Introduction

In the past few decades, knowledge and innovation have been recognized as the key to economic growth and competitive advantage (Brown and Duguid, 1991). To ensure the economic and social well-being of their nations and their competitiveness in the global economy, many governments have invested significant efforts in fostering research and innovation. In Canada, the main policy tool for encouraging socially relevant research and innovation is the Networks of Centres of Excellence (NCEs) program. Introduced in 1989, the program periodically creates large distributed research networks, or NCEs. Each of them functions in a particular area, deemed important for Canadians, and is funded for a fixed period of time. Their mandate is to mobilize existing expertise across the country, to bring together diverse stakeholders including academia, industry, government, and non-profit organizations, and serve as a catalyst for innovations that will benefit Canada. The distinctive characteristics of the program include public-private partnerships to ensure commercial relevance, interdisciplinary collaboration expected to provide better solutions to the complex problems facing society today, and country-wide collaboration. In essence, the NCEs create distributed research networks intended to improve the excellence of research while decreasing its costs.

These distinctive characteristics of the NCE program are consistent with current trends in scientific research: science is increasingly becoming more collaborative, more interdisciplinary, more user oriented, and more networked (Olson et al., 2008; Caruso and Rhoten, 2001; Cummings and Kiesler, 2005; Hey and Trefethen, 2008). While scientists have always worked in informal “invisible colleges”, research networks are now becoming more structured and more formal (Crane, 1972).

Later modifications of the original NCE program have further emphasized commercialization, business driven research, and tangible user benefits. In line with this overall orientation, some NCEs have developed consortia programs – a research model that has several distinct advantages for achieving the NCEs mandate of focusing country-wide expertise and supporting innovation. First, research consortia are based on strong partnerships between researchers and users. Typically, users in research consortia are more active in identifying appropriate research areas and designing specific research projects. They are, as well, more aware and involved in the research activities. Second, because of their greater influence on the research outcomes and better knowledge of the research process, users are expected to be better prepared for adopting them. Third, to achieve their goals of user-oriented research, users from the funding organizations and academics need to reach a shared understanding of their research goals and of the means to achieve them.
Thus, in addition to the knowledge creation taking place in the research projects, research consortia involve learning processes on the level of all participants and particularly in exchanges among researchers and users. In turn, differences in the funding process, research management practices, and knowledge exchanges of consortia are likely to affect the network of researchers and users participating in them.

For instance, engaging users in research consortia will result in their playing a more important role in the networks, while learning processes will lead to specific knowledge exchanges. In essence, consortia are expected to create different networks compared to the networks created by more traditional funding models: user-driven, with intense knowledge exchanges crossing the researcher – user divide.

How successful are research consortia are in achieving their goals? DO they really create user-driven networks? This paper aims to contribute to our understanding of this issue by providing a fine grain description of the advice exchanges in consortia and the role of users in them.

The study

This analysis draws on a case study of the research consortia program launched by a Canadian NCEs (referred to as the Water NCE). The Water NCE runs both a General program based on traditional funding model and a Consortia program. At the moment, the Consortia program has 140 members affiliated with two fully operational consortia and several consortia still in their design stages.

The analysis uses data from a social network survey (N=59) and semi-structured interviews (17). In addition, it is also informed by an earlier research of the General program of the Water NCE (Dimitrova and Koku, 2009; Dimitrova and Koku, 2007). The discussion focuses on the advice exchanges (i.e. who gives advice to whom? Who receives advice from whom) which reflect the mentoring and learning processes in the consortia.

The paper uses Social Network analysis (SNA) – an approach especially useful for the study of large distributed research network which NCEs create. SNA studies the patterns of relationships among a set of actors and the resources flowing along these relationships (Cross et al., 2002). It can map relationships (e.g. who collaborates with whom), show internal groupings (e.g. cliques of people giving each other advice), or capture the location of an individual in the network (e.g. isolated in the periphery).

