

PUBLIC PARTICIPATION AND THE EUROPEAN WATER FRAMEWORK DIRECTIVE

Role of Information and Communication Tools



WorkPackage 3 report of the HarmoniCOP project –
Harmonising Collaborative Planning

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Additionally to the deliverable 4 – the present report on IC-tools – you find in deliverable 3b the practical guide for IC-tools and Social Learning. It represents a joint output of WP 2 and WP 3.

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Preamble

The increasing importance of stakeholder and public participation in river basin management puts increasing demands on the type and the role of IC-tools. On one hand information must be accessible for different non-expert groups. On the other hand IC-tools are not only a means for transferring information but are instrumental in shaping processes of social learning and communication in a network of stakeholders in a river basin.

The HarmoniCOP project adopted such a broad definition of IC-tools and developed a typology to characterize a wide range of tools. A base was established for investigating and evaluating the role of IC-tools in different phases of social learning during the development of a river basin management plan. The overview summarized in this report provides valuable information for anyone interested in the role of IC-tools for participatory river basin management. We expect that the experience from the case studies will support the development of practical guidance for an improved application of existing tools and the development of a new generation of improved IC-tools.

I would like to thank all participants of work package three for their enthusiasm and efforts in produce this excellent overview and template.

We thank the European Union for the financial contribution.

Claudia Pahl-Wostl
Coordinator HarmoniCOP project
November 2003

Executive summary

Overview

This document is the report of the HarmoniCOP project Work Package 3 (WP3) dedicated to Information and Communication tools (IC-tools) in river basin management (RBM).

The HarmoniCOP project has been set up in the framework of the 5th European Framework Programme for Research and Technological Development (Contract nr EVK1-CT-2002-00120). It aims to increase the understanding of participatory river basin management against the background of the European Water Framework Directive. The project involves 17 research teams from nine European countries. Its specific objectives are as follows:

- To prepare a “Handbook on PP methodologies”;
- To provide insight into Social Learning in a multi-phase multi-level context;
- To increase the understanding of the role of information and ICT tools (Information and Communication Technology) in Public Participation (PP) and Social Learning (SL);
- To compare and assess national PP experiences and their backgrounds;
- To involve governments and stakeholder groups.

The project has started in November 2002 and will run until November 2005.

WP3 focus on the role of IC-tools as facilitating mechanism to support the SL dimension of Public Participation in river basin management (RBM). WP3 aims to develop a framework of analysis that will be used by the teams of HarmoniCOP WP4 and WP5 to compare different national situations and analyse several case studies in Europe. Further, it is intended as an input for the Handbook (WP7) dedicated to RBM practitioners.

The context of this work (Chapter 1)

Public participation and awareness are high up amongst the EU concerns’ regarding environmental and water management. PP can generally be defined as allowing people to influence the outcome of plans and working processes. But in the same time, it is quite difficult to find an agreement on the practical meaning of PP and the way to implement it. The expected benefits and drawbacks of PP that are presented indicate that PP is necessary but it has to be organized in order to make it work, especially in term of level of PP and type of public to involve. Several international legislations and policies have been developed to encourage PP. We briefly present the most important, especially the Aarhus convention and the Article 14 of the WFD. The guidance document on PP in relation to the WFD is also introduced.

Considering the interest as well as the limits of traditional PP, HarmoniCOP investigates a new form of PP which promotes the social process aspects and which is called Social Learning. SL refers here to the growing capacity of a multiple actors network (those concerned by the RB) to develop and perform collective actions related to RBM. RBM is considered as a social-relational activity (interests, water practices, information, knowledge, funds are spread over many actors) and a complex technical task, both cannot be separated. SL corresponds both to this participatory social/technical process as well as to the outcomes of this process. This collective problem solving approach requires that the actors meet each other, develop relational practices. The quality of these relational practices is fundamental from a SL perspective : it is based on reflectivity, reciprocity and respect of diversity. The quality of these social interactions is supposed to determine the awareness for interdependencies between the participants and the acceptance of a diversity of interests, of mental frames, of knowledge. The different stakeholder groups in a basin have to understand

that a complex issue such as RBM can be better resolved in a collective way, relying on disseminated information and knowledge.

Considering the huge number of people concerned by RBM, traditional interactions between experts and decision-makers are not sufficient any more and other additional relational mechanisms have to be considered to go across geographical and organisational scales, including the public at large.

In this context, information and communication can play a crucial role to support the SL dimension of PP through two-ways communication processes.

Scoping IC-tools (Chapter 2)

HarmoniCOP WP3 aims to complement the abundant literature on Information and Communication Technology and on PP methods by focusing more on the role of IC-tools as a facilitating mechanism to support the SL dimension of PP in relation to the WFD.

Within HarmoniCOP, an IC-tool is defined as a material artefact, device or software, that can be seen and/or touched, and which facilitates interaction between stakeholders through two-way communication processes. An IC-tool can be computer-based or not.

About twenty IC-tools have been identified based on a literature review and on our own experience.

To categorize them, four main criteria have been identified as useful for those who will have to organize in practice the WFD PP process : communication direction (top-down, bottom-up, bi-directional), public size (small working group, general public), usage purpose (management of information and knowledge, elicitation of perspectives, interaction support and simulation) and phases in the PP process. A preliminary qualitative classification of the tools based on these 4 criteria is proposed as well as a synthetic index card for 13 of them (annex 2).

Description of some IC-tools (Chapter 3)

Three types of IC-tools identified in the previous chapter are described in more detail through a short literature review and examples of application : maps and other spatial representations, simulations models (Decision Support Systems, Integrated Assessment Models, Qualitative Models and Fuzzy Cognitive Mapping) and Role Playing Games.

Framework of analysis and Pool of Questions (Chapter 4)

A framework of analysis is proposed in this chapter to assess IC-tools from three perspectives (with a serie of criteria for each perspective) :

- the technical characteristics of the tools themselves and the usage situations.
- their relational and substantive impacts on PP and SL.
- their usability as perceived by the users (based on a tool acceptance model).

This framework will be used in a number of empirical investigations to evaluate the tools used in historical and real-time case studies.

It is embedded in a more general instrument co-developed with WP2 and called “Pool of Questions” presented in a separate document. The prime aim of this instrument is to provide the teams of HarmoniCOP WP5 with a serie of questions concerning Social Learning and IC-tools, as a common base upon which they can build their case studies.

We describe in this chapter the general structure of the Pool of Questions and a subset is given in Annex 3 : the guidance for a charting procedure, the guidance to fill in the tool index card and a checklist of questions.

Perspectives (Chapter 5)

The findings from the WP4 national studies and the WP5 historical or real-time case studies will allow to test and to validate the ideas and the hypothesis developed in the current document. These results will be integrated in the handbook on PP methodologies to promote SL in RBM. Concerning IC-tools, it will help the WFD practitioners to answer concrete questions such as : What are the relational and substantive functions of a tool ? How should it be used ? Which resources and skills are required ? What is its applicability in the different phases of the PP process ? When was it used and who might be contacted for additional information ?

Table of content

Preamble	iii
Executive summary	iv
1. Introduction	1
1.1. <i>Public Participation</i>	1
1.2. <i>International legislation and policy for PP</i>	3
1.3. <i>Public participation and the Water Framework Directive</i>	4
1.4. <i>The guidance document for PP in relation to the WFD</i>	5
1.5. <i>The HarmoniCOP project</i>	6
1.6. <i>PP and Social Learning</i>	7
1.7. <i>IC-tools as facilitating mechanism for PP and SL</i>	9
2. Scoping IC-tools	11
2.1. <i>Some definitions</i>	11
2.2. <i>Definition of IC-tools</i>	11
2.3. <i>List of IC-tools and criteria of categorization</i>	14
3. Description of some IC-tools	18
3.1. <i>Maps and other spatial representations</i>	18
3.2. <i>Simulation models</i>	21
3.3. <i>Role playing games</i>	23
4. Framework of analysis	26
4.1. <i>Evaluation criteria for IC-tools</i>	26
4.2. <i>Structure of the Pool of Questions and intended use</i>	30
5. Perspectives	32
List of references	33
Annex 1 : IC-tools glossary	41
Annexe 2 : IC-tool index cards	47
1) <i>Questionnaire</i>	48
2) <i>Maps</i>	49
3) <i>Three dimensional scale model</i>	51
4) <i>Cognitive map / Fuzzy cognitive mapping</i>	52
5) <i>Actor analysis</i>	53
6- <i>Role Playing Game</i>	57
7) <i>Board game</i>	59

<i>8) Interactive white board</i>	61
<i>9) GIS (Geographic Information System)</i>	62
<i>10) Group Support System</i>	63
<i>11) Scenario methodology</i>	65
<i>12) Multicriteria analysis tools</i>	67
<i>13) Integrated Assessment model</i>	69
Annex 3 : Summary of the Pool of Questions	70
Annex 4 : Contributors	85
Annex 5 : Contact information	86

1. Introduction

The purpose of this report is to provide a framework to analyse the use and the impacts of IC-tools in participatory River Basin Management (RBM) based on a Social Learning (SL) approach developed by HarmoniCOP WP2. This framework will firstly contribute to compare different national approaches of PP (WP4), then to analyse different case studies in Europe (WP5). Further, it is intended as an input for the handbook (WP7) dedicated to the RBM practitioners. This report complements the Guidance Document on Public Participation in relation to the WFD written by the Drafting Group on public participation, established under the Common Implementation Strategy of the European Commission and the Member States (Drafting Group, 2002).

The current section 1 briefly introduces the concept of Public Participation (section 1.1.), presents the legal and policy background of PP in Europe in general (section 1.2.) and in relation to the WFD (sections 1.3. and 1.4.). After presenting the general structure of HarmoniCOP project (section 1.4.) and the concept of SL (section 1.5.), we introduce the role of IC-tools as one of the facilitating mechanisms for PP and SL (section 1.6.).

More information can be found on these topics in the HarmoniCOP inception report (Mostert, 2003b).

Section 2 focuses on IC-tools. After proposing and discussing some definitions around the concepts of “IC-tools”, “tools”, “techniques”, “methods”, “information” and “communication” (section 2.1.), a list of tools is provided (section 2.3.1.). Then, several criteria of categorization are proposed (section 2.3.2.) and a first attempt is made to classify the tools that have been identified (section 2.3.3.).

Section 3 consists of a short literature review for some of the most important IC-tools.

Section 4 presents the structure of the framework of analysis that will be used by WP5 teams to assess the uses and the impacts of IC-tools in different RBM case studies. Based on this framework, a pool of questions has been produced in collaboration with WP2 and is presented in a separate document (Craps and Maurel ed. 2003).

The annexes to the report contain a glossary (annex 1), a synthetic description of several IC-tools (annex 2), a summary of the pool of questions (annex 3), a list of contributors to this report (annex 4), and contact information (annex 5).

1.1. Public Participation

Public participation (PP) and awareness are high up amongst the EU concerns’ regarding environmental and water management. PP can generally be defined as allowing people to influence the outcome of plans and working processes. But at the same time, it is quite difficult to find an agreement on the practical meaning of PP and the way to implement it. In some cases, it is seen as a mean of empowering local communities and improving democracy, in other cases, just as a marketing tool for classical top-down decision-making processes..

Benefits and drawbacks

Several benefits but also drawbacks can be expected from PP, as described in a recent synthesis (Mostert, 2003a) :

As a first benefit, PP can lead to better-informed and more creative decision-making. Secondly, PP can result in more public acceptance or even ownership of the decision, and therefore in less litigation, fewer delays and generally better implementation. It's partly due to the procedure used in PP when the public is encouraged to make comments and give opinions regarding a decision. Furthermore, PP can also promote more open government and more democratic attitudes among the public. Lastly, in relation with the HarmoniCOP project, PP can also encourage Social Learning among all the parties (see section 1.6), that means learning how to manage in a collective way a complex problem such as a River Basin (RB) and to deal with different views and interests.

On the other side, implementing a real PP process is a complicated task. Governments are often reluctant to listen to the public and to organize true PP with enough resources. Pseudo PP often has been used for obtaining acceptance of preconceived scenarios and plans, but without giving the public the possibility to participate early in the process and to really influence the decision making, resulting in disappointment and less public support. In addition, response from the public may be limited, unrepresentative, of low quality. It can also lead to inconsistent decision. Finally, PP could be a time- and money-consuming process.

As a result of this benefits and drawbacks analysis, it appears that PP is necessary but it has to be organized in order to make it work, especially in terms of level of PP and type of public to involve.

Different levels of PP

Different levels of PP may be considered, based on Arstein's "ladder of citizen participation" (Arstein, 1969) and additional contributions (e.g. Creighton, 1999):

- 1- Information : the public gets/has access to information, which is a basic condition for all levels of PP ;
- 2- Consultation : the views of the public are sought ;
- 3- Discussion : real interaction takes place between the public and the government ;
- 4- Co-designing : the public takes an active part in developing policy or designing projects ;
- 5- Co-decision-making : The public shares decision-making powers with the government ;
- 6- Decision-making : the public performs public tasks independently.

In the guidance document on PP in relation to the WFD, 3 levels of participation only are distinguished : the first one, "information supply", corresponds here to level 1. The second one named "consultation" corresponds here to levels 2 and 3 but separates as well written consultation (level 2) and oral consultation (level 3). Oral consultation is more active and actors can dialogue with the authorities. The third level called "active involvement" integrates here levels 4, 5 and 6, even if level 4 only is required by the WFD. The two last levels (5 and 6) may be considered as best practices and should be encouraged.

These different levels of PP are not mutually exclusive and can be combined according to the objectives and expected benefits, the stages of the process, the available resources and the stakeholders to be involved.

Different forms of "public"

Several categories can be distinguished among the broad term "public":

The WFD refers to the term "public" with respect to information and consultation levels of PP. In this case, the definition given by Art. 2(d) of the 2001/42/EC SEIA Directive (European Union, the European Parliament, The Council 2001) is applicable: "*One or more natural or legal persons, and, in accordance with national legislation or practice, their associations,*

organisations or groups.” Government bodies are usually not considered to be part of the “public”.

The terms “stakeholder” or “interested party” are used concerning the active involvement level. This category of actor integrates any person, group or organisation with an interest or “stake” in an issue either because they will be affected or because they may have some influence on its outcome. The guidance document for PP related to the WFD proposes a typology of stakeholders involved in RBM : professionals, authorities and elected people, local groups and non-professional organised entities (broken down into groups focusing on a place such as a group resident association, and those focusing on an interest, such as fishermen) and finally, individual citizens, farmers and companies representing themselves. We can also add to this typology the “experts” (government and water authorities experts, academics, private consultants).

1.2. International legislation and policy for PP

In this chapter, we briefly analyse the state of international legislation and policy in terms of PP issues and the means to reach those principles.

Most of the time, legislation focuses on delivery of environmental information to satisfy the two first levels of Public Participation (information and written/oral consultation). For instance in the Sixth Environment Action Programme of the European Community, titled “Environment 2010: Our future, our choice” [COM(2001) 31 final]¹, one of the points is to empower citizens and change behaviour by helping citizens to benchmark their own environmental practices and to improve the quality of information on the environment.

Council directive 90/313/EEC of 7 June 1990 on the freedom of access to information on the environment. According to Article 1, “*The object of this Directive is to ensure freedom of access to, and dissemination of, information on the environment held by public authorities and to set out the basic terms and conditions on which such information should be made available.*”

It was derived from previous rules such as the action programmes of the European Communities on the environment of 1973, 1977 and 1983, and more particularly the action programme of 1987, and the principles and objectives they state in terms of environmental protection. Indeed, they are based upon the recognition that the environmental issues are better handled with the participation of all concerned citizens at the adequate level.

Thus, the objectives of directive 90/313/EEC are to guarantee the freedom of access to information on the environment and held by public authorities. It also tries to set up the conditions for the provision of these data.

In this text we can read the definition of what the European Council considered as “information relating to the environment”. Indeed, Article 2 says that “*‘information relating to the environment’ shall mean any available information in written, visual, aural or data-base form on the state of water, air, soil, fauna, flora, land and natural sites, and on activities (including those which give rise to nuisances such as noise) or measures adversely affecting, or likely so to affect these, and on activities or measures designed to protect these, including administrative measures and environmental management programmes*”.

According to Article 3.1, “*Member States shall ensure that public authorities are required to make available information relating to the environment to any natural or legal person at his request and without his having to prove an interest. Member States shall define the practical arrangements under which such information is effectively made available.*”

¹ http://europa.eu.int/eur-lex/fr/com/pdf/2001/fr_501PC0031.pdf

But, finally, nothing was really clarified about those practical arrangements.

The UN-ECE Convention on access to Information, Public Participation in decision-making and access to justice in environmental matters (Aarhus convention) is the most influential legislation on the international level. It was adopted on 25th June 1998 in the Danish city of Aarhus at the Fourth Ministerial Conference in the 'Environment for Europe' process. It focuses on interactions between the public and public authorities and it is forging a process for Public Participation in the negotiation and implementation of international agreements.

The three main objectives of the Aarhus convention are:

- to allow members of the public greater access to environmental information, held by public authorities, thereby increasing the transparency and accountability of governments; (Article 5)
- to provide an opportunity for people to express their opinions and concerns on environmental matters and ensure that decision makers take due account of these; (Articles 6, 7, 8)
- to provide the public with access to review procedures when their rights to information and participation have been breached;

Concerning the practical arrangement to provide information or to help the public involvement in the decision-making process, the Convention mentions, in Article 5.3 that *“Each party shall ensure that environmental information progressively becomes available in electronic databases which are easily accessible to the public through public telecommunication networks.”*

Article 6.5 states that *“Each party should, where appropriate, encourage prospective applicants to identify the public concerned, to enter into discussion, and to provide information regarding the objectives of their application, before applying for a permit”*.

Article 6.7 mentions that *“procedures for Public Participation shall allow the public to submit, in writing or, as appropriate, at a public hearing or inquiry with the applicants, any comments, information, analyses or opinions, that it considers relevant to the proposed activity.”*

Article 6.8 states also that *“in the decision due account, is taken of the outcome of Public Participation”*.

According to the Article 7, *“Each Party shall make appropriate practical and/or other provisions for the public to participate during the preparation of plans and programmes relating to the environment, within a transparent and fair framework, having provided the necessary information to the public. Within this framework, Article 6, paragraphs 3, 4 and 8, shall be applied. The public, which may participate, shall be identified by the relevant public authority, taking into account the objectives of this Convention. To the extent appropriate, each Party shall endeavour to provide opportunities for Public Participation in the preparation of policies relating to the environment.”*

Article 8 states also the question of Public Participation during the preparation by public authorities of executive regulations and other generally applicable legally binding rules that may have a significant effect on the environment.

Two of the most important challenges with respect to the implementation of the Aarhus convention are ensuring stable and predictable resources to support PP, and reporting systems for compliance control.

1.3. Public participation and the Water Framework Directive

In addition to the Aarhus convention, several international water conferences organized during the last decade have considerably influenced the development of PP in the field of water resources : Dublin in 1992 (International Conference on Water and the Environment), The Hague in 2000 (Ministerial Conference during the 2nd World Water Forum), Bonn in 2001 (International Conference on Freshwater), Stockholm in 2002 and Johannesburg in 2002 (World Summit on Sustainable Development).

In Europe, the WFD 2000/60/EC of 23 October 2000 established a framework for Community action in the field of water policy. The key objective of the directive is to achieve by 2015 “good water status” for all European surface and underground waters. Five main instruments will be used to reach this objective : 1) a combined approach among the States to reduce pollution, 2) the principle of cost recovery, 3) management plans at the river-basin level under the responsibility of a “competent authority”, 4) environmental and economical assessments and continuous monitoring of the water status, 5) Public Participation.

The main article concerning Public Participation is Article 14 stating: “*River basin management plans Member States shall encourage the active involvement of all interested parties in the implementation of this Directive, in particular in the production, review and updating of the river basin management plans.*”

According to the philosophy of this article, the decision must be taken with the maximum of transparency. The implementation demands the reform of traditional mechanisms of “the representative democracy” to develop, in parallel, a “participative democracy”, in terms of policy of information, consultation, dialogue and monitoring.

In addition, the WFD requires three rounds of written consultation :

- Before the end of 2006, the elaboration of management plan development works;
- Before the end of 2007 the identification of the main problems;
- Before the end of 2008 the draft Management Plan.

Nevertheless, each State can adapt this schedule.

The WFD calls for public access to the studies used for working out the documents submitted for consultation. Point 46 of the preamble says that: “*To ensure the participation of the general public including users of water in the establishment and updating of river basin management plans, it is necessary to provide proper information of planned measures and to report on progress with their implementation with a view to the involvement of the general public before final decisions on the necessary measures are adopted.*”

Thus, it appears that the WFD is not really exhaustive in the definition of what should be Public Participation and how it should be implemented. For instance, the WFD does not propose any solution concerning the tools that could be mobilised in order to improve Public Participation and public information.

