensure efficiency (Bayulken & Huisingh, 2015a). Due to their inclusive character and member-owned structure, cooperatives may be particularly well-suited to taking over this role as a catalytic agent, as the following section notes.

#### **4.2.3 Cooperatives and Sustainable Development**

Cooperatives are often put forward as a vital organizational form to promote sustainable business models (Boone & Ozcan, 2013; Mont et al., 2014; Sagebiel et al., 2014; Viardot, 2013). Often organized in democratic associations and owned by their members, cooperatives unite people with a joint aim or vision and enable them to work toward a common goal (Menzani & Zamagni, 2010; Novkovic, 2008). Accordingly, cooperatives are active in very different contexts, such as energy, agriculture and housing (Boone & Ozcan, 2013; Ornetzeder & Rohrer, 2006; Viardot, 2013). In the context of sustainable urban development, housing cooperatives are probably the most visible groups. Well-known examples across Western Europe include, for instance, the Vauban project in Germany, where the GENOVA cooperative built two houses that focus on energy efficiency and green building standards (Bayulken & Huisingh, 2015a).

Although cooperatives are often put forward as a vital organizational form to promote sustainable development, research on cooperatives as innovators as well as on the innovation process within and around cooperatives is scarce (Novkovic, 2008). Empirical findings show that cooperative communities in general often struggle with consensus-based decision-making as a form of self-organization and governance (Cunningham & Wearing, 2013) and can increase their innovation capacity by cooperating with external actors (S. C. Smith, 1994). To the best knowledge of the authors, little is known about the innovation process within and around cooperatives and their role as catalytic agents for promoting participatory processes for sustainable lifestyles.

## 4.3 Methodology

### 4.3.1 Research Design

The main objective of this paper is to add to our understanding of innovation processes within cooperatives integrating citizens in the development of a new sustainable neighborhood. Due to the explorative nature of the study, the research project involved an in-depth single case study analysis (Eisenhardt, 1989; Yin, 2009). Whereas the results of a single case study are not universally applicable, these results provide a detailed understanding of an empirical phenomenon within its real-life context and are therefore particularly well-suited as a reference when little is known about the topic (Flyvbjerg, 2006; Yin, 2009). Because the purpose of this research was to develop theory and not test it, theoretical sampling was used (Eisenhardt & Graebner, 2007). Thus, we analyzed one exploratory case of a cooperative-led development process of a new sustainable neighborhood. As was explained in greater detail in the introduction, we selected the case of MAW because MAW represents a form of a cooperative network that has experimented with different forms of participation throughout all phases of the development process of a new neighborhood and has the potential to make an exceptional contribution to urban sustainability due to the size of the project and far-reaching sustainability goals. To our knowledge, the neighborhood development approach of the cooperative under investigation is unique in Western Europe and is therefore likely to generate new findings. Hence, the unit of analysis in our case study analysis is the participatory development process within and around the cooperative network.

### 4.3.2 Data Collection

This study employed a two-method approach encompassing document analysis and semi-structured interviews (Bowen, 2009). The document analysis was very suitable for the case under review, as MAW is committed to transparency and publishes all relevant documents on its website (MAW, 2015a). Thus, we had access to a multitude of documents, such as annual reports, progress reports, documents from meetings and public forums, legal documents concerning the organizational setup of the cooperative, monthly newsletters from July 2008 to February 2015, presentations and conceptual reports on certain topic areas, as well as newspaper and magazine articles that often include extensive interviews with MAW staff, the

founding cooperative members and (future) residents. We also included documents from third parties that had been involved in the development process, such as the city of Zurich, research institutes and universities. As Merriam (1988, p.188) notes, “documents of all types can help the researcher to uncover meaning, develop understanding, and discover insights relevant to the research problem.” The document analysis enabled us to understand the participatory development process of the Hunziker Areal as well as the mechanisms underlying citizen and stakeholder involvement.

To corroborate evidence obtained through the document analysis and verify our understanding of the participatory development process (Bowen, 2009), we conducted additional interviews with five representatives of the cooperative — namely, two members of the board of directors, two executive managers, and the project leader responsible for the organization of participatory activities with (future) residents. Whereas the executive managers both offered a very good overview of the participatory development process, the other three interviewees each gave us in-depth insights into different phases of the development process (idea generation / development / commercialization). We carefully selected all interview partners to gain a detailed understanding of the overall development process and related citizen integration formats.

We conducted the interviews in groups of two researchers, in a face-to-face format when possible. This allowed one researcher to conduct the conversation and the other to note his/her observations. The interviews followed a semi-structured guideline, which consisted of five different sections. The first part began with the background of the interviewee and his/her role in the development process of the Hunziker Areal. The second part of the interview focused on citizen participation in the overall development process and the participatory formats that were applied. The third part included questions on cooperation with other actors involved such as the member cooperatives and external parties, and the fourth part was focused on the lessons learned. The final part included general questions on the overall role of cooperatives and the future vision for participation with regard to the promotion of sustainable lifestyles. Open-ended questions allowed the interviewees to share their thoughts on citizen participation in the development process. We also asked probing questions to further clarify

details regarding the process that emerged in the document analysis (e.g. time of a particular event, etc.). Interviews lasted an average of 60 minutes. We digitally recorded, transcribed and documented all interviews in a standardized form to enhance the validity and reliability of our research.

### **4.3.3 Data Analysis**

The case construction was a multi-step process (Miles & Huberman, 1994). In the first step, we constructed a chronological list of key events and activities and wrote a detailed description of the participatory development process. We asked our main contacts to review the case report, which enabled us to eliminate some of the biases associated with retrospective interviews (Silverman, 2000). In the second step, we documented and coded all interviews and documents. Codes referred to the different phases of the development process — the methods of citizen participation used as well as the main characteristics of the cooperative network that shaped the participatory development process. We set these codes to refer to the different phases of the development process and the methods used to integrate citizens from the very beginning (thematic coding), which mainly helped us structure our large amount of data and understand the participatory development process. Codes focusing on the central characteristics of MAW affecting the participatory development approach only emerged throughout the coding process (inductive coding). First-order codes in inductive coding included, for instance, “efficient decision-making,” “cooperative background of personnel involved,” “belief in participatory formats” and “common vision.” As we discovered codes that were similar or related, we collated them into second-order categories. The final set of categories corresponds to the central cooperative characteristics identified and guides the presentation of our findings in section 4.2.

## **4.4 Results**

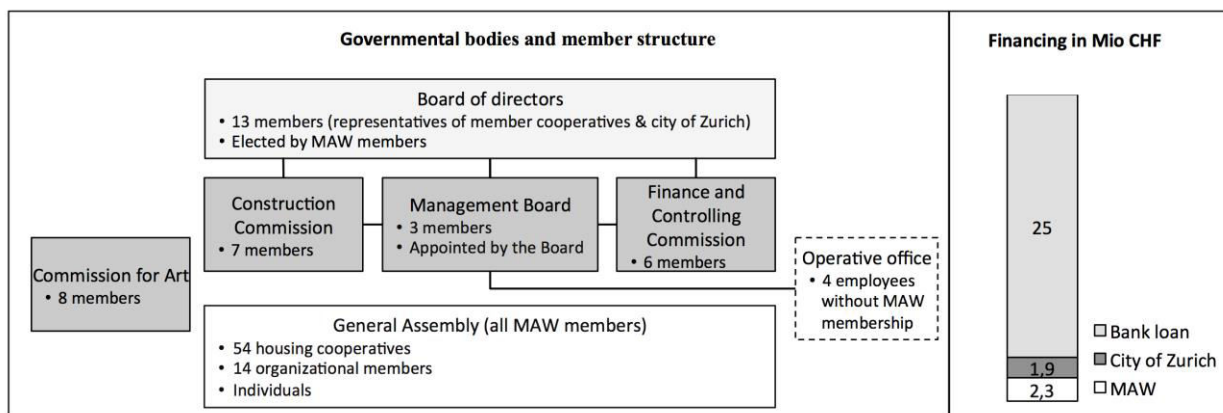
We proceed by outlining the approaches that have been employed by the cooperative to involve citizens and other stakeholders in the different phases of the development process and highlighting the cooperative characteristics that influenced this participatory process. However,

as the overall development process and cooperative characteristics must be seen in the broader context of MAW's organizational setup, we first provide a short description of the cooperative network itself.

Inspired by a public idea contest on future forms of living in 2007, 34 Swiss housing cooperatives created MAW as an experimental platform for innovation and learning regarding new sustainable technologies, future forms of living, and participatory formats in the development process of new neighborhoods. The member base of the newly created cooperative grew quickly by an additional 20 housing cooperatives, 14 other organizational members such as foundations and associations, interested individuals, and (future) residents (BWO, 2013). The ultimate goal of MAW was to create a new neighborhood according to the principles of the 2000-Watt Society. The new neighborhood called Hunziker Areal was finalized at the beginning of 2015 and consists of 13 buildings with 400 residential units as well as a mix of different non-residential premises, community rooms and green spaces.

As shown in *Figure 11*, the organizational structure of MAW was rather flat, and key positions were held by representatives of other cooperatives, assuring close organizational and personal ties with the member cooperatives. Regular meetings between the different governance bodies assured on-going exchanges and learning between the member cooperatives, MAW and other actors involved. In addition, the management board regularly reported to the board of directors and the general assembly, assuring representation and legitimization for the member base. The initial operations and the inclusive and in-depth participatory approach were financed through the equity of the member cooperatives and a loan by the city of Zurich. The cost of construction was covered by an additional bank loan.

**Figure 11:** Organizational set up and financing of MAW, the cooperative network under review in Essay 3



#### 4.4.1 The Participatory Development Process of the Hunziker Areal

In line with some of the innovation literature, the development process of the Hunziker Areal can be differentiated by three main phases: the ideation, development and commercialization phases (Holahan et al., 2014). The ideation phase of the Hunziker Areal started with the founding of MAW in 2007 and lasted until the issuing of the building permit by the City of Zurich in mid-2010. The latter event marked the beginning of the development phase, which lasted until the first information event for citizens who were interested in renting apartments at the Hunziker Areal in April 2013. The information event constituted the beginning of the third phase, i.e., the commercialization phase, as MAW gained a detailed understanding of who the future residents of the neighborhood would be. It has to be acknowledged that the development of the new neighborhood had not been fully completed at this time, and therefore the development phase overlapped with the commercialization phase. We will proceed to analyze the participatory formats in each of the three phases, as illustrated in *Figure 12*.

##### ***Ideation phase:***

From the very beginning, MAW intended to include as many stakeholders in the ideation phase as possible. This approach contrasts conventional participatory processes in cooperatives, where members usually only get to “vote yes or no” for proposed building concepts, as the executive manager highlighted in an interview with a Swiss building magazine (Bösch, 2009). To



reach this goal, MAW introduced two main participatory formats in the ideation phase. First, members of the founding cooperatives and interested volunteers organized themselves into so-called “thematic groups” that met once a month to develop conceptual ideas for different subject areas (see details in *Table 8*). In general, the thematic groups served as initial idea and knowledge generators at the beginning of the development process. Many of the ideas and concepts developed within the group had an influence on the planning process of the new neighborhood, including the final design and architectural layout, as the leader of a thematic group notes:

“So far, we did not have to give up any of our ideas. I am confident that all our original plans can be realized.”

[Interview with leader of a thematic group, in: BWO, 2010, p.66]

Second, MAW organized regular public forums, so-called “echorooms,” which were designed to initiate a dialog with the broader public and present and discuss the ideas developed in the thematic group (see details in *Table 8*). MAW organized these open forums twice a year to create a platform for exchange and dialog between all stakeholders and enable anyone interested to provide further input in the different topic areas. Although the echorooms were open to the general public, the audience initially included mainly representatives of the thematic groups, MAW management staff and members, architects, city planners, and interested individuals from the member cooperatives. From the very beginning, the echorooms were described as a useful controlling mechanism that served to coordinate the activities of the different thematic groups and test the evolving ideas and concepts:

“It was about reconciling the ongoing thematic discussions and get new ideas and inputs. Many recommendations were gathered and will, if possible, be integrated into the project. Further, the echorooms evolved into a barometer of public opinion and served as an advisory body.”

[Interview with external moderator, in: BWO, 2010, p.28]

In this way, the public discussions within the framework of the echorooms served as “reassurance” for the board of directors and executive managers when they were setting the course for future action (Bösch, 2009, p.48). However, participants from the member cooperatives rather than future residents drove participation because it was not clear in the ideation phase who would move into the new neighborhood.

At the end of the ideation phase, all ideas and concepts developed by the thematic groups and the results of the echorooms were documented in electronic form on the cooperative's website. This electronic idea repository was meant to serve MAW management and future residents as inspiration for future project implementation.

