Stakeholder Integration and Social Learning in Integrated Sustainability Assessment

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Abstract

The paper draws on experiences from the MATISSE project ("Methods and Tools for Integrated Sustainability Assessment") and describes the role and functioning of stakeholder integration within Integrated Sustainability Assessment (ISA). It introduces the concept of ISA as a pro-active, strategic and potentially transformative process by emphasising its process dimension. The main part of the paper deals with the experiences of participation in the case studies. It concludes with a discussion of implications of stakeholder integration for ISA and transitions towards sustainability.

Keywords: Integrated Sustainability Assessment, Stakeholder integration, Participation, Social learning, Sustainability learning,

1 Introduction

Sustainable development has become an overall policy objective in the European Union. However, the concept of sustainable development is contested, both scientifically and socially, so by definition it is subjective and ambiguous. This makes it difficult to operationalise the concept. Universal implementation is impossible. Sustainability is context-bound and needs to be interpreted and implemented by a range of stakeholders within that specific context.

Assessment is fundamentally a communication process not simply a report (Farrell et al. 2005). Currently, most practical applications of sustainability assessment fulfill a pragmatic role in screening already tabled sectoral policy proposals that have no sustainability orientation per se. This paper considers a new form of assessment designed explicitly to address the persistent problems of unsustainability, for which the current policy making regime has found no solutions.

2 The MATISSE project

As a response to the pressing governance and management challenges of sustainable development, the MATISSE ("Methods and Tools for Integrated Sustainability Assessment") project, funded by the European Commission under the 6th Framework Programme (Contract number: 004059 (GOCE)), aimed at achieving a step-wise advance in the science and application of Integrated Sustainability Assessment (ISA) of EU policies. ISA is emerging as an innovative new mode of knowledge

development, where the objective is to help develop long-term, cross-sectoral policies expressly designed to contribute to sustainable development. MATISSE aimed to contribute to sustainability-oriented governance by providing innovative methods, tools and process-architecture for conducting Integrated Sustainability Assessments (ISA).

The MATISSE project started in April 2005 and will end in March 2008 and included 21 partners from institutions all over Europe. The project addressed the use of sustainability assessment in the European context, but the innovative methods, tools and insights it was developing are relevant generally to questions concerning the role that sustainability assessment might play in supporting sustainability-oriented governance and in the analysis of potential sustainability 'transitions'. The approach taken to learning within the project may also hold wider implications for other projects in the emerging field of science in support of sustainable development.

Fundamentally, MATISSE was a project with a mandate to be innovative methodologically; it sought to begin work on a new generation of approaches and tools for integrated sustainability assessment that will be capable of exploring transition pathways. This was a long-haul and ambitious endeavour that will continue beyond the duration of the MATISSE project, but MATISSE marks an important beginning and was challenged with setting out the overall 'concept' and developing some of the key elements that will be needed to guide future work.

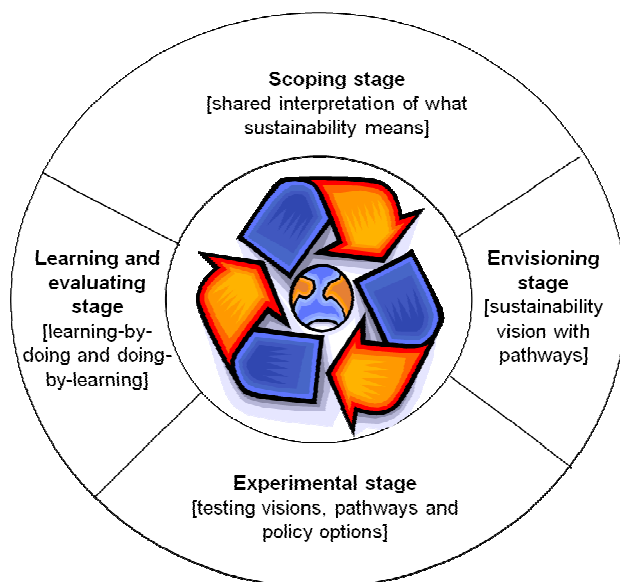The main activities within MATISSE were:
• the development of a common conceptual framework for ISA
• the delivery of a future tool portfolio for ISA
• the application and test of improved and new ISA tools in four case studies
• capacity-building and outreach tasks and stakeholder engagement

