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Article

Linking transitions and sustainability: a study into social effects of transition management

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Abstract:

Sustainability transitions as processes of fundamental change in societal systems are open-ended, nonlinear and uncertain. Respective research and governance approaches, e.g. transition management, propose a reflexive way of governing, aiming for a number of social effects to help facilitating a transition. Effects include empowerment, social learning and social capital development. Jointly mentioned social effects shall allow for reflexivity and innovation in developing socially robust and contextualized solutions to sustainability challenges that work in practice. Still, understanding mentioned social effects and their interplay more in depth is needed to design and assess transition management processes. While such understanding and related assessment framework is under development in transition management literature, transdisciplinary sustainability research can provide a rich body of tools and experiences. Building on a review of respective literature, this article develops an evaluation framework focusing on social effects as important and hitherto under conceptualised aspects of sustainability transitions literature. This framework is used to empirically investigate the effects of two specific transition management processes at local scale. Doing so, the article provides a conceptual and empirical understanding of how social effects contribute to a transition towards sustainability. Results highlight the importance and possibilities of addressing sustainability as an inherent quality of social effects aimed for.

Keywords: Assessment; case study; empowerment; social capital; social effects; social learning; sustainability transition; transition management; sustainability transformation

1. Introduction

More than 20 years after the international community agreed upon sustainable development as a major principle to jointly strive for [1,2], the environmental, social and economic challenges addressed by it have not lost their relevance [cf. 3,4]. Recent international attempts to strive for sustainable development including the SDG [5], are calling for transformational change. Related societal challenges, such as climate change, biodiversity loss or poverty, are characterized as being complex, highly interrelated, are subject to uncertainties and unfold their impacts over long time horizons. Challenges are related to solving 'wicked' or 'ill-defined' problems, which are defined, perceived and valued differently and persist over time [6,7].

The emerging field of transition research proposes that solving 'wicked' problems requires a fundamental change in the structures, cultures and practices of a societal system for the system to become (more) sustainable [8,9]. While these transitions do not automatically lead to sustainability, an adequate facilitation may nevertheless work in favour of it [10,11]. Rather than assuming that societal change processes can actually be 'managed', transition governance frameworks including transition management, hold that sustainability transitions cannot be governed in a regular way. Due to their open-endedness, non-linearity and uncertainty they require an iterative, reflective and explorative way of governing aimed at societal learning [12,13]. In this transition management shows similarities to other reflexive governance approaches, such as adaptive co-management [e.g. ,14,15]. Transition management is further outlined in specific process methodologies for policymakers in cities [16] or for transdisciplinary/action researchers [17]. It is the latter, the transdisciplinary and operational application of transition management that we focus on in this paper.

Being implemented in close collaboration between scientists and stakeholders and aiming to solve real-world problems, transition management is part of transdisciplinary (sustainability) research [12,13, cp.14]. Transition management as transdisciplinary research postulates the systematic development and empowerment of actors, developing alternatives in societal niches as a key instrument to facilitate sustainability transitions [21,22]. In its essence, it "focuses on the content as well as the process by organizing an interactive and selective participatory stakeholder searching process aimed at learning and experimenting" [6] (p.140). This asks for processes that on the one hand allow for empowerment and learning and on the other assure a contribution to sustainability (transitions). This relation is not self-evident and has been under conceptualized [23,24,cp. ,25,26]

As mentioned, there is an inherent tension when assessing the outputs and outcomes of transition management – the tension between the open-endedness and complexity of transitions and the attempt to govern it in direction of sustainability. This tension gives rise to evaluation proposals focusing on adaptive, process-oriented criteria capturing mechanisms of solving persistent problems: empowerment [27], learning ([28]) and a better understanding of complexity or the development of a shared narrative [29]. All contrast to positivist, impact oriented evaluation approaches. A shared and comprehensive transition management evaluation framework is nevertheless still under development [30]. Recent contribution are directed towards the evaluation of transition programmes, thus applying a policy oriented perspective [31,32]. Being part of a broader movement of reflexive evaluation approaches [cp. reflexive monitoring 26,27], these approaches are not limited to ex post evaluation, but are directed at supporting the ongoing learning process of those involved in experiments, projects or programmes. While these evaluation approaches are coherent with the open-endedness and complexity of transitions in the first place, they fall short with regard to assessing the sustainability quality, and there with the normative aim, of the transition.

Addressing the mentioned gap, the aim of this article is twofold: on the one hand to develop an evaluation framework for transition management, as transdisciplinary research, focusing on social effects (i.e. social learning, social capital and empowerment) as important and hitherto under conceptualised aspects of sustainability transitions literature. On the other hand, the article applies this framework empirically to investigate the effects of two specific transition management processes. In both steps the article sets out to understand how social learning, social capital development and empowerment can be linked to the overall goal of contributing to **sustainability** transitions.

The article is structured as follows: In section 2 we develop an evaluation framework to assess the social effects of transition management. Therefore we review respective transition management and transdisciplinary sustainability research literature and outline core concepts of transition managements' social effects in detail, including their relation to sustainability. To create an evaluation framework we operationalize three core social effects (social learning, empowerment, social capital) for empirical application. In section 3 we use this framework to analyse empirical data of two transition management case studies. In the final section 4 we recapitulate and reflect the results on assessing the social effects of transition management as a contribution to sustainability transitions.

2. Assessing social effects of transition management processes

In this article, we start from an understanding of transition management as a transdisciplinary research approach. Transdisciplinary sustainability research aims to develop actionable knowledge to solve real-world sustainability challenges. A key avenue to achieve this is the collaboration with stakeholders from outside academia, "in order to integrate the best available knowledge, reconcile values and preferences, as well as create ownership for problems and solution options" [20] (p. 25). Transdisciplinarity thus focuses on societally relevant problems, aims to allow for mutual learning bridging scientific disciplines and involves non-academic actors. It aims to create knowledge that is oriented towards solutions, socially robust and transferrable to both, scientific and societal practice [20]. As such we turn to the field of transdisciplinary sustainability research for suitable approaches that help to assess the social effects of research projects [e.g. ,35–38].

Transdisciplinary approaches do differentiate societal and scientific effects of transdisciplinary research: scientific effects are e.g. new scientific insights, theory development or similar, while societal effects include a wide range of effects of the research on society [38]. The later are of primary interest for us here as they contribute directly to the core aim of transition management, a sustainability transition as societal change. The following section presents a review of literature on transition management and transdisciplinary sustainability research carving out societal effects of transition management and their relation to sustainability transitions. The literature is discussed along the following three core questions, structured in three sub-chapters:

1. What are (important and hitherto under-conceptualized) societal effects of transition management and other transdisciplinary approaches?
2. How are they related to the aim of sustainability?
3. How can these be assessed?

2.1 Societal effects of transition management and transdisciplinary sustainability research

For assessment purposes, various societal effects of a transdisciplinary program, project or experiment can get differentiated with regard to how immediate effects occur [35,37,38]. Effects are differentiated into **outputs** (What was generated?), **outcomes** (What was accomplished?) and the **impacts**, that are mediating between outputs and outcomes.

In this paper we focus on a particular part of societal effects, namely the impacts, and relate them to the outputs they are caused by. Together we refer to them as social effects. Outputs are immediate, directly traceable achievements of a program, project or experiment. Impacts are the changes induced with participants by being involved with creating the outputs. It is at this stage, and in direct relation to the actual processes performed, where an orientation towards achieving both, sustainability and transition, may be observed first. In this regard, social effects can be used as qualitative indicators to assess transition trajectories [30]. Further societal effects (outcomes), such as a change of institutions or infrastructure can emerge, but are not in the focus of this article. As transmissions of impacts or outcomes to other scales or domains, they are happening outside the spatial and temporal boundaries of most projects, programs and experiments.

According to Wiek et al. [30, see as well 31], social effects that transdisciplinary sustainability research projects aim for, can get differentiated into three basic categories.

- 1) Outputs in form of usable **products** such as (innovative) goods, services as well as action plans or publications as well as production related **experiences** of participants.
- 2) Impacts in form of
 - a. **Enhanced capacities** such as knowledge gains and problem-solving capacities and
 - b. **Network effects**, such as new relationships, trust or accountability.

In the following, we discuss how these three basic categories come back as social effects of transition management processes.

1) The first category refers to the creation of usable products as a concrete and tangible output of solution-oriented sustainability research, which in design, production and delivery themselves should be oriented at sustainability principles [37]. At the very least, in transition management processes, vision documents and related pathways are produced [30]. The processes can also lead to other artefacts, such as websites (see e.g. www.lebensklima.at the website of one of the case studies) or to new products [e.g. a floating building, cf. 32] and services [e.g. a public lecture series on participation and sustainability, cf. 33]. The intensity (quality and frequency) of being involved in creating products and having respective experiences can be seen as an indicator for the creation of impacts, such as enhanced capacities and network effects [38]. Experiences may include methodological experiences and organizational experiences, such as experiencing new ways of working, planning and organizing as well as social experiences, such as interactions with others [36].

2a) The second category refers to enhanced capacity, which includes the acquisition of knowledge by individuals and collectives as well as of skills (know-how) for applying the new knowledge. Capacity is built through participatory research features, “as they organize and encourage information exchange, mutual, and joint learning” [37]. Rather than on ‘enhanced capacity’, transition management focuses on (social) learning and empowerment of participants in the transition arena setting [13,41].

Transition management aims for “transformative change in societal systems through a process of searching, learning, and experimenting” [30] (p. 1006). Learning is considered as core to overcome lock-in situations, allowing for innovations and systems change [42]. Loorbach highlights the value of Learning-by-doing as core process within transition management, allowing for an experimental and explorative attitude towards social innovation and change [22, cp. 43]. Social learning, as a reflexive learning process that involves and goes beyond individual participants, is considered as a precondition of change. It is based on bringing together different actors perspectives and a variety of options in participatory settings. Joint learning of participants can contribute to the development of alternative and visionary solutions to complex challenges. This results in new types of discourses as well as a new language or changing perspectives [30].

Besides social learning, the empowerment of civil society in addressing sustainability locally, forms a second core effect of TM processes. As put by Loorbach [13] (p. 284): “The ultimate goal of transition management should be to influence and empower civil society in such a way that people themselves shape sustainability in their own environments, and in doing so contribute to the desired transitions to sustainability”. This refers to the finding and realizing of (new) ways to solve social challenges in a local and sustainable way – and turn the visions of the future (sustainable) communities developed as part of the TM process into reality. Avelino highlights the empowerment of change agents and frontrunners in niches to challenge, transform or replace (unsustainable) regimes as a core strategy of transition management [41].

2b) The second category includes as well network effects. These refer to the creation or expansion of stakeholder networks and relations (e.g., new contacts) as well as other qualities of human interrelations such trust, identity, and accountability [37]. Via participation transdisciplinary research does help to develop networks and structured interrelations. Similarly, transition management aims at the forming of new coalitions and networks [30] and more broadly new social relations (such as new actors) to address societal challenges and contributing to sustainability transitions [40].

Transition management is centred around participatory spaces, e.g. transition arenas, which bring together a diversity of change agents or frontrunners for joint envisioning and collective action [e.g. ,16]. The development of trust, shared goals and mutual expectations benefits the functioning of the transition arena process. The developed vision and respective images of change then need to be translated to wider networks, organizations and institutions [22]. Altogether, networks and relationships of trust and reciprocity are main determinants of social capital, whose increase is a third core social effect of transition management processes – and an important precondition of collective action to address societal challenges [44].

Figure 1 summarizes the different societal effects of transdisciplinary sustainability research as well as their temporal interplay. Core social effects of transition management are located within this broad conceptual frame. These are social learning, empowerment and social capital.

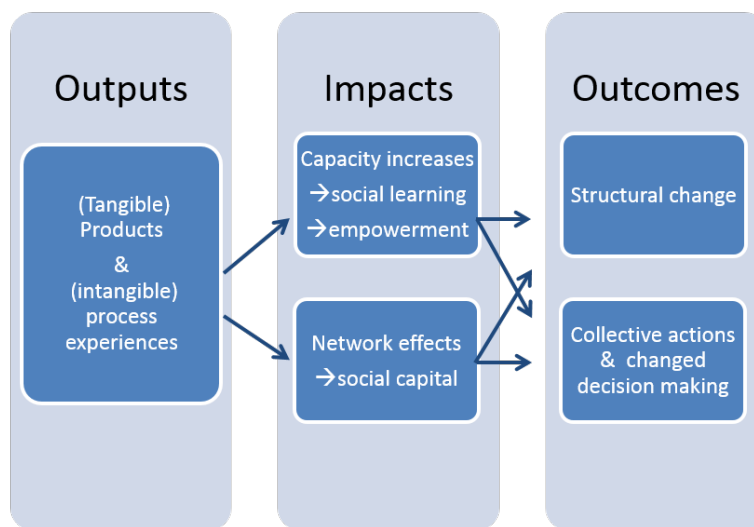


Figure 1: Social effects of transdisciplinary transition management processes

From above discussion we can discern that mentioned social effects are important to understand and assess transition management processes. A focus on social learning, social capital and empowerment is an expression of the reflexivity of the transition management governance approach [30]. Coherent to the nature of sustainability transitions as this appears in the first place, it still leaves the question of how to assess the *sustainability* nature of the transition unanswered. This is investigated in the following.

