# Networking in Public Health:
## Exploring the value of networks to the National Collaborating Centres for Public Health

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**National Collaborating Centre
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## Exploring the value of networks to the National Collaborating Centres for Public Health

**Prepared for the National Collaborating Centre for Methods and Tools by**

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# Acknowledgements

# Main Messages

Networks are relational organizational forms that involve interconnected individuals, groups or organizations within a specific domain of knowledge and practice that interact socially and share knowledge with each other to achieve a common goal.

Networks have the potential to further the goals of the National Collaborating Centres for Public Health (NCCPH), specifically, the promotion of evidence-informed decision-making (EIDM), knowledge management (KM), and capacity development in Canadian public health. Connecting with existing Canadian and international networks may allow the NCCPH to circumvent jurisdictional barriers and structural issues within public health in Canada that currently inhibit EIDM and KM initiatives.

Keys to network success:

- Establish clear purpose and goals.
- Address the "hierarchy of needs."
- Include a culture of trust in stated core values.
- Fulfill specific role functions such as effective leadership, a core group, skilled facilitation, sponsorship, knowledge brokerage and community membership.
- Maintain a flexible infrastructure.
- Establish supportive processes.
- Balance homogeneity and heterogeneity.
- Secure adequate resources.
- Demonstrate value.

A network does not necessarily need a formal name to be a network. The consistent use of commonly understood terms is more important than what the network and its subgroups are called.

Networks are particularly valuable for sharing tacit knowledge and enabling its adaptation and implementation in a local context.

Methods and tools that facilitate a network's social interaction and knowledge exchange contribute to its effectiveness.

Methods and tools are currently available to the NCCPH that support network development, management, effectiveness and sustainability. In addition, existing methods and tools can assist the NCCPH in the evaluation of networks in terms of process, and short- and long-term outcomes.

The NCCPH is positioned to direct the development of additional methods and tools that can support network effectiveness. This paper identifies specific steps necessary to facilitate the development of these new methods and tools.

Collaboration is particularly important. A coordinated and coherent system of networking initiatives across the six NCCs will ensure that knowledge, skills and resources developed within the network of one NCC can benefit the entire program.

# Executive Summary

This paper was commissioned by the National Collaborating Centre for Methods and Tools (NCCMT) to present information on networks for public health to the National Collaborating Centres for Public Health (NCCPH). This paper explores the potential of networks to further the goals of the national program, in particular, the promotion of evidence-informed decision-making (EIDM) and knowledge management (including sharing and co-creation) in public health. While the NCCPH has a primary interest in strengthening public health in Canada, the background information and practical tools presented in this paper will also interest other sectors with the potential to impact population health (e.g. education, justice, urban planning and transportation).

The development of this paper was informed by a review of relevant literature and the valuable contribution of key informants and peer reviewers. (A more detailed description of the methodology can be found in Appendix A.)

*NCCPH program context*

In the aftermath of Walkerton, SARS and other critical public health events, researchers called for a nationwide network of population and public health practitioners, and researchers in public health science, knowledge transfer and exchange to improve the dissemination and use of research findings within the Canadian public health sector (Kiefer et al., 2005). This network would aim to raise awareness of the importance of EIDM and the resources available to facilitate it; identify priority areas; identify and address knowledge gaps; connect members who would share knowledge and resources (thus avoiding duplication); and improve methods and resources to support EIDM in Canadian public health.

Building on this work, the Government of Canada established six regionally-based National Collaborating Centres for Public Health (Frank et al., 2007). The national program was to become a broadly-based, strong and sustainable network connecting each individual NCC with other groups involved in EIDM, knowledge translation and knowledge management. These groups included public health practitioners, managers, knowledge brokers, researchers and policy makers. Other Canadian and international public health experts have suggested expanding the network to include health promotion, population health and other health services that promote ongoing and facilitated dialogue, individual and organizational learning, and system change (Best et al., 2003; Best et al., 2008; Leischow et al., 2008).

Networks are relational organizational forms that involve interconnected individuals, groups or organizations that interact with each other to achieve a common goal. Networks can become valuable tools to enhance the management, sharing and co-creation of knowledge in public health, and to augment professional and organizational capacity development, and system change. Networks are characterized by social interaction and knowledge-sharing related to a common goal within a specific domain of knowledge and practice.

Networks represent one relational approach to enhancing knowledge translation and exchange between people and organizations (Scott & Hofmeyer, 2007), organizational knowledge management, work-related behaviour change (Greenhalgh et al., 2004a; Greenhalgh

et al., 2004b), professional development (Hara & Hew, 2007; Parboosingh, 2002), and organizational performance (Teigland, 2003; White et al., 2008).

A variety of network types and models exists. Given its goals, the NCCPH is likely to be most interested in the development and facilitation of long-term, inter-organizational public knowledge networks. In fact, the original vision for the NCCPH was that it be a network of networks to foster knowledge translation and exchange, promote behaviour change at individual and organizational levels (to facilitate EIDM), and contribute to knowledge management within and among organizations.

No single network theory exists (Monge & Contractor, 2003a; Provan et al., 2007) and most key informants stated that no particular network model was used to guide the development of their networks. Although multiple frameworks have been identified (including network life-cycles, levels and characteristics; networks as complex adaptive systems; and communities of practice), the following factors are consistently recognized as critical to network success:

- Establish clear purpose and goals.
- Address the "hierarchy of needs."
- Include a culture of trust in stated core values.
- Fulfill specific role functions such as effective leadership, sponsorship, knowledge brokerage and community membership.
- Maintain a flexible infrastructure.
- Establish supportive processes.
- Balance homogeneity and heterogeneity.
- Secure adequate resources.
- Demonstrate value.

Networks are characterized by social interaction and knowledge-sharing related to a common goal within a specific domain of knowledge and practice. Methods and tools that facilitate this interaction and knowledge exchange contribute to the network's effectiveness in achieving that common goal. (Relevant resources are found in Appendix C.)

The following steps will enable the NCCPH to develop methods and tools necessary to support network effectiveness:

1. Conduct an analysis of existing NCCPH networks to
    - identify who knows what throughout the networks;
    - identify and designate key "go to" people on specific topics; publicize their designation to the networks;
    - encourage each knowledge broker to purposefully extend the reach and scope of the analysis by contacting two to three individuals to contribute to the analysis, rather answering the questions themselves;
    - request that organizations make this outreach role part of the knowledge broker's job description;
    - link network members with equivalent positions;

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- create a Community of Practice (CoP) among similar roles for on-going support.

2. Review existing PH-related knowledge networking methods and tools and contact associated key players. (Examples of these can be found in Appendix C.)

3. Create a template targeted specifically for the NCCPH network, including examples of public health knowledge networking strategies.

4. Establish a network development approach appropriate for public health organizations and create a related guide, manual and toolkit.

5. Establish consistent (or at least compatible) technological supports across all NCCs; facilitate the purchase of and training for networking software; provide IT support as necessary to set up or adapt current technologies for networking.

6. Involve public health associations and PHAC knowledge development and exchange officers as key network contacts (hubs).

7. Develop a network evaluation strategy as a core component supported by adequate human and financial resources.

8. Develop and implement a network marketing and communications plan.

9. Invite other organizations and networks to
    - join the NCCPH network(s);
    - develop a document to describe alignment with NCCPH;
    - identify the key benefits of joining NCCPH network(s).

(Examples are the CoPs within the Public Health Information Network (PHIN) of the Centre for Disease Control and Prevention (CDC) found at http://www.cdc.gov/phin/communities/resourcekit/pdf/Align.pdf and included in the PHIN's CoP Resource Kit.)

10. Facilitate the development of regional or issue-specific sub-networks (Cross et al., 2006) that are coordinated at a higher level to facilitate knowledge sharing across the NCCPH.

Many networks exist in Canada and internationally. Of specific interest to the NCCPH are other networks and organizations involved in public health practice, and/or knowledge translation and exchange, and sectors with which public health may collaborate (e.g., education, justice, urban planning and transportation). Strategically and deliberately connecting with these networks may advance the goals of the NCCPH to promote evidence-informed decision-making and knowledge management in Canadian public health.

# Introduction

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## NCCPH program context

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Building on this work, the Government of Canada established six regionally-based National Collaborating Centres for Public Health (Frank et al., 2007). The national program was to become a broadly-based, strong and sustainable network connecting each individual NCC with other groups involved in EIDM, knowledge translation and knowledge management. These groups included public health practitioners, managers, knowledge brokers, researchers and policy makers. Other Canadian and international public health experts have suggested expanding the network to include health promotion, population health and other health services that promote ongoing and facilitated dialogue, individual and organizational learning, and system change (Best et al., 2003; Best et al., 2008; Leischow et al., 2008).

Multiple definitions of networks can be found in the literature. For the purposes of this paper, a network is defined as a relational organizational form consisting of a collection of interconnected individuals, groups or organizations that interact with each other to achieve a common goal. An extensive body of literature related to networks exists in various disciplines, including management and education. While networks have recently gained attention, popularity and acceptance in health services (Abbott et al., 2006; Provan et al., 2007; Scott & Hofmeyer, 2007) both in theory and in practice (Hawe, 2007), the term needs further theoretical and practical development  (Scott & Hofmeyer, 2007).

Networks represent a relational approach to enhance knowledge translation (Scott & Hof-

meyer, 2007), organizational knowledge management, work-related behaviour change (Greenhalgh et al., 2004a; Greenhalgh et al., 2004b), professional development (Hara & Hew, 2007; Parboosingh, 2002) and organizational performance (Teigland, 2003; White et al., 2008) between people and organizations.

# Background

Network theory emerged from the social sciences in the 1930's. Original work conducted in psychology combined with input from anthropology to become social network theory. Early efforts related to the impact of relationships on psychosocial outcomes. Mapping networks, using qualitative sociograms that identified nodes and connections between them, later led to the development of social network analysis. At this point, modern network theory evolved as a separate and distinct approach to understanding networks that involved more than social networks (Tesson, 2006).

In the 1950's, the linking of network theory with mathematics and graph theory attempted to better understand communication patterns in networks. A decade later, the small world theory and the later-coined "six degrees of separation" rule were proposed by sociologist Stanley Milgram. Built upon this work, the "strength of weak ties" theory proposed that the important links in a network are not the strongest connections, but rather the weaker ones that connect otherwise unconnected groups through a network bridge (Granovetter, 1973). Watts and Strogatz then identified the structural importance of these weak ties, noting that small world networks (Barringer & Harrison, 2000; Brass et al., 2004; Provan et al., 2003; Provan et al., 2007) had random long distance ties connecting otherwise disconnected actors or nodes. The concept of hubs was introduced to describe nodes that were more connected than others (Barabasi, 2002). These hubs were found to have greater impact on the network than other actors.

In 1977, Canadian researcher Barry Wellman founded the International Network for Social Network Analysis, bringing together multiple disciplines in an emerging field of research. The first social network website was launched in 1997 (Boyd & Ellison, 2007). Social network sites and software have been attracting research attention since they were introduced to the mainstream after 2003 (Boyd & Ellison, 2007). In 2005, the Canadian Health Services Research Foundation (CHSRF) launched the Networks Leadership Summit as an open space for experts and leaders involved in the theory and practice of networks to engage in the power of good conversation and to tap into the wealth of tacit knowledge that exists in this field. Subsequent summits were held in 2006, 2007 and 2009 (Canadian Health Services Research Foundation, 2006; Spragins, 2007). Several health service organizations comprise the core of this ongoing initiative: SEARCH (Swift, Efficient Application of Research in Community Health) Canada, Health Research Transfer Network of Alberta (RTNA), the National Collaborating Centres for Public Health, CHNet Works, and the Child and Youth Health Networks of Canada.

Modern network theory has been used to describe biological systems, sociological behaviour, as well as business and human organizations. Application of the theory spans many disciplines, including organizational behaviour, knowledge management, public administration, sociology, psychology and computer science (Lemieux-Charles, 2006; Provan et al., 2007). In health services, the literature on partnership and collaboration, organization theory, communication theory, systems theory, learning theory, social capital, and community development (Hill, 2002) further refined the network approach. Subsequently, empirical and theoretical work has emerged within the health and health services literature (Huerta et al., 2006).

Two main viewpoints inform modern network theory: networks as human social interactions and networks as structural forms. As the theory evolved, these two viewpoints have become interconnected: patterns of interactions form regular structures within a network and network structures influence the behaviour of individuals that interact within it (A. Casebeer, personal communication, November, 2008). These two approaches to modern network theory have yielded an array of definitions and network types, but no common, consistently-defined language guides the study and understanding of the network concept (Brass et al., 2004). In the Canadian health system and throughout the literature, the term network can describe a variety of organizational forms. As well, a range of terms, including joint alliances, partnerships, quality improvement collaboratives, coalitions and collaborative agreements, can describe similar concepts or even the same concept (Gray & Wood, 1991; Hill, 2002; Mittman, 2004; Provan et al., 2007).

A network does not need to be formally named as a network to be a network. Furthermore, the same network type may be described differently by different authors. This lack of consensus on terminology complicates the use of a networking approach to accomplish organizational and system goals (Beacham et al., 2005; Hayward, 2006; Li et al., 2007; Scott & Hofmeyer, 2007).

## Definition

In general, networks are relational organizational forms that involve systems of interconnected actors or nodes and the ties or links between them (Brass et al., 2004). The links or relationships between actors form the structure of the network. These actors interact and share resources in order to achieve a common goal (Hawe et al., 2004).

This paper focuses on social networks, in which actors are distinct people, groups or organizations. The ties between these actors occur as human or social relationships and can involve many aspects of human relationships (e.g., social contacts that share knowledge and resources, joint membership in organizations, or joint participation in various activities) (Davies, 2003). The common goals include knowledge sharing, innovation, knowledge development or co-creation (Canadian Health Services Research Foundation, 2006), interorganizational capacity, joint problem solving, attribution of value, and sustained synergy (Huerta et al., 2006).

Social network theory suggests that the characteristics of the actors are not as important as the structure of the network. Structure can be described according to the patterns of relationships between actors in the network, or between the actors' positions and their equivalence (Beacham et al., 2005; Hawe et al., 2004). Network structure can change over time. Social network analysis involves mapping and measuring the relationships between actors, the patterns of these relationships, and the flow of resources (e.g., knowledge, support) between actors. Using this approach, the unit of analysis is the collection of actors and the linkages among them rather than on the actors themselves. The network structure can facilitate or impede individual action and outcomes. In fact, a variety of frameworks have been developed to describe, analyse and evaluate networks in terms of such characteristics as structure, patterns of interaction, paradoxes and group dynamics (Bazzoli et al., 1999; Cross et al., 2006; Eisenberg & Swanson, 1996; Merrill et al., 2008).

## Network types

A network can be classified according to its structure or the nature of its nodes or actors. Actors may be telecommunication objects (computer networks); biological neurons (neural networks); individuals, groups or organizations (social networks). If the actors are organizations, the network is an inter-organizational network. If the actors are individuals or groups such as teams, divisions, or regional sites within the same organization, the network is described as an intra-organizational. Networks may be short-term or established for longer sustainability (Beacham et al., 2005; Cox, 2005; Davies, 2003; Provan et al., 2007; Swart & Henneberg, 2007). Regarding network types, key informants urged the NCCPH not to get bogged down in typology, terminology and definitions. Instead, they recommend that, whatever the network and its possible subgroups are called, the meanings are clarified for members and the terms are used consistently.

## Understanding structure

Health service delivery networks are groups "of three or more autonomous organizations working together across structural, temporal and geographic boundaries to implement a shared population health or health services strategy that primarily exploits current research findings rather than seeking new knowledge" (Huerta et al., 2006). Much of the empirical network research in the public sector has focused on service-delivery networks that involve government agency contracts with not-for-profit organizations to deliver a service to the public (Eglene et al., 2007; Provan & Milward, 2001; Provan, 2008).

