

THE ROLE OF SOCIAL CONSTRAINTS IN THE DESIGN OF RESEARCH  
NETWORK INFORMATION SYSTEMS\*

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ABSTRACT

Research networks demand methodological support for the design of adequate network information systems. These systems need to support strong collaboration, that is, the group production of structured artifacts. A typical group artifact for research networks is described: the group report. It is argued that specifying such an artifact in terms of key social constraints is a suitable specification approach for research network information systems. A case related to societal conflict mediation is introduced to exemplify and validate the methodological theory.

1.0 INTRODUCTION

A research network is a goal-oriented human network that focuses on facilitating the research process through the planning and conduct of research activities, and the dissemination and evaluation of results. In this way, they can help resolve a wide range of scientific and societal problems. A research network can be called a closed network if it focuses on furthering specific dogmas and a priori excludes certain relevant viewpoints and approaches. It can be called an open network, however, if it concentrates on carrying out multiple-perspective, opinion-generating and comparing research activities (De Moor, 1996a).

Especially when supported by appropriate applications of information technology, research networks can be very useful instruments for fostering scientific collaboration. Still, a problem with the current information technological support provided to (Internet-dependent) research networks, is that they need to compose adequate overall system functionality out of a wide range of quickly changing generic and unconnected information tools. Mailing lists, web sites, issue-based information systems, and many other tools have been developed, but it remains unclear how exactly they must be configured and connected to truly satisfy the diversity of the rapidly evolving information needs of the network participants. Therefore, a research network has a clear need for a network information system: a set of meaningfully combined and configured information and communication processes necessary to support and coordinate the activities of the network participants in their various roles. To develop this kind of

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system, a specification method is indispensable (De Moor, 1996a). Such a method is currently being developed in the RENISYS project (De Moor, 1996b).

The key issue is, of course, what we mean by *meaningfully* combining and configuring information and communication processes. In our opinion, meaningful specification of information systems for (open) research networks is only possible if done by the participants themselves, because only they have sufficient insight into which - often only subtle - functionality changes are needed and allowed. However, in the reality of daily work, user-driven system specification quickly shows a lack of focus and continuity in efforts. One of the reasons for this is that system requirements cannot be expressed in terms close enough to the users' experience. Thus, the specification method needs to be context-sensitive: network participants must be able to express relevant changes in the usage context in their own terminology.

However, what are *relevant* changes that bear a direct influence on the way the information system is designed? It is not useful nor possible to model all determinants of change in the world, therefore a selection of the most important determinants needs to be focused upon. We feel that the key to the solution of this restriction problem can be found in the goal-orientedness of research networks. These goals are determined by the need for strong collaboration: collaboration in which a group synergistically develops and improves a structured artifact more efficiently than would be possible by the same group of people working independently (Johnson and Moore, 1994).

Thus, one main function of the network information system is to support the efficient and effective group production of such structured artifacts. For a specification method to optimally enable users to adequately define the functionality of such systems, it is thus important to know the characteristics of these artifacts and their production processes. Therefore, we propose an approach in which users focus on defining a group artifact in terms of its meeting certain key social constraints. These can be defined as constraints on possible configurations and combinations of actors, objects and processes that are caused by the specifics of the usage context of the network information system, rather than constraints on the technological resources used. In the remainder of this paper, we will focus on a very important type of research network artifact, the group report. We will discuss how the selected core constraints must be grounded in social theory. This is illustrated by a case on (scientific panel reports on) deforestation in British Columbia.

## 2.0 A TYPICAL RESEARCH NETWORK ARTIFACT: THE GROUP REPORT

At present, the information tools used by most of the research networks communicating through the Internet are not capable of supporting strong collaboration. However, there are plenty of opportunities for improvement. One type of strongly collaborative network activity which could become the focal point of collaborative system development, is the writing of reports on issues relevant to the scope of the group. A group report is a prime example of a dialogic text. According to Harrison and Stephen

(1992) this is a type of text that, contrary to traditional collaborative texts, reflects the involvement of multiple authorial voices. When producing these kinds of artifacts, a key issue is the allocation of authority and accountability for the definition of authoring processes and their results, and thus ultimately for the design of the information system. To ensure that these constraints are sufficiently taken into account in the specification discourse, the definition of such group report writing processes should be grounded in social theory (De Moor, 1996a).

The production of (dialogic) group reports in open research networks can be seen as a kind of formation of public opinion on a topic. A preeminent writer about public opinion is the social philosopher Jurgen Habermas, whose main work is the theory of communicative action. The domain of social life in which public opinion can be formed is called the "public sphere". Habermas (1962) stresses some requirements for this public sphere: it must be accessible to all citizens, it must be possible to deal with matters of general interest without being subjected to coercion (freedom of assembly, freedom to express and publicize opinions). He explicitly stresses issues like the need for publicness and legitimation of authority. These social constraints lead to a number of epistemological constraints as well, which revolve around the relativity of "truth". Habermas (1984) prefers to talk about "rationality", which involves giving valid arguments in the context of an unspoken background. When the background is questioned, the arguments must be reevaluated. Thus, rationality has more to do with the procedure of the argument than the outcome.

Group artifacts are often considered to be black boxes in system development methods, and are only seen as data units that can be manipulated. However, each such artifact has many social dimensions attached, which necessarily constrain the allowable set of information and communication processes that can be involved in the production and handling of the artifact. In standard methods, these constraints are often not paid attention to at all or left implicit in the design team's specification rationale. However, in research network information system design, these constraints need to be made explicit if the system specifications are to be acceptable to all network participants. One way to do this is by assisting the users in the interpretation of their usage context and the subsequent calculation of the effects on the technical system.