1.4. The guidance document for PP in relation to the WFD

To complement the text of the WFD, a Drafting Group on Public Participation has been established under the Common Implementation Strategy of the European Commission and the Member States. This group has produced the “Guidance document for PP in relation to the WFD” (Drafting Group 2002) officially adopted at the EU water directors meeting in Copenhagen on 21-22 November 2002.

This document describes the concept of PP at three different levels : access to information, consultation and active involvement. It indicates also how to organize PP in RBM, which actors to involve, when and how to organise PP. A first attempt is made in section 7 to introduce the concept of a learning approach to PP. Several examples are given in Annex 2 and a list of tools and techniques are presented in Annex 1.

1.5. The *HarmoniCOP* project

The *HarmoniCOP* project² (HARmonising Collaborative Planning) was established within the 5th European Framework Programme for Research and Technological Development (Contract n° EVK1-CT-2002-00120). This project focuses on understanding the PP in river basin management planning (RBMP).

The project is made of 7 interrelated work-packages shown in the figure 1. A detailed description of the project and each workpackage content is provided in the inception report (Mostert, 2003b).

The specific objectives of the project are as follows :

- To prepare a “Handbook on PP methodologies”;
- To provide insight into Social Learning in a multi-phase multi-level context;
- To increase the understanding of the role of information and communication tools (IC-tools);
- To compare and assess national PP experiences and their background;
- To involve governments and stakeholder groups.

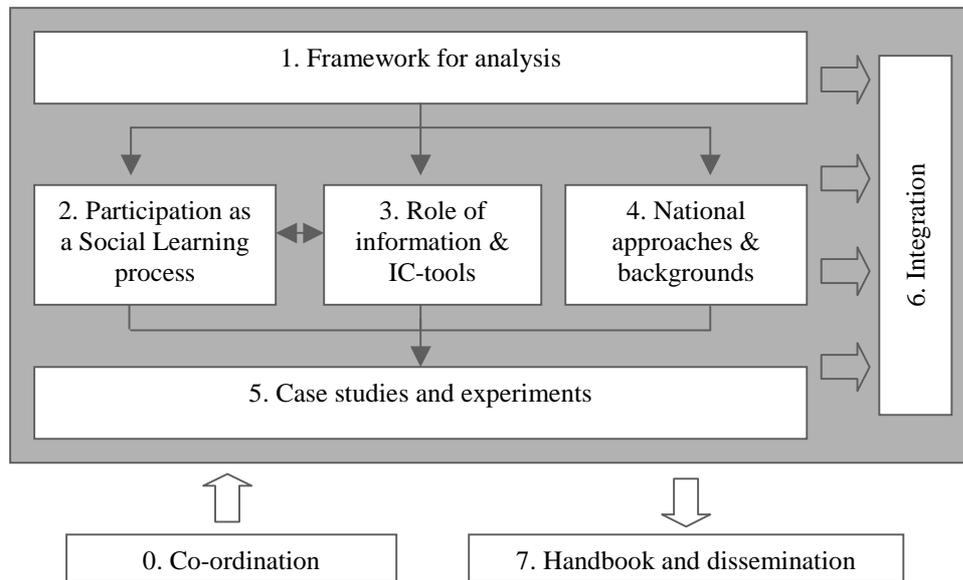


Figure 1: The different work-packages of the *HarmoniCOP* project and their relations

From the literature on PP, participatory RBM and the guidance document for PP in relation to the WFD (section 1.4.), several lessons can be learned on how to design participatory processes (Mostert ed., 2003b, p. 9) and are summarized in box 1.

Compared to this existing know-how, *HarmoniCOP* is focusing more on active involvement and on additional forms of PP, trying to promote the central concept of “Social Learning” (SL). *HarmoniCOP* pays also more attention to the role of Information and Communication Tools (IC-tools) in PP and SL. Finally, even if it’s a research project, the interaction with stakeholders remains central in order to provide a useful complement to the guidance document.

² *HarmoniCOP* website : <http://www.harmonicop.info/>

1. Before using any PP technique, reach agreement between the different government bodies concerned on the scope of PP (what can be discussed and what cannot?), the purpose (what benefits are aimed for?, why PP?), the level of PP, the different publics to be targeted, the project organisation and procedures for exchanging information and deciding on follow-up.
2. Conduct some form of actor analysis.
3. Identify the relevant publics on the basis of (a) the interests they represent; (b) the information, ideas and skills they have; and (c) their influence on decision-making and implementation.
4. Make a process design.
5. Discuss the process design beforehand with the major stakeholders and develop "co-ownership". Important topics are the type of contributions from the public that are expected and what will be done with them. Do not build up false hopes.
6. Make clear afterwards what has been done with the input by the public.
7. More support for water management is a legitimate aim of PP, but if the input by the public is not taken seriously, PP may backfire and public support may decrease.
8. Approach the different publics actively to prevent limited or unrepresentative response. Intervener funding and/ or participatory training may be needed, especially if some publics have far fewer resources than others.
9. Consider the appointment of a professional outside process manager or facilitator to enhance the legitimacy and effectiveness of the process.
10. Start PP as early as possible, when still something can be done with the public input. Different publics may need to be targeted in different phases.
11. Organise PP on the different aspects of river basin management at the geographical scale (local, regional, river basin, etc.) that is closest to the most relevant publics for these aspects, while still keeping the process manageable.
12. Ensure smooth communication between scales and between units at each scale (e.g. different basin states).
13. Try to involve the different publics in policy research, if only to prevent technical controversies.
14. Prevent a "participation burnout." It is better to ask the public to participate in one integrated planning exercise than in 20 sectoral exercises.
15. Review and develop the PP capacity of government (personnel, skills, budget, openness, flexibility).
16. Choose "realistic" PP methods and techniques that fit the available resources, the concerned publics, the geographical scale, the type of issues to be addressed and the phase in the planning cycle.
17. Evaluate PP afterwards in order to learn for future processes and during the PP process in order to adjust to unforeseen developments.
18. Foster mutual trust and open communication.

Box 1: Lessons from the literature on PP initiated by government (Mostert ed., 2003b, p 9).

1.6. PP and Social Learning

Considering the interest as well as the limits of traditional PP (see section 1.1.), HarmoniCOP investigates a new form of PP which promotes the social process aspects and which is called Social Learning.

The concept of Social Learning is relatively new and quite polysemic according to the considered discipline. Within HarmoniCOP, the Social Learning concept is analysed by WP2 (Craps et al. 2003, Thailieu et al. 2003, Mostert 2003c, Pahl-Wost 2002) and is represented in the following graphical framework.

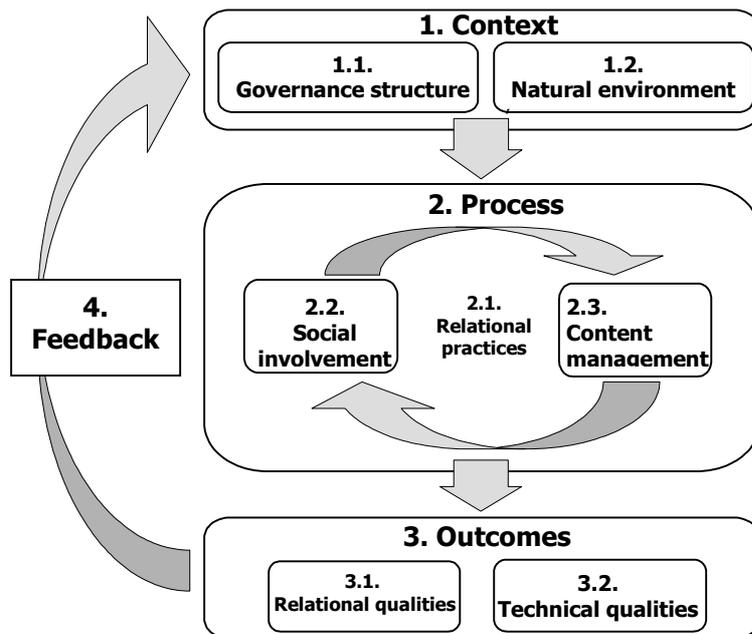


Figure 2 : Graphical framework of the Social Learning concept in HarmoniCOP

Social learning refers here to the growing capacity of a multiple actors network (those concerned by the RB) to develop and perform collective actions related to RBM. RBM is considered here both as a social-relational activity (interests, water practices, information, knowledge, funds are spread over many actors) and a complex technical task. Both cannot be separated : problems are identified and framed, diagnosis is made, solutions are conceived, some are chosen, implemented and monitored always in a social environment, as a result of interactions between different actors who have different representations of the reality (Pahl-Wostl, 1995).

Social learning refers both to this participatory social/technical process (part 2 of Figure 2) as well as to the outcomes of this process (part 3 of Figure 2). It takes place in a specific context (part 1) in terms of the governance structure (actors, regulation and cultural norms) and the river basin environment. This context can be affected in turn by the outcomes (part 4).

During this process (part 2), learning to solve a problem is not limited to a purely cognitive process and to individual exercises. It also includes a form of “learning by doing” in a collective way, within existing or developing communities of practice which are more or less homogeneous in terms of skills, knowledge, rules, beliefs, stakes, vocabulary etc. This collective problem solving approach requires that the actors meet each other, develop relational practices (part 2.1.). The quality of these relational practices is fundamental from a social learning perspective : it is based on reflectivity, reciprocity and respect of diversity.

Social learning is not only a reflection on how to reach a goal (single-loop learning), it also implies a reflection on the goals themselves (double-loop learning) and on the interrelations between the stakeholders.

In addition to this reflectivity activity, reciprocity is another mechanism liable to facilitate collective actions. Each participant has to realise that he is interdependent and that he cannot ignore the interests of the others, and vice versa.

Finally, social learning supposes that the participants accept the diversity of interests, of mental frames, of arguments, of knowledge. They also have to realize that a complex problem such as RBM can be better resolved in a collective way, relying on disseminated information and knowledge. This is what (Rittel, 1984) calls the concept of *symetry of ignorance* (or *asymetry of knowledge*): that means that no individual stakeholders knows all the relevant

knowledge, yet the knowledge of all of them is equally (symmetrically) important to frame and resolve the problem (Arias and Fischer, 2000).

Another key point is that river basins as governance systems have to be considered as open multi-scales systems, not only in term of geographical scales (local, regional, national and international) but also in term of organisational scales. The SL concept in this project is clearly focused on direct interactions in small working groups, with participants belonging either to the same community of practice (e.g. a farmers association, an environmental NGO, ...) or different communities of practice (e.g. in a catchment committee, ...). Since much more actors need to be reached somehow, additional relational mechanisms have to be considered, mainly through representatives (interacting with their constituencies or their superiors), other types of multi-membership (e.g. people actively involved in several communities and thus, able to disseminate information and knowledge among these communities), occasional relational events, common policies and procedures. Artefacts produced by the RB communities of practice can also help to reach the non-participants (including the public at large) through more classical distant and mono-directional communication means (shared information system, radio, TV, web sites, newspapers, ...). It is still an open question if this last form of communication can contribute to SL.

1.7. IC-tools as facilitating mechanism for PP and SL

The importance of PP in the WFD leads to the emergence of new stakeholders in river basin management besides the water experts and decision-makers. It suddenly widens the diversity of "real world representations", skills, stakes, ways of thinking, logics of decision and action. In this complex context, we have seen that the ambition of PP based on SL is to learn how to develop and perform actions related to RBM in a collective way.

This raises the crucial issue of information design, storage and retrieval and communication between stakeholders in ways that are relevant for them and that allows collective learning (Rool et al. 2003, Woodhill 2003).

Effective communication is all the more essential as PP is highly time-consuming due to the increasing number of interactions and the difficulties to combine expert and non-expert knowledge, even if this process is fruitful (Pahl-Wostl 2002a, Garin et al. 2001). Recent feedback concerning the implementation of the SAGEs (water management plans) in France made obvious the importance of information and communication (AELB 2001, AERMC 2002).

IC-tools, as a facilitating mechanism, present real opportunities to take up the communication challenge, but they also form serious risks if they are not mastered in a proper way. Here are some risks:

- The absence of metadata about the origin and accuracy of data can lead to controversies in the case of inconsistencies or misuse or if data were provided on the condition that access was to be restricted (stakeholders may be willing to communicate sensitive information to a limited group only).
- Exclusive use of IC-tools at the expense of traditional media and direct contacts can result in even *larger inequities*. Many people still have no access to the internet or are not familiar with computers at all.
- The growing use of GIS in the water experts community (sometimes integrated in a Decision Support System or "DSS") is currently leading to an abundance of maps. Maps are highly communicative forms of spatial representation, but they are not always complemented by textual explanations. This may result in very different interpretations, especially

when some users do not master map-reading techniques (Miellet 2001, Caquard 2000). The status of maps as expert and definitive representations of reality may reduce the richness of initial co-operation with the stakeholders and bias the points of view that the stakeholders communicate, without enriching their deeply-held convictions.

- Another typical risk is the use of IC-tools that are either too sophisticated for efficient learning by non-specialists given the time constraints, or not open and flexible enough to incorporate local knowledge and new concerns that may emerge in participatory processes.
- In the case of Decision Support Systems (DSSs) for river basin management, a large number have been developed in the past 20 years (Ubbels A. and Verhallen J.M., 2000). These can not only serve the experts but they may also serve as vehicles for communication with the organised stakeholders (Welp 2001, Most et al. 2002) and sometimes with the broad unorganised public. However, in many countries they are rarely applied in real planning processes, or just as prototypes with a strong support from researchers. When they are applied, they are often not capable of solving the problems they are supposed to solve (Waveren 1999).

To avoid these situations or at least to understand the gap between the production and the actual application of IC-tools in RBM, the potential and the limits of these tools have to be evaluated in order to be able to answer practical questions such as : What are the relational and substantive functions of a tool ? How should it be used ? What is its applicability in the different phases of the PP process ? How is it perceived by the actors ?

A lot of literature is available on the use of Information and Communication Technologies to support PP in the field of environment, especially those related to the internet (e.g. Kelly 1999, Beierle et al. 2000, O'Connor 2000, Lopez et al. 2000, Fauchaux et al. 2001). But in most cases, these technologies are used for one way communication purposes from the authority in charge of the PP process to the public, either to communicate information or to get some feed-back on proposed action plans.

In annex 1 of the guidance document for PP in relation to the WFD (Drafting Group 2002), section 4 focuses on interaction and communication tools and techniques. They are classified according to the aim of the interaction among the actors :

- Co-knowing purposes rely on advising media, such as presentations, articles, factsheets ;
- Co-thinking concerns “taping” means, like interviews, discussion groups ;
- Co-operating goals need interactive support such as work meetings, etc.

Most of these correspond to group animation techniques and meeting formats such as workshops, creative sessions, citizens' jury, active listening during interviews, public hearings. Few computerized tools are mentioned (web sites, interactive Web GIS, software for the management of comments) and those described are not directly related to RBM. Furthermore, there is no indication on how to use them in practice.

HarmoniCOP WP3 aims to complement the guidance document for PP by focusing more on the role of IC-tools as a facilitating mechanism to support the SL dimension of PP in relation to the WFD. This goal requires essentially a two-way communication approach. Therefore, IC-tools are not analysed anymore from a one-way communication perspective. As it will be seen below, the term “IC-tools” used in the HarmoniCOP project is also considered in a more restrictive way. But this report does not analyse the different group animation techniques that are already described in the guidance document (and in various other handbooks), even if these techniques can include some types of IC-tools.

A skilled SL facilitator will have to be able to combine and adapt these group animation techniques and IC-tools to build a SL process adapted to a given environmental and social RB context.

2. Scoping IC-tools

2.1. Some definitions

Most of the existing handbooks on PP (CIDA 1988, OCDE 1995, Gueye et al. 1991, World Bank 1996, AELB 2001, Drafting Group 2002, IAP2,) integrate both tools and techniques/methods without making a clear distinction between these three concepts. They are defined in the Merriam-Webster dictionary³ as follows:

A **tool** is *something (as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or profession.*

A **technique** corresponds to the *manner in which technical details are treated or basic physical movements are used. Technical* (from Greek *technikos* or art, skillful, art, craft, skill) means *having special and usually practical knowledge. It is marked by specialization.*

A **method** (from Greek *methodos*, from *meta* with + *hodos* way) is *a procedure or process for attaining an object : a) a systematic procedure, technique or mode of inquiry employed by or proper to a particular discipline or art. b) A way, technique, or process of or for doing something. A body of skills or techniques.*

Therefore, a method can be considered as a technique when it is dedicated to a special technical task. Compared to a tool, neither of them have a physical/material reality but they can include tools to perform technical tasks.

To illustrate these differences, some examples can be taken from the guidance document on PP related to the WFD :

- WebGIS, Web sites, software for the management of comments correspond to (communication) tools.
- Groups meetings, workshops, visits and field observations can be assimilated to (group animation) techniques. They can use tools such as video projector, video conference, GIS, GPS, maps, paper board, post-it paper notes, etc.
- Participatory Rural Appraisal (PRA), evaluation of the citizens values, prospective conference correspond more to (PP) methods than techniques since they combine several techniques and tools in a specific order.

2.2. Definition of IC-tools

Within HarmoniCOP project, an **Information and Communication Tool (ICTool)** is defined as *a material artefact, device or software, that can be seen and/or touched, and which is used in a participatory process to facilitate Social Learning. It supports interaction between stakeholders (including scientists) through two-way communication processes.*

³ Merriam-Webster dictionary : <http://www.m-w.com/home.htm>

Its use can be controlled directly by the stakeholders or through a facilitator.

We explicitly do not count “techniques” that organize human interaction processes themselves (e.g. citizen jury, focus group, field trips, etc.) as ‘tools’. In the broad sense IC-tools generally may support these types of group animation techniques.

Information (from Latin *informare*: in-, in; + formare, to fashion, from forma, form) is a result of data or knowledge processing in a given context for a specific purpose (WP3 definition).

According to Article 13 and Annex VII of the WFD (modified from Nilsson 2003), the following information shall be included in the river basin management plans (box 2) :

- A summary of the economic analysis of water use.
- A summary of significant pressures and impacts of human activity on the status of surface water and groundwater.
- State of surface water, ground water and protected areas.
- State of protected water bodies used for drinking water supply.
- Identification and mapping of protected areas.
- A list of the environmental objectives established under article 4 for surface waters, groundwaters and protected areas.
- A summary of the programme of measures.
- A register of programmes and management plans dealing with sub-basins, sectors, issues or water types.
- A summary of the measures taken for public information and consultation, their results and changes to the plan.
- A list of competent authorities.
- Contact points and procedures for obtaining background documentation and information.

Box 2 : Information of RBM plans according to the WFD (modified from Nilsson 2003).

Data are the results of *formalised collection of facts, concepts or instructions for communication or processing by humans or computer* (GIS working group, 2002).

Perception is an active way of data acquisition about the self and the world through the senses (human perception) or through other types of sensors (i.e. remote-sensing).

Knowledge can be considered as *the sum of interconnected rules of interpretation through which we understand, give meaning, perceive or interpret the world around us* (Leeuwis 2001 in Rambaldi et al. 2002 p4). Knowledge is what we store in our mind and what leads us to take decisions, act and react to stimuli received from the external world. Knowledge is very subjective and builds up in everybody’s mind through a continuous learning process involving, among others, concrete experiences, interaction and communication with others, observations and reflections, formation of concepts and their testing. Three types of knowledge can be distinguished :

- “Unconscious knowledge” is characterized by perceptions/motives that we are not aware of ;
- “Tacit knowledge” corresponds to knowledge that we are not immediately aware of, on which we base our day-to-day actions. This type of knowledge can be elicited through in-depth discussions and interactive exercises including the use of IC-tools like maps, 3D models, cognitive maps ;

- “Explicit knowledge” is the knowledge that we are aware of, have reflected upon and can easily capture in verbal, textual, physical or visual formats, and that transforms into information.

In the HarmoniCOP context, the “I” of IC-tools is used in a more general meaning than the strict definition of information. It also includes data, knowledge and points of view (e.g. river discharge, the outcome of computer simulations, or a regulation) that are exchanged between individuals or groups on a given issue.

Communication in a strict definition (Meriam-Webster dictionary) is *a process by which information is exchanged between individuals through a common system of symbols, signs or behaviour.*

In the field of RBM, communication techniques used by the agencies in charge of the water planning process are of three types (Heathcote 1998) :

- Techniques for *disseminating information* allow the agencies to influence the information the public receives. Examples of tools and techniques include information meetings, open houses, TV and radio coverage and various printed materials.
- Techniques for *obtaining information*, such as surveys, key informant interviews and public hearing. These do not permit dialogue or negotiation.
- *Two-way communication techniques* that allow for gradual modification of positions and may encourage satisfactory resolution of controversial issues. These techniques are used in different participatory methods, based on small group meetings (working committee, focus group, scenario analysis, joint field trips, etc...), large group meetings (citizens juries, consensus conferences, etc.) and on what might be termed “detached methods” whereby the various parties do not actually meet face to face (exchange of views by letters or e-mails, open TV or radio programs, public cleanup events, etc.). See Asselt and Rijken-Klomp (2002) for an overview of these techniques.