Policy networks or public management networks (Agranoff & McGuire, 2001; Clark, 1998; McPherson et al., 2006; Milward & Provan, 2006; Struyk, 2002) involve individuals and/ or organizations with an interest in a policy area. These networks can be mechanisms for knowledge transfer and exchange to further the development of relevant, acceptable, evidence-informed health-related policies and system change. As members interact, knowledge is shared, perspectives better understood, and potential solutions to policy issues jointly created. Other policy network forms include policy communities and epistemic communities (Pross, 1992).

Research networks (Anderko et al., 2005; Beacham et al., 2005; Gunn, 2002; Nutting, 1996) are developed to undertake research studies of varying scales, and/or the promotion of the use of evidence in practice, program or policy decision-making (Haas, 1992).

## Network models

No single theory of networks exists (Monge & Contractor, 2003b; Provan et al., 2007). Most key informants stated that the development of their networks was not based on a particular network model. Multiple frameworks may guide the development, management, sustainability and evaluation of a variety of network forms: network lifecycles, levels and characteristics; networks as complex adaptive systems; and communities of practice. These models are described below:

*Lifecycle or evolutionary model*

Several authors describe a lifecycle approach to the creation, development, enhancement, sustainability and evaluation of networks (Barwick, 2008; Birdsell & Matthias, 2003; Buchel & Raub, 2002; Chin & Carroll, 2000; Cross et al., 2006; Wenger, 1998b; Wenger et al., 2002). Most key informants described their networks, albeit often in hindsight, in terms of staged development. While specific lifecycle models vary in terms of the number of stages, as well as their descriptors and descriptions, Table 1 provides a general overview of the stages of network development.

It is important to note that the following:

- Migration through any or all of these stages may differ between networks (Birdsell & Matthias, 2003).
- These processes are iterative (Agranoff & McGuire, 2001), often non-linear (Birdsell & Matthias, 2003; Hill, 2002), and dynamic (Birdsell & Matthias, 2003).
- Evaluation should be ongoing throughout the life of the network and, to be effective, should consider the life stage (Birdsell & Matthias, 2003).

*Table 1: An overview of stages of network development*
*(adapted from various authors as noted in text above)*

| Lifecycle stage | Activities |
|---|---|
| *Planning* | ***Main Activity: Connect core members and define purpose***<br><br>Identify core members.<br><br>Bring core members together through face-to-face or electronic means to:<br>• confirm the need for a network;<br>• discuss network purpose;<br>• describe value network will add to individuals and organizations;<br>• identify expectations;<br>• determine type of network;<br>• focus where there is passion.<br><br>Identify a sponsor and potential champions.<br><br>Identify and invite potential network members.<br><br>Implement or begin development of technological supports such as:<br>• phone calls and teleconferences;<br>• electronic messaging systems (e-mail, chat rooms, lists);<br>• on-line forums;<br>• on-line directories. |

| Lifecycle stage | Activities |
|---|---|
| *Formation* | ***Main Activity: Develop relationships, collaboratively negotiate network identity, and share knowledge; develop collective sense and shared ownership.***<br><br>Interview and/or survey network members to determine:<br>• motivations;<br>• expectations;<br>• resources (including technological capacity and preferences);<br>• topics of interest;<br>• additional members;<br>• existing networks.<br><br>Host virtual (and, depending on the type of network, possibly face-to-face) opportunities for interaction (e.g., discussion areas, chat rooms, collaborative workspaces, wikis) to:<br>• further develop common understanding of the network's purpose, value and vision;<br>• develop shared values, goals, expectations, ambitions, language, and rules of engagement;<br>• align with shared and/or systemic priority issues (determine the most important need for a community to embrace and generate momentum for it);<br>• discuss network niche in light of member needs and existing resources;<br>• collaboratively plan future activities;<br>• consider one such meeting to be a formal or informal launch.<br><br>Create links with existing networks.<br><br>Develop a communications and marketing plan.<br><br>Legitimize roles of sponsor and facilitator. |
| *Maturation* | ***Main activities: Focus and expand.***<br><br>Implement additional collaborative technology as needed.<br><br>Develop how-to guides to facilitate use of technology for new and existing members.<br><br>Continue ongoing relationship development through multiple opportunities for interaction.<br><br>Invite and actively engage new members.<br><br>Further develop network roles, responsibilities, and member "gives and gets."<br><br>Conduct ongoing process and short- (and possibly) mid-term evaluations.<br><br>Revise network structure, process, technology, and other resources as indicated by evaluation results.<br><br>Develop tangible relevant services and resources, focusing on quality not quantity.<br><br>Continue to develop and implement multiple opportunities for face-to-face and virtual interactions among members.<br><br>Identify knowledge gaps.<br><br>Routinize processes.<br><br>Work to reach a critical mass.<br><br>Implement communications plan to articulate and promote purpose and value of network. |

| Lifecycle stage | Activities |
|---|---|
| *Sustainability* | ***Main activities: Continue effective activities.*** |
| | Identify and host multiple opportunities for interaction. |
| | Consider need to re-energize members (possibly through a conference or workshop). |
| | Recruit new members to core group. |
| | Identify and support new facilitators and other leaders. |
| | Mentor new members and leaders. |
| | Broaden network reach. |
| | Consider potential for sub-group development (as e.g., CoPs, project-based work-groups). |
| | Demonstrate tangible network outcomes. |
| | Evaluate long-term outcomes based on the original purpose for network development. |
| | Communicate evaluation results to members and key interested and involved parties. |
| | Redefine community boundaries. |
| *Termination or transition* | ***Main Activity: Recognize diminished effectiveness or transition to other issues or goals.*** |
| | Decide to end or transfer network. |

*Inter-organizational model*

In this type of model or approach to network analysis and development, network effective-ness is evaluated according to three broad levels: individual/organization, network and system (Mizruchi & Marquis, 2006; Provan & Milward, 2001). Level-specific organizational criteria are considered. Inter-organizational models have been applied in the health sector to evaluate community-based, inter-organizational service-delivery networks that serve multiple interested and involved parties (Mizruchi & Marquis, 2006; Provan & Milward, 2001; Provan et al., 2007).

*Complex adaptive systems model*

Complexity theory, as a multi-level, multi-modal framework, has been used to understand various network types (Monge & Contractor, 2003a), diffusion of innovations in complex social networks (Rogers et al., 2008), and systems approaches to public health (Leischow et al., 2008; Leischow & Milstein, 2006). Complex systems analysis explores actors whose relationships and interactions within the context of the network affect an emergent structure. The network provides the context in which these members act, including their relationships and interactions. Furthermore, each actor has specific attributes that can be classified in terms of location, behaviours or capabilities, as well as valuable memories (including who in the network knows who, who knows what, who knows how). Rules (cognitive and stra-tegic) of interaction that guide the behaviour of actors are based on social theory. Network structure develops when actors follow these rules. The complex adaptive systems model has been used to describe the conditions under which dynamic knowledge-sharing networks

develop over time through the interactions among actors. These interactions may result in knowledge transfer and/or capacity development. In this way inter-organizational network formation can be viewed as a bottom-up process through a collective response by individual organizational actors. Relationships and their structures are crucial for complex adaptive systems. Networks develop as individuals (who are linked in organizations and in the systems created by linkages between organizations) achieve practical and strategic goals. The network structures depend on the number of individuals and organizations involved, their opportunities to interact, and their common interests and goals (Best et al., 2007; Monge & Contractor, 2003a).

This model suggests that networks respond to the complexity of their environments and enable organizations to cope with that complexity (Gray & Wood, 1991). This approach can be applied to network development and evaluation by emphasizing the influence that actors (network members) and their characteristics, relationships, interactions, knowledge and skills have on network effectiveness (i.e., behaviour change together with knowledge sharing and creation).

The relative importance of creating and maintaining networks and links between multiple organizations is debatable, as is the best form such linkages should take (Best et al., 2007). Although widely endorsed as a mechanism to mobilize knowledge, the characteristics of effective networks within population and public health are not fully understood. Further clarification and study are needed to determine exactly what works within networks; how networks should be developed; and what strategies produce effective networking among organizations (Huerta et al., 2006). Nevertheless, networks can foster inter-organizational learning and knowledge creation and use (Best et al., 2007); and certain characteristics of networks are known to be advantageous.

*Community of practice model*

Community of practice theory grew out of the social theory of learning in practice (Cross et al., 2006). Several seminal works (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998a; Wenger, 2000; Wenger & Snyder, 2000; Wenger et al., 2002) describe the evolution of this concept. Evolution, however, may be a misnomer in that the various interpretations of the theory and concept presented in this literature do not necessarily appear to build upon one another (Li et al., 2007).

At their essence, CoPs are voluntary, flexible networks of people who share a common interest or passion in a specific area, and who come together on a regular or ad hoc basis to develop, share and build their knowledge of practice-related issues. CoPs are characterized by socialization, knowledge sharing, knowledge creation and identity building. CoPs may be intra- or inter-organizational in form. They may emerge naturally or be purposefully created.

There are multiple models of CoPs. In a recent online course on the foundations of CoPs, Wenger presented ten of his current CoP models. His general CoP model comprises the fundamental elements of domain, community and practice. The domain is the area of interest that draws members together to create common ground and outlines the CoP boundaries that identify the knowledge to share and how to present it. The community provides the social structure that enables learning through interactions and relationships. The practice

includes the specific knowledge, resources, language and behaviours that are shared and exchanged by the community. When all three elements are present, learning takes place. The literature provides limited direction on ways to facilitate the development of these elements. The other nine Wenger models relate to various CoP orientations, learning activities, forms of participation, leadership forms, lifecycle, technological supports, strategic value, value creation and sponsorship structure (Wenger et al., in press).

A recent systematic review noted a lack of consistency in the interpretation of CoP theory and in the structure of these networks and identified two distinctions between types of CoPs: 1) apprenticeship CoPs or knowledge sharing/creation CoPs, and 2) emergent or established CoPs (Li et al., 2007). Li et al found 26 CoP-related papers in the health care literature, of which 13 were primary studies. The researchers found no quasi-experimental or randomized control trials that evaluated the effectiveness of this organizational form. Nevertheless, the review reveals that, across CoPs in business and health applications, the key shared characteristics include interaction and socialization, knowledge sharing, knowledge co-creation, learning, network identity development and enhanced practice.

Use of the term 'Community of Practice' is inconsistent across seminal works, even by the same author. Key informants for this background paper concur with McDermott (2001) and recommend that NCCPH not focus on the term itself, but rather on the key characteristics and the interventions available to promote them.

# Value of Networks

A large body of literature highlights the important interaction between knowledge and networks. Interest in the impact of networking on knowledge translation and exchange, diffusion of innovations, knowledge management, and organizational outcomes is also increasing. Further, the short- and long-term value of networks can be seen at many network levels (Barwick, 2008; Beacham et al., 2005; Buchel & Raub, 2002; Garcia & Dorohovich, 2005; Heracleous & Murray, 2001; Kandampully, 2002; O'Toole, 1997; Pittaway et al., 2004; Rivera & Rogers, 2006; Wenger et al., 2002).

## Knowledge management, translation and exchange, and the diffusion of innovations

Knowledge and behaviour are embedded in social relationships and exchanges (Greenhalgh et al., 2004a); therefore, knowledge translation and exchange (KTE) can be facilitated by the quality, strength and density of the social interactions occurring in networks (Bate & Robert, 2002; Greenhalgh et al., 2004b; Li et al., 2007).

Networks can be a tool for knowledge management (KM) within and across organizations (Beacham et al., 2005; Wenger et al., 2002). KM includes any process or practice for creating, capturing, synthesizing, sharing and using knowledge for organizational learning, capacity development and performance (Garcia & Dorohovich, 2005). However, knowledge creation in the context of networks has not been well described in the KM literature (Jakubik, 2008). Networks, depending on type, can also enhance the quality and relevance of research for application in practical settings by reflecting the realities of the ultimate users of applied research -- the network members.

Networks are particularly useful in the KTE of tacit knowledge (Bate & Robert, 2002; Teigland, 2003) and in leveraging that knowledge for organizational knowledge management and use (McDermott, 2001). Networks enable knowledge sharing across organizational, sectoral and geographic boundaries. In addition, they can legitimate that knowledge, promoting adaptation and local implementation.

Networks can foster innovation in the form of knowledge creation by developing more efficient new services, and by sharing effective practices within and between organizations and sectors. The diffusion of innovations is a key to the multi-sector involvement so crucial to addressing public and population health issues. The diffusion and adoption of innovations by individuals is powerfully influenced by the structure and quality of the social networks between those individuals (Greenhalgh et al., 2004a; Greenhalgh et al., 2004b). However, research on the intentional use of inter-organizational networks to spread innovations within health services is limited.

## Multi-level value

A network approach helps to identify actors with specific skills that can help the network achieve its goals, and access shared resources and professional development opportunities

(Barwick, 2008; Parboosingh, 2002). Additionally, the opportunities for learning and development offered by networks can help individuals perform their professional roles and develop a sense of belonging.

Networks provide distinct benefits for individual members and organizations. For members, networks facilitate the development of and access to:

- expertise;
- mechanisms to share knowledge;
- relevant methods and tools ;
- mechanisms to enable reuse and reapplication of knowledge.

Networks enable organizations and systems to:

- develop core competencies (Parboosingh, 2002);
- recruit and retain talent;
- more efficiently respond to change and complexity inherent in today's health sector (White et al., 2008);
- accomplish system goals (that could not be accomplished by one organization on its own);
- expand the organizational knowledge base;
- identify and transfer 'best practices'(Parboosingh, 2002);
- share risks and resources;
- strengthen advocacy and policy development efforts;
- more effectively use limited resources;
- readily create new knowledge;
- improve inter-organizational and inter-sectoral collaboration (Barwick, 2008; Wenger et al., 2002).

*Networks can have a "dark" side*

Networks may be necessary tools for knowledge management, transfer and exchange. However, one must also be aware of potential negative impacts of this organizational form. Little is written about the potential downside of networks. Networks can build and use power in various ways, both positively and negatively. In many networks, power is shared; however, in others, prominence and power of some actors can become distorted by such variables as the roles they assume, the network structure or the network leadership. This distortion of power enables certain network members to use power abusively to manipulate other members, impact the direction of the network to their own advantage (and to the detriment of others), create closed networks or silos, and enhance their own or another's status (Addicott et al., 2006).

A network culture that is overly complex or that does not embody the core principles of trust, power sharing, reciprocity or democracy can lead to inter-organizational competition (Eglene et al., 2007; Fahey et al., 2003; Goodwin et al., 2004; Provan & Milward, 2001). Silos

(isolated sub-groups within the network) can result in a duplication of effort and a waste of resources (Fahey et al., 2007); a lack of reciprocity (Agranoff & McGuire, 2001) and a failure to show positive impact (Garavan et al., 2007).

Further, Milward (2007) and others have written about 'dark networks' that are both covert and illegal according to the social and political environment they act in (e.g., terrorist networks such as Al Qaeda; drug trafficking networks; and arms or diamond smuggling networks), and grey networks, those in between legal and illegal (Milward & Raab, 2005; Milward, 2007).

# Keys to Success

Research and anecdotal evidence suggests several factors are critical to network effectiveness. Wenger, McDermott & Snyder (2002) developed seven principles for network success. Authors from the Defense Acquisition University articulate a 14-step process (Garcia & Dorohovich, 2005). Huerta, Casebeer & Vanderplaat (2006) identified six paradoxes that need to be addressed and suggested six propositions concerning the role of health services networks. McDermott (2000, 2001) offers other tips and tools to promote network success and highlight critical factors. (Examples are provided in Appendix C.) Below is a compiled list of the key elements to network success, followed by descriptive summaries:

- Establish clear purpose and goals.
- Address the "hierarchy of needs."
- Include a culture of trust in stated core values.
- Fulfill specific role functions such as effective leadership, sponsorship, knowledge brokerage and community membership.
- Maintain a flexible infrastructure.
- Establish supportive processes.
- Balance homogeneity and heterogeneity.
- Secure adequate resources.
- Demonstrate value.

