ITA
INSTITUTE OF TECHNOLOGY ASSESSMENT
manu:script

Long-term planning for sustainable development

CIVISTI method for futures studies with strong participative elements

Mahshid Sotoudeh
Walter Peissl
Niklas Gudowsky
Anders Jacobi

epub.oeaw.ac.at/ita/ita-manuscript/ita_11_03.pdf

ÖAW
Austrian Academy of Sciences

Vienna, 12/2011
ITA-11-03
ISSN 1681-9187

http://epub.oeaw.ac.at/ita/ita-manuscript/ita_11_03.pdf

December/2011
(ITA-11-03)

Long-term planning for sustainable development

CIVISTI method for futures studies with strong participative elements

Mahshid Sotoudeh[1], Walter Peissl[1], Niklas Gudowsky[1], Anders Jacobi[2]

[1] Institute of Technology Assessment, Austrian Academy of Sciences; [2] Danish Board of Technology

Keywords

Long-term planning, sustainable development, forward looking activities, citizen participation

Abstract

Long-term planning with a time-horizon beyond 20 to 30 years is an established element of policy-making in some core fields such as certain infrastructure policies, and is a substantial principle of sustainable development. At the same time short- and medium-term planning is much more usual in the search for ad-hoc solutions to environmental, economic and social challenges. Economic actors apply flexible policies and use short-term opportunities for their profit. Environmental and social problems also sometimes imply short-term solutions for the survival of a system in acute danger. This creates a paradoxical situation: the society in question needs to define long-term targets for its infrastructure and achieves systematic changes pursuing those, but the necessary short-term actions and flexibility applied to stay functionable might not be in line with longterm goals. If this apparent paradox cannot be solved through an appropriate governance method, it might lead to a conflict between different policy goals. The concept of reflexive governance for transition management tries to solve this apparent paradox and combines a number of short-term planning processes in a stagewise and reflexive way to create a more comprehensive and innovative process of long-term planning for a sustainable development. Future-oriented analyses and forward-looking activities are a fix element at each stage. This contribution points out some key questions for a flexible long-term planning process within the framework of sustainable development. The main challenge is how different knowledge types such as citizens' visions and experts' recommendations can be integrated into long-term planning in order to support an interactive decision-making process that considers a broader basis of information. CIVISTI, an innovative forward-looking approach, addresses this challenge. The CIVISTI method has been developed during the recent EU-project on Citizen Visions on Science, Technology and Innovation (CIVISTI 2008-2011). In this paper we introduce and discuss this method as a reflexive instrument for integrating different types of knowledge and creating a bridge between short- and long-term planning.

Table of Contents

MASTHEAD

Media owner:
Austrian Academy of Sciences (OAW)
Legal person under public law (BGBl 569/1921 idF BGBl I 130/2003)
Dr. Ignaz Seipel-Platz 2, A-1010 Vienna

Editor:
Institute of Technology Assessment (ITA)
Austrian Academy of Sciences
Strohgasse 45/5, A-1030 Vienna
http://www.oeaw.ac.at/ita

ITA manu:scripts appear at irregular intervals and publish working papers and talks from staff members as well as guests. ITA manu:scripts are exclusively made available to the public via the Internet portal "epub.oeaw":
http://epub.oeaw.ac.at/ita/ita-manuscript

ITA manu:script Nr.: ITA-11-03 (December/2011)
ISSN-online: 1818-6556
http://epub.oeaw.ac.at/ita/ita-manuscript/ita_11_03.pdf

© 2011 ITA – All rights reserved

1 Theoretical background

According to Rockström et al. (2009) we have already passed at least three planetary boundaries that define the safe operating space for humanity on earth and still we continue down this road with world-wide CO_2 emissions rising to a new record high in 2010 (IEA 2011). Celebrating the earth overshoot day a little earlier every year should remind us that human life is currently not sustainable (Global-Footprint-Network 2011). In the face of these pending global issues, repeated calls are made for sustainability. Since planning is an exercise of imagining and shaping the future (Chakraborty 2011), it shares much common ground with the concept of sustainability. Opposed to existing short-term economic and policy processes to achieve predefined outcomes, sustainable development relies on flexible long-term planning in decision-making. *"The goals are chosen by society through the political process: the system to satisfy these goals are worked towards in an adaptive, forward-looking manner"* (Kemp/Loorbach 2006, p. 109). There is increasing evidence from transition management that the current supply of information is unlikely to satisfy the demands of decision makers who are looking to facilitate long-term strategic transformative change (Park et al. 2011). *"Transition management is a form of process management against a set of goals chosen by society"* (Kemp/Loorbach 2006, p. 110). It implies learning, dealing with diversity, evaluation of system changes and adaptation of policies (strategies, actors involved, etc.) that serve flexibility for short-term activities without losing the long-term perspective (Kemp/Loorbach 2006).

In this paper we propose a model on how different knowledge types such as citizens' visions and experts' recommendations can be integrated into long-term planning in order to support an interactive decision-making process that considers a broader, socially more robust basis of information.

In the first part we outline long-term planning and the role of participative elements for decision-making as a continuous learning process. The term "futures studies" is used to show that the discussion is based on the assumption of the diversity of possible options for the future and of paths leading to different futures. Futures studies should therefore use appropriate methods to consider the complexity of future problems and the uncertainties of alternative futures. We will use the description of the four laws of futures studies in Sardar (2010) who defines the limits and characteristics of futures studies. He describes futures studies as dealing largely with complex, interconnected problems, emphasizing Mutually Assured Diversity, question-dominant axioms and assumptions and bearing fruit largely in the present (Sardar 2010)

In the second part of the paper we use the results of the CIVISTI project as a forward-looking study with strong participative elements to show a method for the integration of different knowledge forms into a decision-making process for medium- and long-term European research.

This paper can however only cover a small part of the discussions on the knowledge and steps required for long-term planning and the potential pitfalls for the planning. A special focus is on the interaction between different actors and the integration of different inputs within a communication process on future visions and targets. The results of the analysis can be applied for suggestions on the further development of methodologies for long-term planning and reflexive governance for sustainable development.

1.1 Elements of long-term planning, forward looking activities

Global long-term issues require the availability of encompassing and very long-lasting monitoring systems (Hage et al. 2010). The following example highlights well the importance of long-term planning for sustainability, even though it somewhat reduces the complexity of such a process:

> "Focusing only on the short-term is like worrying about how to re-arrange the chairs on the deck of the ill-fated Titanic. All the good work at improving the arrangement of the chairs was lost because the longer-term issue (the survival of the ship) was completely mis-handled" (Tonn 2007, p. 1102).

In the light of limitations of traditional planning and the major unpredicted events, such as the 1973 oil crisis there has been a substantial shift from the apparent certainties of the Cartesian era of modelling and management, toward more contingent approaches. Technology foresight, horizon scanning, technology road-mapping have been developed.

New concepts take into account the co-evolution of science and technology and society in their work. In the field of technology foresight the long-term planning needs a group of elements to deal with the different causes of uncertainties. An example is the six principles of the Future-oriented Technology Analysis (FTA) mentioned by Keenan and Popper (2007):

- Future-orientation (it means that the future can be shaped and there is a certain degree of freedom to choose among alternatives and increase the likelihood of arriving at a preferred future state).
- Participation (FTA values the multiplicity of perspectives, interests and knowledge. It is also important to regard implications of the decisions for a wide variety of actors). Researchers began using participative methods for forward-looking activities in the 1960s (List 2006).
- Evidence (FTA relies on the informed opinion, information and knowledge as well as creative approaches).
- Multidisciplinarity to improve understanding and networking relationship.
- Coordinated mobilisation of people and resources.
- Action orientation (FTA is not only about analysing future but supporting actors to actively shape the future.); (Cagnin et al. 2008).

Cagnin/Keenan (2008) summarise the decision-making process in four knowledge-based structured dialogues for understanding the current situation, exploring what should happen, debating what stakeholders or participants would like to happen and deciding what should be done. The transition management, however, relies on an iterative participatory goal formulation. The acitivity clusters in transition management are described by Kemp/Loorbach (2006) in four groups: developing sustainability visions and transition agendas, mobilising actors and executing projects and experiments, evaluating, monitoring and learning as well as organising a multi-actor network.

In this paper we assume that mobilising actors, executing projects and organising a multi-actor network can be performed in parallel. It is therefore possible to consider a basic three-step planning process for sustainable development as a continuous learning process:

- Setting targets with a consideration of the future environmental, social and economic chances and risks (compared to the developing sustainability visions and transition agendas activity cluster).
- Development of measures to achieve targets (compared to the mobilising actors and executing projects and experiments and organising a multi-actor network activity cluster).
- Assessment of the success or failure of measures and the start of the design of adapted measures and interim targets (compared to the evaluating, monitoring and learning activity cluster).

