

Critical crossroads to explain network change: evidence from a goal-directed network

Goal-directed
network

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Abstract

Purpose – Public networks studies have widely diffused in recent years, but scant attention has been devoted to network change. By endorsing the notion of critical crossroads to describe a crucial turning point for the network survival, the purpose of this paper is to investigate how and why a goal-directed network changes, considering both the benefits and the constraints of the change.

Design/methodology/approach – This study adopts a longitudinal case study based upon an interventionist research approach (Jönsson and Lukka, 2006), with the researchers being immersed in the network life of a group of Italian public universities over a period of 17 years.

Findings – This paper proposes an empirical derived framework about network evolution that identifies two different types of crossroads (i.e. resource-driven crossroads and management driven) as drivers for network evolution. The main determinant behind these crisis situation were found in the heterogeneity of the network actors and, while overcoming the crossroads, informal sub-networks were found emerging.

Originality/value – This study enlarges current public network literature by focusing specifically on how and why networks change, an aspect underinvestigated by current literature.

Keywords Crossroads, Goal-directed network, Network change, Public network

Paper type Research paper

1. Introduction

This paper investigates how changes take place in a goal-directed public network. We know that organizations, including public networks, are affected by change and that this is more the rule rather than the exception, given that “organizations seek to catch up with constantly changing environments, and network change is one way of aligning organizations with such environments” (Kim *et al.*, 2006, p. 706).

Public network literature has mainly addressed the issue of network change indirectly, as a consequence of discussing the phases of a network’s life cycle, since each phase involves different actors and relationships and these are likely to change during the lifetime of the network (Ring and Van De Ven, 1994; Human and Provan, 2000; Saz-Carranza and Vernis, 2006). According to the public network studies currently available, network actors and the relationships between them vary over time, determining changes to the network. These studies, however, concentrate principally on the object of the change, in terms of what aspects of the network are affected and so alter over time. In this study, our aim is to contribute to the literature on public network change and focus on how and why this change occurs. We will concentrate specifically on goal-directed networks, defined as “a group of three or more organizations connected in ways that facilitate achievement of a common goal” (Provan *et al.*, 2007, p. 482). The reason for this is that these are the most commonly found networks within the public sector (Provan and Lemaire, 2012). Unlike informal and



mandated networks, goal-directed networks are formal structures and are set up with the explicit purpose of achieving a common objective that would not be possible by a single organization on its own (Provan and Lemaire, 2012). In this study, we have adopted a critical analysis perspective and, alongside the benefits, we have also considered the negative aspects and constraints that affect the change, as recommended by other scholars (Kim *et al.*, 2006).

Moving on from these considerations, the aim in this paper is to explore how and why a goal-directed network changes, considering both the benefits and the constraints of the change. For the purposes of our study, network change is understood as involving a change to the network actors and/or the relationships in place between them. We have interpreted our findings through the theoretical lens of crossroads, defined as “a point at which the consequence of commitment will motivate members to seek interorganizational arrangements that are either more, or less, binding” (D’Aunno and Zuckerman, 1987, p. 543). The notion of crossroads was developed early on to highlight a situation of crisis, where actors must take decisions to overcome an emergency (e.g. D’Aunno and Zuckerman, 1987; Zuckerman *et al.*, 1995; Turpin *et al.*, 2011). This idea is aligned to the view of network change because, when decisions are taken, the actors involved or the relationships between them are expected to change, and the network moves from one phase to another. We have not addressed the developmental phases of the network, but we have specifically zoomed in on the moment of crisis and investigated the reaction of the network actors.

In order to specifically identify the crossroads for a goal-directed public network, we complement the crossroads literature, which is widely applied to collaboration, with available public network studies that underline network problems (e.g. Agranoff and McGuire, 1998; McGuire, 2002; Agranoff, 2006; Herranz, 2008; Zheng *et al.*, 2010; McGuire and Agranoff, 2011). Our analysis supports a theoretical framework used to distinguish between two different types of crossroads, these being resource-driven crossroads and network management-driven crossroads.

From a methodological perspective, we adopted a longitudinal case study. This was based upon an interventionist research approach (Jönsson and Lukka, 2006), with the researchers being immersed in the network life of a group of Italian public universities over a period of 17 years. Our results expose the crossroads encountered during the 17 years of the network’s life, highlighting that the heterogeneity of the network actors and divergence of their objectives are the main determinants of the crossroads, and that informal sub-networks were regularly established as a means to overcome each critical situation.

The rest of the paper is structured as follows. The literature on public network change is first presented, followed by the theoretical concept of critical crossroads within this network context. The research methodology is then described, followed by the section on results, with a critical analysis of the two critical crossroads. Lastly, the discussion and conclusions draw the main implications for academics and practitioners.