## Establish clear purpose and goals

In the early stages of network development, a mutually negotiated, common, clear understanding of the network's purpose and goals is vital (Agranoff & McGuire, 2001; Garavan et al., 2007; Garcia & Dorohovich, 2005; Kim, 2000; Provan et al., 2007; Rivera & Rogers, 2006; Sobrero, 2008). Marketing and communications products should reinforce these key elements. A periodic and planned reassessment of the purpose and goals will allow the network to respond to the complex and dynamic public health sector.

## Address the "hierarchy of needs"

A successful network will address its members' hierarchy of needs (Neil MacAlpine, personal communication, September 5, 2008). The benefits of network membership, including what the network will do for individuals, groups, network participants and organizations must be communicated. Clearly addressing the hierarchy of needs early in network development allows evaluation measures to be built around that same hierarchy.

## Include a culture of trust in stated core values

Trust contributes to relationship development; network identity; the creation of mutual respect and shared meaning; knowledge sharing and capacity development; meaningful

engagement; and the development of community norms (Addicott et al., 2006; Brass et al., 2004; Sobrero, 2008; Usoro et al., 2007). Trust is developed and facilitated through early, ongoing and regular opportunities for face-to-face communication, interaction and socialization (Donaldson et al., 2005; Swart & Henneberg, 2007), possibly combined with other virtual or computer-mediated opportunities and supplementary contact between "meetings" (Addicott et al., 2006; Agranoff & McGuire, 2001). Community-building, collaborative decision-making processes and small group activities further promote the development of relationships, trust, and off-network interactions (Provan et al., 2007).

Developing trust may require long-term efforts, especially in virtual networks (Wenger et al., 2002). Technological supports, including various online communication tools and applications, as well as video-conferences (Nichani & Hung, 2002) can facilitate these interactions and enhance network functioning. Current, relevant and informative member profiles can also build relationships and trust (Kim, 2000). Digital storytelling is being used more frequently as a way to build stronger and more personal connections, as well as to facilitate professional development (A. Casebeer, personal communication, November, 2008).

In addition to trust, other core principles seen as essential to network culture include power sharing, reciprocity, equity and democracy (Abbott & Killoran, 2005; Abbott et al., 2006; Addicott et al., 2006; Agranoff & McGuire, 2001; Brass et al., 2004; Eglene et al., 2007; Fahey et al., 2003; Provan et al., 2007). Ideally, network members will be committed to these core principles and share the domain-specific values (Rivera & Rogers, 2006).

## Fulfill specific role functions

Networks can be designed to enable and encourage a range of roles and varying levels of participation (Kim, 2000; Wenger et al., 2002). Identified roles for network actors include effective leadership (consisting of a core group and facilitators or managers), sponsorship, knowledge brokerage, and community membership. These roles are described in greater detail below:

### *Effective leadership*

The core group is a small, socially connected and committed group of network members who assume responsibility for the majority of network activity and provide guidance and leadership (Agranoff & McGuire, 2001; Burgess, 2006; Cross et al., 2006; Garavan et al., 2007; Garcia & Dorohovich, 2005; Goodwin et al., 2004; Rivera & Rogers, 2006; Sackmann & Friesel, 2007; Swart & Henneberg, 2007; Usoro et al., 2007). The core group members collectively:

- support the formation of the community by setting boundaries and norms;
- provide the momentum and continued energy needed to sustain the community's development through various stages;
- define the community's mission and purpose;
- contribute to the community; connect members to knowledge and each other; facilitate face-to-face and online conversation;

- serve as social catalysts by making personal connections and developing relation-ships;
- act as stewards of professional knowledge (Burgess, 2006).

Formally or informally, individual leaders act as change agents, mentors or opinion leaders at the local level (Garavan et al., 2007; Garcia & Dorohovich, 2005; Goodwin et al., 2004). Strong competent leadership is critical to the success of both face-to-face and virtual networks (Mizrahi & Rosenthal, 2001; Sobrero, 2008); however, less is known about the impact of effective leadership in a virtual environment (Bourhis et al., 2005). The shared authority of a virtual network, where relationships are based on co-learning and communication, can be challenging to those with traditional hierarchical leadership skills. Nichols, Goldstein, Ashley & Karl (2008) list ten roles of CoP leadership: 1) cultivating social engagement; 2) facilitating and coaching; 3) detecting content expertise; 4) tutoring; 5) content scanning; 6) content creating; 7) evangelizing; 8) stewarding technology; 9) motivating; and 10) governing.

A number of studies highlight the importance of a skilled facilitator --some linking the success or failure of the network to this role -- yet the precise roles and responsibilities of the facilitator remain vague (Lathlean & le May, 2002; Li et al., 2007).

In some networks, the facilitator is not a member, but an outsider who nurtures the leadership group of a network and searches the discussions for new information. Analysis of the discussions may also indicate network processes, new directions, emerging issues for discussion, or the need for new members or consultants. In general, facilitators support the network structure and organization, and help to foster an environment that encourages social learning and knowledge sharing; participation and discussion; and relationship development. They keep community events engaging and energized, and members motivated. They sensitively and systematically gather feedback from members at all levels (Stuckey & Smith, 2004).

*Sponsorship*

The importance of sponsors and their support teams to the success of intra-organizational networks has been explored in detail (Donaldson et al., 2005; Garcia & Dorohovich, 2005). Less is understood about sponsorship in inter-organizational networks. Sponsors have a strong stake in the network domain, its purpose and its goals, and often have some mandate of responsibility for the system-level outcomes with which the network is concerned (Nichol, 2003). The sponsor nurtures and provides top-level recognition for the community while promoting and marketing the network's value and strategic importance. The sponsor measures and evaluates benefits, supports budget requests and secures additional funding. The importance of this role has grown in recent years. This role is similar in function to that of the lead organization often referred to in public health alliances; however, the sponsor's power for decision-making is not intended to be greater than that of any other actor in the network.

*Knowledge brokerage*

Knowledge brokers or "boundary spanners" link disparate actors, organizations and other networks to further the diversity essential to network success (Addicott et al., 2006; Coakes

& Smith, 2007; Goodwin et al., 2004; Krebs & Holley, 2002; Rivera & Rogers, 2006). With the support of a collaborative environment, a network of other brokers, and sufficient resources and processes, knowledge brokers are able to identify and capture knowledge (Bate & Robert, 2002). These network leaders may bridge regional or content-specific organizations or networks. Some experience and literature suggests that knowledge brokers can create or exacerbate problematic or complex connections; therefore, the NCCPH may wish to consider knowledge brokering as a function rather than the responsibility of any one individual (A. Casebeer, personal communication, November 2008).

*Community membership*

Active members participate in community events and activities; share their knowledge, expertise and resources with fellow members; and contribute to community interactions, dialogue and discussions. Further, they help establish governance structure, norms, community etiquette and policies.

Wenger's model related to CoP participation suggests that engagement and learning occur on various levels: core, active, occasional, peripheral and transactional (Wenger et al., 2002). Participation at all levels is considered legitimate and should be supported (Lave & Wenger, 1991).The core group and the coordinators or facilitators function at the core level. Community leaders are considered active members. New CoP members often participate occasionally or perhaps at the peripheral level as lurkers along with alumni. Sponsors function at the transactional level.

While a single member may play more than one role in the network, effective infrastructure and processes will support all key roles (Garcia & Dorohovich, 2005). Leadership roles may change over time as other network members develop new skills and assume the role (Wenger et al., 2002). Ultimately, the enactment of the role function is more important than the title of the person performing a particular role.

## Maintain a flexible infrastructure

Numerous authors recommend a supportive infrastructure (Agranoff & McGuire, 2001; Garavan et al., 2007) with skilled leadership/management/facilitation (Chin & Carroll, 2000; Coakes & Smith, 2007; Donaldson et al., 2005; Eglene et al., 2007; Garavan et al., 2007). Flexible network structures and processes enable a network to evolve and respond to changes in the complex environment in which the network functions (Garcia & Dorohovich, 2005; Swart & Henneberg, 2007).

Network structures influence not only network effectiveness and sustainability, but also the speed of knowledge transfer between actors. The size of a network deserves careful consideration; inertia can frustrate the success of overly large networks (Swart & Henneberg, 2007). Path length and the speed of knowledge flow are also affected by network size. In networks with shorter average path lengths, knowledge sharing may occur more quickly (Krebs & Holley, 2002; Krebs & Holley, 2006). Global, virtual pathways made possible by internet-based technology may mitigate the negative impact of path length on knowledge transfer (A.Casebeer, personal communication, November, 2008).

Networks are more successful when opportunities for interaction can involve either the whole network or small groups (Kim, 2000; Provan et al., 2007; Swart & Henneberg, 2007). Chances for network survival are also improved by the incorporation of multiple paths of interaction between actors. That way, if actors leave the network or if links between actors are damaged or removed, other pathways exist for uninterrupted knowledge sharing between the remaining actors (Krebs & Holley, 2002; Krebs & Holley, 2006). Structurally dense networks are most effective in coordinating activity among actors (Hawe et al., 2004). Nevertheless, that very density can bring unexpected challenges (see also Networks can have a "dark side" sub-section within the Value of Networks section).

## Establish supportive processes

The infrastructure of a successful network will support multiple opportunities for interaction in public and private spaces, virtual and face-to-face venues, and small and large group situations (Wenger et al., 2002). Network effectiveness is further enhanced by a systematic approach to network development and by a good coordinating mechanism that is understood by all members (Agranoff & McGuire, 2001; Garcia & Dorohovich, 2005; Goodwin et al., 2004).

## Balance homogeneity and heterogeneity

Homogeneity is common in networks where actors share common attributes, goals, organizations or sectors; however, too many connections of the same kind can limit creative thinking, innovation and new ideas. Diversity is important to network success. Vibrant and innovative networks maintain connections to many diverse actors and networks (Krebs & Holley, 2002; Krebs & Holley, 2006). Ideally, the balance between heterogeneity and homogeneity will naturally match the complexity and needs of the network's environment (Cross et al., 2006; Goodwin et al., 2004).

## Secure adequate resources

Network success depends on securing sufficient and appropriate resources or, as one key informant stated, having the right tools [resources] for the right tasks. Appropriate resources include financial and other costs necessary to:

- develop and maintain relationships (McDermott & O'Dell, 2001);
- increase awareness of knowledge and skills distributed throughout the network (Sackmann & Friesel, 2007);
- promote organizational support required for long term sustainability and effectiveness;
- establish reliable technological supports (Sobrero, 2008).

A lack of adequate tools (e.g., robust information or peer connection tools outside face-to-face meetings), appropriate support or related resources to effectively use information technology for network development can result in network failure (Neil MacAlpine, personal

communication – September 5, 2008). Network sustainability demands long term investment (Huerta et al., 2006).

## Demonstrate value

For a network to remain active, engaged and effective, its members, supporters and funders must continue to perceive network participation as valuable (Bate & Robert, 2002; Wenger et al., 2002). Attributing value to networks remains a problematic evaluation issue (Huerta et al., 2006). Key informants stressed the importance of finding issues and opportunities that will add value for potential network members, their organizations, the network as a whole, and the public health system. Failure to communicate that added value will result in the failure of the network. Surveying or interviewing members at various network levels helps to identify the key issues and opportunities for additional support and knowledge sharing. Continually eliciting, discussing and incorporating that member feedback ensures that network participation and outcomes reflect the needs and goals of individual members. Early successes of network partnerships/relationships should be celebrated. Marketing material can further promote and reiterate the benefits of network membership.

# Evaluating Networks

The value and success of a network is often difficult to measure (Eglene et al., 2007; Provan & Milward, 2001). The criteria for determining network effectiveness vary in the literature and few tools are available. Both quantitative (Agranoff & McGuire, 2001; Goodwin et al., 2004; Popp et al., 2005a; Popp et al., 2005b; Rivera & Rogers, 2006) and qualitative (Davies, 2003; Tindall & Wellman, 2001) data are necessary to understand networks and assess their effectiveness over time. Each of these data types involves unique sources and approaches to collection and analysis. Key informants spoke of the challenges of network evaluation, including a lack of money, skills, methods and tools. As a result, network evaluations vary in quality, if they exist at all. Difficulties in evaluation are further complicated by the lack of consistency in definitions of networks and their multiple practical applications.

Network evaluation is often considered in terms of levels. Indicators, metrics and potential sources of data are highlighted by level in Table 2. Several tools and approaches have been developed to evaluate network functioning and effectiveness. Among these tools are social network analysis (SNA) (Andriessen & Verburg, 2004; Cross et al., 2006; Eglene et al., 2007; Hara & Hew, 2007; Ling et al., 2005), network visualization and analysis (Scarff, 2006), the community assessment tool (CAT) (Cross et al., 2006) and storytelling (Wasko & Faraj, 2005). Specific methods and tools for network evaluation are provided in Appendix C.

Evaluations conducted at every stage, starting at the inception of the network, will inform and guide network development, management and sustainability. An understanding of whether, when and how to improve the network depends upon a quality evaluation that includes:

- the creation of network maps that accurately represent the network at a point in time;
- the identification of network leaders, content experts and mentors;
- the identification of the specific topics or regional issues around which the community is developing;
- gaps in membership (Krebs & Holley, 2002);
- member perspectives on the network's value, functioning, and methods and tools.

*Table 2: Sample network evaluation (process and outcome) plan*
*Adapted from (Anand & Conger, 2007; Garcia & Dorohovich, 2005; Hawe et al., 2004; Hill, 2002; McDermott, 2002; Mizrahi & Rosenthal, 2001; Provan & Milward, 2001; Verburg & Andriessen, 2006).*

| Level | Indicator | Metric | Source |
|---|---|---|---|
| Population/ Sector | Population-level health outcomes<br><br>Did the network provide significant relevant benefits to the population or sector of focus? | # new policies developed | National, provincial/territorial, and local surveys and other surveillance reports |

| Level | Indicator | Metric | Source |
|---|---|---|---|
| Network Structure | Creation and maintenance of a network administrative structure<br><br>Development of strategic plan<br><br>Network stability & survival as members, especially core members, come and go<br><br>Growth of membership<br><br>Achievement of short- mid- and long-term goals<br><br>Coordination of services to network members<br><br>Increase in knowledge content and uptake<br><br>Co-creation or knowledge, processes and resources<br><br>Value creation<br><br>Image of the network (how well known/praised)<br><br>Identification of challenges and strategies to address them<br><br>Reasons for joining/leaving<br><br>Perceptions of trust | # members<br><br># members joining or leaving in a particular time period<br><br># new members following specific occurrences (e.g., critical events, release of new research)<br><br># page hits<br><br># times a document is viewed<br><br># forum participants<br><br># new discussion threads<br><br>Attendance and active participation in network meetings<br><br># lurkers<br><br># new contributions<br><br>Frequency of core group interactions<br><br>Network composition<br><br>Sustained growth<br><br>Quality of feedback from members<br><br>Unsolicited feedback<br><br>Level of interaction (knowledge sharing, joint development of methods and tools, joint research endeavours and/or capacity development opportunities)<br><br># new methods and tools created<br><br>Growth of the knowledge base<br><br>Reuse of knowledge assets<br><br># requests fulfilled in a particular time period<br><br>Budget size (importance)<br><br>Sponsorship/funding secured<br><br>Social network analyses metrics (e.g., size, average path length, density, centrality, multiplexity, existence of isolates and hubs and the links to them) | Strategic plan<br><br>Social network analysis<br><br>Membership list<br><br>Web reports<br><br>Meeting minutes<br><br>Meeting registration lists<br><br>Conference/workshop evaluation forms membership and contributions surveys of members<br><br>Registry of methods and tools<br><br>Other registries (e.g., member profile, researchers)<br><br>Stakeholder surveys<br><br>Requests/queries database<br><br>Unsolicited feedback<br><br>Rate or incidents of voluntary participation in activities by members<br><br>New member surveys<br><br>Exit interviews<br><br>Measures of trust |

| Level | Indicator | Metric | Source |
|-------|-----------|--------|--------|
| Organization | Perception of relationships: fairness, closeness, equity<br><br>Strength of ties<br><br>Conflict resolution<br><br>Knowledge acquisition and capacity development<br><br>Perception of knowledge sharing culture<br><br>Perceptions of usefulness of knowledge gained/shared<br><br>Perception of value that members get from network involvement<br><br>Enhanced legitimacy | # resources acquired<br><br># new programs developed<br><br>Ratings related to network hierarchy (e.g., Does the network effectively share information or develop tools that are important for the organization?) | Network analysis, (e.g., social network analysis, organizational network analysis)<br><br>Member stories or anecdotes (e. g., increased learning, hastened decisions, reduced risk, new innovations, improved resources or service, ways the network is reaching across boundaries to external groups and members<br><br>Newsletter contributions |
| Individual | Knowledge and skill development<br><br>Increased professional participation<br><br>Career advancement<br><br>Professional satisfaction<br><br>Behaviour change related to EIDM, KM<br><br>Job satisfaction<br><br>New skills | # opportunities for capacity development offered or shared through the network<br><br>Ratings related to network hierarchy (e.g., Does the network effectively share information that is important to individuals? Does the network effectively share/develop information & tools that are important to practitioners?) | Member surveys<br><br>Interviews<br><br>Focus groups<br><br>Professional development registry or database |

# Methods and Tools for Networking

While there is no prescriptive set of tools for the development, leadership or sustainability of virtual or face-to-face networks, several practical and theoretical guidelines can direct the NCCPH in their efforts.