Further information on the project can be found at http://www.matisse-project.net/

3 Integrated Sustainability Assessment (ISA)

ISA is intended as a pro-active, strategic and potentially transformative process to give an explicit sustainability orientation to policy making and other undertakings concerned with the development of social-ecological systems. Such undertakings would be expressly intended to address persistent complex problems of unsustainable development and to take up opportunities for more sustainable development.

The objectives of an ISA are to develop a shared interpretation among stakeholders of the dimensions of sustainability for a particular social-ecological system (scoping), transform these into a shared vision on a sustainable future (envisioning), and explore various solution directions for a transition towards sustainability through a range of innovative experiments (experimenting), as a basis for learning about key relationships and ways of reframing problems and solutions (learning/evaluating). The formal definition of ISA (Weaver and Rotmans, 2006) reflects these means and ends:

"ISA is a cyclical, participatory process of scoping, envisioning, experimenting, and learning through which a shared interpretation of sustainability for a specific context is developed and applied in an integrated manner in order to explore solutions to persistent problems of unsustainable development."

Fig. 1. The ISA-cycle

The essential design requirements for ISA stem directly from its intended role as a process for exploring and supporting reframing and reorientation (regime change) and transition. ISA represents a new mode of knowledge production that responds to the governance and management challenges of sustainable development. It offers a forum for

- defining 'socially- and ecologically-robust' targets and thresholds,
- integrating these as elements of operational, context-specific sustainability interpretations and
- exploring alternative pathways of transition.

ISA therefore has both a process dimension and an analytical dimension. It brings together an integrated systems analysis and a participatory process involving a selection of relevant stakeholders and actors. The integration of stakeholders selected to represent different perspectives and interests is a basic requirement of ISA in order to develop a rich and robust interpretation of sustainability for a specific context (Weaver and Rotmans, 2006).

ISA can be used to support the development of policy proposals and other undertakings that have a special sustainability orientation. Such undertakings would be expressly intended to address problems of unsustainable development, take up possibilities for more sustainable development and maximize synergies among policy objectives. ISA is based on the principles of: addressing intergenerational equity, the integration of the economic, ecological and socio-cultural domains and the interaction of scales.

ISA as a fundamentally participatory approach

"The underlying set of ISA-principles deals with trade-offs between values, between longer- and shorterterm horizons, between social-cultural, economic and ecological domains, between places and parties, and between different scale levels that need to be taken into account. The principal methods to deal with this set of ISA principles are a combination of an analytical approach in the form of an integrated systems analysis, and a process approach in the form of a participatory process involving relevant stakeholders." (Weaver and Rotmans, 2006)

Therefore, ISA is a fundamentally participatory approach to sustainability assessment. Stakeholder integration is a must if science wants to address persistent problems of our societies. There is nothing like complete knowledge about these issues, models have clear limitations and there are many

uncertainties especially when it comes to future issues. Therefore, the knowledge of stakeholders provides valuable input. Moreover, value conflicts have to be taken into account in order to come up with socially robust knowledge (Kerkhof et al. 2002).

Through the engagement of stakeholders, experts and decision makers ISA becomes a social learning process. Stakeholder integration helps to ensure that an ISA asks the right questions and provides relevant answers, and enables the researchers to clarify and integrate different values of the community into their work. Moreover, through participation of stakeholders throughout an ISA the attempt is made to embed the integrated sustainability assessment in the policy process and to promote the formulation of sustainability policy proposals, i.e. linking "knowledge" to "action". At all stages of the assessment it is of great importance to make explicit to the stakeholders to which extent and how their knowledge and expertise is used in assessing the policy proposals and experiments.