The learning process is the core of transition management towards sustainable development. Socio-economic, ecological and physical systems all share the characteristics of complex adaptive systems (CAS), which are self-organisation and co-evolutionary dynamics, expressed in large macroscopic patterns that emerge out of small local interactions (Rammel et al. 2007). CAS theory analyzes these traits and encourages policy makers to consider a variety of system characteristics and behaviour: non-linear effects and sudden shifts, multiple scales of organisation, complementary knowledge from different types of expertise (Vervoort et al. 2010). Vasileiadou and Safarzynska (2010) point out that taking complexity of systems into account is also of utmost importance for transition processes towards sustainability. Transition managent processes have co-evolved with theory in the last decade and scholars increasingly conduct case studies that evaluate such pratices (Loorbach/Rotmans 2010). According to the concepts of transition management decision-making activities for long-term plans have to be performed at the interface between science, politics and society. They require the involvement of the knowledge and experiences of different actor groups and integrate monitoring, evaluation and learning steps recursively.

Considering this context, the recursive learning process indicated in Fig. 1 becomes especially important, since the management of complex adaptive systems can only be sustainable if integrated development strategies and targets are reassessed and adapted continuously.

Figure 1: A basic three step scheme for the recursive process of long-term planning

The iterative cycle is a widely used concept in action research and is also seen as a possibility for the improvement of developing multiple futures perspectives in futures studies (List 2006). It is the basic device for reflexive long-term planning that enables planners to embrace short-term necessities, without loosing sight of long-term targets. In this paper we will specify this basic scheme for different types of knowledge required.

Targets may have different time horizons in the future, while measures are primarily based on past experiences and present short-term possibilities. Dealing with long-term planning in transition management therefore means dealing with differences between long and short time frames or between futures expectations and knowledge from past experiences. Hence the decision-making process should be coordinated in order to avoid too strong an emphasis on one dimension (the future or the past).

The coordination and optimization of planning activities and possible pitfalls need therefore to be considered carefully.

1.2 Pitfalls for long-term planning

To deal with the apparent paradox between short- and long-term planning towards sustainable development, we have to consider the potential pitfalls for planning. As mentioned above, Sardar (2010) describes four laws for the characterisation of the pitfalls of futures studies. Future problems are complex and interrelated. Efforts to solve one problem could cause new problems. They are so called "wicked problems" (Sardar's first law). Future studies are described as MAD (Mutual Assured Diversity) since they should consider the diversity of cultures and different ways for changes (Sardar's second law). The third law is driven from the first and second laws. Futures Studies are sceptical both of linear and simple solutions for wicked problems and dominant ideas. Sardar's fourth law focuses on the strong connection between future ideas and the present time and considers future studies as "futureless". In this paper we use this concept as a basis to identify the knowledge required for futures studies on technology development.

The first law on the complexity of future problems can be described through interrelated problems and needs: The problems and risks that should be addressed in the 21st century are interrelated issues involving poverty, illiteracy, shortage of clean drinking water, environmental degradation and the reduction of biodiversity, industrial waste hazards and health problems, etc. (Balabanian 2006; Jischa 2005) and cannot be solved separately. The United Nation Millennium Declaration (UN-General Assembly 2000) emphasizes the need for international and collective responsibility in solving international problems of an economic, social, cultural or humanitarian character. The United Nation suggests inter alia the development of long-term strategies and the improvement of knowledge on best practices at different levels as key activities for these solutions. The first law therefore leads to at least two types of knowledge required:

- structured knowledge from past experiences and lessons learned and
- system knowledge at local, national and international level.

The second law on the diversity of futures options implies the acceptance of "multiple legitimate needs". The diversity of needs or "plurality of legitimate perspectives" has to be considered especially for long-term planning. The needs of different generations and even the needs of future generations should be considered. There is a broad spectrum of needs such as "peaceful and safe societies" that are not pre-selected and directed by a special group towards a homogenous problem definition. A development, which encompasses not only economic but also environmental, social, and cultural aspects has a broader scope for the selection and interpretation or perception of the needs which should be addressed in policies for sustainable development. Visions are a valuable asset to integrate multiple legitimate needs into an increased diversity of futures, as they are in the definition of Beers et al.' (2010) an image of a desirable future. Van der Helm (2009) stresses that change from the current status is intrinsic to the nature of visions and describes them as idealised expressions of a future with the aim of mobilising present potential for transformative change. To consider the diversity of futures options we need to identify visions based on the hopes and fears of a diverse range of people (based on practical-technical (tacit) and ethical (phronetic) policy knowledge (De Smedt 2008) and to provide

- knowledge of trade-offs between different legitimate objectives and targets.

The third law implies being sceptical of simple and linear solutions for complex problems that involve many uncertainties of systemic knowledge. Sotoudeh (2009) describes the challenge related to future uncertainties as being based on mainly two sources:

a. *Hidden or neglected values*: Long-term planning is strongly connected to visions and future values. In an analogy to Dierkes' et al. (1996) interpretation of the role of visions in technological development, visions could generally keep developments on a specified path. Visions, how-

ever, are not always clear and transparent. Different visions are often hidden in different stages of the process and can be in conflict with each other (Dierkes et al. 1996). These hidden differences could lead to hidden conflicts between targets that appear as unexpected conflicts during the development and application of measures.

b. *Unexpected changes of parameters*: Uncertainties in long-term planning can be caused by:
   - changes of needs, problems, and resources through natural disasters, wars, etc. or unexpected changes of knowledge and skills due to radical innovations and inventions;
   - changes of objectives due to changes in the internal rules of the social system or different interests and controversial values, diverse objectives and their interactions due to new information or experiences;
   - changes of communication mechanisms between people and organisations; formation and changes of networks for new technology development or technology application. (see Sotoudeh 2009).

In order to deal with uncertainties, it is necessary to identify hidden or neglected values. Furthermore, there is need for comprehensive system knowledge on environmental, economic and social conditions at local, national and international level. In this way it is possible to provide more options for the system to deal with unexpected changes.

Sardar's fourth law considers futures studies as futureless and focuses on the role of past experiences and lessons learned, futures expectations and expert knowledge on the definition of targets and different future options. The results of such studies should therefore be considered in the light of their present and past context.

The next section presents a model for integration of different knowledge types required for the recursive process of long-term planning.

1.3 A model of knowledge required for long-term planning

In the light of the above-mentioned challenges for futures studies on technology development, this section discusses a model for the knowledge required for the long-term planning process with the goal of sustainable development.

Figure 2 presents different categories of knowledge required in this model:

a. Different types of knowledge for target setting based on inter- and transdisciplinary research:
   a1. visions of futures based on the hopes and fears of people (based on tacit and phronetic policy knowledge (De Smedt 2008))
   a2. explicit description of values and normative principles from different points of view (in the case of sustainable development, this refers to the principles of human rights, environmental protection, social and economic fairness and other factors that secure the peaceful life of human beings and of future generations defined as Principle 15 in the Rio Declaration on Environment and Development (UNEP 1992)); (a type of phronetic knowledge)
   a3. input from different moderated dialogues between actors to *"understand the current situation, explore what could happen, debate about desired scenarios and decide what should happen*" (Cagnin/Keenan 2008, p. 6) and to identify different futures expectations for the issues under consideration in a participatory process (knowledge generated through interaction between different types of knowledge)

a4. structured knowledge from past experiences and lessons learned (a type of epistemic knowledge)

a5. system knowledge at local, national and international level (based on different types of knowledge from natural, human and social sciences)

b. knowledge of trade-offs between different objectives and targets

c. organisational and political knowledge for the planning of measures and first experiments to achieve targets

d. knowledge for the coordination of pre-assessments for testing measures to achieve targets

e. knowledge of communication methods for the discussion of results with different groups of actors and the implementation of the necessary changes in plans.

Figure 2 presents the contribution of different types of knowledge and elements of the planning process for dealing with different pitfalls of long-term planning. Due to its setting the CIVISTI project focused on category "a" (categories a1, a3 and a4 in figure 2). It included some aspects of categories b and e. The knowledge gained by this method also influences the planning steps for the development of measures (b) and the assessment of success or failure (e).