Key characteristics of network models relevant to the NCCPH involve:

- ongoing social interaction and relationship development;
- knowledge sharing, exchange and co-creation;
- learning and capacity development;
- shared knowledge domain and understanding of common goals (Li et al., 2007; Wenger, 1998b; Wenger et al., 2002).

The promotion of social interaction requires multiple opportunities for face-to-face and virtual interactions. These opportunities include, but (due to limited evidence of their impact) are not limited to, conferences, workshops and other joint learning opportunities (Cross et al., 2006), and facilitated conversations (Tsui et al., 2006). Other strategies include narratives (Canadian Health Services Research Foundation, 2006), storytelling (Public Health Research and Knowledge Translation Network, 2005), dialogue and concept mapping (Leischow et al., 2008). Thus, methods and tools that promote or facilitate these activities will contribute to network success (Bate & Robert, 2002; Contractor & Monge, 2002; Cross et al., 2006; Jackson-Bowers et al., 2006; Norman & Huerta, 2006). The nature of these technologies can impact a network's effectiveness related to useful knowledge sharing (Coakes & Smith, 2007). (Examples of these methods and tools can be found in Appendix C.)

Interaction and knowledge sharing are primarily human, rather than technological (Bate, 2004; Boye, 2006; Donaldson et al., 2005), thus, technology can be viewed as a method or a tool to help develop network identity, build relationships and share knowledge, rather than as the network itself. The promotion of networks as tools to accomplish strategic goals demands an equivalent recognition of the importance of relationship development and an understanding that network development requires time and other resources (McPherson et al., 2008).

In terms of technology, open access should be an initial guiding principle (Clark, 1998). A lack of resources, discomfort with technology, or anticipation of problems may impede the active involvement of some network members. Additional tools can be introduced as required. Key informants suggested that the NCCPH start with very familiar, user-friendly technologies that require very little from members (e.g., e-mail and listserves) and progress to other technologies that may be less familiar (e.g., blogs, wikis, interactive electronic discussion groups, and more complex tools) as members become more comfortable in the network.

## Existing Networks of Interest to the NCCPH

Various knowledge networks, including those in areas of KTE, KM and public health, have recently gained attention in health systems in Canada, the US and the UK (Barwick, 2008; Clark, 1998; Li et al., 2007; Public Health Research and Knowledge Translation Network, 2005). Once network goals have been established and clarified, the NCCPH can identify, connect with, and develop relationships with these relevant Canadian and international organizations and networks, some of which are potential core members that could be involved in early discussions. (Several of these potential partners are identified in Appendix D.)

Linking with provincial/territorial-level networks involved in KTE and KM could facilitate the context-sensitive knowledge exchange efforts and behaviour change required to promote EIDM and KM within and among Canadian public health organizations, as was suggested to the Canadian Best Practices Initiative (Barwick, 2008; Clark, 1998). By connecting with these networks and organizations, the NCCPH may circumvent the jurisdictional barriers and structural issues within public health in Canada that currently inhibit KM and EIDM initiatives.

Additionally, individual NCCs can identify and connect with existing content-specific networks and organizations that have a role to play and an interest in achieving the goals of the NCCPH network. Collaboration and coordination across individual NCC networks will be particularly important.

# Implications for Network Development Within the NCCPH

Given its goals, the NCCPH is likely to be most interested in the development and facilitation of long-term, inter-organizational public knowledge networks. In fact, the original vision for the NCCPH was that it be a network of networks, with the networks of individual NCCs being inter-organizational knowledge networks. These networks would foster knowledge translation and exchange, promote behaviour change at individual and organizational levels (to facilitate EIDM), and contribute to KM within and among organizations. While this type of network can be entirely virtual, occasional face-to-face interactions can provide further support and strengthen connections.

A collaborative decision by the six NCCs on the feasibility of creating an overall NCCPH network will necessarily include a determination of the network's overall goals, membership and scope. If the NCCPH instead supports the existence of six networks, one specific to each of the six NCCs, those networks can be coordinated to ensure consistency in messaging. Thus, the six NCCPH networks could involve public sector inter-organizational knowledge sharing and learning networks, networks of practice and/or CoPs that promote EIDM in public health. These networking initiatives can be developed as part of an overall KM strategy for the NCCPH, incorporating and promoting KM (including knowledge sharing and co-creation) within and between public health organizations across Canada. An intra-organizational network could be managed or facilitated by a hub sponsor organization. A system of networks under the NCCPH would not preclude the development of individual NCC networks with content-specific domains.

Drawing on the keys to network success identified earlier, the NCCPH will need to:

- Clearly identify and articulate purpose and goals of the network that complement the NCCPH program goals.
- Identify, recruit and equip the leadership and other key roles based on the purpose and goals of the overall network (including sub-networks or CoPs).
- Identify potential champions and mentors at the individual, organizational and/or regional levels.
- Identify emerging actors, hubs and leaders that could work together and quickly provide them with the infrastructure to collaborate efficiently. (Due to the complexity of the public health landscape, these key players may be found at the regional, provincial or national levels.)
- Survey network members to determine their priority areas for learning and action, technological capacity and preferred/anticipated level of involvement.
- Utilize those already acting as brokers in public health organizations (Bate & Robert, 2002). These people may be self-identified "knowledge sharers" within their organizations (either with or without the formal title of KB) or be identified by others as people in the knowledge brokerage function. These KBs may form their own community of practice. KBs within the NCCs can collaborate with KBs from partner organizations (e.g., health-evidence.ca) to share knowledge, discuss practice issues, and solve problems related to the development of resources and knowledge.

- Host regional face-to-face workshops to begin those necessary early discussions. Plan additional opportunities for face-to-face and virtual interaction.

- Convene meetings of NCCPH staff responsible for networking and knowledge brokering  to facilitate the development of a CoP among this group.

- Develop consistent network plans, resources and communication strategies across all six NCCs. Specific CoPs can be developed with more specificity and applicability to the mandates of the individual centres.

- Ensure end-user involvement through multiple opportunities for virtual interaction and face-to-face opportunities early in development process and periodically throughout the life of the network.

- Develop and document the effective processes to promote interaction and relationship development.

- Evaluate networking efforts in the context of an overall KM strategy.

A successful networking plan of action for the NCCPH will recognize and respect certain caveats. Avoiding or reducing duplication should remain a key principle. Careful consideration of language will help to avoid the potential confusion of multiple networking approaches described in the literature (Hayward, 2006). Use of terms other than network or CoP may allow for a consistent network name and description across the membership (e.g., the title of the NCCMT's networking initiative, "DialoguePH" -- and in French, "DialogueSP" -- reinforces the interactive and collaborative nature of this organizational form). Clearly articulated roles for the Public Health Agency of Canada (PHAC), the NCCPH and the individual NCCs within this network will be essential. A coordinated and coherent system of networking initiatives across the six centres will ensure that knowledge, skills and resources developed within the network of one NCC can benefit the entire program.

The following ten steps will enable the NCCPH to develop methods and tools necessary to support network effectiveness:

1. Conduct an analysis of existing NCCPH networks to:
    - identify who knows what throughout the networks;
    - identify and designate key "go to" people on specific topics; publicize their designation to the networks;
    - encourage each knowledge broker (KB) to purposefully extend the reach and scope of the analysis by contacting two to three individuals to contribute to the analysis, rather than answering the questions themselves;
    - request that organizations make this outreach role part of the KB's job description;
    - link network members with equivalent positions;
    - create a Community of Practice (CoP) among similar roles for on-going support.

2. Review existing PH-related knowledge networking methods and tools and contact associated key players. (Examples of these can be found in Appendix C. )

3. Create a template targeted specifically for the NCCPH network, including examples

of public health knowledge networking strategies.

4. Establish a network development approach appropriate for public health organizations and create a related guide, manual and toolkit.

5. Establish consistent (or at least compatible) technological supports across all NCCs; facilitate the purchase of and training for networking software; provide IT support as necessary to set up or adapt current technologies for networking.

6. Involve public health associations and PHAC knowledge development and exchange officers as key hubs.

7. Develop a network evaluation strategy as a core component supported by adequate human and financial resources.

8. Develop and implement a network marketing and communications plan.

9. Invite other organizations and networks to:

   - join the NCCPH network(s);

   - develop a document to describe alignment with NCCPH;

   - identify the key benefits of joining NCCPH network(s).

(Examples are the CoPs within the Public Health Information Network (PHIN) of the Centre for Disease Control and Prevention (CDC) found at http://www.cdc.gov/phin/communities/resourcekit/pdf/Align.pdf and included in the PHIN's CoP Resource Kit.)

10. Facilitate the development of regional or issue-specific sub-networks (Cross et al., 2006) that are coordinated at a higher level to facilitate knowledge sharing across the NCCPH.

# Conclusion

Networks have the potential to further the goals of the NCCPH. Regardless of type or function, a network's essential elements involve:

- social interaction and relationship development;
- knowledge sharing and co-creation;
- a common knowledge and practice area;
- interventions that facilitate the development and enhancement of these elements will foster network effectiveness.

Methods and tools to support these interventions are available. Within the NCCPH, individual NCCs have already begun, or have plans to develop, networks related to the content specific to each centre. A program-wide system of networks (including individual NCC networks, and interested and involved parties of key organizations and networks) could focus on the achievement of NCCPH goals, in particular the promotion and facilitation of evidence-informed public health decision-making and knowledge management within and across Canadian public health organizations.

# Reference List

Abbott, S. & Killoran, A. (2005). Mapping public health networks. *Health Development Agency*. Retrieved, March, 2009, from http://www.nice.org.uk/niceMedia/documents/mapping_public_health_networks.pdf

Abbott, S., Petchey, R., Kessel, A. & Killoran, A. (2006). What sort of networks are public health networks? *Public Health, 120*, 551-556.

Addicott, R., McGivern, G. & Ferlie, E. (2006). Networks, organizational learning and knowledge management: NHS cancer networks. *Public Money & Management, 26*, 87-94.

Agranoff, R. & McGuire, M. (2001). Big questions in public network management research. *Journal of Public Administration Research and Theory, 11*, 295-326.

Anand, N. & Conger, J. A. (2007). Capabilities of the consummate networker. *Organizational Dynamics, 36*, 13-27.

Anderko, L., Bartz, C. & Lundeen, S. (2005). Practice-based research networks: nursing centers and communities working collaboratively to reduce health disparities. *Nursing Clinics of North America, 40*, 747-758.

Andriessen, J. H. E. & Verburg, R. M. (2004). *The development and application of the community assessment toolkit*. Retrieved March, 2009, from http://www.knowledgeboard.com/item/510/23/5/3

Barabasi, A. L. (2002). *Linked: The New Science of Networks*. Cambridge, MA: Perseus.

Barringer, B. R. & Harrison, J. S. (2000). Walking a tightrope: Creating value through interorganizational relationships. *Journal of Management, 26*, 367-403.

Barwick M. (2008). *Developing a Community of Practice Model for Cancer and Chronic Disease Prevention.* Toronto, Ontario, Canada. Retrieved March, 2009, frm http://www.melaniebarwick.com/document/CDPAC_Final_Report_version_date_April_23_2008.pdf

Bate, P. (2004). The role of stories and storytelling in organizational change efforts: The anthropology of an intervention within a UK hospital. *Intervention Research, 1*, 27-42.

Bate, S. P. & Robert, G. (2002). Knowledge management and communities of practice in the private sector: lessons for modernising the National Health Service in England and Wales. *Public Administration, 80*, 643-663.

Bazzoli, G. J., Shortell, S. M., Dubbs, N., Chan, C. & Kralovec, P. (1999). A taxonomy of health networks and systems: Bringing order out of chaos. *Health Services Research, 33*, 1683-1717.

Beacham, B., Kalucy, L., McIntyre, E. & Veale, B. (2005). Understanding networks. *FOCUS on...2005(1).* Retrieved march, 2009, from http://www.phcris.org.au/phplib/filedownload.php?file=/elib/lib/downloaded_files/publications/pdfs/phcris_pub_1223.pdf

Best, A., Hiatt, R. A. & Norman, C. D. (2008). Knowledge integration: Conceptualizing communica-

tions in cancer control systems. *Patient Education and Counseling, 71*, 319-327.

Best, A., Stokols, D., Green, L. W., Leischow, S. & Holmes, B. (2003). An integrative framework for community partnering to translate theory into effective health promotion strategy. *American Journal of Health Promotion, 18*, 168-176.

Best, A. B., Riley, B. & Norman, C. (2007). *Evidence informed public health policy and practice through a complexity lens: a rapid review*. Ottawa, ON, Canada: Canadian Association of Health Services and Policy Research (CAHSPR).

Birdsell, J. & Matthias, S. (2003). *Networks and their role in enhancing research impact in Alberta: report from a workshop held July 21-23, 2003*. The Alberta Heritage Foundation for Medical Research.

Bourhis, A., Dubé, L. & Jacob, R. (2005). The success of virtual communities of practice: The Leadership Factor. *Electronic Journal of Knowledge Management, 3*, 23-34.

Boyd, D. M. & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*, 210-230.

Boye, J. (2006). Improving collaboration with a portal: Categorizing your portal needs and evaluating for the first 100 days. *Knowledge Management Review, 9*, 30-31.

blog. (2009). In Merriam-Webster Online Dictionary. Retrieved March 27, 2009, from http://www.merriam-webster.com/dictionary/blog

Brass, D. J., Galaskiewicz, J., Greve, H. R. & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 46*, 795-817.

Brown, J. S. & Duguid, P. (1991). Organizational learning and communities of practice: Toward a unified view of working, learning and innovation. *Organization Science, 2*, 40-57.

Buchel, B. & Raub, S. (2002). Building knowledge-creating value networks. *European Management Journal, 20*, 587-596.

Burgess, A. P. (2006). *Understanding the core group in a distributed community of practice*. Faculty of The School of Engineering and Applied Science of The George Washington University.

Canadian Health Services Research Foundation (1999). *Issues in linkage and exchange between researchers and decision makers: Summary of a workshop convened by the Canadian Health Services Research Foundation*. Retrieved from http://www.chsrf.ca/knowledge_transfer/pdf/linkage_e.pdf

Canadian Health Services Research Foundation (2006). *Bridging boundaries, creating knowledge: the power of good conversation*. In Network Leadership Summits I and II Invitational Sessions.

Chin, G. Jr. & Carroll, J. M. (2000). Articulating collaboration in a learning community. *Behaviour & Information Technology, 19*, 233-245.

Clark, H. C. (1998). *Formal knowledge networks: a study of Canadian experiences.* Winnipeg, MB, Canada: International Institute for Sustainable Development.

Clemmons Rumizen, M. (2002). *The Complete Idiot's Guide to Knowledge Management*. Indianapolis, IN: Alpha Books.

