

# Governance in the OPAALS<sup>1</sup> Community

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**Abstract.** This paper provides a theoretical overview of the field of governance with a special focus on the analytic perspectives concerning virtual research networks. We discuss network governance as translation of the classical socio-economic governance continuum of market and hierarchy into a *hybrid model* based on collaboration and trust, supported by explicit as well as implicit governance structures and processes. Furthermore we present some key results drawn from official OPAALS documents and from an ongoing online questionnaire study conducted in the OPAALS research community. The interpretation of these data gives an overview of the actual self-governance procedures and structures in an emerging research community. Furthermore, communication, interaction, and decision making structures are presented in the context of implicit and explicit rules that aim at building a transparent community based on collaboration.

**Keywords:** Governance, Digital Ecosystems, Networks, Scientific Networks, Collaboration

## 1 Introduction

Governance can be seen as a core dimension of a community or network overarching main factors like communication, collaboration, trust and identity. In networks, especially digital networks, governance mechanisms typically rather evolve over time in a bottom-up process than being implemented top-down. Therefore rules as well as power structures are usually less explicit, i.e. less obvious than in hierarchically organised constellations with bureaucratic frames. Within the OPAALS-NoE the principles of collaboration are clearly defined – openness, engagement, transparency and accountability – while explicit policies and regulations are kept to a minimum. This allows for the self-generation of an organisational structure that is conditioned by its members, their needs and interactions. The actual governance practices that gradually emerge in such a process presumably involve a higher degree of implicit forms of rules and policies, whereas patterns might be of higher complexity.

A reflexive analysis of governance issues can therefore support an open and transparent community building process and lead to a better (self)understanding of the OPAALS community itself. Hence, the aim of this paper is to summarise the major theoretical orientations towards governance with a focus on virtual research networks and to discuss governance structures and mechanisms within the OPAALS NoE based on empirical data.

## 2 Theoretical background: Governance as an analytic perspective

The term “governance” evolved in research contexts that employ institutionalist or interaction-centered approaches, particularly policy-research and economic theory. At this stage governance is generally perceived as an analytical perspective for researching and describing patterns of coping with interdependencies between stakeholders or agents, respectively the intentional and active shaping of social order, especially in terms of regulation and coordination. Not only explicit forms of governance such as law, formal rules and hierarchies are taken into consideration but also implicit forms like “unwritten rules” and “working practices” which emerge through continuous interaction or habitus and are highly context-specific (Darking, 2007, p. 80).

The concept provides a wide range of disciplinary and theoretical approaches as well as methodical pluralism. Various heuristic instruments are employed in order to identify structures of coordination and describe/understand collective action. This allows for the application to a variety of social contexts. Therefore the field of governance research is highly fragmented and dynamic.

In the next section we will elaborate on network governance and governance in science with

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special consideration of the challenges of information and communication technology (ICT) in multi-institutional and geographically dispersed networks.

## 2.1 Network Governance

In socio economic theory two basic forms of governance – ideal types or “discrete structural alternatives” – are distinguished: market and hierarchy, which are designed as counterpoints (Coase, 1937; Williamson, 1985). The governance mechanism of market is price which includes all relevant information necessary for coordination. Hierarchies, on the other hand, are man-made, central organisations that are governed through commands.

While New Institutional Economics regard networks as a hybrid form in the continuum between market and hierarchy that unites advantages as well as disadvantages of both (Williamson, 1991, p. 281-284), in Sociologic Institutionalism networks are considered to be a discrete form of governance that – as any structural alternative - is not necessarily efficient. Differing from market and hierarchies, relationships in networks do not have to be exclusively related to transaction. Furthermore Sociologic Institutionalism questions the basic assumption of Institutional Economics that humans are rational, perfectly informed and consequently act exploitatively driven by self-interest (“homo oeconomicus”). Hence the emergence and functioning of networks do not only depend on certain task or contract-related problems but also on the interaction orientation of actors that is often guided by norms. Typical characteristics of networks are relative co-equality and autonomy of actors as well as horizontal relationships (Jansen, 2002, p. 89).

Leaving aside the question whether networks are to be seen as a hybrid or a discrete form of governance there appears to exist a consensus considering governance mechanisms: The competitive price-mechanism of markets is replaced by collaboration, and formal relationships associated with commands and power in hierarchies are replaced by trust. Granovetter (1985) accounts the embeddedness in multiplex relationships for the emergence of trust. Generally, embeddedness in networks influences action in any institutional arrangement which is also referred to as “network effect”. Hence, the acknowledgement of causes and effects of network effects is crucial to an understanding of governance within and executed by networks.