***Development phase:***

At the beginning of the development phase, MAW had to find appropriate construction companies and make several decisions regarding very technical issues. Accordingly, the participatory setup, focusing on thematic groups with a rather broad focus, was changed to smaller informal working groups and collaborative partnerships, which focused on specific topics only and aimed at the integration of expert knowledge (see details in *Table 8*). This outreach to the external environment represented another step in opening up the development process:

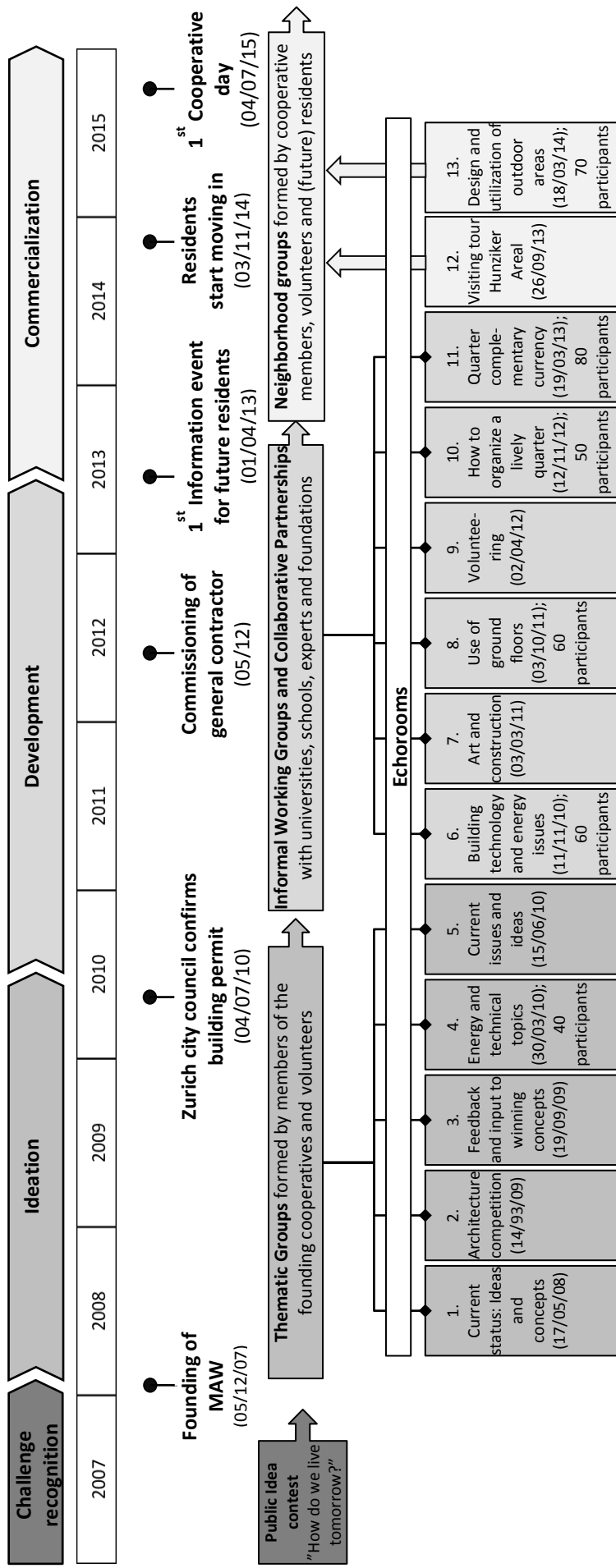
“After the internal discussions regarding cooperative sustainable housing, many external stakeholders became aware of it. The cooperative is no longer a single company but is in contact with many partners who want to contribute to the implementation of this innovative project.”

[Interview with executive manager, in: BWO, 2013, p.78]

It becomes evident that the cooperative network strengthened its ties to external actors and stakeholders, such as universities, schools and foundations during this phase of the development process.

These working groups and partnerships had the aim of assessing, together with expert partners, the potential of different and very specific concepts and, if viable, develop concrete implementation plans. The outcomes of these working groups and partnerships were often discussed at echorooms. Hence, the first echoroom in the development phase (Echoroom No. 6) focused on building equipment and appliances, such as energy and ventilation systems, and included mainly expert presentations. MAW also actively restricted citizen participation throughout the development phase to advance the project and handle contract awarding:

Figure 12: The participatory development process of the Hunziker Areal analyzed in Essay 3



"We realized that we were not able to maintain this (level of participation) for such a long time. So we restricted the participative part and told ourselves that we first have to focus on the contracts, starting with the construction process."

[Interview with executive manager, 2014]

Although echorooms continued to be open to the general public, MAW did not actively advertise them. Accordingly, the document analysis shows a decreasing number of citizens among the participants during this time of the project.

Only toward the end of the development phase and with start of the construction of the Hunziker Areal did MAW start to advertise the echorooms again to reinvigorate broader participation in the development process. MAW also initiated a number of additional initiatives for citizens to raise awareness of the new neighborhood and allow for further participation. This development of the project from technical planning to more lifestyle-oriented topics is also reflected in the topic focus of echorooms such as *volunteering* (Echroom No. 9) and the *organization of a lively neighborhood* (Echroom No. 10). The documentation of the latter echorooms also shows an increasing number of citizens among the participants who again became interested in the discussions. This increasing importance of citizen participation toward the end of the development phase is also indicated by the creation of the new position of *project leader participation* in 2012. The participation of future residents was further formalized in the commercialization phase.

#### ***Commercialization phase:***

When MAW organized the first information day for citizens interested in living at the Hunziker Areal in spring 2014, the participation entered a new stage because it became clear who the future residents of the neighborhood may be. In the commercialization phase, the participation of (potential) future residents mainly took place via so-called neighborhood groups, in which a minimum of five people decided to work together to realize a certain idea (see details in *Table 8*). The level of motivation and commitment of the participants surprised one of the executive managers interviewed:

"Neighborhood groups already emerged when it was not yet clear who would get an apartment. That was really amazing. People wanted to contribute something without getting any compensation just because they liked the idea."

[Interview with executive manager, 2014]

MAW facilitated the formation of these groups by organizing two echorooms at the beginning of the commercialization phase to put people with similar interests in contact. The cooperative also provided for common meeting rooms and a certain budget. In spring 2015, around twenty such neighborhood groups had been set up to realize new ideas or further elaborate concepts that had initially been developed in the other formats. As one can see from the focus topics of the neighborhood groups (see *Table 8*), this participatory format aimed to lay the groundwork for vibrant community life in the new neighborhood so as to become a lasting component and to ultimately promote the achievement of the 2000-Watt Society.

To summarize, MAW integrated citizens and other stakeholders at several stages by different methods and with different intentions in the development process of the Hunziker Areal. An overview of the different participatory formats can be found in *Table 8*. Whereas the main participatory format for the integration of (future) residents were neighborhood groups in the commercialization phase, citizens and other stakeholders had been integrated at a much earlier stage. In the ideation phase, members of the founding cooperatives participated in thematic groups and echorooms, ensuring that the opinion of ordinary citizens were considered when MAW set the stage for the development of the new neighborhood. In the development phase, MAW management had to restrict participation for a certain time period to ensure project advancement. After this period, echorooms, informal working groups and collaboration with actors from the educational and non-profit sectors assured a broad discussion of the Hunziker project. In particular, echorooms served as a platform for learning and dialog among the different groups and stakeholders involved, promoting a common understanding at each point in time.

**Table 8:** Overview of participatory formats analyzed in Essay 3

Name	Phase applied	Org. Format	Selected topics	Intention	Exemplary Quotes
<b>Thematic groups</b>	Ideation	<ul style="list-style-type: none"> <li>• 4 groups with focus topics</li> <li>• 50 members of the founding cooperatives and MAW staff</li> <li>• Monthly meetings</li> <li>• Electronic documentation of results</li> </ul>	<ul style="list-style-type: none"> <li>• Utilization of the neighborhood</li> <li>• Economy</li> <li>• Ecology</li> <li>• Technology</li> </ul>	<ul style="list-style-type: none"> <li>• Generate and explore ideas for planning and architecture of the neighborhood</li> <li>• Combine economic and ecological thinking</li> <li>• Generate and explore possibilities to reach 2000-Watt Society (e.g. energy efficiency standards, car-free zone, etc.)</li> </ul>	<p>“They completely organized themselves on their own. Each time there was somebody else writing the protocol, etc. That was pretty easy. And then all groups came together and exchanged their ideas on thematic conferences (echorooms). But then we noticed, I think it was in 2009, that they are not so important any longer, because many of the ideas had been incorporated in the project.” (Interview with executive manager,, 2014).</p> <p>“Despite the official termination in late 2010, all ideas are noted down.” (Interview with executive manager, 2014)</p>
<b>Echorooms</b>	Ideation Development Commercialization	<ul style="list-style-type: none"> <li>• 13 events</li> <li>• 50-80 participants</li> <li>• Open to the general public</li> <li>• Meetings twice a year</li> <li>• Led by an external moderator</li> <li>• Often with expert input presentations</li> <li>• Electronic documentation of all meetings</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable Construction</li> <li>• Building technologies and energy</li> <li>• Use of ground floors</li> <li>• Volunteering</li> </ul>	<ul style="list-style-type: none"> <li>• Cross-thematic discussion of the results of the thematic groups, working groups and collaborative partnerships respectively</li> <li>• Gain expert input on current topics</li> <li>• Discuss and legitimize future MAW decisions</li> <li>• Raise awareness for the new city neighborhood</li> </ul>	<p>“Echorooms evolved into an stimulating and important element of our thinking processes.” (Interview with MAW president, in: Omoregie, 2010, p.12)</p> <p>“For the board of directors, echorooms represented the ideal occasion to negotiate important questions with the basis.” (Interview with executive manager, in: BWO, 2010)</p>
<b>Informal working groups &amp; collaborative partnerships</b>	Development Commercialization	<ul style="list-style-type: none"> <li>• Working groups of volunteers to elaborate further topics</li> <li>• External stakeholder involvement for specific topics</li> <li>• Electronic documentation of results</li> </ul>	<ul style="list-style-type: none"> <li>• Complementary currency</li> <li>• Contract farming</li> <li>• Sustainability at Hunziker Areal</li> <li>• Regional sourcing</li> <li>• Urban farming</li> <li>• Living with the elderly</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the potential of different ideas regarding sustainable lifestyle</li> <li>• Develop more detailed concepts and implementation plans</li> </ul>	<p>“We work together with this foundation, which investigates intensively forms of living for elderly people. That is an important partner for us, which gives us very good expert advice.” (Interview with executive manager, 2014)</p> <p>“The report of a partner foundation was a fundamental reading for me. We take the conclusions and recommendations very seriously.” (Interview with project leader participation, 2014)</p>
<b>Neighborhood groups</b>	Commercialization (on going)	<ul style="list-style-type: none"> <li>• Small working groups of minimum 5 residents</li> <li>• Monthly meeting of all groups</li> <li>• MAW provides for meeting places and required resources</li> </ul>	<ul style="list-style-type: none"> <li>• Complementary currency</li> <li>• Public library</li> <li>• Outdoor areas</li> <li>• Swap area</li> <li>• Regional vegetable sourcing</li> </ul>	<ul style="list-style-type: none"> <li>• Continue work on new or existing ideas and concepts</li> <li>• Realize ideas, visions or concepts for sustainable lifestyle and shared living</li> </ul>	<p>“Once a month there is a meeting of the neighborhood groups. One took place recently, and I was part of it. There were about fifty people that were very intrigued and started the discussion. Everybody presented his or her topic.” (Interview with executive manager, 2014)</p> <p>“My function is to represent a contact point for the residents, who want to get involved. (...) I react rather than act. When people from the Hunziker Areal want to contribute, then I support these initiatives.” (Interview with project leader participation, 2014)</p>

#### 4.4.2 The Cooperative as a Catalyst for Participation in the Development Process

In this section, we continue our analysis by identifying aspects related to the cooperative network and its organizational peculiarities that (positively and negatively) influenced the participatory development processes.

##### ***Cooperative network member base with common vision and mission:***

When asked about the key partners in the development process, one of the executive managers states:

“Well for me, the members of the other (member) cooperatives were a very central partner. They have given us very valuable information and, in turn, also took something back to their setting; well, it encouraged them to do something different at their organization. That was, for me, almost the most important group.”

[Interview with executive manager, 2014]

This citation indicates that the member cooperatives and their broad member base played a decisive role in the participatory development process of the Hunziker Areal. The members of the founding cooperatives shared from the very beginning the objective of implementing the 2000-Watt Society and saw MAW as an opportunity to take a step toward its realization. As the president of MAW notes, *“The anniversary year was an opportunity to form a collective and approach this neighborhood.”* (Interview with MAW president, in: Omoregie, 2010, p.12). This mission was thus clear from the establishment of the cooperative network (see e.g. annual report 2008) and was later formalized by an official mission statement. Being united by a common goal helped MAW overcome the challenge of implementing participatory development processes from the start without knowing the future residents. As described in 4.1, MAW was able to attract citizens at a very early project stage by tapping into the member base of all member cooperatives, thereby ensuring that the ideas and opinions of ordinary citizens were considered. In addition, the dialogue principles and cooperative culture of the broad member base were described as facilitating factors for the smooth organization and implementation of the participation formats.

However, the shared vision and attitude of participating actors also led to the risk of creating a homogeneous group of residents:

“We have to be careful not to turn into a green-gate community, where there are only do-gooders. (...) Our responsibility toward the urban area is to not create an elite or special group here. It’s about a social mix, it’s about diversity, and it’s also about integration.”

[Interview with member of the board, 2014]

One of the basic findings from the participation process for MAW was that mostly well-educated people from the middle class became involved, whereas other groups, such as non-German speakers, had difficulties in actively participating. It is clear that the common vision and worldview inherent to the project facilitated the participatory processes and project implementation but also put the social inclusiveness of the project at risk. Therefore, when assigning apartments to applicants, MAW used a database of socio-demographic characteristics to ensure a social intermix that is representative of Swiss urban areas.

***Strong belief in participatory processes:***

One can identify the strong belief among MAW’s management in the benefits and usefulness of participation. The participatory formats used in the development of the Hunziker Areal, such as the self-organized groups that worked on specific topics without much guidance from MAW management showed a very high degree of independence and freedom. Whereas this led critical voices among the member cooperatives to accuse MAW staff of “*not having everything under control*” (Interview with executive manager, 2014), one of the executive managers stresses:

“This is exactly what we want; we do not want to have everything under control. Things should develop on their own. Only in the case of something going utterly wrong do we interfere.”

