

Scientific report for STSM within the COST Action FP0804 FORSYS

COST STSM Reference Number: COST-STSM-FP0804-9739

Period: 2012-05-27 to 2012-07-21

COST Action: FP0804 Forest Management Decision Support Systems (FORSYS)

STSM Applicant: Valentina Ferretti, Department of Regional and Urban Studies and Planning, Politecnico of Torino, Italy (valentina.ferretti@polito.it)

STSM Topic: Overcoming challenges of integrating DSS in strategic collaborative forestry scenario development

Host: Luc Boerboom, Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, the Netherlands (boerboom@itc.nl)

1. Purpose of the visit

The main purpose of the STSM was to develop a case study report (Yin, 2009) describing (i) the decision process development for the Regionale Waldbauplanung Rheinland Pfalz – Regional Forestry Planning Rhineland Palatinate (ReFoRP) project, (ii) the way in which a collaborative DSS changes the planning process, and (iii) the selection and embedding of a series of forestry decision support systems and methods (e.g. forest growth systems, forest function assessment, forest evaluation systems) to address different planning and decision problems in the overall decision process.

Commonly use of Decision Support Systems is considered as a technology adoption process. However, a lot of implicit requirements are embedded in these complex tools to make them successful or fail in decision processes. Therefore it would be better to consider them as products of networks of people, other products, rules, regulations, policies, institutions, etc. Consequently developers are not only supposed to look at the output that is desired, but also at the embedding in these networks. They would thus look into the institutionalization of the decision support technology in decision and administrative processes. At the same time, they would also look into the drift of existing institutionalized methods, tools and approaches, that could move out of a network.

In this case study we use Actor Network Theory, that has been developed to understand the interaction between technology and society, to understand how DSS development could change if we would not only consider the output of a DSS. Actor Network Theory is thus an alternative

framework to identify and examine the extended collection of actors and interactions associated with a collaborative DSS development process.

The STSM thus aimed at addressing the third FORSYS objective (i.e. to evaluate the requirements put on the development process and design of forest DSSs by the problem specific context. Key to this objective is the identification of basic elements that makes model development a unique endeavour in each case. Elements pertain to dimensions such as time, space, owners, resources, and involved attributes/objectives. Deliverables include recommendations on how to arrange for a problem- or project-oriented development of forest DSSs).

2. Description of the work carried out during the visit

The work plan of the STSM has been divided into two tasks.

The first period (June) of the visit to Enschede was dedicated to the systematization of the key concept of the Actor Network Theory that has been used to study DSS institutionalization in forestry practice. Furthermore, a first “panorama” of the actors (both humans and technology) involved in the ReFoRP project has been draft in the form of a Prezi presentation.

On the basis of the performed work, the second period of the STSM (July) was dedicated to the preparation of the presentation for the meeting with the experts from different sections in the Ministry who have contacts with external agencies and organizations in order to validate the first draft of the proposed network of actors in the ReFoRP project. The discussion with the stakeholders focused on the experience and validity of the decision process and outcome.

On the basis of the studied information, the structure of a scientific paper concerning the DSS institutionalization in the forestry sector from the Actor Network Theory perspective has been drafted. The case study findings will thus be proposed for publication in a peer reviewed academic ISI journal.

3. Description of the main results obtained

The most important results of the STSM consist in:

- (i) the study of the Actor Network Theory (Latour, 2005) and in the subsequent organization of its key concepts into a table with definitions and examples of the fundamental concepts;
- (ii) the systematization of the information concerning the planning and decision-making process in the ReFoRP project until July 2012.

The above mentioned information has been organized according to the Actor Network Theory perspective, making also use of the concept of Thinklets for collaboration engineering.

The central question concerned the way according to which forest DSS get institutionalized in forestry practice.

From the methodological point of view, the Actor Network Theory sees technology as an actor made up of a network of human and other technology actors. A thinkLet is a named, packaged facilitation technique, captured as a pattern that collaboration engineers can incorporate into process designs, thus combining technology with process.

In order to trace the actor network “panorama” for the ReFoRP project, the prezi tool (www.prezi.com) has been used because it allows to visualize processes and elements and to zoom in and out, thus incorporating different levels of details into the work. Figure 1 provides a snapshot of the ReFoRP actor network, in terms of both actors and relations, with a zoom on the current planning practice procedure.

The main effort that we made to stick to the Actor Network Theory perspective was to keep everything flat, meaning with this that we did not differentiate between global and local. In trying to draft an actor network what is usually labeled as “global” has to be considered at the same level of the local, being just more connected.