Other program evaluation models are inward looking: they examine the links between activities and outcomes but the links between the producers and the users of research remain beyond their scope (Reardon et al., 2006; Coutts, 2005). In contrast, by tracing connections among participants, social networks studies can make visible the exchanges among researchers and users and can demonstrate the integration of a community and the building of its research and innovation capacity.
This analysis seeks to answer the following questions:

- What is the role of users in the consortia network, specifically in its advice networks?
- Are there advice exchanges between users and researchers? In other words, are users and academics mentoring and learning from each other?

**Management of the General and Consortia Networks**

In order to achieve its goals of actively engaging users and orienting the research to their needs, the Water NCE has developed distinct procedures for its Consortia program. These are best described in a brief comparison with the procedures of the traditional General program of the Water NCE.

In the General program, the research agenda is set by academics. The central governing body is the General Management Committee (GMC) – a small group of less than a dozen people. The committee members are - with a couple of exceptions - academics. It is the responsibility of the GMC to set the research agenda in the General program, monitor projects, provide annual feedback to the researchers, and evaluate the projects after their completion. As all the members are volunteers, their committee work comes on top of multiple commitments and heavy workloads. They meet a couple of times a year to discuss in person the progress of the research projects funded through the program, rethink research agendas, and consider administrative issues. Usually, such meetings are organized around larger events attended by members such as annual retreats or annual conferences.

In contrast, the research agenda in all consortia is defined by users. Consortia require a lengthy period of preparation, during which the Consortia Program staff identify potential participants and conducts consultation workshops to help them uncover shared research priorities. These workshops set the research agenda for the consortia. After consortia become operational, they set up governing bodies – committees and subcommittees - that are comprised entirely by practitioners. The members of the Consortia Management Committees (CMC) meet more often, at least 3 - 4 times annually. Although there have been a couple of teleconferences and a web conference, most meetings are in person: they involve complex discussions and negotiations that cannot be done over mediated channels.

The funding and management of the research process in consortia is also different. A noticeable difference is their much more specific and targeted calls for proposals which closely reflect the research priorities set by users during the consultation workshops. The selection of projects for funding is also done by users with the help of international experts. Further, the coordination of research and monitoring of projects in the Consortia program is done in a much more deliberate fashion than in the General program. Many consortia funded projects have several mandatory workshops at the consortia level so that during a 2 ½ year-long project, researchers and users may meet for a kick-off workshop before the project starts, in mid-stream for a progress report, and for a wrap-up after completion.
“They [the Consortia funded projects] had conference calls, they had workshops, they had annual reports that were reviewed by committees... It was a much more accelerated, or, focused attention [compared to] the four-year projects [in the General program] ... Partially, that was because of they [the program staff] had a deliverable that they needed to provide to the government [funder] on a specific topic... So they had a responsibility, and we [the academics] were their workers in a sense.” (Researcher)

Participants include users, the researchers from all the projects currently funded by the consortium, and the international experts evaluating them so such meetings create opportunities for a discussion among a wide range of stakeholders.

The Water NCE staff plays an important facilitating role in the consortia. While the staff members do not make any of the decisions on the research priorities, the scope of projects, or their approval and evaluation, they are involved in every process in the network. They identify potential consortia participants, facilitate uncovering of the research priorities, and providing the infrastructure for the work of consortia members.

The staff members organize events and meetings, facilitate the discussion in them, write up calls for proposals on behalf of the consortia participants, network with external experts who evaluate proposals and projects, and prepare documents summarizing decisions or projects results. They extensively consult individual members and network on their behalf.

The procedures above reflect the goals of the Consortia program to give users a leading role in setting the research agenda and to ensure that research projects follow pre-determined parameters based on user needs. In addition, they provide numerous opportunities for interactions among consortia participants that involve complex discussions, negotiations, and integration of diverse perspectives. Goals and reality, however, do not always coincide. To answer the question to what extent the Consortia program achieves its goals of putting users in leading position and enabling them to reach shared understanding with researchers about what research projects should achieve, we need to examine the actual rather than the prescribed interaction in consortia. The next sections first examine the characteristics of the consortia network and then patterns of advice exchanges in it.