2.2 Relating core concepts of social effects and sustainability

Prescriptive transition management methodologies propose the facilitation of an open ended process and do not outline how ‘sustainability’ is to be introduced. Rather, defining sustainability is left to the transition arena group. The participating frontrunners essentially shape the understanding and valuation of sustainability in the transition management process [10] (p.10). Therewith they have a crucial role in directing the process towards sustainability – and not only them, but also the process managers that are actually selecting these frontrunners and frame the process (a practice that has been critiqued by Shove and Walker [25]). Rauschmayer et al. [24] draw attention to the need to design a proper process allowing to make sustainability meaningful to the frontrunners and to later critically evaluate the process outputs, impacts and outcomes.

In the following we discuss social learning, empowerment and social capital as core social effects of transition management with regard to their contribution to a sustainability transition. As stated concepts are under-conceptualized in transition management scholarship, besides transition management literature we rely on literature from the field of transdisciplinary sustainability research, and more broadly of sustainability science. Each social effect is discussed with regard to 3 questions:

1) what constitutes it, 2) who is subject of it and 3) how does it contribute to sustainability transitions – including critical reflections.

While the output level is not explicated in conceptual terms here (see figure 1), it will be considered again when it comes to discussing and assessing concrete empirical examples in later sections.

2.2.1 Social learning

A core role in many sustainability related disciplines is attributed to social learning, such as e.g. in adaptive co-management of social and ecological systems in general [9,39] or with more specific foci such as water [45], agriculture [47], in resource governance [15], ecological economics [48], transformation and participation studies [43,49–51] or with regard to broader political responses to global change [52]. Although social learning enjoys a high interest of sustainability related scholars, and albeit recent attempts to clarify the concept [46] the very understandings of what is social learning and what learning contributes to are diverging [48,53].

Add 1) What is learned is understood in different ways, but at its core it involves a lasting change in the interpretive frames (belief systems, cognitive frameworks, etc.) guiding the actions of a person [54]. A frequently made distinction separates first and second order, lower and higher order or single and double loop learning. In the following we use first and second order learning. First order learning is understood as the simplest mode of learning basically involving the acquisition of new cognitive knowledge. Therewith first order learning allows doing things in a better way. The kind of social learning most relevant in the context of transitions can be defined as second order learning [43]. This indicates learning processes aiming at changes in values, worldviews and assumptions underlying the actual behaviour: learning to do new things or “old” things in a fundamentally new way.

Add 2) Individuals are the subject of learning, but as indicated by the term social, their learning is happening in a form of social exchange, e.g. within a group. Furthermore, as Reed et al. [46] point out, learning cannot be considered social, if the learning content only stays with one person. Social learning therewith relates to the transmission of individual learnings to wider social groups at small or larger scales.

Add 3) How may social learning contribute to sustainability transitions? Reed et al. contend that “social learning may lead to pro-environmental or sustainable behavior but this is not guaranteed” [46] (p. 3). Siebenhüner et al. [48] put forward, that (social) learning contributes an orientation towards transformation and to creating path and routines of individuals and collectives towards sustainability. We elaborate this relation in three steps:

First, several authors have emphasised second order learning as a way to adapt to a continuously changing and increasingly complex environment through collaborative action and dialogue [55–58]. In transition management, social learning allows to deal with complexity and uncertainty, based on individual and collective experimentation and reflection. Considering collective actions e.g. of sustainable grassroots organisations, social learning contribute to a more successful achievement of group aims [58]. Thus, we assume that second order learning is one aspect of voluntary behavioural change as well as for the development of innovative and successful solutions to persistent problems locally. Schäpke and Rauschmayer [59] put forth that (social) learning can be understood as one major source of empowerment (e.g. via new skills).

Second, social learning is connected to changes in values, assumptions and worldviews and relates to the awareness and valuation of sustainability topics in the arena process. Overall the social learning process should increase the transition mindedness of the involved people [60]. Social learning in this regard can contribute to sustainability by raising awareness on sustainability related problems as well as by increasing the feeling of responsibility and capacity of people to react to these sustainability problems [cf. 49]. It as well can function as a process of spreading sustainable practices from alternative niches to the broader societal mainstream (the regime) [24].

Third, social learning processes may go beyond individual interests and/or values and allow for “shared understanding and joint action” [57] (p.1713) and may strengthen intrinsic values [61]. It has been shown that people with emphasis on intrinsic values (caring for others, community, self-

reflection) do not only have a higher self-rated wellbeing, but have less material intense lifestyles than those with stronger extrinsic (income, status symbols) values [61]. In addition, Crompton [62] shows that people with high intrinsic values tend to have more and better social relations (cp. section on social capital).

Critical remarks point towards social learning (pre-) conditions: To come across in participatory setting, social learning is dependent on a trustful atmosphere and intensive, open exchange between participants combined with a willingness to reflect one's own position. When focussing on mutual understanding and shared goals, and thereby emphasizing consensus, this may potentially limit the space for radically new and more sustainable solutions.

2.2.2 Empowerment

Empowerment is a multidimensional and multi-scalar concept and transition studies [41,63] as well as sustainable resource management and development studies [e.g. 54–56] do outline various aspects of it, based on different disciplinary traditions, such as psychology, management studies, social as well as political studies and critical theory. Issues of power and politics in transitions and transition management have generated growing interest among scholars [25,63,67].

Add 1) Empowerment is discussed in various disciplines [see 41 for an overview]. Psychological research understands empowerment as a perceived increase of intrinsic motivation and control of the situation [41]. Empowerment may be accompanied by increased feelings of self-esteem and pride [65]. An intrinsic motivation (to do something) is dependent on positive task assessments, such as the perceptions of choice, impact, meaningfulness and competence on what a person does [68] [41] (p. 377). Such intrinsic empowerment increases the capabilities of a person to lead a valuable life [64]. Management studies do interpret empowerment as a process of sharing decisional power (against hierarchies), delegating decisional power [69] and providing people (individuals and groups) with the power to take decisions [70]. In this regard empowerment is linked to leadership and innovation. In broader political terms, empowerment is linked to participation in decision making and the development of leadership, which may be granted to or gained by certain groups. In economic terms it is related to gaining control of resources [65]. In social terms, empowerment is related to better education, the development of social capital or improved local organizations (ibid.).

Add 2) Depending on the context of the analysis and the scale level, various actors are proposed for empowerment, such as individuals as well as groups and communities. Frequently the question of whom to empower is linked to observation on the (unequal) distribution of power, resources and opportunities – with empowerment being a process of re-distribution or at least gains of resources and opportunities by formerly less well-off individuals or groups.

Add 3) Empowerment can contribute to a transition to sustainability in various ways and on different scales. At an individual psychological level, empowerment processes do offer the possibility to increase the motivation and capacity of individuals to act sustainably. Here, Schäpke and Rauschmayer [59] highlight the role of values and awareness, when it comes to how people 'use' a respective empowerment: engaging for sustainability or not. First is likely if a felt empowerment is linked to an increase in awareness on and felt responsibility for sustainable behaviour – or simply, if already sustainability oriented actors feel empowered. A similar relation between empowerment and sustainability transitions can be assumed at organisational and political level, e.g. understood as gains in decision making capacities. These are likely to be used for sustainability, if (newly or already) sustainability oriented actors are given more decision making power on sustainability related issues.

More broadly speaking, a transition to sustainability as a fundamental change necessarily entails a shift in existing power constellations. In this regard, Avelino [63] distinguishes between different types of power as a capacity of actors, such as transformative power (the capacity to invent and develop new structures and institutions, e.g. legal structures, infrastructure or norms) or innovative power (the capacity to invent and create new resources, such as natural resources or technologies). Gains of innovative and transformative power may lead to a change towards more sustainability, if empowered actors change structures and institutions to become more sustainable. In this line of thought, frontrunners or change agents, as empowered individuals, are the first to realize possibilities

for solving sustainability challenges, e.g. by establishing consumption and lifestyle alternatives. Solutions developed by change agents at micro or niche level transfer to wider social groups by processes of upscaling and broadening [71]. Thereby frontrunners function as the drivers behind innovation, trendsetting, mainstreaming and institutionalization processes of sustainable alternatives [23,24,72,73].

Still, critical theory holds that the power of an individual or group depends on its position within the system – and empowerment could therewith only happen in connection to changes of the system. It also holds that the very attempt to empower somebody creates a dependency relationship that is reinforcing the dualism between the powerful and the powerless – and therewith is ultimately disempowering [41]. This calls to critically reflect the development of dependencies in contrast to system changes as part of the research process.

2.2.3 Social capital

Social capital is a broad concept that is used in several sustainability related disciplines, such as adaptive collaborative governance [74], resource governance [75], collective action [76] and studies on socio-ecological systems [77].

Add 1) Social capital is a broad concept that describes relationships, relations of trust, reciprocity, and exchange, the evolution of common rules, and the role of networks and of social ties [74,76,78,79]. Thus, a distinction can be made between structural aspects of social capital, such as networks and groups, and content related aspects, such as values, norms or trust [65 building on 71]. Important dimensions of social capital, according to [81], are Bonding vs. Bridging social capital. “Bonding” social capital describes the links within a homogeneous group (e.g. people with common interests, world views, social background). “Bridging” social capital refers to ties between people belonging to different societal groups. This distinction depends on the perspective taken and both processes can happen simultaneously [80].

Add 2) Social capital development basically can occur with every individual and group. Depending on the subject of social capital analysis, e.g. an individual or a certain group, the different types of social capital development (bridging and bonding) can be observed – what constitutes bridging for one person may constitute bonding for another, as groups of people known to one person vary to those of another. The kind of social capital development process observed therewith is relational to the object of analysis.

Add 3) Social capital can have positive and negative effects on effected persons or groups. In positive terms social capital facilitates collective actions [76] and increases the probability of mutually beneficial, cooperative behaviours [82]. In this way social capital functions as a productive resource allowing to achieve (additional and joint) benefits [83]. Therewith it explains how individuals and groups use their relationships with other actors in societies for their own and for the collective good [84]. In negative ways, social capital e.g. by excessive bonding may result in exclusion and island groups [85] that may hamper innovation [86] and obscure power and class relations [87]. A strong community is characterized by solid bonding but still should remain flexible, not leading to an exclusion of others [88].

Social capital is frequently linked to sustainability, especially to its social aspects [85,89,90]. Social capital thereby contributes to the well-being of communities, their sustainability and ability to function. Social capital and ‘social cohesion’ as concepts are associated with social networks, norms of reciprocity and features of social organization [83], and the integration of resulting social behavior [85]. More precisely, social capital influences social innovations and their potential impacts. Social capital is regarded as a „sustainable investment in the common good and the capacity of societies to innovate” [81] (p.10). In terms of an environmental focus of sustainability, [91] (p.232) points out the critical role of social capital to sustain and develop community initiatives and environmental protection efforts while Garcia-Amando et al. [75] highlight the positive relation of social capital to collective action to sustainably governing common resources.

Table 1 gives a conceptual overview on the three social effects and their potential contribution to sustainability.

Table 1: Conceptual overview of social effects

Social effect	Description (subject and object of effect)	Potential contributions to sustainability (result of effect)	Adverse effects (critique)
Social learning	Social learning comprises processes of individual and collective experimentation, reflection and innovation which lead to lasting changes in the interpretive frames (such as belief systems, cognitive frameworks, etc.) guiding the actions of a person. It can include first (new knowledge) and second-order learning (changes in values and assumptions). It involves the transmission of individual learnings to wider social groups at small or larger scales.	<ul style="list-style-type: none"> • More focus on intrinsic values which is indirectly linked to an increase of sustainable lifestyles; • Raising awareness on sustainability related problems; • Increasing the feeling of responsibility and capacity of people to react to these sustainability problems (→ empowerment); • Allowing for the development of joint visions and collective action in direction of sustainability; • Spreading of (sustainability) insights from individuals and groups to wider groups is possible. 	A focus on consensus building, shared goals and trust/respect to foster social learning may limit the space for radical change (towards sustainability)
Empowerment	Empowerment refers to increases in intrinsic motivations, to increases in decision making capacities, gains in control over resources and possibilities as well as (beneficial) changes in the overall position of individuals and groups within the system.	<ul style="list-style-type: none"> • When process of (psychological) empowerment are linked to increases in awareness and motivation on/ for sustainability; • By giving sustainability interests more decision making power; • By contributing to the development of new, more sustainable resources (innovative power); • By contributing to changing structures, if new structures are more sustainable, e.g. sustainable niches become mainstream (transformative power). 	Empowerment paradox: the attempt to empower somebody does establish a dependency relation – and therewith ultimately may be disempowering
Social capital	Social capital structurally refers to relationships between individuals, group and networks and content-wise to trust, common rules and values as well as norms of reciprocity between individuals and groups. Two dimensions can be distinguished: bonding amongst people in a group and bridging to people outside.	<ul style="list-style-type: none"> • By contributing to a strong local community, which can be considered as one of the social aspects of sustainability. • By building and maintaining strong ties within a group (bonding), while remaining flexible and inclusive; and building and maintaining ties with other groups or across groups (bridging); • Increasing the capacity of the community for (sustainability) innovations (→empowerment); • Supporting to sustain and develop community initiatives; • Positively relating to collective action for sustainability. 	Strong increase of social capital within a group may create exclusion tendencies towards “outsiders”, hamper innovation and obscure power relations.