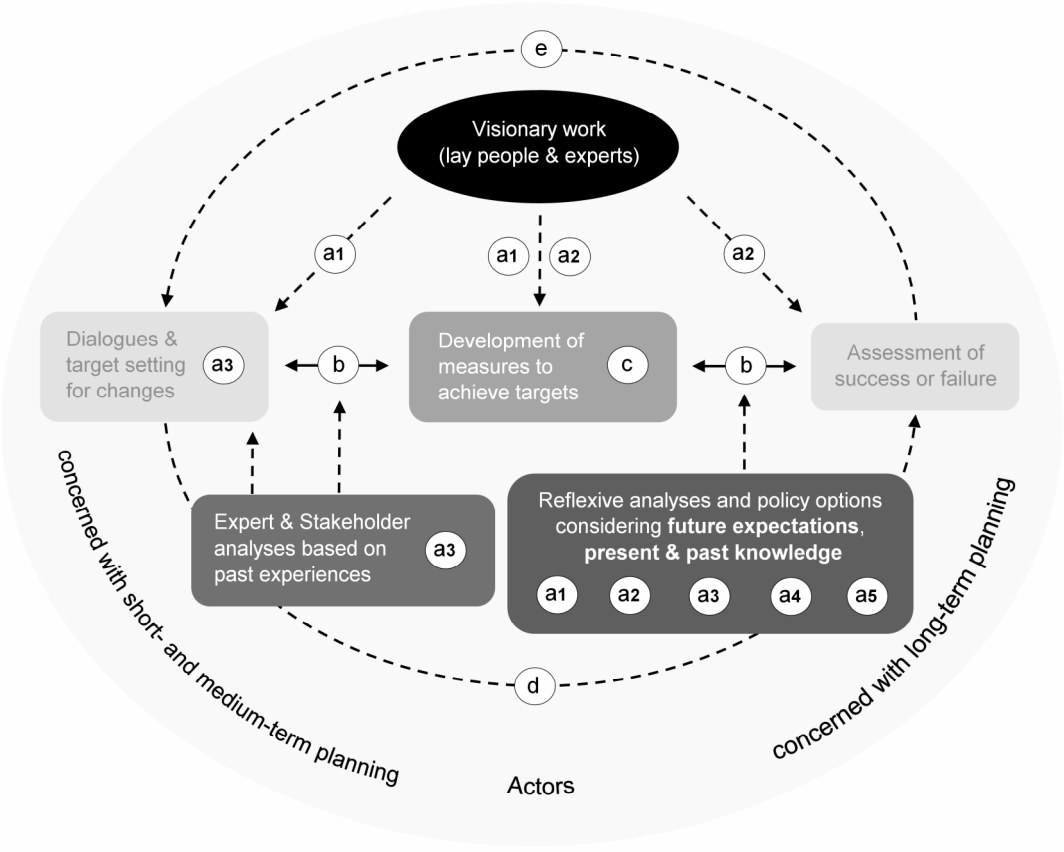

Figure 2: A model for integrated quality control for recursive long-term planning with different inputs

The model introduced in this paper for the knowledge required for long-term planning (figure 2) shows some key elements for the continuous monitoring and assessment of success and failure and for the comparison of results with the long-term targets. Due to the nature of short-term targets, they are often defined under time pressure and without complete information. Therefore they should be validated and adapted more often on the basis of new knowledge. Such a learning process is seen as an essential issue in dealing constructively with futures.

The challenge of the comprehensive decision-making process presented in figure 2 is on the one hand the integration of the results of different analyses in different fields[1] and on the other hand action-orientation with a coordinated mobilisation of people and resources at the interface of different organisations (Cagnin et al. 2008) with different time horizons (see figure 2).

In section two we will present the CIVISTI method and discuss its capability to contribute to the elaboration of the presented knowledge-based model.

[1] for different sectors at national/international levels.

2 CIVISTI – A forward looking study based on strong elements of citizen participation

As mentioned before, the aim of foresight studies is to support a "continuous policy learning process" which is open and "not predetermined" (Warnke/Heimeriks 2008, p. 73) to foster the development of a system to deal with futures uncertainties. These approaches are future-oriented, often apply participation to identify a multiplicity of perspectives, interests and knowledge and therefore are multi- and transdisciplinary, relying both on informed opinion and creative approaches. Forward-looking activities are used in the EU policy-making context as studies to inspire evidence-based future-oriented policies. Forward-looking activities in this context are *"mostly foresight and forecast but also technology assessment and horizon scanning* [2]*."*

In this contribution we study the challenge of integrating the results of the CIVISTI project as a forward-looking activity with participative elements into the long-term planning procedure (Citizen Visions on Science, Technology and Innovation, 2008-2011, http://civisti.org).

The CIVISTI method is a new approach in foresight studies and forward-looking activities. Most forward looking activities have taken their starting point in what could be called the supply side, understood as technological development and research disciplines. There are also previous forward looking activities considering both the supply side and demand side, the latter understood as societal needs and trends. Next figure illustrates how the CIVISTI approach compares to other forward-looking methods in the demand/supply dimension.

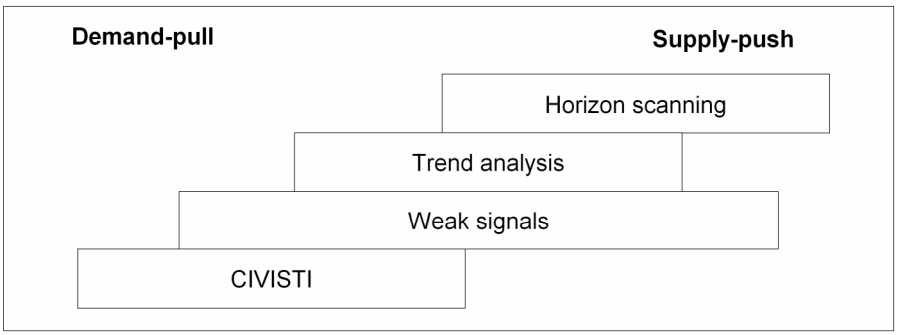

Figure 3: The CIVISTI method as compared to other forward-looking approaches (Jacobi et al. 2011)

The CIVISTI project was a European research foresight exercise funded by the Socio-economic, Sciences and Humanities (SSH) Programme in the EU 7th Framework Programme (2007-2013). The aim of the project was to identify new and emerging topics for the EU R&D policy by consulting citizens in seven European countries (Denmark, Austria, Belgium, Finland, Malta, Bulgaria, Hungary) with the aim of shaping the future research programme for 2014-2020. The CIVISTI project revealed European citizens' visions of the future and transformed these into relevant long-term science, technology and innovation issues. A short introduction of the method is presented below:

[2] see http://ec.europa.eu/research/social-sciences/forward-looking_en.html

"The CIVISTI method consists of three overall steps. First citizens around Europe were asked about their visions for the future. Seven Citizen Panels of 25 people were established, one in each of the CIVISTI partner countries. The people in the panels were not representative for each country, but they were selected to ensure diversity in the panel and there were some basic criteria for the selection gender, age, education and occupation). Each Citizen Panel made a long-term view into the needs, wishes, concerns and challenges of the future through a process of deliberation, informed by introduction material and expert and stakeholder input. This was done in 7 national citizen consultation weekends in May-June 2009. The result of this process was 69 visions for the future. Secondly experts and stakeholders analysed the citizens' visions and transformed them into research agendas and policy options for European research in a two-day expert- and stakeholder workshop in June 2010. The overall result of the expert- and stakeholder workshop was a list of recommendations for research agendas and policy options derived from the citizens' visions. Thirdly these results were given back to the citizens in the third step of the process where the citizens validated and prioritised the new S&T agendas and policy options before the results were presented to the relevant policy makers at a Policy Workshop in January 2011." (Jacobi et.al 2011, p.9)

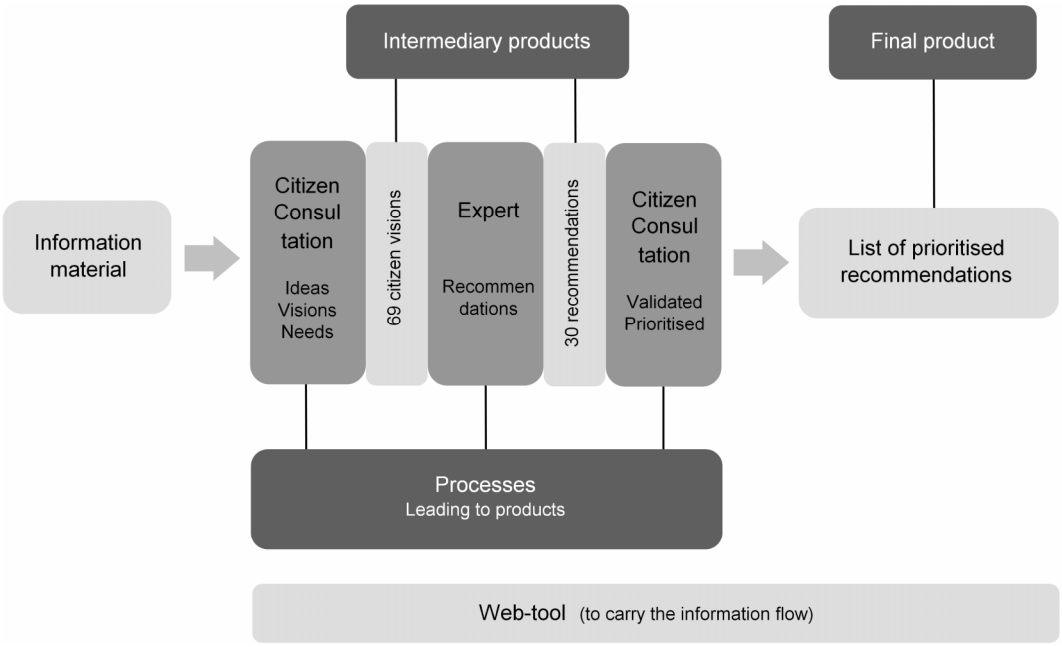

Figure 4: CIVISTI-Method (Jacobi et al. 2011, see p. 10)

The more detailed process of implementing the CIVISTI method follows these steps:

1. Framing – At the framing stage it was decided what should be the aim of consultations, then information material about how visions should be produced was developed for the citizen panels and a detailed process for the first citizen consultation was planned.
2. CC1 – In the first round of citizen consultations the citizen panels in the seven countries met for two days and developed their visions for science and technology in 30-40 years.
3. Analysis of the visions and creation of an analytical model for an expert-stakeholder workshop – The visions developed by citizens were analysed and 37 topics were identified. The content analysis informed the building of the analytical model that structured the work in the following expert-stakeholder workshop.