**Consortia Members and Personal Networks**
The Consortia participants come from different sectors and institutions but they all are mature established professionals with years of experience in their fields. The program recruits specifically among senior government officials, or the people “who hold the purse strings” (User). A lot of the practitioners are in decision-making positions (See Annex: Table 1).

Most of consortia participants know ten or more people in the program – which a substantial number of ties in the type of network examined here (See Annex Table 2). The size of respondents’ networks is reflective of the number of meetings the program involves as well as of the seniority of its participants. Literature on organizational networks often links formal status and social capital. In other words, organizational members with high status know more people, more high status people like themselves, and often people outside their own units (Tichy et al., 1979; Daniel et al., 2003).
When such well-connected professionals join consortia, they bring some of their prior ties with them, hence the size of the reported networks.

In addition, the results suggest that at least some of the ties in the consortia network have been created through the program. This is evident from the fact that most consortia participants have known others in the network for a short time – the duration of ties roughly coincides with the existence of the program – and the people they know are acquaintances rather than friends (See Annex: Table 3). Hence, the participants have both old ties that they bring into the consortia network and new ties they created through involvement in the program.

In short, participants are relatively well connected to the network but they are diverse in background and have relatively short-lived ties to other consortia members. Compared to the participants in the General program, they know more people in the Consortia program but have known them for a shorter period of time. These characteristics of the consortia participants and their connections have several implications for the interactions in the network. Since knowing someone is a precondition for other relationships such as exchanging advice or networking help with that person, the high number of ties of consortia members suggests that they are in a good position to exchange resources among themselves.

At the same time, according to social network theory ties emerge more easily among similar people. The diversity of sectors and institutions means that participants bring to the consortia different opportunities, constraints, views and cultures. Further, the consortia network involves, in addition to old ties, more recent ties that may not have been able to build trust. Just knowing someone does not necessarily mean that you will exchange advice or help that person. While the Consortia program creates opportunities for its participants to meet, the diversity of participants and the short duration of some of the ties among them make difficult the building of trust and the development of more demanding ties among. Are consortia participants able to cope with this challenge and learn from each other?

**Connectivity in Advice Exchanges**

To understand the interactions in the network, we focus on giving advice and seeking advice. At a first glance, it may seem redundant to examine separately giving advice and seeking advice. However, advice exchanges are inherently asymmetrical and often status related. For instance, an expert may be actively giving advice to junior colleagues without seeking advice from them. Alternatively, an expert may be seeking advice from colleagues in other fields without giving advice to anyone. In a community, members may be engaged to a different degree in giving and seeking advice and, typically, members giving advice may not necessarily be the ones seeking advice. For these reasons, it is best to treat giving and seeking advice as distinct processes.

**Mentors versus Learners**

The analysis shows that consortia members do indeed exchange advice with each other. While they do not give or receive advice from every person they know, the advice exchanges are sufficiently active to create not only connections among participants in a particular consortium but also connections on the level of the program. Figures 1 and 2 (Annex)
represent visually giving and receiving advice among the participants in the consortia program. They show that while there are a few participants who are isolated and do not give or receive advice from other consortia members, most of the participants are connected to a program-wide network and not only to the members of their own consortium. This means that they are connected to a broader and more diverse pool of people and therefore have access to more diverse information and ideas than those coming from a single consortium. Such diversity of ties, social network theory suggests, is essential for access to new knowledge and learning.