2. Public network change

At a general level, network change is conceived “as the dissolution or replacement of an inter-organizational network tie” (Kim *et al.*, 2006, p. 706), which occurs when network actors take action to respond to a changing environment. Environments are continuously changing and, when network actors act to reflect these variations in the environment, their actions alter the existent network structure, determining change (Kim *et al.*, 2006).

When focusing specifically on public networks, the notion of change has received limited attention to date and this issue has been mainly investigated in an indirect manner. The field contains two streams of studies: studies that adopt an evolutionary perspective on public network change and studies focused on changes to the precise features of a public network. However, in neither of these streams does the main core of investigation deal with the notion of change.

A first stream of studies is concerned with public network change viewed from an evolutionary perspective, where the starting point consists of recognizing that, when a network changes, it passes through different phases, each with their own distinctive features which are likely to vary over time (Osborne and Murray, 2000; Saz-Carranza and Vernis, 2006; Hermans, *et al.*, 2013). A major work on the subject was carried out by Saz-Carranza and Vernis (2006). These authors completed a literature review covering the previous contributions on the developmental phases that affect public networks and on collaboration at a more general level, framing the evolution of a public network within three main phases, emergence, evolution and dissolution. When network relationships are evolving over time, the authors noted that they are also changing with regards to information, resources and the various mutual expectations. This literature leaves network change in the background and focuses attention primarily on the developmental phases of the network and the elements (i.e. relationships) that are most likely to change.

The second stream of studies is, instead, specifically concerned with understanding how specific aspects in public networks evolve, while still maintaining an evolutionary perspective. Several authors have provided evidence that the constitutive elements of a network, specifically the actors involved, their relationships and the network governance, vary over time, thus determining network change (e.g. Vangen and Huxman, 2003; Keast *et al.*, 2004; Isett and Provan, 2005; Provan and Kenis, 2008; Klijn *et al.*, 2010; Whelan, 2011). For example, Isett and Provan (2005), in their study on a publicly funded mental health network, found that the degree of multiplexity among network actors progressively becomes stronger, supporting the idea that trust between actors is also progressively reinforced (Isett and Provan, 2005). In parallel, they found that, while the formal and contractual relationships between actors did not fade away, informal relationships also developed. Gulati (1995), however, found that, when trust between the actors increases over time, formal relationships tend to be partly replaced by informal connections. Provan and Kenis (2008) have discussed how forms of network governance vary over time. In their study, the authors suggested which types of governance are more likely to evolve than others. Again, in this second stream of studies, network change is not at the core of the investigation, but the focal point consists rather of the evolution of the network's constitutive elements (i.e. nodes and relationships).

The aim of this study is to address specifically the process of network change, isolating this process from the evolution of the network in its entirety and zooming in on the particular conditions and the actors' ensuing reactions that combine to lead to change. Within this context, network change is conceived in this paper as a variation to the two constitutive components of a network: actors and relationships. A change to the actors corresponds to a variation within the organizations that together form the network, affecting the size of the network itself. A change to relationships, instead, means that the interactions in place among the network actors undergo some kind of variation that affects both the governance structure and the management practices necessary for the network to function.

In our work, we investigated network change within a specific type of public network: a goal-directed network (Agranoff, 2007). This kind of network is defined as "a group of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal" (Provan and Kenis 2008, p. 231). These networks are the most common in the public sector (Provan and Lemaire, 2012) and differ from informal networks, which mainly come into being serendipitously (Provan *et al.*, 2007). The distinctive feature of a goal-directed network is that it is structured formally and has a common purpose that could be not realized by a single organization on its own (Provan *et al.*, 2007).

3. Framing crossroads to explain network change

This paper relies on the notion of critical crossroads to support the explanation of change within a goal-directed network. By crossroads, we mean a critical situation where one or

another mutually exclusive decision must be made. This, in turn, alters the network actors or their relationships, driving toward network change.

The notion of crossroads has been often adopted to describe a critical situation within a broader life cycle of alliances or inter-organizational relationships more in general. The first application of crossroads is found in the study by D'Aunno and Zuckerman (1987). The authors investigated the life cycle of a hospital collaboration venture, with the aim of defining a life cycle model focused on the determinants that influence the transition from one developmental stage to another. When framing the phases of collaboration, they conceived the idea of a crossroads as the last moment in the process's life cycle, which may undermine the survival of the whole venture. Specifically, the authors argued that a crossroads is "a point at which the consequence of commitment will motivate members to seek interorganizational arrangements that are either more, or less, binding" (D'Aunno and Zuckerman, 1987, p. 543). This implies that, if the challenge of a crossroads is overcome, then a new phase in the collaboration is activated, otherwise, the collaboration itself will dissolve.