4. Expert-stakeholder workshop – In an expert-stakeholder workshop 18 experts and stakeholders worked for two days on extracting recommendations for future S&T from the citizens visions.
5. CC2 – In the second round of citizen consultations the citizen panels validated the expert/stakeholder recommendations on the basis of the citizen visions and prioritised the recommendations.
6. Dissemination – Results presented at a policy workshop.
7. The whole process was supported by an online web-tool. The tool was central in documenting the process as results of the different steps (Jacobi et al. 2011, see p. 10).

A thorough description of the CIVISTI process can be found in Jacobi et al. (2011). The results of the project show that citizen visions included a broad spectrum of interdisciplinary issues related to aging, eco cities, education, energy, multicultural society, social fairness, mobility, intelligent devices, safety and security, etc. The experts abstracted the citizens' visions into more practical recommendations. In this transformation some of the former spirit was lost. The second round of reflection and validation of the experts' recommendations by citizens solved a part of this problem through additional comments by citizens.

The CIVISTI top ten recommendations for research and development based on citizen and expert votes are as follows. Note that there are eleven recommendations on the citizens' side because two recommendations had the same score.

Table 1: Comparison of priority lists of citizens and experts on recommendations (for CIVISTI project)

Citizens voting	Experts voting
Attractive public transportation	***Attractive public transportation***
Decentralised energy	Innovations in participation
Re-appropriate the countryside	***(European) eco-cities***
Tools for disabled people	Recycling complex materials
(European) eco-cities	Ethics of 'bionic' production
Social innovation for ageing society	*Tools for disabled people*
Direct democracy through e-voting	*Decentralised energy*
Develop effective urban infrastructure	Platform for research in future of work
Policies towards immigrants and refugees	Organic agriculture
Dignity in the dying process	Sofia as an eco-model
Plants for extreme weather	

It is not only similarities in table 1 that are relevant, but also the differences between the priorities of citizens and experts. This will be discussed in section 3. The list of all 30 recommendations and their related visions are documented in the CIVISTI final report (see www.civisti.org).

2.1 Can CIVISTI results be regarded as a useful input to long-term planning?

According to the discussion in the previous section (1.3 and figure 2), results of CIVISTI can be used for long-term planning if they can contribute to the different knowledge categories in the knowledge-based model presented in figure 2. The CIVISTI project focused on target setting. Therefore, the results should be appropriate at least for one of the following sub-categories:

a1. visions of futures based on people's hopes and fears

a2. explicit description of values and normative principles from different points of views

a3. input from different moderated dialogues between actors to identify different future values for the issues considered in a participatory process

a4. structured knowledge from past experiences and lessons learned or

a5. system knowledge at local, national and international level.

CIVISTI results can indeed contribute to three of the above categories of knowledge. Results on citizen visions are based on the hopes and fears of citizens (a1). The moderated dialogue during the experts and stakeholder workshop and the transfer of visions to experts and the communication of the recommendation of the experts with citizens acts as input for the identification of different values for the future (a3). Last but not least recommendations are based on past experiences from experts (a4). The CIVISTI method could be altered to identify explicit values and normative principles (a2). System knowledge at different levels should be available for the optimal use of results (a5).

A discussion on the quality of the CIVISTI method in all three knowledge categories (a1, a3 and a4) is beyond the scope of this paper. In the next sections we discuss the challenge of category a3 to the integration of different inputs to the process, because of its general relevance for all stages of long-term planning.

2.2 The challenge of integrating the different knowledge of citizens and experts

One of the aims of the CIVISTI method was to support the innovation process at European level through participative elements. This was close to the aim of foresight studies that foster changes, serve as orientation towards social needs and as a measure to set agendas and to provide "anticipatory intelligence" as a basis for decision-making (Warnke/Heimeriks 2008, p. 73). In the CIVISTI project the results of the visionary exercise of citizens had to be integrated into the analysis process by experts (see Figure 4).

A major challenge for the integration of different types of knowledge within the CIVISTI project was the different quality of citizen visions, expert recommendations and validation reports by citizens. Both citizens and experts were asked to consider that their message would be taken up by the respective others in the next step of the process and in the end by the their final addressees, namely the EU Commission as well as policy makers at the national level. In CIVISTI we also observed a loss of information due to translation. Citizens created visions in their national language, which were translated into English for expert assessment. The expert recommendations were then translated again into the national languages so that citizens could validate them. During this process a loss of information was inevitable. We observed that the results of the visionary work include messages with varing quality depending on hopes, fears and different expectations of the future.

All visions and recommendations can be found in Jacobi et al. (2011). The holistic character of visions can be shown by the following example. One of the visions of citizens for the next 30 to 40 years was as follows:

A happy day – Tuesday, 16th April 2045

As fatal diseases and pandemics have been combated and health care prevention functions well, life expectancy is between 120 and 130. People work four days a week, thus unemployment rate is under 2 percent in the EU. There is no significant environmental pollution, discrimination, nor inequality between social groups. Ageing has taken an opposite trend: there are three children in every family. Modern technology is everywhere: bird-twittering robots in the morning, maglev and interactive telephone conferences are just a few examples. 'World-English' is an official language of the EU.

Vision number 53 (Jacobi et al. 2011, p. 21)

This vision includes a broad range of issues on health, aging, environmental and socio-economic improvements, pervasive computing and influence of information and communication technology on daily life and cultural aspects of EU language policy. The vision includes a number of messages that cannot be easily understood if we do not understand their background. Is a "bird-twittering robot" a wish or is it a threat? Is a "life expectancy of 120 to 130" a hope or a fear? The CIVISTI method was based on the idea of transporting the messages of the visions through written texts. Even if there was a chance for face-to-face discussions between citizens and experts after the visionary work we could not guarantee that both actor groups would go into details on all 69 visions and thus get a deeper understanding of the messages hidden in visions (also considering the language barriers).

Another example should show the difference between the focus of visions and recommendations. The development of recommendations in the expert and stakeholder workshop showed that the way experts interpret the information is different from the way citizens intend to send this information. In CIVISTI method we used the written reports as a medium for transfer of visionary ideas to achieve an input into the next EU research programme (2014-2020). The 69 visions generated by citizens were translated by a group of 18 experts into 30 recommendations.

Two visions of citizens focused on the idea of a European TV:

TV for the creation of a European identity

The programmes aim to contribute to cultural understanding amongst the people of Europe and to strengthen the feeling of togetherness. Regional cultural differences should be retained and not standardized. There is a central transmitter site that moves around in all European countries.

The transmitter is independent under public law and there is no advertising. There are separate times for television forums. People can communicate through the television entertainment forums. In cooking programmes, there is a kind of web cam allowing viewers from different countries to discuss together. You can test the cooked meals virtually. There are rules and discussion facilitators, acting as an incorruptible objective virtual instance (Neutrum) to ensure that there is no manipulation. All items should be available in all EU languages.

Vision number 10 (Jacobi et al. 2011, p. 16)

A similar vision from another country on European TV was the following:

Europe TV

A TV channel is established to report on EU operations and decisions and other European current affairs and to introduce the cultures, customs and events of the EU countries. The channel offers programmes that give more detailed insight to current questions relating to the EU and introduce them in an understandable and clear form (e.g. contents of the Lisbon Treaty). The channel offers a diverse selection of both politics and entertainment. News is reported from all around the world, with an emphasis on the EU perspective.

Vision number 42 (Jacobi et al. 2011, p. 22)

The short description of the expert's recommendation based on the above visions is:

European TV – unity in diversity.
A permanent lab for experimentation on building and expressing identity (IdenTVLab)

Description of the recommendation: TV contributes to the creation of different forms of European identity and allows different cultures to cooperate, especially through the establishment of an experimental platform for collaborative projects developed by children and young people.

Recommendation number 3 (Jacobi et al. 2011, p. 25)

Even though the project team with expertise on participatory processes and foresight studies served as a translator between the two actor groups, we observed the above mentioned loss of parts of the information from the citizens' visions in the results of the expert workshop. In the above recommendation experts chose a different target group to citizens. This shift of focus caused scepticism among citizens during the validation of the recommendations in terms of the possible negative side effects of TV on the development of the young generation. In the same way the presentation of the results of the project to the EU Commission could not include all aspects of the project results. The presentation of the end results of the project in a policy workshop in Brussels in January 2011 and the different presentations at national level were only able to transfer some highlights, although the project resulted in a broad spectrum of relevant issues for the long-term research planning at national and EU level.