Coakes, E. & Smith, P. (2007). Developing communities of innovation by identifying innovation champions. *The Learning Organization, 14*, 74-85.

collaboration. (n.d.) NHS Glossary of Health Knowledge Management Terms. Retrieved March 27, 2009, from http://www.library.nhs.uk/knowledgemanagement/Page.aspx?pagename=GLOSSARY

Contractor, N. S. & Monge, P. R. (2002). Managing knowledge networks. *Management Communication Quarterly, 16*, 249-258.

Cox, A. (2005). What are communities of practice? A comparative review of four seminal works. *Journal of Information Science, 31*, 527-540.

Cross, R., Laseter, T., Parker, A. & Velasquez, G. (2006). Using social network analysis to improve communities of practice. *California Management Review, 49*, 32-60.

Davies, R. (2003). *Network perspectives.* In The Evaluation Of Development Interventions: More Than A Metaphor. In EDAIS Conference: New Directions in Impact Assessment for Development: Methods and Practice.

discussion forum. (July, 2005). OECD Glossary of Statistical Terms. Retrieved from http://stats.oecd.org/glossary/detail.asp?ID=6715

Donaldson, A., Lank, E. & Maher, J. (2005). Making the invisible visible: How a voluntary organization is learning from its work with groups and communities. J*ournal of Change Management, 5,* 191-206.

Eglene, O., Dawes, S. S. & Schneider, C. A. (2007). Authority and leadership patterns in public sector knowledge networks. *The American Review of Public Administration, 37*, 91-113.

Eisenberg, M. & Swanson, N. (1996). Organizational network analysis as a tool for program evaluation. *Evaluation & The Health Professions, 19*, 488-506.

Fahey, D. K., Carson, E. R., Cramp, D. G. & Muir Gray, J. A. (2003). User requirements and understanding of public health networks in England. *Journal of Epidemiology & Community Health, 57*, 938-944.

Fahey, R., Vasconcelos, A. C. & Ellis, D. (2007). The impact of rewards within communities of practice: a study of the SAP online global community. *Knowledge Management Research & Practice, 5*, 186-198.

Frank, J., Di Ruggiero E. & Mowat D. (2007). Developing knowledge translation capacity in public health: The role of the National Collaborating Centres. *Canadian Journal of Public Health, 98*, 11-16.

Fredericks, K. A. & Durland, M. M. (2005). The historical evolution and basic concepts of social network analysis. *New Directions for Evaluation, 2005*.

Garavan, T. N., Carbery, R. & Murphy, E. (2007). Managing intentionally created communities of practice for knowledge sourcing across organisational boundaries: Insights on the role of the CoP manager. *The Learning Organization: An International Journal, 14,* 34-49.

Garcia, J. & Dorohovich, M. (2005). The truth about building and maintaining successful communities of practice. *Defense Acquisition Review Journal, 10*, 33.

Goodwin, N., 6, P., Peck, E., Freeman, T. & Posaner, R. (2004). *Managing across diverse networks of care: lessons from other sectors.* National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO).

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*, 1360-1380.

Gray, B. & Wood, D. J. (1991). Collaborative alliances: Moving from practice to theory. *Journal of Applied Behavioral Science, 27*, 3-22.

Greenhalgh, T., Robert, G., MacFarlane, F., Bate, P. & Kyriakidou, O. (2004a). Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Quarterly, 82*, 581.

Greenhalgh, T., Robert, G. & Bate, P. (2004b). *How to spread good ideas: A systematic review of the literature on diffusion, dissemination and sustainability of innovations in health service delivery and organisation*. (Report to the National Co-ordinating Centre for Service Delivery and Organisation Research Programme) Department of Health, London.

Grimshaw J., Shirran R.L., Thomas G., Mowatt C., Fraser L., Bero R., et al. (2001). Changing provider behaviour: An overview of systematic reviews of interventions. *Medical Care 39 (suppl.2)*, 112-145.

Gunn, J. M. (2002). Should Australia develop primary care research networks? *The Medical Journal of Australia, 177*, 63-66.

Gurteen, D. (2007, December 15). KM 2.0: KM goes Social. Message posted to http://www.gurteen. com/gurteen/gurteen.nsf/id/km-goes-social

Haas, P. M. (1992). Introduction: Epistemic communities and international policy coordination. *International Organization, 46*.

Hara, N. & Hew, K. F. (2007). Knowledge-sharing in an online community of health-care professionals. *Information Technology & People, 20*, 235-261.

Hawe, P. (2007). *Applications showing the value of a network perspective*. The Networks Leadership Summit Series: Networks Leadership Symposium, July 23 - 24, 2007, Banff, Alberta - Harnessing the Value of Networks: Network Management, Analysis and Evaluation. Retrieved March, 2009, from http://www.searchca.net/users/FolderData/%7B08D6009A-C75D-4159-B221-ADD8F9482B40%7D/networks_leadership_symposium_iii.pdf

Hawe, P., Webster, C. & Shiell, A. (2004). A glossary of terms for navigating the field of social network analysis. *Journal of Epidemiology and Community Health, 58*, 971-975.

Hayward, S. (2006). Networks: Better language required. *Healthcarepapers, 7,* 62-66.

Heracleous, L. & Murray, J. (2001). Networks, interlocking directors and strategy: Toward a theoretical framework. *Asia Pacific Journal of Management, 18*, 137-160.

Hill, C. (2002). *Network literature review: Conceptualizing and evaluating networks*. Southern Alberta Child and Youth Health Network. Retrieved from http://www.sacyhn.ca/media/pdf/LiteratureReview.pdf

Hodgson, K. (May, 2005). *Digital storytelling: using technology to tell stories.* Retrieved March 27, 2009) from http://www.umass.edu/wmwp/DigitalStorytelling/Digital%20Storytelling%20Main%20Page.htm

Huerta, T. R., Casebeer, A. & Vanderplaat, M. (2006). Using networks to enhance health services delivery: perspectives, paradoxes and propositions. *Healthcarepapers, 7*, 10-26.

Jackson-Bowers, E., Kalucy, L. & McIntyre, E. (2006). Knowledge brokering. *FOCUS on... 2006(4)*. Retrieved March, 2009, from http://www.phcris.org.au/phplib/filedownload.php?file=/elib/lib/downloaded_files/publications/pdfs/phcris_pub_3238.pdf

Jacobson N., Butterill D., Goering P. (2003). Development of a framework for knowledge translation: understanding user context. *Journal of Health Services and Research Policy 8*, 94-9.

Jakubik, M. (2008). Experiencing collaborative knowledge creation processes. *The Learning Organization, 15*, 5-25.

Jarvenpaa, S. L. & Tanriverdi, H. (2003). Leading virtual knowledge networks. *Organizational Dynamics, 31*, 403-412.

Kandampully, J. (2002). Innovation as the core competency of a service organisation: the role of technology, knowledge and networks. *European Journal of Innovation Management, 5*, 1:18-26

Kiefer, L., Frank, J., Di Ruggiero, E., Dobbins, M., Manuel, D., Gully, P. R. et al. (2005). Fostering evidence-based decision-making in Canada: Examining the need for a Canadian population and public health evidence centre and research network. *Canadian Journal of Public Health, 96*, I-19.

Kim, A. J. (2000). *Community Building on the Web: Secret Strategies for Successful Online Communities*. Berkeley, CA: Peachpit Press.

knowledge. (n.d.) NHS Glossary of Health Knowledge Management Terms. Retrieved March 27, 2009, from http://www.library.nhs.uk/knowledgemanagement/Page.aspx?pagename=GLOSSARY

knowledge broker. (n.d.) NHS Glossary of Health Knowledge Management Terms. Retrieved March 27, 2009, from http://www.library.nhs.uk/knowledgemanagement/Page.aspx?pagename=GLOSSARY

Krebs, V. (2008). *Social network analysis, a brief introduction*. Retrieved March 27, 2009, from http://www.orgnet.com/sna.html

Krebs, V. & Holley, J. (2002). *Building sustainable communities through network building*. Retrieved March, 2009, ffrom http://supportingadvancement.com/web_sightings/community_building/community_building.pdf

Krebs, V. & Holley, J. (2006). *Building smart communities through network weaving*. Retrieved march, 2009, from http://www.progressiveroundtable.org/files/krebs-networks.pdf

Lathlean, J. & le May, A. (2002). Communities of practice: an opportunity for interagency working. *Journal of Clinical Nursing, 11,* 394-398.

Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. New York: Cambridge University Press.

Leischow, S. J., Best, A., Trochim, W. M., Clark, P. I., Gallagher, R. S., Marcus, S. E. et al. (2008). Systems thinking to improve the public's health. *American Journal of Preventive Medicine, 35*, S196-S203.

Leischow, S. J. & Milstein, B. (2006). Systems thinking and modeling for public health practice. *American Journal of Public Health, 96*(3) 403-405.

Lemieux-Charles, L. (2006). Understanding the conditions that lead to effective health services delivery networks. *Healthcarepapers, 7*, 40-45.

Li, L., Grimshaw, J., Graham, I., Nielsen, C., Judd, M. & Coyte, P. (2007). *Knowledge translation in health care communities: Use of communities of practice for the dissemination and uptake of best practices: A research synthesis report.* Ottawa, ON: Canadian Institutes of Health Research.

Lin, N. (1999). *Building a network theory of social capital*. Retrieved from http://www.insna.org/PDF/Keynote/1999.pdf

Ling, K., Beenen, G., Ludford, P., Wang, X., Chang, K., Li, X. et al. (2005). Using social psychology to motivate contributions to online communities. *Journal of Computer-Mediated Communication, 10*.

Lomas, J. (2000) Using "Linkage and Exchange" to move research into policy at a Canadian foundation. *Health Affairs 19(3)* 236-40.

Louadi, M. E. (2008). Knowledge heterogeneity and social network analysis - Towards conceptual and measurement clarifications. *Knowledge Management Research and Practice, 6*, 199-213.

Luke, D. A. & Harris, J. K. (2007). Network analysis in public health: History, methods, and applications. *Annual Review of Public Health, 28*, 69-93.

McDermott, R. (2001). *Knowing in community: 10 critical success factors in building communities of practice*. Retrieved March, 2009, from http://www.co-i-l.com/coil/knowledge-garden/cop/knowing.shtml.

McDermott, R. (2002). Measuring the impact of communities: How to draw meaning from measures of communities of practice. *Knowledge Management Review, 5*, 26-29.

McDermott, R. & O'Dell, C. (2001). Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management, 5*, 76-85.

McDonald, J., Atkin, W., Daugherity, F., Fox, H., MacGillivray, A., Reeves- Lipscomb, D., Uthailer-taroon, P. (2003). *Let's get more positive about the term 'lurker.'* CPsquare Foundations of Communities of Practice Workshop. Retrieved March, 2009, from http://www.cpsquare.org/edu/foundations/index.htm

McPherson, C. M., Casebeer, A., Kothari, A., Popp, J. K. on behalf of Child & Youth Health Networks of Canada Research Team (2008). *The illusive and irksome characteristics of evaluating interorganizational health networks*. Proceedings of Bridging Silos: CAHSPR/ACRSPS Conference. Gatineau, Quebec, Canada.

McPherson, C. M., Popp, J. K., & Lindstrom, R. R. (2006). Re-examining the paradox of structure: a child health network perspective.*Healthcarepapers, 7*, 46-52.

Merrill, J., Bakken, S., Rockoff, M., Gebbie, K. & Carley, K. M. (2008). Description of a method to support public health information management: Organizational network analysis. *Journal of Biomedical Informatics, 40*, 422-428.

Milgram, S. (1967). The small world problem. *Psychology Today. 1*, 61.

Milward, H. B. (2007). *Dark networks as organizational problems: Elements of a theory*. Retrieved March, 2009, from http://cluster.ischool.washington.edu/caenser/Documents/Milward_report.pdf

Milward, H. B. & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks*. In IBM Center for the Business of Government, Networks and Partnerships Series. Retrieved March, 2009 from http://www.businessofgovernment.org/pdfs/ProvanReport.pdf.

Milward, H. B. & Raab, J. (2005). *Dark networks as problems revisited: Adaptation and transformation of Islamic terror organizations since 9/11*. Proceedings of 8th Public Management Research Conference at the School of Policy, Planning and Development. University of Southern California. Los Angeles, California.

Mittman, B. S. (2004). Creating the evidence base for quality improvement collaboratives. *Annals of Internal Medicine, 140*, 897-901.

Mizrahi, T. & Rosenthal, B. B. (2001). Complexities of coalition building: Leaders successes, strategies, struggles, and solutions. *Social Work, 46*, 63-78.

Mizruchi, M. S. & Marquis, C. (2006). Egocentric, sociocentric, or dyadic? *Social Networks, 28*, 187-208.

Monge, P. R. & Contractor, N. (2003a). Communication and knowledge networks as complex systems. In *Theories of Communication Networks*. (pp. 79-98). Oxford University Press, US.

Monge, P. R. & Contractor, N. S. (2003b). Network concepts, measures, and the multitheoretical, multilevel analytic framework. In *Theories of Communication Networks* (pp. 29-77). Oxford University Press, US.

Nichani, M. & Hung, D. (2002). Can a community of practice exist online? *Educational Technology, 42*, 49-54.

Nickols, F. (2003). *Communities of Practice: A start-up kit*. Distance Consulting. Retrieved March, 2009, from http://www.nickols.us/

Norman, C. D. & Huerta, T. (2006). Knowledge transfer and exchange through social networks: building foundations for a community of practice within tobacco control. *Implementation Science, 1:20*.

Nutting, P. A. (1996). Practice-based research networks: building the infrastructure of primary care research. *Journal of Family Practice, 42*, 199-203.

O'Toole, L. J. (1997). Treating networks seriously: Practical and research-based agendas in public administration. *Public Administration Review, 57*, 45-52.

Parboosingh, J. T. (2002). Physician communities of practice: where learning and practice are inseparable. *Journal of Continuing Education in the Health Professions, 22*, 230-236.

Pittaway, L., Robertson, M., Munir, K., & Denyer, D. (2004). Networking and innovation: a systematic review of the evidence. *International Journal of Management Reviews, 5/6*, 3/4,137-68.

podcast. (2009). In Merriam-Webster Online Dictionary. Retrieved March 27, 2009, from http://www.merriam-webster.com/dictionary/podcast

Popp, J. K., Douglas-England, K., Casebeer, A. & Tough, S. C. (2005a). Creating Frameworks for Providing Services Closer to Home in the Context of a Network. Healthcare Management FORUM, 27, 27-33.

Popp, J. K., L'Heureux, L. N., Dolinski, C. M., Adair, C. E., Tough, S. C., Casebeer, A. L. et al. (2005b). How Do You Evaluate a Network? A Canadian Child and Youth Health Network Experience. Canadian Journal of Program Evaluation, 20, 123-150.

Pross, A. P. (1992). *Group Politics and Public Policy* (2nd ed.) Toronto: Oxford University Press.

Provan, K. G. (2008). *Addressing public problems through organizational networks: what we know and implications for management*. The Networks Leadership Summit Series: Networks Leadership Symposium, July 23 - 24, 2007, Banff, Alberta - Harnessing the Value of Networks: Network Management, Analysis and Evaluation. Retrieved March, 2009, from http://www.searchca.net/users/FolderData/%7B08D6009A-C75D-4159-B221-ADD8F9482B40%7D/networks_leadership_symposium_iii.pdf

Provan, K. G., Fish, A. & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management, 33*, 479-516.

Provan, K. G. & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-

sector organizational networks. *Public Administration Review, 61*, 414-423.

Provan, K. G., Nakama, L., Veazie, M. A., Teufel-Shone, N. I. & Huddleston, C. (2003). Building community capacity around chronic disease services through a collaborative interorganizational network. *Health Education & Behavior, 30*, 646-662.

Public Health Research and Knowledge Translation Network (2005). Report of the Public Health Research and Knowledge Translation Network workshop. Halifax, NS: Atlantic Health Promotion Research Centre, Dalhousie University.

Rivera, M. A. & Rogers, E. M. (2006). Innovation diffusion, network features, and cultural communication variables. *Problems & Perspectives in Management, 4*, 126-135.