[Interview with executive manager, 2014]

The citation indicates a very profound belief in the usefulness of participatory formats among MAW managers, which also implies a significant amount of trust in the skills and capabilities of the citizens.

When asked about the origin of this strong belief in participation, one of the interviewees explains:

“It has to do with the cooperatives. Indeed, we all have a background in the cooperative sector. All of us have been active in this scene for quite some time, Mr. H. for about 15



years and Mr. S. for 20 years. We are all convinced that this cooperative idea is a very good idea that works.”

[Interview with executive manager, 2014]

Therefore, it is reasonable to argue that the cooperative background of the MAW personnel and people involved shaped their general attitude toward participation and allowed the organization to implement participatory processes that were more far-reaching compared to cases from other organizations.

***Efficient decision-making body embedded in broader participatory processes:***

Despite the vast participatory processes, MAW still managed to channel and coordinate participation efficiently. As described in section 4.1, there were times when MAW management restricted participation to move forward with the project. Additionally, participatory formats such as echorooms had a consultative function, and the ideas and recommendations generated by the participants were not formally binding to the board of directors. This can be attributed to the requirements of external actors, most importantly the financial sector, that prompted MAW to adapt more economic thinking, processes and structures to obtain a sufficient bank loan, as the president of the cooperative highlights in a public report from 2013 (BWO, 2013, p.60).

One of our interviewees stressed that this combination of a lean decision-making body and a greater range of participatory formats was a key factor for success:

“We had very slim discussions among the board about what ideas to realize. It was not a cumbersome process at all; the decision-making processes were always very lean. Let’s put it that way: a lean and quite hierarchical decision-making structure embedded in a plurality of participatory formats, individuals and external organizations (...); I found this dichotomy between decision-making bodies connected to a very broad environment very efficient.”

[Interview with member of the board, 2014]

It becomes clear that participatory processes went hand in hand with an efficient decision-making body that maintained a bird’s-eye view, synthesized the results of the different working groups and made decisions to move the project forward.

***Consensus based decision-making:***

Our analysis shows, however, that these lean decision-making processes did not mitigate the strong consensus-based culture of MAW. Our interviewees stress that the exclusive decision-making power of the board had never been challenged by any actor involved in the project nor led to any conflict, which indicates that all groups continually perceived MAW as a legitimate decision-making body. This can probably be attributed to the cooperative nature of MAW, which obliges it to act on behalf of its members and the concerns of the broader community, as well as the constant deliberation of important decisions and next steps in the echorooms. As described previously in 4.1, echorooms often served as a forum to discuss MAW's decision-making with the broader public. One of the external moderators of an echoroom states:

“It became evident that the echorooms resemble a barometer of public opinion and can serve as a consultative body. (...) It's about reassuring the board's work against the (broader member) base. (...) Echorooms represent a key tool for the board to regularly discuss central questions with the member base. And so far, our experience has shown that fundamental criticism remained absent.”

[Interview with external moderator, in: BWO, 2010, p.28]

Consensus-based decision-making therefore seems to be another key characteristic that facilitated the participatory development process.

***MAW as a learning and innovation platform:***

With regard to the diffusion of practices, values and ideas, the role of MAW as a learning and innovation platform also seems to be unique. As described in the prior sections, MAW was set up by existing cooperatives as an experiment to test new sustainability practices and participatory formats that had not been applied before. Accordingly, industry partners, for instance, were invited to experiment with new technologies and materials (Interview with executive manager, 2014). Further, the participatory development process of the Hunziker Areal fostered learning among the representatives from the member cooperatives and partner organizations, who became acquainted with ideas on future living solutions that were also suitable for their own environment:

“(With MAW) we have proven in different ways that it works. In that way, when I put ideas forward, I can always say ‘one can do it as MAW did - it works there.’ That is a very

important aspect. (...) The experience at MAW encouraged me to trust and serves as a reference that I can carry forward.”

[Interview with member of the board, 2014]

The quote shows that participants coming from the member cooperatives started to refer to MAW as a best-practice example, where sustainability and economic aspects were successfully reconciled. Accordingly, one of our interview partners reports, for instance, that he was able to convince his cooperative to implement several living concepts developed by MAW in a slightly adapted form in another project (Interview with member of the board, 2014). Another board member notes that MAW taught him much about the value of a connected neighborhood approach and the importance of the surrounding areas for new building projects by showing him that one has to *“think more about how to connect with the surrounding environment”* (Interview with member of the board, 2014) to create a lively new neighborhood. He also states that he fundamentally changed the approach of his cooperative to plan new buildings and urban areas by giving more attention to the broader context of the new neighborhood:

“I have learned that with careful selection and a method of designing commercial space, one can vitalize a neighborhood [...] a central point we started to change in our new building projects.”

[Interview with member of the board 2, 2014]

The learning process did not only take place among member cooperatives, but also among external partner organizations. Partners changed, for instance, their view on concepts put into practice at MAW as the example of the AGE foundation shows. During the ideation phase, the foundation gave major input for alternative new living concepts for elderly people such as large shared satellite flats that enable groups of people to live together, but have opportunities for retreat at the same time. The experience at MAW showed, however, that these new concepts were hard to communicate to the target generation during the rental phase, and that elderly people only started to be interested in the new living formats after they had moved to the Hunziker Areal. Thus, by accompanying the overall development process, the foundation was able to change its interpretive frame, and concluded that 2.5 room flats seem to correspond best to the needs and wants of the elderly people when first moving in (AGE-Foundation, 2015).

Our data show, however, that not only did a learning process regarding the feasibility of new sustainable practices and future living solutions take place among the member cooperatives and partner organizations, but also a change in the individuals' perception and general assumptions toward the participatory formats. At the beginning of the development process, there was not only enthusiasm but also wide-spread doubts with regard to the width and depth of the participatory formats, as one of the members of the board admits:

"There were people like me, who were very skeptical about these forms of participation, and we often expressed that in the board meetings. But our management was very confident in the participatory formats at MAW, and they pushed them through. [...] In the end, I was glad that the management pushed the new formats through because I learned a lot from them."

[Interview with member of the board, 2014]

This enthusiasm for new participatory formats tested at MAW emerged also among some of the partners involved. A professor from one of the universities involved in the process highlights:

"I would recommend to replicate the participatory format [...] The development and realization of sustainable concepts should not be a purely technocratic matter. [...] During the echorooms a unique accumulation of progressive ideas evolved and were discussed"

[BWO, 2010, p.33]

Furthermore, the board member also describes his changing attitude toward some of the concepts developed in the participatory formats. Initially, he had doubts about the feasibility of some of the ideas such as urban farming, judging them as "*utopian*" and "*naïve*," but he was finally convinced of their usefulness. MAW convinced him that the involvement of sustainability experts and building specialists as well as committed individuals can give valuable input regarding ecological and social sustainability. Even the executive managers, who were fully convinced of deep and wide participation from the very beginning, note that learning still took place regarding the applicability of participatory methods in a complex project such as MAW. As one of the executive managers states:

"I have to admit, facilitating such open processes with so little guidance - I could not imagine it. That was a major learning experience."

[Interview with executive manager, 2014]

The given examples illustrate that the experience of the participatory formats and successful outcomes strengthened trust in participation among representatives of the member cooperatives, the project team, and external partner organizations alike. Therefore, MAW had become a tool to drive innovation within the cooperative network and initiated learning processes among its staff, the member cooperatives and partner organizations that started to disseminate the new practices beyond the borders of the new neighborhood.

## 4.5 Discussion

This paper provides an analysis of the cooperative-led development process of a new sustainable neighborhood, focusing on the cooperative's organization and the participatory formats used to involve citizens (and other stakeholders) as well as the specific cooperative characteristics that influenced the participatory development approach. The results show that cooperative networks can be powerful actors in sustainable city development and are very suitable for diffusing new sustainability concepts and innovations via their network of member cooperatives. Three key insights emerge from the case study:

1. Cooperative and cooperative network characteristics create an environment conducive to citizen participation at all stages of the development process of new sustainable neighborhoods.
2. Organizational structures in cooperatives must balance between far-reaching participatory formats and efficient decision-making to be successful in implementing participatory development processes for sustainable lifestyles.
3. Cooperatives that are highly embedded in a cooperative and partner network will be more likely to generate higher order learning among its participants and diffuse sustainable lifestyles throughout and beyond the network.

### **4.5.1 Cooperatives and Cooperative Networks Facilitating Participation**

Several factors associated with the cooperative nature and organizational setting of MAW promoted continuously wide and deep citizen participation throughout the development process of the new sustainable neighborhood. The case study shows that a cooperative

network can be a very suitable organizational format to integrate citizens into the development process of a new sustainable neighborhood. With a broad member base, cooperative networks can enable the participation of citizens in the ideation phase long before the residents of the future neighborhood become known. The study also reveals that the cooperative culture of dialogue and consensus facilitates far-reaching participatory formats in all phases of the development process. In the case of MAW, these values were deeply embedded in the cooperative background of the executive managers and the board of directors of MAW. It seems as if the cooperative network, therefore, naturally created an environment that promoted the outside-in process of open innovation by guaranteeing constant input of and feedback on external ideas and concepts, a challenge that corporate actors still struggle to overcome (West & Bogers, 2013).

This finding corresponds to the argument of Novkovic and Holm (2012), who see the cooperative business model at the forefront of social innovation due to its problem-solving nature and common purpose. Thus, this case study identifies cooperatives, and especially corporative networks, as a new form (or even the ideal form) of catalytic agency in the process of eco-town development being not only a part of the project but driving the development process. This finding corresponds also to the outlook of Johansova, Crabtree, and Fankova (2013), who identify social enterprises such as cooperatives and their mutual support networks as driving elements of future degrowth economies. Therefore, our finding adds a new actor perspective to the literature on sustainability transitions, which has often called for a more fine-grained image of actors involved in transformation processes (Farla et al., 2012).

#### **4.5.2 Organizational Structures Must Balance Far-reaching Participation and Efficient Decision-making**

This case study further highlights the innovative organizational structures of MAW, which reflect a more company-like setup, compared to other housing cooperatives. The organizational setup constituted by a rather small decision-making body connected to a broader citizen and stakeholder environment allowed MAW to coordinate the coherence of the different participatory formats and ensured the overall implementation of the project according to the set timeline. This organizational setup can be attributed to the cooperative network structure

behind MAW as well as requirements from external actors, as described in 4.2.3. In this way, the network structure behind MAW and interaction with outside actors, especially the financial sector, inspired new forms of organizational structures. Thus, similar to the findings in the previous literature, MAW as a cooperative network does not represent a traditional housing cooperative but acted as a source of organizational innovation (Novkovic & Holm, 2012).

Our case further illustrates how an organizational setup and governance structure with a small decision-making body and the described network structure enabled the alignment of far-reaching participatory formats with very tight and efficient decision-making processes. The board of directors, which is elected by the members of the cooperative, holds all decision-making power. The exclusive decision-making power of the board, however, was never questioned, nor did any citizen or any other party involved complain about its purely consultative role. This absence of criticism can probably not only be attributed to the organizational set-up of the cooperative, in particular the election process in place, but also to the format of echorooms, since echorooms served as a barometer of public opinion and created a culture of consensus-based decision-making. Thus, our case study shows that deep and wide participation can, next to the general organizational set-up of cooperatives, additionally serve the purpose of legitimization, as it is often the case in sustainability-oriented projects that have a direct impact on the (future) life of the participants (Bäckstrand, 2003). In summary, the efficient organization of participatory processes is remarkable because participatory processes and consensus-based decision-making are often found to cause time delays, struggles and higher costs in such development processes (Solitare, 2005). By using an innovative organizational setup, MAW managed to overcome these challenges without taking firm control of the participatory formats, as is often described with regard to participatory processes led by public bodies (Bayulken & Huisingsh, 2015a).

#### **4.5.3 The Cooperative Network was able to Induce Higher Order Learning**

Our findings show that the cooperative network and external parties involved in the project hold a very central role in the development process that goes beyond the organizational innovation described above. In section 4.2.5, we highlight different learning experiences, problem refinement and readjustment processes among the actors involved, especially with

regard to the member cooperatives and partner organizations that were highly involved into the participatory development process. We find that by interacting with each other throughout the overall development process, the different actors redefined and readjusted their understanding of how to achieve the common vision of the new sustainable neighborhood and the 2000-Watt Society. Participants questioned, for instance, their initial assumptions regarding different participatory processes and their usefulness in cooperative development projects, the tools for how to achieve new sustainable future forms of living and norms for new neighborhoods, and the role of cooperatives and cooperative projects regarding society's sustainability goals. The cooperative and partner network can therefore be identified as a place for higher order learning, which is commonly defined as "changes in the assumptions, norms and interpretive frames which govern the decision-making process and actions of individuals, communities and organizations" (Brown & Vergragt, 2008, p.110). By conducting an experiment aiming to develop and test new technologies and inducing higher order learning among all actors involved through interactive processes, MAW and the construction of the Hunziker Areal also seem to correspond to the characteristics of a bounded socio-technical experiment (BSTE) as defined by Brown and Vergragt (2008, p.114). As many BSTEs, MAW also shows several characteristics that are conducive for higher order learning, such as heterogeneous actors from different sectors, a common vision of sustainability, a specific goal, and the creation of a sense of urgency (Brown & Vergragt, 2008, p.127).