In a similar vein, other studies investigating the developmental phases of alliances and collaborations, especially in the health care section, have also endorsed the idea of crossroads as a way of describing a critical situation where a decision has to be made on which the survival or dissolution of the venture can depend. For example, while investigating the evolution of a rural HIV/AIDS alliance, Topping and Hartwig (1997) discovered that the alliance found itself at a crossroads when the funding granted to the project came to an end, and this led to a critical period for the collaboration. Similarly, the concept of crossroads also emerged in the study by Human and Provan (2000), which focused on the success or demise of small-firm multilateral network, describing how the evolution of a network can come up against a red light. In a similar vein, Ring and Van De Ven (1994) referred to the concept of crossroads in their analysis of the developmental process of cooperative inter-organizational relationships.

Starting from this literature, we have specifically isolated the concept of crossroads, rather than tackling the entire network life cycle. We will focus on how these critical situations can offer a wider explanation about how and why the network changes. In order to isolate the crossroads in this way, it was necessary to identify the particular types of critical situation that can occur. While we could not find a complete definition of crossroads in literature, we were able to extrapolate the notion theoretically from extant public network literature by reviewing the available studies on the problems in public networks that may lead to a crossroads arising (e.g. Agranoff and McGuire, 2001). We have, therefore, identified two different types of crossroads that can affect a goal-directed network: resource-driven crossroads and network management-driven crossroads.

A resource-driven crossroads is where there is a lack of the financial and human resources needed to support the network activity. Several authors have underlined the problem of resources in a public network (see, e.g. Cristofoli and Markovic, 2015; Raab *et al.*, 2015; Agranoff, 2006; Provan and Milward, 2001). Resources in this context are generally limited and, for a public network to work and the network goal to be achieved, they need to be shared. For the network to function correctly, the resources must be reserved for the network's various aims and purposes and shared among them. When resources are scarce, this can generate a crisis, since the organizations within the network have to balance their resources between internal purposes and network activities. This is further accentuated when the network goals differ widely from the organizational goals (Provan and Kenis, 2008; Agranoff and McGuire, 2001). In mandated networks, actors cannot leave the network and need to operate continuously under these arrangements. When actors take part on a voluntary basis, any reduction in human or financial resources means that the organizational actors must decide if and how to devote resources to the network activity. This results in resource-driven crossroads.

A network management-driven crossroads, on the contrary, is where there is instability among the network managers of the organizations belonging to the network. This issue is connected to the seminal problem of the complexity of managing networks (see McGuire and Agranoff, 2011; Herranz, 2008; Agranoff and McGuire, 2001; Kickert and Koppenjan, 1997; Gage and Mandell, 1990). Several authors have noted that network management is a crucial and intricate issue (Agranoff, 2006; McGuire 2002; Agranoff and McGuire 1998) for a number of reasons. First, by definition, networks have no hierarchy and this poses a problem in terms of directing the network actions (Agranoff and McGuire, 2001). Second, the actors involved can have different and conflicting objectives, and this means that a “win-win” management strategy must be put in place for the network to work efficiently (McGuire and Agranoff, 2011; Zheng *et al.*, 2010). Third, achieving the network’s goals is strictly related to the level of trust and mutual dependency between the actors, and these need to be supported and reinforced by the network managers (Whelan, 2011; Provan and Kenis, 2008).

On examining these studies on network management, one element emerged that clearly affected the evolution and results of the network, the instability of network management (Turrini *et al.*, 2010). In the paper by Turrini *et al.* (2010), for example, the authors discussed the determinants of network performance, finding a relevant source of explanation in network stability. We, therefore, consider that network management instability, by which we mean the continuous exchange of personnel directly involved in network activity, can potentially create a crossroads. This is because instability of this kind can determine a situation of crisis and, therefore, call for intervention.

This paper will be concerned with investigating these two types of crossroads, searching for how and why they drive network change, in terms of altering nodes and relationships.

4. Research methodology

4.1 Research setting: the good practice (GP) network (1998-2015)

This research was conducted within a network of Italian universities. The network was set up in 1998 with the aim of measuring and benchmarking performance in terms of the efficiency and effectiveness of the universities’ support services. It had a further aim of encouraging the diffusion of knowledge and best practice among the participants. This network was called GP and membership was and is on a voluntary basis. Initially, it was promoted and financed by the Italian Central Government to spread a culture of performance measurement among Italian universities, inspired by the New Public Management wave. The number of universities belonging to the network has varied over the years, from the initial ten of 1998 to 31 in 2015 (see Figure 1 to see how the number of universities in the network has grown over the years).