Social Learning has the aim of improving the sustainability of solutions on the one hand, and to increase ownership of solutions, and to stimulate active, democratic responsible citizenship on the other. This can be achieved only by allowing shared knowledge creation and the recognition of multiple perspectives (Craps et al. 2003, Thailieu et al. 2003, Mostert 2003c, Woodhill 2003). ICT’s are therefore necessarily two-way communication tools.

Therefore, communication can be defined as *social interaction through messages (Fisker 1990). This is much more than the exchange of information, but also a mean to reflect and reinforce social relations or "communities". New communication patterns can help to build up new communities. Within these communities, new representations of reality and new "meanings" can develop.*

In order to contribute to two-way communication and Social Learning, the tools should exhibit one or more of the following requirements. The tool should:

- Allow to *collect, provide, and/or process information.*
- Support *interaction* between stakeholders.
- Allow *interactive control* of use directly by the stakeholders or through a facilitator.
- Allow the *recognition of multiple perspectives* of scientists, stakeholder groups, and policy makers.

Information and Communication Tool vs Information and Communication Technology

The widely spreaded term “ICT” generally refers to “Information and Communication Technology”. Even if a strict definition of this term cannot be found in the literature, the corresponding technologies must be able to capture, process, transmit and display data and information electronically.

Based on our definition of IC-tools, some of the tools analysed in this report are computer based (e.g. Web sites, Decision Support Systems, various computer simulation models, gaming simulation software, group decision software, GIS, etc) and therefore belong to this broad category of Information & Communication Technology (ICT).

However, there are also numerous non-computer tools that can facilitate Social Learning. Physical tools are indeed one of the important ways to help people articulate their knowledge and communicate with others. Examples are board games, paper models, (3D) geographic maps, etc. They allow for instance to create an explicit understanding of the natural or artificial features that are parts of a RB.

For that reason, we prefer to use in this report the term “IC-tools” rather than “ICT tools”.

2.3. List of IC-tools and criteria of categorization

2.3.1. List of IC-tools

After several discussions especially among WP3 participants concerning the role of IC-tools to support PP and SL, a list of tools has finally been established (see table 1).

<p>Tools to obtain information</p> <ul style="list-style-type: none"> - Questionnaire⁽¹⁾ 	<p>Tool for dynamic representations of reality, simulations</p> <ul style="list-style-type: none"> - Scenario tools⁽¹⁾ - Multicriteria analysis tool⁽¹⁾ - Simulation tool⁽²⁾ - Spreadsheet (e.g. : Excel) - Decision Support System⁽²⁾ - Integrated assessment model⁽¹⁾⁽²⁾
<p>Tools for static representations of reality</p> <ul style="list-style-type: none"> - Maps⁽¹⁾⁽²⁾ (spatial representations) - 3D landscape scale model⁽¹⁾ - Information system - Geographic information system⁽¹⁾ - Conceptual model <ul style="list-style-type: none"> For (geographical) data base For systems dynamic - Cognitive mapping⁽¹⁾⁽²⁾ - Actors mapping⁽¹⁾ - Management of comments 	<p>Interactive tools</p> <ul style="list-style-type: none"> - Interactive white board⁽¹⁾ - Internet <ul style="list-style-type: none"> Web information Forum communities Computer supported decision making Web mapping - Group Support System⁽¹⁾
<p>Gaming tools</p> <ul style="list-style-type: none"> - Role playing game⁽¹⁾⁽²⁾ - Board game⁽¹⁾ 	

Table 1 : Examples of IC-tools ⁽¹⁾: an ICTool index card is presented in Annex 2 ⁽²⁾: a short literature review is given in section 3).

The questionnaire has been kept as a tool because it can also be used in a bidirectional communication process if a feedback mechanism is organized to report the results of the survey to the participants.

Maps are taken here in a broad sense. They include several types of maps (see section 3.1.) but also other forms of 2D or 2,5D spatial representations such as sketched maps, field or aerial photos, satellite imagery, perspective views.

The index cards of the IC-tools presented in Annex 2 include the following items : definition of the tool, implementation objective(s), pertinent participation process phase(s) where it can be used, ways to implement it in operational situations, real cases and contacts, references and available resources.

2.3.2. Criteria of categorization

To categorize IC-tools, four main criteria have been identified as useful for those who will have to organize in practice the WFD PP process.

1. Communication direction

This criterion allows to determine the attractiveness of the IC-tool for **top-down** communication (from the leading team to the stakeholders and the general public), or on the contrary for **bottom-up** communication, or both (**bi-directional** communication).

2. Public size

We have distinguished **two types of public size** where IC-tools can be used to support communication. The first type corresponds to **small working groups** (single or multiparty) where people generally meet face to face or exchange through specified tools. The second type corresponds to the **general public**. Most of the time, the relational events are space-time distributed.

3. Usage purpose

Four main purposes have been identified :

- Management of information and knowledge

The corresponding IC-tools aim to store, retrieve, analyse, display and disseminate information.

This is one of the traditional substantive functions of some IC-tools but in the context of SL and PP, it raises important issues. How does one deal with the sharing of information between actors belonging to different communities of knowledge and of practice with multiple perspectives, points of view, vocabulary, skills ? How are uncertainties addressed ? How to keep the memory of relational events and make it accessible and understandable to non-participants ? How to respect the confidentiality rules that have been adopted ? How to assure well balanced, or at least well accepted informational power and resources among the actors ?

- Perspective elicitation

Here, the IC-tools help to elicit perspectives and behaviours of stakeholders, to make them explicit to the others.

This may be the most challenging and innovative relational function of IC-tools to contribute to SL. However this function depends not only on the intrinsic properties of the tool but also on the way it is designed, used and combined with group animation techniques.

To be able to fulfil this function, an IC-tool should have all or part of the properties of what (Star and Griesemer 1989) call *boundary objects* or (Vinck and Jeantet 1995) call *intermediary objects*:

- common point of reference for conversations;
- support and reveal different representations of the reality, meanings, points of views;
- means of translation between individuals or groups belonging to different communities of knowledge. Even if a full translation seems utopic, the structure of a boundary object is shared enough to work together;
- means of coordination and alignment;
- working arrangements, adjusted as needed and not imposed by one community or by outside standards;
- plastic enough to be transformable (an “open” object and not a “closed” object) during the interaction process;
- trace of the collaborative process (successive proposals of transformation, successive states of the final output, comments, etc);
- help to manage uncertainties (through development of trust, increase of knowledge, larger number of solutions found and evaluated, etc).

According to (Harvey 1997) and (Harvey and Chrisman 1998), *boundary objects mediate between different groups; they don't provide a common understanding or consensus between participants. They don't create a common language or a perfect translation. Instead, boundary objects serve a dual function: at the same time they serve to distinguish differences, they also supply a common points of reference.*

- Interaction support

In this case, the objectives of using IC-tools are to support the interactions between actors, to improve communication and bring the individuals together.

This function complements the previous one and raises also central issues related to SL. This function depends also on the way the tool is implemented and used by the participants.

- Simulation

The scope of IC-tools here is to simulate the dynamics of RB systems for environmental, and/or technical and/or economical aspects.

This is also a function expected traditionally of IC-tools such as DSS, Integrated Assessment models, qualitative modelling techniques.

4. Phases in the PP process

WP3 has chosen to comply with the four phases proposed in the EU guidance document for Public Participation : 1) starting organisation, 2) actors and context analysis, 3) diagnosis of the situation, 4) search for solutions.

A key question raised by the stakeholders participating in HarmiCOP is how to determine the applicability of these IC-tools in the different phases of the PP process.

2.3.3. Provisional qualitative classification of IC-tools

Based on a literature review and on our own experience, the WP3 team is proposing a first qualitative classification of IC-tools using the four criteria described in the previous section and a three level scale (0: low interest 1: medium interest 2: high interest).

Some tools can of course be used to fulfil several functions and for different phases. The results are presented in table 2.

IC-tools	Usage purpose				Phase in the PP process					Communication direction			Public size	
	Info & K management	Perspective elicitation	Interaction support	Simulation	Start org.	Actors anal., context	Diagn. situation	Search solution	Implement / Evaluation	Bottom up	Top down	Bi-directional	General public	Group of actors
To obtain information:														
Questionnaire	1	2	0	0	1	1	2	2	1	2	0	0	1	2
Static representation of reality:														
Maps	0	2	2	1	1	1	2	2	2	0	2	1	1	2
3D landscape scale model	0	2	2	1	1	1	2	1	0	0	2	1	1	2
Information system	2	0	1	1	2	2	2	2	2	0	2	1	1	2
Geographic information system	2	0	1	1	0	0	2	2	1	0	2	1	1	2
Conceptual model					0	0		0	0	0	2	1	0	2
For (geographical) data base	0	1	1	0	0	0	1	0	0					
For systems dynamic	0	2	2	1	0	0	1	2	0					
Cognitive mapping	0	2	2	1	0	0	2	2	0	0	0	1	0	2
Actors analysis	0	1	2	0	1	2	0	0	0	0	2	1	0	2
Management of comments	0	2	1	0	0	2	2	2	1	2	0	1	2	2
Dynamic representation/ simulation:														
Scenario tools	1	1	1	2	0	0	0	2	0	0	2	1	0	2
Multicriteria analysis tool	0	1	1	2	0	0	0	2	0	0	2	1	0	2
Simulation models	0	1	1	2	0	0	2	2	1	0	2	1	0	2
Spreadsheet (e.g. : Excel)	2	0	1	2	0	0	2	2	2	0	2	0	0	1
Decision Support System	2	1	1	2	0	0	0	2	0	0	2	0	0	1
Integrated assessment model	0	1	1	2	0	0	2	0	1	0	2	1	0	2
Interactive tools:														
Interactive white board	0	1	2	0	1	2	2	2	1	0	1	2	0	2
Internet	1	1	2	0	0	0	0	0	0	0	2	2	2	2
Web information	2	0	0	0	2	2	2	2	2					
Forum communities	1	1	2	0	1	1	2	2	1					
Computer supported decision making	1	2	2	0	0	0	0	2	0					
Web mapping	2	2	1	1	0	1	2	2	1					
Group Support System	1	2	2	0	0	1	1	2	0	0	0	2	0	2
Gaming:														
Role playing game	0	2	2	1	0	0	2	2	0	0	0	2	1	2
Board game	0	1	2	1	0	0	0	0	0	0	0	2	1	2

0 : Low interest 1 : medium interest 2 : high interest

Table 2 : Provisional qualitative classification of IC-tools based on the 4 criteria usage purpose, phase in the PP process, communication direction and public size

The WP5 case studies and other sources of information will help validate and improve this preliminary classification before the handbook of WP7 is finalized. They will also allow to assess the gap between the potentials of the tools, the real uses and the perceived usability.

3. Description of some IC-tools

Some of the IC-tools identified in the previous section are described here in more detail through a short literature review and examples of application. For the corresponding tools, this section completes the IC-tool index cards presented in Annex 2.

3.1. Maps and other spatial representations

In policymaking, spatial maps have been used since long times, next to written and spoken forms of language. The basic functions of a map are those of every representation; to communicate, both between people and between people-and-map. MacEachren (1995) divided these functions in two types; to facilitate communication and to facilitate ‘thinking’ or exploration.

In participatory RBM, maps are most of the time included in the documents used for reporting to the authorities or for public information and consultation (MATE et al. 1995, GIS Working Group, 2002).

But maps are not only a means to communicate end-results. Maps form a model of reality, and thereby serve as language among participants during their explorations (Carton, 2002).

3.1.1. Shifted role of map tools in participative settings

During the heydays of technocratic rationality in the middle of the twenties century, an institutionalised ‘habit’ had grown that the design of spatial structures used to be the exclusive territory of urban and rural planners and their clients. They designed ‘blue prints’ for new spatial developments in a hierarchical legal and institutional structure. (Stillwell, Geertman and Openshaw, 1999; Jong and Voort, 2002).

Since the 1980’s and 1990’s, new concepts like public participation, process management -and also social learning- have been introduced in practice (Fischer and Forester, 1993; Healey, 1998; Enserink, 2000; Bruijn, Heuvelhof and Veld, 2002). In these shifted constellations, maps have got a changed role and function (Stillwell, Geertman and Openshaw, 1999). From being a result of a learning process between designer and policymaker, who face ‘the public’ afterwards to communicate their decisions, the role of maps has shifted towards a tool for discussion among multiple actors -*with social learning as goal*. In these settings, the map is not the private possession of the expert. Presented maps are not restricted to end-products of the type of blue prints. The exploration is not only executed by a policy analyst and his map, but also takes place among the group of actors. This means that there is a simultaneous process of exploration and communication among the group of actors involved. The actors think, learn and negotiate through deliberation. This participative exploration takes place by using various modes of communication. In between moments of solitary internalization of new map information and thinking about (spatial) patterns and mechanisms, the actors interact by listening, asking questions, providing statements, making arguments, and deciding on issues or procedures. In this process, maps are a means to ‘grasp’ the complexity of the real world. “The map-maker gets a new role as the one who makes ‘visualized briefings’ of the various arguments, findings, views, options and decisions” (Hajer, verbal statement in seminar “Image as Dialogue” in Amsterdam, November 2003).

Policymakers and participants use maps for a range of purposes. Amongst others to represent the problem of the real world, to assist the participants in their exploration and research, to visualize a new idea, or to communicate decisions. We have classified those functions of map tools that are in line with the aim of social learning (see the following table).

Particular functions of maps for social learning	Example
1. to identify spatial phenomena	Collect knowledge and arguments on a map of ill-defined problems, f.e. local dryness, diffuse sources of water pollution
2. to articulate and specify spatial issues	Put issues on the agenda, f.e. local bottlenecks in drainage systems
3. to clarify issues and mechanisms	Explain arguments and concerns by localizing and describing them with help of map images, f.e. link spatial patterns of water pollution to changes in local land-use
4. to synthesize arguments and designs	Summarize a design, an analysis result or a viewpoint as an argument in the debate, e.g. argue for more space for water with a map of several flooding scenarios
5. to consolidate findings, views, options and decisions	Location related decisions and visions get concrete when they are defined and described. Laid out on maps, this knowledge is being fixated and captured 'black on white'. For instance with the definition of regional river basins

3.1.2. Maps in different phases of decision-making

The next case illustrates the roles of maps in different phases of participative policymaking (Carton, 2002). During 2001-2002, the Dutch water board Delfland developed a water vision in collaboration with municipalities. They used maps both as means and as end product, calling the vision a 'water opportunity map'.

In the beginning, only the mayor problems and scenarios were collected and sketched on a map, on a very broad scale. When 'zooming in' to a sub region, first descriptive maps were made to clarify the current situation and to articulate the tacit knowledge of experts. Then followed ten maps with interpretations of specialists (expert judgements) of current problem situations and potential areas for measures. These maps led to a discussion on normative interpretations: "How should we differentiate target values for water quality (and quantity) here and there?" or "Where should we aim for a natural urban run-off and exclude rainwater from the drainage system?" Various options were designed in several versions, of each topic individually. In the next step, the maps were overlaid with help of a Geographic Information System (GIS) to explore conflicts and win-win situations. Finally, these were prioritised and integrated into an integral vision.

These are all changing uses of maps. In Figure 3, a matrix is spanned by the phases in policymaking and the types of maps made in the case of the water opportunity map. The matrix illustrates the shifting role of mapping activities during the policymaking process, from an exploratory role (as to make an inventory), till a role as *debating instrument* in the negotiations about priorities, trade-offs and combinations of water-and-land-use functions.

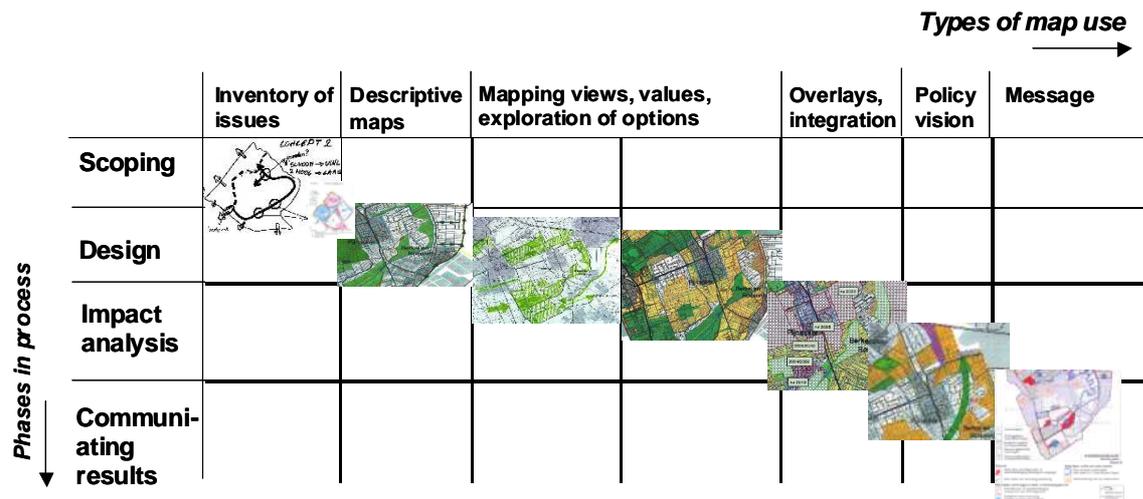


Figure 3. Illustration of the used maps and their shifted role in the collaborative process

3.1.3. Social intentions with maps

How to use a map thus depends on the occasion. But it also depends on the approach and intention of the actor who uses the map; does he aims :

- to produce knowledge (typical main objective of research institutions);
- to make a contribution to the debate (politicians and debaters);
- to advocate the viewpoints of the client or problem owner (stakeholders, consultants);
- to speed up the process (independent process facilitators);
- to mediate between trade-offs (decision-makers) ;
- or to enhance democracy in general (ethic/idealistic groups) ?

In all these approaches, to increase *mutual understanding and to learn* with each other stands besides one of these core ‘process goals’. These process goals depend on an actor’s viewpoint and drivers (interests). In the interaction process with others, maps are one of many means of influence. Stakeholders will use them particularly to agendize their issues of concern, while research institutions use them to clarify and synthesize research findings.

3.1.4. Lock-in effect of maps in social environments

Because of the conceptual power of a map, they also have a high ‘lock-in’ effect on the group working with the maps (Carton, forthcoming). Harley (1988) has identified the existence of this mechanism. He spoke of “hidden messages”, because people do not perceive it consciously but it is still inherent with all maps. Harley explained this mechanism with his famous example of the world-map of Great Britain. Next to a view on the world’s surface, this map also shows Britains’ supremacy, with the Queen’s home-base London centered in the middle. Harley’s message to the world is that every map ‘shapes’ reality according to a certain worldview. With the map as ‘evidence’, map-makers keep their worldview alive and consolidate their position in the world.

Van Eeten (1999) and Rein and Laws (1999) describe this mechanism as *framing*. Van Eeten (1999, p. 91-111) described the controversy over maps in the story of the “Green Heart” planning concept in Dutch spatial planning. This public dispute on validity or fictionality of the Green Heart concept has been going on for years. Van Eeten (p. 109): “If a concept so clearly signals its main rationale is to capture the ‘essence’ of a map image, then

one should not be surprised that all criticism is channeled into attempts to show that the concept does not accurately represent the map.” Van Eeten advises here to move beyond the fixation of “one area – one map – one concept – one identity”.

3.1.5. Other types of spatial representations

Even if maps are currently the dominant way to represent the geographical space, other kinds of spatial representations can also be used to support PP : 3D scale models (see annex 2), block diagrams, field or aerial photographs, satellite images, photo or video simulations (2D or 3D), chorèmes, etc. Recent studies proposed criteria of categorization to compare different types of spatial representation (Caron 2001, Maurel 2001).

It has been demonstrated that spatial representations other than maps were presenting specific advantages for PP. For instance, representations such as field or aerial photographs, high-scale black and white or natural color satellite images and block diagrams facilitate the expression of different points of view. That can be explained by different factors : their low level of abstraction makes them closer to human perception, they are rather neutral, they do not require complex reading skills and finally, they are polysemic enough to elicit different perspectives. Among this group of spatial representations, field photographs have been widely used in landscape perception, especially for preference judgements (Hagerhall C.M. 2001). In participatory land planning, several authors recommend to use field photographs during the initial phases of the projects in order to reveal the diversity of perceptions and to bring the people together (Michelin 2001, Lillin 2001).

3D scale models, made with solid materials, can be manufactured in a participatory 3D modeling approach in order to increase local stakeholders involvement and to integrate their knowledge. This tool has been already widely used in participatory projects in developing countries (Rambaldi and Callosa-Tarr, 2002).