BSTEs are often presented as agents for social learning, leading to social change (Brown & Vergragt, 2008, p.127). Learning mechanisms on the part of the member cooperatives and external partners involved in the project are therefore particularly important with regard to the diffusion of the new participatory formats and sustainability practices, as described in 4.2.5. Learning among the member cooperatives is a starting point for the diffusion of MAW practices and sustainable lifestyles beyond the borders of the new neighborhood. The embeddedness of highly involved partners, which also experience higher-order learning, strengthens this diffusion. This finding correspond not only to the concept of bounded socio-technical regimes but also to the research of Lawrence, Hardy, and Phillips (2002), who argue that forms of collaborations that show a high level of involvement among participating actors and a high level of embeddedness will have the greatest impact on the diffusion of new practices and rules.



## 4.6 Conclusion

With the case study of MAW, we intended to analyze cooperatives and cooperative networks regarding their ability to facilitate participation in the development process of new sustainable neighborhoods. In particular, we investigated the participatory formats, such as e.g. echorooms or neighborhood groups, throughout the development process and the characteristics of the cooperative network that affected participation. Our analysis illustrates how an innovative cooperative format, born out of the collective entrepreneurship of numerous existing housing cooperatives, mobilizes citizens and other actors to contribute to the development of a new neighborhood that is centered on economic, environmental and social sustainability. At the beginning of the development process, the broad base of the member cooperatives allowed MAW to tap into the knowledge and ideas of citizens that complemented the expert input into the project. Throughout the process, the collaboration with future residents became even more important, in order to realize the 2000-Watt Society.

The diverse set of participatory formats ranged from self-organized working groups to collaborative partnerships and public forums for discussion. The different formats were meant to allow external actors to contribute and develop their own ideas on the design and organization of the new neighborhood, initiate dialog and discussion among a wider public, and ultimately guide and legitimize MAW decision-making. Although this wide and deep participatory approach was associated with challenges such as a higher work load, limited time resources on parts of the cooperative, and the creation of a homogeneous group of residents that was not representative of the urban average, MAW managed to overcome these challenges. The successful implementation can be attributed to a number of factors that relate to the cooperative nature of MAW and its innovative organizational setup. In particular, one can highlight the organizational structures, which assured efficient decision-making as well as a long history and familiarity with participatory approaches within the cooperative world and the resulting high level of commitment and strong belief in the idea of participation among MAW management. We argue, therefore, that the cooperative network is a suitable organizational format to efficiently manage and conduct citizen participation in the transition to more sustainable forms of living. Future research may consider analyzing other organizational forms

and leadership styles that can promote successful management of such vast participatory processes that aim at establishing sustainable lifestyles.

One important finding of the analysis also relates to the social learning processes induced by the cooperative and the diffusion of its ideas and practices through the member cooperatives beyond the boundaries of the new sustainable neighborhood. MAW was set up as an innovation and learning platform for existing housing cooperatives in Zurich to test the suitability and feasibility of new participatory elements as well as new practices for future sustainable forms of living. By participating in the overall development process, participants from the member cooperatives gained trust in wide-ranging participatory formats and sustainability-oriented new forms of living. Such learning processes led to a more open attitude among the member cooperatives and a willingness to experiment with similar participatory formats and sustainability practices within their own setting, thereby taking the newly developed forms of living beyond the boundaries of the new neighborhood. Due to the high number of member cooperatives involved in the project, future researchers may want to consider analyzing the depth and width of the diffusion of practices through these cooperatives.

Furthermore, this research focuses on the organizational perspective of the participatory processes during the development of only the Hunziker Areal. In line with the findings of Ornetzeder and Rohrer (2006), one could also focus on the citizens and investigate the impact that the involvement in the development processes had on the sustainable lifestyle of the participating actors and whether participation has led, as assumed, to lasting changes in behavior and practices. It would also be interesting to analyze how the participatory organization of the new neighborhood develops over time.

Regarding MAW's vision of the 2000-Watt Society, the cooperative network was able to record a first success, as it was nominated as a lighthouse project by the Swiss Federal Office of Energy due to its energy optimization measures and efforts to raise awareness of energy usage among the inhabitants. However, it has to be acknowledged that the overall evaluation of the sustainability impact of the Hunziker Areal remains to be done in the future, since it highly depends on the behavior of the (future) residents (e.g. use of electric mobility solutions, ban of

individual washing machines, meat reduced diet from local food supply), which has not been investigated until now.

From a practitioners' point of view, our study also provides some important insights. First and foremost, it illustrates that cooperatives represent an ideal playground for involving citizens in promoting urban sustainable neighborhoods. Our findings show that participation in MAW development processes has led to a changing perception of the innovative potential of citizens among participants from the member cooperatives. This study can therefore serve as an example and diffuse the learning processes across the boundaries of the cooperative under investigation.

#### 4.7 References

- AGE-Foundation (2015). *Erstvermietung auf dem Hunziker Areal: Instrumente, Prozesse, Erfahrungen*. Zurich: AGE Foundation.
- Arnold, M., Barth, V. (2012). Open innovation in urban energy systems. *Energy Efficiency* 5(3), 351-364.
- Bäckstrand, K. (2003). Civic science for sustainability: Reframing the role of experts, policy-makers and citizens in environmental governance. *Global Environmental Politics* 3(4), 24-41.
- Bayulken, B., Huisingh, D. (2015a). Are lessons from eco-towns helping planners make more effective progress in transforming cities into sustainable urban systems: A literature review (part 2 of 2). *Journal of Cleaner Production* 109, 152-165
- Bayulken, B., Huisingh, D. (2015b). A literature review of historical trends and emerging theoretical approaches for developing sustainable cities (part 1). *Journal of Cleaner Production* 109, 11-24
- Boone, C., Ozcan, S. (2013). Why do cooperatives emerge in a world dominated by corporations? The diffusion of cooperatives in the U.S. bio-ethanol industry, 1978-2013. *Academy of Management Journal* 57(4), 990-1012.
- Bösch, I. (2009). Weniger als Träumen: Das Ziel ist mehr als Wohnen, *Hochparterre* 6, pp. 48-49. Zurich: Hochparterre AG.
- Bowen, G.A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal* 9, 27-40.
- Brown, H.S., Vergragt, P.J. (2008). Bounded socio-technical experiments as agents of systemic change: The case of a zero-energy residential building. *Technological Forecasting and Social Change* 75(1), 107-130.

- BWO (2010). *Mehr Als Wohnen: Von der Branche zum Stadtquartier - Report 1*. Zurich: Bundesamt für Wohnungswesen (BWO).
- BWO (2013). *Mehr Als Wohnen: Von der Branche zum Stadtquartier - Report 2*. Zurich: Bundesamt für Wohnungswesen (BWO).
- Carrillo-Hermosilla, J., del Río, P., Könnölä, T. (2010). Diversity of eco-innovations: Reflections from selected case studies. *Journal of Cleaner Production* 18, 1073-1083.
- City of Zurich (2011). *On The Way To The 2000-Watt Society: Zurich's Path to Sustainable Energy Use*. Zurich: City of Zurich.
- Cunningham, P.A., Wearing, S.L. (2013). The Politics of Consensus: An Exploration of the Cloughjordan Ecovillage. *Cosmopolitan Civil Societies Journal* 5(2), 1-28
- Dangelico, R.M., Pontrandolfo, P., Pujari, D. (2013). Developing sustainable new products in the textile and upholstered furniture industries: Role of external integrative capabilities. *Journal of Product Innovation Management* 30(4), 642-658.
- De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy* 41(3), 614-623.
- Del Río González, P. (2005). Analysing the factors influencing clean technology adoption: A study of the Spanish pulp and paper industry. *Business Strategy and the Environment* 14(1), 20-37.
- Dorado, S. (2013). Small groups as context for institutional entrepreneurship: An exploration of the emergence of commercial microfinance in Bolivia. *Organization Studies* 34(4), 533-557.
- Doyle, R., Davies, A.R. (2013). Towards sustainable household consumption: Exploring a practice oriented, participatory backcasting approach for sustainable home heating practices in Ireland. *Journal of Cleaner Production* 48, 260-271.
- Eisenhardt, K.M. (1989). Building theory from case study research. *The Academy of Management Review* 14(4), 532-550.
- Eisenhardt, K.M., Graebner, M.E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal* 50(1), 25-32.
- Farla, J., Markard, J., Raven, R., Coenen, L. (2012). Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological Forecasting and Social Change* 79(6), 991-998.
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry* 12(2), 219-245.
- Heiskanen, E., Kasanen, P., Timonen, P. (2005). Consumer participation in sustainable technology development. *International Journal of Consumer Studies* 29(2), 98-107.
- Hoffmann, E. (2007). Consumer integration in sustainable product development. *Business Strategy and the Environment* 16(5), 322-338.
- Holahan, P.J., Sullivan, Z.Z., Markham, S.K. (2014). Product development as core competence: How formal product development practices differ for radical, more innovative, and incremental product innovations. *Journal of Product Innovation Management* 31(2), 329-345.

- Irwin, A., Hooper, P.D. (1992). Clean technology, successful innovation and the greening of industry: A case-study analysis. *Business Strategy and the Environment* 1(2), 1-11.
- Johanisova, N., Crabtree, T., Fankova, E. (2013). Social enterprises and non-market capitals: A path to degrowth? *Journal of Cleaner Production* 38, 7-16.
- Kronsell, A. (2013). Legitimacy for climate policies: Politics and participation in the green city of Freiburg. *Local Environment* 18(8), 965-982.
- Laperche, B., Picard, F. (2013). Environmental constraints, product-service systems development and impacts on innovation management: Learning from manufacturing firms in the French context. *Journal of Cleaner Production* 53, 118-128.
- Lawrence, T.B., Hardy, C., Phillips, N. (2002). Institutional effects of interorganizational collaboration: The emergence of proto-institutions. *Academy of Management Journal* 45(1), 281-290.
- Markard, J., Raven, R., Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy* 41(6), 955-967.
- MAW (2015a). Official Website: <http://www.mehralswohnen.ch>.
- MAW (2015b). Press release: *Eine Vision wird wahr*. Zurich: MAW.
- Menzani, T., Zamagni, V. (2010). Co-operative networks in the Italian economy, *Enterprise & Society* 11(1), 98-127.
- Merriam, S.B. (1988). *Case Study Research in Education: A Qualitative Approach*. San Francisco: Jossey-Bass.
- Miles, M.B., Huberman, A.M. (1994). *Qualitative Data Analysis*. London: Sage Publications.
- Mont, O., Neuvonen, A., Lähteenoja, S. (2014). Sustainable lifestyles 2050: Stakeholder visions, emerging practices and future research. *Journal of Cleaner Production* 63, 24-32.
- Novkovic, S. (2008). Defining the co-operative difference. *The Journal of Socio-Economics* 37(6), 2168-2177.
- Novkovic, S., Holm, W. (2012). Cooperatives as source of organizational innovation. *The International Journal of Co-operative Management* 6(1), 51-60.
- Omoregie, R. (2010). Das genossenschaftliche Dialogprinzip ist ein Erfolgsfaktor, *Wohnen* 11/2010. Luzern: Verband der Baugenossenschaften.
- Ornetzeder, M., Rohracher, H. (2006). User-led innovations and participation processes: Lessons from sustainable energy technologies. *Energy Policy* 34(2), 138-150.
- Owens, S. (2000). Engaging the public: Information and deliberation in environmental policy. *Environment and Planning* 32, 1141-1148.
- Penna, C.C.R., Geels, F.W. (2012). Multi-dimensional struggles in the greening of industry: A dialectic issue lifecycle model and case study. *Technological Forecasting and Social Change* 79(6), 999-1020.

- Sagebiel, J., Müller, J.R., Rommel, J. (2014). Are consumers willing to pay more for electricity from cooperatives? Results from an online Choice Experiment in Germany. *Energy Research & Social Science* 2, 90-101.
- Sanders, E.B.N. (2002). From user-centered to participatory design approaches, in: Frascara, J. (Ed.), *Design and the Social Sciences: Making Connections*. New York: Taylor & Francis Books Limited.
- Sangle, S. (2011). Adoption of cleaner technology for climate proactivity: A technology-firm-stakeholder framework. *Business Strategy and the Environment* 20(4), 365-378.
- Seyfang, G. (2007). Cultivating carrots and community: local organic food and sustainable consumption'. *Environmental Values* 16, 105-123.
- Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. London: Sage Publications.
- Smith, A., Fressoli, M., Thomas, H. (2014). Grassroots innovation movements: challenges and contributions. *Journal of Cleaner Production* 63, 114-124.
- Smith, S.C. (1994). Innovation and market strategy in Italian industrial cooperatives: Econometric evidence on organizational comparative advantage. *Journal of Economic Behavior and Organization* 3, 303-320.
- Solitare, L. (2005). Prerequisite conditions for meaningful participation in brown-fields redevelopment. *Journal of Environmental Planning and Management* 40(6), 725-738.
- Stirling, A. (2008). Opening up and closing down: Power, participation, and pluralism in the social appraisal of technology. *Science, Technology & Human Values* 33(2), 262-294.
- UN-Habitat (2011). *Global Report on Human Settlements 2011: Cities and Climate Change*, London: Earthscan.
- Vergragt, P., Akenji, L., Dewick, P. (2014). Sustainable production, consumption, and livelihoods: global and regional research perspectives. *Journal of Cleaner Production* 63, 1-12.
- Vergragt, P.J., Brown, H.S. (2007). Sustainable mobility: From technological innovation to societal learning. *Journal of Cleaner Production* 15, 1104-1115.
- Viardot, E. (2013). The role of cooperatives in overcoming the barriers to adoption of renewable energy. *Energy Policy* 63, 756-764.
- West, J. & Bogers, M. (2013). Leveraging external sources of innovation: A review of research on open innovation. *Journal of Product Innovation Management* 31(4), 1-18.
- Yin, R.K. (2008). *Case study research: Design and methods*, 3ed. London: Sage Publications.

