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Characteristics of Collaborative Network Models.

ed. by

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This chapter aims at summarizing the discussion on collaborative networks as discussed in the reviewed literature (see appendix 3.). The question on governance of networks has today assumed a key role as more and more research programs are depending on large scale network collaborations. The criteria for evaluation the optimal organizing of a network can be divided into two important categories, each facing a number of important challenges. *Management of network* and *management in network* constitute together the governance system of the network and are of course closely connected but represent simultaneous a very important division of labour in the whole network system. Each type of management has to find solutions to specific challenges raised by the function of the network and its participants. This is what the following pages will describe in more detail.

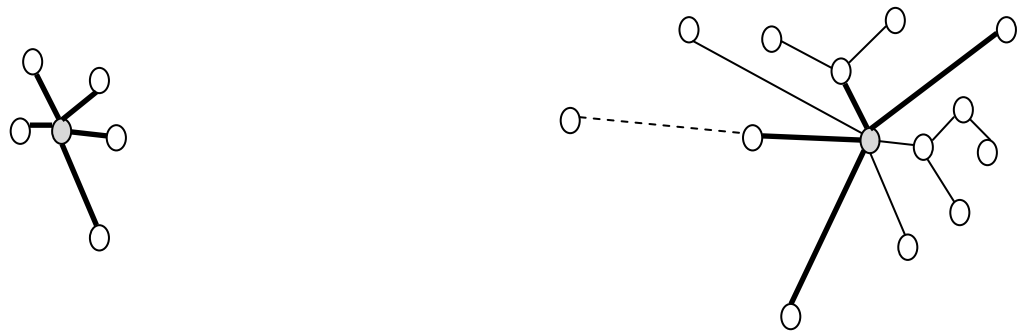
Existing literature and studies of collaborative networks in the field of innovation, education and research makes it clear that networks hold many different characteristic, and that these characteristics make the different forms of networks suited for very different purposes and functions. There is no network-model that fits all collaborative purposes and thus there is no main model to apply in all situations where collaboration is asked for. Still a generic purpose for building an innovation network is to benefit from the inter-organization links that connects people and knowledge from diverse fields. The form of a given collaborative network is often dependent on the motivation of the organizations that participate, or dependent on various contextual factors specific to the partners or their disciplinary background. For example, members of a given collaboration may be reluctant to engage in a huge collaborative project due to previous experiences with partners that do not deliver the promised services or knowledge in time. Thus they prefer to work in small scale collaborations with a clear management structure where they, in a swift manner, can get acquainted with the partners and build up a trustful relationship that make them feel in control with the collaborative processes. Yet small networks will only provide access to a limited amount of new knowledge and thus the core challenge is to settle for the right size and character of the network.

[1] The chapter is edited by Line Gry Knudsen from the background papers on networks, governance and innovation in Appendix 3.1 to 3.6

Yet, in spite of the fact that previous experiences as well as factors intrinsic to a given project or partner organization may affect the form of a given collaboration, it is possible to outline some overall factors that describe any given collaborative network. The core factors that affect the design of the collaborative project and the way it is carried out are the *size of the collaborative network* measured by number of active participants and the *proximity* of partners in relation to geographical and disciplinary scope. These two core characteristics are illustrated in Table 1.

TABLE 1: Core Characteristics of Networks

Small	**Size**	*Large*
High	**Proximity**	*Low*



= Network member = Management in networks

= Weak tie = Strong tie

As shown throughout the literature review of the SUCCESS project these factors are described in many studies of network models and are often used to group different collaborative projects. The different forms of collaborations have different strength and weaknesses and it is important to be aware of this when networks are designed. Being aware of the strength and weaknesses may help to make the best possible match between the aim and the form of the collaborative project.

The large scale and very diverse networks are especially well suited for projects with the aim of searching for new knowledge, exploring new collaborative opportunities, or creating associations. Joining employees from many different organizations and with diverse backgrounds may serve the purpose of elucidating new knowledge and facilitating relations between employees

that would not have made contact otherwise. Organizing a project as a large-scale network may be beneficial in the early stages of research projects where activities such as getting familiar with the knowledge and abilities of the partners, searching for valuable knowledge and making connections are vital. However, large-scale networks need cross-unit coordination activities to keep the network parts together. This solicits strong management, and clear structures of the network. But also stress the mutual dependencies, which keeps motivations across cross-unit collaborations also at the practitioner's (researchers) level.

Later on, when connections are made between the members of the network and the project goes into the next phase it is often agued to be beneficial to work towards a tighter structure in the network. Especially if complex or tacit knowledge is to be transferred between partners, the relation need to be tight and a trustful relation must be built. This can happen either through repeated collaboration or because the network members trust the organizations behind the collaboration. In general, a relation that is characterized by mutual trust between the partners will provide a better foundation for knowledge sharing as the partners can be confident that the knowledge will not leak to third parties and the receiver will handle the knowledge with due respect. A trustful relation may also reduce the need for rules and regulations as the partners respect each other's requests. In table 2 the strength and weaknesses of the different network models are illustrated. The table portrays the archetypes and a mix of factors that confer both challenges and opportunities to the network often characterize networks.