In a first reflection we find, that all three social effects may contribute to a transition as well as to the orientation of this transition towards sustainability. These observations based on a literature review will be further explored in empirical case studies, starting with the operationalization of the concepts in the next step.

3 Materials and Methods

3.1 Operationalization and assessment of social effects

In this section we operationalize the three core concepts for application in the context of transdisciplinary transition management. The latter is mainly relying on one of the core governance instruments of transition management, the **transition arena**. This is a protected space for social learning, where participants meet outside of their usual habits and roles and engage in a deliberative process and transformative action regarding a specific persistent problem [22]. The deliberative process of the transition arena includes a common problem framing, envisioning a sustainable future as well as participatory back-casting to define concrete steps for realizing future visions. Setting up experiments so as to carry out these steps is part of the process. Once finished, the transition arena group presents their transition narrative to a broader public and re-connects it with political, social and economic realities [22]; the group is its ambassador. In the context of this setting, we propose to operationalize and assess the three key concepts as outlined in figure 2, summing up the various aspects related to the outlined social effects (cp. Appendix A for details). While the proposed operationalization could generally be used for the assessment of the transition area instrument in various context (e.g. companies, cities, or regions), it specifically suits the local level as outlined in the consecutive case study analysis.

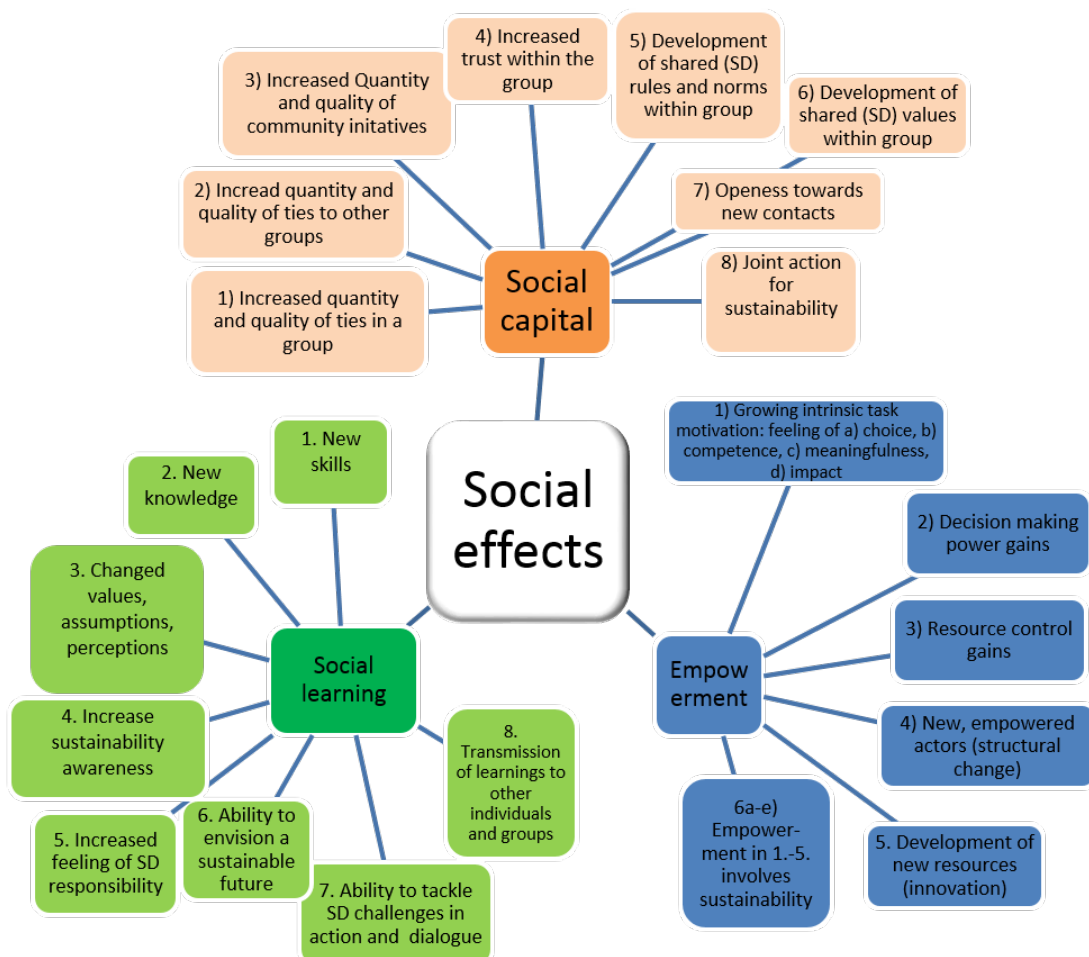


Figure 2: Aspects to assess social effects

3.2 Case description

We focus on two specific transition management processes that we were involved in: one in the village of Finkenstein in Austria and one in the urban neighbourhood of Carnisse in Rotterdam, the Netherlands (for details see box 1). These processes were initiated as part of the EU FP7 funded research project “InContext” (2010-2013), which (amongst others) developed and applied a transition management approach for local communities, the community arena [17]. This was done by adapting the transition arena approach outlined above to the local level.

Using an action research approach, researchers systematically facilitated a collective search to explore opportunities of joint action in Finkenstein and Carnisse [40]. The process was participatory

Box 1: The case study communities [taken from 82]

Finkenstein am Faaker See is located in Austria, on the border to Slovenia and Italy. It is one of the largest communities in Carinthia (one of the nine Austrian Länder). About 8,500 people live in Finkenstein - spread over about 28 villages and settlements being divided into a Slovenian-speaking minority and a German-speaking majority. Main economic sectors are tourism and (small) industry and agriculture. The focus of the community arena process was on quality of life. The process was co-financed by the municipality of Finkenstein and the vision is put into practice through action-oriented projects or deliberative processes in a number of working groups, e.g. on economics, sustainability, and social issues.

Carnisse is an urban neighbourhood in the city of Rotterdam, situated at the Western coast of the Netherlands. Some 10,000 (out of Rotterdam’s 600,000) inhabitants live in Carnisse. It is known as a deprived neighbourhood scoring low on a number of municipal indexes, marked by a high turnaround of inhabitants which together represent about 170 nationalities. Severe budget cuts of the municipality are threatening the continuation of social work as well as community facilities. The focus of the community arena process was on the quality of life in the neighbourhood and it was co-financed by the Dutch government. The vision is put into practice by a group that aims to re-open one of the community facilities, a community centre, in self-management. Members of the community arena are also organising a number of deliberative meetings with different stakeholder groups.

and reflexive in nature, aiming to allow for intensive learning amongst participants. Reflexive elements included a focus on the values, needs, thinking and feeling of the participants, as they were supposed to be essential drivers for behavioural change and collective actions.

The InContext project consortium agreed that a predefined sustainability goal with targets for the case studies would be counterproductive to the idea of an open process of experimentation and learning. The case studies were conceived as learning journey to render the concept meaningful in the local context [40]. Rather than focusing on the term and concept of sustainability, the community arena process aimed to play into local dynamics and was centred on a good quality of life for all now and in the future. Herewith the consortium hoped to catch the essence of sustainability without falling into quarrels about the notion itself. The researchers operationalized the concept of sustainability in four dimensions:

- 1) Environmental thinking (awareness of nature and natural resources),
- 2) Social thinking (consideration and acknowledgement of self and others),
- 3) Time horizon (short and long term) and
- 4) Interregional thinking (connection with other parts in the world, near and far).

These dimensions of sustainability thinking were to be used in the facilitation of the processes (Wittmayer et al. 2012). For the action research practice, this meant that the researchers provided space for the participants to decide what is important for them and for their community locally. In the discussions the four dimensions were used to motivate people to think into directions of sustainability [for details see 82]. The term sustainability was used, though it was not given a very prominent role in the process.

3.3 Data collection and interpretation

The consecutive analysis is focussed on research activities and data generation that took part during the lifetime of the two local case study projects (see Supplement 4 for details). When research projects ended, processes initially facilitated by researchers were handed over to local participants. Participatory evaluation workshops marked the end of the research process in both communities. Setting temporal boundaries for the analysis was necessary for practical, e.g. funding reasons. While this allows to capture a range of social effects (see next chapter), mid- and long terming effects generated by the project are excluded (the outcomes; see figure 1). All authors have been involved in the case studies, albeit to different degrees.

For gathering and interpreting data on social effects and related outputs various methods were used (e.g. qualitative interviews, surveys, baseline data collection, participants' observations, document analysis). The case studies of Finkenstein and Rotterdam-Carnisse are based on different data sources, both including participatory evaluation workshops and numerous qualitative and semi-qualitative interviews [for detailed reporting see project deliverables available for download at www.fp7-incontext.eu: 12,82,83–86]. In both cases core outputs of the case studies at the level of products (see previous section on operationalisation) are additionally used as data sources. This includes the vision documents as well as concrete and experimental services developed by participants (see mentioned project deliverables).

The consecutive assessment does both: it *directly* assesses social effects and it *indirectly* gathers information about them by analysing outputs generated by project participants. For direct assessments, participants were asked to report on various aspects of the social effects as part of the participatory evaluation workshop and respective interviews in the final phase of the case studies. For indirect assessments and reflections of direct data sources, researchers analysed a) participant observations of the arena process creating these outputs and, where possible b) the indication of developed outputs (e.g. the vision documents) with regard to the social effects. Jointly, these three assessments form a triangulation, complementing one another to a multifaceted picture on the creation of social effects. Due to the nature of the data (self-reported observations of participants, participant observations, and document analysis of visions) and the small sample size, the analysis is of a qualitative and explorative nature.

4. Results

Results for each social effect are presented in form of an overview table (table 2-4), capturing core insights regarding each social effect as analysed in the two cases and a consecutive discussion of possible insights from applying the developed framework to the empirical cases (For a detailed reporting of empirical observations please see Supplements 1-3). This discussion as well allows for testing the suitability of the framework to analyse transition managements social effects in the cases studied. We try to answer three questions regarding the different social effects:

- a) Was the social effect observed?
- b) How was the social effect empirically related to sustainability?
- c) Which similarities and differences got observed between the two cases?

4.1 Social learning

Table 2: Overview on social learning results (Formatting: regular – effects directly reported, *italic* - effects indirectly assessed by researchers, P= participants, R= researchers)

No		Finkenstein	Carnisse
1	New skills	Several survey R discovered new competencies: speaking one's own mind in public, better communication, creativity, organisation, leadership, an increase in self-reflexivity and the feeling of responsibility as well as the ability to work in a team and the understanding for political work - <i>Rs made similar observations.</i>	Diverse new skills reported: speaking one's own mind in public, sharing knowledge and perspectives, put things in a broader perspective, <i>Rs made similar observations, Additionally observed skills: working respectfully together, chairing group session, reporting outcomes.</i>
2	New knowledge	P reported some surprises, insight that individual worries (but also ideas) are shared by others; a general increase in knowledge. <i>Ps learned about the idea of transitions, sustainability transitions, participatory methods and issues related to different areas such as mobility, energy, local economic affairs; knowledge repercussions in outputs generated</i>	P reported more knowledge and awareness on what was happening around them, the neighbourhood and its dynamics and the history of Carnisse. Legal, financial and institutional know-how related to a community centre was gained. <i>R observed participants getting acquainted with new perspectives.</i>
3	Changed values, assumptions and perceptions	P reported increased trust, more openness, fewer prejudices, positive attitudes to change and more long-term thinking, personal growth and a higher motivation to engage themselves. <i>No particular observations.</i>	P reported awareness that they can make a difference; arena re-affirmed their current perspectives and values; vision gave them nice ordering of their assumptions and perspectives on change. <i>Rs observed P starting to feel that change is necessary and possible, a continuous process that comes from within.</i>
4	Increased sustainability awareness	R stated sustainability is a very important issue. <i>Working groups explicitly or implicitly deal with sustainability; experiments do address sustainability challenges; vision includes sustainability goals.</i>	All P found a clear connection between sustainability and the vision; interpretation of sustainability differed, common denominator was focus on the long-term. <i>Sustainability was multi-interpretable, no consensus on priorities reached, vision created awareness on the interconnectedness of different scales.</i>
5	Increased feeling of responsibility for sustainability	P partially feel responsible; in general increased feeling of responsibility of own actions. <i>Working on a common vision including sustainability increased sustainability awareness; vision attributes responsibility on current generation. It was agreed upon by all participants.</i>	P reported on tackling neighbourhood problems (not specific sustainability problems), felt responsible for participating in the arena and lamented the absence of institutional actors from the arena process and the outsourcing of responsibility respectively. <i>N/a</i>
6	Ability to envision a (sustainable) future	<i>N/a - A joint vision was developed, agreed upon by all, includes sustainability. Radical change was constantly promoted by single participants only, participants reacted rather annoyed, the arena stuck to envision soft changes.</i>	Some reported vision as too utopian, others stated that it wasn't radical enough. <i>A joint vision was developed, with input from group discussions and I-on-I interviews. Vision was agreed upon in the arena, however most participants did not own the vision.</i>
7	Tackling sustainability in actions&dialog.	P stated project to be beneficial for future generations and other regions and to benefit sustainability in Finkenstein. <i>10 working groups, several actions and events in many parts relating to sustainability were developed.</i>	For most P neighbourhood development (so not SD) was a collaborative effort par excellence and working collaboratively was guiding principle in vision. Thereby sustainability was operationalized in relation to social challenges. <i>Collaborative actions were initiated in experiments.</i>
8	Transmission of (sustainability) learnings	P stated to have frequently talked with other citizens about project, interest partially given; some scepticism. <i>Results presented to the transition team (local politicians) as well as to the interested public. Following the arena process a successful application was launched to become a climate energy model region, building on insights from the arena process and supported by local officials.</i>	Vision was being distributed during a network event. P talked to other residents about 'Bloeiend Carnisse', the development vision for Carnisse. People that were not engaged in the process were mainly sceptical, although they liked the vision, but it was considered as too abstract. <i>Similar observations, plus vision was presented in media. General focus on internal group process. The final experiment, reopening a community centre under self-maintenance, attracted interest by officials of Rotterdam municipality and was interpreted as a potential role model to mitigate the crisis of the welfare state within the city.</i>