From an analytical perspective, network effects can be fragmented into a relational and a structural effect. The relational effect is a result of the direct dyadic relationship between two actors that is based on information and experience and is concentrated in trust and generally expectations regarding behaviour (Granovetter, 1992, p. 34f). The structural effect however is an indirect effect bound to the entirety of relationships within the network. As the connections between members are manifold, information – including information about non-cooperational behaviour – diffuses quickly. Additionally, indirect relationships can contribute to a heightened reliability of information and expected behaviour. Potential negative effects derive from certain situations referred to as “overembeddedness”, where strong ties dominate within the network. Although internal information exchange and multilateral adaptation function efficiently, the integration of new information becomes increasingly difficult which leads to an incomplete and hesitant adaptation to external demands of the environment.

Positive aspects of network effects are also discussed in terms of social capital (Bourdieu, 1983; Coleman, 1988; Putnam, 1993). As a collective resource social capital is mainly based on strong ties, i.e. close multiplex relationships, which establish solidarity and trust. Moreover social capital has positive effects on the quality and the flow of information, thus reduces problems of information, coordination and even motivation.

In summary, the main advantage of networks as a form of governance lies in their adaptability on the autonomous as well as multilateral level:

[Networks] can, at the same time, be flexible and adaptive thanks to their capacity to decentralize performance along a network of autonomous components, while still being able to coordinate all this decentralized activity on a shared purpose of decision making. (Castells, 2005, p. 4)

## 2.2 Governance in Digital Networks

Despite the fact that networks have existed long before the rise of the Internet, digital technologies increased the potential of networks regarding the execution of governance and consequently their productivity immensely. Information and communication technologies (ICT) “affect not simply production processes in and across organizations and supply chains. They also deeply affect coordination, communication and control – in short, the fundamental nature of organizations”

(Fountain, 2005, p. 151), or in other words: structures and mechanisms of governance. These effects enable networks to fulfil tasks beyond a certain size and complexity that formerly required vertical organisations in order to accumulate and coordinate resources.

The benefits of ICT for the coordination and collaboration in geographically dispersed networks are quite obvious, but online collaboration and community building also implicate specific challenges as communication patterns and conditions differ from offline activity. Explicit definitions of duties, rights and responsibilities, rules, organisational or procedural structures may form a basis for governance practices but implicit rules of association and interaction as well as informal means of coordination should not be underestimated (Darking, 2007, p. 80). Generally governance procedures in digital networks or online communities are highly influenced by cultural norms that have to be developed in the community building process. The altered conditions of online communication in comparison to offline communities require the creation or endorsement of a form of (self) governance, where “policies must be strong enough to guide community behavior but flexible enough to change as the community evolves” (Preece & Maloney-Krichmar, 2003, p. 27). Such policies concern, for example, joining and exit of the community, access to resources, appropriate communication channels, rules regarding behaviour, enforcement of rules or dealing with passive or even exploitive forms of conduct (e.g. “lurking”).

In networks with a strong offline background, such as political activists, church groups or scientific communities to that matter, established governance structures, procedures and explicit as well as implicit norms will most likely be imported in the online community (Preece & Maloney-Krichmar, 2003, p. 17).

### **2.3 Governance of Scientific Networks**

Governance in science seems to imply a somewhat conflicting relation, as it is a common understanding that the scientific process requires a high level of autonomy. On the other hand, science is highly depending on financial support by governmental or economical actors (Gläser & Lange, 2007, p. 437). However, the steering of science is only possible by the indirect design of its functional constraints (resources, institutional arrangements, intellectual property rights, and agenda setting). One example is the organisation of science in formal organisations/institutions which provide resources, infrastructure, and employ scientist by means of employment contracts.

From the research conducted in the sociology of science field the following conclusion can be drawn: direction and speed of scientific progress are not directly manageable from the outside (Gläser & Lange, 2007, p. 437).