3.2. Simulation models

Simulation models are computer tools that are used to simulate the dynamics of a target system such as a river basin. The purpose of the simulation is to calculate possible evolutions of the target system, with or without the execution of specific management measures.

Before describing more precisely simulation models, it shall be mentioned that more classical models can also be used in a context of shared vision modelling for and by the stakeholders. For instance, several operational US experiences for large RB management are described in (Tate, 2002).

Within the category of simulation models we distinguish between Decision Support Systems (DSS), Integrated Assessment models, and Qualitative models. These models differ in terms of detail of information provided, the scope of the target system, the focus and aim of the tool.

Decision Support Systems

Starting from the 1970's numerous DSSs have been developed to support decision-making with expert knowledge. The most generally accepted definition of a DSS is the one articulated by Sprague (1986): “Interactive computer based systems, which help decision-makers utilize data and models to solve unstructured problems”. A more detailed definition is the one provided by Turban (1990): “an interactive system, flexible and adaptable, which uses decision rules, models, databases and suitable formal representations of the decision-makers' requests to indicate specific and applicable actions to solve problems which cannot be solved

by the optimisation model of Classical Operational Research. It thus assists complex decision processes and increases their efficiency.”

Over the course of time the focus of DSS development has evolved from technocratic tools for Decision Support by legitimising decisions, towards participatory tools providing a platform for dialogue and common ground (see, for example, Pereira and Quintana 2002). This development can also be seen in a number of recent European projects for the development of DSSs for water issues. GOUVERNe, for example, has the primary objective to develop a DSS that “provides information at interdisciplinary level to people with different knowledge, background and technical skills. This information should foster discussions and debate among interest groups affected by the decision that will be taken” (<http://neptune.c3ed.uvsq.fr/gouverne/>). The currently ongoing project MULINO “will adopt an application-driven approach, in which the scientific backgrounds and previous research of the consortium members will be integrated with local knowledge and needs expressed by already identified user groups ...” (<http://linux.feem.it/web/loc/mulino/>).

Such a great number of DSSs has been developed for water management that it is hard to give a representative set of examples. Some examples of DSSs are DSS Large Rivers for river management in the Netherlands (Schielen, 2001), Waterware (Jamieson and Fedra, 1995) aiming at river basin planning in Europe, and the MODULUS DSS addressing land degradation in the Mediterranean (Oxley et al., 2002). A synthesis study has been performed to evaluate the suitability of various DS tools in collaborative decision processes (Ubbels A. and Verhallen J.M., 2000).

Integrated Assessment models

Integrated Assessment models are frameworks to organize and structure various strands of recent scientific knowledge. Most frameworks are computer simulation models that describe a specific problem and the cross-linkages and interactions with other problems in terms of specifying cause-effect relationships. This causal description can be done in a qualitative sense, through conceptual models, and in a quantitative sense, through formal computer models (Rotmans and Asselt, 2001). IA models have a number of distinct foci which differentiate them from general DSSs: 1) IA models attempt to incorporate the social, economic, environmental and institutional capital, 2) they are used to investigate the inter-linkages between elements of the system, and 3) they explicitly deal with uncertainties. IA models are generally built up from a suite of simplified disciplinary models, making them flexible and rapid simulation tools that are particularly suitable to assess strategic policy choices for complex problems that are immersed in uncertainty.

The first IA models were built in the early seventies on the authority of the Club of Rome (Meadows and Meadows, 1972). Later, the phenomenon of global change stimulated the development of a number of IA models such as IMAGE (Rotmans and Asselt, 1990), TARGETS (Rotmans, 1997), and ICAM (Dowlatabadi and Morgan, 1993). Recent integrated water modelling approaches are the ones of QUEST, a simulation model developed to support participatory planning of the Georgia Basin in Canada (<http://www.basinfutures.net/>), and the AQUA model that describes the global water cycle (Hoekstra, 1998).

Qualitative models

When knowledge is to a large extent incomplete it is often opportune to use qualitative modelling rather than pretending to know detailed quantitative relations. Qualitative modelling can be performed, for example, in the form of Qualitative Differential Equations

(Kuipers, 1994). This technique has been used, for example, to assess options for global environmental management (Petschel-Held, Block et al., 1999).

Fuzzy Cognitive Mapping

Another form of qualitative modelling that is directly related to stakeholder perspectives is Fuzzy Cognitive Mapping (FCM) (Kosko, 1986). FCMs are fuzzy graph structures for representing causal reasoning. They are based upon the concepts of Cognitive Maps developed by Axelrod (1976) for representing social scientific knowledge. A FCM consists of nodes, representing properties of a system, that are connected to each other by weights that represent the causal relationships between these properties. When a system of nodes and weights has been defined, a fuzzy calculation algorithm is used to assess possible evolutions of the system (in terms of the excitation levels of the nodes) for specific induced initial changes.

Fuzzy Cognitive Maps may be valuable tools for social learning. On the one hand, Fuzzy Cognitive Maps are transparent and flexible tools, which make them easy to use in a participatory process. On the other hand, FCMs can be defined according to each individual stakeholder or expert perspective, which makes the tool particularly suitable for the elicitation and comparison of stakeholder perspectives. However, to our knowledge no examples of the use of FCM for participative planning exist.

3.3. Role playing games

Role playing games are one of the most innovative and promising IC-tools to support interaction between stakeholders with different stakes, mental frames, perspectives.

Role playing games may support two kinds of learning: players' learning or game organizers' learning. However these two categories are far from being exclusive. Both may co-exist for the very same session of the very same game depending on who is looking at it. In "Njoobaari Ilnoowo" (Barreteau et al., 2001), players learn about the interaction of different sets of rules whereas researchers learn about other farmers' behavioral patterns (Daré and Barreteau, 2003). This brings us to current trends in social sciences and group decision support which tend towards social learning, with interactive methods, which call for specific support tools and platforms (Röling and Jiggins, 1998).

Several RPGs belong to this category of interactive methods: The *Stratagène game*, which deals with property rights on phylogenetic resources, has been designed in close collaboration with scientists and a board of stakeholder representatives (Aubert, Le Page et al., 2002). They actually promote learning through action and dialogue. This use of RPG is completely intertwined with action and practice. Even though they are controlled and explicitly "out of real life" experiments, RPG are social places, and playing is in itself a social activity. As such, along the same lines as Goffman, they depend on a framework of interactions involving players, scientists and observers, and restricting each player's action (Ogien, 1997). These games, now considered as interactive methods, feature group settings from real life situations, only stakes are simulated. For players, learning might then only concern how to interact with each other.

Since RPG take place in real life, interactions in the experiment and interactions in real life cannot be fully separated. This leads to the reconsideration of Huizinga's definition of a game (Huizinga, 1951): "*it is an activity bound in time and space, which includes imaginary components and the enforcement of some rules, inducing group reactions, and which is partially embedded in real life rather than beside it. It may not be an absolutely free activity. However, it is an extra-ordinary encounter and must be considered as a specific rendez-vous*".

A common assumption is that players behave in the game as they do in reality concerning choices made out of context of any roles, which should be nuanced since players come into the game with their own habits and strategy (Daré and Barreteau, 2003). With Social Learning both game organizers and players are considered to be learning from an interactive pattern such as a RPG session (Hare, Heeb et al., 2002). Game organizers may be both designers and “external” observers commissioned to analyze the processes at stake within the game itself. This type of Social Learning may be an answer to the question of the players' interests in participating in games, as long as induced constraints are acceptable. While experimenters in economics expect them to play for the rewards, they may play because they are interested in learning through the experiment.

However, this type of Social Learning touches on another purpose of the use of games: negotiation or discussion support, which may already be the objective of some policy exercises. Several experiments have proven that RPGs are always a very powerful tool to make people discuss topics (Tsuchiya, 1998, Barreteau, Bousquet et al., 2001, Forssén and Haho, 2001). They have already been successfully used on their own for these specific purposes within the realm of territory management issues (Piveteau, 1995).

All of these approaches use the ability of RPGs to create some complexity (Schelling, 1961). Even if roles cast a rough yet essential representation of individual behavior, these approaches still adhere to the view that the economy is an interactive system (Kirman, 1997). It builds an artificial system by specifying and controlling some of the interactions among players using quite simple individual behavioral patterns. It then assumes that this designed system, notably thanks to the presence of human players, will feature other interaction patterns, which are to be observed. Both controlled and observed interactions together make it a complex system. These systems are of course far simpler than real ones, but they feature and simulate some complexity, which is partly controlled and thus can be studied. They are the “like societies” upon which scientists and stakeholders may reflect and discuss (Kohler, 1999). A RPG constitutes a kind of small-scale model of a society in interaction with its environment. Diversity among these approaches comes from the implementation of these “like societies” and their use: discussion and allocation of roles, groups of players and of observers, individual and/or collective debriefing.

These research products have shown the ability of RPGs to generate dialogue and learning. Some of them have gone towards a formal agreement, such as a Local Concerted Action Plan to manage the closing of landscapes with pine trees with the game MéjeanJeu (Etienne et al., 2003). Concerning water issues, several games have been developed, notably for educational purposes. The Irrigation Management Game (Burton, 1989) is dedicated to the training of technical and non-technical staff involved in the operation of irrigation schemes; it focuses on relations between crop growth and water supply, interactions among water users when water is scarce as well as the relation between the Irrigation Department and the farmers. While this game is framing the possible actions of players, most games already used are more from the family of Policy Exercises, with players put in situation and left to play by themselves. These Policy Exercises have been used for a long time and are also known as war games since they were first developed for strategic military issues. It has been translated and shown to be suitable for environmental issues as well (Mermet, 1992). Fisheries and their impact on fish populations as a common-pool resource, with a game such as FishBanks® (Meadows and Meadows, 1993) are thus a support to train many actors involved in Common-Pool Resources management. More directly involved in the decision processes in cases of a river basin, some experiments are now explicitly on-going with this kind of very open game with the River

Basin Game (Lankford and Sokile, 2003) which is receiving through two days workshops a very active participation of farmers playing the game, as shown by experiments in Tanzania.

4. Framework of analysis

The criteria that have been chosen to characterise IC-tools, to evaluate their impact on SL and their usability are first presented. Based on these criteria, a list of questions and their underlying assumptions have been produced and included in an instrument co-developed with WP2 and called “Social Learning Pool of Questions” (Crap and Maurel, 2003). We describe here the general structure of the Pool of Questions. A subset of this document is given in annex 3.

4.1. Evaluation criteria for IC-tools

IC-tools used in the WP5 case studies will be evaluated from three points of view:

- the technical characteristics of the tools themselves and the usage situations.
- their impact on PP and SL.
- their usability as perceived by the users.

The evaluation criteria are derived from WP3 and WP2 discussions and from literature on the evaluation of PP (Rowe et al. 2000, Van den Hove 2000, Webler et al. 2001), on the evaluation of tools (Halvorsen 2001, Lim, 2000, Swinford and Jeffrey 2002, Ubbels and Verhallen 2000), on the factors of technology acceptance and usability (Davis 1989, Malhotra Y. and Galleta G. 1999, Mahmood MA et al 2000, Legris P. et al. 2003) and on participation in integrated assessment and modelling for environmental management (Argent et al. 1999, Pahl-Wostl 2002a).

4.1.1. IC-tools characteristics and usage situation

This analysis is embedded in a more general work, common with WP2 SL aspects, which involves describing the whole PP process for a given case study and identifying the main relational events.

A charting procedure, included in the Pool of Questions document (Craps and Maurel ed. 2003), has been established to facilitate the collection and analysis of information.

A first series of factual criteria concerns the usage situation of IC-tools for each relational event in the PP process :

- list of ICtools that have been used ;
- phase(s) in the process ;
- main usage purposes (both for relational and substantive tasks) ;
- relations between the actors and the IC-tool : who promoted or prevented the use of the tool, who manages it, who provides the data/information/knowledge, who has access to it or to its informational content ?

Then, for each IC-tool that has been identified, a second series of criteria addresses the technical characteristics of the tool. These criteria are synthetized in an **IC-tool index card** divided in 5 main sections (Annex 3):

- **General characteristics:** Each tool is characterized by its type, its complexity, its availability, and its current stage of development.

- **Usage purposes** : The IC-tool uses are defined according to the context of the participatory process and the relational and/or substantive tasks to be performed. Four main usage purposes (with the corresponding functionalities and conditions of use) are *a priori* proposed: information and knowledge management, interaction support, perspective elicitation, simulation (see chapter 3). These functionalities represent the potentials of the tool. It will be possible to observe a difference between the potentials of the tool and the effective use: restrictive use, or use for other purposes.
- **Sustainability**: Some conditions are necessary to guarantee a minimal sustainability of the IC-tool: the direct or indirect use by the actors, the availability of use support, the degree of openness, and the management of the monitoring/reporting or tracability.
- **Informational output description**: Content and formal aspects.
- **Uncertainties management**: The information is rarely an original quantitative data set. There are numerous sources of uncertainty, particularly in ecosystem management, linked to variability (of natural processes, human behaviour, social dynamics, etc.) and to limited knowledge (lack of observations, practically immeasurable data, etc.) (Gärling et al., 1998, Asselt and Rotmans 2002). So it is necessary to clarify the “fuzzy” nature of the information, i.e. the uncertainties associated with this information. The stake is to convince all participants that the decision process is at least as important as the decision output, because the decision output will have to be modified in the future due to uncertainty (Funtowicz et al. 1999). Therefore, an important function of IC-tools is to be able to handle and to communicate uncertainty.

This information can be obtained by interviewing several key persons (tool technical support /facilitator, project manager), or through literature and web reviews, or also by testing directly the IC-tool.

4.1.2. *Impact of IC-tools on the participation process and on Social Learning*

The sharing of informational resources among the participants

A first issue concerns the analysis of the allocation of IC-tools resources (tools, skills, facilitators, training, data, information, time, money) among the participants during the RBM PP process. The assumption is that a certain degree of equality among the parties concerning their informational resources is necessary for a credible PP process. A related point is to analyse whether there is a gradual emergence of formal or informal agreements between stakeholders concerning the sharing of resources to participate, as an indicator of Social Learning.

Influence of IC-tools on the relational quality among the participants

Our assumption is that IC-tools (those used for the acquisition, management, visualization and dissemination of information/knowledge and/or those used for the elicitation of different perspectives and/or those used to support interaction) can help improve the communication between the participants at different organizational scales (within a working group, between working groups, between a representative and his constituencies, between the project team and the general public, between institutions). They make the information accessible (e.g. through a web site connected to a repository, through a public information centre, ...), they may facilitate the expression of local knowledge (e.g. an interactive Web GIS for the management of comments, a 3D scale-model or a map posed on a table to allow the participants to express more easily their points of view and their knowledge), they support distant and/or asynchronous exchanges (e.g. electronic forum, ...), they may make uncertainties of experts knowledge explicit and thus encourage discussions, etc.

Another point concerns the differences between the organizations or professional groups in terms of their embedded professional languages. Significant misunderstandings can happen, even concerning very basic terminology. Citizens or representatives of communities, who may not be water specialists in their normal jobs, may be very frustrated or even excluded from discussion by professional jargon (Huxham 2000).

Some IC-tools or some specific tasks related to a tool may help share the same language or understand each other or at least, make explicit the differences of representation among the participants. Here are some examples :

- the design of a GIS or a DSS which requires making explicit the type and definition of features stored in its database (data dictionary),
- a tool (e.g. a web site) which allows to access and eventually to update a glossary,
- specific functions on a web site for optimal information search, retrieval and display according to a user profile (e.g. a given professional category),
- comparison of similar IC-tools produced by different communities of practice to describe the same phenomena.

This last example is well illustrated by an experience of land-use mapping in the US where the different participants understood through the mutual comparison of their respective maps that they didn't understand each other (Chrisman 1999) and agreed to disagree. IC-tools play here the role of "boundary objects".

The last assumption is that participating in the co-design of an informational tool facilitates the acknowledgement of both expert and local knowledge and offers a positive context for bi-directional communication and mutual understanding (Kensing F. and Blomberg J. 1998, Mahmood M.A. et al. 2000).

Numerous examples of co-design activities related to electronic or non-electronic IC-tools are available: participative mapping (Carton 2002), 3D scale co-modelling (Rambaldi and Callosa-Tarr 2002), co-defining the legend of a map or the dictionary of a data-base, co-designing a multi-actors GIS (Tourment et al. 2003)), discussing the criteria in a multi-criteria analysis process, co-designing the roles of different actors in a role playing game (Barreteau et al. 2001, Etienne et al 2003), co-designing qualitative models (Boutet et al. 2003), etc.

Influence of IC-tools on the technical quality of the PP process outcomes

The assumption is that IC-tools may help the involved actor network to resolve better the substantive river basin issues through different ways :

- by improving the amount and quality of knowledge on the river basin thanks to better access to information, to a mutual enrichment between expert and local knowledge;
- by allowing to test more alternatives during the "search of solutions" phase;
- by allowing a better ranking of alternatives (e.g. through the multi-criteria analysis process);
- by integrating better the different components of a complex river basin system (e.g. models able to link surface and subsurface water issues, ...).

The interest of co-designed activities developed in the previous section is still relevant for the technical quality issue.

4.1.3. Perceived usability of IC-tools

By perceived usability, we refer to the degree to which the user expects the tool to fit a given purpose in a given context (characteristics of the physical, organisational and social environment in which the tool is used).

Four components of usability have been selected :

- The learnability: amount of things that have to be learnt before using a tool.
- The effectiveness: accuracy and completeness with which users achieve specific goals.
- The efficiency: amount of resources consumed in performing a task.
- The satisfaction: users' subjective reactions in performing a task (absence of discomfort, positive attitudes towards the use).

The perceived usability predicts “attitude toward using” the tool, defined as the user's desirability of her or his using the system. This attitude itself influences the individual's behavioral “intention to use the tool”.

People perceive the usability of a tool through indirect sources (‘peers’ or champions opinions, technical documentation, ...) or practical experiences. In this second case, the level of usability for a given tool will depend on its performances to fulfil a substantive and/or relational task in a specific context. This will influence the decision to use or not to use these IC-tools again in the future.

The following diagram (figure 4) helps to represent in a synthetic form the factors that may influence the acceptance of IC-tools by the different actors involved in the participative RBM process.

It has to be read considering SL as a dynamic cycle. The initial context of the participative project is more or less favourable to the use of IC-tools : importance given to IC-tools in the governance structure, type of environmental problem to solve, historical and cultural collective working practices and use of IC-tools, list of tools available among the actors network (including the local research laboratories), actors' initially perceived usability. Key actors to focus on are those who choose the working procedures and the tools in a RBM process.

In a favorable context, once a tool has been used within the SL process, it influences the outcomes, improves the users' perceived usability and therefore, their intention or not to use the tool again.

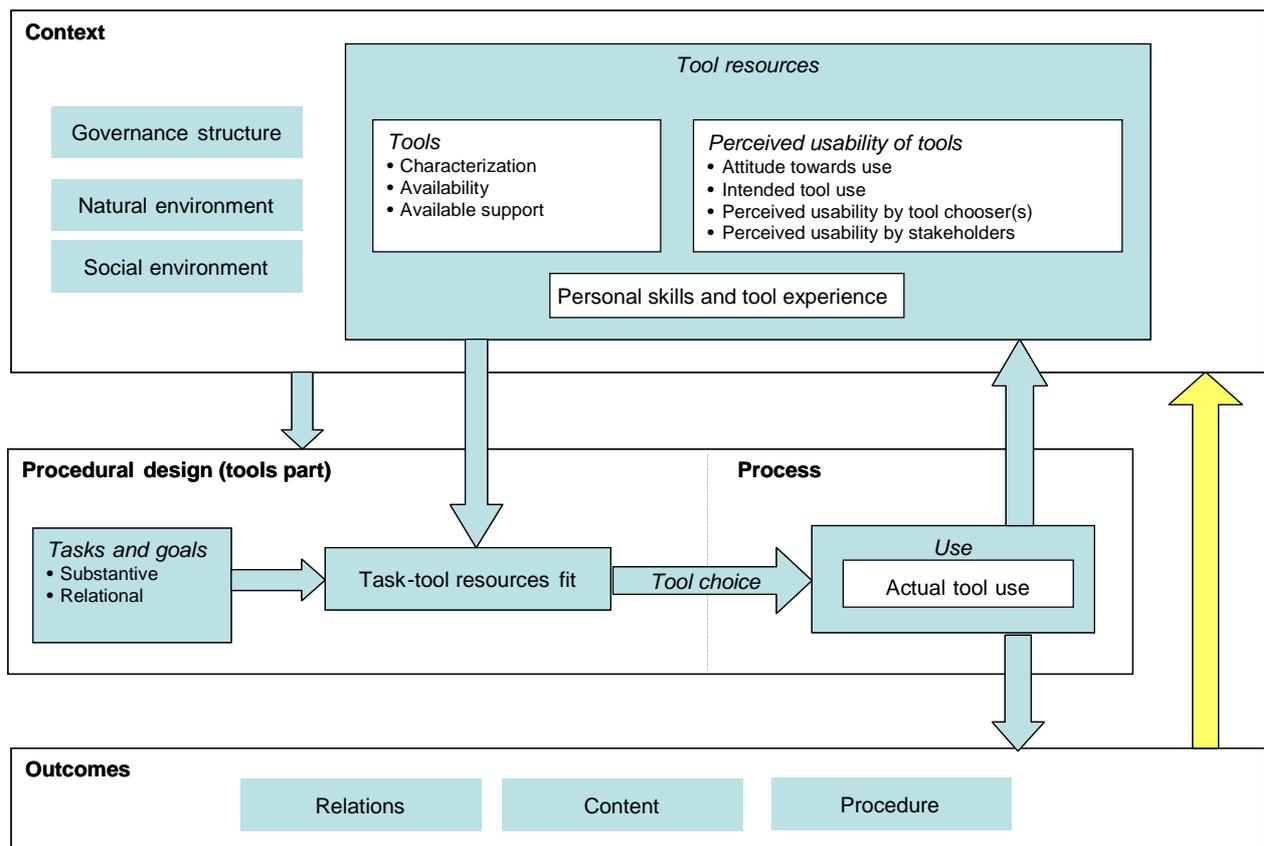


Figure 4 : Tool acceptance influence diagram

4.2. Structure of the Pool of Questions and intended use

The IC-tools evaluation criteria, the index cards and the charting procedure have been integrated in an instrument called “Social Learning Pool of Questions” (Craps and Maurel ed. 2003) summarized in Annex 3. This is the result of a concerted action between WP2 (Social Learning aspects) and WP3 (IC-tools aspects).