In the ReFoRP project there is an ongoing planning process that has a high degree of predictability but, since new technologies and tools (web-based collaborative Decision Support System, ILWIS, Community Viz, touch tables) are being introduced in the current planning practice, it is particularly interesting to study the consequences of this innovation. This is why we chose to approach this task by means of the Actor Network Theory that is able to make analysis about how people and technologies interact.

The methodological approach to investigate actor-networks is to observe and record the interactions, connections and effects of actors involved in the process. The difficulty associated to this approach refers to the overwhelming multitude of possible interactions and circulating entities that constitute the actor-network.

Nevertheless, by concentrating firstly on the evaluation thinklet, we tried to understand the current environment in which the system has to be embedded by proposing an initial functional sketch (Figure 1) aiming at describing the whole actor-network.

We thus developed a sort of meta study of the process by identifying the actors involved and the relations among them.

We can thus describe the system in terms of actors (both human and non human), and more specifically in terms of *boundary objects* (e.g. the current planning standards and the technical standards), *obligatory points of passage* (nodes which act as intermediaries between networks or network components, exercising control over resources and claiming responsibility for the success of the network, e.g. the Ministry and Landesforsten), *centers of calculation* (these are locations where information is accumulated, processed and transformed in other information in order to yield

greater understanding, e.g. Landesforsten), *mediators* (these are actors that make other actors do unexpected things, e.g. touch tables for collaborative spatial analysis), and *intermediaries* (what flows between actors, e.g. spatial maps and scientific publications).

We have then tried to identify the relations among the different actors and we found *articulations* (e.g. the ReFoRP project structuring in terms of objectives and criteria coming from the collaborative Decision Support System methodology), *delegations* (e.g. from Landesforsten to the Forest Planning Unit in the current planning practice), *negotiations/translations* (e.g. between the Ministry and Landesforsten), *unpredictability* (e.g. the effect of temperature and rainfall envelopes on the current planning practice), *predictability* (e.g. operational guidelines).

The above described “panorama” has been shown to the experts from the different sections in the Ministry who have contacts with external agencies and organizations during the meeting that was held on the 19th of July in Koblenz.

3.1 Categorization of the case study according to FORSYS guidelines

With specific reference to the adopted methodological approach, Table 1 illustrates the categorization of the case study according to FORSYS guidelines (http://fp0804.emu.ee/wiki/index.php/Case_Study_Guidelines).

Table 1 Categorization of the case study according to FORSYS guidelines

Methodological approach	Case study categories
General type	Descriptive
Methods – case definition options	The application of DSS (possibly multiple) to a particular problem domain or to a problem type
Methods – data sources & collection methods	Documents, interviews, direct observation, participant observation
Methods – data analysis	<ul style="list-style-type: none"> - Working group themes (architecture, participation) - Regions: regional issues - Stages of development: development, adoption - Stages of decision making: intelligence - Users: researchers, developers, users, stakeholders
Reporting results	<ul style="list-style-type: none"> - General Possible audiences: academic, DSS developers, forest managers - FORSYS specific Add to wiki journal article