We also observed that the quality of visions and recommendations depended not only on the ideas of citizens and the knowledge of experts and stakeholders but also on the experiences of citizens and their writing abilities and the utilities and facilitation methods available for the preparation of outputs in citizen meetings and the expert and stakeholder workshop. The CIVISTI method provided facilitation tools such as information magazine, question catalogues and templates for vision writing for citizens as well as an analysis report on visions and a template for the writing of recommendations for experts and stakeholders. The method aimed to improve the confidence of interacting actors in the integration of their input into the process and to reduce the black boxes of the interaction between citizens, experts and stakeholders (Warnke/Heimeriks 2008, p. 146) even though the different actor groups involved had no face to face meetings. The CIVISTI method focused on the split of the roles of the actors in the participative process in order to maximise the diversity of ideas and to reduce the influence of experts' opinions on the ideas of the citizens. The last step for the policy workshop was strongly based on the expert recommendations. The translation by the project team and the expert workshop were elements for the integration of the output from the visionary work of citizens into the decision-making process.

2.3 The challenge of integrating CIVISTI results into the EU research planning process

In order to study the integration of the CIVISTI results into EU research planning we started some explorative interviews with highly experienced experts in different fields to identify different paths of impacts of project results in April 2011. The first interviews have been held in relevant areas for sustainable development and EU research. We have interviewed five experts in fields of environmental risk management[3], EU research programmes[4] and process evaluation and engineering education in a sustainable development[5]. After a short presentation of the aims, method and results of the CIVISTI-Project, interviewees have been asked about their opinion on the potential impact of results (recommendations and visions) of such projects on the long-term research agenda. Interviewees mentioned different possibilities for the integration of the results in the decision-making process:

- Selection of a part of the results by the scientific community for further research or
- Integration of the results by the administration and legislature as a holistic normative frame for the development of technology or
- Integration of the results in broader societal debates.

All of these paths were indeed different from the assumption of the project team on the "integration of results directly by the Commission administration" through the policy workshop, project report and policy report. Figure 5 illustrates the situation if all the paths of impact mentioned could be available at the same time.

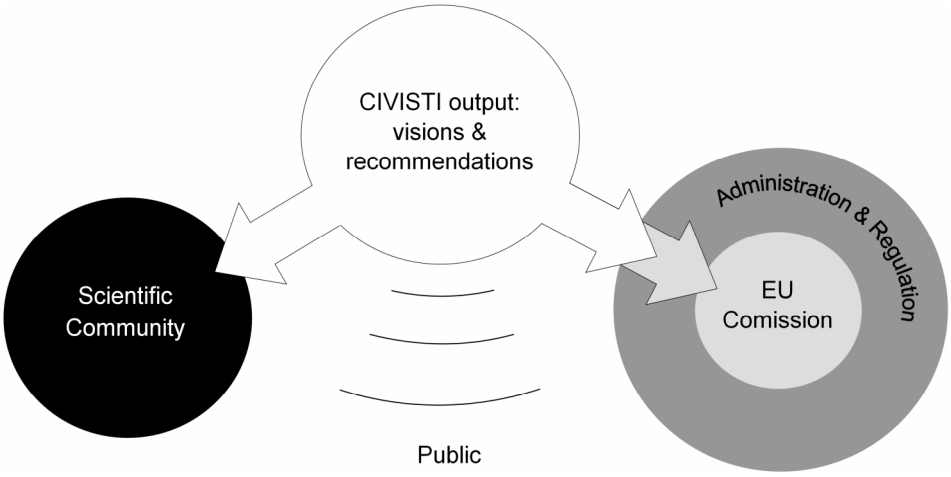

Figure 5: Basic assumption of potential impact paths for the results of the CIVISTI project (based on the results of explorative interviews)

Figure 5 is a simple illustration of the communication of the CIVISTI results. In this basic view, the scientific community, the EU administration and legislature are separated black boxes with limited interactions with the project.

[3] Group interview: Dr. Heriberto Cabezas, Dr. Ahjond S. Garmestani, Dr. Verle Hansen; April 2011, EPA, USA.

[4] Mag. Bernhard Plunger; May 2011, OeAW, Austria.

[5] Prof. Dr. Michael Narodoslawsky; June 2011, TU-Graz, Austria.

The communication paths refer to the special case of CIVISTI's face-to-face method of participation. In this case the results of CIVISTI's minipublic[6] were received by the public rather passively through media coverage and assumed interpersonal discussions. This flow is therefore not represented through an arrow but wave lines. In a more generalised view, other forms of participation could apply different paths that lead to different systemic coherence. E-participation for example uses the Internet to create communication platforms in a new type of public sphere not only for information transfer, but also for consultation and political deliberation. Therefore new forms of old pathways (e.g. bottom-up initiatives, campaigning) are enabled (Beckert et al. 2011).

Nevertheless, participative processes actually start with information input from the environment (experts, decision makers and/or public) into the participatory process and continue with direct and indirect interactions between different actors (Gudowsky/Bechtold 2012). Therefore, figure 5 should be supplemented to regard the whole communication processes.

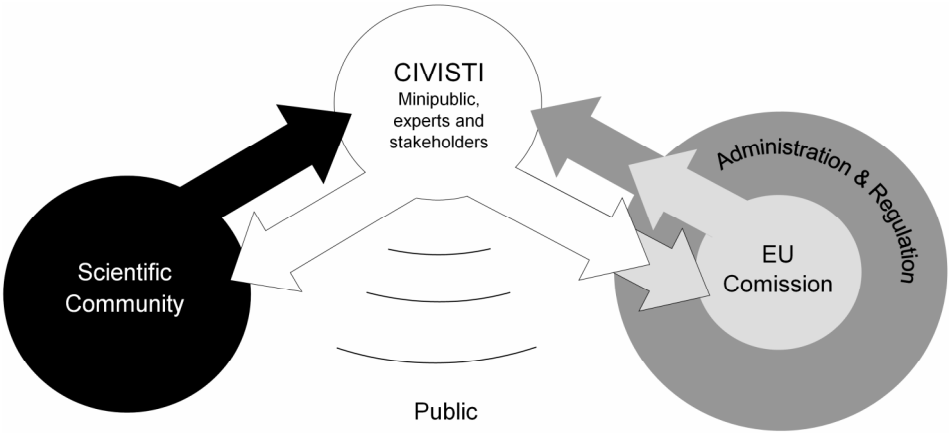

Figure 6: Basic assumption of potential communication paths during the CIVISTI project

If we consider/assume a participatory process as a planned interactive element of the forward-looking activities between different actors, then the quality of this interaction (communication) and the planning potential of its results are highly dependent on the quality of the communication target and context and last but not least on the communication method (related to the rules of communication behaviour):

- The communication target for the long-term planning can be regarded as the development of strategies based on different values and interests that go beyond the targets for the coming months, years and decades, and the avoidance of pitfalls for the planning process.
- The communication context can vary according to the geographical, political, cultural and socio-economic conditions of the interaction. In this contribution we regard it as the available context for the development of future EU research programmes.
- The communication method should consider the target, content and context of communication and define action rules for the whole communication process (Wahren 1987, p. 155).

CIVISTI was designed to identify new and emerging topics for the EU R&D policy by consulting citizens in seven European countries with the aim of shaping the future research programme for 2014-2020. The communication target was therefore the shaping of a medium-term planning proc-

[6] The term "minipublic" refers to the classifications used in Fung's (2006) democracy cube.

ess. In section 1.3.1 we discussed the challenge of the different capacities and time resources of actors and systems to integrate the results of visionary work in their plans. The target of actors for short- or medium-term plans is to be able to act promptly for a certain reason. Therefore there is a need for a fast reaction or strong commitment and consensus in those planning processes. Long-term planning, however, needs enough time to identify differences between views and future expectations and past lessons in order to plan goals and measures to deal with different possible futures. It is therefore essential for the target-setting process through CIVISTI to retain the differences as a planning potential instead of reducing them through emphasis on short or medium-term feasibility. The presentation of different views (of different panels and different actor groups) was a key element of the policy workshop in the CIVISTI project.

There follows a short discussion of the influence of communication context and method on the impact of CIVISTI results.

2.3.1 Influence of communication context on the integration of CIVISTI results

Communication context should be discussed from an internal and external perspective related to the project. A transparent presentation of the context is necessary to show the assumptions and specific conditions that influence the results of the communication process (in this case the results of the CIVISTI project and their impact)

The internal communication context can be regarded as the context of the CIVISTI project including the interdisciplinary teamwork between consortium, the quality and context of altogether fourteen citizen consultations (CC1 and CC2) in seven different EU countries as well as the communication quality of the expert and stakeholder workshop in 2010. In general the feedback of the citizens, facilitators, experts and stakeholders and evaluators involved was very positive with respect to the internal communication context. The detailed information is documented in the reports of the consultations and the workshop and the external evaluation report of the CIVISTI project (www.civisti.org). In this paper we focus on the relevant external context of the communication for the CIVISTI project and its results at EU level. The first step of the external communication was the organisation of a policy workshop in Brussels in the dissemination phase of the project. The aim of the workshop was to present the results together with citizens directly for the Commission administration. The communication context of the CIVISTI project for the next EU research programme (2014-2020) is, however, much more complex than the setting of this workshop.