The prime aim of this “Social Learning Pool of Questions” is to provide the teams of HarmoniCOP WP5 with a checklist of questions concerning Social Learning and IC-tools, as a common base upon which they can build their case studies. Further, it is intended as an input for the manual on “Public Participation and Social Learning for River Basin Management” that will be produced by HarmoniCOP WP7.

For HarmoniCOP WP5 teams, the Pool of Questions is intended to serve as a guide when preparing to interview stakeholders, to consult archives and to evaluate IC-tools. It is recommended that the users select a number of questions and adapt these as is appropriate for their case study. Matters to consider are, for example:

- the nature of the case study, e.g., historical versus real-time analysis;
- the scope of the case study, e.g., a global overview of all projects in the entire river basin, or a local perspective on a single project;
- the type of involvement of the researcher, e.g., as an observer or as an active participant;
- the kind of person that is interviewed, and his/her relationship with the case under study; and
- the setting in which the interview takes place.

The structure of the Pool of Questions is intended to cover the most relevant aspects for social learning in the case study, with a special additional interest in the application of IC-tools and how they affect the SL process. It reflects the conceptual framework of SL and tool acceptance influence diagram already presented (see figure 1 and figure 4).

The Pool of Questions consists of three layers:

1. What : A list of general questions, summarizing the main issues that have to be considered in relation to SL in RBM. The structural order of the questions follows the conceptual framework that is demonstrated in the two diagrams previously mentioned.
2. Why : A short explanation of the underlying assumptions for these questions.
3. How : Examples of concrete and clear questions that can be used during the interview of stakeholders.

5. Perspectives

A first perspective concerns the lessons that will be learned from the WP4 national studies and the historical and real-time WP5 case studies analysed through the Pool of Questions. The results will show which IC-tools have been used, their usage situation as well as the relational and substantive outputs perceived by the users or observed by WP5 teams. They will help to assess the gap between the potentials of the tools, the real uses and the perceived usability. Our preliminary qualitative categorization of IC-tools presented in section 2.3. will be updated according to these results. A cross-comparison between the different case studies will also contribute to better understand the economical, technical, institutional and cultural factors that might affect the usability of the tools. Finally, the case studies will allow to verify our hypothesis on the importance of sharing informational resources and of co-designing IC-tools.

Our major expectation is to be able through these findings to make more explicit the relational functions of the different IC-tools and their impact on SL.

A second more practical perspective derived from the previous one concerns the WP7 handbook. This handbook will allow the WFD practitioners to tailor a participatory RBM process to regional/regional conditions. Concerning IC-tools, it will help the SL facilitators to answer concrete questions such as : What are the relational and substantive functions of a tool ? How should it be used ? Which resources and skills are required ? What is its applicability in the different phases of the PP process ? When was it used and who might be contacted for additional information ?

This handbook is considered by HarmoniCOP as a mean to make understandable the concept of “learning together for managing together” and to put it effectively into practice. We hope that our investigation on IC-tools will contribute to achieve this ambitious objective.

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Annex 1 : IC-tools glossary

Terms in bold correspond to IC-tools described in this report.

Term	Definition
Accuracy	Closeness of agreement between a test result and the accepted reference value (RDM)
Actors analysis	Analysis of all relevant actors (De Bruijn, Ten Heuvelhof, In 't Veld, 2002). Various methods for actor analysis exist. In general there are two types: institutions approaches (focus on the identification of actors and characterization of these on some institutional features) and cognitive approaches (aim to understand and disclose the deeper perceptions and argumentations of the various actors). (Enserink B., Mayer I., 2002)
Attribute	A defined characteristic of an entity type described in numbers or text (e.g. attributes of a lake might include its name, area, depth, ...)
Attribute value	A specific quality or quantity assigned to an attribute (GIS working group, 2002)
Background (layer)	(domain : GIS) Display of a base map or an orthoimage in the background of other spatial data providing information on the geographical context (adapted from RDM)
Base map	A map containing geographic features, used for locational reference. Can be used as a source map for participative mapping or 3-dimensional modelling processes or for GIS database design. (Rambaldi et al., 2002).
Board games	Board games are a complex form of games. They consist of boards and various kinds of pieces (dice, pawns, counters, etc.), a system of rules, and most importantly players. Other key elements are a goal (winning), an unpredictable outcome, and no direct impact on reality. (Alexander J. de Voogt, 1998)
Catalogue	A mechanism for making third parties aware of available material based on their characteristics expressed in metadata. A clearinghouse directory.
Clearinghouse	1) A decentralised system of servers on the internet based on the use of metadata. 2) A central agency for the collection, classification and distribution especially of information (RDM).
Cognitive map/ cognitive mapping	Cognitive mapping is a method of defining relationships between concepts (not always spatial) involved in a decision-making problem. By means of cognitive mapping, implicit knowledge (available only in the participants minds) can be stored, analysed, and presented (Ubbels, A. et al. 2000). A cognitive map of a problem is created in which causes, effects, measures, functions, goals and so on are schematised and relationships between them are defined as arrows. Also called mental map.

Communication	<i>Social interaction through messages (Fisker 1990). This is much more than the exchange of information (e.g. concerning river discharges, the outcome of computer simulations, or a regulation), but also a mean to reflect and reinforce social relations or "communities". New communication patterns can help to build up new communities. Within these communities, new representations of reality and new "meanings" can develop.</i>
Completeness - value	The degree to which values are present for all attributes (GIS working group, 2002).
Consistency	Refers to the absence of apparent contradiction in a database (RDM)
Data	A formalised collection of facts, concepts or instructions for communication or processing by humans or computer (GIS working group, 2002).
Data dictionary	A catalog of all data held in a database, or a list of items given data names and structures (GIS working group, 2002).
Database data model	The result of the conceptual design process of a (geographical) database which represents the real-world entities. A fully developed data model specifies entity classes, relationships between entities, integrity rules and operation on the entities.
Digital Elevation Model	A digital representation of a topographic surface (RDM)
Decision Support System	Interactive computer based systems, which help decision-makers utilize data and models to solve unstructured problems (Sprague, 1986).
Entity	(domain : data base) A real world object that cannot be further subdivided into similar objects (RDM)
Environmental information	The Aarhus convention provides the following definition : Any information in written, visual, aural, electronic or any other material form on : (a) The state of elements of the environment, such as (...), water, (...), and the interaction among these elements; (b) Factors, such as substances, energy, (...), and activities or measures, including administrative measures, environmental agreements, (...), affecting or likely to affect the elements of the environment (...). (c) The state of human health and safety, conditions of human life, cultural sites and built structures, inasmuch as they are or may be affected by the state of the elements, (...) or by the factors, activities or measures (...).
Facilitator	Someone who brings people together (networking) and catalyzes and/or directs learning and exchange processes, either in general or around a specific problem area (Rambaldi, 2002).
Field	(domain : data base) A space (column) in which data of the same type is entered (GIS working group, 2002).

Fuzzy cognitive map	A fuzzy cognitive map consists of nodes, representing properties of a system that are connected to each other by weights that represent the causal relationships between these properties. When a system of nodes and weights (i.e. a ‘cognitive map’) has been defined, a fuzzy calculation algorithm is used to assess system change (in terms of the excitation levels of the nodes) as a result of specific changes in a particular concept. (Kosko B., 1986).
Geographic feature	(domain : GIS) A point, line or polygon in a spatial database that represents a real-world entity (RDM)
Grid	A raster-based data structure composed of cells of equal size arranged in columns and rows (Rambaldi, 2002).
Geographic information	Information that is referenced to the earth’s surface, whether by coordinates or by identifiers such as addresses (GIS working group, 2002).
Geographic Information System (GIS)	GIS is a general-purpose system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data. Practitioners also regard the total GIS as part of an information system within an organization, including the operating personnel and the data that go into the system. Some of the GIS functionalities are now available on internet. In this case, we speak about Web-GIS and Web-mapping (if mapping functionalities only are available).
Group Support Systems (GSS)	Group Support Systems (GSS) are information systems that aim to make group meetings more productive by offering electronic support for a variety of meeting activities. (de Vreede, Muller, 1997).
IC-tool	In the context of PP for RBMP, an ICTool is considered a material artefact, device or software, that can be seen or touched, <i>and which is used in a participatory process to facilitate Social Learning</i> . It supports interaction between stakeholders (including scientists) through two-way communication processes. It allows to collect, provide and share data, information, knowledge, perceptions and points of view for a given issue. It’s use can be controlled directly by the stakeholders or through a facilitator. It doesn’t include for example group animation techniques (e.g. citizen jury, focus group, ...) or field trips.
Information	The result of data or knowledge processing in a given context for a specific purpose (from Latin <i>informare</i> : in-, in; + formare, to fashion, from forma, form). In HarmoniCOP context, the “ T ” of IC-tools is used in a more general meaning than this strict definition of information. It also includes data, knowledge and points of view that are exchanged between individuals or groups for a given issue.
INSPIRE	Infrastructure for Spatial Information in Europe (http://egeols222.egeo.sai.jrc.it/inspire/) (GIS working group, 2002).
Interactive white board	Group of devices and software to increase communication in distant or face-to-face interactive meetings. It generally consists of an electronic whiteboard (with a writing surface up to 1,6m x 1,2m), electronic pens and an annotation software connected to a computer and a video projector. Optional wireless pads can also be used.

Interoperability	The ability of two or more systems to operate in conjunction with each other (cf. RDM & IEEE 90). Semantic interoperability cf. semantics
Integrated Assessment Models	Integrated Assessment models are frameworks to organize and structure various strands of recent scientific knowledge. Most frameworks are computer simulation models that describe a specific problem and the cross-linkages and interactions with other problems in terms of specifying cause-effect relationships. This causal description can be done in a qualitative sense, through conceptual models, and in a quantitative sense, through formal computer models. (Rotmans, J. and M. B. A. van Asselt, 2001)
Knowledge	<p>Knowledge can be considered as the sum of interconnected rules of interpretation through which we understand, give meaning, perceive or interpret the world around us (Leeuwis 2001, in Rambaldi 2002 p4). Knowledge is what we store in our mind and what leads us to take decisions, act and react to stimuli received from the external world. Knowledge is very subjective and builds up in everybody's mind through a continuous learning process involving, among others, concrete experiences, interaction and communication with others, observations and reflections, formation of concepts and their testing. Three types of knowledge can be distinguished :</p> <ul style="list-style-type: none"> - "Unconscious knowledge" is characterized by perceptions and motives that we are not aware of ; - "Tacit knowledge" corresponds to knowledge that we are not immediately aware of, on which we base our day-to-day actions. This type of knowledge can be elicited through in-depth discussions and interactive exercises including the use of IC-tools like maps, 3D models, cognitive maps ; - "Explicit knowledge" is the knowledge that we are aware of, have reflected upon and can easily capture in verbal, textual, physical or visual formats, and that transforms into information.
Layer	A collection of similar features in a particular area referenced together for display on a map (RDM).
Map	<p>A graphical representation of a section of the earth's surface displayed on a planar surface (GIS working group, 2002). In the field of policymaking, four groups of maps can be distinguished: exploratory maps, sketch maps, policy maps (or 'plan maps') and mental maps (Carton L.J., 2002).</p>
Metadata	<p>In a literal sense, "data about data". Based on international standards, metadata describe the content, quality, condition and other characteristics of the data that allow users to locate data and to understand them.</p> <p>The first objective of metadata is to organize and maintain the investment in data made by one or several organizations or groups of stakeholders to facilitate further appropriate reuse.</p> <p>The second objective is to access and to share data by making metadata available through on-line data catalogues and clearinghouses.</p>
Mental map	see cognitive map

NIMBY	"Not In My Back Yard" Many important social choice problems involve selecting a single community (the "host") to bear the cost of a project which yields positive net benefit for society as a whole. For example, society needs to dispose of its waste, but no one wants a waste facility in their backyard.
Model	An abstraction of reality used to represent objects, processes or events (RDM)
Multicriteria analysis	A method to present the outcomes of an (integral) assessment of different solutions or alternatives based on a matrix of alternatives and their effect scores on different (prioritised) criteria.
Perceived usability	The degree to which the user expects the tool to fit a given purpose in a given context (characteristics of the physical, organisational and social environment in which the tool is used).
Perception	The active acquisition of data about the self and the world through the senses (human perception) or through other types of sensors (i.e. remote-sensing).
Policy	A set of obligations, prohibition or permission rules that either constrain or enable action (AST)
Precision	Degree of refinement in measurements. The exactness with which a value is expressed (RDM)
Projection	Both a mathematical model and a technique used to convert the three-dimensional reality of the earth's surface to a two-dimensional representation.
Protocol	A conventional and accepted method of fulfilling a task (GIS working group, 2002).
Prototype	A non-operational system for testing purposes (GIS working group, 2002).
Quality	An essential or distinguishing characteristic necessary for data to be fit for use (RDM)
RBM	River Basin Management
Reference data	Data necessary to identify the position of physical features in relation to other data in a geospatial context.
Role Playing Games	RPGs are group gaming situations in which players take on their own or other people's roles or behavioral patterns in a real or imaginary context. It works in parallel to the real world but still involves people with their own experience, viewpoints and objectives.
Scale	The relation between the dimensions of features on a map and the objects they represent on the earth (RDM) - large scale > 1:25.000 - medium scale 1:25.000 to 1:250.000 - small scale < 1:250.000
Scenario	A scenario is a description of a possible future situation of a system. Scenarios are used to explore future states of the system, and/or to assess the effects and robustness of intended policies. Three kinds of scenarios can be distinguished: 1) Policy scenarios 2) Context scenarios 3) Strategic scenarios.
Semantics	The meaning of words
Spatial accuracy	Cf. Positional accuracy

(Spatial) Data Infrastructure	The relevant base of technologies, policies and institutional arrangements that facilitate data availability and access
Three Dimensional Scale Model	Scale Relief Model that is made with solid materials (carton, plastic, resin, ...). Conventional spatial information can be represented on top of the 3D model, like road networks, land-use, water bodies, etc...
Web mapping	The provision of map based information services on the internet.

Sources

RDM : Reference Data and Metadata – INSPIRE Working Group

AST : Standards and Architecture – INSPIRE Working Group

<http://www.communityplanning.net/glossary/>

The other sources are available in the list of references.

Annexe 2 : IC-tool index cards

- 1. Questionnaire**
- 2. Maps**
- 3. 3D scale model**
- 4. Cognitive map / Fuzzy cognitive mapping**
- 5. Actor analysis**
- 6. Role Playing Game**
- 7. Board game**
- 8. Interactive white board**
- 9. GIS (Geographic Information System)**
- 10. Group Support System**
- 11. Scenario methodology**
- 12. Multicriteria analysis tools**
- 13. Integrated Assessment model**

1) Questionnaire

Tool name	Questionnaire
Glossary definition	A questionnaire is a list of questions that is used to gain useable information from certain persons (respondents). When a questionnaire is sent to the respondents to be returned by mail we speak of a 'written inquiry'. When the questions are posed by phone or face to face, we speak of an oral inquiry. When questions are phrased in an open way and extensive answers can be expected, we generally speak of an interview. An important criterion for usable information is the comparability of the answers from different respondents.
Tool implementation objective(s)	Gaining useable information from stakeholders. Eliciting stakeholder perspectives (how they view the problem) and possibly acquiring lay knowledge about the water system.
Pertinent participation process phase(s) ⁴	Starting organization, actors analysis, diagnosis of the current situation
Implementation	Questionnaires are in principle one-way communication tools. In order to use them for Social Learning they are to be used in a larger framework of interactive communication between government and citizens. They could be used, for example, to assess whether public opinion has changed as a result of policy and/or government campaigns and may thereby form a basis for further governmental action.
Implementation examples / contacts	Interviews were performed as basis for scenario development in order to support the development of flood management strategies for the Rhine and Meuse basins in the context of integrated river management ¹ .
References	¹ van Asselt, M. B. A., H. Middelkoop, et al. (2001). Integrated water management strategies for the Rhine and Meuse basins in a changing environment : Final report of the NRP project 0/958273/01. Maastricht/Utrecht, ICIS.