Next, giving and seeking advice have distinct patterns in the network. The analysis suggests that participants in the consortia network are more active in seeking advice than in giving advice. This may come as a surprise: seniority and reputation are typically associated with advice giving and, as previously discussed, most of the participants in the consortia networks are experienced professionals in senior positions. Despite their experience and seniority, they are more active in seeking advice than giving advice. This process is not unexpected in an interdisciplinary and cross-sectoral group where members may need to learn disciplinary and institutional norms and practices from each other.

To some extent, this emphasis on seeking advice is also related to the way advice exchanges occur in the network. Advice giving is not always a conscious or deliberate activity. Instead, it is intertwined with other activities. For instance, people named by others as giving advice often do not see themselves as advice givers.

Because many advice givers are not aware of their role, fewer people appear active in giving advice (mentors) but many more recognize and gratefully acknowledge the advice they have received thereby increasing the number of learners.

**Leaders in Mentoring and Learning**
While the previous section shows that consortia participants are exchanging advice and are particularly active in receiving advice, it does not reveal who the most active participants in the exchanges are. Typically, not all members of a network participate in its exchanges to the same extent: some are closely involved in network exchanges, while others take a more passive role. Since the goal of the Consortia program is to engage users, one of the indicators for the success of the program is the active engagement of users in the advice exchanges.

Core – periphery analysis captures the uneven participation of network members and identifies the members of the network core. By definition, core members are most closely connected with each other and, in addition, are also a magnet for the less connected network members in the periphery. Periphery members, on their part, are more connected to the core than among themselves. Core members thus play a crucial role in the integration and viability of a network. By revealing the core member of advice relationships, core-periphery analysis can also demonstrate the role of users in the network.
The core-periphery analysis of the advice relationships in the consortia network reveals strikingly different results between giving and receiving advice. In advice giving, the analysis uncovers a core of 9 network members who actively give advice; the density values follow neatly the requirements for identifying a core (Table 4.A, Annex). In contrast, a total of 30 network members – more than half the survey respondents – are at the core of the advice receiving network; the density values further suggest that interpreting such a large group as “core” is unwarranted (Table 4.B).

Giving and seeking advice in the consortia network therefore unfolds quite differently. Advice giving, which is relatively infrequent activity, is dominated by a small group of “idea people” or “thought leaders” and experts, who consult each other actively and, in addition, are provide advice to those in the periphery. Among them are senior members of the Water NCE staff, practitioners from industry and municipal government, and researchers. Users outnumber academics among core members even though the difference is small. The presence of the Water NCE staff is significant. Their facilitating and organizing duties not only put them in contact with a lot of members of the consortia network and create opportunities for developing numerous ties. Their presence among the core members for giving advice suggests that the staff members not only know a lot of consortia participants but they are also actively providing advice and mentoring them. Notably, the nine core members come from four provinces and seven cities. Core members, therefore, bring distinct regional and institutional perspectives to their discussions.

Seeking advice, on the other hand, follows a different pattern. The set of 30 people uncovered by the analysis are more active in seeking advice than periphery members but the differences are not as pronounced as in giving advice and a core cannot be truly distinguished. The majority of the 30 especially active advice seekers are mostly practitioners who come from just about any corner of the country. Water NCE staff members are also among them – an indicator that they are both providing and receiving advice.

In short, because participants in the consortia networks are more actively seeking advice than giving advice, clear leaders emerge only in the domain of giving advice where fewer people engage – at least consciously - in the activity. Among those leaders users outnumber academics – an indication of the increased importance of users in the exchanges within network. The presence of the Water NCE staff in the core places them among the most active advice givers and indicates that they play an important role in the advice exchanges.