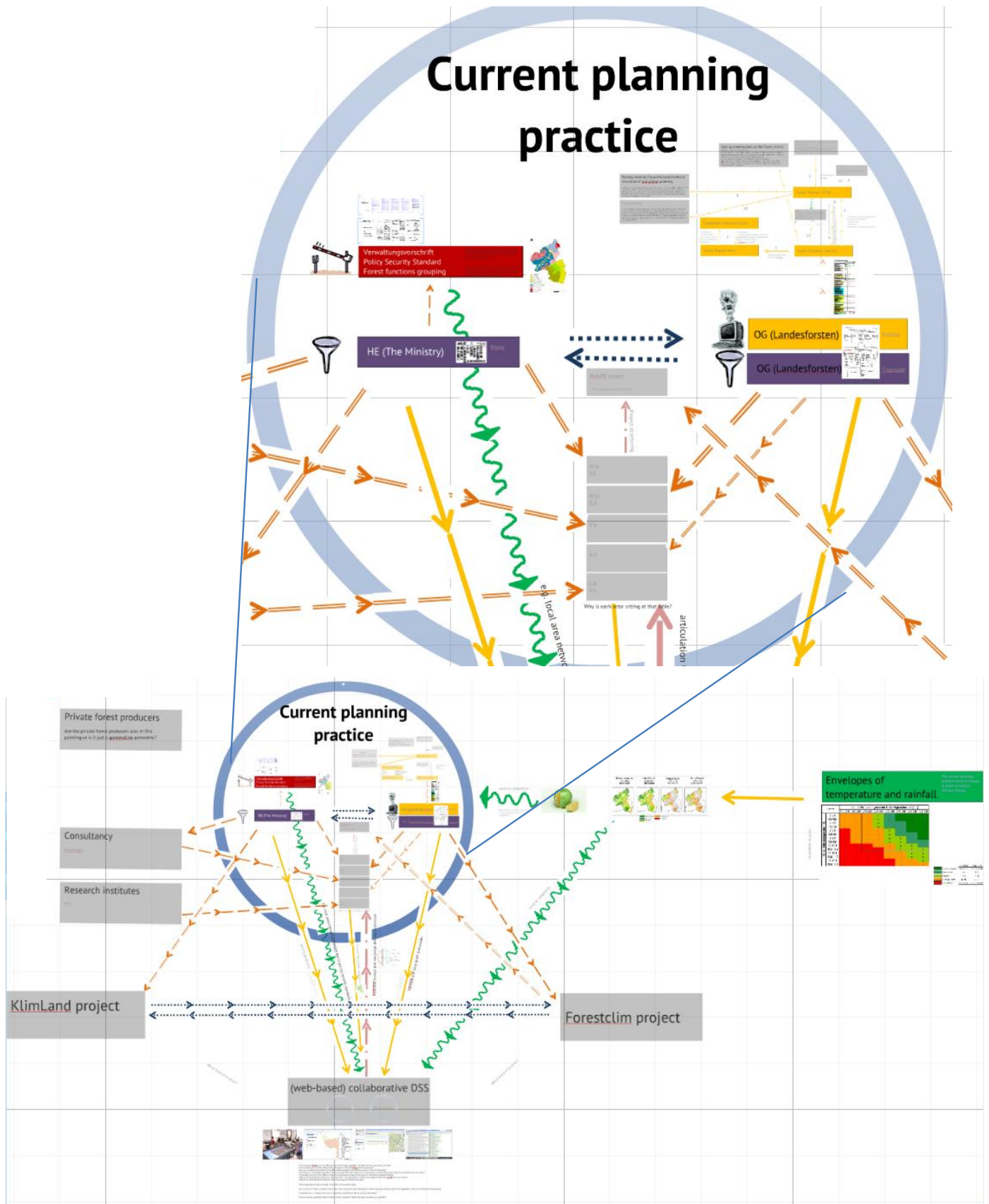


Figure 1 The actor network "panorama" in the ReFoRP project

4. Lessons learned

The presentation of the results of our systematization seemed to generate some positive results. First of all, the visualization of the “panorama” seemed to provide useful insights for the design of the subsequent steps of the planning procedure. For instance, the owners of the decision process realized that there was not link yet between the existing processes and the new ones within which the DSS needs to be used.

Secondly, the discussion of the different elements included in the “panorama” also allowed the different experts to gain better awareness about the whole planning and decision process. Moreover, the criticalities to be solved were highlighted and the role a collaborative DSS can play in shaping the planning process and changing the current practice started to become clearer (e.g. the actors involved in the decision process realized that they weren’t sufficiently clear on the use of technical specifications).

Thirdly, some preliminary directions for future work were discussed by those involved in the process based on a systematic tracing of the current interaction of actors. For instance, the actors involved in the decision process reviewed what they previously considered as stakeholders (based on the KlimLandRP project experience) and realized that those were not the kind of stakeholders needed in the ReFoRP project for the process we were looking at with the help of the actor-network “panorama”.

The research efforts have thus identified the factors that may play significant roles in affecting collaborative DSS institutionalization and implementation.

Future developments of the study refer to the investigation of the stability of the actor-network.

5. Future collaboration with the host institution (if applicable)

Depending on the financial possibilities of COST, a second STSM is desired by the applicant and host. Since the complexity of the issues being investigated is very high and requires intensive collaboration, a second STSM could be both very useful and interesting for writing a formal reference document in the form of a scientific publication. Furthermore, both institutes (ITC and the Politecnico of Torino) are interested in future collaboration.

6. Projected publications to result from the STSM

The applicant and host of the STSM are preparing a paper concerning the DSS institutionalization in the forestry sector from the Actor Network Theory perspective for submission to an international journal by the end of this year. The subject is very complex and requires intensive collaboration. It is thus difficult to properly address this complexity by working at a distance.

7. Confirmation by the host institute of the successful execution of the mission

See attached e-mail.

8. Other comments

I would like to greatly thank the Cost Office for allowing me to visit the ITC Institute.

9. References

Latour B. (2005), *Reassembling the social: an introduction to Actor Network Theory*. Oxford University Press, New York.

Yin R.K. (2009), *Case study research, design and methods*. SAGE Publications.