## 5 Conclusion

The aim of this dissertation is to shed light on the emerging phenomenon of company-driven sustainability innovation integrating users. For this purpose, the essays included in this thesis address three specific research questions empirically, and draw on different conceptual and theoretical approaches to analyze the phenomenon and improve our understanding. Essay 1 draws on institutional theory to understand and explain how companies shape societal norms and behaviors by directly and indirectly interacting with users throughout the social innovation process. Essay 2 also focuses on the relationship between innovating companies and users, but analyzes the reverse effect, i.e. how user integration affects sustainability innovation in incumbent firms. Essay 3 again puts emphasis on the role of cooperatives, an organizational form that transcends the traditional divide between producers and users, and aims to answer how cooperatives organize and implement citizen participation throughout the development process of a new sustainable neighborhood. In doing so, the essays expand theoretical knowledge on user integration in sustainability innovation and offer practical implications. This chapter first summarizes the main results of the essays and outlines the implications for theory and practice, and then goes on by pointing out limitations of this work as well as areas for future research.

### 5.1 Summary of Results and Implications

**Essay 1** set out to answer the question of how companies shape the informal institutional environment throughout the sustainability innovation process. By looking at four different innovation processes covering multiple technologies, the study allows to draw conclusions on the relevance of different types of informal institutional work along the different phases of the innovation process, and on the relevance of these types of institutional work according to different characteristics of innovativeness of the newly developed product / service.

The findings reveal that institutional work of the case companies differed indeed with regard to the different dimensions of innovativeness of the newly developed product /

service under review, i.e. the degree of change in consumption patterns necessitated by adoption, and the degree of difference to existing alternatives on the market. Companies that brought products and services to the market, which differed highly from existing alternatives, engaged more actively and much earlier in education and research activities to challenge users' fears about the functionality of the technology and fears of sacrifice. They also aimed to provide users with physical experiences of the technology, in order to generate positive emotions that countered initial hesitations. Direct user interaction also served them to better understand what informal institutions they can tap and modify to legitimate their technology, and directly shape and alter users' understanding of the technology. In addition, the companies cooperated with third parties, in order to legitimize their innovation efforts. The findings thus suggest that earlier institutional work to influence informal institutions in multiple ways can compensate for a greater degree of difference of the newly developed product or service compared to existing alternatives on the market. Companies developing products and services that imply higher changes in consumption patterns, in contrast, rather put emphasis on activities to shape informal institutions throughout the latter stages of the innovation process. They cooperated with third parties, in order to promote the visibility of the new product / service, and turned users that had been integrated in the innovation process into ambassadors for the new product / service, thereby aiming to increase market adoption.

The study expands existing literature on institutional work in innovation studies in several ways. First, it portrays the different sets of practices to influence informal institutions against the distinct phases of the innovation process. This shows that innovating actors start not only in the commercialization phase to shape the understanding of the new product or service, as it is often documented in existing literature (e.g. Kukk et al., 2016; Munir & Phillips, 2005). It also extends existing process models on institutional work (Walker et al., 2014) by showing that there are institutional constraints on the user side that need to be overcome by innovating actors. In the case of sustainability innovations, it seems to be particularly important to take these constraints on the user side into account, since these products and services often evoke functionality fears and fears of sacrifice among users.



Second, by pointing out the different practices to influence informal institutions, and categorizing them according to the number of actors involved in uni-, bi- and multilateral practices, the study stresses the social dynamics of institutional work. Prior literature often presents the shaping of meaning of new technologies as a one-directional process led by companies that make use of different discursive practices. Against this understanding, Essay 1 finds that institutions are often co-created and emerge via the interaction with users and other parties such as public authorities, civil society organizations and market players (Zietsma & McKnight, 2009). This stresses the importance of “distributed agency” for technology emergence (Garud & Karnoe, 2003). Cooperation and interaction with users and other third parties seems to be particularly important in the case of sustainability innovation, since it requires the adoption of new norms and practices, which are more socially and environmentally beneficial.

Third, the findings of the essay contribute to the emerging literature stream on emotional work (Creed et al., 2014) by pointing out the role of physical experiences and positive emotions for changing informal institutions. Our findings show that in the cases under review, the generation of physical experiences and positive emotions had a stronger effect than other educational activities, such as the pure offering of information, in countering prevailing fears, challenging initial assumptions and triggering behavioral changes. Thereby, the findings contribute to a more detailed understanding of how emotions are used in institutional work.

The findings are also useful from a practitioners’ perspective. First and foremost, they demonstrate the need to embed sustainability innovation in the everyday lives of (potential) users. The identification of different sets of practices to induce change in informal institutions according to the different characteristics of innovativeness of the new product / service helps managers to visualize that informal institutions need to be taken into account from the very beginning of the innovation process. The findings imply that it is crucial for companies aiming to bring sustainability innovation to the market to design organizational processes that support the integration of users and other parties throughout the innovation process, and promote the generation of physical experiences with the product.

**Essay 2** investigates how company-driven user integration in various stages of the innovation process affects sustainability innovation in incumbent firms, by comparing cases of sustainability innovation in the context of e-mobility and smart housing in three incumbent firms. Results suggest that companies profit in various ways from user integration in sustainability innovation in the different phases of the innovation process. Early user integration served mainly the exploration of user ideas and future needs, and the validation of company internal ideas. User integration in the latter stages, particularly via field trials, was meant to uncover behavioral changes in the everyday lifestyle of users induced by the novel sustainable new products and services, allowing the company to refine the product / service under development accordingly and increase the chances of market success.

By outlining different approaches to involve users along the innovation process as well as corporate motivations and benefits, the study advances existing literature on the role of user integration in sustainability innovation, which has focused mainly on independent user innovation and the testing of particular methods at one point in time. First of all, it is interesting to note that all case companies stressed the fact that early and constant user integration helped them to confirm the strategic course of the company with regard to the sustainability innovation, thereby overcoming risk aversion towards very novel sustainability innovations. Previous research has shown that sustainability innovation often represents a challenge for the private sector, since it requires the translation of environmental and social benefits into customer benefits, and is therefore often not easily introduced to the market (e.g. Baden-Fuller & Haefliger, 2013; Bohnsack et al., 2014). Companies thus often face uncertainties about concepts and business models that are sustainable and profitable at the same time (Kley et al., 2011). Incumbent firms are particularly prone to stay close to the status quo, since past experiences often guide future decision-making (Budde Christensen et al., 2012), and deeply established operational norms, procedures and practices limit the cognitive capabilities to appreciate the potential of novel products and services (Hienerth et al., 2011). The findings in Essay 2 suggest that user integration helped incumbents to overcome these barriers, and strengthened the companies' willingness and efforts to invest in sustainability innovation. By confirming the innovation course of the company and minimizing the chances of market failure of the new sustainable product or service, user

integration in sustainability innovation represented a form of risk-management to the companies under review.

It is also noteworthy that the companies experienced a change in perception of the benefits of user integration in sustainability innovation over time. Whereas collaborations with other parties, such as universities and research institutes seemed to be widely accepted, company representatives had little expectations with regard to the integration of users in sustainability innovation. This corresponds to the “not invented here” syndrome identified in innovation literature, which describes the initial rejection of ideas from outside actors, since they are perceived as less qualified than company representatives. After their first experiences with user integration, the case companies were surprised by the innovative potential of users as well as the usefulness of their ideas and feedback. As a consequence of the changing perception, two of the companies even altered their approaches to integrate users along the innovation process and expanded it to new areas. Thus, first experiences with user integration triggered a learning process among company representatives, which appears to manifest in an intensification of further user integration in sustainability innovation.

These aspects uncovered in the analysis hold important implications for practitioners and policy makers alike. By outlining how innovating actors profit from user integration in sustainability innovation, the findings can serve other companies as an example and spread the learning process across the boundaries of the three cases under review. This is particularly important considering the fact that all companies acknowledged initial doubts with regard to the usefulness and practicability of user integration. Policy makers might consider this fact when designing funding schemes for sustainability innovation, since public funding for user integration in the present might be an effective tool to trigger companies to intensify these efforts in the future.

**Essay 3** looks at cooperatives as an organizational form that transcends the traditional divide between producers and users. It aims to answer the question of how cooperatives organize and implement citizen integration in sustainability innovation, by analyzing the cooperative-

led development process of a new sustainable neighborhood in Switzerland. The analysis focuses on the different participatory formats implemented as well as cooperative characteristics that affected participation.

The findings suggest that cooperatives and cooperative networks are a promising organizational form for involving citizens in all phases of the innovation process of new sustainable neighborhoods. Cooperative characteristics such as a broad member base with a common vision, a strong belief in participatory processes, and a culture of dialogue and consensus-based decision-making enabled wide and deep citizen participation throughout all phases of the innovation process. The extensive participatory approach was associated with challenges, such as time delays, a higher workload and limited time resources on parts of the participants. The cooperative network managed to overcome these challenges with an innovative organizational set-up, consisting of a small decision making body that was connected to a broader citizen and stakeholder environment. As such, the cooperative network naturally promoted an environment conducive to the outside-in process of open innovation, by ensuring constant integration of external ideas and concepts, a task that companies often still struggle with (West & Bogers, 2013).

In addition, the study suggests that cooperatives and cooperative networks hold an important role for the diffusion of sustainability concepts and sustainable lifestyles in and beyond the cooperative network. MAW, the cooperative network under review, was set up by existing cooperatives in Zurich to test the feasibility and suitability of new participatory formats and sustainability-oriented forms of living. The findings show that participation in the development process induced social learning processes among the participants from the member cooperatives, which led to increased trust in, and a willingness to experiment with new participatory formats oriented towards sustainability in the settings of the member cooperatives. Thereby, the member cooperatives represented a starting point to diffuse the new forms of participatory innovation and sustainable living beyond the boundaries of the new neighborhood. However, social learning was not limited to representatives of the member cooperatives only. The findings show that also other participating actors changed their understanding of how to achieve new sustainable forms of living, thereby indicating

higher order learning, defined as changes in norms, assumptions and shared conceptions of reality that guide individual and organizational action (Brown & Vergragt, 2008).

By highlighting the cooperative and the cooperative network as a powerful actor for promoting user and stakeholder integration in sustainable development and diffusing new sustainability concepts, the study provides scientific evidence for the assumption expressed in prior conceptual work that cooperative business models favor sustainability innovation and the transition towards a more sustainable economy (Johanisova et al., 2013; Novkovic & Holm, 2012). As Lawrence et al. (2002) have shown, forms of collaborations with a high level of involvement among participants and a high level of embeddedness have the greatest impact on the diffusion of new practices and rules. By highlighting the role of cooperatives and cooperative networks for the diffusion of new forms of sustainable living, the study also advances the literature of sustainability transitions, which has often been criticized for a lack of actor perspective (Farla et al., 2012).

The findings of Essay 3 are also interesting for policy makers and cooperatives that aim to promote sustainable lifestyles in general, and new sustainable forms of living in particular. By outlining the benefits of the cooperative business model more generally, and the cooperative network in particular, the study might inspire cooperatives and policy actors alike to form and support stronger networks, in particular for promoting innovation and experimentation.

Taken together, the findings of the three essays offer empirical evidence on the emerging phenomenon of user integration in company-driven sustainability innovation that illustrate different paths of corporate and cooperative actors to implement it, as well as its potential to contribute to more sustainable ways of product and consumption in Europe. Still, the process of case selection and analysis also showed that user integration in sustainability innovation today remains a niche phenomenon and more investment and activity is needed, in order to unlock its full potential. Since scholarship will play a crucial role in shaping future developments, the next sections of the conclusion therefore highlight limitations of this work as well as areas for future research, in order to move forward.

## 5.2 Limitations

This dissertation faces several limitations. Whereas this section highlights mainly limitations that relate to the overall research design including all three essays, the subsequent section on areas for future research also touches limitations that relate to one specific essay only and outlines related areas for future research.

First and foremost, it has to be acknowledged that all innovations analyzed in this doctoral thesis have only recently been released onto the market. As a criterion for case selection, this was meant to assure that all relevant actors involved in the innovation process were still available for interviews, and remembered the relevant events and procedures correctly. However, there is also an important shortcoming inherent to this approach. One cannot draw any conclusions yet neither about the sustainability performance, market attractiveness and profitability of the new products and services under review, nor relate it to the different sets of practices to influence informal institutions identified in Essay 1, the user-centered development strategies analyzed in Essay 2, and the cooperative-led development process under review in Essay 3.

Second, given the exploratory nature of this work, and considering the fact that the three essays included are based on a limited sample of cases only, the external validity of the case studies and therefore the generalizability of the results is limited. The cases under review all are located in Western Europe, belong to the energy, housing and mobility sector only, and deal with innovations that require (to a greater or lesser extent) shifts in user behavior. Additional cases from other contexts, such as different regions or sectors, could have been collected to further strengthen the reliability of the findings. However, at the same time, the strengths and weaknesses of a particular research design are inherently related to the rationale for selecting it as the most suitable method for studying a certain phenomenon. As Yin (2008) points out, case studies offer the unique opportunity to study an emerging phenomenon in depths, gain a rich data set, and generate a first-hand understanding of it. Thereby, case study research often inspires future research, qualitatively and quantitatively alike, and plays an important role in advancing a scientific field.

Third, as in any qualitative study, construct validity might also have been affected in this work, since interview statements risk of being biased by the respondents' view and (un-)conscious selection mechanisms (Miles & Huberman, 1994), and data analysis, particularly coding, is subject to the researcher's interpretation (Yin, 2009). This study aimed to minimize these risks by collecting data from multiple sources, including the consultation of different interview partners for each case, and analyzing data in a truly cooperative process between the co-authors. In addition, (preliminary) results were regularly discussed with other researchers in the European research project and on international management conferences. Data triangulation and investigator triangulation thus aimed to minimize potential problems of construct validity in this study (Patton, 1990).