The following analysis builds on table 2 to answer the questions above for the effect of social capital.

Add A) In Finkenstein first and second order learning got reported and observed. Furthermore, the learnings from participants partially got transmitted to wider groups. Thus, social learning took place. In Carnisse mostly first order learning was reported, complemented by some second order learning. Both types of learning were as well observed by researchers, while transmission of learning to wider groups was reported and observed only to a limited extend. Overall, social learning took place.

Add B) Via the learning process in Finkenstein, sustainability gained an important role: participants learned to counter sustainability challenges by developing a joint vision including sustainability prominently and started actions and dialogue on realizing this vision. Thereby it is likely that learning on sustainability related issues got transferred into the vision and actions. Some aspects of second order learning, e.g. the increased attribution of responsibility for own actions as well as the increased openness to change and positive attitude towards the future, is likely to positively affect participant's motivation for sustainability related actions. It remains difficult to evaluate the relation of learning and sustainability in Carnisse, since sustainability was open for different interpretations in the arena process. Sustainability was mainly linked to 'the social' and 'the local'. In addition there was some awareness gained on long term processes and different scales related to the local developments. Overall social learning can only partly be related to sustainability. For both cases critical aspects of social learning, like the blocking of radical change by a strong impetus on consensus, are difficult to decide upon. There are some indications, that the vision developed in Finkenstein includes rather soft but radical changes. In Carnisse different opinions got raised with regard to the developed vision as being either too utopian or not radical enough.

Add C) Aspects of social learning could be reported for both cases – most strongly first order learning. Albeit transmissions of learning were aimed for, they remained limited in Carnisse and Finkenstein. A major difference is how sustainability was related to learning: while awareness and felt responsibility for sustainability was given and potentially increased in Finkenstein, the arena in Carnisse had a more open focus, directed towards neighbourhood problems and social issues with a mixed attribution of responsibilities. Joint action for solving local challenges was given in both communities, while the underlying vision was embodied more by participants in Finkenstein than in Carnisse. None of the arenas developed alternatives as part of vision or experiments that must be considered radical.

4.2 Empowerment

Table 3: Overview on results regarding empowerment(Formatting: regular – effects directly reported, *italic* - effects indirectly assessed by researchers, P= participants, R= researchers)

No		Finkenstein	Carnisse
1	A growing intrinsic task motivation via a) choice, b) competence, c) meaningfulness and d) impact.	a) P reported they were able to choose the agenda. <i>Vision written by researchers but developed and agreed upon by the community arena, working groups and actions led by P.</i> b) Cp. social learning/ new skills; <i>P took roles depending on competences they became aware of during the arena, new skills got developed.</i> c) Good scores for bringing in their own input and topics, open agenda, majority of the P had the feeling doing something meaningful; <i>R made similar observations.</i> d) P believe they have an impact on the local environment; steps taken were quite small; some changes on deeper assumptions on their own ability to impact the development; 50% of P reported increase in possibilities to shape Finkenstein; attitude towards future changed in a positive way; <i>experiments did impact upon local developments, in form of raising attention, attracting additional participants and finally the validation of the climate energy model region Finkenstein.</i>	a) All P reported being able to choose the agenda. <i>The arena process helped to voice perspectives on the state of Carnisse.</i> b) P reported gains of crucial competence to speak your voice in public (see 'skills' in social learning table); <i>P took different roles, could employ their competences in the arena when necessary.</i> c) Scores P gave for being able to bring in their own input and topics were good; P felt vision a great result, appreciated the exchange of perspectives. <i>Motivation in group was very apparent during the whole process, a symptom of a meaningful process.</i> d) Scores P gave to level of impact they are having were good. P stated they were able to make a difference. Some had this feeling prior to the arena. Others stated arena-process did not manage to develop sufficient tangible actions for people to make an impact. P in re-opening of the community center stated they make a direct impact in the here and now. <i>Re-opening the community center made a direct impact; presentation of vision to broader audience had impact.</i>
2	Gains in decision making power with regard to local developments	Change in perception of local politics: realizing own abilities to shape local politics, taking responsibility for local developments, recognition of value of local politics. The majority of the P agreed that they can bring in their own requests/ideas in the municipality. <i>No formalized decision making power granted by local politics, but increased influence on local development, working groups started activities, organised courses and events, brought new ideas into the community council.</i>	Most P reported being decision makers with power, but also reported the most important decision-makers were not present in the arena process and that they needed to be involve. <i>Arena had strong emphasis on 'power to the people', managed to influence a large scale networking event and to put its' transition agenda on the table.</i> (See also aspect 1/impact above)
3	Gains of control over resources by arena participants	Nothing to report. <i>Very little concrete resources granted, intangible resources difficult to observe. Actions by arena P frequently undertaken without waiting for permission or resources from the community council.</i>	Direct effect was generated by taking control over the closed community center, participants stated actors that control resources should act up. <i>Resource of symbolic legitimization, financial and physical capital to re-open and manage the community center. New social capital (ties and networks of engaged residents and volunteers) and symbolic capital (the group became a powerful actor in the institutional network of Carnisse).</i>
4	Changes in local structures	Nothing to report: <i>Arena established itself as a new, but temporal actor in the local system. It gained more and more publicity; supporting group of local officials (the transition team) ; local steering committee was elected</i>	Nothing to report. <i>Community arena did not appear as new actor much, because it was kept in the shadow/marginal. But action-group around community centre gained considerable influence (because of their central position in the neighbourhood and influential networks).</i>
5	Development of new resources (innovation)	Nothing to report. <i>Nothing to report.</i>	Nothing to report. <i>Symbolic capital: vision and the arena became a symbol to relate to. See aspect 3/ resource gains on new social capital and symbolic capital strengthening the new actor.</i>

6 a	Empowerment contributes to sustainability by: increasing the meaningfulness of sustainability to P	Cp. social learning/ increase sd awareness	1) Sustainability was not an explicit goal of the arena for the P, but rather local problems such as social challenges. Some P reported to engage because they felt responsible to solve these challenges. Long term thinking and awareness on interlinkages between different scale levels was strengthened <i>Vision shows sustainability in social, ecological and economical dimensions, but was potentially influenced by the writing of the vision by the Rs.</i>
6b	Feeling of (increased) capacity to react to sus. problems	Vision had pull effect and encouraged participants to build their pathways for reaching the vision; attempts to directly influence decisions of community council were only partly successful. <i>Rs made similar observations.</i>	P reported community centre reopening as reaction to local, social problems. <i>Vision of arena and arena process focussed on “power to the people”, independence from local institutional structures, embeddedness of new actions in the local communities.</i>
6c	New sustainability related decision making capacities	nothing to report; <i>working groups influenced local developments with their actions, including sustainability related experiments</i>	3) Nothing to report. <i>Only with regard to social aspects of sustainability as part of the re-opened community centre.</i>
6d	A sustainability orientation of new actors	Cp. social learning aspect 6 and 7 <i>Indirectly: The developed vision shows the high value of sustainability; Some working groups and activities highlighted the value of sustainability</i>	Nothing to report. <i>Foundation board as a new local actor had a certain (implicit) sustainability orientation.</i>
6e	Developed resources contribute to sustainability	Nothing to report	Nothing to report. <i>Vision as symbol including sustainability aspects implicitly may promote sustainability in neighbourhood development.</i>

The following analysis builds on table 3 to answer the questions above for the effect of empowerment.

Add A) In Finkenstein there was empowerment happening in different areas. A psychological empowerment of participants was observable on all four indicators. On the organization and political level some aspects of empowerment were observable. Participants perceived their influence on local politics to be growing and reported a growing appreciation of the work of local politicians. A new actor (the community arena and related working groups) was established and its' decision making capacities increased during the lifetime of the project. At the end of the project this actor got institutionalized in form of a self-standing local steering committee. Still, resources were developed or gained control on very little. Critically reflecting empowerment in Finkenstein reveals the establishment of dependency relationships between more and less powerful participants as well as with regard to local politics. Still this dependency was limited, since the arena acted largely independently from local politics, e.g. not drawing on respective resources.

In Carnisse a psychological empowerment of participants was observed and reported with regard to all four indicators. In organizational and political terms, empowerment took place to a certain degree when the transition arena and the respective vision gained symbolic capital. A stronger empowerment took place via the re-opening of the community centre which included a gain in decision making power, new resources and established a new actor in the local community. A limiting factor was the low connection of the arena to current policy and governmental structures with important decision makers being absent from the process. Dependency relations in Carnisse can be observed in the toleration of the actions e.g. the squatting of the community centre, by the municipality and the high level political support of this.

Add B) In Finkenstein, sustainability is part of the new actors' agenda and actions. As part of the social learning process, sustainability got more important to the participants. Therewith sustainability and empowerment emerged simultaneously. Participants felt capable to and actively did influence local developments including sustainability related activities. Still, no sustainability related formalized decision making power or resources were gained. In the community arena in Carnisse, its' vision and experiments, sustainability was considered only in limited and implicit ways. Rather the focus was on local and social challenges. In this limited way, sustainability was part of the empowerment that took place via resource and decision making power gains as well as the establishment of a new actor. Beyond this, generic sustainability dimensions can be traced in the vision, which functioned as a symbol for local development.

Add C) The cases show similarities and differences. In both cases, participants felt psychologically empowered and established a new actor to influence local developments. This was achieved in differing ways: While participants in Finkenstein gained the insight to be capable of influencing local politics, increasingly appreciated local political work and collaborated with local politics via a supporting group, the participants in Carnisse partially perceived themselves as powerful actors from the beginning, focussed on "power to the people" instead of institutionalized collaboration and squatted a municipality owned building. Finally, sustainability was related to empowerment in quite diverging ways: being an essential part of the ongoing empowerment in Finkenstein, and being rather implicitly and in limited ways related to empowerment in Carnisse.