According to the above considerations, stakeholders are integrated within all four stages of ISA:

Scoping stage

The scoping stage of the ISA-process involves a thorough definition of the persistent problem in question. This requires an integrated systems analysis, where 'thought-tools', such as the sustainability framework, can be used to perform a cross-cutting analysis. A stakeholder analysis is conducted in order to identify all persons or groups with interests in the project or programme, those affected by the (results of) the project (negatively or positively), potential winners, losers, and those involved in, influential on or excluded from decision making. It is also important to identify their interests in the relation to the persistent unsustainability problem being addressed. Moreover an appropriate participatory method is selected and stakeholder input is used to refine understanding of the persistent problem in question, the policy context and the conceptual model. Thus, the unsustainability 'problematique' can be looked at from multiple perspectives, and the extent to which it is possible to draw a common picture of the issue at stake can be explored. Major differences between the norms, values and perceptions of the project team and the stakeholders can also be examined. Models and other tools can be useful in the scoping stage to support the development of a common ground regarding the problem perception among a diverse group of actors, in particular when the problem is largely ill-defined (although this does not imply consensus building) (Tàbara and Pahl-Wostl, 2007).

Envisioning stage

During the envisioning phase a context-specific interpretation of sustainability that is acceptable to a wide range of stakeholders needs to be developed, wherein different perspectives on this unsustainability problem among different actors and stakeholders are made explicit. Moreover, visions and scenarios are developed with the stakeholders – a process which also provides a great mobilizing capacity for the stakeholders involved. Stakeholder input can also be used to formulate explicit and implicit policy options in the scenarios, and to make a narrative assessment of the impacts of these proposals.

Experimenting stage

The experimenting stage uses ISA-tools and methods to test the sustainability visions and policy proposals in terms of consistency, adequacy, robustness and feasibility. Transition pathways (scenarios) from drivers to sustainability goals, the sustainability impact of policy proposals and trade-offs are tested and explored. At this stage the knowledge of stakeholders can help to choose the

appropriate set of ISA tools and to ensure that the assessment is salient (i.e. capable of answering questions that stakeholders think are important). Moreover, stakeholders can provide valuable input for the analysis of the results, e.g. the assessment of policy proposals and of ISA experiments.

Participatory approaches to ISA modelling can help to provide a better representation of social agents' behaviour and a social-ecological robust depiction of the system of reference under consideration (Tàbara, Elmqvist, et al. 2007)

Learning, evaluating and monitoring stage

In the learning, evaluating and monitoring stage, learning experiences and lessons during the ISA-process need to be made explicit. Besides internal evaluation through the researchers themselves, the views of the stakeholders on the ISA-process and -tools and -results are elicited and the social and individual learning processes in the ISA are evaluated. In order to enable those engaged in the process to understand each others' language and frames, as well as to develop methods and approaches that provide an effective process it is important to explicitly organize the process of reflection, evaluation and learning (Tuinstra et al., in press). This stage also forms the basis and input for a next ISA-cycle, eventually leading to a possible reframing of the shared problem perception, an adjustment of the sustainability vision and related pathways, and reformulation of the experiments to be conducted. Regarding stakeholder integration, evaluation regarding the composition of the stakeholder group (include new ones, leave some out) and the methods of engagement (interviews, workshops, etc.) has to take place.

4   Stakeholder Integration in MATISSE

Within the MATISSE project stakeholders were integrated:

- to construct 'visions' of, and 'pathways' to, sustainable futures – that reflect the experiences, views and concerns of different stakeholders;
- to look at the different options (including options for transformation of and collaboration between stakeholders) and trade-offs between options that different pathways entail;
- to increase the mutual understanding of the science and policy and to improve the representation of the policy arena in the models that were developed;
- to test and improve participatory methods for policy assessment and social learning; and
- to disseminate our research and raise the profile of institutions involved in MATISSE.