Social theory, such as the need for rationality defined by Habermas, is too broad to directly be translatable in consequences for system specification. Derived from Habermas' insights, we will therefore first discuss two major social constraints, neutrality and transparency, and then show how they can be used to define a spectrum of group report types. By focusing on the description of the artifact in terms of social constraints, we can thus on the one hand ensure that relatively vague but important usage context needs are captured, while at the same time making these requirements comprehensible to system designers by turning them into formal design issues. By way of example, we describe two important social aspects, based on Habermas' ideas: neutrality of reports and transparency of the writing process.

- Neutrality

The neutrality dimension determines the kind and degree of participation of affected parties in the production of the report. In traditional, monolithic reports, one person, often the editor, has the ultimate voice on what are to be the structure and contents of the final report. On the other side of the spectrum, one can imagine the completely neutral group report, which includes all opinions of all group members on the problems selected by the group. Neutrality here does not imply that individual opinions are free of bias, they cannot be. Rather, it means that the discussion and report editing procedures, and thus the implemented tools, ensure that equal weight is given to all opinions, so that the network as a whole advocates a composition of opinions, instead of only a single view.

- Transparency

Besides determining who has the authority to contribute what statements, it is also important to know who is allowed to observe which part of the process in which these statements are produced. Sachs (1995) claims that although public opinion is well known, little is known about the formation of public opinion. In most of the studies on this topic, the stress is on the outcome of the process, instead of on the process itself. The same goes for group reports. Often, it is not known exactly how a report came to be, as only the end result is known and the reasoning procedures applied remain a black box to the observer.

We can now define the concept of scenario-presenting group report, which is a neutral group report of which the creation processes are transparent to the reader. Such a report represents the opinion of all parties on a specific issue. It consists of a part about which true consensus has been reached, and a part which contains opinions about issues of conflict, on which the authors have not (yet) reached agreement. Of course, the topic selection process itself may not be completely free of bias. However, if each party is allowed to frame its own research questions, this difficulty can be overcome.

### 3.0 USING GROUP REPORTS IN SOCIETAL CONFLICT MEDIATION: A CASE ON DEFORESTATION IN BRITISH COLUMBIA

One of the most significant applications of scenario-based group reports is in societal conflict mediation. As the world's environmental and developmental problems increase in number and magnitude, there is an increasing demand for reliable and rapidly obtainable research information that can be used to settle disputes. Thus, ad hoc scientific committees can often be quite influential in steering societal decision making processes. One such committee was asked to mediate in the deforestation crisis which has emerged in the Canadian Pacific province of British Columbia.

In British Columbia, in the past few years a large societal conflict has arisen because of the planned large-scale cutting of ancient rainforests. According to some researchers,

there was not sufficient scientific rationale for the management approach existing prior to the publication of the panel reports (Darling, 1995). In 1993, the conflict culminated in the arrest and conviction of hundreds of people blocking logging roads to the forests in Clayoquot Sound on Vancouver Island. To resolve the crisis, the provincial government then appointed a scientific panel to write a series of reports on how to define new land management policies (Scientific Panel on Clayoquot Sound, 1994-95). The recommendations were used to partially revise the initial land use decision, but some claim that important issues of conflict were still left out or not adequately addressed in a proper way in the final versions of the reports (GRNSD, 1995).

In the Clayoquot case, two world views clash: the conservative scientific perspective on forestry as an industrial activity, and a more holistic ecological view, such as advocated by the school of ecoforestry. These world views may in principle be incommensurable, as they use 'different vocabularies' (Darling, 1995). One particular suggestion for improvement of the research approach used by the Scientific Panel is that there should have been more emphasis on *contrasting* analyses of issues (Hammond-Flavelle, 1995). This seems a valid criticism, considering a tell-tale footnote remark in the fourth (March 1995) of the Scientific Panel reports: "The Panel's protocol is characterized by respect for one another, for different values, and for data founded both in scientific knowledge and traditional knowledge. *This respect enabled the Panel to be unanimous in its recommendations*" (our emphasis). However, if the values of panel members, and the stakeholders they represent, are different, perhaps even incommensurable, it is not clear at all why respect for these values would have to lead to unanimity. The Panel "recognizes tensions among subsistence, development, and protection values" and "seeks harmony among these tensions". This focus on harmony explains why the Panel can regard itself as respectful to all values involved, while some inadequately represented stakeholders have an different view.

This example shows two things. Firstly, consensus or unanimity cannot be a preset goal of any group report which is truly scientific rather than political. Rationality should be the goal, and this may lead to consensus or not. Secondly, there is a difference between trying to respect different values and views by integrating them into a single framework, and by allowing the people involved to make their own point. Thus, scenario-presenting group reports produced in open research networks could prove to be useful at least as a complementary instrument to give rational scientific advice in these kinds of conflictuous situations (An attempt was made at producing such a group report on this case in a project group of the Global Research Network on Sustainable Development - <http://infolabwww.kub.nl:2080/grnsd/>).

#### 4.0 CONCLUSIONS

The key idea underlying this paper is that a method which focuses on the definition of a group artifact in terms of social constraints, gives groups of users a vehicle for focused discussion of the essential configurations and combinations of otherwise

seemingly abstract and unrelated information and communication processes. In this way, a real network information system instead of just a loose set of tools can be designed.

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