Advice Exchanges between Users and Researchers
To capture who directly mentors whom and who learns from whom, the discussion uses clique analysis: a technique that identifies subgroups of network members who are closely and directly connected among themselves. In a sense, cliques show where “the action” is and who is involved in it. Their number, composition, and membership overlap provide a fine-grained understanding of how the “action” is carried out. For instance, the diversity of the participants in the network would contribute little to accessing new ideas or to understanding of different perspectives if the members of each clique are similar to each other. Because of their connectivity, the members of a clique inevitably have common interests and concerns – this is what makes them a clique in the first place.
However, cliques comprised of users only suggest different processes compared to cliques with diverse – users and researchers - members. For instance, if a clique includes only researchers, this means that researchers are not really working with and are not learning from users. The benefits of the network for exchanging different ideas and understanding different perspectives will be diminished.

The analysis finds three cliques of people who give advice to each other. Each clique includes five participants. Most of the members participate in several cliques and the memberships of the cliques substantially overlap. As a result, a total of seven people are involved in giving advice. These patterns suggest that each of the seven clique members provides advice to several other people and does this in slightly different configurations. Remarkably, the people giving advice to each other are mostly users and staff of the Water NCE: only one clique includes a researcher. By comparison, there are more cliques and participants in advice seeking relations, the more active relationship in the consortia network.

More importantly, of the larger group of 14 clique participants, 5 clique members are researchers and the rest are users and Water NCE staff. Researchers and users are thus both involved in cliques of where members seek advice from each other. Similar to giving advice, however, each member participates in more than one clique, a pattern suggesting that consortia participants seek advice from several groups with slightly different configurations. Again as in giving advice, the ‘‘record’’ for participating in many cliques belongs to the senior Water NCE staff; they are part of almost every clique.

These patterns are understandable given the nature of advice relationships. Advice exchanges are targeted, specific and selective activities: people can work or discuss their ideas with many but pertinent advice comes from only a few members in their network. As a result, network members direct their advice or seek advice on specific issues from different specialized subgroups. Further, membership in several cliques means that clique members do not isolate themselves in a single group of people with whom they are most familiar or most comfortable. Instead, they have a chance to exchange ideas and see the perspectives of different people. In turn, the membership overlap across the cliques means that the consortia network is not fragmented in several insulated cliques; the cliques are connected to each other. Such links strengthen the integration of the consortia network as a whole and enable the rapid flow of information and resources within the network.

Apart from the staff members of the Water NCE, in both give and seek advice relationships more clique members are users than researchers. Out of 7 clique members involved in giving advice, 2 are academics; out of 14 members involved in seeking advice, 5 are academics. In other words, more users than researchers have cliques of trusted confidants in the consortia network to whom they give advice or from whom they seek advice. Such results cast new light on the active engagement of users in advice exchanges: users are active not only in single one-to-one exchanges but also in cohesive subgroups.
The crucial question is, however, is whether advice exchanges link users and researchers, i.e. whether users and researcher learn from and mentor each other. The test for the existence of such exchanges across sectors is the composition of each individual clique. Such learning and assistance across sectors are possible if a clique includes both users and researchers. Results show that over half of the cliques (6 out of 10 cliques for GIVE and SEEK ADVICE relationships combined) are composed of both users and researchers. Such “mixed” cliques are more common for seeking advice: five out of seven cliques in the SEEK ADVICE relationship include both practitioners and academics. Users and researchers are therefore especially active in seeking advice and learning from each other.

By comparison, in giving advice, only one of the three cliques has such a mixed composition and only one of the five members in this clique is a researcher; giving advice and mentoring therefore takes place mostly among users. One possible reason for this is that the role of researcher in the consortia network is fairly specific and once the research questions are specified by users, researchers conduct independently their research. This is consistent with a ‘hands-off approach’ to the research process emphasised by users and the Water NCE staff. They argue that – once the research questions are identified – they “will not tell the researchers how to do the work” (User).

It is worth noting that clique members as a whole and the members of each individual clique are dispersed in terms of geographic area. Clique participants come from four provinces and nine cities in Canada; two members come from different countries. With one exception, the members of each clique are located in two or three provinces and in different cities. In their advice exchanges, which are rather specialized and selective relationships, clique members in the consortia network have access to diverse regional views. Such patterns also suggest that distance has not been a problem in building trust: cliques have members scattered across the country.