The EU framework programmes as the communication context

The EU framework programme sets the direction for research aims throughout the EU on a short to medium-term basis. Since 1997, decisions concerning this programme can be adopted by the Council of Ministers with a qualified majority vote. Decisions are taken on the basis of the greatest common denominator, which is decreasing as the diversity of interests increase. Michele André, the Commission's consultant, regards this shift from unanimous decision-making to be necessary to maintain the capacity to act on short-term goals while the absolute number of member states was increasing (André 2007)[7]. In contrast this can be seen as a loss of space for debate among member states, which can mean the loss of important arguments for long-term planning.

[7] Michel André, adviser in the European Commission's Directorate-General for Research, 2007.

In addition to the focus on short- and medium-term horizons, changes in research policy take a long time as the system is rigid:

> ... "The fact is that situations only evolve very gradually, and ideas take a long time to be formulated, understood, assimilated and accepted, and an even longer time to be finalised and to have a discernible effect on the real world"(André 2007).

The long-term reaction to the integration of new inputs to the EU's research management can be described as a convergence of the interrelations between research activities, research budget and research management (figure 7).

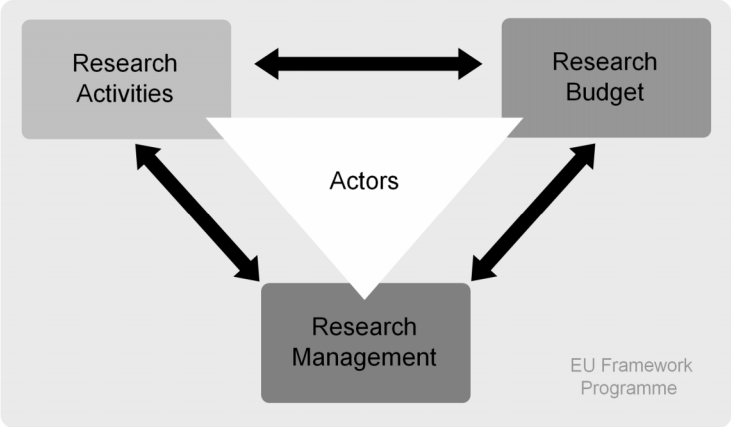

Figure 7: Interrelations of core-elements within EU research programmes

Institutions responsible for the development of the research programme are e.g. the Directorate General for Research and Innovation, cabinet members as well as the framework programme work steering group, which consist of various DGs. Different other groups are also committed to an internal review process (stakeholder representatives, commissioners on innovation task forces etc.).

A crucial starting point for the integration of participatory results into the preparation of an EU framework programme is the external consultation process that takes place during the formulation of legislative proposals for the next programme. Such a process took place during 2011 in the course of the preparation of Horizon 2020 (the next framework programme for research and innovation)[8]. Written responses to a published green paper and an interactive blog for commenting as well as an event in June 2011 were part of the consultation process. As every person and institution could take part in this process, it is at least a new way of participating that can provide a channel for the integration of results of projects such as CIVISTI.

Although the system of EU research planning as a whole reacts slowly to new inputs, there are parts of it with faster dynamics. Results of a participatory procedure and transfer of information to the long-term planning process would therefore be integrated by different actors with different priorities. The policy workshop at the end of the CIVISTI project probably transferred a part of the CIVISTI results to the decision-making process, but impacts of the information as well as if and how decision makers take up information in such a process are difficult to detect.

In the next section we discuss the influence of the method on the quality of results and their integration into the EU research planning process.

[8] http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=home, last accessed 28.08.2011.

2.3.2 Influence of communication method on the integration of CIVISTI results into the EU research planning process

We have already argued that long-term planning procedures should be able to use the difference between future expectations and lessons learned from the past to identify required activities. The CIVISTI method was designed to profit from the future expectations of citizens and the available expertise of experts and stakeholders (based on knowledge of the past), and its aim was a strong separation between experts and citizen roles, while still combining and synthesising the results.

The reference times of past experiences and future expectations selected through the method are influenced by the communication context and they play a substantial role for the communication content and results of the target setting process. Taking the example of public transportation, the citizen's vision is written for the year 2040, since citizens were asked to think about the next 30 to 40 years. The experts' recommendation is formulated for the next EU research programme 2014-2020 (as was formulated in the aim of the expert and stakeholder workshop) in order to achieve the citizen visions in 30 to 50 years. Recommendations were therefore much more based on short- or medium-term plans. The CIVISTI method has therefore some common roots with back-casting method[9]. Citizens, however, were not completely satisfied with this transformation and mentioned the tendency of the future spirit of recommendations to be weaker. For the development of the CIVISTI method this would mean considering the question:

Would recommendations be much more holistic if experts were asked to think about a research programme that would start in 2020? The answer would probably be "Yes, but …" If experts were asked to think about a research programme for 2020, they would have to develop their own visions based on the citizen visions. As a result, their input would be far from the past experiences in their special field. Experts would act in such a case as citizens with expertise in a special field and not as experts on scientific knowledge assessing citizens' visions.

Corresponding to the presented knowledge-based model, the dissemination strategy of the CIVISTI method could be used for more interactions between potential addressees of results. New communication tools will be applied in future for a more efficient communication of intermediate results (e.g. citizen's visions) and final validated recommendations.

[9] Back-casting: *„The setting of short-term and long-term goals based on long-term sustainability visions, scenario studies, trend analyses and short-term possibilities"* (Kemp/Loorbach 2006, p.111).

3 Conclusion

Sustainable development implies comprehensive long-term planning that is also reflected in short-term measures. Nevertheless there are some pitfalls, which might lead to an apparent paradox between short- and long-term planning. Time pressure of short-term planning increases the risk of developing targets that might be incompatible with the long-term targets. A well-designed planning process should therefore enable trade-offs between targets and integration of different knowledge required for the planning process.

In the model of required knowledge presented in this paper, we argued that the problem solving potential of strategies based on long-term targets depends on the difference between lessons learned from past experiences and future expectations. Neither targets with a focus on visions without considering the past experiences nor plans based on the extrapolation of past experiences without a future-orientation fulfil the normative requirements for long-term planning for sustainable development.

According to these challenges, the knowledge-based model presented in this paper attempts to integrate different types of knowledge:

- Long-term plans require a comprehensive analysis of problems, identification of futures expectations and moderation of (controversial) discussions between science, politics and society. A key task is the identification of a broad spectrum of future expectations
- The identification and explicit description of a broader spectrum of values help to define assessment criteria for the success or failure of plans.
- Another source of challenges depends on the condition of systems and their ability to react appropriately to a long-term plan and adapt to it. The ability of a system can be changed through a crisis. A system that has been under pressure for a long-time reacts differently to changes compared to a system with a lower load of stress. Information about the history and past experiences is therefore essential for the planning process. The analysis of the system capabilities should be prior to any other activity related to the long-term planning. In this case there is a need for an analysis of the strengths and weaknesses of a system regarding its short- and long-term behaviour.
- It is also necessary to design a learning approach and criteria for the early assessment of impacts to deal with unexpected problems and changes and develop strategies for adaptation due to new changes.

CIVISTI contributed to the identification of similarities and dissenting views of citizens, experts and stakeholders concerning future expectations and it generated multidimensional and holistic targets.

The comparison of the presented knowledge model and the CIVISTI method shows that CIVISTI could contribute more to the planning process if in future such projects were to be expanded by an analysis of values (knowledge category a2 in figure 2) and system knowledge at local, national and international level (knowledge category a4 in figure 2). This could improve the knowledge base for long-term planning and decision-making based on the visionary work.

Special advantages of the CIVISTI method:

The CIVISTI method was able to synthesise recommendations for the medium-term planning process of the EU research programme that are directly related to long-term visions of citizens. CIVISTI is unique in strongly taking the starting point on the demand side. The strong focus on citizens' visions for the future of Europe is an innovation to futures studies. While citizen consultations in earlier foresight studies and forward looking activities have stopped with letting citizens express their visions or opinions in relation to a subject, CIVISTI takes the next step as well. Normally the

translation of citizens' visions or input into concrete actions is done by experts and/or policy makers in the dark after the citizen consultation process is finished. In CIVISTI this translation is part of the process and thereby a lot of transparency is added to the process. Furthermore the validation part of CIVISTI is unique – the idea of overcoming the translation problem by returning the recommendations to citizens is novel and innovative. This iteration process adds empowerment of citizens and authenticity towards the visions and the citizen consultation process.

Two special outputs of CIVISTI are:

- identification of differences of views of citizens and experts
- an integrated set of citizens' views.