Stakeholders were formally engaged through workshops, in-depth interviews and questionnaires. In addition we had informal contact (via email, phone and face-to-face meetings) with several relevant groups (academics, government agencies, and industry representatives) who also acted as advisors and data providers. Furthermore, a high-level advisory group, comprising senior academics, politicians and industry representatives, has given feedback on the project as a whole and advised on how findings could be applied to real-world sustainability challenges. In order to disseminate the project's results and work to the stakeholders and decision makers who might be interested in implementing an ISA within their sphere of influence, a project summary for policymakers and stakeholders will be issued as a brochure at the end of the project. It gives an overview of the work done and the elaborated process in an adequate language and a reasonable length (Jäger et al., forthcoming).

The integration of stakeholders within MATISSE can be seen on two levels: (1) It was sought to include stakeholders' knowledge during the theoretical elaboration of the ISA process. This was done in order

to analyse the practice of policy assessment in Europe (Hertin et al., 2007). Besides this, (2) stakeholders were integrated in the work of the case studies in order to examine possible methods to be used in order to ensure the participatory character of the ISA-approach. The following discussion builds mainly on the latter, in order to enhance the benefits of stakeholder integration in future ISA-processes.

Four case studies provided the real-world context for testing and developing the ISA methodology and its tools within the MATISSE-project. The case studies were designed to cover the broad spectrum of domains and contexts of ISA in the EU. The themes were

i)   agriculture, forestry and land-use (AFLU),
ii)   resource use, waste and dematerialisation (with two sub-cases following different approaches)
iii)   water (using the example of Ebro delta, Spain)
iv)   sustainable environmental technology development (again with two sub-cases, one on hydrogen/sustainable mobility (European wide), one on Ecological Tax Reform (concentrating on the Czech Republic)

The following table gives an overview of the stakeholder events within MATISSE:

Topic	Activities & Contents
Dematerialisation	Workshop with stakeholders from the European Commission in October 2005. A second workshop within the framework of the EU-funded FORESCENE project in 2006. Both workshops delivered input for the scoping and envisioning phases of the ISA. Both sub-cases on dematerialisation provided important input into the stakeholder workshop on Ecological Tax Reform in the Czech Republic (see below).
Water	Stakeholder meetings in November 2005, March 2006 and March 2007 in the area of the case study. This case-study followed a participatory modelling approach, which included a gaming tool in order to facilitate a structured dialogue among stakeholders to support reflexive learning in the domain of water. The game can also be used as an empowering tool, to illustrate differences in the agents' policy competence and in the fairness of power distribution. The game forms part of the ISA experimenting stage, in which the insights obtained during the scoping and visioning stages were tested and refined (Tàbara, 2007a, b and c).
Agriculture, Forestry and Land Use	Workshop with stakeholders from the EU commission and other relevant organisations in Brussels in October 2006. The meeting aimed to elicit stakeholder input on sustainable development objectives and policy instruments to be considered in the assessment. Stakeholder perspectives on the sustainability problems in the AFLU sector were also discussed alongside their views on the future in the AFLU sector (for more information see Briefing Sheet of WP4_based on 18 months report [http://www.matisse-project.net/projectcomm/uploads/tx_article/WP04_BS18months_final2_01.pdf]).
Hydrogen/ Sustainable Mobility	Two workshops were held in Frankfurt (February 2006, June 2007). MATISSE researchers moderated focus groups, and distributed self-completion questionnaires. The workshop were organised as clustering workshops with other projects working in the field, therefore there was a strong bias towards experts in sustainable transport and hydrogen transport technology. The stakeholders' inputs were used in order to (re)frame the case study and get feedback on the modelling results. The questionnaire also included questions on the learning of the

	stakeholders (Whitmarsh, Bohunovsky, et al., 2007; and Whitmarsh, Jäger, et al., 2007) Furthermore, two *citizens' workshops* were organised in the UK as part of events to engage the public in science or environmental issues: the BA Festival of Science in September 2006, and the Norwich Forum Trust's Earth Event in March 2007 (Whitmarsh, 2007).
Environmental Technology/ Ecological Tax Reform – the Czech Republic	Two workshops were held in Prague in 2006 (April and September) in order to elaborate a sustainability vision on the Czech republic. A third workshop was held in November 2007 together with colleagues from the case study on dematerialisation, with a clear focus on Environmental Tax Reform (ETR). The aim of the workshop was to get feedback on the modelling of the consequences of the introduction of different forms of ETR. Moreover, the stakeholders were asked to evaluate elements of the elaborated sustainability vision according to how important they are and how challenging they are to achieve. Modelling assumptions were also cross-checked, and learning of the stakeholders was explicitly evaluated (Barker et al., forthcoming)
Sustainable housing and communities	Two *citizens' workshops* focussed on sustainable housing and communities (Whitmarsh, 2007).