⁴ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnostic of the current situation 4- search of solutions 5- implementation, evaluation

2) Maps

Tool name	Maps
Glossary definition	A map is a graphic scale-model that represents the spatial aspects, dimensions and relations of reality (based on Carton 2002, and Kraak and Ormeling, 1987, translated).
Tool implementation objective(s)	Objective: To define a common vocabulary and for exchanging information. The power of maps is that they bridge disciplinary designs of all kinds of spatial problems.
Pertinent participation process phase(s) ⁵	During all phases, maps can be used for spatial-related policy issues. The following types of maps can be distinguished that are useful during the different phases of the participation process: Phase 1) <i>Starting</i> : Identify spatial problems and trends on exploratory maps, collecting –tacit and registered- information on maps. Phase 2) <i>Actors analysis</i> : Mental maps, meaning that stakeholders draw their perception of the ‘system’. Phase 3) <i>Diagnostic of the current situation</i> : Two types of maps serve the phase of diagnosis: a) Topographic and thematic maps that come from monitoring, research, and previous phases; b) Drawn sketch maps and added comments from stakeholders/ advisors that are based on their experience and tacit knowledge. Phase 4) <i>Search of solutions</i> : In the policy process, participants can be requested to draw their solutions on sketch maps, possibly assisted by a (landscape) designer. Phase 5) <i>Implementation, evaluation</i> : Implementation does not go without communicating the plan to others. There are three main types of plan maps: a) cartographic blue-print maps that defines detailed project-information; b) impact assessment maps that show estimations of consequences of –candidate– policy options; and c) communicative sketches or <i>infographics</i> (CSD, 2000)
Implementation	Different map sources can be used and combined in participatory processes. For long-distance sharing of information, some type of a digital spatial data infrastructure (SDI) is required. This involves among others geo-data exchange standards and application tools like (web-)GIS. Mapping experts, both digital experts as paper-designing experts are helpful in assisting stakeholders to visualize their ideas and concerns The use of GIS in participative settings is called community mapping or Public Participation GIS, which has met with increased popularity (Craig, W. J., M. Trevor and D. Weiner, 2002).
Implementation examples / contacts	The making of so-called regional ‘Water Opportunity Maps’ in the Netherlands, in several projects between 1998 and 2003 by water boards and county boards. A few water boards followed a participative approach. In the projects, several mapping techniques were used in combination, like exploratory and mental maps, GIS, communicative

⁵ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnostic of the current situation 4- search of solutions 5- implementation, evaluation

	<p>sketches and landscape designs. Contact: L. Carton (Delft University of Technology)</p>
Sources	<p><i>Maps and water management:</i> France, Robert L. (eds) (2002) Handbook of water sensitive planning and design. Lewis, Boca Raton. Lyon, John G. (eds) (2003) GIS for water resources and watershed management. Taylor and Francis, London.</p> <p><i>Maps for participative policy:</i> Carton, L.J. (2002) Strengths and weaknesses of spatial language: Mapping activities as debating instrument. In: Conference Proceedings FIGXXII International Congress. (Washington, D.C., April 19-26 2002). International Federation of Surveying, Copenhagen. CSD: Committee on Spatial Development, a co-operation between European Commission and the EU Member States (2000) Study Program on European Spatial Planning; Infographics workgroup. Brussels/Stockholm. Craig, W. J., M. Trevor and D. Weiner (2002) Community Participation and Geographic Information Systems. Taylor and Francis, London.</p> <p><i>Basics of resp. cartography, GIS:</i> Kraak, M.J. and F. Ormeling, 1987, Kartografie. Visualisatie van ruimtelijke gegevens. Delft, Delft University Press. (revised edition 1999) Longley, P.A., M.F. Goodchild, D.J. Maguire, and D.W. Rhind (2001) Geographic Information Systems and Science. Wiley, New York. McEachren, Alan M. (1995) How maps work. Guilford, New York.</p>
Resources	<p><i>Many links to sites on Maps, Mapping and Cartography:</i> http://oddens.geog.uu.nl/index.html</p> <p><i>Many references on maps, geo-information science, GIS :</i> http://www.ncgia.ucsb.edu/varenius/info_soc_panel/bibliog2.html</p> <p><i>Portal of geo-information related activities of the European Commission Services:</i> www.ec-gis.org</p> <p><i>Portal resp. paper on exploratory cartographic visualization:</i> http://www.elsevier.com/homepage/misc/cageo/ http://www.elsevier.nl/homepage/misc/cageo/mk/mkintro.htm</p> <p><i>Portal on visualization and education :</i> http://www.agocg.ac.uk/sima.htm</p>

3) *Three dimensional scale model*

Tool name	3D scale model
Glossary definition	Three Dimensional scale Models (3D-Models) or Scale Relief Models that are made with solid materials (carton, plastic, resin, ...). Conventional spatial information can be represented on top of the 3D model, like road networks, land-use, water bodies, etc. It belongs to the spatial tools family. It has proved to be a user-friendly, relative accurate data storage and analysis device and at the same time an excellent communication and relational artefact.
Tool implementation objective(s)	When co-developed with the local communities, this tool helps bring the people together. Generating geo-referenced data both from expert and local perspectives ; Supporting actors analysis (who acts where) ; Substantiating public hearings and planning workshops ; Servicing as reference during board meetings ; Raising awareness (e.g. on the hydraulics of watersheds like upstream-erosion / downstream-sedimentation effects) ; Involving local stakeholders in developing water resource use and management plans ; Planning field activities ; Supporting the learning of local geography and water resource uses ; Introducing visitors to the area.
Pertinent participation process phase(s) ⁶	Actors analysis (who acts where), diagnosis of the current situation, identification of problems, analysis of options, choice of solutions Guidance document phases: Actor analysis, context, diagnosis of the current situation, search of solutions
Implementation	Such models can be manufactured in a participatory 3D modeling approach in order to increase local stakeholders involvement and to integrate their knowledge. The process leading to the construction of the models requires local and external inputs and skilled support. The outputs can be stored in a GIS for additional data capture, further analysis and mapping. One major constraint of 3D-Models is their limited mobility. The transfer into a GIS may reduce this limitation.
Implementation examples / contacts	http://www.iapad.org/rationale.htm
References	Rambaldi G., Callosa-Tarr J, 2002. Participatory 3-Dimensional Modelling: Guiding Principles and Applications. Asean Regional Centre for Biodiversity Conservation. 84p.
Resources	http://www.iapad.org/participatory_p3dm.htm

⁶ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

4) Cognitive map / Fuzzy cognitive mapping

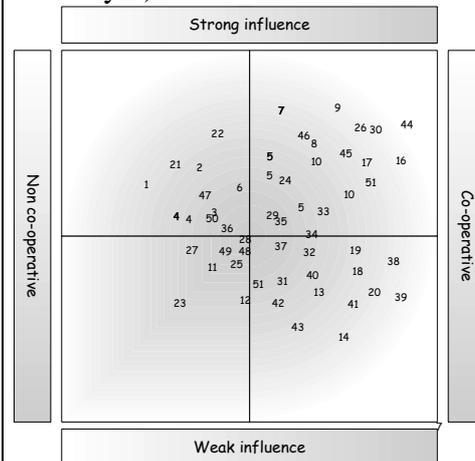
Tool name	Cognitive map / Fuzzy cognitive mapping
Glossary definition	<p>‘Cognitive mapping is a method of defining relationships between concepts involved in a decision-making problem. By means of cognitive mapping, implicit knowledge (available only in the participants minds) can be stored, analysed, and presented. A map of a problem is created in which causes, effects, measures, functions, goals and so on are schematised and relationships between them are defined as arrows.’¹</p> <p>An extension to the function of cognitive mapping is provided by means of Fuzzy Cognitive Mapping (FCM) introduced by Kosko². A FCM consists of nodes, representing properties of a system that are connected to each other by weights that represent the causal relationships between these properties. When a system of nodes and weights (i.e. a ‘cognitive map’) has been defined, a fuzzy calculation algorithm is used to assess system change (in terms of the excitation levels of the nodes) as a result of specific changes in a particular concept.</p>
Tool implementation objective(s)	Improved communication between stakeholders, eliciting stakeholder perspectives, and representing stakeholder knowledge in soft knowledge domains.
Pertinent participation process phase(s)	Starting organization, actors analysis, diagnosis of the current situation, search of solutions
Implementation	To benefit Social Learning the tool should be used in an interactive way. This means that a number of actors should be questioned about the decision-making problem, preferably in a focus group session. The contribution of each actor is translated into a (schematic) ‘cognitive map’. All participants should be able to question and/or reflect upon each other’s map. The outcome of the process may be an integrated cognitive map representing a ‘consensus’ problem definition, or different cognitive maps mapping out the diversity of perspectives among stakeholders. Fuzzy cognitive mapping may then be used to assess system change and advantageous management directions.
Implementation examples / contacts	Application to the case of the management of estuaries in the Netherlands ³ .
References	<p>¹ Ubbels, A., Verhallen, J.M. (2000). Suitability of decision support tools for collaborative planning processes in water resources management. Lelystad, RIZA.</p> <p>² Kosko, B. (1986). “Fuzyy cognitive maps.” <u>International Journal of Man-Machine Studies</u> 24: 65-75.</p> <p>³ Wijk, M. T. v. (1996). Toepassing van Fuzzy Congnive Maps ten behoeve van systeem- en beleidsanalyse. Rijkswaterstaat, Rijksinstituut voor Kust en Zee (RIKZ), The Netherlands.</p>

5) Actor analysis

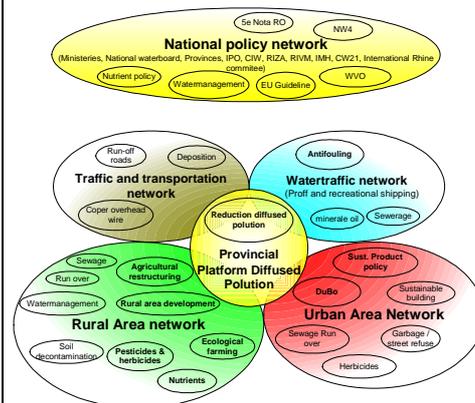
Tool name	Actor analysis																				
Glossary definition	<p>Actor analysis is an analysis of all relevant actors. Relevant actors are:</p> <ol style="list-style-type: none"> Actors that have an interest in the decisionmaking; Actors that can hinder the decisionmaking; Actors that can enrich the decisionmaking; Actors that has to be involved on moral arguments. <p>(De Bruijn, Ten Heuvelhof, In 't Veld, 2002)</p> <p>Various methods for actor analysis exist. In general there are two types: institutions approaches (focus on the identification of actors and characterize these on some institutional features) and cognitive approaches (aim to understand and disclose the deeper perceptions and argumentations of the various actors). (Enserink, Mayer, 2002)</p>																				
Tool implementation objective(s)	<p>To identify all relevant actors, so that you know whom to involve in your process. Learn about different problem perceptions of actors/stakeholders. Learn more about different content aspects of the problem situation.</p> <p>Estimate how the network of actors will participate. Who the 'enemies' are and who are your 'friends'. Whom do you need or don't need, etc.</p> <p>A more legitimate problem formulation.</p> <p>A problem formulation in which different actors recognize themselves.</p>																				
Pertinent participation process phase(s) ⁷	<p>Problem analysis</p> <p>Guidance document phases: Actor analysis, context.</p>																				
Implementation	<p>Actor analysis is based on information from literature study and interviews.</p> <p>It's a static representation of a very dynamic reality. So the analysis has to be updated often.</p> <p>It helps to identify relevant stakeholders and learn about them. Different stakeholders can learn about each other if the analysis is public. The analysis can be made participative within a group of stakeholders. It then can facilitate the discussion. (Social Learning)</p> <p>There are different formats, some examples are:</p> <ol style="list-style-type: none"> Matrix with all relevant actors and their interests, goals, instruments and problem perspective <table border="1"> <thead> <tr> <th></th> <th colspan="2">Dedicated actors</th> <th colspan="2">Non-dedicated actors</th> </tr> <tr> <th></th> <th>Critical actors</th> <th>Non-critical actors</th> <th>Critical actors</th> <th>Non-critical actors</th> </tr> </thead> <tbody> <tr> <td><i>Joint perceptions and objectives</i></td> <td>Probable participant, potential allies (powerful friends)</td> <td>Possible participants and potential allies (friends)</td> <td>Indispensable allies, but hard to engage</td> <td>Actors that need not be involved (in first instance)</td> </tr> <tr> <td><i>Opposed perceptions and objectives</i></td> <td>Probable participant, potential opponents (biting dogs)</td> <td>Possible criticist (of certain changes) (barking dogs)</td> <td>Potential enemy, but not active (sleeping dogs)</td> <td>Actors that need no attention (in first instance)</td> </tr> </tbody> </table> <p>Figure : Example of Actor Matrix after Enserink et al 2001, Matrix can be filled after inventatrisation of goals, objectives, perceptions, means, influence and replaceability.</p>		Dedicated actors		Non-dedicated actors			Critical actors	Non-critical actors	Critical actors	Non-critical actors	<i>Joint perceptions and objectives</i>	Probable participant, potential allies (powerful friends)	Possible participants and potential allies (friends)	Indispensable allies, but hard to engage	Actors that need not be involved (in first instance)	<i>Opposed perceptions and objectives</i>	Probable participant, potential opponents (biting dogs)	Possible criticist (of certain changes) (barking dogs)	Potential enemy, but not active (sleeping dogs)	Actors that need no attention (in first instance)
	Dedicated actors		Non-dedicated actors																		
	Critical actors	Non-critical actors	Critical actors	Non-critical actors																	
<i>Joint perceptions and objectives</i>	Probable participant, potential allies (powerful friends)	Possible participants and potential allies (friends)	Indispensable allies, but hard to engage	Actors that need not be involved (in first instance)																	
<i>Opposed perceptions and objectives</i>	Probable participant, potential opponents (biting dogs)	Possible criticist (of certain changes) (barking dogs)	Potential enemy, but not active (sleeping dogs)	Actors that need no attention (in first instance)																	

⁷ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnostic of the current situation 4- search of solutions 5- implementation, evaluation

2. Inferred mapping: “An iterative approach in which interactive group support sessions, e.g. using group systems, are used for stakeholder identification and characterization, followed by the construction of a map or system schematic of the policy network(s) by the analyst. This map is then validated, detailed and elaborated upon, in one more group support sessions with other participants. The map is a communicative device for strategic decisionmaking.” (Enserink, Mayer)



FigureA: Simplified version of the GDSS stakeholder analysis output.
 Note: Each number represents stakeholder positioned by degree of influence and estimated (non) co-operative behaviour (Alternative analysis, Source : Enserink and Mayer 2002)



FigureB: Networks and issues in diffuse pollution policy making (Source Enserink and Mayer. 2002)

3. DANA, DANA is a conceptual modeling approach which intends to portray the perceptions of actors and their relationship to one to another in a form which is amenable to study, analysis and (re)-design. The DANA workbench is based on the assumption that the situations by which actors are influenced and to which they adapt themselves do not stem from the ‘objective’ world of the policy analyst, but from their own subjectively perceived world. Working from DANA the perceptions of the actors, in terms of relevant factors and actor-specific instruments and goals, are made explicit in a qualitative, conceptual language. The analyst can sharpen her insight by performing different types of comparative analysis. In

DANA, every actor perception is modeled in terms of factual, causal and teleological assumptions.

- a. Factual assumptions make a statement about the state of a particular factor, e.g., "water quality is adequate" or "sediment pollution < 50 mg Cd / kg".
- b. Causal assumptions represent the logic that an actor (says he) attributes to chains of events, e.g., "if strictness of water policies increases *then* freedom of navigation on the Scheldt will decrease", "if freedom of navigation decreases *then* economic position of Antwerp will probably decline", and so on. Formally, a link has a cause part and an effect part, where cause and effect are two different changes. Links may be uncertain, which is expressed by a hedge like 'possibly', 'probably' or 'definitely', typically associated with some value between 0 and 1. A link should be read as "if cause *then* certainty effect".
- c. Teleological assumptions represent an actor's true (or stated) objectives. The actor's *insistence* on a goal expresses how strongly he desires a factor to change, typically on some ordinal scale, e.g., from 'preferably' to 'definitely'.

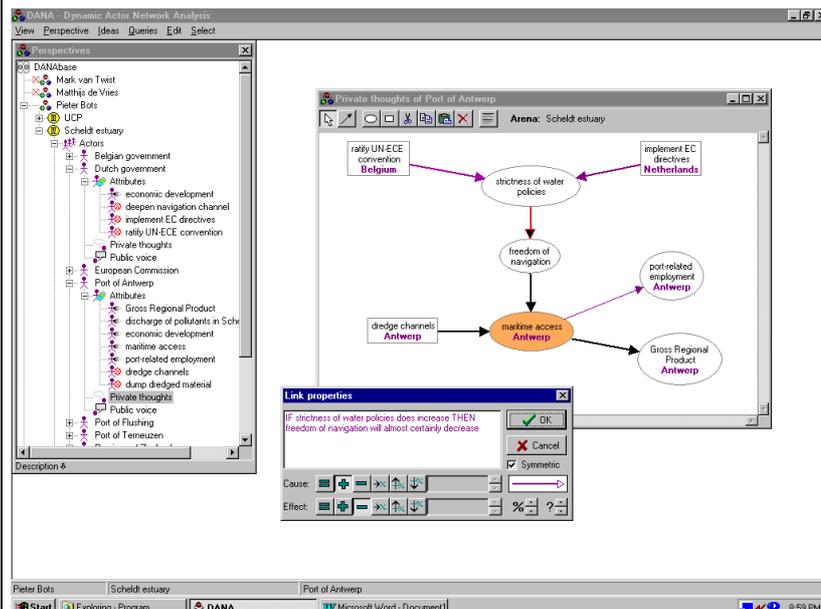


Figure : example of DANA specification of causal Relations (Source Bots et al 2000)

See for more information on application of DANA :

<http://www.dana.tudelft.nl/publications/Scheldt/Scheldt.html>

Implementation examples / contacts

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www.computer.org/proceedings/hicss/0001/00016/00016029abs.htm

	<p>Bots, P.W.G., van Twist M.J.W., van Duin J.H.R. (2000) "Dynamic Actor Network Analysis for the Scheldt estuary". In: <i>Decision Support for the Western Scheldt</i>, Proceedings of the LWI Workshop University Projects, Amsterdam, The Netherlands. http://www.dana.tudelft.nl/publications/Scheldt/Scheldt.html</p> <p>Bruijn, H. de, E.F. ten Heuvelhof, 2000. <i>Networks and Decision Making</i>, Lemma, Utrecht</p> <p>Bruijn, Hans de, Ernst ten Heuvelhof, Role in't Veld, 2002. Process management: why project management fails in complex decision making processes. Sordrecht: Kluwer Academic.</p> <p>Enserink, Bert and Igor Mayer, 2002. "Improving the strategic impact of policy making for diffuse water pollution through interactive inferred mapping of complex actor networks" International Water Association, <i>Proceedings of the 6th International Conference Diffuse Pollution</i>, 30 sept - 4 oct. 2002 Amsterdam, pp.420-427.</p> <p>Enserink, B., J.F.M. Koppenjan, W.A.H. Thissen, <i>Analyse van complexe omgevingen, leerboek tb 211</i>. Delft: Faculteit Techniek, Bestuur en Management, 2001.</p> <p>Hermans. Leon, M., and Johannes S. Timmermans, 2001. Actor Analysis as a means to connect water professionals and decision makers, <i>Building Bridges Through Dialogue</i> (Abstract Volume of the 11th Stockholm Water Symposium, August 2001) Stockholm International Water Institute</p> <p>Hermans, Leon., Nader El-Masry, M., Tarek M. Sadek, 2002. Linking Actors and Models for Water Policy Development in Egypt: Analyzing Actors and their Options <i>Knowledge, Technology, & Policy</i>, Winter 2002, Vol.14, No.4, p.57-74</p>
Resources	<p>http://www.tbm.tudelft.nl/webstaf/pieterb/DANA.HTM</p> <p>http://www.dana.tudelft.nl/publications/Scheldt/Scheldt.html</p>

6- Role Playing Game

Tool name	Role Playing Game
Glossary definition	RPGs are group gaming situations in which players take on their own or other people's roles or behavioral patterns in a real or imaginary context. It works in parallel to the real world but still involves people with their own experience, viewpoints and objectives. Underpinning every RPG is a model of some sort which can be adapted into a game to provide the playing context. The most apt model to adapt for these purposes is an Agent-Based Model, which already represents the behaviour of agents. These models can then be easily converted by allowing players to take the role of the model agents.
Tool implementation objective(s)	Elicit information from stakeholder, provide learning support, sharing information through practice, social learning, enabling people to become comfortable with models. Such tools are also a means of increasing people's trust in the use of computer models as well as testing management strategies, the impact that human decision making might have on their efficacy. Games are also a way to put people and their policies into a management situation without heavy consequences for the real world. It is a tool for learning by simulating.
Pertinent participation process phase(s)	Identification of problems, search of solutions, choice of solution, policy analysis, model validation.
Implementation	<p>Role-Playing Games can be used to support PP in different ways :</p> <ul style="list-style-type: none"> - to provide a representation on a shared system to foster the expression of each stakeholder's own viewpoint. - to provide a support to share and discuss each one's viewpoint on a shared system. - to collect and share information on stakeholders behavioural patterns when put in situations similar to real ones - to make stakeholders understand conditions of actions of other stakeholders through the exchange of roles (one stakeholder will put on the role of another stakeholder and vice-versa, i.e. forester and herder in Etienne et al. (2003)) - to learn directly about the interconnectivity and complexity of each stakeholder's actions within a management system - to make stakeholders feel comfortable with using models - increase stakeholders' sense of ownership and trust of policy models - to open the black box of models – stakeholders are no longer outside the model, looking in, rather they become embedded within it. - to carry out policy analysis of possible management plans. <p>The RPG itself can be designed in a participative way : actors identify issues and key elements of their system, define the prototype and play with it. For an example: D'aquino et al. (2003) and Hare et al. (2002a; 2002b).</p>

Implementation examples / contacts	<p>Application to the collective planning of a concerted local development plan in Cévennes, Causse Méjean area (Etienne et al. 2003)</p> <p>Application to a territory management plan in Senegal Delta (D'aquino et al. 2003)</p> <p>Application to urban water management in Switzerland (Hare & Pahl-Wostl, 2002)</p>
Sources	<ul style="list-style-type: none"> - Etienne M., Le Page C., Cohen, M. (2003). A step-by-step approach to building land management scenarios based on multiple viewpoints on multi-agent system simulations. <i>Journal of Artificial Systems and Social Simulations</i> 6 (2). http://jasss.soc.surrey.ac.uk/6/2/2.html - D'Aquino, P., Le Page, C., Bousquet, F. and Bah, A. 2003. Using self-designed role-playing games and a multi-agent system to empower a local decision-making process for land use management: The SelfCormas experiment in Senegal. <i>Journal of Artificial Societies and Social Simulation</i> 6(3). http://jasss.soc.surrey.ac.uk/6/3/5.html - Barreteau, O. 2003. The joint use of role-playing games and models regarding negotiation processes: characterization of associations. <i>Journal of Artificial Societies and Social Simulation</i> 6(2). http://jasss.soc.surrey.ac.uk/6/2/3.html - Hare, M.P., & C. Pahl-Wostl. (2002). Stakeholder categorisation in processes of participatory integrated assessment. <i>Integrated Assessment</i>.3: 50-62. - Hare, M.P., D. Medugno, J. Heeb & C. Pahl-Wostl (2002a) An applied methodology for participatory model building of agent-based models for urban water management. In: C Urban (ed) <i>3rd Workshop on Agent-Based Simulation</i>. SCS- Europe BVBA, Ghent. - Hare, M.P., J. Heeb & C. Pahl-Wostl (2002b) <i>The Symbiotic Relationship between Role Playing Games and Model Development: A case study in participatory model building and Social Learning for sustainable urban water management</i>. Proceedings of ISEE, 2002, Sousse, Tunisia
Resources	<p>http://cormas.cirad.fr/en/reseaux/ComMod/index.htm</p> <p>a special issue of JASSS has been dedicated to role playing games, models and negotiation issues. It has been split over these two issues:</p> <p>http://jasss.soc.surrey.ac.uk/6/2/contents.html</p> <p>http://jasss.soc.surrey.ac.uk/6/3/contents.html</p>