TABLE 2: Different Network Models: Strengths and Weaknesses

	Strength	Weakness
Large scale networks	• Knowledge search is eased as the pool of knowledge to search from is more diverse • Exploration activities are eased	• Easier for partners to violate an obligation to provide resources • Governance challenges • Hard to get rid of non-performers
Small scale networks	• Easier to build trust • Knowledge transfer between partners is eased • Exploitation activities are eased	• Partner knowledge may be redundant • Difficult to ensure a diverse pool of knowledge

We may see networks as being either large and loose in structure *or* small and tightly knitted. Even though many studies are based on this binary classification of network models either as being either large and diverse or small and tight, this continuum entails both the archetypes, but it does also describe all the different forms inherent to this spectrum as a 'continuum of network forms'.. The best possible size of a network and level of proximity between the partners in a network are dependent on a number of factors, which we have described in detail in SUCCESS literature review. It is not possible to make a general and conclusive list of these factors as some will be idiosyncratic to the project; still, a number of core factors are of special importance due to their effect on the activities of the network etc. For members in a given network or managers that are responsible for activities in this network it is vital to go through evaluations of the following factors, as the answers will have an impact on the size and diversity of the project:

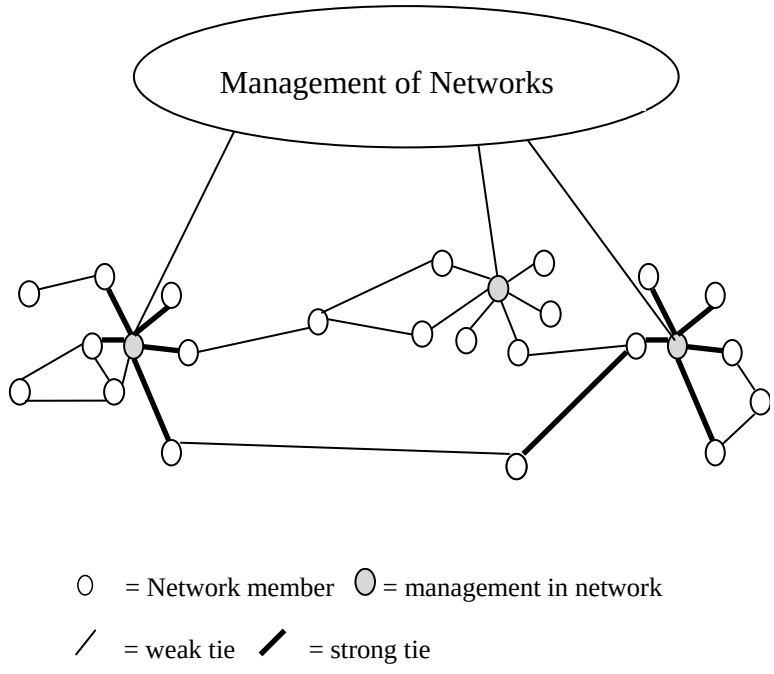
- *Does the project involve in diversity in activities?* In the present setting, this question could be rephrased as: does the project involve both research, innovation and education activities; i.e., are all of the parts in the knowledge triangle activated? If so, the project might need to be big in scope and number of partners with very different competences must be involved.
- *Are the activities core or marginal to the partners?* Core activities may need to be better protected and partners will probably prefer to do these activities in close networks groups where

knowledge can be protected. Are the activities marginal to other activities of the partner firms it may not be that necessary to protect them and the partners may even want third parties to join the project in order to inspire and bring new knowledge to the scene. Some very basic early stage research may in this phase be called marginal, as they are not yet core business, and thus exploration is still important for good results.

- *Is the project vertically and/ or horizontally integrated?* A horizontal project involves partners from the same kind of organizations, such as a number of university departments. If the project aims at creating new basic knowledge about a specific kind of energy technology, a high degree of horizontal integration is needed in order to get highly specialized researchers gathered in the same project. If the project on the other hand aims at innovations as commercializing research results, partners from different phases of the research process and the more development oriented phases need to be included and the project will thus be more vertically integrated. This is a kind of "extended division of labour" between organizations to create a mutual dependency.
    - *What is the time frame of the project?* The time perspective is a core determinant of the design of a given network. Is the core aim to come up with solutions to well defined problems in a relatively short period of time the project may not need to be large in scale. A network that, on the other hand is planned to run for a longer period may include different kinds of activities. The extend of interaction will often be greater in a long term project and more importantly it may vary over time.

These themes or questions are important to address when dealing with how to design a specific network, where for example network purpose has to be aliened with network form. Still, it is also important to remember that networks do never operate in a vacuum; a number of other actors and groups will relate to the network and different networks are often overlapping. Considering this makes it important to add another model to the ones outlined above. Instead of describing the issues that affect the design and management *in* networks, we must add a description of management *of* networks. The difference is more than semantic as it puts focus on the difference between coordinating people and processes that are set up to fulfill a specific goal and coordinating the interaction between different groups and actors.