Robinson, K., Elliott, S. J., Driedger, S. M., Eyles, J., O'Loughlin, J., Riley, B. et al. (2005). Using linking systems to build capacity and enhance dissemination in heart health promotion: a Canadian multiple-case study. *Health Education Research, 20*, 499-513.

Rogers, E. M., Medina, U. E., Rivera, M. A. & Wiley, C. (2008). Complex adaptive systems and the diffusion of innovations. *The Innovation Journal: The Public Sector Innovation Journal, 10*, 1-26.

Sackmann, S. A. & Friesel, M. (2007). Exploring cultural impacts on knowledge sharing behavior in project teams – results from a simulation study. *Journal of Knowledge Management, 11*, 142-156.

Scarff, A. (2006). Advancing knowledge sharing with intranet 2.0: how IBM, Motorola and Siemens are using blogs, wikis and RSS. *Knowledge Management Review, 9*, 24-27.

Schwartz, D. G. (2007). Integrating knowledge transfer and computer-mediated communication: categorizing barriers and possible responses. Knowledge Management Research & Practice, 5, 249-259.

Scott, C. & Hofmeyer, A. (2007). Networks and social capital: a relational approach to primary healthcare reform. *Health Research Policy and Systems, 5*, 9.

Sobrero, P. M. (2008). Essential components for successful virtual learning communities. *Journal of Extension, 46,* 4. (article number 4FEA1) Retrieved March, 2009, from http://www.joe.org/joe/2008august/a1.php

Spragins, W. (Ed.). (2007). *Bridging boundaries, creating knowledge: The power of good conversation.* Final report. Networks Leadership Symposium, July 23 - 24, 2007, Banff, Alberta - Harnessing the Value of Networks: Network Management, Analysis and Evaluation. Retrieved march, 2009, from http://www.searchca.net/users/FolderData/%7B08D6009A-C75D-4159-B221-ADD8F9482B40%7D/networks_leadership_symposium_iii.pdf

Struyk, R. J. (2002). Management of transnational think tank networks. *International Journal of Politics, Culture, and Society, 15*, 625-638.

Stuckey, B. & Smith, J. D. (2004). *Sustaining communities of practice*. Retrieved March, 2009, from http://www.bronwyn.ws/publications/papers/sustaining.pdf

Swart, J. & Henneberg, S. C. (2007). Dynamic knowledge nets - the 3C model: exploratory findings and conceptualisation of entrepreneurial knowledge constellations. *Library Hi Tech News 11 (incorporating Online and CD Notes)*, 126-141.

Teigland, R. (2003). *Knowledge Networking: Structure and Performance in Networks of Practice*. Stockholm School of Economics, Stockholm.

Tesson, K. J. (2006). Dynamic Networks. An interdisciplinary study of network organization in biological and human social systems. (Doctoral thesis, University of Bath, Department of Psychology). Retrieved March, 2009, from http://www.jackwhitehead.com/teesonphd/001opening.pdf

Tindall, D. B. & Wellman, B. (2001). Canada as social structure: social network analysis and Canadian sociology. *Canadian Journal of Sociology, 26*, 265-308.

Tsui, L., Chapman, S. A., Schnirer, L. & Stewart, S. (2006). *A handbook on knowledge sharing: strategies and recommendations for researchers, policymakers, and service providers*. Community-University Partnership for the Study of Children, Youth, and Families. Edmonton. Alberta, Canada. Retrieved March, 2009, from http://www.ice-rci.org/research_ops/Knowledge_Sharing_Handbook.pdf

Usoro, A., Sharratt, M. W., Tsui, E. & Shekhar, S. (2007). Trust as an antecedent to knowledge sharing in virtual communities of practice. *Knowledge Management Research & Practice, 5*, 199-212.

Verburg, R. M. & Andriessen, J. H. E. (2006). The assessment of communities of practice. *Knowledge and Process Management, 13*, 13-25.

Wasko, M. M. & Faraj, S. (2005). Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice. MIS Quarterly, 29, 35-57.

Webb, C. (2008). Measuring Social Capital & Knowledge Networks. *Journal of Knowledge Management, 12*, 5. In special issue: Knowledge-Based Development (forthcoming). ISSN: 1367-3270.

Wenger, E. (1998a). Communities of practice: Learning as a social system. *The Systems Thinker, 9*, 5. Pegasus Communications Inc.. Waltham, MA, USA.

Wenger, E. (1998b). *Communities of Practice: Learning, Meaning, and Identity*. New York: Cambridge University Press.

Wenger, E. (2000). Communities of practice and social learning systems. *Organization: The Interdisciplinary Journal of Organization, Theory, and Society, 7*, 225-246.

Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, MA: Harvard Business School Press.

Wenger, E. & Snyder, W. (2000). Communities of practice: The organizational frontier. *Harvard Business Review, 78*, 139-145.

Wenger, E., White, N. & Smith, J. D. (in press) *Digital habitats: stewarding technology for communi-*

*ties*. Retrieved January 22, 2009, from http://technologyforcommunities.com/actionnotebook-v1/

White, D., Suter, E., Parboosingh, I. J., & Taylor, E. (2008). Communities of practice: creating opportunities to enhance quality of care and safe practices. *Healthcare Quarterly, 11*, 80-84.

wiki. (2005). In Oxford English Dictionary Online. Retrieved March 27, 2009, from http://www.askoxford.com/worldofwords/bubblingunder/archive/bubbling_03/?view=uk

# Appendix A: Methodology

Extensive searches of health, business and humanities literature informed the content of this paper. These searches were conducted by a research assistant (CL) using the following databases: sociological abstracts, social science abstracts, business source complete and MEDLINE.

*Humanities*

KW=(("communit* of practice") or ("business network*")) or ("community network*")) or KW=(("interorganization* network*") or ("knowledge network*")) or KW=(("managed network*") or ("network governance"))

*Business*

KW=(("communit* of practice") or ("business network*")) or ("community network*")) or KW=(("interorganization* network*") or ("knowledge network*")) or KW=(("managed network*") or ("network governance")) not SU ("website*" or "wireless*" or "computation*" or "career*")

*Health*

Searches were conducted on MEDLINE using MeSH terms associated with the k words used above.

Citations were downloaded to RefWorks and then into Reference Manager. An initial relevance assessment involving screening of titles and abstracts was conducted by NCCMT staff. The author received copies of papers deemed relevant through that process. At that time, a secondary relevance check involving a review of the full text was conducted.

Further, reference lists of relevant papers were reviewed for other articles. Additional references were provided by health-evidence.ca having recently conducted a similar search related to communities of practice, one type of network. Several relevant journals were also handsearched. The websites of the authors' network and community of practice affiliations were searched; however, it is important to note that a systematic review of the literature was beyond the scope of this paper and the search strategies employed may have missed some key references.

To supplement the knowledge gathered through the literature search, 24 key informants were invited to participate. From this group, 17 interviews were conducted. Key informants were identified through review of participant lists for the Network Leadership Summits, contacting authors of key publications, suggestions of the NCCMT, and recommendations from other key informants. Key informants were asked about their involvement in networks, the models and theoretical underpinnings which have guided these networks in terms of incep-

tion, development, maintenance and management, as well as evaluation. Other questions related to the models and tools to support these networking activities; critical success factors and barriers to avoid; opportunities for collaboration with the NCCPH; as well as additional networks and key informants to contact. Due to time constraints, some of the key informants recommended by participants were not able to be interviewed.

Additionally, the author participated in the Foundations of CoPs online course offered on CPsquare during the development of this paper. Learnings identified through this participation and interaction with other Foundations participants are incorporated throughout this document.

# Appendix B: Glossary of Terms

## Actor (node)

Network member that is a distinct individual, group or organization  (Hawe et al., 2004).

## Betweenness

Degree an individual lies between other individuals in the network (Webb, 2008).

The extent to which a node is directly connected only to those other nodes that are not directly connected to each other; an intermediary; liaisons; bridges.

The number of people with whom a person is connecting indirectly through their direct links.

## Blog

Website with regular personal journal entries of commentary, descriptions of events, reflections or other material such as graphics or video (Merriam Webster's Online Dictionary).

## Boundary Spanner

A network actor that is more central in the overall network (via bridging connections to other clusters or concurrent membership in overlapping groups) than any immediate neighbours whose connections are only local, within their immediate cluster; well-positioned in the network to be an innovator, to combine different ideas and knowledge, found in various places, into new products and services, due to its access to ideas and information flowing in other clusters (Addicott et al., 2006; Coakes & Smith, 2007; Goodwin et al., 2004; Krebs & Holley, 2002; Rivera & Rogers, 2006).

## Capacity development

The development of knowledge, skills and attitudes within individuals and groups of people; the creation of structures, resources, policies and procedures in organizations and networks for the purpose of sustainability and to achieve relevant goals, to cope with complexity and to innovate.

## Centrality

The extent to which an actor is in a central role in a network (Fredericks & Durland, 2005).

The importance or prominence of an actor in a network (Hawe et al., 2004; Louadi, 2008; Luke & Harris, 2007).

Betweenness centrality

The number of times an actor connects pairs of other actors, who otherwise would not be able to reach one another and thus a measure of the potential for control that one actor has over the flow between that actor and its direct connections (Hawe et al., 2004).

Closeness centrality

The measure of closeness of an actor that is close to everyone else or the pattern of the

direct and indirect ties allows the nodes any other node in the network more quickly than anyone else; they have the shortest paths to all others (Hawe et al., 2004).

Degree centrality

The number of direct connections (and where they lead and how they connect the otherwise unconnected) an actor has to other actors in the network (Hawe et al., 2004; Webb, 2008).

Eigenvector centrality

A measure of the importance of a node in a network that assigns relative scores to all nodes in the network based on the principle that connections to nodes having a high score contribute more to the score of the node in question (Webb, 2008).

## Centralization

The difference between the numbers of links for each node divided by maximum possible sum of differences (Webb, 2008).

The fraction of main actors within a network (Fredericks & Durland, 2005).

A centralized network will have many of its links dispersed around one or a few nodes, while a decentralized network is one in which there is little variation between the number of links each node possesses.

## Chat room

An interactive online-based, sometimes moderated, discussion group taking place in real (synchronous) time (Merriam-Webster Online Dictionary).

## Clinical or health service delivery networks

A group of three or more independent organizations that collaborate to provide a variety of evidence-informed health care services (Huerta et al., 2006; Provan & Milward, 2001).

## Clique

Subgroup of a network in which actors are all directly connected to one another and no additional actor exists who is also connected to all members of the subgroup (Fredericks & Durland, 2005; Hawe et al., 2004).

## Closeness

The degree an individual is near all other individuals in a network (directly or indirectly). It measures independence or efficiency and reflects the ability to access information through the "grapevine" of network members. Thus, closeness is the inverse of the sum of the shortest distances between each individual and every other person in the network.

## Clustering coefficient

A measure of the likelihood that two associates of a node are associates themselves. A higher clustering coefficient indicates a greater 'cliquishness.'

## Cohesion

The degree to which actors are connected directly to each other by cohesive bonds. Groups are identified as 'cliques' if every actor is directly tied to every other actor, 'social circles' if there is less stringency of direct contact, which is imprecise, or as structurally cohesive blocks if precision is wanted; measures of cohesion include: distance, reachability, and density (Hawe et al., 2004).

## Collaboration

A process of interaction through which people, groups, and/or organizations work together to achieve desired outcomes (NHS Glossary). (See http://www.library.nhs.uk/knowledgemanagement/Page.aspx?pagename=GLOSSARY)

## Community of practice

Voluntary, flexible networks of people with a common interest or passion in a specific area, who come together on a regular or ad hoc basis to develop, share, and build their knowledge and learn about a practice-related issue (Lave & Wenger, 1991; Wenger, 1998a; Wenger, 2000; Wenger & Snyder, 2000; Wenger et al., 2002).

## Component

A portion of the network in which all actors are connected, directly or indirectly, by at least one tie. An isolate (see below) is a separate component (Hawe et al., 2004).

## Computer-mediated communication (CMC)

Any communicative transaction which occurs through the use of two or more networked computers (Schwartz, 2007).

## Core group

A small, socially connected and committed group of network members who value the vision for the network and assume responsibility for the majority of network activity, providing guidance and leadership (Agranoff & McGuire, 2001; Burgess, 2006; Cross et al., 2006; Garavan et al., 2007; Goodwin et al., 2004; Rivera & Rogers, 2006; Sackmann & Friesel, 2007; Swart & Henneberg, 2007; Usoro et al., 2007).

## Density

The total number of relational ties in a network divided by the total possible number of relational ties (Beacham et al., 2005; Fredericks & Durland, 2005; Goodwin et al., 2004; Hawe et al., 2004; Louadi, 2008; Luke & Harris, 2007).

Individual-level density

The degree a respondent's ties know one another; the proportion of ties among an individual's nominees.

Network or global-level density

The proportion of ties in a network relative to the total number possible (sparse versus dense networks).

## Digital storytelling

Combines oral storytelling with telecommunications tools to produce short, personal stories in computer-based images, text, recorded audio narration, video clips and/or music that focus on a specific topic and contain a particular point of view (Hodgson, 2005). (See http://www.umass.edu/wmwp/DigitalStorytelling/What%20is%20Digital%20Storytelling.htm)

## Discussion forum

An online space in which people can share knowledge about a common interest (OECD Glossary of Statistical Terms). (See http://stats.oecd.org/glossary/detail.asp?ID=6715)

It is a useful tool to encourage CoPs or knowledge sharing generally – flow of conversation through subcategories can be controlled; high-value topics can be moved to FAQ section of intranet between NCCs, clients.

## Distance

The sum of the number of distinct ties (lines) that exist between two actors along the shortest route between them (Hawe et al., 2004; Louadi, 2008).

## Domain

Shared interest that provides the incentive and passion for the community to come together (Lave & Wenger, 1991; Wenger, 1998a; Wenger, 2000; Wenger & Snyder, 2000; Wenger et al., 2002).

## Equivalence

The extent to which any two actors in a network are similar in terms of their social roles and structural positions within the network (Beacham et al., 2005; Hawe et al., 2004).

### Automorphic equivalence

The extent to which a set of actors has the same pattern of ties or parallel structures as another set in the same network.

### Regular equivalence

The extent to which an actor has the same profile (or types) of ties, or social roles, with members of another set of actors.

### Role equivalence

Actors are said to be role equivalent when they are related to the same actors.

### Structural equivalence

A measure of the extent to which two actors are similar in terms of their relationships with other actors; two actors must be exactly substitutable, or in identical positions with regard to all other actors in the network structure, to be structurally equivalent.

## Forum

A grouping of related threads of discussion containing threads and possibly sub-forums.

## Heterogeneity

Diversity; the extent to which actors and/or their relationships with other actors are different (Cross et al., 2006; Goodwin et al., 2004; Krebs & Holley, 2006).

## Homogeneity (homophily)

The extent to which actors and/or their relationships with other actors are the same (Fredericks & Durland, 2005).

## Hub

A network actor or node with high degree centrality (has large number of direct connections) and high betweeness centrality (has great influence over what flows in the network indicating important links and single point of failure); a connector within the network (Krebs, 2008). (See http://www.orgnet.com/sna.html)

## Isolate

A network subgroup which is an actor who is not connected to any other actors in that network (Fredericks & Durland, 2005; Hawe et al., 2004).

## Knowledge

The capacity for effective action that has been derived from information; includes familiarity, awareness, and understanding gained through experience or study; results from making comparisons, identifying consequences, and making connections (NHS Glossary). (See http://www.library.nhs.uk/knowledgemanagement/Page.aspx?pagename=GLOSSARY)

### Tacit knowledge

Knowledge that resides within the people of the organization and is not formalized into written or documented forms; accessible only through conscious efforts.

### Explicit knowledge

Knowledge that is available in spoken or written form; the ordering of data and information according to well-defined, formalized procedures or rules.