4.3 Social capital

Table 4: Overview on results regarding social capital (Formatting: regular – effects directly reported, *italic* - effects indirectly assessed by researchers, P= participants, R= researchers)

No		Finkenstein	Carnisse
1	Quantity and quality of ties within a group; i.e. the community arena	Collaboration with like-minded people was appreciated. P perceived themselves as “one group”; development of very good relations, more trustful relationships and connection to new milieus. <i>The group was quite diverse; participants did not know each other; trustful atmosphere; group feeling.</i>	67 P in total made contact with each other. Participants did not knew each other before and were quite diverse. They didn’t see the arena as a stable group with a lot of cohesion and interactions were very informal, loose and short-term. A shared feeling of responsibility to Carnisse was given. <i>Arena group was exclusive in participation. Ties within the arena group where rather distant. Different phases can be observed: from open and flexible, to a closed core group which was opening up again.</i>
2	Quantity and quality of ties with other groups; i.e. other groups within or beyond the community	P frequently talked with other citizens about project with interest partially given and some skepticism. Criticism of P regarding lacking public interest. <i>Arena connected to public in three broadening events; connected with policy makers in three meetings. Ties to slovenian minority in Finkenstein could hardly be established.</i>	Outside-contact on the topic of the arena did not really take place. In regard to the experiment, there was a lot of exchange. <i>1 public broadening event with 100+ participants, contact established with local municipality and government. Working on the opening of the community center established further contacts with Rotterdam municipality, housing cooperation’s, local schools, etc. Ties to inhabitants with migrant backgrounds were difficult to establish and maintain in deliberative processes, but as visitors of the community center and participants in workshops and activities new ties were established</i>
3	Quantity and quality of sustained or new community initiatives	Quantity: 60 participants in 8 working groups meet regularly; 8 arena workshops with 10 – 30 participants each took place; Quality: new ways of working together. <i>Quantity: 8 collective actions were started. Quality –working groups are related to sustainability.</i>	<i>N/a 3 types of innovative practices: newly arena initiated experiments; participants engaged in own (innovative) activities; innovative ideas were communicated through vision and networking event.</i>
4	Development of trust within the group	Growing trust was reported as well as working together in a respectful and constructive way. <i>Trust could be observed.</i>	Group-feeling was not really created. <i>Not directly observed.</i>
5	Development of shared rules and norms within group	Similar concerns among the participants; communication became more appreciative. <i>Steering committee was elected by a mutually agreed voting procedure; communication guidelines got developed.</i>	<i>N/a. Common denominator of the group was a shared connection and responsibility to the neighbourhood.</i>
6	Development of shared values within the group	Initially divagating interests and aims got transferred into a shared vision and actions benefitting the common good. <i>Some activities show shared values (mostly social); the vision includes a number of value statements and was endorsed by the whole arena group.</i>	<i>N/a. Shared values of group centred around social morals for community; also apparent in the vision.</i>
7	Openness towards new contacts	Process sparked interest in and respect for other persons, increased self-reflexivity and led to fewer prejudices. <i>Working groups focussed on establishing exchange.</i>	Some participants reported sparked interest in other participants. <i>Effort by arena group to invite new contacts to each meeting were not very effective.</i>
8	Joint action for sustainability	9 out of 15 participants state that the project implements measures that are future oriented and benefit other parts of the world. <i>A Climate-energy-model-region was applied for and got accepted. Working group are related to sustainability. An institutional structure for further implementation of the vision has been build, establishing a local steering committee. See social learning indicator 7 and empowerment indicator 6.</i>	Directly: No explicit joint action for sustainability was mentioned; community centre reopening as reaction to local, social problems. <i>Indirectly: three newly arena initiated experiments, related to social aspects of sustainability. See also above (3); cp. social learning indicator 7 and empowerment indicator 6.</i>

The following analysis builds on table 4 to answer the questions above for the effect of social capital.

Add A) In Finkenstein there was social capital development clearly visible with regard to the arena group itself. Formerly unknown persons developed new relations characterized by trust, shared communication guidelines and self-selected a steering committee. The group was able to perform joint actions. Prejudices against unknown persons and politicians got reduced. A larger number of persons got involved in working groups adhering to joint guidelines and the vision. Still, establishing contacts beyond the scope of the arena and working group participants was partly successful. In Carnisse social capital was developed in terms of establishing new contacts and the ability of working together within the group of quite diverse people. Still, a group feeling was not developed and the group was rather loose than cohesive. Thus developing new shared rules, trust or values was not really visible. Participants were led by initially shared social concerns for the community and developed joint actions as well as individual actions to tackle social challenges. Contacts to persons beyond the group got partly established, e.g. in a large public event. Different stages of the process can be differentiated and bridging beyond the arena was mostly part of latter stages. The experiment of the community centre created far more connections and relations than the actual arena meetings. Experiments seem crucial for social capital development as well as (public) places where people meet and develop activities together.

Add B) In Finkenstein sustainability was clearly supported by a number of newly formed community initiatives, building on shared vision, communication guidelines and a trustful and cooperative atmosphere as well as shared understandings of e.g. local challenges. Openness towards new contacts, fewer prejudices and networking attempts supported the communication and local support for the sustainability related activities. The process in Carnisse was not explicitly oriented towards sustainability, but towards addressing local social problems. Working together was oriented towards a common goal, to take responsibility for the neighbourhood.

Add C) In both processes a relatively small and diverse number of people got engaged developing bonds between them. In later process stages these groups reached out to the public, albeit with some difficulties. Both groups performed joint actions. Besides similarities some differences exist: In Finkenstein there was more cohesion and trust building visible. Later a large number of working groups got established involving more people. In Carnisse, cohesion was lower, and besides collective actions there were as well individual actions pursued. A core action, the reopening of the community center, relied on a small number of individuals only. While actions related more broadly to sustainability in Finkenstein, sustainability did play a major role in Carnisse primarily with regard to social aspects.

In sum, it appears that the developed assessment approach allows to draw a differentiated picture of social effects of transition management, their various components and relation to sustainability.

5. Discussion and conclusion

In our research we have tried to discern the interrelations between sustainability and social effects, thus to develop qualitative indicators for assessing the direction of transition trajectories. Our aim was to develop an approach to assess the social effects of transition management projects at the local scale. Furthermore we did seek to understand the relationship between these social effects and the overall aims of contributing to a sustainability transition. Building on conceptual work developing a broad assessment framework, we analysed three social effects and their link to sustainability in two case studies. The discussion is divided into three parts that present our insights into the interrelations between social effects, sustainability, and transitions, followed by some concluding remarks.

5.1 An interplay of social effects contributing to sustainability transitions

The transition arena process can be understood as a social experiment aimed at social effects. The developed framework allows to assess changes regarding these social effects, effects which in turn are constituting resources of participants to shape their local contexts (e.g. via growing innovation capacities of participants, increasing networks, trustful co-operations, etc.). The three social effects are in small parts overlapping, but do highlight complementary aspects of how transition management facilitates sustainability transitions. Boldly speaking, social learning raises the orientation of the process towards sustainability and increases the capacity to successfully deal with sustainability challenges. Empowerment makes the sustainability oriented actors and initiatives more powerful. Social capital, finally, may support sustainability attempts to be more resilient and innovative. Nevertheless these sustainability contributions are dependent on the character of the social learning, on who is being empowered to do what and on whose social capital is increased.

On a general level, social effects' development may be mutually supportive, e.g. as social learning does support social capital development when new insights on collaborators allow for a trustful exchange. Social learning in terms of new skills may benefit empowerment. Social capital e.g. in form of new networks may benefit empowerment as well. This interplay is particularly apparent when we focus on the normative orientation of the social effects, meaning their relatedness to sustainability. As an example, social learning contributing to a growing sustainability awareness and feeling of responsibility may strengthen the sustainability orientations of empowered actors. This was visible as well in the cases – empowerment and sustainability related social learning emerged together. The interplay – potentially multiplying facilitated changes via positive feedback loops between social effects – should be taken into account when designing and facilitating transition management processes.

5.2 Multi-scalar effects

All three concepts are bridging different scale levels, from the individual to the group, to the community and beyond. Thus, social effects show a multi-scalar character. This has a a) procedural dimension, and b) influences the overall impact of the transition management project.

In regard to the procedural dimension the observed developments were not linear, but dependent on process steps. Social capital for example developed differently in the initial arena process (rather bonding with like-minded people) and the later experiments or respective working groups (bridging with others). Similarly, sustainable community initiatives got developed first at small scale and then became more public. Gaining power for sustainability oriented actions in both cases was a process of giving and taking when facing local politics. On the one hand arena groups were supported while on the one hand they were “just acting” without permission of the local politics (e.g. when squatting the community center in Carnisse). In both cases people started to “use” the local (power) system differently and gained a new understanding of their potential role(s) in shaping the local context.

Regarding the overall impact in view of the scalability of social effects, the effect of transition management expanded beyond the original process participants, thus it may contributed to the overall aim of facilitating a transition as a larger process of systemic change [97]. Empirical examples from the cases relating the local process to higher scale levels include e.g. the successful application of Finkenstein as a “climate-energy-model-region” as well as city officials referring to the Carnisse community center experiment as a flagship for overall Rotterdam development. Still, upscaling processes may have adverse influences on the original transition management process, such as losses in ownership, dis-empowerment of participants or losses of the original sustainability character of developed solutions. Our approach allows to capture these tendencies as a first step to influence them appropriately.

5.3 Facilitating and assessing sustainability in relation to social effects

There is, as mentioned, an inherent tension present when aiming to evaluate transition managements' contribution to facilitate a sustainability transition. This is the tension between the open-endedness and complexity of transitions and the attempt to govern them in direction of sustainability. In our research we have tried to discern the interrelations between sustainability and social effects, thus to develop qualitative indicators for assessing the direction of transition trajectories [cp. 27]. When exploring this links more in depth, we found that it is possible to include sustainability as an inherent quality to the mentioned social effects. Our analysis furthermore suggests that transition management in the case studied contributed to the enhancement of the communities' potential to respond to societal challenges and shape sustainability locally. In these cases we used an open yet reflexive facilitation technique to discuss the futures of Finkenstein and Carnisse, bringing in sustainability considerations via reflexive questions. This contributed to the discerned effects on the level of social learning, empowerment and social capital. With regard to how sustainability gains prominence in the process, particularly the role of social learning appears to be crucial as it captures active changes of the meaningfulness, motivation and awareness of sustainability.

Therefore, we propose a conceptual as well as empirically tested approach to link both the "open-endedness" and the direction towards sustainability in transition management approaches: by adding a normative orientation to the processes. This way the impacts of transition management processes can be empirically and systematically researched. Still, we conclude that there is no inherent relation between the social effects and sustainability. They remain two different things, which may be related (conceptually, empirically and process-wise). As such, processes can be oriented at bringing forward social effects and sustainability together. However, this draws attention to the character of the learning that is facilitated, to the selection of the participants and the overall framing of the process goals, visions and experiments.

In sum, the developed framework allows us to discern, describe and systematically address the impacts of transition management. It allows to capture the semi-open and reflexive approach to facilitating sustainability transitions in great detail. Contrasting an approach relying on a small set of indicators the proposed approach does allow for a broader picture including interplays between social effects as well as with regard to the various aspects composing each effect.

This article elaborates on social effects of transition management in an exploratory manner. Future research questions might relate to more long term oriented effects of transition management on societal change. This type of longitudinal research opens up the possibility of assessing the (self-reported) value of transition processes in the sense of the durability of the effects. It would also allow for testing the assumption in how far social effects do have an indicator function for the direction of change. Another area of research is empirically applying the scheme to other types of transdisciplinary sustainability research, which allows for comparing facilitation techniques applying different grades of openness, reflexivity and normative orientation.

Supplementary Materials: The following are available below: Table S1: Detailed results social learning, Table S2: Detailed results empowerment, Table S3: Detailed results social capital, Description S4: Outline of data collection and interpretation.

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Appendix A

So- cial effect	Aspects composing the social effect	Operationalisation of aspects
Social Learning	<ol style="list-style-type: none"> 1. New skills 2. New knowledge 3. Changes of values, assumptions and perceptions 4. (Increased) Awareness of sustainability problems and persistent problems in the area and in general 5. (Increased) Feeling of responsibility of people to react to these sustainability problems 6. Ability to jointly develop a vision of a sustainable future (including radical change) 7. (Increased) Ability to adapt and react to sustainability challenges through collaborative action and dialogue 8. Spreading of (sustainability) insights from individuals to further group-members and beyond 	<ol style="list-style-type: none"> 1. Directly: People report new skills, new types of tasks completed; <i>Indirectly: Production of outputs includes new tasks and skills.</i> 2. Directly: People report to have acquired new knowledge, insights etc.; <i>Indirectly: Developed outputs include generation of knowledge.</i> 3. Directly: People report changes of values, assumptions and perceptions; <i>Indirectly: Changes in the arena-discourse are observable, changes of ways of behaviours of participants observable.</i> 4. Directly: People (increasingly) express a concern about/ awareness of sustainability problems; <i>Indirectly: Developed products address sustainability problems (explicitly or implicitly).</i> 5. Directly: People report or discuss themselves as (increasingly) responsible for causing and/ or solving sustainability problems; <i>Indirectly: Developed products attribute responsibility for sustainability problems (explicitly or implicitly) to local community, developed products outline role of community for causing/ solving sustainability problems.</i> 6. Directly: Participants report the development of a joint vision of a sustainable future; <i>Indirectly: A shared vision and narrative of a sustainable future is developed including radical change.</i> 7. Directly: Participants report increased collaborative action and dialogue on sustainability challenges; <i>Indirectly: Developed outputs include collaborative action and dialogue towards solving sustainability challenges, changes of reactions of participants to problems become visible.</i> 8. Directly: Participants report to have learned from one another. Participants report the uptake of learning from the arena by other local actors, e.g. as part of the working groups; <i>Indirectly: Outputs involve participation of other local actors; observation of uptake of arena ideas by other local actors.</i>