In short, there is no doubt that consortia participants are overcoming the challenges of diversity and distance and actively exchanging advice with each other. There are pockets of active advice exchanges in the consortia network, in which members mentor and learn from each other. More users than researchers have such cliques of trusted people with whom they exchange advice; a finding that confirms again the active engagement of users. There is also no doubt that users and researchers are to some extent engaged in advice exchanges with each other. In more than half of the cliques, practitioners and academics seek advice and learn from each other and, to a lesser degree, give advice to each other. Partnerships across sectors do exist although they do not characterize every cliques and seem to be the stronger barrier than distance.

**Discussion and Conclusions**

Several findings emerge in the analysis. First, users are not only occupying the formal leadership positions in the consortia, but are also actively engaged and have leadership position in the advice exchanges in the network. The core of the most connected and most active participants in the exchanges includes – in addition to the staff of the Water NCE – more users than researchers. Users outnumber researchers in both the mentoring core of people giving advice and the set of active learners seeking advice.
As well, more users than researchers are members of cohesive supportive cliques where they exchange advice with trusted confidants. There is no doubt that users play as important if not more important role in the advice exchanges in the consortia network. These results are in contrast with patterns in the General program where an earlier study that found advice exchanges were dominated by academics: senior academics were most active in providing advice while junior academics were most active in receiving advice (Dimitrova and Koku, 2007).

The results are consistent with the interview data which suggest that most users feel more actively engaged; this feedback comes especially clearly from participants with experience with both the General and the Consortia Programs. Such practitioners state that in the Consortia program, they have more opportunities to provide input, more control over the results, and feel more engaged. In the Consortia program, according to them:

“Yeah, you [as a user] definitely have more say. There is continuous meetings, continuous updates you get to feed into it, you have more opportunities to input, to decide what the project is, how is it going, who is doing it. It’s kind of control but it’s not control its more ongoing input.” (User)

These results indicate that the Consortia program has indeed placed more control in the hands of users and enabled them to be more actively engaged in the network.

A second key finding is the importance of the Water NCE staff in the advice exchanges. They are among the most connected and the most active participants in the consortia network: senior staff members have several times more ties than other network members in both giving and receiving advice relationships. They are a constant presence in all advice cliques, and, in addition, are part of the core of the most important participants in the network. Members of all consortia exchange advice with the Water NCE staff more actively than even with the members of their own consortium. This suggests that senior staff, in particular, together with the other members of the core, functions as a linchpin of the exchanges in the network.

The importance of the Water NCE staff is recognized by other participants. Survey respondents consistently name them as providing or receiving advice; interview data further confirm their contribution to the exchanges in the network. Many participants explicitly credit the program staff for fostering a collaborative spirit in various discussions:

“… [staff] added that little glue to sort of pull this group together and get them to think and work together towards a common goal. As opposed to working like individual researchers normally do - grab your stuff and keep it tight because you can’t let everyone else know.” (User)

Such a linchpin role is consistent with the formal duties of the Water NCE staff in the network of facilitating exchanges, creating the necessary management infrastructure, and assisting other consortia participants. Yet this level of engagement also suggests that designed research networks and learning communities - such as the consortia network discussed here - may need more extensive organizational support than previously expected (Wenger, 2004).
A particularly interesting finding is the strong learning processes in the network. The active advice exchanges among the participants in the network suggest the existence of consultation and mentoring processes and, ultimately, the existence of learning processes. Interview data also clearly demonstrate the learning processes of the network. Most importantly, learning involves exchanges between researchers and users. While the survey data indicate the existence of exchanges between users and researchers, interview data clarify how exactly such exchanges might be happening. In their interviews, participants point to the importance of workshops and other consortia meetings for creating learning opportunities. It is at such meetings and workshops that participants learn to appreciate the viewpoints of different stakeholders and to collectively develop a shared understanding of research issues and their importance:

“I clearly remember a conversation with [a researcher] where [the researcher] looked at me and said “Well we didn’t understand that before” and by hearing this message it helped us figure out where to take our research… For the researchers, that was something that they have not really heard. I know that a number of them changed the way they did their work on their reports so it fit better with way the government makes decisions.” (User)

In turn, the organization of this user changed the way they communicated their needs to researchers. These strong learning processes suggest that the consortia network functions as a large distributed Community of Practice (CoP). The learning nature of the consortia network confirms later conceptualization of CoPs as communities that can number hundreds of participants as long as there is a core of members providing intellectual and social leadership (Wenger, 200b). The core – periphery analysis of the network demonstrated the presence of such a core of active mentors and learners.

The analysis provides interesting insights in the learning processes in the consortia network and specifically in the advice exchanges between users and researchers. The exchanges are reminiscent of the idea of learning loops which Wenger has discussed in his work (Wenger, 2000a). In his initial interpretation, CoPs of professionals with similar expertise create new ideas and build knowledge capacity, which members of the CoPs later bring to their functionally diverse projects teams. In the consortia network, knowledge is created on the level of the consortia by members who differ in their sectoral, disciplinary, and institutional background. Their shared understanding and agreed upon goals are later brought by researchers to their disciplinary and institutionally diverse project teams.

While such learning processes are not among the explicit goals of the Consortia program, participants link them to better research outcomes.

“I found that having the researchers in the room having them talk having us available to answer questions to help them understand our needs was an excellent approach for getting research done. I think we got more out of the research then we would have without that.” (User)
Indeed, if users and researchers in consortia have a better understanding of where each side is coming from and more trust in each other, they both make adjustment in the way they work in order to accommodate their partners.

These results suggest that the Consortia Program under investigation has to large extent proved the viability of the consortia model in ensuring user participation and user-oriented research. It has achieved this by creating a network with intense learning processes, a core of active participants with high presence of users, and exchanges between users and researchers. The distinctive patterns of the network provide a higher potential for change and innovation as well as a higher potential for knowledge transfer across different groups of participants.

References


BIO

Dimitrina (Dima) Dimitrova received her Ph.D. from the University of Toronto. She teaches organizational studies at York University and has a research and consulting business. Her primary research interests include issues at the intersection of collaborative work, social networks, and new technologies. Her current research examines collaborative research networks and research policy. She applies social network analysis and focuses on the way network structure and collaboration are linked to management practices. Her findings have been published in edited collections and journals in the US, Austria, Britain, Norway, Italy, Russia, and Bulgaria. She is affiliated with NetLab, a social network group at the University of Toronto; Graphics, Animation and New Media (GRAND) Network of Centres of Excellence, and the Ontario Knowledge Transfer and Exchange Community of Practice (KTECOP).”

Annex

<table>
<thead>
<tr>
<th>Table 1. Sector and Position</th>
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<td>Variables</td>
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<tr>
<td>Variable</td>
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<tr>
<td><strong>A. Mean Number of Ties in Respondent’s Network</strong></td>
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<tr>
<td>10 to 20 Ties</td>
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<td>More than 20 Ties</td>
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Table 3. Years Respondent Has Known Tie

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Table 4. Density Matrix of Core – Periphery Relations

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<tr>
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<th>Core</th>
<th>Periphery</th>
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<td>0.047</td>
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<td><strong>B. Seeking Advice</strong></td>
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<tr>
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<td>0.029</td>
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</tbody>
</table>
**Figure 1. Who Gives Advice to Whom**

- **Black** – Water NCE staff
- **Blue** – members of the first functioning consortium
- **Red** – members of the second functioning consortium
- **Green** – potential members of the consortia now in design stages

**Figure 2. Who Receives Advice from Whom**

- **Black**
- **Blue**
- **Green**
- **Red**