Science is divided in specific scientific communities with a respective shared set of knowledge. This knowledge comprises theories and is furthermore institutionalised in domain specific languages<sup>2</sup>, methodologies and different rules of conduct, e.g. rules for the presentation of research results, etc. (e.g. the Publication Manual of the American Psychological Association as major reference manual in psychology and social sciences). Such rules are implicit as well as explicit. For example, one specific science-internal governance procedure guaranteeing the correctness of scientific knowledge is the peer-review-mechanism. Peer-review is more or less the universal governance procedure in science.

Scientists’ decisions to conduct research are mostly interdependent from decisions of other scientists, arising through the permanent observation of their colleagues. In this respect, results need to be disseminated. These publications are the basis for further decisions. Conferences, books, journals and other publication forms ensure a kind of public sphere where scientists can observe each others’ work (Gläser & Lange, 2007, p. 439). Both formal (journal articles) and informal (e.g. a chat at a conference’s coffee break, a social dinner) contacts serve this important function.

Science is becoming increasingly distributed: geographically and in the contributions of a variety of institutions in specific projects (Cummings & Kiesler, 2007, p. 3). This new organisation is grounded in policy changes concerning the governance of science. Policy makers encourage and

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<sup>2</sup> Language plays a central role in the research field of scientific communities and knowledge construction. Domain specific languages serve as an important means of membership recognition/acceptance, and also as a demarcation line to other scientific fields. However, also in the day-to-day ‘business’ of science, domain specific languages are necessary since they comprise a set of specific vocabulary that facilitates the communication processes between the members of a particular domain. Specifically in the field of the natural sciences, exact definitions and descriptions of mutually accepted knowledge is considered to be vital. For an overview in this field, see Baumann & Kalverkämper, 2007; Hoffmann, Kalverkämper & Wiegand, 1998; Jahr, 2005; Gillam & Lee, 2002.

support collaborations among different research sites in different countries (Cummings & Kiesler, 2003, 2005, 2007; Walsh & Maloney, 2007). Examples for this trend are the Genome project, interdisciplinary research initiatives of the US National Science Foundation and the EU framework programmes (Cummings & Kiesler, 2007, p. 3).

However, these developments involve higher coordination costs as Cummings and Kiesler argue. The problems associated include diverging institutional structures, pay scales, different scientific norms in distinct cultures and languages, and slower decision making processes (Walsh & Maloney, 2007; Cummings & Kiesler, 2007). All these aspects challenge the governance of research projects. However, coordination under the condition of rising complexity can be reduced by applying the following four strategies (Cummings & Kiesler, 2007, p. 6f.):

- (1) Division of responsibilities in different tasks to specialists in order to reduce failure costs
- (2) Resource-sharing through websites, ICT-tools
- (3) Learning and knowledge transfer through exchange programmes and joint paper writing
- (4) Enabling meetings and spontaneous discussions

In all four types of coordination, ICT may play a crucial role for the success of research projects. However, communication and computer technology cannot substitute collocation appropriately. Project delays, misunderstandings, failures to share information may be some of the negative outcomes and thus are specific challenges internal governance has to address.

Another aspect is that the specialisation of science leads to the necessity to form interdisciplinary collaborations where individual researchers need to cite sources whose quality they cannot estimate properly. In this case the issue of trust arises. As a result the role of so called second-order criteria such as the reputation of a scientist, of a journal, the number of citations, and the judgement of colleagues is growing (Gläser & Lange, 2007, p. 447). Moreover, the involvement of many researchers can help to increase the quality of research through peer-review and idea exchange (Rigby & Edler, 2005). This consequently contributes to a better interdisciplinary understanding, and promotes the development of new interdisciplinary and international scientific communities.

## 2.4 Conceptual Framework of Network Governance

All the aspects introduced above can be summarised in a conceptual framework of network governance. From socio-economic theory we can draw the continuum of market and hierarchy as forms of governance. Collaboration and trust are the underlying governance mechanisms. Network governance is reflected by implicit and explicit rules. We suggest applying this conceptual framework in order to study explicit as well as implicit governance structures and processes within the OPAALS community. The next section is intended to contextualise this conceptual framework with the OPAALS community.