Empowerment	<ol style="list-style-type: none"> 1. A growing intrinsic task motivation via a) choice, b) competence, c) meaning-fulness and d) impact 2. Gains in decision making power with regard to local developments 3. Gains of control over resources by arena participants 4. Changes in local structures (new, empowered actors/ decreased dependencies) 5. Development of new resources (innovation) 6. Empowerment involves sustainability, by a) increase meaningfulness of sustain-ability to actors b) Feeling of (increased) capacity of people to react to these sustainability problems, c) new decision making capacities with regard to sustainability related issues, d) a sustainability orientation of new actors, e) developed resources contribute to sustainability 	<ol style="list-style-type: none"> 1. a) Directly: Participants report their arena related behaviour as self-determined (choice); <i>Indirectly: Products are decided upon and/ or carried out by participants in self-determined ways</i>; b) Directly: Participants report a feeling a competence with regard to their arena related behaviour; <i>Indirectly: Participants possess skills needed for tasks carried out in the arena/ participants are observed as carrying out arena related behaviours/ tasks skilfully</i>; c) Directly: Participants report a high appreciation for activities performed in/ by the arena; <i>Indirectly: Participants are observed as being intrinsically motivated for arena activities</i>; d) Directly: Participants report the feeling of having impact on the output of the arena and the local environment; <i>Indirectly: Actions performed by participants create impact</i>. 2. Directly: Participants report on increased decision making capacities with regard to local development; <i>Indirectly: Transfer of decision making capacities to the community arena is observed; output development builds on (new) decision making capacities</i>. 3. Directly: Participants report themselves of resources they gain control upon; <i>Indirectly: outputs involve usage of (new) resources</i>. 4. Directly: Participants report themselves/ the arena as a new, influential local actor with low dependencies on other actors; <i>Indirectly: Output realization involved establishing new, independent actor(s)</i>. 5. Directly: Participants report to have developed new resources as part of the arena process; <i>Indirectly: Outputs generated involve new resources (e.g. natural or cultural resources, technologies)</i>. 6. a) Directly/ <i>Indirectly: cp. Social learning 4./5.</i>, b) Directly: People report an increasing capacity to react to sustainability problems. <i>Indirectly: Changed and more motivated discourse in group on solving SD problems is observable; developed products address sustainability problems (explicitly or implicitly)</i>; c) Directly: People report gains of decision making capacity over sustainability related issues as part of arena process; <i>Indirectly: Realisation of outputs involves taking decision over sustainability related issues (formerly being decided by other actors)</i>; d) Directly: Participants forming new actors highlight sustainability as a goal of the new actor; <i>Indirectly: Outputs related to operation of new actor make sustainability orientation explicit</i>; e) Directly: Participants report the development of a sustainable resource; <i>Indirectly: Outputs generated include sustainable resources</i>.
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Social Capital	<ol style="list-style-type: none"> 1. Quantity and quality of ties within a group; i.e. the community arena 2. Quantity and quality of ties with other groups; i.e. other groups within or beyond the community 3. Quantity and quality of sustained or newly developing sustainability oriented community initiatives 4. Development of trust within the group 5. Development of shared rules and norms within the group 6. Development of shared values within the group 7. Openness towards new contacts 8. Joint action for sustainability 	<ol style="list-style-type: none"> 1. Directly: Quantity - Participants report (increased) meetings and information exchange with other members of the community arena; Quality – Participants describe the working-atmosphere within the arena; <i>Indirectly (quantity and quality): Observable meetings and working atmosphere in the arena and when experimenting.</i> 2. Directly: Quantity - Participants report (increased) meetings and information exchange (in relation to the arena process) with people from the community and beyond; Quality – participants describe the character of exchange with others; <i>Indirectly (quantity and quality): Observable meetings and working atmosphere of arena with other groups.</i> 3. Directly: Quantity – Participants report on community initiatives; Quality – Participants report initiatives as being sustainability oriented. <i>Indirectly (quantity and quality): Outputs include establishment or maintenance of (sustainability oriented) initiatives.</i> 4. Directly: Participants report on (growing) trust amongst each other; <i>Indirectly: Outputs highlight value of trust or depend in development on trustful relationships.</i> 5. Directly: Participants report to have established common rules amongst them; <i>Indirectly: Outputs highlight or are based upon common rules.</i> 6. Directly: participants report to have developed shared values; <i>Indirectly: Product build or express shared values (e.g. vision).</i> 7. Directly: Participants report establishment or openness towards new contacts; <i>Indirectly: products build upon or value new contacts.</i> 8. Directly: Participants report joint activities for sustainability; <i>Indirectly: products build upon joint action and relate to sustainability.</i>
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Table A1: Operationalization of social effects for assessing transition management projects

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Supplementary Material 1: Detailed results overview regarding social learning

(Indication on formatting of information in table: regular: directly reported effects, *italic: indirectly assessed effects*, **bold: keywords for results overview table 2 in main text**)

No		Finkenstein	Carnisse
1	New skills	<p>Several survey respondents stated that they discovered new competencies through the transition arena process such as: speaking one's own mind in public, better communication, creativity, organisation, leadership. Participants mentioned an increase in self-reflexivity and feeling of responsibility of own actions, particularly in interaction with other persons. In the evaluation interviews about 40% of them stated an increase in the ability to work in a team; better understanding for political work and problems that might emerge as well as respect for politicians. Writing newspaper articles was also mentioned.</p> <p><i>Researchers made similar observations: In the workshops the facilitators challenged the participants to do things they had (self-reportedly) never done before and by this, new skills were gained or started to be gained. They observed that in the working groups people applied new skills such as speaking one's own mind in public and speaking in front of a large group of people (e.g. 100 people), facilitating meetings which they have not done before, working respectfully together in diverse groups.</i></p>	<p>In the evaluative interviews respondents reported diverse new skills: One of the most prominent one was speaking one's own mind in public as well as speaking in front of a large group of people (e.g. 100 people). While some weren't that afraid to raise their voice, others needed to get out of their 'comfort zone' to do so. Another reported skill is sharing knowledge and perspectives of the neighbourhood and its dynamics (networks, initiatives, people, etc.), as well as being able to put things in a broader perspective (e.g. connect the situation of Carnisse to broader debates in Rotterdam, The Netherlands and even the world).</p> <p><i>Researchers made similar observations: Additionally they observed that participants gained skills to working respectfully together in diverse groups, being able to have small-talks with other residents, etc. Also, participants developed the skills of chairing group-sessions and reporting outcomes of these sessions to the broader group, activities they were not used to before.</i></p>
2	New knowledge	<p>Participants reported some surprises ('eureka moments') they came across during the project, e.g., the insight that some apparently individual worries (but also ideas) are shared by others. 13 out of 15 respondents of the quantitative evaluation reported a general increase in knowledge.</p> <p><i>Researchers observed that by taking part in the process participants learned about the idea of transitions, sustainability</i></p>	<p>Directly: Participants reported that they got more knowledge on what was happening around them and this proved to be very useful to them (since they were lacking a certain degree of overview). The awareness and knowledge of the neighbourhood and its dynamics (present networks, initiatives, people, etc.) and also the history of Carnisse proved to be fruitful knowledge to the participants. Developing this knowledge and overview was a collective effort and learning process by the group itself, yet facilitated by the moderators who additionally gave input from their research. Also, acquiring a whole array of</p>

		<i>transitions, participatory methods and issues related to different areas such as mobility, energy, local economic affairs. New knowledge repercussions in outputs generated by working groups (f.i. a sustainability related working group which organised events to discuss certain topics such as climate change, energy etc. together with experts).</i>	legal, financial and institutional know-how related to keeping open a community centre , was reported by the participants during the experiment. <i>Indirectly: Researchers observed that participants were getting acquainted with new perspectives and practices of other residents and community members (and their views on migration, education, manners, morals, etc.).</i>
3	Changes of values, assumptions and perceptions	Participants reported that the workshops allowed for increased trust towards “others”, more openness , having fewer prejudices in interactions with others, positive attitudes to change and more longterm thinking . Some stated that personal growth became an important objective, as well as integration and they got more motivated to engage themselves . Most of them stated they would like to be engaged after the project. <i>Indirectly: no particular observations</i>	Directly: Participants reported that the arena gave them the awareness that they themselves (as residents and local communities) can make a difference and that people from the outside can be a stimulus for this (but that they are not necessary for this). They reported that the arena re-affirmed their current perspectives and values , and not really changed them. However, several Participants stated that the vision gave them an overview on and nice ordering of their assumptions and perspectives on change . <i>Indirectly: Researchers observed that participants started to feel that change is necessary and possible. Researchers observed participants to realize that change is a continuous process (due to reframing the current challenges from a historical view and the envisioning exercise) and that change comes from within. This became apparent e.g. in regard to the community centre where participants did not address the municipality of Rotterdam to keep the centre open, but re-opened it themselves with the help of local communities and change-agents.</i>
4	(Increased) Awareness of sustainability problems in the area	Directly: Most respondents stated that sustainability is a very important issue within the transition arena in Finkenstein as well as for all of them personally. <i>Indirectly: A sustainability working group was created. Working groups explicitly (e.g. group on sustainability, energy, social affairs) or implicitly (e.g. on culture, participation) dealt with sustainability and respective experiments do address sustainability challenges. The vision does include sustainability goals and related principles of action prominently.</i>	Directly: All respondents found a clear connection between sustainability and the vision , however their interpretation of sustainability differed . A common denominator in their responses was a focus on the long-term and that the arena fuelled this perspective. For all respondents the long-term development of the neighbourhood was of great concern. <i>Indirectly: Participants (re-)framed the problems in the neighbourhood as socially dominant (and less in economic or ecological factors). It proved that sustainability was multi-interpretable for the different participants and also considered fashionable (or trendy). Developing the vision created awareness on the interconnectedness of different scales (micro, meso and macro), i.e. ‘glocal’</i>

			<i>dynamics as well as on the multi-interpretability of change. This resulted in a vision (Blossoming Carnisse) with several (six) transition pathways. However no clear consensus on priorities or a clear vision of a future 'sustainable' Carnisse was reached.</i>
5	(Increased) Feeling of responsibility to react to sustainability problems	<p>Directly: Participants only partially feel responsible for solving sustainability challenges and attribute responsibility to local and/or regional politics. But, in general participants report an increased self-reflexivity and feeling of responsibility of own actions, particularly in interaction with other persons.</p> <p><i>Indirectly: Working on a common vision for the future of Finkenstein, including sustainability goals, may have increased the sustainability awareness of participants. This vision attributes responsibility for life in Finkenstein in 2030 on to the current generation. It was agreed upon by all participants.</i></p>	<p>Directly: Participants did not specifically reported on feeling the responsibility to address <i>sustainability</i> problems. They did report on tackling neighbourhood problems in general and that they felt they had an important role to play in this and felt responsible for participating in the arena. However, several respondents referred to the absence of institutional actors like the municipality and housing corporations in the arena and these actors were needed to step up in order to address these problems (outsourcing of this responsibility).</p> <p><i>Indirectly: also due to the TM process being a sort of shadow-process freed from (too much) institutional interference or municipal control, the process was not targeted at shifting responsibilities. The responsibility was kept within the group and/or the local communities in the neighbourhood.</i></p>
6	Ability of envisioning a sustainable future including radical change	<p>Directly: n/a</p> <p><i>Indirectly: A joint vision was developed by using the following format: each participant developed his/her own vision in accordance with their values and needs. Then pairs were built and a common vision based on the two single ones was developed, then one out of 4, then 8, then 16 and a common vision was born. The vision was agreed upon by all and includes sustainability related goals prominently.</i></p> <p><i>Radical change was constantly promoted within the group by single participants only, in rather aggressive or friendly ways. Other participants reacted rather annoyed upon these claims. Thus, in the end the arena</i></p>	<p>Directly: Some respondents stated that the vision was rather general and was also applicable for other districts and neighbourhood. Some reported that it was too utopian, others stated that it wasn't radical enough.</p> <p><i>Indirectly: A joint vision was developed in four participatory workshops which followed these steps: 1) problem structuring, 2) envisioning, 3) pathways and 4) backcasting. The input for the joint vision was mainly derived from group discussions (also a few sub-group meetings) and 1-on-1 interviews. The vision was agreed upon in the arena before it was presented to a broader audience during a network event. However, most participants did not own the vision, it was sometimes still the vision of the moderators instead of the participant themselves. During the network-event it became clear that presenting a vision and talking about</i></p>

