Collaboration in spatial planning. Assessing the suitability and application potential of information and communication technologies

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Abstract

This paper deals with the category of so-called wicked problems, characterized by a great deal of complexity and uncertainty. Problem-solving strategies focus on participation of stakeholders and on transdisciplinary approaches. In this context, communication and information technologies will play a crucial role. The paper describes the technological options and how they can be used under different conditions.

1. Introduction

Dealing with land use conflicts in the context of the “Energiewende”, finding a balance between competing claims or use for the available land for agriculture, nature conservation and residential development, the challenges associated with the introduction of new technologies or the development of climate adapted and resilient infrastructure systems are classic examples of so-called "wicked problems" - problems for which there is a low common understanding among stakeholders and also no clarity regarding the strategy to respond to such problems. Hence there will also be no "right" or "wrong" solutions, but only better or worse results [1-3]. Traditional planning and regulation approaches which are mainly based on a clear definition of objectives, an analysis of cause and effect relationships, forecasting and monitoring, seem to be less suitable to solve these problems [3-5]. To be successful, solutions must therefore be composed of a wide range of coordinated actions to respond to the multi-causal relationships.

Strategies have to take into account the strengths and weaknesses as well as opportunities and risks of the conflicting issues [6]. Such approaches have according to [7] the following distinguishing features:

- “holistic, not partial or linear thinking
- innovative and flexible approaches with a focus on creating a ‘learning organisation’
- the ability to work across agency boundaries
- effectively engaging stakeholders and citizens in understanding the problem and in identifying possible solutions
- additional core skills e.g. communication, big picture thinking and influencing skills and the ability to work cooperatively
- tolerating uncertainty and accepting the need for a long-term focus, no quick fixes, solutions may need further policy change or adjustment.“

In the context of the problems outlined, technical solutions will play a less prominent role in the future. The focus will be more on institutional and social concepts. In dealing with problem

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complexity and situations characterized by uncertainty and risks, new planning approaches arise, relying on cooperative procedures and transdisciplinarity. This holds especially for climate adaptation measures, which in general are more locally and regionally based compared to climate mitigation. An effective climate adaptation particularly depends on the participation of local actors and on the opportunities to exploit their specific knowledge and experiences. The need for a transdisciplinary approach obviously is quite clear, but so far the questions how such participatory processes should be organized and which supporting tools can be used, has not been analysed systematically [8]. It is evident, in this context to think about the use of information and communication technologies and new social media. But there have been very few studies dealing ssystematically with the questions whether, under what conditions and in what stages of a participatory process what technical options can be meaningful and purposeful. In the following sections these issues will be discussed in the context of the so-called living labs concept, a new and promising approach of transformation management.

2. The Living Lab Approach

The living lab approach is an emerging approach, which tries to tackle aforementioned challenges and to find answers to them. A literature review on living labs revealed that the living lab approach is mainly based on strong civil society (user) integration, strong involvement of many relevant stakeholder groups from science and business (transdisciplinarity) as well as the consideration of real life contexts through the examination of socio-ecological relations from different perspectives [9-12]. Living labs are platforms for research and innovation and for implementing practical solutions within real societal contexts (e. g. cities, districts, regions) and challenges (e. g. climate change, demographic change etc.) applied to the co-creation of policies, technologies, economical, socio-cultural as well as ecological solutions. They provide an institutionalized framework for transdisciplinary work between different stakeholders (e. g. residents, users, policy makers, local citizens, industry representatives as well as academics) with various concerns and interests. The aim is to develop solutions reasonable for the society, taking into account present conditions and future developments [11, 13].