Differences of diverse views:

CIVISTI generated a valuable source of information on expert knowledge based on lessons learned (even if they could only be less comprehensive than citizen visions). We can compare the priorities of citizens and experts for expert recommendations (table 1) in order to identify topics, which are:

- important for citizens for the future without being recognized by experts or
- priority for experts without being a priority for citizens for the future.

Differences of views can improve the integration of the CIVISTI results into the decision-making process if the important topics for citizens could gain the attention of experts and stakeholders and be selected by the scientific community for further research, while the priorities of experts would contribute to the broader social debates. The priorities of experts can also be discussed in the light of the public understanding of science.

Integrated set of citizens' views:

A possible application of CIVIST results could be their use as a holistic framework for the evaluation of activities and early assessment of long-term plans. The results as a whole should be analysed and refined to create an integrated set of criteria for future research activities. An idea on the aging society should for instance regard the needs of eco-cities, independent living, active aging at work and social participation with the help of public transport, social innovations, etc. and be developed on the basis of specific local situations. In the same way a public transport system should consider the idea of an aging society, etc.

Advancing CIVISTI:

A main challenge for the CIVISTI project was the great amount of translation in the process. For citizens and experts from different countries to be able to discuss and develop visions and recommendations there has to be a lot of translation in the process: Translations from national languages to English and vice versa as well as the qualitative translation of meaning from visions to recommendations and back to citizens. All this translation is very challenging and it is impossible not to lose parts of the original meaning in the process. It is also very difficult to overcome this challenge, but one way forward could be additional elements with (face to face) communication between citizens and experts/stakeholders. In addition this problem is reduced, when applications are conducted at the local and national level.

Finally, the integration of results into the planning process could be improved by effective communication tools to make the outputs much more visible to citizens, experts and decision-makers.

4 References

André, M., 2007, Das 7. Rahmenprogramm und die Geschichte der europäischen Forschung <http://ec.europa.eu/research/rtdinfo/special_fp7/fp7/01/article_fp709_de.html>.

Balabanian, N., 2006, On the presumed neutrality of technology, IEEE Technology and Society Magazine (Winter), 15-25.

Beckert, B., Lindner, R., Goos, K., Hennen, L., Aichholzer, G. and Strauß, S. (ETAG), 2011, E-public, e-participation and e-voting in Europe – prospects and challenges. E-democracy: technical possibilities of the use of electronic voting and othert Internet tools in European elections (final report), Karlsruhe: Fraunhofer Institute for Systems and Innovation Research (ISI)

Beers, P.J., Veldkamp, A., Hermans, F., van Apeldoorn, D., Vervoort, J.M., Kok, K., 2010, Futures 42, 723–732.

Cagnin, C., Keenan, M., 2008, Positioning future-oriented technology analysis, in: Cagnin, C., Keenan, M., Johnston, R., Scapolo, F. and Barre, R. (Eds): Future-Oriented Technology Analysis, Strategic intelligence for an innovative economy, Berlin, Heidelberg: Springer, 1-13.

Cagnin, C., Keenan, M., Johnston, R., Scapolo, F. and Barre, R. (Eds), 2008, Future-Oriented Technology Analysis, Strategic intelligence for an innovative economy, Berlin, Heidelberg: Springer.

Chakraborty, A., 2011, Enhancing the role of participatory scenario planning processes: Lessons from Reality Check exercises, Futures 43, 387-399.

De Smedt, P., 2008, Strategic Intelligence in decision making, in: Cagnin, C., Keenan, M., Johnston, R., Scapolo, F. and Barre, R. (Eds): Future-Oriented Technology Analysis, Strategic intelligence for an innovative economy, Berlin, Heidelberg: Springer, 89-102.

Dierkes, M., Hoffmann, U. and Marz, L., 1996, Visions of technology, Social and institutional factors shaping the development of new technologies, Frankfurt/Main; New York: Campus Verlag.

Fung, A., 2006, Varieties of Participation in Complex Governance, Public Administration Review 66, 66-75.

Global-Footprint-Network, 2011, World Footprint: Do we fit on the planet? GFN <http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/>.

Gudowsky, N., Bechtold, U., 2012, The role of information in public participation, Working Paper, Vienna: Institute of Technology Assessment (ITA).

Helm, van der, R., 2009, The vision phenomenon: Towards a theoretical underpinning of visions of the future and the process of envisioning, Futures 41, 96–104.

Hage, M., Leroy, P., Petersen, A., 2010, Stakeholder participation in environmental knowledge production, Futures 42, 254–264.

Jacobi, A., Andersen, I., Rask, M., Lanckriet, A., Cruyce, E. V. d., Damme, L. V., Warrington, B., Damianova, Z., Bakonyi, E., Sotoudeh, M. and Peissl, W., 2011, CIVISTI final report, Copenhagen: Danish Board of Technology.

Jischa, M. F. (Ed.), 2005, Herausforderung Zukunft. Technischer Fortschritt und Globalisierung, 2. edition, München: Elsevier GmbH.

Keenan, R., Popper, R. (Ed.), 2007, Guide to Research Infrastructures Foresight, Brussels: European Commission.

Kemp, R., Loorbach, D., 2006, Transition management: a reflexive governance approach, in: Voß, J.-P., Bauknecht, D., Kemp, R. (Ed.): Reflexive Governance for Sustainable Development, Edinburgh: Edward Elgar, 103-130.

List, D., 2006, Action research cycles for multiple futures perspectives, Futures 38, 673–684.

Loorbach, D., Rotmans, J., 2010, The practice of transition management: Examples and lessons from four distinct cases, Futures 42, 237–246.

Park, S.E., Marshall, N.A., Jakku, E., Dowd, A.M., Howden, S.M., Mendham, E., Fleming, A., 2011, Informing adaptation responses to climate change through theories of transformation, Global Environmental Change (Article in press)

Rammel, C., Stagl, S., Wilfing, H., 2007, Managing complex adaptive systems. A co-evolutionary perspective on natural resource management, Ecological Economics 63, 9–21.

Rockström, J., Steffen, W., Noone1, K., Persson, A., Chapin, III, F.S., Lambin E., Lenton, T., Scheffer, M., Folke, C., Schellnhuber, H., Nykvist, B., de Wit, C., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L., Corell, R., Fabry, V., Hansen, J., Walker, B., Liverman, B., Richardson, K., Crutzen, P., Foley, J., 2009, A safe operating space for humanity, Nature 461, 472-475.

Sardar, Z., 2010, The Namesake: Futures; future studies; futurology; futuristic; foresight – What's in a name? Futures 42, 177-184.

Sotoudeh, M., 2009, Technical education for sustainability, An analysis of needs in the 21st century; in series: Environmental Education, Communication and Sustainability, Vol. 30, edited by Filho, W. L., Frankfurt am Main: Peter Lang Internationaler Verlag der Wissenschaften.

Tonn, B., 2007, Futures sustainability, Futures 39, 1097–1116.

UN-General Assembly, 2000, United Nations Millennium Declaration, <http://www.un.org/millennium/declaration/ares552e.htm>.

UNEP, 1992, Rio Declaration on Environment and Development, <http://web.archive.org/web/20070626201643/http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>.

Vasileiadou, E., Safarzynska, K., 2010, Transitions: Taking complexity seriously, Futures 42, 1176–1186.

Vervoort, J. M., Kok, K., van Lammeren, R., Veldkamp, T., 2010, Stepping into futures: Exploring the potential of interactive media for participatory scenarios on social-ecological systems, Futures 42, 604–616.

Wahren, H.-K., 1987, Zwischenmenschliche Kommunikation und Interaktion in Unternehmen – Grundlagen, Probleme und Ansätze zur Lösung, Berlin: Walter de Gruyter.

Warnke, P., Heimeriks, G., 2008, Technology foresight as innovation policy instrument: learning from science and technology studies, in: Cagnin, C., Keenan, M., Johnston, R., Scapolo, F. and Barre, R. (Eds): Future-Oriented Technology Analysis, Strategic intelligence for an innovative economy, Berlin, Heidelberg: Springer, 71-87.