Table 1: Stakeholder workshops in the MATISSE project

Most of the workshops were addressing experts in the respective fields, whereas four workshops were explicitly citizens' workshops. The aims of the citizens' workshops were to elicit citizens' perspectives on transport and housing, and to use this information to inform Integrated Sustainability Assessments (ISA) of mobility and housing/communities. The workshops also aimed to test and improve participatory methods for policy assessment and social learning; and to stimulate a social learning process among participants taking part in the workshops (Whitmarsh, 2007).

Learning

Previous experience shows that learning in assessment processes can range from simple learning in which new knowledge is absorbed through error correction, through more advanced learning in which underlying objectives, values and norms are also modified as new knowledge becomes available, to more advanced "learning to learn" (Tuinstra et al., in press).

Evaluation and learning are an explicit step in the ISA-cycle. All sustainability assessment processes seek to generate and integrate information. But in contrast to other forms of sustainability assessment, which aim to develop evidence for immediate instrumental purposes, ISA aims to develop insights able to promote conceptual learning, reframing and other transformative outcomes (Tuinstra et al., in press). The participatory process of ISA is designed in order to allow participants to gain insights into the nature of context-specific problems of sustainable development and how these are embedded in the broader social-ecological system. In addition, it focuses on different perspectives on these problems, including how issues (and solution possibilities) are framed presently. As Tuinstra et al. (in press) have elaborated, whereas other sustainability assessment processes focus on projecting the impacts of proposed undertakings, ISA is more concerned with improving understanding among all those engaged in the assessment process about

- key relationships in the social-ecological system and how they relate to sustainability (sustainability learning);
- how issues are framed by different stakeholders and how these framings relate to the possibilities to resolve persistent problems of unsustainable development (social learning);
- possible pathways toward more sustainable futures (transition learning).

Of critical importance is that 'sustainability learning' takes place through a participatory process of social learning so that it includes learning about (and reflection on) ones own understanding, perspectives on and framing of the issues as well as others' understandings, perspectives and framings. This is needed in order to establish shared visions of desirable futures and to provoke a process of social capital building around the exploration of pathways toward these, which is needed for 'transition learning'.

However, there is another reason why learning and evaluation are essential in ISA. Perhaps one of the most important insights about ISA is that any specific ISA application will need to be tailored to its context of application. Both in the development of the general elements of the ISA approach and in customising ISA to the specifics of a particular application, ISA calls for a process of co-development of methods and tools involving mutual learning among those developing methods and tools and those using them. By implication the development of ISA methods and tools will have to be achieved through an adaptive 'learning-by-doing' approach involving interplay between tool developers and users supported by evaluation. Evaluation will necessarily involve the stakeholders, since it is their experiences as users of the methods and tools and their insights into their 'fitness-for-purpose' that are needed to support adjustment and corrective action.

In the following "learning in MATISSE" is discussed on three different levels:

1) Stakeholders get new inputs when participating in workshops, they can change their opinion due to discussions with other stakeholders or after hearing about the scientific findings of the project. This is referred to as "Learning in ISA - by stakeholders"
2) MATISSE project partners learn due to stakeholder participation. New topics are raised, new quantitative or qualitative input can lead to a changing interpretation of results, etc. This is referred to as "Learning in ISA - by research"
3) Finally, the MATISSE project aimed at developing a new process. Stakeholder participation is an important part of this process – the MATISSE project helped to understand, how this could be best organised, what can be expected and what are potential fields of improvement for stakeholder participation in ISA. This is referred to as "Learning to do ISA"

The following description of cases concentrates on two case studies, namely the hydrogen / sustainable mobility case study and the ETR-case study. Both of these case studies used the ISA-approach and the authors of this paper were actively involved in them. Experiences from other case studies draw on personal communications from the respective case study leaders or on respective publications.