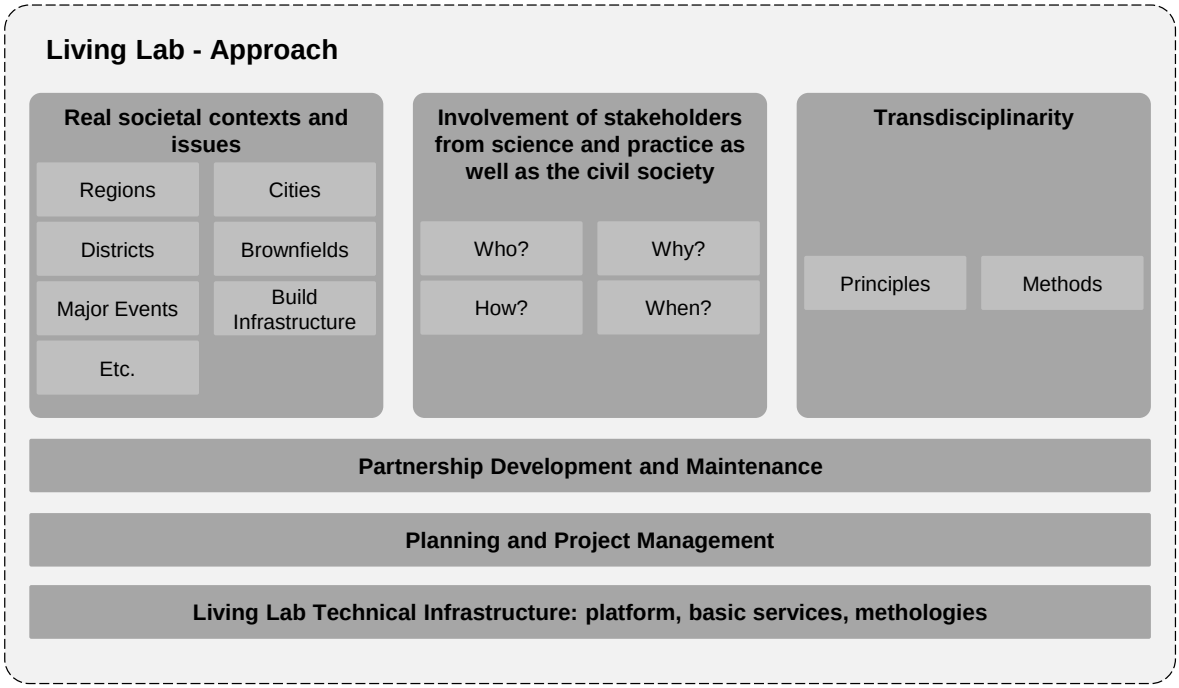

Figure 1: Living lab components

The platform in the context of living labs supports and arranges the innovation and planning process through value added activities. In doing so, the platform ensures time and space for innovation, the organization of innovation and planning activities, it supports the stakeholders in searching for and in the development of partnerships as well with the project management. Furthermore, the platform also provides the technical infrastructure, which facilitates the knowledge-transfer and collaboration amongst stakeholders. Finally, such a platform assists in elaborating the organizational, financial and cooperative arrangements between the participants [12, 14].

3. IT in the context of living labs

As previously shown the engagement of different stakeholder groups is one of the core elements of living labs. Especially land-use conflicts are characterized by heterogeneous stakeholder constellations and for this reason also by divergent interests: stakeholders from different industries and political levels, scientists from different disciplines, the civic society or planners to name but a few examples of possible constellations which come along with conflicts of interests, different knowledge and information stands, divergent perspectives and beliefs [15, 16]. In the light of the variety of possible stakeholder groups the question arises which stakeholders should be involved why, when and by which means [17-19]. During the consideration about the technical infrastructure of living labs it is obvious to examine to what extent the decision-making and the collaboration between stakeholders could be supported through information and communication technologies. On the one hand, decision support systems could be used to foster the decision-making process in order to ensure societal reasonable solutions, despite a diverse knowledge and database as well as interests amongst participating stakeholders. On the other hand, information and communications technologies could be used to facilitate the cooperative process itself. These technologies are primarily used for the knowledge and information transfer as well as for the mediation between stakeholders, to assure as much as possible social, ecological and economical concerns from different perspectives with the result of consensus-oriented and legitimized decisions [20]. These include software systems like groupware, collaborative software, e-collaboration, social software, e-participation etc. [21]. In order to not exceed the limits of this paper the focus hereinafter is on the latter category of technologies.

The application of information and communications technology in the context of cross-organizational co-working is especially in theory attributed with positive characteristics. These positive attributes are the increase of productivity and efficiency in the co-working, cost reduction, bridging of time and space dispersions, integration of several relevant stakeholders, absorption of suggestions from users, easier knowledge and information transfer etc. [21-23]. In reality, in 70 % of cases the application of collaborative information and communication technologies fails. According to [23] this is due to a lack of goal definitions and implementation strategies during the introduction of such software or technologies. Other reasons are the ignorance of already existing applications, the low controllability by users or simply the ignorance of critical aspects. Hence a systematically approach for the right chose of process and organizational relevant technologies seems to be necessary [21-23].