### 5.3 Areas for Future Research

#### 5.3.1 User Integration in Sustainability Innovation and Institutional work

Essay 1 reveals the need to analyze user integration in sustainability innovation from an institutional theory lens. One array that seems to be particularly promising in this regard is *institutional work of ambidextrous organizations*. Two case companies analyzed in Essay 1 and 2, i.e. the German automotive manufacturer and the British energy provider, engage in sustainability innovation, but at the same time protect a traditional less sustainable business model. As such, they can be identified as ambidextrous organizations. Whereas this might not have any impact on the findings of Essay 2, it might have influenced their practices to influence informal institutions outlined in Essay 1. Without doubt, the companies under review do not only shape societal norms, values and behaviors to put forward sustainability innovation, but also aim to maintain current institutions, in order to defend their entrenched interests. In this regard, Essay 1 reveals the need to analyze how ambidextrous organizations combine or align institutional work that aims to promote new sustainability innovations with institutional work that protects their traditional business model. It might also be interesting to investigate the role that ambidextrous organizations play for promoting sustainability innovation in general.

Essay 1 also complements existing work on the *role of emotions in institutional work* (e.g. Creed et al., 2014). The findings show that physical experiences with the new product often triggered positive emotions such as joy and excitement among users, which affected users' initial perception and understanding of the new technology. So far, literature on 'emotional work' has primarily highlighted the use of discursive practices and explicit appeals to positive or negative emotions for realizing a certain objective (Creed et al., 2014; Toubiana & Zietsma, 2016). Essay 1 suggests that the generation of physical experiences constitutes another mean to evoke and mobilize emotions for shaping informal institutions, thereby contributing to a more detailed understanding of how emotions are used in institutional work. Further research is needed to fully understand the role of emotional work for the diffusion of sustainability innovations.

### **5.3.2 User Integration in Sustainability Innovation and Organizational Learning**

It is also interesting to note that all innovating actors under review experienced a *learning process* once they engaged with users. In particular, the empirical findings in Essay 2 and 3 have shown that innovating actors, i.e. company members and participants from the member cooperatives, started to question their initial perceptions and expectations with regard to user integration when experiencing it for the first time. This stimulated in many cases the intensification of user integration efforts, such as a change in methodological design or the integration of users in other settings or for different purposes. However, it remains unclear what factors affected this learning process. Future research might therefore want to explore in more detail the moderating factors in the relationship between experiences, learning and action that helped to overcome entry barriers to user integration in sustainability innovation.

One relevant moderating factor might be the *integration of secondary stakeholders*. Although this work set out to investigate the role of users in the sustainability innovation process, it soon became clear that many other stakeholders played an equally important role. All cases analyzed for this thesis showed a very high degree of interaction with secondary stakeholders, such as, for instance research institutes, governmental actors, and NGOs. This might be attributed to the complex nature of sustainability innovation, which demands collaboration across different organizations, as described in the introduction.



Compared to the corporate sector, secondary stakeholders are often primarily dedicated to environmental and social issues, which allows them to expand the company's boundaries in the sustainability innovation process. In some cases, they also brought specific expertise on user integration into the innovation process. Future research might therefore want to look into the role of secondary stakeholder integration on sustainability innovation in general, and on user integration in sustainability innovation in particular. It might also be interesting to investigate how companies implement stakeholder integration in everyday business and what type of tensions stakeholder integration entails for the company and stakeholders alike.

### **5.3.3 Organizational Forms and Formats Promoting User Integration in Sustainability Innovation**

This work, in particular Essay 2 and 3, highlights how corporate actors and cooperative networks implement user integration in the different phases of the innovation process. It became clear how innovating actors gained access to user ideas and feedback, and interview partners confirmed that they tapped need as well as solution knowledge on parts of the users. The final product / service offer also proofed that certain ideas of users were implemented, as described in detail in Essay 2 and 3. However, the process of how user ideas were merged with internal ideas and were incorporated in the R&D activities, in contrast to how user ideas and feedback was obtained, still remains somewhat unclear, particularly with regard to the corporate actors analyzed in Essay 2 (see also West & Bogers, 2014). To broaden our understanding of the integration activities, future research might want to give increasing attention to organizational formats and processes that enable the *incorporation and merging of user ideas* in corporate innovation processes.

In addition, the interviews conducted for this thesis showed that all innovating actors noted not only benefits, but also challenges and downsides with regard to user integration. As outlined in the introduction to this thesis, user and stakeholder integration has numerous advantages, but also disadvantages, such as a higher workload, additional costs, long time periods, and uncertain intellectual property rights. Our data shows that all companies encountered some of these challenges with regard to user integration. Whereas Essay 3 identifies cooperative actors, and particularly the cooperative network, as a suitable organizational form to overcome these challenges, many open questions remain in this

regard. Future research may consider investigating other *organizational forms, structures and leadership styles* that are able to minimize the downsides of user integration in sustainability innovation.

#### **5.3.4 Societal Impact of User Integration in Sustainability Innovation**

As pointed out in the prior section on limitations, one cannot draw any conclusions yet on the market success and sustainability impact of the newly developed products and services analyzed in this thesis, since they all were only recently introduced to the market. Future research might therefore consider revisiting the cases in a couple of years time, in order to evaluate the *impact of user integration on market and sustainability performance*, and compare cases of successful sustainability innovation with cases where a product or service has failed on the market. In order to test and refine the findings in this thesis, future research might also include the analysis of additional cases and their comparisons with cases where no users have been integrated in the innovation process, as well as quantitative studies.

Another point that seems to be interesting in this regard is the role of integrated users for the diffusion of sustainability innovation. The findings of Essay 1 indicate that companies relied on integrated users and stakeholders to help the diffusion of the newly developed product or service and related informal institutions. Integrated users took on the role as ambassadors for the newly developed product or service, promoting its adoption among other users. Partnerships with secondary stakeholders, such as NGOs, aimed to increase market visibility and attraction. Thus, users and stakeholders took on the role as multipliers, extending market performance and sustainability impact of the innovation under review. Future research might want to investigate in more detail the impact of this *multiplying role of users and stakeholders* on the diffusion and sustainability impact of innovations, and whether and how this effect could be strengthened.

Furthermore, this thesis focused on the organizational and company perspective of user integration in sustainability innovation only. It might also be worth to put the user at the center of analysis and investigate in more detail the *impact of user integration in sustainability innovation on user behavior*. Whereas Essay 1 took changes in users norms and behaviors into account, in order to fully understand the corporate activities to influence

informal institutions, much more could be done in this regard. Future research might consider investigating whether user integration (in the cases under review and in others) led to lasting changes in behaviors and practices among users, thereby contributing to a more sustainable future.

## 6 References

- Abdelkafi, N., Makhotin, S., & Posselt, T. (2013). Business model innovations for electric mobility: What can be learned from existing business model patterns? *International Journal of Innovation Management*, 17(1), 1-41.
- AGE-Foundation. (2015). *Erstvermietung auf dem Hunziker Areal: Instrumente, Prozesse, Erfahrungen*. Zurich: AGE-Foundation.
- Ambec, S., & Lanoie, P. (2008). Does it pay to be green? A systematic overview. *Academy of Management Perspectives* 22(4), 46-62.
- Ansari, S., Garud, R., & Kumaraswamy, A. (2016). The disruptor's dilemma: Tivo and the US television ecosystem. *Strategic Management Journal*, 37(9), 1829-1853.
- Ansari, S., & Phillips, N. (2011). Text Me! New Consumer Practices and Change in Organizational Fields. *Organization Science*, 22(6), 1579-1599.
- Arnold, M., & Barth, V. (2012). Open innovation in urban energy systems. *Energy Efficiency*, 5(3), 351-364.
- Bäckstrand, K. (2003). Civic science for sustainability: Reframing the role of experts, policy-makers and citizens in environmental governance. *Global Environmental Politics*, 3(4), 24-41.
- Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning*, 46(6), 419-426.
- Bayulken, B., & Huisingsh, D. (2015a). Are lessons from eco-towns helping planners make more effective progress in transforming cities into sustainable urban systems: A literature review (part 2 of 2). *Journal of Cleaner Production*, 109, 152-165.
- Bayulken, B., & Huisingsh, D. (2015b). A literature review of historical trends and emerging theoretical approaches for developing sustainable cities (part 1 of 2). *Journal of Cleaner Production*, 109, 11-24.
- Belz, F.-M. (2013). Shaping the future: Sustainable innovation and entrepreneurship. *Social Business*, 3(4), 311-324.
- Belz, F.-M. (2017). *Working paper: Sampling strategies in multiple case study research*. Munich: TUM
- Belz, F.-M., Schrader, U., & Arnold, M. (2011). *Nachhaltigkeitsinnovationen durch Nutzerintegration*. Marburg: Metropolis.
- Berchicci, L., & Bodewes, W. (2005). Bridging environmental issues with new product development. *Business Strategy and the Environment*, 14(5), 272-285.
- Bergvall-Kareborn, B., & Stahlbröst, A. (2009). Living Lab: An open and citizen-centric approach for innovation. *International Journal of Innovation and Regional Development*, 1(4), 356-370.

- Binz, C., Harris-Lovett, S., Kiparsky, M., Sedlak, D. L., & Truffer, B. (2016). The thorny road to technology legitimation — Institutional work for potable water reuse in California. *Technological Forecasting and Social Change, 103*, 249-263.
- Bogers, M., Afuah, A., & Bastian, B. (2010). Users as innovators: A review, critique, and future research directions. *Journal of Management, 36*(4), 857-875.
- Bohnsack, R., Pinkse, J., & Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy, 43*(2), 284-300.
- Boone, C., & Ozcan, S. (2013). Why do cooperatives emerge in a world dominated by corporations? The diffusion of cooperatives in the U.S. bio-ethanol industry, 1978-2013. *Academy of Management Journal, 57*(4), 990-1012.
- Bösch, I. (2009). Weniger als Träumen; das Ziel ist: mehr als Wohnen. *Hochparterre, 6*, 48-49.
- Bosch-Sijtsema, P., & Bosch, J. (2015). User involvement throughout the innovation process in high-tech industries. *Journal of Product Innovation Management, 32*(5), 793-807.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27-40.
- Brown, H. S., & Vergragt, P. J. (2008). Bounded socio-technical experiments as agents of systemic change: The case of a zero-energy residential building. *Technological Forecasting and Social Change, 75*(1), 107-130.
- Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly, 42*(1), 1-34.
- Brundtland, G. H. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. New York: United Nations
- Budde Christensen, T., Wells, P., & Cipcigan, L. (2012). Can innovative business models overcome resistance to electric vehicles? Better Place and battery electric cars in Denmark. *Energy Policy, 48*, 498-505.
- BWO. (2010). *Mehr Als Wohnen: Von der Branche zum Stadtquartier - Report 1*. Zurich: Bundesamt für Wohnungswesen (BWO).
- BWO. (2013). *Mehr Als Wohnen: Von der Branche zum Stadtquartier - Report 2*. Zurich: Bundesamt für Wohnungswesen (BWO).
- Carrillo-Hermosilla, J., del Río, P., & Könnölä, T. (2010). Diversity of eco-innovations: Reflections from selected case studies. *Journal of Cleaner Production, 18*(10-11), 1073-1083.
- Castaldi, C., Faber, J., & Kishna, M. J. (2013). Co-innovation by KIBS in environmental services: a knowledge-based perspective. *International Journal of Innovation Management, 17*(5), 1-17.
- Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning, 43*(2-3), 354-363.

- Chesbrough, H. (2012). GE's ecomagination challenge: An experiment in open innovation. *California Management Review*, 54(3), 140-154.
- City of Zurich. (2011). *On The Way To The 2000-Watt Society: Zurich's Path to Sustainable Energy Use*. Zurich: City of Zurich.
- Creed, W. E. D., Hudson, B. A., Okhuysen, G. A., & Smith-Crowe, K. (2014). Swimming in a sea of shame: Incorporating emotion into explanations of institutional reproduction and change. *Academy of Management Review*, 39(3), 275-301.
- Cunningham, P. A., & Wearing, S. L. (2013). The Politics of Consensus: An Exploration of the Cloughjordan Ecovillage. *Cosmopolitan Civil Societies Journal*, 5(2), 1-28.
- Dangelico, R. M., Pontrandolfo, P., & Pujari, D. (2013). Developing sustainable new products in the textile and upholstered furniture industries: Role of external integrative capabilities. *Journal of Product Innovation Management*, 30(4), 642-658.
- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming Green Product Innovation: Why and How Companies Integrate Environmental Sustainability. *Journal of Business Ethics*, 95(3), 471-486.
- De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy*, 41(3), 614-623.
- De Medeiros, J. F., Ribeiro, J. L. D., & Cortimiglia, M. N. (2014). Success factors for environmentally sustainable product innovation: A systematic literature review. *Journal of Cleaner Production*, 65, 76-86.
- Del Río González, P. (2005). Analysing the factors influencing clean technology adoption: A study of the Spanish pulp and paper industry. *Business Strategy and the Environment*, 14(1), 20-37.
- Den Hond, F., De Bakker, F. G. A., & Doh, J. (2012). What prompts companies to collaboration with NGOs? Recent evidence from the Netherlands. *Business & Society*, 54(2), 187-228.
- Dorado, S. (2013). Small groups as context for institutional entrepreneurship: An exploration of the emergence of commercial microfinance in Bolivia. *Organization Studies*, 34(4), 533-557.
- Doyle, R., & Davies, A. R. (2013). Towards sustainable household consumption: Exploring a practice oriented, participatory backcasting approach for sustainable home heating practices in Ireland. *Journal of Cleaner Production*, 48, 260-271.
- Driessen, P. H., & Hillebrand, B. (2013). Integrating multiple stakeholder issues in new product development: An exploration. *Journal of Product Innovation Management*, 30(2), 364-379.
- Edmondson, A. C., & McManus, S. E. (2007). Methodological fit in management field research. *Academy of Management Review*, 32(4), 1155-1179.
- Eisenhardt, K. M. (1989). Building theory from case study research. *The Academy of Management Review*, 14(4), 532-550.

- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25-32.
- Eisenhardt, K. M., Graebner, M. E., & Sonenshein, S. (2016). Grand Challenges and Inductive Methods: Rigor without Rigor Mortis. *Academy of Management Journal*, 59(4), 1113-1123.
- Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *California Management Review*, 36(2), 90-100.
- Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation - Exploring the phenomenon. *R&D Management*, 39(4), 311-316.
- Fam, D. M., & Mitchell, C. A. (2013). Sustainable innovation in wastewater management: Lessons for nutrient recovery and reuse. *Local Environment*, 18(7), 769-780.
- Farla, J., Markard, J., Raven, R., & Coenen, L. (2012). Sustainability transitions in the making: A closer look at actors, strategies and resources. *Technological Forecasting and Social Change*, 79(6), 991-998.
- Feola, G., & Nunes, R. (2014). Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement. *Global Environmental Change*, 24, 232-250.
- Fligstein, N., & Dauter, L. (2007). The sociology of markets. *Annual Review of Sociology*, 33, 105-128.
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219-245.
- Franke, N., & Piller, F. (2004). Value creation by toolkits for user innovation and design: The case of the watch market. *Journal of Product Innovation Management*, 21(6), 401-415.
- Fuenfschilling, L., & Truffer, B. (2016). The interplay of institutions, actors and technologies in socio-technical systems: An analysis of transformations in the Australian urban water sector. *Technological Forecasting and Social Change*, 103, 298-312.
- Füller, J., Hutter, K., & Fries, M. (2012). Crowdsourcing for goodness sake: Impact of incentive preference on contribution behavior for social innovation. *Advances in International Marketing*, 11(23), 137-159.
- Garcia, R., & Calantone, R. (2002). A critical look at technological innovation typology and innovativeness terminology. *Journal of Product Innovation Management*, 19(2), 110-132.
- Garud, R., Gehman, J., & Giuliani, A. P. (2014). Contextualizing entrepreneurial innovation: A narrative perspective. *Research Policy*, 43(7), 1177-1188.
- Garud, R., Hardy, C., & Maguire, S. (2007). Institutional entrepreneurship as embedded agency: An introduction to the special issue. *Organization Studies*, 28(7), 957-969.
- Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal*, 45(1), 196-214.

- Garud, R., & Karnoe, P. (2003). Bricolage versus breakthrough: distributed and embedded agency in technology entrepreneurship. *Research Policy, 32*(2), 277-300.
- Garud, R., & Rappa, M. (1994). A socio-cognitive model of technology evolution: The case of cochlear implants. *Organization Science, 5*, 344-362.
- Geels, F. W. (2014). Reconceptualising the co-evolution of firms-in-industries and their environments: Developing an interdisciplinary triple embeddedness framework. *Research Policy, 43*(2), 261-277.
- Granqvist, N., & Gustafsson, A. (2016). Temporal institutional work. *Academy of Management Journal, 59*(3), 1009-1035.
- Green Jr, S. E., & Li, Y. (2011). Rhetorical institutionalism: Language, agency, and structure in institutional theory since Alvesson 1993. *Journal of Management Studies, 48*(7), 1662-1697.
- Greenwood, R., & Hinings, C. R. (1996). Understanding radical organizational change: Bringing together the old and the new institutionalism. *Academy of Management Review, 21*(4), 1022-1054.
- Greenwood, R., & Suddaby, R. (2002). Theorizing change: The role of professional associations in the transformation of institutionalized fields. *Academy of Management Journal, 45*(1), 58-80.
- Grodal, S., Gotsopoulos, A., & Suarez, F. (2015). The co-evolution of technologies and categories during industry emergence. *Academy of Management Review, 4*(3), 423-445.
- Hargadon, A. B., & Douglas, Y. (2001). When innovations meet institutions: Edison and the design of the electric light. *Administrative Science Quarterly, 46*(3), 476-501.
- Hargrave, T., & Van de Ven, A. H. (2006). A collective action model of institutional innovation. *Academy of Management Review, 31*(4), 864-888.
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change, 23*(5), 868-880.
- Heiskanen, E., Kasanen, P., & Timonen, P. (2005). Consumer participation in sustainable technology development. *International Journal of Consumer Studies, 29*(2), 98-107.
- Hienerth, C., Keinz, P., & Lettl, C. (2011). Exploring the nature and implementation process of user-centric business models. *Long Range Planning, 44*(5-6), 344-374.
- Hinings, C. R., Logue, D., & Zietsma, C. (forthcoming). Fields, institutional infrastructure and governance. In R. Greenwood, T. Lawrence, R. Meyer, & C. Oliver (Eds.), *Handbook of Organizational Institutionalism* (2 ed.). Thousand Oaks: Sage.
- Hockerts, K., & Wüstenhagen, R. (2010). Greening Goliaths versus emerging Davids — Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing, 25*(5), 481-492.
- Hoffmann, E. (2007). Consumer integration in sustainable product development. *Business Strategy and the Environment, 16*(5), 322-338.



- Holahan, P. J., Sullivan, Z. Z., & Markham, S. K. (2014). Product development as core competence: How formal product development practices differ for radical, more innovative, and incremental product innovations. *Journal of Product Innovation Management, 31*(2), 329-345.
- Holmes, S., & Smart, P. (2009). Exploring open innovation practice in firm-nonprofit engagements: A CSR perspective. *R&D Management, 39*(4), 394-409.
- Howard-Grenville, J., Buckle, S. J., Hoskins, B. J., & George, G. (2014). Climate change and management. *Academy of Management Journal, 57*(3), 615-623.
- Hoyer, W. D., Chandy, R., Dorotic, M., Krafft, M., & Singh, S. S. (2010). Consumer Cocreation in New Product Development. *Journal of Service Research, 13*(3), 283-296.
- Hyysalo, S., Juntunen, J. K., & Freeman, S. (2013). User innovation in sustainable home energy technologies. *Energy Policy, 55*, 490-500.
- Irwin, A., & Hooper, P. D. (1992). Clean technology, successful innovation and the greening of industry: A case-study analysis. *Business Strategy and the Environment, 1*(2), 1-11.
- Jeppesen, L. B., & Frederiksen, L. (2006). Why Do Users Contribute to Firm-Hosted User Communities? The Case of Computer-Controlled Music Instruments. *Organization Science, 17*(1), 45-63.
- Jerneck, A., & Olson, L. (2013). A smoke-free kitchen: initiating community based co-production for cleaner cooking and cuts in carbon emissions. *Journal of Cleaner Production, 60*, 2018-2215.
- Johanisova, N., Crabtree, T., & Fankova, E. (2013). Social enterprises and non-market capitals: A path to degrowth? *Journal of Cleaner Production, 38*, 7-16.
- Johnson, M. W., & Suskewicz, J. (2009). How to jump-start the clean-tech economy. *Harvard Business Review, 87*(11), 52-60.
- Jolly, S., & Raven, R. P. J. M. (2015). Collective institutional entrepreneurship and contestations in wind energy in India. *Renewable and Sustainable Energy Reviews, 42*, 999-1011.
- Kaplan, S., & Tripsas, M. (2008). Thinking about technology: Applying a cognitive lens to technical change. *Research Policy, 37*(5), 790-805.
- Katz, R., & Allen, T. J. (1982). Investigating the not invented here syndrome: A look at the performance, tenure and communication patterns of 50 R&D project groups. *R&D Management, 12*(1), 7-20.
- Khaire, M. (2014). Fashioning an industry: Socio-cognitive processes in the construction of worth of a new industry. *Organization Studies, 35*(1), 41-74.
- Khaire, M., & Hall, E. V. (2016). Medium and message: Globalization and innovation in the production field of Indian fashion. *Organization Studies, 37*(6), 845-865.
- Khaire, M., & Wadhvani, R. D. (2010). Changing landscapes: The construction of meaning and value in a new market category: Modern Indian art. *Academy of Management Journal, 53*(6), 1281-1304.

- Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: A systematic review. *Journal of Cleaner Production*, *65*, 57-75.
- Kley, F., Lerch, C., & Dallinger, D. (2011). New business models for electric cars: A holistic approach. *Energy Policy*, *39*(6), 3392-3403.
- Korsunova, A., Goodman, J., & Halme, M. (2017). Our collaborative future: Activities and roles of stakeholders in sustainability-oriented innovation. *Business and Society*, (forthcoming).
- Kortmann, S., & Piller, F. (2016). Open business models and closed-loop value chains: Redefining the firm-consumer relationship. *California Management Review* *58*(3), 88-108.
- Kronsell, A. (2013). Legitimacy for climate policies: Politics and participation in the green city of Freiburg. *Local Environment*, *18*(8), 965-982.
- Kukk, P., Moors, E. H. M., & Hekkert, M. P. (2016). Institutional power play in innovation systems: The case of Herceptin®. *Research Policy*, *45*(8), 1558-1569.
- Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management Review*, *24*(4), 691-710.
- Laperche, B., & Picard, F. (2013). Environmental constraints, product-service systems development and impacts on innovation management: Learning from manufacturing firms in the French context. *Journal of Cleaner Production*, *53*, 118-128.
- Lawrence, T. B., Hardy, C., & Phillips, N. (2002). Institutional effects of interorganizational collaboration: The emergence of proto-institutions. *Academy of Management Journal*, *45*(1), 281-290.
- Lawrence, T. B., & Suddaby, R. (2006). Institutions and institutional work. In S. R. Clegg, C. Hardy, T. B. Lawrence, & W. R. Nord (Eds.), *Handbook of Organization Studies* (2nd ed.), pp. 215-254. London: Sage.
- Lawton, L., & Parasuraman, A. (1980). The impact of the marketing concept on new product planning. *Journal of Marketing*, *44*, 19-25.
- Lee, K.-H., & Kim, J.-W. (2011). Integrating suppliers into green product innovation: An empirical case study in the semiconductor industry. *Business Strategy and the Environment*, *20*(8), 527-538.
- Lettl, C., Herstatt, C., & Gemuenden, H. G. (2006). Users' contributions to radical innovation - Evidence from four cases in the field of medical equipment technology. *R&D Management*, *36*(3), 251-272.
- Liedtke, C., Baedeker, C., Hasselkuß, M., Rohn, H., & Grinewitschus, V. (2015). User-integrated innovation in Sustainable LivingLabs: an experimental infrastructure for researching and developing sustainable product service systems. *Journal of Cleaner Production*, *97*, 106-116.
- Maguire, S., Hardy, C., & Lawrence, T. B. (2004). Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. *Academy of Management Journal*, *47*(5), 657-679.

- Mair, J., & Marti, I. (2009). Entrepreneurship in and around institutional voids: A case study from Bangladesh. *Journal of Business Venturing*, 24(5), 419-435.
- Mair, J., Marti, I., & Ventresca, M. J. (2012). Building inclusive markets in rural Bangladesh: How intermediaries work institutional voids. *Academy of Management Journal*, 55(4), 819-850.
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955-967.
- MAW. (2015a). Official Website: <http://www.mehralswohnen.ch>.
- MAW. (2015b). *Press release: Eine Vision wird wahr*. Zurich: MAW.
- McKague, K., Zietsma, C., & Oliver, C. (2015). Building the social structure of a market. *Organization Studies*, 36(8), 1063-1093.
- Menzani, T., & Zamagni, V. (2010). Co-operative networks in the Italian economy. *Enterprise & Society*, 11(1), 98-127.
- Merriam, S. B. (1988). *Case Study Research in Education: A Qualitative Approach*. San Francisco:: Jossey-Bass.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis* (2 ed.). London: Sage Publications.
- Mlecnik, E. (2013). Opportunities for supplier-led systemic innovation in highly energy-efficient housing. *Journal of Cleaner Production*, 56, 103-111.
- Moisander, J. K., Hirsto, H., & Fahy, K. M. (2016). Emotions in Institutional Work: A Discursive Perspective. *Organization Studies*, 37(7), 963-990.
- Mont, O., Neuvonen, A., & Lähteenoja, S. (2014). Sustainable lifestyles 2050: Stakeholder visions, emerging practices and future research. *Journal of Cleaner Production*, 63, 24-32.
- Munir, K. A., & Phillips, N. (2005). The birth of the 'Kodak Moment': Institutional entrepreneurship and the adoption of new technologies. *Organization Studies*, 26(11), 1665-1687.
- Musiolik, J., & Markard, J. (2011). Creating and shaping innovation systems: Formal networks in the innovation system for stationary fuel cells in Germany. *Energy Policy*, 39(4), 1909-1922.
- Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2009). Why sustainability is now the key driver of innovation. *Harvard Business Review*, 87(9), 56-64.
- Nielsen, K. R., Reisch, L., & Thøgersen, J. (2016). Users, innovation and sustainability: The role of end-users and policy makers in sustainable innovation. *Journal of Cleaner Production*, 133, 65-77.
- Novkovic, S. (2008). Defining the co-operative difference. *The Journal of Socio-Economics*, 37(6), 2168-2177.
- Novkovic, S., & Holm, W. (2012). Cooperatives as source of organizational innovation. *The International Journal of Co-operative Management*, 6(1), 51-60.