7) Board game

Tool name	Board game
Glossary definition	<p>Several definitions can be found in the literature:</p> <p>¹<i>‘Board games are a complex form of games. They consist of boards and various kinds of pieces (dice, pawns, counters, etc.), a system of rules, and most importantly players. The context of playing board games includes referees, interfering and non-interfering spectators, rules of ceremonies or rules of etiquette, club houses and societies, boards for special occasions, etc. (...) If we consider a context with players, boards and pieces, and rules, it appears that these elements cannot be separated for a complete understanding of a board game. The rules may influence the board and vice versa. The players may determine the shape and kind of boards and the specificity of the rules. They form a complex ‘being’ which is a board game.’</i></p> <p>²<i>‘(Rule) games are objects which consist of components and rules and have certain criteria: rules, a goal, always changing course; chance; competition; common experience; equality; freedom; activity; diving into the world of the game; and no impact on reality.’</i></p> <p>From these definitions we may extract the following key elements of a board game: 1) A board, 2) pieces, 3) players, 4) rules, 5) a goal (winning) 6) an unpredictable outcome, and 7) no direct impact on reality.</p>
Tool implementation objective(s)	Problem definition, raising public awareness, educating the public, developing a dialogue and a common language.
Pertinent participation process phase(s) ⁸	Starting organization, actors analysis
Implementation	<p>A board game can be designed and used in two ways:</p> <ol style="list-style-type: none"> 1) Distributed use: This requires the game to be cheap to develop, easy to distribute, and easy to use. 2) Central use: Hereby the players must come to a playing location. The game can be more expensive and cumbersome, and more complicated (requiring facilitation).
Implementation examples / contacts	The Water four Space (W4s) game: Exploring the future consequences of water management in the Netherlands. See reference ³ .
References	<p>¹Alexander, J. de Voogt (1998). Editorial of the International Journal for the Study of Board Games, Issue 1.</p> <p>²Wolfgang Kramer (2001). What is a game? The games journal. http://www.thegamesjournal.com/articles/WhatIsaGame.shtml</p> <p>³Carton, L., Karstens, S. et al. (2002). ‘The W4s game: exploring the future consequences of water management’. In: Mayer, I., and</p>

⁸ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

	Veeneman, W. (eds.), 2002. 'Games in a world of Infrastructures: Simulation-games for research, learning and intervention'. Eburon Academic publishers, Delft, Netherlands.
Resources	Web site for the Water 4 Space game (in Dutch): http://water4ruimte.wldelft.nl/

8) *Interactive white board*

Tool name	Interactive white board
Glossary definition	Group of devices and software to increase communication in distant or face-to-face interactive meetings. It is generally made up of an electronic white board (with a writing surface up to 1,6m x 1,2m), electronic pens and an annotation software connected to a computer and a video projector. Optional wireless pads can also be used.
Tool implementation objective(s)	Public hearing, co-production of solutions, minutes of meeting, public information dissemination.
Pertinent participation process phase(s) ⁹	Actors analysis, context, identification of problems, analysis of options, choice of solutions. Guidance document phases : Actors analysis, context, diagnosis of the current situation, search of solutions
Implementation	An interactive board can be used as a white board to make and to save digital or dry-erase notes. With electronic pens used like a mouse, the user can also control directly from the whiteboard any application (e.g. slide show, CAD, GIS, DSS, ...) running on the computer and add notes. Optional wireless electronic pads allow anyone in the room to contribute to the working session. The meeting notes and all notations (including drawing) can be saved, printed or sent by e-mail in order to make the meeting more interactive and to record the process and the outputs. These devices can also be used for on-line meetings and share applications to allow everyone to see in real time the presentation and the notes being made. In practice, taking into account the size of the board, this device is more suited for being used by a limited number of participants (between 5 and 25, larger meetings can be split into small working groups). Several uses can be imagined to support PP for RBMP: - to communicate information to the participants ; - connected to a GIS or a DSS, to allow participants to provide their own knowledge, perceptions and comments (on the problems, the options, the solutions) in a very intuitive way (writing on a board) ; - to co-produce living documents ; - to improve the quality of the minutes.
Implementation examples / contacts	This IC-tools is quite recent and has mainly been used in the world of business and education.
References	
Resources	http://www.touchboards.com/allcompanies.html

⁹ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

9) GIS (Geographic Information System)

Tool name	GIS (Geographic Information System)
Glossary definition	<p><u>GIS</u> is a general-purpose system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data. Practitioners also regard the total GIS as part of an information system within an organization, including the operating personnel and the data that go into the system.</p> <p>Some of the GIS functionalities are now available on the internet. In this case, we speak about <u>Web-GIS</u> and <u>Web-mapping</u> (if mapping functionalities only are available).</p>
Tool implementation objective(s)	Reporting to the European Commission (maps and GIS layers defined by a WFD GIS working group, 2002), public information dissemination, public hearing, co-production of solutions
Pertinent participation process phase(s) ¹⁰	Identification of problems, analysis of options, choice of solution, implementation/monitoring/evaluation
Implementation	<p>Off-line or Web-GIS can be used to support PP in different ways :</p> <ul style="list-style-type: none"> - to provide geoinformation to inform the public in a mono-directional communication process. - to provide geoinformation upon request during participative workshops. - to collect and to communicate public's own knowledge, perceptions and comments connected to a specific geographic area. In this case, additional functionalities are required to make the GIS interactive (digitizing, comments management,...). <p>The GIS itself can be designed in a participative way : share a vision of the real phenomena represented in the data base model (relevant scales, geographic features, parameters to describe them, relations between these features, data dictionary), iterative prototyping, co-ownership of the GIS.</p>
Implementation examples / contacts	<p>Application to the design of a fictitious city Zwuile containing a population of 23 000. This virtual experimental test involves developing a new industrial zone within the city limits.</p> <p>Contact : R. Kluskens (Wageningen University)</p>
References	<p>GIS Working Group, 2002. <i>Guidance document on implementing the GIS elements of the WFD</i>. European communities, 166p.</p> <p>Guidance on Public Participation in relation to the WFD, Annex 1 p 36.</p>
Resources	<p>Web site for participatory GIS</p> <p>http://www.iapad.org/participatory_gis.htm</p>

¹⁰ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

10) Group Support System

Tool name	Group Support System
Glossary definition	<p>"Group Support Systems (GSS) are information systems that aim to make group meetings more productive by offering electronic support for a variety of meeting activities." (de Vreede, Muller, 1997).</p> <p>An example is the Group Decision Room (GDR), which "is a meeting environment in which electronic meeting support is used to help groups address complex problems collaboratively. The GDR consists of a normal meeting room in which every work space is equipped with a computer, these enable meeting participants to work together using an electronic meeting system."</p> <p>An electronic meeting system or Group Support System (GSS) helps people to generate new ideas (brainstorming), to define concepts, to organize ideas into categories, and to evaluate ideas using various criteria and voting techniques. Groups can use a GSS to perform activities such as project evaluations, strategic planning, work process analysis and design, crisis management, budgeting, and group training.</p>  <p>The added value of this meeting technology is its ability to make group meetings more productive and more effective. Information from various work stations can be easily integrated and presented using various presentation facilities. This enables the fast and effective execution of brainstorming, organization, and evaluation activities. In addition, experience shows that participants feel satisfied with the form and process of electronic meetings.</p> <p>(www.tbm.tudelft.nl, September 2003)</p>
Tool implementation objective(s)	More productive and effective meetings.
Pertinent participation process phase(s) ¹¹	Can be used for all the same goals of a normal meeting.
Implementation	<p>The advantages of having a meeting in a GDR are: anonymity (the origin of a comment is not shown), parallel communication (saving time), information availability (no information is lost), structuring discussions (depends not only on the tool, but also on the facilitator)</p> <p>Limitations are: the quality of the facilitator, computer network</p> <p>The advantages of having a meeting in a GDR are: anonymity (the origin of a comment is not shown), parallel communication (saving time), information availability (no information is lost), structuring discussions</p>

¹¹ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

	(depends not only on the tool, but also on the facilitator (www.tbm.tudelft.nl , September 2003).
Implementation examples / contacts	<ol style="list-style-type: none"> 1. “Policy Network study; developing meeting guidelines for inter-organizational policy making meetings. 2. Collaborative Simulation Modeling study; developing collaborative tools and meeting design guidelines to support group conceptualization and specification at Amsterdam Airport Schiphol. 3. Asynchronous Brainstorming study; developing meeting design guidelines for asynchronous brainstorming in very large design groups.” (www.tbm.tudelft.nl, September 2003) <p>Contacts: J.H.Appelman@TBM.TUdelft.nl</p>
References	Vreede, GJ. de, “Why some GSS meetings just don’t work: exploring success factors of electronic meetings’. <i>Proceedings of the 7th European Conference on Information Systems (ECIS)</i> , vol. III (1997), p. 1266-1285.
Resources	http://www.tbm.tudelft.nl/ → organisation → Group Decision Room, web-site also in English

11) Scenario methodology

Tool name	Scenario methodology
Glossary definition	<p>A scenario is a description of a possible future situation of a system. Scenarios are used to explore future states of the system, and/or to assess the effects and robustness of intended policies. There are many classifications of scenarios. Here we focus on systematically constructed scenarios, created through logical reasoning and construction of a scenario logic consisting of driving forces. We distinguish three kinds of scenarios:</p> <ol style="list-style-type: none"> 1. Policy scenarios depict what the future might look like if specific alternative policies are successful, partially successful or not successful at all. They show a wanted or unwanted normative future situation and how to reach this situation through policies. 2. Context scenarios depict possible future environments of specific policy fields; they show how the world might look <i>despite</i> our policies allowing us to assess the robustness of policies. The driving factors of these scenarios originate outside the system or policy field and cannot be influenced by the policy makers. 3. Strategic scenarios depict possible futures of the system and its environment; driving forces originate both within and outside the system or policy field.
Tool implementation objective(s)	<p>Policy scenario: to think through which policies can bring you closer to your (more) ideal future. And which can't.</p> <p>Context scenarios: evaluation of different alternatives/policies in possible future situations and for anticipating unexpected events (robustness, fall-back and no-regret options).</p> <p>Strategic scenarios are built to design robust strategies.</p>
Pertinent participation process phase(s) ¹²	<p>Design (policy scenarios) and evaluate solutions (context/strategic scenarios). Scenarios can be used in the design and ex-ante evaluation stages.</p> <p>Guidance document phases: Search of solutions.</p>
Implementation	<p>The basic methodology for scenario construction can be found in the references below. The process of creating scenarios can be an important tool for cooperation and building trust. Brainstorming, elaboration and prioritisation of driving forces and creation of a scenariologic lend themselves very well for a workshop-like setting.</p> <p>Scenarios can be constructed participatively. As the focus is on possible futures of both system and environment the process enlightens the discussion about the problem, the delineation of the problem and the alternatives. It's a creative process so people go away from the conflict, which can help the process.</p>
Implementation examples / contacts	<p>b.enserink@tbm.tudelft.nl</p>
References	<p>- Enserink, Bert., 2000. "Building Scenarios for the University" <i>International Transactions in Operational Research</i>, Vol. 7, No. 6.</p>

¹² Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnostic of the current situation 4- search of solutions 5- implementation, evaluation

	<p>pages 569-584. ISSN 0969-6016</p> <ul style="list-style-type: none"> - Enserink, B., 'Creating a Scenariologic - Design and Application of a Repeatable Methodology'. <i>Paper presented at the 36th Annual Hawaii International Conference on Systems Science, Collaboration Systems and Technology Track, sub-group GSS Patterns of Use: Repeatable thinkLets and Methods</i>. January 6-9, 2003. - Enserink, B. 2003. Thinking the unthinkable - the end of the Dutch river dike system? Exploring a new safety concept for the river management. <i>Journal of Risk Research</i>, Volume 7 nr 6-8 - Heijden, Kees van der, 1996. <i>Scenarios; the art of strategic conversation</i>, Chichester, Wiley. - Rotmans, Jan, Marjolein van Asselt, Chris Anastasi, Sandra Greeuw, Joanne Mellors, Simone Peters, Dale Rothman, Nicole Rijkens, 2000. "Visions for a sustainable Europe", <i>Futures</i> 32 (2000) 809-831 - Schwartz, Peter. 1991. <i>The Art of the Long View: Planning for the Future in an Uncertain World</i>. New York: Doubleday.
Resources	-

12) Multicriteria analysis tools

Tool name	Multicriteria analysis tools
Glossary definition	<p>Multicriteria analysis: A method to present the outcomes of an (integral) assessment of different solutions or alternatives based on a matrix of alternatives and their effect scores on different (prioritised) criteria. Multicriteria analysis is a non-monetary evaluation method for ranking alternatives. It uses different explicit evaluation criteria for assessing the effects of policy alternatives. These criteria can be very different in character and will be scored in their own units (Euros, meters, hectares, etc.) or will be expressed qualitatively.</p>
Tool implementation objective(s)	<p>Ex-ante evaluation of alternatives and alternatives ranking. Choice of an alternative.</p> <p>The generation of the criteria for assessment can be a valuable tool for surfacing concerns and issues.</p> <p>When applied in a participatory and transparent way outcomes might gain broad support.</p>
Pertinent participation process phase(s) ¹³	<p>Ex-ante evaluation of alternatives and alternatives ranking. Choice of an alternative.</p> <p>Guidance document phases: Search of solutions.</p>
Implementation	<p>Multicriteria analysis can be used for both screening of alternatives early in interactive processes and for more extensive evaluation of alternatives at a later stage.</p> <p>Beware that several multicriteria techniques are available for use by practitioners as well as decision support systems. Especially in participatory processes multiple objective analysis and problem structuring is required for elaboration and acceptance of the evaluation criteria.</p> <p>Typically a table or matrix will be produced with the evaluation outcomes. By attributing weights to criteria and through mathematical operation a rank order can be established. By discussing the weights attributed to the criteria and by varying the set of weights (sensitivity analysis), the robustness of the outcome can be tested and different stakeholder perspectives can be shown.</p> <p>But this mathematical approach is not always a good one; you can use this tool also in a more qualitative way. In heavily politicised circumstances it might be wise to present outcomes in a scorecard, leaving the interpretation and weights of the various (groups of) criteria to the user. Criteria should be derived from multiple stakeholder objectives to gain social support.</p>
Implementation examples / contacts	<p>Application in many water management and land-use and infrastructure planning projects</p> <p>b.enserink@tbm.tudelft.nl</p> <p>p.bots@tbm.tudelft.nl</p>
References	<p>- Enserink, Bert, 2000. A quick scan for infrastructure planning: screening alternatives through interactive stakeholder analysis. <i>Impact</i></p>

¹³ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnostic of the current situation 4- search of solutions 5- implementation, evaluation

	<p><i>Assessment and Project Appraisal</i>, volume 18, number 1, March, pages 15-22</p> <p>- Hipel, Keith W. 1992. "Multiple objective decision making in water resources" <i>Water Resources Bulletin</i>, American Water Resources Association, Vol.28, No.1: 3-12</p> <p>- Keeney, Ralph L. 1988. "Structuring objectives for problems of public interest" in: <i>Operations Research</i>, Vol. 36, No. 3 May-June pp.396-405</p> <p>Miser, H.J. and E.S. Quade (eds.) 1985. <i>Handbook of Systems Analysis: Overview of Uses, Procedures, Applications and Practice</i>. North-Holland New York</p> <p>Miser, H.J. and E.S. Quade (eds.) 1985. <i>Handbook of Systems Analysis: Craft Issues and Procedural Choices</i>. North-Holland New York</p>
Resources	-

13) Integrated Assessment model

Tool name	Integrated Assessment model
Glossary definition	'Integrated Assessment models are frameworks to organize and structure various strands of recent scientific knowledge. Most frameworks are computer simulation models that describe a specific problem and the cross-linkages and interactions with other problems in terms of specifying cause-effect relationships. This causal description can be done in a qualitative sense, through conceptual models, and in a quantitative sense, through formal computer models.' ¹
Tool implementation objective(s)	Raising public awareness (early warning function), rapid assessment tools of policy alternatives, framework for structuring knowledge, educating people, clarifying uncertainties, negotiation support.
Pertinent participation process phase(s) ¹⁴	Starting organization, problem definition, search of solutions
Implementation	Integrated assessment models can be implemented as quantitative computer models (calculation tools) or as qualitative, conceptual models. The quantitative models may be used to support focus group discussions, see reference ² . The qualitative SCENE model is generally applied in different forms of focus groups, together with interviews and feedback sessions ³ .
Implementation examples / contacts	The use of Integrated Assessment computer models for Public Participation has been evaluated within the European Research project ULYSSES. IA model were applied within focus groups to allow informed citizens to express their judgement on climate policy ² . The qualitative SCENE model has been applied in the Netherlands, for strategic vision development for the Province of Limburg, to underpin a sustainability-monitoring tool for the province of North-Brabant, and to derive a set of monitoring indicators for the city of Maastricht ³ .
References	¹ Rotmans, J. and M. B. A. van Asselt (2001). "Uncertainty in Integrated Assessment Modeling: A labyrinth path." <i>Integrated Assessment</i> 2001(2 - special issue edited by RMNO): 43-55. ² http://www.zit.tu-darmstadt.de/ulysses/ ³ Grosskurth, J. and J. Rotmans (2003). "The SCENE Model: getting a grip on sustainable development in policy making." <i>Environment, Development and Sustainability (submitted)</i> .

¹⁴ Phases (see Guidance document for PP Annex 1) : 1- Starting organization 2- Actors analysis, context 3- diagnosis of the current situation 4- search of solutions 5- implementation, evaluation

Annex 3 : Summary of the Pool of Questions

This annex summarizes the whole Pool of Questions presented in a separate document (Craps and Maurel ed. 2003).

Here are presented the guidance for the charting procedure (Annex 1 of the Pool of Questions), the guidance to fill in the tool index card (Annex 2 of the Pool of Questions) and a checklist of the questions (Annex 3 of the Pool of Questions).

The following persons contribute to elaborate the Pool of Questions :

- USF-Osnabrück : Claudia Pahl-Wostl
- T.U.Delft : Bert Enserink, Erik Mostert, Dille Kamps
- K.U.Leuven COPP : René Bouwen, Marc Craps, Art Dewulf, Silvia Prins, Tharsi Taillieu, Edward Van Rossen
- Cemagref-Montpellier : Annabelle Boutet, Flavie Cernesson, Nils Ferrand, Patrice Garin, Pierre Maurel
- WL/Delft Hydraulics : Peter Gijsbers
- Colenco Power Engineering Ltd. : Liane Schlickerieder
- ICIS-Maastricht : Joerg Krywkow, Pieter Valkering
- WRc : Jodie Thorne

Annex 1 of the Pool of Questions : Guidance to fill in the synthetic process chart

This document gives the main rationales and rules for filling in and using the synthetic process chart for HarmoniCOP. This chart (figure 3) is a graphical representation of the collaborative decision making process, including the use of different Information and Communication Tools (IC-tools) and the evolution of Social Learning (SL) meanwhile. It is hereafter called “the chart”. It is designed for use in the context of HarmoniCOP WP5, and follows the results of WP2 and WP3. It complements the combined WP2/WP3 “Social Learning Pool of Questions”.

