Some Methodological Concepts to Analyse the Role of IC-tools in Social Learning Processes

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Abstract: The Water Framework Directive requires to include public besides the water experts and policy makers into development and implementation of River Basin Management (RBM) plans (see Article 14). In such a context, the EU research project HarmoniCOP, studies a method to improve Public Participation based on Social Learning (SL) concepts. SL refers to the growing capacity of a social network to develop and perform collective actions. The different stakeholder groups in a basin are supposed to realize that a complex issue such as RBM can be better resolved in a collective way, taking account the diversity of interests, of mental frames, of knowledge and relying on disseminated information and knowledge. Information and Communication tools (IC-tools) can play an important role to support the Social Learning dimension of the Public Participation. This paper presents a HarmoniCOP project synthesis of the definition of different concepts and proposes a framework of analysis. A first part consists in a preliminary qualitative characterization of the role of the IC-tools stemming from a bibliography analysis. Twenty IC-tools are already inventoried and four criteria are proposed: communication direction, public size, usage purpose (management of information and knowledge, elicitation of perspectives, interaction support and simulation), phases in the PP process. A second part presents a framework of analysis based on a joint approach of psychologists and engineering sciences experts. This framework will be tested in a number of empirical investigations to assess the tools used in historical and real-time case studies from three perspectives: their technical characteristics, their impact on PP and SL and their usability as perceived by the users. Finally, we present some perspectives concerning expected outcomes of the HarmoniCOP project.

Keywords: IC-tools; Public participation; Social Learning; Water Framework Directive

1. INTRODUCTION

1.1. The Water Framework Directive and Public Participation

In Europe, the Water Framework Directive (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. One of the five main instruments that will be used to reach this objective is Public Participation (PP).

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.*"

First of all, we have to define the terms "public participation" and more precisely "active involvement of interested parties".

PP can generally be defined as allowing people to influence the outcome of plans and working processes. Several benefits but also drawbacks can be expected from PP, as described in a recent synthesis [Drafting Group 2002, Mostert 2003]. This synthesis also shows 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.

Different levels of PP may be considered, based on [Arstein 1969]'s "ladder of citizen participation":

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.

"Active involvement" integrates here levels 4, 5 and 6.

Several types of public 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 may have some influence on its outcome. The guidance document for PP related to the WFD proposes a typology of stakeholders involved in River Basin Management (RBM): professionals, authorities and elected people, local groups and non-professional organised entities 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).

For the "public", levels of PP 1 and 2 only are required by the WFD and levels 3 and 4 may be considered as best practice and should be encouraged. For the "stakeholders", level 4 is the minimum required by the WFD and levels 5 and 6 have to be promoted.

1.2. Social Learning in the HarmoniCOP Project

Considering the interest as well as the limits of traditional PP, the EU research project HarmoniCOP[1] studies a new approach of PP called Social Learning (SL) which promotes collective actions within social networks [Craps et al. 2003a]. This concept is represented in figure 1.

RBM is considered as a social-relational activity [part 2.2 of figure 1] (interests, water practices, information, knowledge, funds spread over many actors) and a complex technical task [2.3], both cannot be separated. SL corresponds both to this participatory social/technical process [2] as well as to the outcomes of this process [3]. It takes place in a specific context [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 [4]. This collective problem solving approach requires that the actors meet each other, develop relational practices [2.1].
The quality of these relational practices is fundamental from a SL perspective: The different stakeholder groups in a river basin learn to take into account the diversity of interests, of mental frames, of knowledge and relying on disseminated information and knowledge, and may be realize that complex issues like RBM are better resolved then.

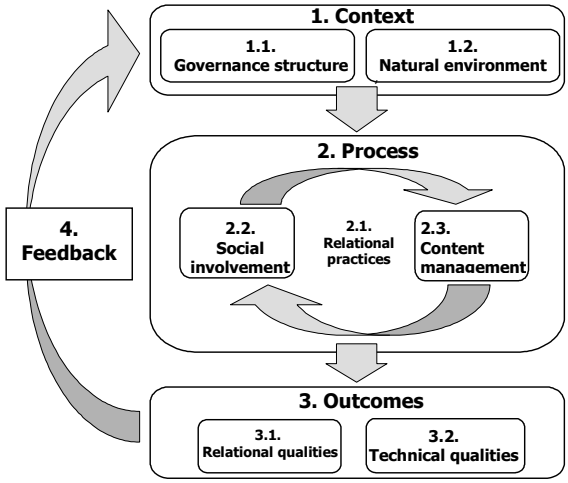

Figure 1. Graphical framework of the Social Learning concept in HarmoniCOP

2. IC-TOOLS AS FACILITATING MECHANIMS FOR PP AND SL

This context 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 2004, Woodhill 2004]. 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 2002].