Learning in ISA - by stakeholders

Questionnaires administered in several of the MATISSE stakeholder workshops provided an opportunity to explore whether the stakeholder engagement methods had fostered learning amongst stakeholders.

For example, in the Hydrogen case study, when asked what they (the stakeholders) had learned from the break-out discussions, most felt they had learnt something. Responses often referred to learning about other participants' points of view, as well as technological aspects, etc. Table 2 reflects the stakeholder responses in the second workshop in detail. (Whitmarsh, Bohunovsky et al, 2007).

Divergent opinions (despite sharing same analysis)	2
Consensus between discussants	2
Complexity and contingency	2
Information about hydrogen	1
Problems of introducing hydrogen cars	1
Multiple solutions needed for H_2 and biofuels introduction	1
Discussion too focused on supply, not individuals' acceptance	1
Different technologies are necessary	1
Global view is necessary	1
Renewable energies will become competitive due to rising oil prices	1
transport modes and modal split for different distances	1
wind energy considered for H2 production	1
Various	1
learning during whole workshop	1
experts are relatively clueless	1
No answer	9

Table 2: What, if anything, do you feel you have learned from the break-out discussion? Source: Whitmarsh, Bohunovsky, et al., 2008

At the workshop on ETR in the Czech Republic, the views of the stakeholders on the sustainability vision, which was elaborated according to inputs from former workshops, and the key challenges in achieving it were gathered through questionnaires at the beginning of the workshop, before any presentations or discussions. For this exercise, the sustainability vision was split up into seven elements – each of which had to be ranked according to (a) how important it seems to the stakeholders and (b) how challenging the stakeholders thought it would be to achieve. At the end of the workshop the stakeholders were asked if their opinion had changed due to the presentations/discussions. Although no clear trend in the direction of changes can be seen from the results, the answers clearly show that people changed their view concerning a sustainability vision for their country, and thus learned from the presentations and discussions at the workshop. Table 3 shows that the detailed results (Barker, Bohunovsky, forthcoming).

	more important	less important	more challenging	less challenging
1: economic growth	1	2	0	2
2: standard of living	1	3	1	2
3: workforce	2	0	1	0
4: good jobs	1	1	0	1
5: cultural heritage	1	1	0	1
6: burden shifting	1	1	2	1
7: material use	1	1	3	0

Table 3: Change of opinion regarding importance / Challenge of elements of the Czech sustainability vision

In the water case study Tàbara, Roca and Madrid (2007) observed that the participants developed a very strong perception about the key role of the institutional dimension during stakeholder workshops on the sustainability of the Ebro Delta.

Moreover, the experiences from MATISSE show that the stakeholders learned about the process itself and made recommendations for improvements or elements that should receive more attention.

Learning in ISA - by research

There has also been considerable learning within the project as a result of the stakeholder activities. The results of our stakeholder engagement work considerably influenced the work of the hydrogen case study, the ETR case study, and also provided input to the AFLU-case study and the case study about the water management of the Ebro River Delta.

Within the hydrogen case study, the assessment was broadened to encompass a range of technical and behavioural options for addressing 'unsustainable mobility' (rather than restricting the assessment to hydrogen-based transport as originally intended) due to stakeholder input in the first workshop.

The same is true for the ETR-case study in the Czech Republic: Initial work and discussions within the environmental technology case study in the Czech Republic aimed at providing stakeholders with information on underlying trends and indicative impacts that technology might be able to achieve in relation to sustainable development. For the second iteration of the ISA, stakeholders suggested that a scenario exploring the effects of an ecological tax reform (ETR) would be of interest, in order to provide more focus on potential drivers of change the discussions.