The network’s core activity concerns collecting data on the performance of the universities’ support services. These are then benchmarked to identify the best management practice for each support service. The services under investigation relate to personnel support, student support, library services and infrastructure management services. Performance is evaluated by computing indicators of efficiency and effectiveness. The efficiency indicators quantify the cost of the resources needed to provide the support services, adopting an activity-based costing methodology (Cooper and Kaplan, 1992). The effectiveness indicators determine the quality of a delivered service measured through customer satisfaction surveys targeting students, academics and administrative staff.

Network activity is cyclical; in the early years of the network’s life, work was carried out on a two-yearly basis, while from 2010 it has become annual. The work involves collecting data to be used to achieve the network’s objective of benchmarking performance and sharing best practice.

| | | GP | GP2 | GPSUD | GP 2003 | GP 2005 | GP 2007 | GP 2009 | GP 2011 | GP 2012 | GP 2013 | GP 2014 | GP 2015 |
|----|----|----|-----|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| A | 11 | X | X | | X | X | X | X | X | X | X | X | X |
| B | 11 | X | X | | X | X | X | X | X | X | X | X | X |
| C | 11 | X | X | | X | X | X | X | X | X | X | X | X |
| D | 11 | X | X | | X | X | X | X | X | X | X | X | X |
| E | 10 | X | X | | X | X | X | X | X | X | | X | X |
| F | 10 | | X | | X | X | X | X | X | X | | X | X |
| G | 9 | | | X | | X | X | X | X | X | X | X | X |
| H | 9 | | | | X | X | X | X | X | X | X | X | X |
| I | 6 | X | X | | X | X | X | X | | | | | |
| J | 8 | | | | X | X | X | | X | X | X | X | X |
| K | 8 | | | | | X | X | X | X | X | X | X | X |
| L | 7 | X | X | | X | | | | X | X | | X | X |
| M | 8 | | | | X | X | | X | X | X | X | X | X |
| N | 6 | | X | | X | X | X | X | | | | | X |
| O | 7 | | | | X | X | X | | | X | X | X | X |
| P | 7 | | | | | | | X | X | X | X | X | X |
| Q | 7 | | | | | | | X | X | X | X | X | X |
| R | 7 | | | | | | | X | X | X | X | X | X |
| S | 7 | | | | | | | X | X | X | X | X | X |
| T | 7 | X | X | | | | | | X | X | X | X | X |
| U | 4 | | | X | | X | X | X | | | | | |
| V | 6 | | X | | X | X | X | | | | | X | X |
| W | 5 | | | | | | | | X | X | X | X | X |
| X | 4 | | | | | X | | | X | X | | X | X |
| Y | 3 | | | | | | | X | X | X | | | |
| Z | 3 | X | X | | | | X | | | | | | |
| AA | 3 | | | X | | X | X | | | | | | |
| BB | 2 | X | X | | | | | | | | | | |
| CC | 2 | | | X | X | | | | | | | | |
| DD | 4 | | | | | | | | | X | X | X | X |
| EE | 4 | | | | | | | | | X | X | X | X |
| FF | 4 | | X | | | | | | | | X | X | X |
| GG | 3 | | | | | | | X | | | X | X | X |
| HH | 2 | | | | | | | | | | X | X | X |
| II | 3 | | | | | | | | | | X | X | X |
| JJ | 3 | | | | | | | | | | X | X | X |
| KK | 3 | | | | | | | | | | X | X | X |
| LL | 1 | | | | | | | | | | | | X |
| MM | 1 | | | X | | | | | | | | | |
| NN | 1 | | | X | | | | | | | | | |
| OO | 1 | | | X | | | | | | | | | |
| PP | 1 | | | | X | | | | | | | | |
| QQ | 1 | | | | | X | | | | | | | |
| RR | 1 | | | | | | X | | | | | | |
| SS | 1 | | | | | | | X | | | | | |
| TT | | | | | | | | | | | | | X |
| UU | | | | | | | | | | | | | X |
| | 44 | 10 | 14 | 7 | 16 | 19 | 22 | 22 | 20 | 21 | 26 | 28 | 31 |

Figure 1.
The network
over the years

4.2 Research design

From a methodological perspective, a longitudinal case study was conducted using an interventionist approach (Jönsson and Lukka, 2006). The design of the case study allows researchers to answer “how” and “why” type questions (Yin, 1994) and is, therefore, particularly suitable in our investigation, where the research questions concern how and why crossroads drive network change. The longitudinal analysis has been helpful in exploring the actions taken by network actors to overcome critical situations, which is something often visible over time. Given the complexity of public networks and the difficulties in detecting a crossroads from the outside, we searched for crossroads inside the network, applying an interventionist approach (Jönsson and Lukka, 2006). Because of this approach, the case study was extended, by collaborating with the institutions studied (Suomala, 2009).