2.1. Definition of IC-tools in the context of SL

Within HarmoniCOP project, an **Information and Communication Tool** (**IC-tool**) 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 through two-way communication processes.*

The term "information" is used here in a more general meaning than its strict definition. It also includes data, knowledge and points of view that are exchanged between actors on a given issue.

[1] HarmoniCOP - Harmonising COllaborative Planning - http://www.harmonicop.info/

The term “communication” can be defined here 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.

2.3. List of IC-tools

After a literature review and a comparison of usage situation in the different countries involved in HarmoniCOP, a list of tools has finally been established (see table 1).

Artefacts	**Info System / Software**
- Questionnaire*	- Information system
- Maps*, photos, images	- GIS*
- 3D scale model*	- Scenario tool*
- Conceptual models	- Multicriteria analysis tool*
For data base	- Simulation tool
For systems dynamic	- Spreadsheet
- Cognitive mapping tool*	- Decision Support System
- Actors mapping tool*	- IA models*
- Management of comments	- Internet
- Role playing game*	- Web information
Devices	- Forum communities
- Interactive white board*	- CSDM
- Board game*	- Web mapping
	- Group Support System*

Table 1. List of IC-tools
* an IC-tool index card is presented in [Maurel 2003]

3. 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.

3.1. Communication direction

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

3.2. 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.

3.3. 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 and used within “transitional spaces” [Craps et al 2004] that cross the boundaries between communities of knowledge and of practice. To be able to fulfil this function, an IC-tool should have all or part of the properties of what [Star et al 1989] call *boundary objects* and [Vinck et al 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 larger number of solutions found and evaluated, development of trust, increase of knowledge).

- Interaction support
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. It 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 Assesment models, qualitative modelling techniques.

3.4. Phases in the PP process

We have 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, and two additional phases: 5) implementation and 6) follow-up and feed-back.

A first qualitative classification of IC-tools using the four criteria previously described and a three level scale (0: low interest, 1: medium interest, 2: high interest) is presented in [Maurel 2003].

4. FRAMEWORK OF ANALYSIS

The following framework of analysis is based on a joint approach of psychologists and engineering sciences experts. It will be tested in 2004 and 2005 in a number of empirical investigations to assess the tools used in historical and real-time case studies (HarmoniCOP WP5).

The evaluation criteria are derived from HarmoniCOP discussions and from literature on the evaluation of PP [Webler 2001], on the evaluation of tools [Ubbels et al 2000], on the factors of technology acceptance and usability [Legris 2003], and on participation in integrated assessment and modelling for the environment [Pahl-Wostl 2002].

Based on these criteria, a list of questions and their underlying assumptions have been produced and included in an instrument called “Social Learning Pool of Questions” (PoQ) [Craps et al 2003b].

The PoQ consists of three layers:
- 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 figure 1.
- Why : A short explanation of the underlying assumptions for these questions.
- How : Examples of concrete and clear questions that can be used during the interview of stakeholders.

Within the PoQ, IC-tools will be analyzed from three perspectives: their technical characteristics and usage situation, their impact on PP and SL and their usability as perceived by the users.

4.1. IC-tools characteristics and usage situation

A charting procedure, included in the PoQ, has been established to facilitate the collection and analysis of information [Ferrand et al. 2004].

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:
- **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 tool: direct or indirect use by the actors, availability of use support, degree of openness, and 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.) Therefore, an important function of IC-tools is to be able to handle and to communicate uncertainty.

The stake is to convince all participants that the decision process is at least as important as the decision output, because the output will have to be modified in the future due to uncertainty.

4.2. Impact of IC-tools on PP and SL

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 SL.

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

Our assumption is that IC-tools 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).

Another point is that 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 (i.e. thesaurus, database dictionary, ...).

The last assumption is that participating in the co-design of an IC-tool facilitates the acknowledgement of both expert and local knowledge and offers a positive context for bi-directional communication and mutual understanding. A distinction will have to be made between tools that are imposing and structuring certain interaction characteristics, and tools that leave more freedom among participants.

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.

We also expect that the quality of the relations among the actors is reflected in an enhanced quality and satisfaction with the technical outcomes of the process; and the other way around: the better the joint technical solutions, the more the actors get motivated to invest in their interaction.

4.3. 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).

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.

5. PERSPECTIVES

A first perspective concerns the lessons that will be learned from the national studies (HarmoniCOP WP4) and the historical and real-time case studies (HarmoniCOP WP5) analysed through the Pool of Questions. The results will shown 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 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 IC-tools and their impact on SL.

A second more practical perspective derived from the previous one concerns the production of a handbook. It 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.

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