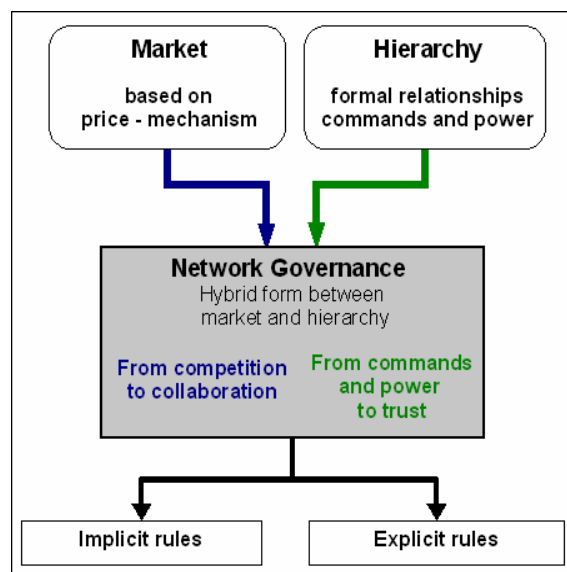


Figure 1: Network Governance

### 3 Governance in OPAALS

OPAALS is an interdisciplinary EU Network of Excellence in the field of Digital Ecosystems. The research comprises social science, linguistics, economics, computer science, software engineering, and biology. The OPAALS consortium is currently composed of 20 partners located on four continents (Europe, Africa, Asia, South America). One important aim of OPAALS is to establish a framework of distributed governance, i.e. self governance is emphasised. The very principles the research community defined as essential to their distributed governance are accountability, transparency, and trust (DoW Phase 2, p. 13). The OPAALS community strongly acknowledges this by stating that a

...mature, participatory, and distributed governing framework based on these principles is an essential characteristic of the OPAALS research community. (DoW Phase 2, p. 13)

In this section we present some results of an ongoing self-reflection process that the OPAALS team of the University of Kassel conducts. The data we present are drawn from official OPAALS documents and from the second wave of the OPAALS survey, a quantitative online questionnaire study.

The next two subchapters describe the dimensions of “explicit” and “implicit” rules regarding issues of governance in OPAALS.

#### 3.1 Explicit Rules

Explicit rules provide a formal structure and procedure of the knowledge production process in the OPAALS community. OPAALS is part-financed for four years by the European Union’s 6th Framework Programme and was launched on the 1st of June 2006. The basic structure, rules and aims are fixed in the corresponding “Description of Work - DoW“. The work performed by the OPAALS consortium is organised in work packages (WPs) and tasks. A salient work package is WP0: Project Management that conduces the management activities represented in the deliverable D0.1 Project Management Handbook, including a detailed time schedule for the financial and management reports, internal and external review mechanisms for the milestone reports and deliverables, which represent the formal outcomes of the different research activities. Each partner is responsible for reporting to her respective tasks. This WP and the decision-making processes on an operational level are conducted by the project management board (PMB) which is composed of the project coordinator, the scientific domain leaders, and the Project Management representative. The OPAALS community’s global domains are: social science, natural science and computer science. Each domain leader coordinates the specific WPs; each of them has a WP leader, coordinating the research process at WP and task level.

Whereas the operational and day-to-day business level is managed by the PMB and the OPAALS project office, the high-level governing function of the project is performed by the OPAALS Board and the Scientific Board. The OPAALS Board is responsible for the network governance on major contractual matters, resolutions of disputes, and can be depicted as the final “court of appeal” for the project. The Scientific Board comprises one senior researcher of each partner and is open to external outstanding experts in the OPAALS domain (maximum of 5) and represents the research vision group of the project. Its main activity is to provide overall strategic advice on the scientific direction of the project, lending authority and credibility by advising on, validating and endorsing the scientific strategy at a high level of decision making (DoW Phase 1, p. 76). Figure 2 depicts the OPAALS management structure with the different actors and their relations.

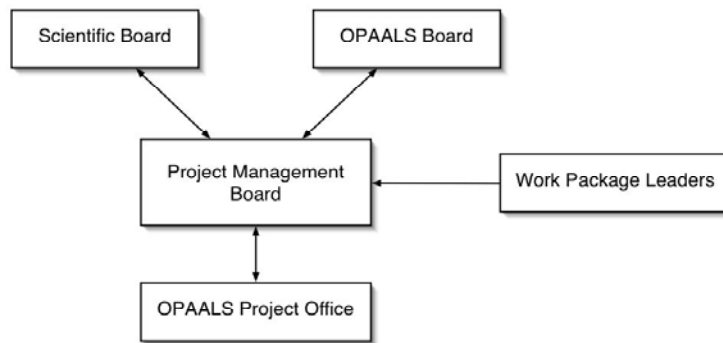


Figure 2: OPAALS management structure

The second work package dealing with coordination and governance is WP 9. Tasks in WP 9 deal with the OPAALS website, events for knowledge dissemination (e.g. the OPAALS summer school 2008 in Limerick), researcher exchanges, newsletters, and knowledge dissemination and capturing. Very important to note is the development of the OPAALS online journal. The community is developing a shared process ensuring “rigorous and innovative interdisciplinary research” (DoW Phase 2, p. 13). The DoW explicitly refers to the traditional peer-review process:

The scientific peer review publication process is designed to inject a higher level of objectivity in the assessment of research, and the OKS will likewise employ a similar peer review and editorial process. (DoW Phase 2, p. 13)

If we consider the four types of coordination presented in the theoretical section divided in (1) division of responsibilities in different tasks to specialists, (2) resource-sharing through websites, ICT-tools, (3) learning and knowledge transfer through exchange programmes and joint paper writing, and (4) enabling meetings and spontaneous discussions, all four types are applied within the OPAALS community.

These explicit rules provide a high flexibility for the development of more implicit rules the next section of this chapter will elaborate on.

### 3.2 Implicit Rules

Governance – even in hierarchical organisations – can never be entirely controlled with means of explicit definitions and rules. Forms of conduct as well as working procedures emerge through continuous interaction and establish implicit rules. Following the theoretical assumptions laid out in this paper, such implicit rules or procedures should also have arisen in the OPAALS community building process. Identifying them will foster the transparency of the governance structures within the OPAALS community which is a fundamental principle of OPAALS collaboration.

To that end the implicit aspects of governance as communication structures, work procedures and decision making processes need to be monitored and reflected. The results of the above mentioned online questionnaire study provide first insights into the emerging/established communication structures, work procedures and decision-making processes within the OPAALS community. The wave was conducted towards the end of the first phase of the project, after the first 1.5 years of the overall 4 years run-time.

#### Sample Description

The sample size of the study was 87 researchers from the OPAALS community; we received 56 completed questionnaires, adding up to a response rate of 64%. Half of the respondents are computer scientists (50%, n=28), 28,6% are social scientist (n=16), 1,8% natural scientists (n=1), the rest is to be located in more than one domain, 7,1% in computer science and social science (n=4), 5,4% in computer science and natural science, 3,6% work in all three domains. The majority of the respondents are male (69.6%, n=39), 30.4% are female (n=17).

#### Formal and Informal Interaction

In the questionnaire OPAALS community members were asked to evaluate the level of professional as well as informal interaction with members of their task group(s), OPAALS members who work in the same institution and with members of the entire OPAALS community on a scale from 1 (no interaction) to 5 (a lot of interaction).

Generally the results reveal evaluations close to the top-end of the scale so there appears to be a high level of interaction within the OPAALS community. Professional interaction slightly overweighs informal interaction in all the surveyed sub-groups (mean difference between 0.14 and 0.29). Most interactions, professional as well as informal, occur between members working in the same institution (mean: 4.34 for professional interaction, 4.05 for informal interaction) followed by interactions with task group members. The interaction with other members of the entire OPAALS community is evaluated slightly above the midpoint of the scale.

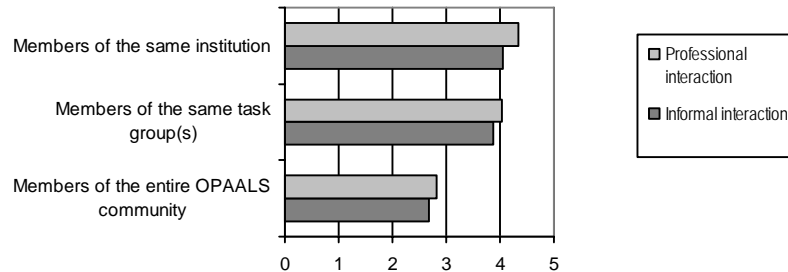


Figure 3: Level of interaction

The results indicate a successful community building process. Especially the level of informal interaction can be interpreted as the emergence or existence of multiplex relationships between community members which lay the foundation for building trust and – according to network theory – should have positive effects on the flow of information and thus the quality of collaboration. The rank of interaction between members of the same institution highlights the role of face-to-face-situations and geographical vicinity which appear to stimulate professional as well as informal interaction. Quite naturally common tasks and goals also influence interaction and therefore relationships positively. Although the level of interaction between community members who neither share the institution nor a task is comparatively low the results insinuate a coalescence of the entire OPAALS community.