Besides this very fundamental influence of stakeholders, participants of the workshops within the MATISSE offered valuable feedback on the modelling work, they pointed out risks and requirements, and identified or emphasised different sustainability criteria (e.g. Whitmarsh, Jäger, et al., 2007). Moreover, they highlighted areas where further work may be needed to modify the visions and assumptions underpinning the models or raised concerns about possible unsustainability of proposed scenarios and pathways (e.g. Whitmarsh, Bohunovsky, 2007).

In her work Whitmarsh (2007) also highlights the different perspectives of citizens and experts: The views of the experts highlighted, for example, a need for both technological and non-technological measures to tackle rising transport demand. Citizen stakeholders supported the view of experts that transport in its current form and ongoing trends in the sector are unsustainable and that a 'business-as-usual' approach should be rejected. Citizens and experts identified similar environmental, social and economic criteria for sustainable transport and located responsibility for fostering sustainable transport primarily with governments. In contrast to experts, citizens tended to place more emphasis on behavioural change policies than on transport technologies. Moreover, citizens considered amenity aspects of transport to be most important, while experts stressed the technological issues.

Learning to do ISA

In addition to reporting on learning within the case studies, it is important to report on findings about learning on how to do an ISA. MATISSE aimed at developing the ISA-process, thus ISA is in its infancy and the project is, first and foremost, a methodology development and testing project, which responds to a gap in sustainability assessment practice. ISA is intended to fill this gap and the project tested ways to implement the ISA process architecture and analytical dimensions. ISA is challenging, since it calls for capacities and features that are unconventional. Hence the most urgent task at this stage is to build awareness among scientists of these challenges and requirements.

The degree and nature of stakeholder involvement varied in the case studies (see above). For those case studies that were more open towards the participation of stakeholders and external experts, it broadened the scope of the case studies and was an enriching experience. At the same time it was a major challenge for the case studies to engage stakeholders in the process and to keep them involved. An important lesson was that a lot of time and resources and professional skills are required to manage stakeholder processes. Also it has been a major challenge to include stakeholder input in the assessments in a consistent way.

The four steps of the ISA cycle were in principle useful in structuring the complex process of doing sustainability assessments. The scoping stage was an important step for all case studies to broaden the perspective of the issue and to put the case study into context. An important lesson seems to be that

although the concept of ISA seems to be simple, logical and straightforward, it is not at all easy to apply to real life complex problems with multiple levels.

5 Conclusions

The experiences made in MATISSE show the value of stakeholder input in ISA. Short, half-day workshops or even one hour break-out groups within a broader setting can bring significant input to an ISA.

ISA is intended to be a process to explore and support reframing, reorientation (regime change) and transition. The input of stakeholders provided the basis for such reframing in several case studies (e.g. change of hydrogen focus to sustainable mobility or from environmental technologies to ETR). In both cases, the research started from a much narrower framework. Due to stakeholders' input the case studies could meet the ISA-requirement of taking a broader system view and of being potentially transformative. Moreover, these two cases have shown that being explorative (goal-searching), instead of trying to follow a given goal, opens the possibility to be innovative and to explore new ways of system-management.

Feedback from involved stakeholders also documented their learning within the project. Thus it can be argued, that deliberative workshops provide valuable fora to co-construct knowledge and elicit informed views of citizens and experts. They can also empower these groups to participate in important social issues related to sustainability. This probably is especially true for citizens' workshops, as their opinion often rather represents "niches" due to lack of voice in the broader debate.

Good experiences were made with regard to the organisation of the participatory process, which showed that combining a deliberative workshop with questionnaires that were filled in individually helped to assess the learning processes and to get additional and more concrete feedback on chosen issue.

The experiences from MATISSE have shown that daring to embark on the adventure of opening the process to the input of stakeholders and following together with them a goal-searching approach, offers new opportunities not only for science, but – as ISA is intended to initiate policy changes – for societal development. ISA can only come up to its promises of being potentially transformative, if stakeholders are integrated in a comprehensive and open way. This is a new and challenging mode of knowledge production for science.

6 Acknowledgments

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