Previously published manu:scripts

ITA-01-01 Gunther Tichy, Walter Peissl (12/2001): Beeinträchtigung der Privatsphäre in der Informationsgesellschaft. <www.oeaw.ac.at/ita/pdf/ita_01_01.pdf>

ITA-01-02 Georg Aichholzer (12/2001): Delphi Austria: An Example of Tailoring Foresight to the Needs of a Small Country. <www.oeaw.ac.at/ita/pdf/ita_01_02.pdf>

ITA-01-03 Helge Torgersen, Jürgen Hampel (12/2001): The Gate-Resonance Model: The Interface of Policy, Media and the Public in Technology Conflicts. <www.oeaw.ac.at/ita/pdf/ita_01_03.pdf>

ITA-02-01 Georg Aichholzer (01/2002): Das ExpertInnen-Delphi: Methodische Grundlagen und Anwendungsfeld „Technology Foresight". <www.oeaw.ac.at/ita/pdf/ita_02_01.pdf>

ITA-02-02 Walter Peissl (01/2002): Surveillance and Security – A Dodgy Relationship. <www.oeaw.ac.at/ita/pdf/ita_02_02.pdf>

ITA-02-03 Gunther Tichy (02/2002): Informationsgesellschaft und flexiblere Arbeitsmärkte. <www.oeaw.ac.at/ita/pdf/ita_02_03.pdf>

ITA-02-04 Andreas Diekmann (06/2002): Diagnose von Fehlerquellen und methodische Qualität in der sozialwissenschaftlichen Forschung. <www.oeaw.ac.at/ita/pdf/ita_02_04.pdf>

ITA-02-05 Gunther Tichy (10/2002): Over-optimism Among Experts in Assessment and Foresight. <www.oeaw.ac.at/ita/pdf/ita_02_05.pdf>

ITA-02-06 Hilmar Westholm (12/2002): Mit eDemocracy zu deliberativer Politik? Zur Praxis und Anschlussfähigkeit eines neuen Mediums. <www.oeaw.ac.at/ita/pdf/ita_02_06.pdf>

ITA-03-01 Jörg Flecker und Sabine Kirschenhofer (01/2003): IT verleiht Flügel? Aktuelle Tendenzen der räumlichen Verlagerung von Arbeit. <www.oeaw.ac.at/ita/pdf/ita_03_01.pdf>

ITA-03-02 Gunther Tichy (11/2003): Die Risikogesellschaft – Ein vernachlässigtes Konzept in der europäischen Stagnationsdiskussion. <www.oeaw.ac.at/ita/pdf/ita_03_02.pdf>

ITA-03-03 Michael Nentwich (11/2003): Neue Kommunikationstechnologien und Wissenschaft – Veränderungspotentiale und Handlungsoptionen auf dem Weg zur Cyber-Wissenschaft. <www.oeaw.ac.at/ita/pdf/ita_03_03.pdf>

ITA-04-01 Gerd Schienstock (1/2004): Finnland auf dem Weg zur Wissensökonomie – Von Pfadabhängigkeit zu Pfadentwicklung. <www.oeaw.ac.at/ita/pdf/ita_04_01.pdf>

ITA-04-02 Gunther Tichy (6/2004): Technikfolgen-Abschätzung: Entscheidungshilfe in einer komplexen Welt. <www.oeaw.ac.at/ita/pdf/ita_04_02.pdf>

ITA-04-03 Johannes M. Bauer (11/2004): Governing the Networks of the Information Society – Prospects and limits of policy in a complex technical system. <www.oeaw.ac.at/ita/pdf/ita_04_03.pdf>

ITA-04-04 Ronald Leenes (12/2004): Local e-Government in the Netherlands: From Ambitious Policy Goals to Harsh Reality. <www.oeaw.ac.at/ita/pdf/ita_04_04.pdf>

ITA-05-01 Andreas Krisch (01/2005): Die Veröffentlichung des Privaten – Mit intelligenten Etiketten vom grundsätzlichen Schutz der Privatsphäre zum Selbstschutz-Prinzip. <www.oeaw.ac.at/ita/pdf/ita_05_01.pdf>

ITA-05-02 Petra Grabner (12/2005): Ein Subsidiaritätstest – Die Errichtung gentechnikfreier Regionen in Österreich zwischen Anspruch und Wirklichkeit. <www.oeaw.ac.at/ita/pdf/ita_05_02.pdf>

ITA-05-03 Eva Buchinger (12/2005): Innovationspolitik aus systemtheoretischer Sicht – Ein zyklisches Modell der politischen Steuerung technologischer Innovation. <www.oeaw.ac.at/ita/pdf/ita_05_03.pdf>

ITA-06-01 Michael Latzer (06/2006): Medien- und Telekommunikationspolitik: Unordnung durch Konvergenz – Ordnung durch Mediamatikpolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_01.pdf>

ITA-06-02 Natascha Just, Michael Latzer, Florian Saurwein (09/2006): Communications Governance: Entscheidungshilfe für die Wahl des Regulierungsarrangements am Beispiel Spam. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_02.pdf>

ITA-06-03 Veronika Gaube, Helmut Haberl (10/2006): Sozial-ökologische Konzepte, Modelle und Indikatoren nachhaltiger Entwicklung: Trends im Ressourcenverbrauch in Österreich. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_03.pdf>

ITA-06-04 Maximilian Fochler, Annina Müller (11/2006): Vom Defizit zum Dialog? Zum Verhältnis von Wissenschaft und Öffentlichkeit in der europäischen und österreichischen Forschungspolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_04.pdf>

ITA-06-05 Holger Floeting (11/2006): Sicherheitstechnologien und neue urbane Sicherheitsregimes. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_05.pdf>

ITA-06-06 Armin Spök (12/2006): From Farming to „Pharming" – Risks and Policy Challenges of Third Generation GM Crops. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_06.pdf>

ITA-07-01 Volker Stelzer, Christine Rösch, Konrad Raab (3/2007): Ein integratives Konzept zur Messung von Nachhaltigkeit – das Beispiel Energiegewinnung aus Grünland. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_01.pdf>

ITA-07-02 Elisabeth Katzlinger (3/2007): Big Brother beim Lernen: Privatsphäre und Datenschutz in Lernplattformen. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_02.pdf>

ITA-07-03 Astrid Engel, Martina Erlemann (4/2007): Kartierte Risikokonflikte als Instrument reflexiver Wissenspolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_03.pdf>

ITA-07-04 Peter Parycek (5/2007): Gläserne Bürger − transparenter Staat? Risiken und Reformpotenziale des öffentlichen Sektors in der Wissensgesellschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_04.pdf>

ITA-07-05 Helge Torgersen (7/2007): Sicherheitsansprüche an neue Technologien – das Beispiel Nanotechnologie. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_05.pdf>

ITA-07-06 Karen Kastenhofer (9/2007): Zwischen „schwacher" und „starker" Interdisziplinarität. Die Notwendigkeit der Balance epistemischer Kulturen in der Sicherheitsforschung zu neuen Technologien. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_06.pdf>

ITA-07-07 Ralf Lindner, Michael Friedewald (9/2007): Gesellschaftliche Herausforderungen durch „intelligente Umgebungen. Dunkle Szenarien als TA-Werkzeug. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_07.pdf>

ITA-07-08 Alfons Bora (11/2007): Die disziplinären Grundlagen der Wissenschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_08.pdf>

ITA-08-01 Alexander Degelsegger (5/2008): „Frames" in sozialwissenschaftlichen Theorieansätzen. Ein Vergleich aus der Perspektive der Technikforschung. <epub.oeaw.ac.at/ita/ita-manuscript/ita_08_01.pdf>

ITA-08-02 Jens Hoff (11/2008): Can The Internet Swing The Vote? Results from a study of the 2007 Danish parliamentary election. <epub.oeaw.ac.at/ita/ita-manuscript/ita_08_02.pdf>

ITA-09-01 Georg Aichholzer, Doris Allhutter (2/2009): e-Participation in Austria: Trends and Public Policies. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_01.pdf>

ITA-09-02 Michael Nentwich (11/2009): Cyberscience 2.0 oder 1.2? Das Web 2.0 und die Wissenschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_02.pdf>

ITA-09-03 Hilmar Westholm (12/2009): Wandel der Formen politischer Partizipation und der Beitrag des Internet. Schlussfolgerungen aus Bevölkerungsbefragungen in Deutschland. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_03.pdf>

ITA-10-01 Iris Eisenberger (12/2010): Kleine Teile, große Wirkung? Nanotechnologieregulierung in der Europäischen Union. <epub.oeaw.ac.at/ita/ita-manuscript/ita_10_01.pdf>

ITA-10-02 Alexander Degelsegger and Helge Torgersen (12/2010): Instructions for being unhappy with PTA. The impact on PTA of Austrian technology policy experts' conceptualisation of the public. <epub.oeaw.ac.at/ita/ita-manuscript/ita_10_02.pdf>

ITA-10-03 Ernest Braun (12/2010): The Changing Role of Technology in Society. <epub.oeaw.ac.at/ita/ita-manuscript/ita_10_03.pdf>

ITA-10-04 Fritz Betz (12/2010): E-Partizipation und die Grenzen der Diskursethik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_10_04.pdf>

ITA-11-01 Peter Parycek, Judith Schoßböck (1/2011): Transparency for Common Good. Offener Zugang zu Information im Kontext gesellschaftlicher und strategischer Spannungsfelder. <epub.oeaw.ac.at/ita/ita-manuscript/ita_11_01.pdf>

ITA-11-02 Georg Aichholzer und Doris Allhutter (6/2011): Online forms of political participation and their impact on democracy. <epub.oeaw.ac.at/ita/ita-manuscript/ita_11_02.pdf>

ITA-11-03 Mahshid Sotoudeh, Walter Peissl, Niklas Gudowsky, Anders Jacobi (12/2011): Long-term planning for sustainable development. CIVISTI method for futures studies with strong participative elements. <epub.oeaw.ac.at/ita/ita-manuscript/ita_11_03.pdf>