### Work Process

Another aspect of emerging implicit structures within the OPAALS community concerns the appearance of specific elements of the work procedures. OPAALS members spend most of the time working on work package tasks or deliverables. Management of work package tasks ranks second, but appears not to be overly time-consuming which could indicate functioning work flows and collaboration and thus well-established governance procedures. The frequency of social activity – about half of the respondents state to spend time getting to know collaborators or staying in touch with them at least several times a week – once more speaks for a strengthening of relationships within the network. Furthermore the creation and discussion of new ideas appears to have a solid position within the workflow. The topic least dealt with is the dissemination of information. One third of the respondents engage here at least several times a month.

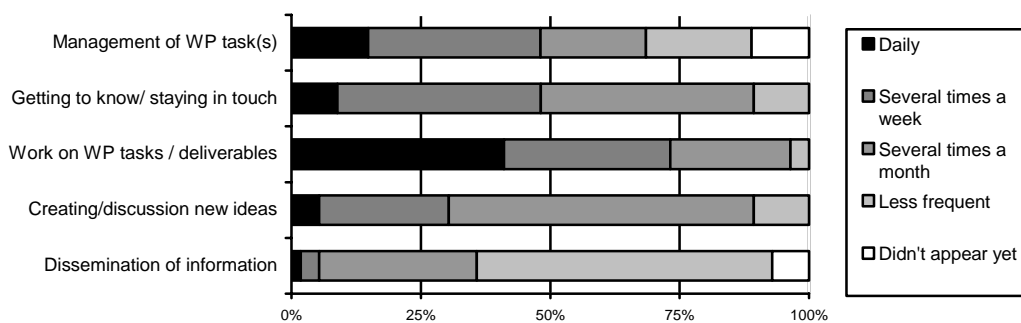


Figure 4: Occurrence of Topics

In order to carry out the tasks discussed within a dispersed network different communication tools are employed. The tools considered as most adequate by respondents for all these topics except the dissemination of information are face-to-face-interaction, face-to-face-meetings and email. The asynchronous communication mode - email - appears to be favoured for management and work-package or deliverable-related tasks while getting to know collaborators and creating/discussing new ideas rather require personal forms of interaction which might be linked to the development of or the necessity for trust.

Regarding the dissemination of information to the community wikis and mailing lists as well as email, i.e. generally asynchronous communication tools are considered most appropriate.

Based on these results one could assume that the explicit OPAALS guidelines concerning the aspired culture of offline contact (meetings, conferences, summer school) correspond with the communication preferences of the community.

### Decision Making Processes

The decision making process is a central aspect of governance and was therefore part of the survey. Community members were asked to choose the decision making style that most applies to their work experience in the OPAALS project among four options.

Almost half of the respondents state, that "The 'democratic' decision style is our underlying concept, but sometimes decisions are made authoritatively because of different constraints" (44.6%, n=25). Another 17.9% (n=10) always seek the approval of the majority for major decisions to pass in their work. The same portion of respondents estimates the decision making process to be authoritarian, meaning they have a 'supervisor' who is responsible for decision making. Slightly more respondents (19.6%, n=11) see the decision making to be more ad hoc thus the process is not based on specific rules.

According to the results of the study a democratic decision making style as intended by the explicit guidelines is dominant within the OPAALS community. However, circumstances of the work process seem to require a pragmatic handling of this norm.

## 4. Conclusion

The community building process of the OPAALS community appears to be successful, as interaction is on a high level, including informal interaction which indicates the emergence of multiplex relationships between members which is strengthening the network. This should have positive effects on the flow of information and thus contribute to the productivity of the NoE and the quality of research outcomes. The results of the survey also reveal that trust and collaboration play an important role as regulatory mechanisms. Informal contacts might eventually become tantamount to professional relations and friendship ties could contribute to the strength of the network. This aspect will be addressed with a further qualitative study.

This paper also fleshed out that the explicit guidelines and rules within OPAALS leave a wide scope for interpretation and actual governance procedures and structures that is filled by emerging implicit working practices and rules. For example, although decision-making is bound to a deeply rooted democratic conduct the actual circumstances often seem to demand "top-down"-decisions. Such circumstances should be identified in order to gain a deeper understanding of the process.



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