		<i>sticked to envision soft changes rather than radical ones.</i>	<i>the future itself was perceived as being radical and contrasting the interest of the audience, since the audience felt that action is needed now.</i>
7	Increase ability to tackle SD challenges via (more and better) collaborative actions and dialogues	<p>Directly: Participants stated that that the project does include steps that are also beneficial for the future generations and other regions or even parts of the world and benefit sustainability in Finkenstein.</p> <p><i>Indirectly: In the backcasting workshop the idea of working groups became reality. 10 working groups were built, 3 of them merged later on. Within those groups actions and events were planned and successively carried out.</i></p> <p><i>The current social, economic and environmental situation locally and globally was discussed and built the basis for the actions.</i></p>	<p>Directly: For most respondents neighbourhood development (so not SD) was a collaborative effort par excellence. The notion of sustainability was primarily operationalized by participants as a social challenge. To some SD could only be realized by sharing a language and narrative and respecting different cultural values as to work effectively together. Working collaboratively was also one of the guiding principles in the vision.</p> <p><i>Indirectly: collaborative actions were initiated in experiments like the re-opening of the community centre and the 'neighborhood-guide'. New collaborations were created between residents and neighbourhood professionals, but also new collaborations were created with institutions like the municipality, schools, and welfare organizations.</i></p>
8	Transmission of learnings to other individuals and groups	<p>Directly: Participants stated that they frequently talked with other citizens about the "LebensKlima - project", its content and the working group. Interest was only partially given; there was quite some scepticism by those that were not involved in the process.</p> <p><i>Indirectly: The results of the transition process and of the first actions of the working groups were presented to the transition team and the interested public in three meetings and in the media (local newspaper, community newsletter, websites, radio).</i></p>	<p>Directly: the vision was being distributed by the participants during a network event and was used to connect to other initiatives and/or to inspire people to take action to change something. During the network event all the activities in the neighbourhood were connected to the vision (even if they weren't part of the arena) as to be able to show that change is happening already. Participants also reported that they talked to other residents about 'Bloeierend Carnisse' (title of vision), but that these people said it was too vague, not tangible, too utopian and old-fashioned/hippy. In sum, the people that were not engaged in the process were mainly sceptical about the process, although they liked the vision but it was perceived as too abstract.</p> <p><i>Indirectly: The results of the transition process were presented during a public meeting (with about 125 participants). The vision was also presented in the media (websites, twitter, etc.). General focus of attention in arena process was on group internal processes.</i></p>

Supplement 2: Detailed results overview regarding empowerment

(Indication on *formatting in table*: regular: directly reported effects, *italic*: indirectly assessed effects, **bold**: keywords for results overview table 2 in main text)

No.	Indicator	Finkenstein	Carnisse
1	A growing intrinsic task motivation via a) choice, b) competence, c) meaningfulness and d) impact.	<p>a) Choice: Directly - Participants had the feeling to be able to choose what to put on the agenda of the community arena, e.g. due to this agenda being open and defined jointly by participants and researchers; <i>Indirectly: The joint vision was written by researchers but developed by the community arena and agreed upon by the arena participants; the working groups and respective actions where formed, decided upon and realized led by participants</i></p> <p>b) Competence - Directly: <i>Cp. social learning/ new skills</i></p> <p><i>Indirectly: Within the working groups the participants took over different roles (leader, coordinator, socializer, creative head, mentor...) depending on their skills and competences, of which they became more aware during the arena meetings. New skills got developed – cp. social learning/ new skills.</i></p> <p>c) Meaningfulness – Directly: The scores participants gave for being able to bring in their own input and topics, they felt strongly about, were good. This positive assessment is also clearly related to the open agenda of the process as this made it possible to meet the different senses of urgency. The reason for joining the process stated most often is to maintain or increase the living quality in Finkenstein as well as personal growth. Social and justice issues as well as sustainability issues were important reasons for some to join the process. The majority of the participants had the feeling doing something meaningful.</p>	<p>a) Choice: Directly - All participants reported that they felt that they were able to choose what to put on the agenda of the community arena, e.g. due to this agenda being open and defined jointly by participants and researchers. Some also reported that they felt it was their ‘civic duty’ and societal responsibility to participate in these kinds of processes.</p> <p><i>Indirectly: The arena process helped the participants to get an overview of activities in Carnisse and to voice their perspectives on the state of Carnisse. The open agenda of the arena helped in getting these diverse perspectives on the table and openly articulated.</i></p> <p>b) Competence – Directly: Participants reported gains of crucial competence to speak your voice in public (also see ‘skills’ in social learning table). Also, a lot of participants stated that it was not entirely clear what the actual goal of the arena-process was and that they could not always make the distinction between the envisioning-process and the process that revolved around the community centre.</p> <p><i>Indirectly: Within the arena the participants took different roles (group leader, socializer, expert, listener, etc.), but it’s hard to say if there were any developments in these competences. Anyway, participants could employ their competences in the arena when necessary.</i></p> <p>c) The scores participants gave for being able to bring in their own input and topics, they felt strongly about, were good (an average of 4 out of 5 points). The opinions differed in respect to whether the community arena was meaningful. However, most of the participants felt the vision was a great result of the whole process. And that they</p>

		<p>Indirectly: <i>Researchers made similar observations:</i> the meaningfulness could be heard and seen in the participants' words and actions.</p> <p>d) Impact: Directly – Most of the participants asked in the evaluation phase believe they can have an impact on the local environment; they also stated that the steps taken were quite small. A number of participants reported changes on deeper assumptions on their own ability to impact the development of the community. About 50% of the participants reported an increase in possibilities to shape Finkenstein through the project.</p> <p>The attitude towards the future changed in a positive way.</p> <p><i>Indirectly: The experiments done by the arena group did impact upon local developments, e.g. in form of raising attention and by attracting additional participants in the working groups (about 30) and to the public events that took place during the project (about 100), the reports in the local media, the agenda points in the council meetings and concrete outputs such as the validation of the climate energy model region Finkenstein by the Austrian Climate and Energy Funds.</i></p>	<p>liked the fact that the future-orientation made it possible to get away from the present and the 'naysayers'. Participants reported that they appreciated the exchange of perspectives and acquiring more knowledge about the neighbourhood and its characteristics (e.g. networks, present initiatives, etc.).</p> <p><i>Indirectly: The motivation in the arena group was very apparent during the whole process, which can be seen as a symptom of a meaningful process.</i></p> <p>d) The scores participants gave as an answer to the level of impact they have in Carnisse based on the arena process were good (a 4.2 out of 5). People stated they were able to make a difference. Some made the addition that this hadn't changed due to the arena-process, but they already had this feeling prior to the arena.</p> <p>Others stated that the arena-process did not manage to develop sufficient tangible actions for people to make an impact (or that they were too optional/without obligations).</p> <p>An exception was the opinion that the arena alone is insufficient because - although it was fruitful to participate and share experiences, perspectives and knowledge – there are 'larger/higher powers at work' to change the future of the neighbourhood.</p> <p>The people that participated in the re-opening of the community arena stated that they felt they could make a direct impact in the here and now (instead of in the future).</p> <p><i>Indirectly: The re-opening of the community centre made a direct impact on the local communities and municipality. It created conflicts, struggles and enthusiasm. Also the presentation of the vision to a broader audience had an impact, e.g. talking about future change was not</i></p>
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			<i>something people were used to. Plus this presentations placed current discussions in a broader context and time-frame.</i>
2	Gains in decision making power with regard to local developments	<p>Directly: About half of the participants reported a change in perception of local politics in two directions: realizing own abilities to shape local politics and starting to take responsibility for local developments as well as increased recognition of value of local politics; the majority of the participants agreed that they can bring in their own capabilities, that each individual can participate in the community and that they can bring in their own requests/ideas in the municipality.</p> <p><i>Indirectly: no formalized decision making power granted by local politics, but increased influence on local development, since working groups started activities, organised courses and events, brought new ideas into the community council which shows that they recognised and used the power they gained. This is particularly remarkable, since the political system in Finkenstein in general is marked by high polarization, a low level of citizen participation and trust in political actors (cp. Wittmayer et. al 2014/ CPS)</i></p>	<p>Directly: Most of the participants reported that they felt they could make an impact and were also decision makers with power. Some stated that it was up to the local residents and communities to actually be that change. However, most of the participants also reported that the most important decision-makers were not present (the local sub-municipality, housing corporations and welfare organizations) and that they needed to be involve, because they had the most power and impact.</p> <p><i>Indirectly: The arena had a strong emphasis on ‘power to the people’, in the sense that local communities can and should make a difference. In the end the arena managed to influence a large scale networking event and put their transition agenda on the table. The power balance thus shifted a bit (since the local sub-municipality, housing corporations and welfare organizations have been very dominant in Carnisse).</i></p> <p>See also ‘impact’ above.</p>
3	Gains of control over resources by arena participants	<p>Directly: Nothing to report</p> <p><i>Indirectly: There were very little concrete resources granted to be used by the arena (e.g. minor printing costs, allowance to occasionally use rooms), intangible resources (such as reputational gains, legitimizational power) were difficult to observe. In a few cases the ideas were brought to the transition team in order to get the ideas published in the community newsletter, to get allowance to use public rooms for events or to get little financial support for the brochure for a good “miteinander”. Actions were frequently undertaken by the arena participants and working groups</i></p>	<p>Directly: Direct effect was generated by taking control over the closed community centre (and actually squat it for almost a year). Other effects were not reported. In order to make an impact, participants stated that the actors that control resources (i.e. the municipality) should act up.</p> <p><i>Indirectly: Resource of symbolic legitimization and capital, in regard to the people that set the agenda were gained. Also financial and physical capital (e.g. a key) in order to re-open and manage the community centre, as well as new social capital (ties and networks of engaged</i></p>

		<i>without waiting for permission or resources from the council of the municipality.</i>	<i>residents and volunteers) and symbolic capital (the group became a powerful actor in the institutional network of Carnisse) were gained.</i>
4	Changes in local structures (new, empowered actors)	Directly: nothing to report <i>Indirectly: The transition arena established itself as a new, but temporal actor in the local system. It gained more and more publicity during the process, due to the three public events, media appearance, further workshops organised by the working groups on participation and on sustainability, and the meetings with the transition group. A supporting group of local officials (the transition team) was installed to secure uptake of arena results by local politics. Towards the end of the project consecutive a local steering committee was elected to further coordinate working groups and network with local politics.</i>	Directly: Nothing to report <i>Indirectly: The Community arena did not appear as a new actor much, because it was kept in the shadow/marginal. But the action-group around the community centre gained considerable influence (because of their central position in the neighbourhood and influential networks).</i>
5	Development of new resources (innovation)	Directly: Nothing to report <i>Indirectly: Nothing to report</i>	Directly: Nothing to report <i>Indirectly: Having a (alternative) vision to the institutional vision on Carnisse led to a certain symbolic capital. The vision and the arena became – to a certain extent – a symbol to relate to. This also applied to the reopening of the community centre which led to symbolic capital (new powerful actor in the local network which got back-up from high level city officials) and new social capital (new networks of engaged residents and city officials).</i>
6	Empowerment involves sustainability, by a) increase meaningfulness of sustainability to actors b) Feeling of (increased)	a. Directly and indirectly cp. social learning/ increase sd awareness b. Directly: The development of the vision had a pull effect and encouraged participants to build their pathways for reaching the vision. Some actions would have to be set by politicians, some by participants without asking for permission and that is	a. Directly sustainability was not an explicit goal of the arena for the participants, but rather local problems such as social challenges. Some participants reported to engage because they felt responsible to solve these challenges. Long term thinking and awareness on interlinkages between different scale levels was strengthened <i>Indirectly: the developed vision shows a lot of</i>

<p>capacity of people to react to these sustainability problems,</p> <p>c) new decision making capacities with regard to sustainability related issues,</p> <p>d) a sustainability orientation of new actors,</p> <p>e) newly developed resources are contributing to sustainability</p>	<p>what they started doing at the end of the transition arena phase. Still, attempts to directly influence decisions of community council were only partly successful.</p> <p><i>Indirectly: Researchers made similar observations:</i></p> <p>c. Directly: Nothing to report <i>Indirectly: No formalized decision making power gained. As far as working groups influenced local developments with their actions, including sustainability related experiments, respective decision making power was gained.</i></p> <p>d. Directly: cp social learning aspect 6 and 7 <i>Indirectly: The developed vision shows the high value and meaning of sustainability for the citizens. Participants reported a strong relationship between the vision and sustainable development. Some of the working groups and their activities particularly highlighted the value of sustainability, such as the social group and the one on sustainability. In the second arena meeting they produced a little film showing Finkenstein in 2030: the citizens had new lifestyles, were aware of the responsibility and lived in harmony with nature and others. Sustainability interests were taken into account.</i></p> <p>e. Directly: Nothing to report; Indirectly: Nothing to report</p>	<p><i>signs of sustainability in regards to social, ecological and economical dimensions. This potentially was influenced by the writing of the vision (and selection of input) by the researchers.</i></p> <p>b. Directly: Participants reported community centre reopening as reaction to local, social problems rather than sustainability problems. <i>Indirectly: Vision of arena and arena process focussed on "power to the people". A strong emphasis in the vision is the independence of local institutional structures and the embeddedness of new actions in the local communities. Self-organized activities were seen as most sustainable by some of the participants.</i></p> <p>c. Directly: Nothing to report. <i>Indirectly: New decision making capacities only with regard to social aspects of sustainability as part of the re-opened community centre.</i></p> <p>d. Directly: Nothing to report. <i>Indirectly: As far as the reopening of community centre includes social aspects of sustainability the respective foundation board as a new local actor had a certain (implicit) sustainability orientation.</i></p> <p>e. Directly: Nothing to report. <i>Indirectly: vision as symbol including sustainability aspects implicitly may promote sustainability in neighbourhood development.</i></p>
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Supplement 3: Detailed results overview regarding social capital development