This may be illustrated as follows:



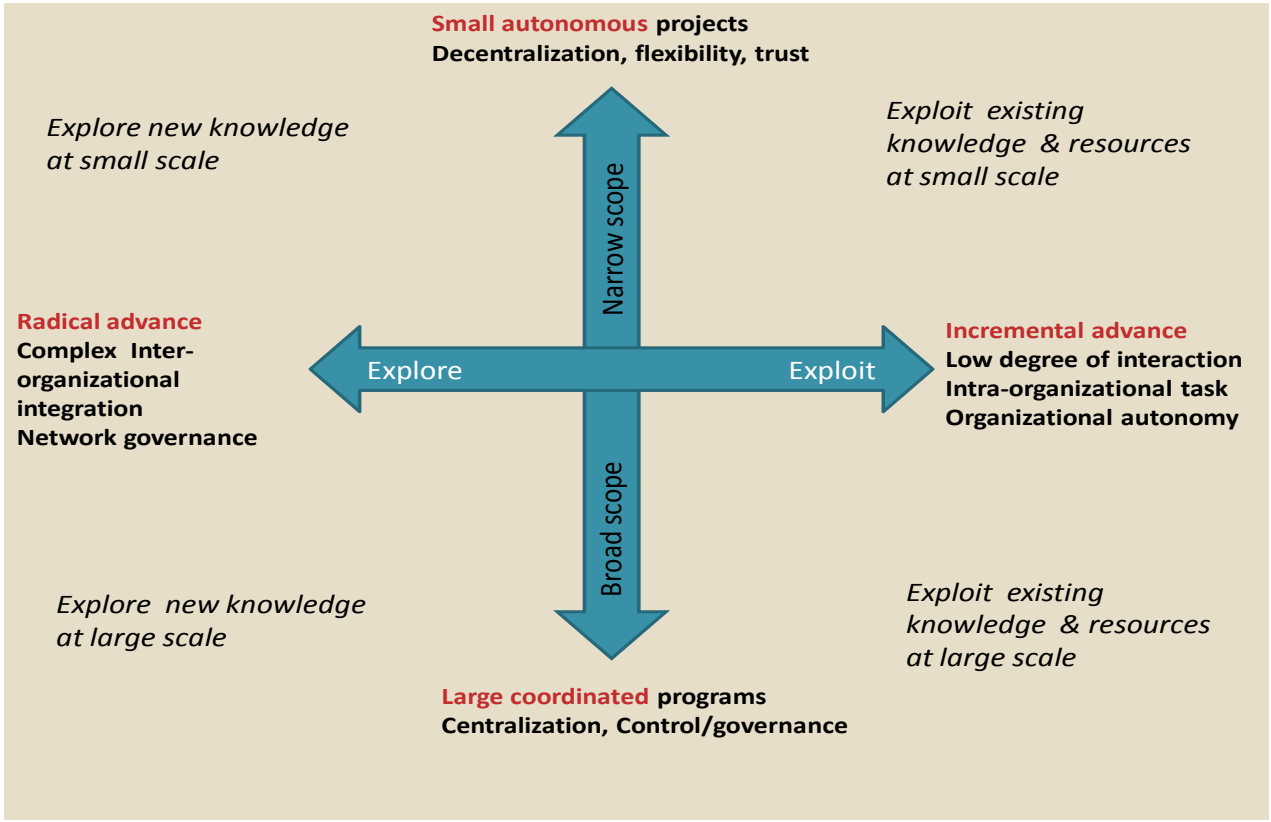
Organizing networks: Criteria

Management of networks
Integration at different levels
Changes in the surroundings
Competence alignment
Creating engagement
Decision structure
Incentive structure
Legal unit
Shared facilities
Up-scaling

Management in networks
Core or marginal activities
Integration of different kinds of activities
Time frame
Vertical or horizontal integration

When dealing with the management of networks other issues become important. First, this level of management considerations becomes important when there is a need for *up scaling* of a given project. This may for example be a consequence of a wish to join all activities in a given discipline. Second, the defining the *right level of integration* of the many different sub networks becomes an important task in this setting. A high degree of integration will be beneficial for knowledge transfer between the units, but it may harm the diversity of knowledge if all network members hold the same knowledge. Third, the need for *engagement* in these large related networks is a core issue to work on. Decisions on more practical issues such as whether or not to design a *shared legal unit* and whether or not to have *shared facilities* are also core decisions that must be taken at the managerial level. Finally, it is very important to stress that this kind of network management is not solely a administrative task. There need to be a high degree of focus on the *disciplinary content* in all decisions taken about the network activities. The dimensions enter into the model, but also the idea of multiple contacts as a glue of networks is important. The need for cross cluster activities and a high level of activities and sense of joint deadlines.

The dimensions may be illustrated as follows in the figure.


Small autonomous projects
Decentralization, flexibility, trust
Explore new knowledge at small scale
Exploit existing knowledge & resources at small scale
Narrow scope
Explore
Exploit
Broad scope
Radical advance
Complex Inter-organizational integration
Network governance
Incremental advance
Low degree of interaction
Intra-organizational task
Organizational autonomy
Explore new knowledge at large scale
Exploit existing knowledge & resources at large scale
Large coordinated programs
Centralization, Control/governance