In an interventionist approach, the researcher takes an active role in the research field and participant observation is the main source of data (Jönsson and Lukka, 2006). Following this approach, we, the researchers, have been involved on a practical basis in the network’s life and activities from its inception in 1998 until late 2015. To be more precise, one author was involved in the network at its start in 1998, another joined the network in 2009, and the third in 2012. The role of the authors, all from one of the universities in the network, was to lead the network activities and manage the data analysis work. According to the terminology used in the GP network, the authors were known as the network research team, becoming a reference point for all the other universities. Each research team member has a

specific function: one as scientific coordinator for all network activity, the other two responsible for specific aspects (i.e. elaborating the efficiency and effectiveness indicators).

The main source of data in an interventionist research consists of participant observations, and these have been carefully managed by taking field notes throughout the life of the network. The researchers each took notes independently while working on network activities; moreover, they accessed all the network documents and material, and discussions were conducted informally on a daily basis with the network participants by e-mail and phone as well as during the face-to-face network meetings.

Our daily work within the network has allowed us to have first-hand experience of the crossroads encountered during the life of the network. A crossroads was detected every time there was a critical moment that could have undermined the survival of the entire network. These moments were detected in part because the researchers were the leaders of the network, and so were contacted every time a network problem arose. Whenever one of these moments of crisis (i.e. crossroads) cropped up, the authors completed their field notes by carrying out semi-structured interviews with several network participants from the universities involved, enriching the available material.

Each author collected field notes independently and wrote their own narrative about why the crossroads had occurred and how the actors, including the author, reacted to these critical situations. The authors organized and analyzed data using open coding categories in order to gain a good understanding of the network crossroads and of the network actors' reactions.

While the crossroads were identified equally by the three researchers, the statements selected to support the explanation were in some cases different. The variety in the explanations relating to the crossroads has been addressed by drawing on the insights gained during the semi-structured interviews. By comparing the field notes and completing them with the material gleaned from these semi-structured interviews, we were able to work out why the actors behaved in a certain way when faced with a crossroads and why a crossroads cropped up, and to understand the network actors' reactions. This comparative approach was used iteratively with theory to derive the insights presented in the results section.

5. Results

This section presents the results from the interventionist research. We were particularly interested in looking for the reasons that led a crossroads to emerge and how the network reacted to the crisis, determining a change to the network.

5.1 Resource-driven crossroads

In resource-driven crossroads there are limited human and financial resources available to the network management. This represents a crucial decisional moment for the network, since network managers must question the survival of the network itself.

In our empirical investigation, we faced such a crossroads in 2002, when the network stopped being financed externally. Since its establishment in 1998 until that time, the GP network had been receiving funding and support from Central Government through a dedicated public body, Comitato Nazionale di Valutazione del Sistema Universitario (CNVSU) (CNVSU – the National Committee for the Evaluation of Universities), which promoted the foundation of the network, lead the network and, most importantly, financed its activity. At that time, Italian universities were invited to join the network and were free to do so or not, but if they did, there were no financial obligations (apart from the cost of dedicated network personnel) since CNVSU provided all funding for running the network. CNVSU's reasoning was related to its desire to spread a culture of management within the Italian higher education system:

Higher education institutions are old style bureaucracies that are not used to measuring their actions or improving their performance as private companies must do. We think that

the time has come to guide them towards a new culture based on evaluation and management (CNVSU Representative).

In 2002, the CNVSU felt that it has accomplished its mission to spread a culture of measurement across Italian universities through the network actions that were actively being developed, and decided to drop out of the network. This meant that the GP network stopped receiving any type of funding, and there were no further incentives for universities joining the network.

This decision represented a situation of crisis for the network, and the member universities found themselves at a crossroads. They had to decide whether to dissolve the network or self-finance the project and cover the network running costs.

Some network actors were despondent and left the network:

We believe in the GP network and its mission, but we cannot survive without an external financial commitment (University Q, Network Representative).

The network however survived since other network actors were upbeat and rescued the project. One university, in particular, put in place a self-financing initiative that allowed the network to continue:

The GP network has strongly affected the culture of every member university by stimulating dialogue, looking at performance measures and a introducing culture based on indicators. I think we can continue to follow this approach and I am prepared to take on the duty of leading the network. But every university must help out by paying an annual fee to cover the network costs (University M, Network Representative).

This offer was received enthusiastically by several universities and the network continued to function. Coming through this crossroads successfully had two major implications: one relating to the network's activity and the other in terms of organizational contribution to network activity.

The first implication presented itself as a network activity challenge, that of developing strategies to attract potential participants and external supporters and so secure commitment to the project. A new key management task was established in the form of strengthening and clarifying the benefits of the network to potential universities. This approach was intended to help universities commit to the project and, outside the network's boundaries, increase the appeal of the network to other universities:

We have some fixed costs, like those to analyze and benchmark university performance. The more of us in the network the better, not only in terms of financing, but also of benchmarking: we have more organizational data to work with (University B, Network Representative).