## Knowledge broker (knowledge worker, knowledge manager, boundary spanner)

A person or organization that facilitates the creation, sharing, and use of knowledge in an organization by linking people, groups, and/or organizations with each other or with knowledge and knowledge-related resources (NHS Glossary). (See http://www.library.nhs.uk/knowledge-management/Page.aspx?pagename=GLOSSARY)

## Knowledge management

The systematic application of policies, methods, and tools by which knowledge needed for an organization to succeed is created, captured, shared and leveraged (Clemmons Rumizen, 2002)

## Knowledge network

A collection of people, resources, and the relationships between them that is assembled to share, accumulate, create, and use knowledge to achieve a specific (often organizational) goal (Teigland, 2003).

## Knowledge sharing

The reciprocal transfer of knowledge between and among people, groups or organizations.

## Knowledge transfer and exchange (KTE)

An interactive process involving the interchange of knowledge between research users and researcher producers (Kiefer et al., 2005).

KTE is facilitated by two-way phased communication (Robinson et al., 2005); networking opportunities and relationship development (Jacobson et al., 2003); and interactive engagement of key stakeholders (Grimshaw et al. 2001).

Linkage and exchange activities focus on building and maintaining new relationships between researchers and policy-makers and senior managers to exchange knowledge and ideas (Canadian Health Services Research Foundation, 1999; Lomas, 2000).

## Links (see Ties)

## Lurker

Someone who reads discussions, listens to chats or otherwise passively takes in other forms of network communication, but rarely participates; sometimes referred to as a non-contributor or passive participant (McDonald et al., 2003).

## Multiplexity

The extent of network complexity as determined by the differences and variation among actors, the relationships between them, and the resources available to and shared among them (Beacham et al., 2005).

## Network

A system of interconnected actors or nodes and the ties or links between them (Brass et al., 2004; Hawe et al., 2004).

Ego-centric (personal) network

System of interconnected actors and the ties or links between them as defined from a focal

actor's perspective only. This refers to the ties directly connecting the focal actor (ego) to others (ego's alters) in the network, plus ego's views on the ties among his or her alters (Fredericks & Durland, 2005).

Emergent networks

Informal naturally occurring system of social relationships that are not prescribed by a formal organization but aim to enhance the capacity of individuals and/or organizations to manage knowledge, perform their work, and achieve organizational goals (Teigland, 2003).

Inter-organizational (community) network

A collection of organizations loosely and voluntarily bound together in collaboration through commitment to the same system-level goal.

Intra-organizational network

A collection of organizational units (e.g., teams, workgroups, or regional offices) within one organization bound together voluntarily or through an organizational mandate.

Mandated network

Organizational form that have been imposed upon, mandated by, or purposely created by an organization (Teigland, 2003).

One-mode network

System of a single interconnected set of similar actors and the links between them (Hawe et al., 2004).

Policy (public management) network

Consists of connections among people, programs and organizations for the purpose of developing or implementing public policy (Milward & Provan, 2006).

Research network

A purposely established group of people that is assembled to collaborate on research initiatives and/or encourage evidence-informed practice (Beacham et al., 2005).

Social network

A collection of interconnected individuals, groups, or organizations that interact with each other to achieve a common goal, representing one relational approach to enhancing knowledge transfer and exchange, knowledge management, work-related behaviour change, professional development, and organizational outcomes (Davies, 2003; Huerta et al., 2006).

Socio-centric (complete or whole) network

A system of interconnected actors and the relational ties among them in a single, bounded group

Two-mode network

System of two different sets of interconnected actors and the links between them (Hawe et al., 2004).

## Networking

A common activity, not only in public health practice, involving actors (organizations and individuals) working together around a common issue; building relationships with other actors to share knowledge, resources, experiences and expertise (or know how); learning from each other through interaction, dialogue and storytelling.

## Network of practice

A set of individuals connected together through social relationships that emerge through the interaction of these individuals on task-related matters when conducting their work; communities of practice are a subset of networks of practice (Teigland, 2003).

## Node (see Actor)

## Orientation

A typical pattern of activities and connections through which members experience being a network; Wenger, White & Smith (in press) have identified nine orientations that have implications for the selection of technology: meetings, open-ended conversations, projects, content, access to expertise, relationships, individual participation, community cultivation, and serving a context.

## Podcast

A multimedia program or file (audio or video), typically downloaded from Web sites and played on your computer (with "podcatching" software) or on a digital media player (an MP3 player) such as an iPod® (Merriam-Webster Online Dictionary).

## Path length

The distance between pairs of actors in a network (Krebs & Holley, 2002; Krebs & Holley, 2006).

## Portal

A framework for integrating knowledge, methods and tools; can be used to enhance collaboration and support knowledge sharing (including document management, project collaboration tools, and multi-platform search and navigation).

Provides a single point of access for management information (e.g., data warehouses), and acts as a container for co-created knowledge and specific knowledge management and networking applications (Norman & Huerta, 2006).

## Reachability

The ease with which any member of a network can reach other members of the network; the extent to which network actors are related, either directly or indirectly, to all other actors (Hawe et al., 2004).

## Small world theory

The theory that most actors in a social network are connected by short path lengths and therefore can be readily connected to other actors (Milgram, 1967).

## Social capital

The resources embedded in a social network that are available to, accessed or used by individuals or groups in purposive actions (Lin, 1999).

## Social network analysis

Both a theoretical perspective and a quantitative approach (or set of methods) to mapping and measuring the patterns of interactions among actors in, or the structure of, social networks. Organizational network analysis refers to social network analysis when the actors are organizations (Hawe et al., 2004).

## Social software

Blends tools and modes for richer online social environments and experiences (e.g., weblogs, wikis, forums, chat environments, instant messaging, and related tools and data structures for identity, integration, interchange and analysis). (See http://cpsquare.org.)

Social tools put knowledge sharing power in the hands of users and often open source and free or low cost (Gurteen, 2007). (See http://www.gurteen.com/gurteen/gurteen.nsf/id/km-goes-social)

## Sponsor

An individual or organization that recognizes the strategic value of the network to the overall objectives of the organization or system; helps secure needed resources, nurture and protect the community, and ensure its exposure in the organization or system. The sponsor does not necessarily belong to the network (Barwick, 2008).

## Stability

A measure of the changes within a network in terms of actors, the relationships between them, and the resources available to support the network.

## Structural cohesion

The minimum number of members who, if removed from a group, would disconnect the group (Louadi, 2008).

## Structural equivalence

The extent to which actors have a common set of linkages to other actors in the system and thus play similar roles in the network (Luke & Harris, 2007). Actors do not need to have any ties to each other to be structurally equivalent. Actors that are structurally equivalent are in identical positions in the structure of the visual representation of the network.

## Structural hole

The gap between two actors that share no relationship in a network (Fredericks & Durland, 2005; Louadi, 2008).

## Structure (see Network structure)

## Thread

A grouping of one or more related posts in a discussion forum.

## Ties (relational ties or links)

Connections or relationships between actors in a network (Hawe et al., 2004).

## Video-conference (videoteleconference)

A set of interactive telecommunication technologies that enables actors at two or more different locations to interact using interactive video and audio applications simultaneously on computer networks. Audio transmissions may be accomplished by a separate phone bridge rather than a computer.

## Virtual networks

Dynamic, computer-mediated, transient, organizational structures that are not bounded by geography (Jarvenpaa & Tanriverdi, 2003). These structures are often weak in terms of their ability to develop and maintain the social relationships and exchanges necessary for effective knowledge transfer and diffusion of innovations. As well, the element of trust, often cited as a critical success factor in networks, can be difficult to develop and maintain when opportunities for face-to-face interaction are not available.

## Wiki

A website that is developed collaboratively by users and that can easily be revised by anyone (Oxford English Dictionary). (See http://www.askoxford.com/worldofwords/bubblingunder/archive/bubbling_03/?view=uk)

# Appendix C: Networking Methods and Tools

Many methods and tools exist to promote network development, management, maintenance, sustainability and evaluation. Their use would support the efforts of the NCCPH in networking and fostering interaction, relationship and identity development, and knowledge sharing.

## Methods

### *Back channel conversations*

- A method of layering face-to-face and/or virtual private or shared conversations that enables more than one person to share their thoughts at the same time; often considered crucial to community development
- Whiteboards and other technologies may enable these conversations during face-to-face or virtual meetings

### *Brainstorming*

- A group-based method for generating ideas, sharing knowledge and developing creative solutions to problems involving the identification of a problem of focus followed by the deliberate generation of as many solutions as possible
- Electronic brainstorming tools are available

### *Café conversations or World café*

http://www.theworldcafe.com

- A flexible, easy-to-use, face-to-face or virtual, synchronous or asynchronous method based on a set of integrated design principles to foster collaborative dialogue, share mutual knowledge and discover new opportunities for action

### *Collaborative dialogue*

- A discussion in which speakers are engaged in problem-solving and knowledge-building – in this case, about evidence-informed decision-making in public health built on the belief that individual knowledge develops from collective behaviour

### *Concept mapping*

- A visual tool to assist and enhance thinking and learning

### *Evaluation*

- Tools to support network evaluation, including:
    - Social network analysis
    - Community Assessment Toolkit

- Community Health Assessment tool

*Facilitation*

- Tools to support network facilitation can be found at:
    - Facilitating networks: A good practice guide http://km4dev.org/index.php?module=uploads&func=download&fileId=27 http://km4dev.org/index.php?module=uploads&func=download&fileId=232
    - Guidelines for moderators of online discussions https://hhsu.learning.hhs.gov/communities/downloads/0213YGA11711.doc
    - Work the Net. A Management Guide for Formal Networks, GTZ, 2006 http://www.km4dev.org/index.php/articles/news/716
    - Communities of Practice: A New Tool for Government Managers http://conversations.cpsquare.org/CP2KB/Members-products/Snyder_newTool-ForGovtMgrsReport.pdf
    - CHECKLIST of Facilitator Competencies, Tasks and Roles http://www.lap.org/NRPA/Papers/The_Road_To_Community_Conversation.doc

*Open spaces*

http://www.openspace-online.com

- A generic term describing a wide variety of different styles of meeting in which participants define the agenda with a relatively rigorous process, and may adjust it as the meeting proceeds
- A good way for a group to quickly explore which potential communities exist, and fairly quickly determine which ones are likely to move ahead long-term

*Narratives (stories)*

- Storytelling
    - An informal method for knowledge transfer and exchange, particularly of tacit knowledge, in which a person describes a situation, actions taken to address a problem or issue presented in that situation, events related to those actions, and the outcome or what happened
- Digital storytelling
    - The use of new computer-based tools and technologies to tell personal stories and exchange knowledge

## Tools

- A Guide to Managing Knowledge. Cultivating Communities of Practice (Wenger et al., 2002). Tips, advice and further links on setting up and maintaining a CoP, provided by knowledgeboard, an online KM platform http://www.knowledgeboard.com/cgi-bin/item.cgi?id=378

- A Manager's Guide to Choosing and Using Collaborative Networks (Milward & Provan, 2006)
  http://www.businessofgovernment.org/pdfs/ProvanReport.pdf

- Best Practices: Developing Communities that Provide Business Value
  http://www.chris-kimble.com/KNICOP/Chapters/Chapter_13.html

- Communities of Practice Design Guide: A Step-by-Step Guide for Designing & Cultivating Communities of Practice in Higher Education
  http://net.educause.edu/ir/library/pdf/NLI0531.pdf

- Community Launch Design Template
  http://www.itesm.mx/va/dide2/enc_innov/doctos/Launch_design_template.pdf

- Community of Practice Practitioners' Guide
  http://knowledge.usaid.gov/documents/cop_practicioners_guide.pdf

- CoP Technology Evaluation Criteria
  http://knowledge.usaid.gov/documents/cop_evaluation.pdf

- Communities of Practice Start-up Kit
  http://home.att.net/~discon/KM/CoPStartUpKit.pdf

- Communities of Practice Start-up Kit
  http://www.kunnskapsnettverk.no/C14/C10/CoP/Document%20Library/Toolkitstartup2.pdf

- Communities of Practice Start-up Kit
  http://www.calliopelearning.com/papers/copkit.zip

- Cultivating Communities of Practice. A quick start-up guide, by Etienne Wenger, 2002
  http://www.ewenger.com/theory/start-up_guide_PDF.pdf

- Facilitating a Community: KariaNet PKF KS and Facilitation Workshop Resource Manual
  http://www.idrc.ca/uploads/user-S/11479375371KM_Training_Manual_en.doc

- Facilitator Toolkit for Building and Sustaining Virtual Communities of Practice
  http://www.chris-kimble.com/KNICOP/Chapters/Chapter_17.html

- Focus on Facilitation in Communities of Practice
  http://conversations.cpsquare.org/WebX?233@31.gR7vaPShi6e.31@.3bb36445!enclosure=.3bb36446

- Guidelines for Establishing and Facilitating Communities of Practice
  http://www.finance.gov.au/e-government/better-practice-and-collaboration/docs/Guidelines_for_Establishing_and_Facilitating_CoP.pdf

- How to launch a Network? Primer on UNDP Networks, including success factors and tips
  http://km4dev.org/index.php?module=uploads&func=download&fileId=232

- Knowledge Management Toolkit for the Crisis Prevention and Recovery Practice Area

http://www.undp.org/cpr/documents/whats_new/UNDP_Toolkit_LowRes.pdf

- Launching Communities of Practice Design Templates & Guidelines
  (information prepared for or resulting from the November 27-28 launch event, in-
  cluding the presentation on CoPs, the templates used, and notes from the launch)
  https://hhsu.learning.hhs.gov/communities/downloads/0114HSK45177.doc

- Links to experiences in setting-up and running CoPs, provided by KM4DeV
  http://km4dev.org/index.php/articles/c151

- PHIN CoP Resource Kit includes tools to
  http://www.cdc.gov/phin/communities/resourcekit/index.html

    - align with PHIN
      http://www.cdc.gov/phin/communities/resourcekit/pdf/Align.pdf

    - launch and sustain CoPs
      http://www.cdc.gov/phin/communities/resourcekit/pdf/Launch.pdf

    - evaluate
      http://www.cdc.gov/phin/communities/resourcekit/pdf/Evaluate.pdf

- Tools for Knowledge Management
  http://knowledge.usaid.gov/tools.html

- Partnership Guidelines. Alberta Public Health Association
  http://www.cms.apha.ab.ca/files/partnership.pdf

## Technological tools

Technological tools to promote the core network activities of interaction and knowledge shar-
ing (Bate & Robert, 2002; Contractor & Monge, 2002; Cross et al., 2006; Jackson-Bowers et
al., 2006; Norman & Huerta, 2006) include:

- Telephones

    - personal

    - cell phones

    - VoIP (Voice over Internet Protocol) enables the transmission of voice traf-
      fic over IP-based networks. (e.g., Skype is a VoIP service that allows users
      to make telephone calls over the Internet.)

- Interactive websites and portals

- Desktop tools (customizable Web portals)

    - shared bookmarking

- Tagging

- E-mail distribution lists such as e-newsletters and listserves

- Discussions forums

    - synchronous or asynchronous

- threaded or unthreaded

- moderated or non-moderated

- open or closed

- chat (instant messaging)

- Groupware
  software that provides collaborative online support to groups and offers one or more of the following capabilities

  - electronic brainstorming

  - electronic conferencing or videoconferencing

  - group scheduling and calendars

  - model building

  - electronic document sharing

  - voting services

  - electronic meeting services also available

- Social networking
  sites that link people to other people and other resources (e.g., Facebook, LinkedIn, CPsquare, Communispace or, NewSof)

- Document management systems
  (e.g., SharePoint which has discussion group and network support capabilities through SharePoint KM)

- Podcasts

- Wikis and blogs

- Webinars or web-based conferences (such as WebEx or NetMeeting)

- Shared workspaces or online collaboration applications
  (e.g., WebCrossing http://www.webcrossing.com; Basecamp http://en.wikipedia.org/wiki/ Basecamp (software) and the associated online chat service Campfire;

- Second life
  a virtual world created by network members to create and collaborate

  http://secondlife.com/whatis/

  see also Conference Board webcast The Next Wave of Web 2.0 and Web 3D Powered Communications discussing Second Life and other virtual worlds, along with Web 2.0 tools like blogs, wikis, podcasting and social networking sites can inspire and enable network members to get engaged, create and learn from each other

  http://www.conferenceboard.ca/documents.asp?rnext=2680

- Slideshare
  enables members to share powerpoint presentations

  http://www.slideshare.net/

- Knowledge bases

  - content management tools such as Documentum

- registries of experts, members, researchers, or resources
- e-Learning spaces
(range from interactive collaboration tools such as Blackboard to learning management systems such as HealthStream)

- Network analytic software

# Appendix D: Existing Networks for Potential Linkage With NCCPH

## Canadian Networks and Organizations – Health-related

### Atlantic Networks for Prevention Research (ANPR)
http://preventionresearch.dal.ca

- A capacity-building project grant led by Renée Lyons of the Atlantic Health Promotion Research Centre (AHPRC) at Dalhousie University, and funded by the CIHR, Institute of Population and Public Health has developed two associated networks:
- Public Health Research and Knowledge Translation (PHRKT) Network
    - aims to produce and use research evidence to support the improvement of public health and the restructuring of public health systems in Atlantic Canada through research development, training and knowledge translation.
- Health and Communities Research Network
    - aims to develop research capacity in Atlantic Canada related to the development and use of community-level data to clarify impacts of social and physical environments on health.