3.1. Selection criteria

Each phase of the living lab process is concerned with different stakeholder constellations and therefore with different knowledge bases and requirements in general, which need to be considered during the process [24]. Therefore, it is critical to consider in which way the different stakeholders are going to participate during the process, which time and space disparities have to be overcome and which of the potential tasks can be supported by collaborative technologies [21, 25].

Stakeholder participation can happen in different ways. According to Arnstein´s ladder of participation [26],[17] distinguish between five participation levels: presentation and explanation of the project to the stakeholders (inform), stakeholders can make suggestions which are not taken into account (consult), stakeholders can make suggestions which are taken into account (collaborate), stakeholders cooperate with each other towards an agreement for solutions and the implementation (co-decision) and the decision process can be delegated to the stakeholders during the entire process (empowerment). Each participation level has implications for decisions pro or contra a certain technology, like blogs, wikis, project management software, share points, e-participation etc.

Besides the participation level it is also crucial time and space disparities, which are possible during the process. The cooperation, for example, can take place within the same spaces or across different spaces. Collaboration between stakeholders can also be synchronous (at the same time) as well as asynchronous (at different times). The combination of time and space implications results in the time-space matrix diverse requirements to the collaborative application [27].

Different use cases are only one aspect for the decision for or against a certain application. Application assessment should also be performed at the organizational-technical as well individual-technical level. At the organizational-technical level it is about how the application meets the needs of the potential tasks and of the organizational environment, does the organization have the required resources to buy and to run the software, to conduct training courses or even to moderate the application. In the context of the individual-technical level it is crucial to consider if the project employees and the potential operator are willing and able to apply a certain application and what could be possible barriers to use the application on the individual level [21, 28].

3.2. An approach for the technology selection

A decision for or against a certain collaborative application should not only rely on its technological attributes, but rather consider several aspects as mentioned in the previous section. In the literature several approaches exist to assess a certain technology. Most of these approaches set out from the technology´s point and therefore only examine how the technology meets the requirements of a certain task [21]. Several scientists stress that the assessment of so called “technological fit alone” is not appropriate to justify the application of a technology during a collaboration or participation process. Rather it is essential to consider the availability of existing resources on the individual as well as organizational level. Therefore, they propose the application of the fit-viability approach [21]. The fit-viability approach was development in the e-commerce sector and later adopted for the application of mobile technologies as well as web 2.0 applications in the entrepreneurial context [21, 28, 29]. Such an approach includes two important components: a) Consideration of the possibilities, which come with the usage of a certain technology and b) assessment of the required realization aspects and of the potential challenges, which could appear if a technology is implemented [21,28]. In accordance with [21] the following procedure is suggested to utilize the fit-viability approach:

- **Analyse existing technologies:** Examinating which collaborative technologies exist, what are the contexts to utilize them, which resources and infrastructures are necessary and what are the advantages and disadvantages of a certain technology;
- **Determine the collaboration context:** Here it is useful to draw on the data from the stakeholder analysis as well as on the conceptual approach of the project. The objective is to anticipate which stakeholder groups participate when and in which way during the project and what are the requirements of the collaborative application;

- **Determine the fit between technologies and the collaborative tasks:** At this level the insights from both previous phases are consolidated. Thereby it is possible to use a scoring system to assess how far a certain technology meets the requirements of the collaborative tasks;
- **Analyse economic viability of the technology:** After the first screening an assessment of the economic viability is conducted. It is essential not only to consider the procurement costs, but also the costs of possible trainings, costs of maintenance, the compatibility with existing software tools etc.;
- **Identify necessary IT infrastructure:** Verifying to what extent the existing infrastructures are sufficient to run a certain technology. If the existing IT infrastructure is not sufficient, when it is necessary to identify which adjustments are needed to run an application. Here it is imperative to consider the infrastructure of all potential participants;
- **Examine the human factors:** Even if a technology makes sense from an organizational point of view, it is crucial that for potential users the need and advantages are also evident. An implementation of technologies is useless if the users are not ready or able to utilize it. Training courses could be useful to overcome technology inhibitions or to foster the acceptability;
- **Define a deployment strategy:** Here, a plausible implementation plan and the performance measures are developed. The previous phases provide here a guiding framework. Basically one can say: A technology with a low rated fit should not be implemented; at a high fit and low viability it is necessary to consider which measures could increase the viability;
- **Evaluate the technologies:** Finally, the application of the technology should be evaluated. In addition to the results, the evaluation design should also assess the process itself. While the results measure the effectiveness, the process evaluation measures, if and to what extent the collaboration process contributed to the efficiency of the process and to the satisfaction of the participants with process.