The second implication was, instead, related to the individual universities, who found themselves asking how important it was for them to be in the network, since they had to finance the network's activity on their own. This aspect recalls the seminal network trade-off between the objective of the whole network and the objective of individual network actors. This duality has been highlighted several times in literature on public networks (McGuire and Agranoff, 2011; Zheng *et al.*, 2010), and often it leads to some members leaving the network or to bringing about a level of network conflict when the network is mandated. In our empirical investigation, this duality was accentuated by the lack of resources: in a condition of limited resources, but where resources were needed for the network to function, universities were forced to rethink how useful it was for them to be part of the network. They came up with different responses. Some universities discovered that the network's objective of benchmarking the performance of support services and finding best practice was not aligned to their own organizational objectives. This was the case of University A, which decided to leave the

network in the run-up to the GP2014 edition. Its network representatives justified this choice as follows:

To be honest, we are not that interested in benchmarking. We joined the network because of its connections with Central Government. We thought that, by belonging to the network, we would get early inklings of any new laws or requirements. But this was not the case. So we prefer to leave (University A, Network Representative).

Another group of universities decided to remain in the network, but this in turn led to them taking one of two different paths: a passive or an active approach to network activity. Passive universities remained the network, but contributed only in terms of collecting data for its benchmarking purposes. They often did not attend the network meetings, or, if they did, were not involved actively in debates and interaction. This was the approach taken by University L, whose presence was passive but constant throughout the life of the network.

The active universities adopted the opposite approach, and participated actively in the debates, the operative and plenary meetings and the discussions, and were proactive in leading network activity. This emerged from the number of informal telephone calls and e-mails sent to the research team. For example, during the most recent edition of the project, University B sent more than 100 e-mails asking for clarification on data collection. This group of universities sought indirectly to influence the network activity toward their own specific needs, as highlighted by the network manager of University D:

We do not have the resources to fund network activities. But if we align the data we collect for the network's benchmarking work with the data we need internally, we can manage our limited resources much better (University D, Network Representative).

This statement was shared by other network actors and gave rise to an informal sub-network of universities linked by a common desire to align the network's activity with their internal processes, which also meant that the network's goal and their internal goals were aligned. The intention of these universities was highlighted several times during network meetings, and, in practice, this group of actors exchanged e-mails, telephone calls and held informal discussions with the research team. The result was that the formally directed network co-existed with this sub-network and, in practice, it was in some cases able to influence how the network functioned. For example, we decided that the deadlines for the network activities should be set coherently with the universities' internal deadlines, which were, in turn, aligned with their normative requirements.

In summary, a resource-driven crossroads is linked to a lack of the financial and human resources needed for the network to function, a situation that can occur when a sponsor drops out of the network. The only way to survive consists of covering the costs elsewhere, that is by the individual network actors. While in charge of evaluating whether it made sense for them to pay for the network costs, the actors had to decide whether they saw a connection between the network's goal and their organizational goals. Answering this question led some actors to leave the network and others to stay, therefore altering the network's structure. The actors that remained in the network either adopted the passive approach of observers or gathered in informal sub-networks in order to influence the network's activity and direct it toward their own objectives.

This decisive moment was then formalized and every year the universities in the network are asked whether they intend to stay in the network or leave it. Figure 1 shows how the number of participant actors evolved over the years.

5.2 Network management-driven crossroads

The second type of crossroads concerns the instability of network management, by which we mean changing the network leader with no clear idea of who the substitute will be.

This was the case in 2010, when the former scientific leader managing the research team resigned, placing the network universities at a crossroads.

The research team was composed of a scientific leader (i.e. the network leader) in charge of approving the main ideas regarding network activity, and of checking network activity and output twice a year, early on when activities are planned and in the run-up to year-end when the annual results are presented; two senior researchers responsible for network activity in specific terms (i.e. cost of collecting data, sending surveys to students, staff and academic personnel) and a group of junior researchers in charge of the day-by-day network functions.

A crossroads appeared when the network leader resigned from his role, having been appointed as rector in his university. This resignation put the network up against another crossroads challenge, since there were no clear options for a replacement leader and the network members felt abandoned:

Prof [OMISS] provided vision about the work of the network and at network meetings, was able to steer us through disagreements, support discussion and give us a common vision. Without his intervention, I think we will find it very difficult to coordinate the network and strengthen its work (Network Representative, University O).

Once again, the network actors overall felt that the network and its work was beneficial and decided to appoint a new leader (i.e. a senior researcher on the research team). While the challenge of this crossroads was overcome, the network dynamics were affected, mainly due to a new sub-network emerging. The boundaries of this sub-network were determined by the actors' network-related skills and their previous participation in network activity.