(Indication on **formatting** of information in table: regular: directly reported effects, *italic*: indirectly assessed effects, **bold**:

keywords for results overview table 2 in main text)

No	Indicator	Finkenstein	Carnisse
1	<p>Quantity and quality of ties within a group; i.e. the community arena</p> <p>Directly: Quantity - Participants report (increased) meetings and information exchange with other members of the community arena; Quality – participants describe the working-atmosphere within the arena; Indirectly (Quantity and quality): Observable meetings and working atmosphere in the arena and when experimenting.</p>	<p>Directly: Exchange and collaboration with “like-minded” people in the community arena was appreciated by the participants; participants of the community arena perceived themselves as “one group”. The majority of the participants reported the development of very good relations within the group of participants. All participants that responded to the survey stated that they had more relationships at the end of the project (characterised by trust), although they did not know each other before in most cases; about one third of the reported new relations was characterized as being more than a “project relationship”, but also private. Participants got also connected with new milieus. Feelings of communion and trust was strongly given.</p> <p><i>Indirectly: The group of the community arena was quite diverse in terms of age, gender, professions, but not in terms of ethnicity. The participants did not know each other before.</i></p> <p><i>With regard to the quality of relations, the vision-building process as well as the perceived trustful atmosphere were probably decisive as it contributed a lot to a group feeling, giving the group a shared aim.</i></p>	<p>Directly: Through 7 community arena meetings, 67 participants in total made contact with each other (amount of unique participants is approximately 25-30). Most participants reported that they did not know each other before. Participants were quite diverse in terms of age, gender, professions but not so much in ethnical and cultural background.</p> <p>The participants stated that they didn’t see the arena group as a stable group with a lot of cohesion. It was seen as rather fluid and interactions were very informal, loose and short-term. But they reported that they have a shared feeling of responsibility and connection to Carnisse.</p> <p><i>Indirectly: The temporary community arena group was exclusive in that participation was depending on an invitation by the research team. Only later, after the transition narrative had been developed, the group was opened up to be more open and flexible. This is also when the community arena group stopped to exist. Ties within the arena group were rather distant, with an exception here and there. The community centre working group went through different phases: from open and flexible, to closed focusing on the work in a core group; and then opening up again to invite others to join in for volunteering or offering activities in the community centre.</i></p>

2	<p>Quantity and quality of ties with other groups; i.e. other groups within or beyond the community</p> <p>Directly: Quantity - Participants report (increased) meetings and information exchange (in relation to the arena process) with people from the community and beyond; Quality – participants describe the character of exchange with others; Indirectly: Quantity - Observable meetings; Quality - Working atmosphere of arena with other groups.</p>	<p>Directly: Participants stated that they frequently talked with other citizens about the “LebensKlima-project”, its content and the working groups. Interest was only partially given; there was quite some scepticism by those that were not involved in the process. In parts criticism by participants was raised regarding lacking public interest in the project.</p> <p><i>Indirectly: The community arena connected to the general public in three broadening events with each around 30 participants. Participants of the community arenas connected with policy makers in the three meetings were the arena group met the transition team.</i></p>	<p>Directly: In the evaluation this was not reported. Outside-contact on the topic of the arena did not really take place, according to the group members. In regard to the experiment, participants reported that there was a lot of exchange with groups beyond the arena.</p> <p><i>Indirectly: Through one public broadening event with more than 100 participants, contact got established with other groups such as the local municipality and the local government. A lot of new connections were made during this event. However, it is unclear whether the connections were continued after this event. In experiments such as the community centre (but also the communal garden) the quantity of social ties are extensive and this also increased over time. It is in working together in a practical context were ties are really being developed and even friendships are created. Also, through working on the opening of the community centre (6 official meetings plus numerous informal contacts), contact established with different departments within Rotterdam municipality, housing cooperation's, local schools, etc.</i></p>
3	<p>Quantity and quality of sustained or newly developing community initiatives</p> <p>Directly: Quantity – Participants report on community initiatives; Quality – Participants report initiatives as being sustainability oriented. Indirectly (Quantity and Quality): Outputs include establishment or maintenance of</p>	<p>Directly – quantity: Around 60 participants in 8 working groups meet regularly; 8 workshops as activities of the working groups with each 10 – 30 participants</p> <p><i>Indirectly- Quantity: 8 working groups were installed and within them already during the project, 8 collective actions were started, e.g. approaching one's own neighbours and inviting them to an informal working group meeting.</i></p> <p>Directly - Quality: New ways of working together (different participatory methods) could be tested.</p>	<p>Directly: 3 types of innovative practices were pioneered by individual arena participants in more or less formalized working groups (see below):</p> <p><i>Indirectly: The arena-group participated in three newly arena initiated experiments, i.e. the reopening of the community centre, the reopening of the communal garden and an internship for students of Intermediate Vocational Education (community college). These were directly related to the community arena (output). Almost all participants were engaged in their own</i></p>

	(sustainability oriented) initiatives.	<i>Quality – One working group focussed primarily on sustainability, others are related to sustainability issues (such as social or ecological issues); an institutional structure for further implementation of the vision has been build using the method of sociocracy, establishing a steering committee.</i>	<i>(innovative) activities in Carnisse (since this was one of the criteria for selecting arena members). Also, innovative ideas about the present and future of the community were exchanged and communicated through the vision and the presentation at the networking event. Quality – directly: Initiatives are not reported as being oriented towards sustainability, but towards social goals. Indirectly: Social dimensions of sustainability are explicitly part of the initiatives, ecological dimensions are implicitly part of the initiatives (e.g. the community garden).</i>
4	Development of trust within the group Directly: Participants report on (growing) trust amongst each other; Indirectly: Outputs highlight value of trust or depend in their development on trustful relationships	Directly: growing trust was reported in the feedback interviews and meetings; all participants reported the experience of working together in a respectful and constructive way even with previously unknown people and in a very diverse group. <i>Indirectly: The growing trust could also be observed by the research team.</i>	Directly: This was not addressed in the interviews and evaluation meeting (n/a). A group-feeling was not really created according to the participants. So developing new shared rules or trust or values was not really a direct effect. <i>Indirectly: Not directly observed.</i>
5	Development of shared rules and norms within the group Directly: Participants report to have established common rules amongst them; Indirectly: Outputs highlight or are based upon common rules	Directly: The majority of the respondents reported similar concerns among the participants and all experienced an exchange of likeminded people. Some also said that their form of communication became more appreciative during the process. <i>Indirectly: The newly established steering committee was elected by a mutually agreed voting procedure. There were</i>	Directly: This was not addressed in the interviews and evaluation meeting (n/a) . A group-feeling was not really created according to the participants. So developing new shared rules or trust or values was not really a direct effect. <i>Indirectly: Maybe some implicit shared moral on letting each other talk and discussing in a respectful manner. Participants did state that the common denominator of the group was a shared connection and responsibility to the neighbourhood.</i>

		<i>communication guidelines developed to be applied within the working groups.</i>	
6	<p>Development of shared values within the group</p> <p>Directly: Participants report to have developed shared values; Indirectly: Products build on or express shared values (e.g. vision).</p>	<p>Directly: Some participants perceived the TM case study itself as a learning journey with regard to developing shared understandings. Many of them realized how the initially divagating interests and aims got transferred into a shared vision and actions benefitting the common good. In the eyes of the participants the project contributed to putting the diverse needs of the citizens on the table in form of a shared vision: “something has started”.</p> <p>Indirectly: <i>Some of the activities started or planned within the working groups show shared values, in particular social ones; the vision includes a number of value statements and was endorsed by the whole arena group</i></p>	<p>Directly: This was not addressed in the interviews and evaluation meeting (n/a). A group-feeling was not really created according to the participants. So developing new shared rules or trust or values was not really a direct effect.</p> <p>Indirectly: <i>The shared values of the group centred on certain social morals of doing something for the community (responsibility). This was also apparent in the vision, it was all about collective and collaborative place-making and respecting different cultural values as to work effectively together.</i></p>
7	<p>Openness towards new contacts</p> <p>Directly: Participants report establishment or openness towards new contacts; indirectly: products build upon or value new contacts</p>	<p>Directly: Participants reported that the process sparked interest in (opinions of) and respect for other persons and an attitude of appreciation towards other persons (e.g. representatives of community politics) was developed.</p> <p>People reported an increased self-reflexivity and attention in contact with other people. Some participants described themselves as being more open and having fewer prejudices in interactions with others.</p> <p>Indirectly: <i>Several working groups focus on establishing exchange and new contacts (such as welcome neighbour-round-tables, community journalists and workshops on participators cultures)</i></p>	<p>Directly: Some participants reported that the process sparked interest in (opinions of) other participants.</p> <p>Indirectly: <i>Effort was made by the arena group to invite new contacts to each meeting. This was not very effective, partly because participants were struggling with explaining the process to outsiders.</i></p>

8	<p>Joint action for sustainability</p> <p>Directly: Participants report joint activities for sustainability; indirectly: products build upon joint action and relate to sustainability</p>	<p>Directly: 9 out of 15 participants state that the project implements measures that are not just good for the moment but also the far future and that they are not just good for Finkenstein but also for other parts of the world.</p> <p><i>Indirectly: A climate-energy-model-region (German "Klimaenergiemodellregion") was applied for and accepted by the Austrian Climate and Energy Fund; new bicycle lanes or car sharing options were planned;</i></p> <p><i>One working group focussed primarily on sustainability, others are related to sustainability issues (such as social or ecological issues); an institutional structure for further implementation of the vision has been build using the method of sociocracy, establishing a steering committee.</i></p> <p><i>cp. social learning indicator 7 and empowerment indicator 6.</i></p>	<p>Directly: No explicit joint action for sustainability was mentioned. Participants reported community centre reopening as reaction to local, social problems rather than sustainability problems.</p> <p><i>Indirectly: The arena-group participated in three newly arena initiated experiments, i.e. the reopening of the community centre, the reopening of the communal garden and an internship for students of Intermediate Vocational Education (community college). Those can be related to social aspects of sustainability.</i></p> <p>See also above (3)</p> <p><i>cp. social learning indicator 7 and empowerment indicator 6.</i></p>
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Supplementary Material 4:

Data collection and interpretation

The consecutive analysis is focussed on research activities and data generation that took part during the lifetime of the two local case study projects. In Finkenstein, the community arena process took place from summer 2011 to March 2013, while in Carnisse it took place from September 2010 to March 2013. Spring 2013 was also the official ending of the overall InContext project the case studies were part of. At that moment, processes initially facilitated by researchers were handed over to local participants. Participatory evaluation workshops marked the end of the research process in both communities. In Finkenstein, this was followed by the election of a local steering committee. In Carnisse, a citizen led foundation board was formed to run the community centre. Setting temporal boundaries for the analysis was necessary for practical, e.g. funding reasons. While this allows capturing a range of social effects (see next chapter), mid- and long term effects generated by the project are excluded.

All authors have been involved in the case studies, albeit to different degrees. The third and fifth authors have jointly been responsible for planning, supervising, facilitating and evaluating the action research in Carnisse. The other authors have been engaged in Finkenstein in various roles, including planning, supervising, facilitating and evaluating the action research.

For gathering and interpreting data on social effects and related outputs various methods were used (e.g. qualitative interviews, surveys, baseline data collection, participants observations, document analysis). The case studies of Finkenstein and Rotterdam-Carnisse are based on different data sources (for detailed reporting see project deliverables Wittmayer et al. 2011a, 2011b, 2012, 2013a, 2013b, 2013c available for download at www.fp7-incontext.eu). In Finkenstein, respective analysis draws primarily on results of a final participatory evaluation workshop (25 participants) and a preceding quantitative online survey (15 responses) as well as 8 semi-structured interviews. In Carnisse, the analysis draws on the final participatory evaluation meeting (7 participants) as well as 13 semi-structured interviews (7 mid-term interviews and 6 interviews at the end). In both cases core outputs of the case studies at the level of products (see previous section on operationalisation) are additionally used as data sources. This includes the vision documents as well as concrete and experimental actions developed by participants.

The consecutive assessment does both: it *directly* assesses social effects and it *indirectly* gathers information about them by analysing outputs generated by project participants. For direct assessments, participants were asked to report on various aspects of the social effects as part of the participatory evaluation workshop and respective interviews in the final phase of the case studies. For indirect assessments and reflections of direct data sources, researchers analysed a) participant observations of the arena process creating these outputs and, where possible b) the indication of developed outputs with regard to the social effects. Jointly, these three assessments form a triangulation, complementing one another to a multifaceted picture on the creation of social effects.

Due to the nature of the data (self-reported observations of participants, participant observations, and document analysis of visions) and the small sample size, the analysis is of a qualitative and explorative nature. Results are presented in form of an overview table (table 2), capturing core developments of social effects and a consecutive discussion (For a detailed reporting please see supplementary material 1, 2 and 3).