Using the recently introduced approach it is possible to assess the need and the applicability of collaborative technologies within cross-organizational projects. The approach presented here is intended to be used and evaluated within the cross-border and cross-organizational project "Climate Adaptation in Living Labs: Integrative Spatial Strategies".

4. Climate adaptation in living labs: a project proposal

"Climate adaptation in Living Labs: Integrated Spatial Strategies" is a pilot project with the focus on the conceptual foundations for a long-term oriented, cross-border cooperation between the Netherlands and Germany. This INTERREG IVB project is supported by three German and Dutch municipalities and by two research groups. The common problems studied are land use conflicts due to the growing demand of the agricultural sector, the energy and water industries, new infrastructure projects and nature conservation commitments. In the future, decisions on land use will be more complex due to new challenges caused by climate mitigation and climate adaptation. Current plans include, inter alia, the construction of new tidal polders to reduce the risk of floods in the Ems region. This of course would increase the pressure on the land market and will face both policy-makers as well as land owners with new challenges.

The objective of the "network project" is to create the foundations for a cross-border long-term knowledge sharing and new forms of cooperation under real laboratory conditions. A network of spatial planners, policy-makers, the local population, of the economic representatives and of scientists has to be set up to establish a concept for a cross-border real lab, in which innovative strategies, new procedures and standards as well as new planning approaches can be tested and implemented. Intensifying the transfer of experiences and knowledge is seen as a way to better understand the specific challenges in conjunction with risk management, climate change impacts and adaptation to climate change and the demand for regionally-specific optimization. It is of

central importance to the realization of the project idea that the participation and cooperation between stakeholders each with different experience levels, decision-making competences and interests and integrated in very different political and institutional structures and planning philosophies can be implemented in a systematic way.

These challenges are also reflected in the project structure. First, a kick-off meeting means that the cooperation of all players will take place at the same time in one location. The focus of the project is on workshops on both sides of the border; that means that meetings will be organized at different times and spatially separated. The exchange of information and experience across the border and between different actors therefore should be organized by using a kind of virtual platform. The challenges resulting from this project structure will have an impact on the technologies that could be used as part of the platform. The approach presented in the chapters above, can be used to determine and to select the appropriate technologies. The use of blogs, wikis, forums and other social media is conceivable to involve as many stakeholders as possible. The integration of the local population can also be supported by the implementation of e-participation applications. The use of groupware applications will be helpful for project management. On a conceptual level it needs to be clarified:

- which of the potential actors should use this platform;
- which functions and what degree of participation the platform should provide or allow (inform, consult, collaborate);
- and whether the use of the platform can be restricted to the lifetime of the project or should be implemented as an instrument of long-term, institutionalised cooperation.

Finally, the special challenges and barriers regarding the feasibility of the approach have to be taken into account. Due to the limited duration of the project, the technical options should be put into practice quickly and easily and the platform should by moderated by a project partner so that there is no need for the use of experts. From an economic point of view, it should be checked carefully, whether there are potentials to use the platform in other applications outside the project.

Particular challenges may arise from the fact that in rural and economically weak areas the technical prerequisites do not exist (access to broadband) and in general the willingness to use and the acceptance of an internet-based cooperation could be low. In this particular project linguistic barriers may exist, but due to a great deal of experiences of cooperation this should not be an obstacle to a successful cross-border activity.

5. Conclusion

The paper’s objective was to make clear that current and future land use conflicts constitute a problems that are characterized by a great deal of complexity and exhibit characteristics of wicked problems. Based on the project proposal different ways to use information and communication technologies in participation and collaboration processes have been discussed. It remains to be seen how the use of these technologies will develop under practical conditions. It is important to point out the need for a systematic analysis of the underlying problem and to present an overview of the relevant stakeholders; their interests and interrelationships in order establish the framework conditions for the use of the new technologies and not to implement them only because they are available.

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