The reason for the appearance of this sub-network was because, over the years, the network leader and the network managers had acquired personal knowledge and expertise relating to the network's dynamics and the specific requirements of the network's activity. This was underlined by the network leader's team-mate:

As time goes by, the network leader has learnt who the leading actors are and who can influence the final network decisions; he knows how to interact with colleagues internally so data is collected more rapidly and he knows all the little details about each piece of data that must be passed on to the research team (Network Representative).

These skills and knowledge were even more precious during the period of network growth when specific aspects were introduced and training in them required, such as when an IT system was introduced to manage the network data.

The instability at this point did not only relate to the change of network leader, but also to the changes to the research team over the years. The senior researchers in charge of the specific network processes were frequently replaced. In the early years, from when the network was set up until 2009, the reference researchers involved in the network cost-related work changed with every edition of the project, while the reference person in charge of the surveys remained in place. From 2009 until today, the opposite was true: the researcher in charge of managing costs is the same, but there has been a new person in charge of surveys every year. This instability within the research team once more posed several problems in connection with knowing about the network dynamics and network activity. This is clear from a comment written by a network manager to the research team, when the person responsible for costs was replaced in 2009:

During the collection of costs data I had some doubts about the type of data to collect, both in terms of how to map personnel and concerning the specific information required. This was crucial for me in terms of driving my internal processes. More than once I saw that, on your side, the reference researcher did not know the answer: I called her on the phone, but she could not help me. She answered by email a few days later and this led to me delaying my own work. I found it more useful to ask other universities (Network Representative, University P).

This sentence highlighted how the scene was set for a new emergent array of relationships, giving rise to a new informal sub-network, that of the technical experts. Unlike the previous sub-network, this was composed of individual actors, rather than universities, with a long history of network life. This meant that the discriminating element of being part of this network was the actors' technical knowledge about network activity. This was not a voluntary sub-network, but arose spontaneously from expert-actors sharing the same problems and level of knowledge about the network.

To summarize, the instability of network actors over the years created a set of heterogeneous skills and knowledge on network activity and network dynamics, leading actors to connect informally with other actors with whom they shared a similar level of knowledge. This, in turn, gave rise to an informal sub-network which developed on the basis of past network history.

6. Discussion

On investigating the two different crossroads, we found two types of critical decisional moments, either of which can undermine the survival of a goal-directed network. These involve a lack of human and financial resources dedicated to network activity, and the instability of network managers.

Our empirical investigation on how the network actors react to these crossroads supports a broader discussion about how and why crossroads explain network change. Two issues concerning how crossroads are able to influence network change are discussed in this paper. These are the co-existence of informal sub-networks and the formal goal-directed network, and the heterogeneity of network actors.

6.1 *Co-existence between informal sub-networks and the formal goal-directed network*

The empirical analysis has shown that two informal sub-networks emerged from the network actors' response to two different crossroads, these being resource-driven crossroads and network instability crossroads. On the one hand, a shortcoming in human and financial resources has accentuated the duality between the network's objective and the various organizational objectives. This, in turn, has led to the emergence of an informal sub-network composed of the actors which decided to remain in the main goal-directed network, while seeking to align the network's goal with their own organizational objectives, with the end purpose of using the available but limited resources in a more efficient way. The universities whose reaction to the crossroads was driven by this motivation found that they could use the official network meetings held by the main goal-directed network as a means of finding allies with similar views and motives and so increase their influence over the decisions of the main network. During the formal network meetings, the actors belonging to the sub-network held informal discussions on how to join forces and affect the network's activity. As a consequence, it was found that the informal network was able to co-exist with the formal goal-directed network. The formal network's meetings, in particular, proved to be an excellent occasion for the informal network to grow and plan its activity.

On the other hand, the instability of network management, with reference to both the resignation of the network leader and frequent changes taking place within the research team, encouraged the spontaneous appearance of a second informal sub-network encompassing the network actors with a long network history. Over time, these actors had gained deep knowledge of the network dynamics and activity, and found themselves in the position of anticipating network problems, network needs and network activity. In parallel with the previous sub-network, this also surfaced during the formal meetings of the main goal-directed network. During the discussions among network members at the official network meetings, a clear distinction arose between the technical network experts and the new entrants. Again, once these formed into a group, they continued their work

informally outside the formal network meetings through e-mails, telephone calls and by meeting informally.

To conclude, the empirical analysis has provided evidence that informal sub-networks can be established within a goal-directed network as a response taken by network actors to overcome the challenges when dealing with crossroads. The two networks examined were able to co-exist with the goal-directed network and, indeed, the network's formal meetings presented the occasion for the informal sub-networks to come into being and, ultimately, have a strong influence over the decisions and activity of the main network.