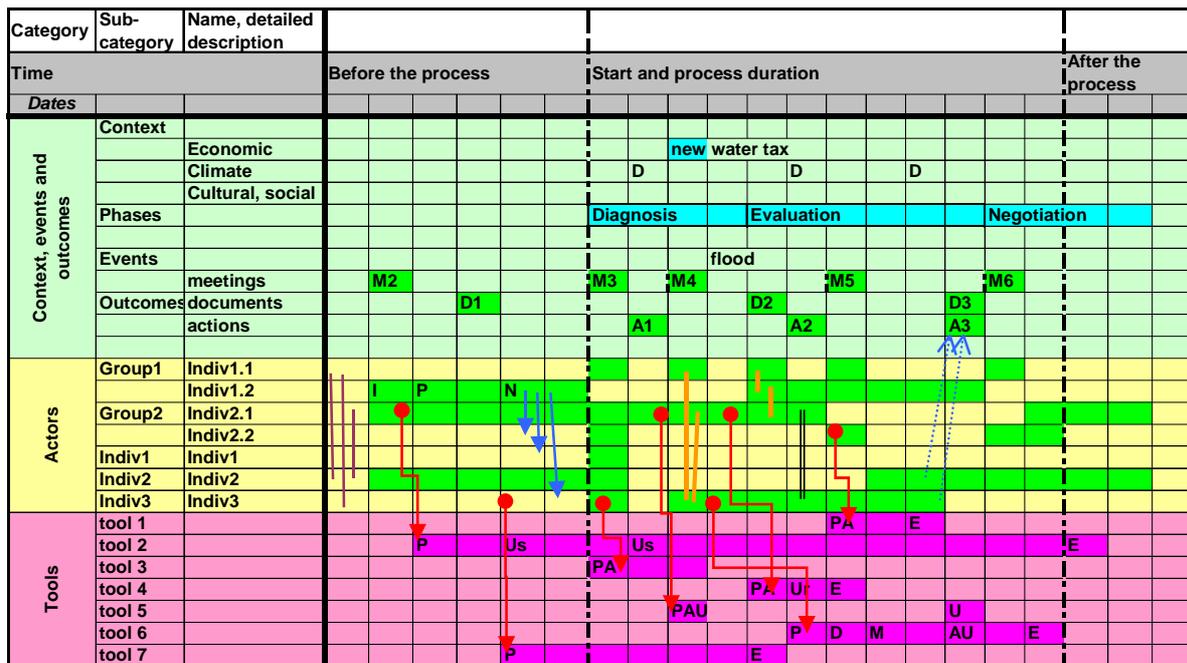


Figure 3: Synthetic chart of the whole process

Objectives of the chart

The chart is an “information processing support” for the collection and analysis of information about different decision processes related to RBM.

The chart is designed to support and facilitate :

- **Organizing** : the collection and organization of the data and knowledge about a RBM or policy process, for its different dimensions : context, events, actors, tools, achievements
- **Showing** : the presentation and discussion about a specific case, between the analysts and with the stakeholders
- **Interviewing** : the collection of information from different interviewees or groups, as a base to be filled, criticized and discussed during the meetings
- **Comparing** : the comparison and classification of different cases

It is a general model of the process (incl. conventions for drawing and relating facts) and not a specific artefact. Adaptations and modifications are possible by the analysts. It is not based on a specific knowledge management tool, although an Excel™ base is proposed for efficiency (Time or project charters like MS Project™ could also be used, as well as dedicated infrastructures). It is to be considered as an “information processing support”.

General presentation

The chart has a main time dimension expressed horizontally: it shows the evolution of different process properties from “before” to “after” the assessed processes.

It has three main parts (“blocks”):

- context, events and phases
- stakeholders and community participation in the process
- IC-tool use

Each part is filled with the relevant information, using a mixed textual and graphical conventional language. Information from the different parts can also be related to each other.

The chart should show how processes, facts and actions occur in time, and how they relate or organize themselves. It should clarify for instance :

- which roles were played by the different actors in the process, and how they introduced the tools
- which tools were used for the different phases or meetings of the process

For a given case, there can be different versions of the chart. Each version can show a different “view” on the process, according to a participant. Therefore, there are three ways of filling in and using the chart :

- the analyst can fill it on his or her own, using various archives and knowledge he/she collected in an informal way
- the analyst can fill a version representing the specific perspective of one single participant in the process
- the analyst can aggregate and synthesize different perspectives in order to give a more complete overview of the process

The last option is the one that should be chosen for comparative objectives. However it requires a precise methodology to combine the different views. A practical approach is to start with version 1, then discuss and improve it in an incremental way with different interviewees, and by the end come to a synthetic form.

How to fill up and use the chart?

Some general rules

The analyst should gather and organize as much data and information as he can, prior to any interview. He/she must fill most of the chart him/herself and then get feedback and completion from the interviewee.

The analyst should keep track of the different “views” expressed by different interviewees, even if they seem contradictory

Together with the chart goes a supporting document (called “notes”) including all related materials, comments and notes. It defines more precisely the elements of the chart, and gives more space for an extensive description of the charted pieces.

The first column of the chart is for general categories of information, the second for sub-categories (can be modified), the third for naming the different parts or elements.

The process itself is the following :

Time closure

The analyst will specify the effective starting date of the process (it doesn’t need to be exact, but notions like “before” and “after” must be clear). The period “before” will be also

described, especially for known previous relationships between participants, and background context. There should be some flexibility as participants can partly disagree on the notion of “start”.

If the process has supposedly finished, then the “end” date should be specified. The period “after” until the present will be kept for assessing long term effects.

In most cases, it will be interesting to include a “future” period for which participants eventually can express their expectations.

As much as possible, events will be dated.

Before, start, duration, end and future of the process will be dated in the first line of the chart

Defining the phases

As for the general “SL Pool of Questions” different phases in the process can be specified and used for further and convenient reference. The notion of phase is very subjective, but it can be based on official phasing, types of process, kinds of social relationships, issues addressed, context, etc... Phases will be named and described in the notes. The analyst will state a reasonable consensus between the different proposals of interviewees.

Phases can overlap.

Phases will be named in lines in the “context, events, phases” block of the chart, third column.

Specifying the events

Based on the media archives and all available materials, together with proposals from interviewees, the analyst will make an inventory and name all the main events of the process, of different kinds, e.g. :

- meetings
- official decisions and agreements
- public statements or declarations of some parties in the media
- effective actions (e.g. building infrastructure)

Events are single dated. There is only one event by column so that further indications of occurrence can be related to that event, using its column.

Events will be named and numbered in notes and will be put in the “event” line of the chart at their date of occurrence. A coloured spot is inserted at the date, with the label.

Describing the outcomes and deliverables

During the process, different outcomes and deliverables are produced: reports, agreements, stated decisions, actions on the field. Their occurrence are often milestones in the process.

Outcomes and deliverables will be named and listed in its sub-block, at their date of delivery.

Describing the context

The main features of the context will be specified, according to common knowledge and clues indicated by the interviewees.

Contextual events or processes (trends) can be:

- climate : droughts, storms, perceived trends
- environment and water : floods, pollutions, scarcity, river landscape evolution, etc
- economic : changing prices of the water, the agricultural goods, incentives, taxes
- political and institutional : new decision framework, general regulations, policies
- social and cultural : changing opinions, public demonstrations, emergence of active NGOs

The context will be described and numbered in the notes and main features will be indicated in the time chart as a box or plots

Listing the actors

All participants of the process will be listed and named. For corporate actors, the overall organization is named, and main participant representatives are named and listed. It is known that differences and even conflicts can occur between representatives of the same corporate body. However quite often the persons are not distinguishable from their organization.

Put the actor names in the third column in the block “actors”

Listing the IC tools

As for the other parts of the analysis, all the Information and Communication Tools that have been used will be named and listed.

List the tool names in the third column in the block “tools”

Charting the IC tool use

During the process, IC Tools can be :

- Proposed : P
- Discussed : D
- Accepted : A
- Refused : R
- Modified : M
- Used for showing and discussing the water issues (substantive knowledge) : Us
- Used for improving mutual knowledge : Ur
- Used for communication and exchange : Uc
- Criticized : C
- Abandoned : E

If limited information is available, then only “used” is charted.

If applicable, each type of operation in regard to a tool is charted with its initials at its known date. Colour the cells.

Charting the actor participation

During the process, actors can :

- be outside the process, not acknowledged to be aware of it : (nothing in the chart)
- be interested, be aware of the process : I

- ask for participation, request information about the process : R
- be introduced by another participant : P
- participate only through listening : L
- participate through information or opinion providing : S
- participate through discussions, exchange and negotiations : N
- implement or act in response : A
- resign from the process : E

Put colour in all cells where the actor is active in the process. Denote a letter when a related state is known to be the case.

Charting relationships between actors

Relevant relationships between actors are described according to their known interactions outside and inside the process arena:

- they speak together : S : orange link
- they work together : W : brown link
- they exchange or sell each other goods and resources : M : pink link
- one introduces the other's participation : I : blue directed arrow
- one denies other's participation : D : blue dotted directed arrow
- a strong conflict appears between them : C : double lined black link

For the most important actors and "strong" relations, chart them vertically as a link between the actor lines, with a label and at the date of known occurrence. For long term relationships, chart them at the earliest.

For all relationships, specify when they disappear with a similar link to the first, but in dotted line and the same label.

Use different colours for different types of relations.

Charting actor roles with the IC tools

IC-tool operations can be promoted or prevented by some actors, especially the introduction of a tool. Actor IC-tool operations are :

- Introducing : I
- modifying : M
- refuting : R
- organizing and controlling : O
- dismissing : E

Each actor tool operation is charted as a vertical line between the actor line and the tool line, at the date of its main occurrence, and with an attached label.

Charting tool roles for different events

The use of some tools for specific events is directly charted by the existence of a coloured block in that tool line at the column of the event.

Other elements

The analyst can use other kinds of representations or chart different elements, as long as he defines the definitions and rules of the charting.

The practical protocol

There are three main ways of collecting and charting the information :

- using usual interview method based on semi-open discussions and design the chart afterwards on the computer
- using a paper chart, pre-filled, and use “post-it” and different strings to include and organize the elements – synthesize on computer a posteriori
- work with the interviewee directly on the computer

The second method is usually preferred as it is the most convenient and friendly with the interviewee.

Although it is not included in the main protocol, the analysis can be conducted with a group of participants, charting together during a discussion, if the analyst feels like doing it.

Comparing and classifying the charts

The main directions for comparing and classifying the charts will be proposed after the first collections have been made. However the following features are supposed to appear :

- centralized processes with a strong control of a limited number or a single actor
- distributed processes with sub groups and delegations
- exploratory processes with many tools used each for a short time
- processes with very few tools used
- strong effect of a tool in facilitating discussion and exchange

Annex 2 of the Pool of Questions : Guidance to fill in the IC-tool analysis index card

What?

To describe technical aspects of the IC-tools and their usage situation:

- nature of tool
- how common is the use of the tool
- sustainability of the IC-tool.
- nature of the output
- management of uncertainties

Why?

To supply technical characteristics of the tool to understand which parameters may restrict or encourage its acceptability by the users.

How?

By interviewing the technical support /facilitator, and/or the project manager, literature, www review, ICTool test.

The results can be synthesised in an IC-tool analysis index card. This card contains 5 sections:

- General characteristics: type, degree of complexity, availability, current stage of development
- Main functionalities: the IC-tool uses are defined according the context of the participatory process. Four different kinds of functionalities are *a priori* proposed:
 - information and knowledge management
 - interaction support
 - perspective elicitation
 - simulation.

These functionalities represent the potentialities of the tool. It will be possible to observe a difference between the potentialities of the tool and the effective use: restrictive use, or use of an another function. A comparison between the IC-tool Index Card and the Event Index Card should visualize this gap.

- Sustainability: realization of conditions necessary to guarantee a minimal sustainability of the IC-tool: direct use by the actors, support to the user, degree of openness, and management of the monitoring/reporting or tracability.
- Output description: contents and formal aspects
- Management of uncertainties: the information is rarely an original quantitative data set, it is necessary to clarify the “fuzzy” nature of the information, that means the uncertainties associated to this information. Understanding uncertainties and their impact on the RBM, and dealing with them adequately in a decision process is a real issue for SL, and IC-tools can fullfill eventually an important function in this.

To each section of the card corresponds a very simple table to be filled up. There are 4 possible answers:

- “yes”
- “no”
- “missing” if you don’t know or you don’t have the information
- “irrelevant”, because some questions are specific for computer-based tools, and so they are inadequate for the other types.

At the end of each section there is a space to put “comments”. Some questions are suggested.

The IC-tool index card is already available on an Excel spreadsheet. Some terms are defined in the comments (red little triangle in the right upper corner of the corresponding cell). A list of these comments is also available at the end of this paper.

Case study :	ICT name :
Author :	Date :

General description: Complete tables by putting "yes" in cell corresponding to the studied ICTool or "missing" near the title of the table when you haven't the information.

Complexity:

Single	
Integrated	

Availability:

Free-to-use product	
Commercial product	
Research product	
Other	

Current stage of development:

Research prototype	
Pre-operational tool	
Operational tool	
Other	

Type

Questionnaire		Conceptual model		Interactive board [2]	
Opinion polls		. For (geographical) database		Information system	
Management of comments		. System dynamics		Spreadsheet (ex : Excel)	
Spatial représentations		Actors analysis [2]		Geographic Information System [2]	
. 2D or 2,5D [1]				Group support system [2]	
Maps [2]		Role playing game[2]		Scenario tools [2]	
Field or aerial photos		Board game [2]		Multicriteria analysis tool [2]	
Satellite imagery		Internet tools		Integrated assessment models [2]	
Perspective view		. Web information		Simulation tool	
Diagram block		. Forums and communities		Decision Support System (DSS)	
. 3D landscape scale model [2]		. CSDM [3]		Others :	
Cognitive mapping		. Web mapping			

Comments : if possible, precise the media to support the use of the tool, the cost if it's commercial product, if it's an usual tool or still innovative...

- [1] 2,5 D : Perspective view
- [2] An index card presenting the tool exist in the annex 2 of HarmoniCOP WP3 report
- [3] CSDM : computer supported decision making
- [4] Information and knowledge management : tools used to store, retrieve, visualise, disseminate information
 - collect/ structure information /knowledge : choice of the format, associated metabase
 - show information/knowledge : included, statistical or spatial analysis function
- Interaction support : tools used to improve communication, bring the individuals together
- Perspective elicitation : behaviour of stakeholders, game and role play tool...
- Simulation: dynamics of RB : social, economic, environmental aspects

.../...

Main functionalities: Complete all the cells by putting "yes", "no" or "missing" according to your analysis [4]

Information & knowledge management						Interaction support	Perspective elicitation	Simulation		Others
Collect & structure info / knowledge			Show info / knowledge				Play the situation	Simulate impact	Optimize solution	
About the environment	About others / social	About procedure	About the environment	About others / social	About procedure					

Comments :

Sustainability, maintenance, documentation: Complete all the cells by putting "yes", "no", "missing" or "irrelevant" according to your analysis.

Does the use of the tool necessitate :

. a facilitator ?	
. a technical support (computer specialist) ?	
. others ?	

Degree of openness :

Is it easy to add new data, information ?	
Is it easy to modify data, information ?	

Support :

Does an user's support exist ?	
--------------------------------	--

If user's support exists, fill in this table

Does the supplier provide :	
. Corrective maintenance ?	
. Evolutive maintenance ?	
Does an On line or off line help exist ?	
Does an User guide exist ?	
Is some training sessions organized ?	
Does a Technical assistance exist ?	
Does a Web site exist ?	
Does a User forum exist ?	

Comments:

Management of the tracability:

Does a follow-up of the data, information collecting exist ?	
Does a follow-up of the data, information processing exist ?	
Does a follow-up of the conditions of the use of the tool exist ?	
Does an another follow-up exist ? Which one ?	
Who did it ?	
Are reports produced ?	
Are minutes produced ?	
Are specific documents about metadata produced ?	
Others ?	

.../...

Output: Complete all the cells by putting "yes", "no", "missing" or "irrelevant" according to your analysis.

Are the contents of the output

Facts and objective presentations ?	
Opinions / emotional appeals ?	

Are the uncertainties of the data present ?	
---	--

Form's aspects:

Text		1D		Static	
Table		2D		Animated	
Chart		2.5D [1]			
Photo		3D			
Image					
Mmap					
Conceptual model					
Mathematical model					
Other					

Comments:

- Are the outputs dynamically linked together ?
- Can the user control the speed of the dynamic representations or interrupt it ?
- How is uncertainty represented if it exists ?
- Is the anonymity of the contribution guaranteed ?

Management of uncertainties: Complete all the cells by putting "yes", "no", "missing" or "irrelevant" according to your analysis.

Is the ICT unable to do it ?	
Is it through metadata ?	
Is it through different perspectives in the case of local or expert knowledge ?	
Is it the range of confidence directly in the data set (mean, max, probability, ...) ?	
Does an approach exist to analyse the propagation of uncertainties during the process ?	
Other way?	

Comments:

Annex 3 of the Pool of Questions : Short checklist of Social Learning and IC-tools questions

CONTEXT

Description of the main characteristics of the socio-historical and geographical-natural context in which the case study takes place.

Governance system

The concept “governance system” refers to the socio-political setting that allows the effective planning and management of activities that affect the RB.

Stakeholders

- *Which actors are involved in RBM and/or are affecting the river basin in a significant way?*

Actors involved in PP

- *Which actors are currently involved, or have been involved, in a Public Participation process concerning RBM?*

Formalized and/or legal context

- *What are the main public policies and legal standards regulating the roles of the different actors in the RBM, their relations and the procedures to be followed?*

Informal actor relations

- *How are the informal relations between the stakeholders related to the river basin, at the start of the case under study?*

Physical system characteristics

- *What are the main physical characteristics of the river basin and of the problems or issues under consideration in this study?*

The social construction of a river basin

- *What are the main opportunities and/or problems of the river basin, as identified by the different actors?*

Experts and public in RBM

- *To what extent do the problems to be solved require data and knowledge from expert and non expert actors ?*

Authorities and stakeholders in RBM

- *To what extent authorities are willing to share their decision making power concerning RBM with other social actors?*

PROCESS

- *How do the interactions between the stakeholders and the RBM issue contents, they deal with, evolve in the period defined for the study?*

Relational practices

- *To what degree and in which way do the critical events in the RBM process demonstrate characteristics of “relational practices”?*

Relational practices are defined as: task-centred actions with relational qualities of reciprocity and reflexivity, enabling all relevant stakeholders to connect with a shared domain, in a meaningful way for themselves and for the rest of the group.

Social involvement

The framing and reframing of a problem domain

- *How does the framing of the problem domain and its issues develop or change throughout the process?*
- *Can moments of reframing (significant changes in how the issues are defined) be identified?*
- *By “frames” we mean here the conceptual entities and their interrelationships that are used by actors to describe an aspect of reality in such a way that it gets some sense for them, and becomes an issue to be dealt with.*
 - Boundary management between in-group/multiparty group (representatives and constituencies)**
- *How is the relationship between the individuals participating in the inter-organizational conversations and negotiations on RBM and their constituencies?*
 - Negotiation strategies**
- *What are the (mostly implicit) negotiation strategies with which the actors participate in the meetings concerning RBM?*
 - Interaction ground rules**
- *To what extent do the parties agree on and adopt working methods likely to support an effective participation of all those willing to participate?*
- *Is there some implicit or explicit procedure on the way PP will be conducted?*
 - Leadership and facilitation roles**
- *How do the participants define the roles in the RBM for themselves and for the others?*
- *How are different roles assigned to each of the actors?*

Leadership:

- *How is leadership enacted in the multiparty RBM process?*
- *In which way does this favour or complicate SL?*

Facilitation:

- *Are there (professional) actors “facilitating” the process? That means here: do they have an explicitly recognized function of contributing to the (SL) process characteristics of the RBM? How do they (and the others) describe their role, and what is the effect of their presence/absence on the process?*
 - Allocation of resources, with special attention to IC-tools**
- *To what degree do the stakeholders dispose of the resources necessary to participate in a credible way in a joint RBM process?*

Content management

- *What are the concrete challenges and practical-technical problems with which the actors are confronted in relation to the river basin?*

OUTCOMES

Evaluation of the social-relational and technical qualities of the outcomes of the process.

Relational outcome qualities

- *To what degree the multistakeholder group involved in joint RBM can demonstrate evidence of its enhanced capacities to deal constructively with its internal diversity and interdependence?*

Influence of IC-tools on relational quality outcomes.

- *Which are the potentials and the limits of different types of IC-tools in a given context concerning the communication and relations between the participants?*

Technical outcome qualities

- *To what degree and in which ways a better RBM can be attributed to the collaborative efforts of a multistakeholder group?*

Influence of IC-tools on technical outcome qualities

- *What is the impact of the IC-tools used on the capacity of the involved actor network to resolve the substantive river basin issues?*

IC-tools usability

- *How did the perceived ICTools usability among the participants evolve during the process?*

REIFICATION OF RESULTS AND FEEDBACK IN CONTEXT

- *In which way and to what degree have the outcomes of the process under study had repercussions on the governance system of the RB?*
- *Are there lasting effects of the process under study on the physical qualities of the RB (water quality, quantity, biodiversity)?*

Geographical scope and organizational levels

- *Which effects do the actors report from their participation in direct, face-to-face contacts (e.g. interorganizational task-group) on higher levels of aggregation (coordinated behaviour between organizations, networks, regional and basin planning, etc.)?*

Stakeholder participation and the public at large

- *To what degree and by which mechanisms the public at large has been involved in the RBM process under study?*

Annex 4 : Contributors

This report is the result of discussions between all HarmoniCOP partners in the consortium and in-depth work between WP3 partners. The Pool of Questions is the result of a concerted action between WP2 and WP3. The report has been edited by Pierre Maurel. The co-writers are the following persons :

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