- OECD. (2015). *OECD Innovation Strategy*. Paris: OECD
- Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16(1), 145-179.
- Olson, E. L. (2013). Perspective: The green innovation value chain - A tool for evaluating the diffusion prospects of green products. *Journal of Product Innovation Management*, 30(4), 782-793.
- Omoregie, R. (2010). Das genossenschaftliche Dialogprinzip ist ein Erfolgsfaktor. *Wohnen*, 11/2010. Hochdorf: Bischof, Meier & Co., 12-16.
- Ornetzeder, M., & Rohracher, H. (2006). User-led innovations and participation processes: Lessons from sustainable energy technologies. *Energy Policy*, 34(2), 138-150.
- Ornetzeder, M., & Rohracher, H. (2013). Of solar collectors, wind power, and car sharing: Comparing and understanding successful cases of grassroots innovations. *Global Environmental Change*, 23(5), 856-867.
- Owens, S. (2000). Engaging the public: Information and deliberation in environmental policy. *Environment and Planning*, 32, 1141-1148.
- Patton, M.Q. (1990). *Qualitative Evaluation and Research Methods*. Thousand Oaks: Sage.
- Penna, C. C. R., & Geels, F. W. (2012). Multi-dimensional struggles in the greening of industry: A dialectic issue lifecycle model and case study. *Technological Forecasting and Social Change*, 79(6), 999-1020.
- Perkmann, M., & Spicer, A. (2007). 'Healing the scars of history': Projects, skills and field strategies in institutional entrepreneurship. *Organization Studies*, 28(7), 1101-1122.
- Piller, F. T., & Walcher, D. (2006). Toolkits for idea competitions: A novel method to integrate users in new product development. *R&D Management*, 36(3), 307-318.
- Pinkse, J., & Kolk, A. (2011). Addressing the climate change-sustainable development nexus: The role of multistakeholder partnerships. *Business & Society*, 51(1), 176-210.
- Pobisch, J., Eckert, S., & Kustermann, W. (2007). *Konsumentenintegration in Nachhaltigkeits-Innovationen: Ein Beitrag zur Unternehmerischen Verbraucherbildung?* Freising: TUM
- Poetz, M. K., & Schreier, M. (2012). The value of crowdsourcing: can users really compete with professionals in generating new product ideas? *Journal of Product Innovation Management*, 29(2), 245-256.
- Priem, R. L., Li, S., & Carr, J. C. (2011). Insights and new directions from demand-side approaches to technology innovation, entrepreneurship, and strategic management research. *Journal of Management*, 38(1), 346-374.
- Reay, T., & Hinings, C. R. (2009). Managing the rivalry of competing institutional logics. *Organization Studies*, 30(6), 629-652.
- Ryan, B., & Gross, N. C. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology*, 8(1), 15-24.

- Sagebiel, J., Müller, J. R., & Rommel, J. (2014). Are consumers willing to pay more for electricity from cooperatives? Results from an online choice experiment in Germany. *Energy Research & Social Science, 2*, 90-101.
- Sanders, E. B. N. (2002). From user-centered to participatory design approaches. In J. Frascara (Ed.), *Design and the Social Sciences: Making Connections*. New York: Taylor & Francis Books Limited.
- Sangle, S. (2011). Adoption of cleaner technology for climate proactivity: A technology-firm-stakeholder framework. *Business Strategy and the Environment, 20*(6), 365-378.
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment, 20*(4), 222-237.
- Schrader, U., & Belz, F.-M. (2012). Involving users in sustainability innovations. In Defila, R.; Di Giulio, A.; Kaufmann-Hayoz, R.; (Eds.), *The Nature of Sustainable Consumption and How to Achieve it*, 335-350, Munich: Oekom.
- Schumpeter, J. A. (1934). *The Theory of Economic Development*. London: Transaction Publishers.
- Scott, W. R. (2007). *Institutions and Organizations: Ideas, Interests and Identities* (3rd ed.). Thousand Oaks: Sage.
- Seidel, V. P., & O'Mahony, S. (2014). Managing the repertoire: Stories, metaphors, prototypes, and concept coherence in product innovation. *Organization Science, 25*(3), 691-712.
- Seyfang, G. (2007). Cultivating carrots and community: local organic food and sustainable consumption'. *Environmental Values, 16*, 105-123.
- Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. London: Sage Publications.
- Slager, R., Gond, J. P., & Moon, J. (2012). Standardization as institutional work: The regulatory power of a responsible investment standard. *Organization Studies, 33*(5-6), 763-790.
- Slotegraaf, R. J. (2012). Keep the door open: Innovating toward a more sustainable future. *Journal of Product Innovation Management, 29*(3), 349-351.
- Smink, M. M., Hekkert, M. P., & Negro, S. O. (2015). Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. *Business Strategy and the Environment, 24*(2), 86-101.
- Smith, A., Fressoli, M., & Thomas, H. (2014). Grassroots innovation movements: challenges and contributions. *Journal of Cleaner Production, 63*, 114-124.
- Smith, S. C. (1994). Innovation and market strategy in Italian industrial cooperatives: Econometric evidence on organizational comparative advantage. *Journal of Economic Behavior and Organization, 3*, 303-320.

- Solitare, L. (2005). Prerequisite conditions for meaningful participation in brown-fields redevelopment. *Journal of Environmental Planning and Management*, 40(6), 725-738.
- Stake, R. E. (1994). Case Studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 236-247). Thousand Oaks: Sage Publications.
- Stirling, A. (2008). Opening up and closing down: Power, participation, and pluralism in the social appraisal of technology. *Science, Technology, & Human Values*, 33(2), 262-294.
- Suddaby, R., Elsbach, K., Greenwood, R., Meyer, J., & Zilber, T. B. (2010). Organizations and their institutional environments: Bringing meaning, values, and culture back in. *Academy of Management Journal*, 53(6), 1234-1240.
- Tidd, J. O. E., & Bessant, J. (2009). *Managing Innovation: Integrating Technological, Market and Organizational Change* (4 ed.). Chichester: Wiley.
- Toubiana, M., & Zietsma, C. (2017). The message is on the wall? Emotions, social media and the dynamics of institutional complexity. *Academy of Management Journal*, (forthcoming).
- Trencher, G. P., Yarime, M., & Kharrazi, A. (2013). Co-creating sustainability: cross-sector university collaborations for driving sustainable urban transformations. *Journal of Cleaner Production*, 50, 40-55.
- Tukker, A., Huppes, G., Guineße, J., Heijungs, R., De Koning, A., van Oers, L., & Nielsen, P. (2006). *Environmental impact of products: Analysis of the life cycle environmental impacts related to the final consumption of the EU-25*. Brussels: European Commission.
- UN-Habitat. (2011). *Global Report on Human Settlements 2011: Cities and Climate Change*. London: Earthscan.
- Van de Ven, A. H. (1993). A community perspective on the emergence of innovations. *Journal of Engineering and Technology Management*, 10, 23-51.
- Van de Ven, A. H., & Garud, R. (1993). Innovation and industry emergence: The case of cochlear implants. *Research on Technological Innovation, Management and Policy*, 5, 1-46.
- Van Wijk, J., Stam, W., Elfring, T., Zietsma, C., & Den Hond, F. (2012). Activists and incumbents structuring change: The interplay of agency, culture, and networks in field evolution. *Academy of Management Journal*, 56(2), 358-386.
- Vergragt, P., Akenji, L., & Dewick, P. (2014). Sustainable production, consumption, and livelihoods: global and regional research perspectives. *Journal of Cleaner Production*, 63, 1-12.
- Vergragt, P., & Brown, H. S. (2007). Sustainable mobility: From technological innovation to societal learning. *Journal of Cleaner Production*, 15(11-12), 1104-1115.
- Viardot, E. (2013). The role of cooperatives in overcoming the barriers to adoption of renewable energy. *Energy Policy*, 63, 756-764.
- Von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science*, 32(7), 791-805.

- Von Hippel, E. (2007). Horizontal innovation networks: By and for users. *Industrial and Corporate Change*, 16(2), 293-315.
- Von Hippel, E., Ogawa, S., & De Jong, J. P. L. (2013). The Age of the Consumer-Innovator. *MITSloan Management Review*, 53(1), 26-35.
- Voronov, M., & Vince, R. (2012). Integrating emotions into the analysis of institutional work. *Academy of Management Review*, 37(1), 58-81.
- Wagner, M. (2009). The links of sustainable competitiveness and innovation with openness and user integration: An empirical analysis. *International Journal of Innovation and Sustainable Development*, 4(4), 314-329.
- Waldron, T. L., Fisher, G., & Pfarrer, M. (2016). How social entrepreneurs facilitate the adoption of new industry practices. *Journal of Management Studies*, 53(5), 821-845.
- Walker, K., Schlosser, F., & Deephouse, D. L. (2014). Organizational ingenuity and the paradox of embedded agency: The case of the embryonic ontario solar energy industry. *Organization Studies*, 35(4), 613-634.
- Weber, K. M. (2003). Transforming large socio-technical systems towards sustainability: On the role of users and future visions for the uptake of city logistics and combined heat and power generation. *Innovation: The European Journal of Social Sciences*, 16(2), 155-175.
- Werner, M., & Cornelissen, J. P. (2014). Framing the change: Switching and blending frames and their role in instigating institutional change. *Organization Studies*, 35(10), 1449-1472.
- West, J., & Bogers, M. (2013). Leveraging external sources of innovation: A review of research on open innovation. *Journal of Product Innovation Management*, 31(4), 1-18.
- Westley, F., & Antadze, N. (2010). Making a difference: Strategies for scaling social innovation for greater impact. *The Innovation Journal*, 15(2), 1-19.
- Westley, F., Antadze, N., Riddell, D. J., Robinson, K., & Geobey, S. (2014). Five configurations for scaling up social innovation: Case examples of nonprofit organizations from Canada. *Journal of Applied Behavioral Science*, 50(3), 234-260.
- Yin, R. K. (2009). *Case Study Research: Design and Methods* (5th Ed.). London: Sage.
- Zietsma, C., & McKnight, B. (2009). Building the iron cage: Institutional creation work in the context of competing proto-institutions. In T. Lawrence, R. Suddaby, & B. Leca (Eds.), *Institutional Work: Actors and Agency in Institutional Studies of Organizations*, pp. 143-177. Cambridge: Cambridge University Press.
- Zilber, T. B. (2007). Stories and the discursive dynamics of institutional entrepreneurship: The case of Israeli high-tech after the bubble. *Organization Studies*, 28(7), 1035-1054.

## Appendix:

### Appendix 1: Affidavit

I hereby declare that the dissertation titled

#### **Essays on User Integration in the Sustainability Innovation Process**

prepared under the guidance and supervision of Prof. Dr. Frank-Martin Belz at the Chair of Corporate Sustainability – Brewery and Food Industry and submitted to the degree-awarding institution of TUM School of Management of Technische Universität München is my own, original work undertaken in partial fulfillment of the requirements for the doctoral degree. I have made no use of sources, materials or assistance other than those specified in § 6 (6) und (7), clause 2.

- ✓ I have not employed the services of an organization that provides dissertation supervisors in return for payment or that fulfills, in whole or in part, the obligations incumbent on me in connection with my dissertation.
- ✓ I have not submitted the dissertation, either in the present or a similar form, as part of another examination process.
- ✓ The complete dissertation was not published.
- ✓ I have not yet been awarded the desired doctoral degree nor have I failed the last possible attempt to obtain the desired degree in a previous doctoral program.

I am familiar with the publicly available Regulations for the Award of Doctoral Degrees of TUM, in particular §28 (Invalidation of doctoral degree) und §29 (Revocation of doctoral degree). I am aware of the consequences of filing a false affidavit.

I agree that my personal data is stored in the TUM alumni database.

Munich, March 28, 2017

Henrike Purтик



## Appendix 2: Contribution to Articles Included in the Thesis

### **Essay 1: Embedding Social Innovation: Shaping Societal Norms and Behaviors throughout the Innovation Process (chapter 2)**

I developed the research question and the research design in agreement with my co-author Prof. Daniel Arenas.

I was responsible for a significant part of the data collection, and conducted the data analysis.

I wrote the article, incorporating constant feedback from my co-author Prof. Daniel Arenas.

Munich, March 16, 2017



Henrike Purтик

Barcelona, March 16, 2017



Prof. Daniel Arenas

**Essay 2: End-Users as Co-Developers for Novel Green Products and Services - An Exploratory Case Study Analysis of the Innovation Process in Incumbent Firms (chapter 3)**

I developed the research question and the research design together with my co-author Eric Zimmerling and in agreement with Prof. Dr. Isabell M. Welpé.

I was responsible for a significant part of the data collection and analysis.

The article was written together with my co-author Eric Zimmerling in an iterative cooperative process.

Munich, March 17, 2017



Henrike Purтик



Eric Zimmerling



Prof. Dr. Isabell M. Welpé

**Essay 3: Cooperatives as catalysts for sustainable neighborhoods - A qualitative analysis of the participatory development process toward a 2000-Watt Society (chapter 4)**

I developed the research question and the research design together with my co-author Eric Zimmerling and in agreement with Prof. Dr. Isabell M. Welpé.

I collected the data set together with my co-author Eric Zimmerling and was responsible for most parts of the data analysis.

The article was written together with my co-author Eric Zimmerling in an iterative cooperative process.

Munich, March 17, 2017



Henrike Purтик



Eric Zimmerling



Prof. Dr. Isabell M. Welpé