6.2 Heterogeneity of the network actors as a driver for the formation of sub-networks

A second element of discussion deriving from our empirical investigation is connected to the heterogeneity of the network actors, acting as the main driver behind the formation of informal sub-networks. Surprisingly, we found that the network responded in the same way to two different types of crossroads, the resource-driven crossroads and the crossroads corresponding to instability in network management, by forming informal sub-networks.

In searching for the reason behind this, we found that the connecting element between the formation of informal sub-networks in both cases depends on the heterogeneity of the network actors. The heterogeneity of network actors is often related to the different types of organizations belonging to the network (Kenis and Provan, 2009), but this was not so in our case. We found a different type of heterogeneity: the motivation for an actor to belong to the network and an actor's history of involvement in network activity.

When facing a resource-driven crossroads, the heterogeneity of the network actors was found to be connected to the many individual organizational objectives in play, which often were not aligned with the network's main goal of benchmarking services and finding best practice. Because of these variety of organizational objectives, the network actors were stimulated to search for organizations similar to themselves, inducing the creation of an informal sub-network.

When faced with an instability-driven crossroads, the heterogeneity among network actors was found to be connected to their previous involvement and experience within the network. The past network history of people involved in network activity influenced their technical skills and expertise in addressing the network activity, as well as the dynamics of interaction among the network actors.

The actors' heterogeneity, whether related to their organizational objectives or to their previous network history, seems to emerge as the main reason driving network actors to search for similar organizations and, accordingly, stimulates the emergence of informal sub-networks.

7. Conclusion

The aim of this paper is to investigate how and why a goal-directed network changes, endorsing the notion of critical crossroads. While extant studies have mainly addressed the issue of network change indirectly, by investigating how specific network components (i.e. actors and relationships) vary over time (e.g. Hermans *et al.*, 2013; Osborne and Murray, 2000; Saz-Carranza and Vernis, 2006; Lowdnes and Skelcher, 1998; Ring and Van De Ven, 1994), in this paper, we have covered the topic more explicitly. In our work, we have moved the notion of "what" aspects of the network change further, by exploring "how" and "why" this change occurs through the concept of crossroads (D'Aunno and Zuckerman, 1987). A crossroads is broadly understood as a critical decisional moment where actors are required to take evasive action to avoid the network being dissolved. Overcoming this situation of crisis inevitably alters the network nodes and/or relationships, leading to network change. By combining the available studies on crossroads (Human and Provan, 2000; Topping and Hartwig, 1997; Ring and Van De Ven, 1994; D'Aunno and Zuckerman, 1987)

with the literature on public networks, we were able to derive two conceptually different types of crossroads acting as the main determinants of network change: resource-driven crossroads and network management-driven crossroads.

Adopting an interventionist approach, these crossroads were investigated in a goal-directed network of public universities, which had been set up with the purpose of benchmarking the performance of their support services and finding best practice. Our empirical approach has led to two main implications. First, informal sub-networks frequently emerge as a network actor's approach to overcome the critical situation presented by a crossroads. These sub-networks co-exist with the formal goal-directed network, with official network meetings representing the main arena for informal connections to be set up and reinforced. This result underlines the fuzziness of network classifications and categories. Several authors have proposed a wide variety of classifications for use in public networks, and include formal vs informal; voluntary vs mandated, goal-directed vs informative (e.g. Agranoff, 2007), but this forces public network scholars to place networks within a specific cluster. Networks, however, have many facets, being at the same time goal-directed networks and informal sub-networks. The findings introduce the issue of hybridization within networks where there is co-existence between many different networks within the same organizational whole. This opens up further research to study the co-existence between these two types of networks and its implications on network output and outcomes.

Second, heterogeneity among network actors seems to be the main determinant for the emergence of informal sub-networks: network actors search for organizations with similar problems and settings to theirs when crossroads appear. When the actors felt that the objectives and/or skills in the network were heterogeneous, they remained within the network, but were keen to find partners and allies with characteristics similar to theirs. This strive for homogeneity was finally achieved in the informal sub-network. As a result, this expands on the current view about heterogeneity in public networks (e.g. Provan *et al.*, 2007), by providing evidence that network variety is not only connected with the different type of network actors (i.e. public administrations, private organizations and non-profit bodies), but that heterogeneity is also linked to different objectives and previous experience in the network and its activity. While this heterogeneity is often viewed as a positive feature in a network because it stimulates network innovation (e.g. Agranoff and McGuire, 2001), our study highlights a further implication of network heterogeneity, which acts as a determinant for informal sub-networks to emerge when the actors strive for similarities and homogeneity.

These insights can contribute to the literature on public networks, by including the reasons behind network change and the complex dynamics associated with the intention of overcoming the critical situation posed by crossroads and the decisions that must be taken at that point.

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