### Canadian Association for Health Services and Policy Research (CAHSPR)
http://www.cahspr.ca

- A collective of producers and users of research from a variety of disciplines, jurisdictions and organizations that:
    - is dedicated to improving health and health care by advancing the quality, relevance and application of research on health services and health policy;
    - provides its members with unique opportunities for networking, research collaboration and career advancement;
    - hosts communities of practice for embedded research.

### Canadian Best Practices Initiative (CBPI)
http://cbpp-pcpe.phac-aspc.gc.ca/about-eng.html

- A national initiative that has evolved to:
    - facilitate knowledge exchange about best practices among decision-makers in research, policy development and practice;
    - build consensus about best practices approaches;
    - provide a centralized access point for these approaches and coordinate activities to increase the uptake and utilization of best practices approaches.
- CBPI is considering the development of CoPs to further their efforts.

### Canadian Health Leadership Network (CHLNet)
http://www.chlnet.ca

- A coalition of emerging and senior leaders with a shared commitment to leadership that aims to:
    - address the imminent leadership shortage by focusing on the lifecycle of leadership, specifically leadership development and succession planning for a broad cross-section of the health community in Canada;
    - identify, develop, support and celebrate leaders throughout the leadership continuum and transcending all health professions.

### Canadian Health Services Research Foundation (CHSRF)
http://www.chsrf.ca

- An independent, not-for-profit corporation established to:
    - promote and fund management and policy research in health services and nursing;
    - increase the quality, relevance and usefulness of this research for health-system policy makers and managers;
    - work with health-system decision-makers to support and enhance their use of research evidence when addressing health management and policy challenges.
- Views networks as tools for effective knowledge exchange and has embarked on various initiatives to understand, support and create networks that link key stakeholders in the health system.

### Canadian Network for Public Health Intelligence (CNPHI)
https://www.cnphi-rcrsp.ca/cnphi/index.jsp

- A secure web-based collective of applications designed to:
    - facilitate national, integrated, real-time collection and processing of laboratory and epidemiological surveillance data, dissemination of strategic intelligence and coordination of public health response;
    - reduce the occurrence of human illness by dramatically enhancing the response capacity of public health stakeholders.
- CNPHI maintains and respects jurisdictional responsibilities by integrating disparate public health information resources for the direct benefit of local/regional, provincial/territorial and national decision-makers a comprehensive framework of applications and resources designed to fill critical gaps in Canada's national public health infostructure.
- CNPHI has a Program/IT approach to data sharing and collaboration that integrates disparate data sources and facilitates intelligence generation and dissemination to enhance public health coordination and response activities for the direct benefit of local, regional, provincial/territorial and national stakeholders.

### Canadian Obesity Network
http://www.obesitynetwork.ca

- Focuses the expertise and dedication of more than 2,000 member researchers, clini-

cians, allied health care providers and other professionals with an interest in obesity in a unified effort to reduce the mental, physical and economic burden of obesity on Canadians.

## Canadian Public Health Association

http://www.cpha.ca

- A national, independent, not-for-profit, voluntary association representing public health in Canada with links to the international public health community.

## Canadian Women's Health Network

http://www.cwhn.ca

- A voluntary national organization to improve the health and lives of girls and women in Canada and the world by collecting, producing, distributing and sharing knowledge, ideas, education, information, resources, strategies and inspirations.
- A far-reaching web of researchers and activists; mothers, daughters, caregivers and family members; people working in community clinics and on hospital floors; at the university, in provincial and federal ministries of health; and in women's organizations, all dedicated to bettering women's health and equality.

## Cancer Care Ontario

http://www.cancercare.on.ca

- The provincial agency responsible for continually improving cancer services.
- Knowledge transfer strategies include the development of collaborative networks such as communities of practice (CoPs).

## Chronic Disease Prevention Alliance of Canada (CDPAC)

http://www.cdpac.ca

- A networked community of national and provincial/territorial organizations and networks that share a common vision for an integrated system of chronic disease prevention in Canada
- Hosts an alliance of FTP networks.
- Developing a model for CoPs.

## CHN community of practice project through CHNAC

http://www.chnac.ca

- Initiative involving three Canadian health regions: Eastern Ontario- Cornwall & Ottawa; Nunavut; and Vancouver Coastal.
- CHN brings together nurses working in public-, home- and community health centres to identify and work toward addressing a common issue.
- First communities of practice were launched in January and February, 2008.
- Builds on research conducted in Ontario and B.C. on incorporating the Canadian Community Health Nursing Standards and using the Toolkit.

### CHNet Works!

http://www.chnet-works.ca

- An evolving infrastructure and networking venue that uses innovative information technology to support discussions and actions on pressing community health issues CHNet Works is hosted by the Community Health Research Unit at the University of Ottawa.

### Contacts, Help, Advice and Information Network (CHAIN) Canada

http://www.epoc.uottawa.ca/CHAINCanada

- A network designed to facilitate links between health care professionals, specialists, researchers, educators, managers, librarians and other professionals.

### Dietitians of Canada

http://www.dietitians.ca

- A dynamic service designed as a series of knowledge pathways, each focusing on a topic from the diverse practice of dietetics. Each pathway is developed from key practice questions and evidence-based answers, with links to tools and resources consistent with the evidence. Knowledge pathways are grouped under four broad Practice Categories: Population Health/Lifecycle; Health Condition/Disease; Food/Nutrients; Professional Practice.
- Hosts PEN: Practice-based Evidence in Nutrition.
http://www.dieteticsatwork.com/pen/

### health-evidence.ca

http://health-evidence.ca

- A free, searchable, online registry of public health and health promotion evidence in the form of systematic reviews and meta-analyses. All articles are screened for relevance and assessed for methodological quality to facilitate evidence-informed decision-making. Research summaries are available in both English and French.

### Health Promotion Clearinghouse Network

http://hpclearinghouse.net

- Provides health promotion material, information, learning opportunities, assistance and support; funded by the Nova Scotia Department of Health Promotion & Protection (HPP).
- A component of the Health Promotion Clearinghouse (HPC).
http://www.hpclearinghouse.ca

### Health Research Transfer Network of Alberta (RTNA)

http://www.ahfmr.ab.ca/rtna

- An Alberta-wide network that aims to strengthen the incorporation of research evidence in health services decision-making.

### ICEBeRG (KT-ICEBeRG)

http://www.iceberg-grebeci.ohri.ca

- A team of investigators, new investigators and students led by Jeremy Grimshaw and Ian Graham and jointly funded by the Ontario Ministry of Health and Long term Care and the Canadian Institutes of Health Research that aims to:
  - generate sustainable transdisciplinary research capacity to address the scientific questions raised in the implementation of evidence-based health care to improve quality;
  - conduct transdisciplinary research into the barriers and enablers to the development, dissemination and uptake of clinical best practices and evaluations of dissemination and implementation strategies to improve quality;
  - undertake a series of knowledge translation activities directed at key stakeholders interested in improving quality of care.

### InSource
- A virtual health research service centre to support decision-makers; for more information, contact project manager Gregg Moor (gregg.moor@in-source.ca).

### Institute for Healthcare Improvement
http://www.ihi.org

- An independent not-for-profit organization helping to lead the improvement of health care throughout the world by building the will for change, cultivating promising concepts for improving patient care, and helping health care systems put those ideas into action.

### Knowledge Exchange Network of the Canadian Cancer Society – Manitoba Division
http://www.cancer.ca/Manitoba/Prevention/MB-Knowledge%20Exchange%20Network.aspx?sc_lang=en

- Develops information packages of effective practices in chronic disease prevention, healthy living and palliative care.
- Builds capacity in community groups to use evidence for decision-making in chronic disease prevention, healthy living and palliative care planning.
- Bridges the gap between research and users of research information.

### KU-UC Chair on Knowledge Transfer and Innovation
http://kuuc.chair.ulaval.ca

- A CHSRF Chair to further our scientific understanding of knowledge transfer and innovation in health services, to train and support students who are pursuing a Masters or PhD in this field, and to encourage and facilitate the transfer of knowledge in general.
- The weekly KUUC E-watch bulletin spreads knowledge and promotes the use of research by decision-makers.
http://kuuc.chair.ulaval.ca/english/master.php?url=bulletin.php

### Ontario Tobacco Research Unit (OTRU)
http://www.otru.org

- An Ontario-based research network that is recognized as a Canadian leader in tobacco control research; monitoring and evaluation; teaching and training; and as a respected source of science-based information on tobacco control.

- Learning through Evidence, Action and Reflection Networks (LEARN) encompasses the development of resources for health intermediaries and province-wide Communities of Practice (CoP) to cultivate innovation, knowledge exchange and capacity building for the Smoke-Free Ontario strategy.
http://www.otru.org/pdf/learn/learn_tcan_final_report.pdf

- Seven geographic Tobacco Control Area Networks (TCAN) within public health units (PHU) in Ontario organized by geography, with one to nine PHUs per TCAN. Each TCAN is lead by one PHU in the region, which is called the Coordinating Public Health Unit (CPHU). Each CPHU has a TCAN Coordinator and a Youth Development Specialist. The TCAN Coordinator leads this network of PHUs and is funded to develop their respective TCAN networks and steering and subcommittees and to assist with area-wide planning, communication, and collaboration. To date, the TCANs have facilitated a wide variety of collaborative public education, public relations and training activities, and hired CoP facilitators.

### Pan-Canadian Public Health Network
http://www.phn-rsp.ca

- A mechanism for different levels of government and experts to work together to improve public health in Canada that:
    - assists in the sharing of knowledge, the development of best practices and policy development;
    - aims to bring together community-based clinicians, public health authorities, viral laboratories and all levels of government to safeguard the health of Canadians against emerging infectious diseases.

### Provincial/Territorial Public Health Associations

Alberta

- Alberta Public Health Association
www.cms.apha.ab.ca

British Columbia

- Public Health Association of British Columbia
www.phabc.org

Manitoba

- Manitoba Public Health Association
www.manitobapha.ca

New Brunswick / Prince Edward Island

- New Brunswick/Prince Edward Island Branch, CPHA
www.cpha.ca/en/about/provincial-associations/nb-pei.aspx

Newfoundland and Labrador

- Newfoundland & Labrador Public Health Association
  www.cpha.ca/en/about/provincial-associations/nl.aspx

Northwest Territories/Nunavut

- Northwest Territories/Nunavut Branch
  www.cpha.ca/en/about/provincial-associations/nwt_nun.aspx

Nova Scotia

- Public Health Association of Nova Scotia
  www.phans.ca

Ontario

- Ontario Public Health Association
  www.opha.on.ca

Québec

- L'Association pour la sante publique du Québec
  www.aspq.org

Saskatchewan

- Saskatchewan Public Health Association, Inc.
  www.cpha.ca/en/about/provincial-associations/saskatchewan.aspx

Yukon

- Yukon Public Health Association
  www.cpha.ca/en/about/provincial-associations/yukon.aspx

## Schools of Public Health

- Dalla Lana School of Public Health, University of Toronto
  http://www.phs.utoronto.ca/

- Queen's School of Public Health, Queen's University
  http://www.queens-pph.ca/school/index.asp

- School of Occupational and Public Health, Ryerson University
  http://www.ryerson.ca/sophe/

- School of Population & Public Health, University of British Columbia
  http://www.spph.ubc.ca/

- School of Public Health, University of Alberta
  http://www.publichealth.ualberta.ca/

- School of Public Health, University of Saskatchewan
  http://www.usask.ca/sph/graduate_programs/mph/

### Seniors Health Research Transfer Network (SHRTN)

http://www.shrtn.on.ca

- An Ontario-wide knowledge exchange network of people involved in seniors' health care. SHRTN hosts CoPs to:
    - bring together researchers, policymakers and caregivers to share tacit and explicit knowledge;
    - provide the latest knowledge and best practices about seniors' health and health care;
    - improve care for seniors in the long-term care and community care sectors.

### SEARCH (Swift, Efficient Application of Research in Community Health) Canada

http://www.searchca.net

- An Alberta-based public service organization dedicated to knowledge access, creation and use by health managers, health providers and their organizations.

- An example of a formalized CoP model.

- Provides a mechanism to bring together and benefit the diverse communities of medical and health research, health service delivery and higher education.

- Provides tools and support to build network capacity, develop innovative academic relationships and promote EIDM.

- Promotes sustained learning opportunities; ongoing connection to knowledge sources; linkages across research and practice expertise; and executive buy-in as critical to successful exchange and use of evidence.

- SEARCH Network – a community of learning and practice focused on EIDM.
  http://www.searchca.net/users/folder.asp?FolderID=1437

### Southern Alberta Child and Youth Health Network

http://www.sacyhn.ca/

- A dynamic, voluntary collaboration among individuals and organizations concerned with the health and well being of all children, youth and families.

## Other Canadian Networks and Organizations – Knowledge Transfer-related

### Alberta Public Services

- Has developed a Knowledge Management Framework.
  http://www.chr.alberta.ca/learning/knowledge/framework.pdf

- Ministries using this KM practice include:
    - Agriculture and Food;
    - GOA Learning Centre;
    - Municipal Affairs and Housing;
    - Infrastructure and Transportation;

- Human Resources.
  http://www.chr.alberta.ca/Employees/?file=corporate/gain/overview&cf=6

## Canadian School of Public Service, Centre of Expertise in Communities of Practice Portal

http://csps-efpc.tomoye.com/ev_en.php

- An online community that promotes and implements communities of practice and social learning approaches in the federal public service.

## Canadian Institute of Knowledge Management

http://cikm.com

- An organization focused on organizational innovation, decision-making and strategy, and intended to help managers build sustainability into their enterprises.

## Community-University Partnership for the Study of Children, Youth and Families

http://www.cup.ualberta.ca

- A unit within the Faculty of Extension (dedicated to community engagement, scholarship of engagement, and lifelong learning) of the University of Alberta that is committed to improving the development of children, youth, families and communities by:
  - generating, sharing and mobilizing new knowledge about child and family development;
  - identifying and promoting the use of evidence-based policies and practices for optimizing child and family development;
  - nurturing a culture, both in the community and the University, in which rigorous research, evaluation and practice are valued highly as critical components in efforts to understand and optimize development.

## Conference Board of Canada's KSEN (Knowledge Strategy Exchange Network)

http://www.conferenceboard.ca/KSEN

- A select group of senior Canadian government and business executives who have a strategic interest in knowledge management and its related issues and challenges.
- Meets three times per year to share learnings and experiences related to key KM issues, to learn from experts in the field, and to examine business issues affecting their organizations on a national and global scale.
- Reported to be the strongest group of KM strategic thinkers in Canada who are working as KM practitioners at the management level.

## Cynefin Centre for Organizational Complexity

http://www.cynefin.net

- The concept-based Cynefin Model focuses on the location of knowledge in an organization using cultural and sense making aspects of four different forms of community, both formal and informal.

- Since becoming independent from IBM this organization has developed a network of academics and practitioners in diverse fields who see the network as a new way to be more competitive with the big consulting firms while bringing a more powerful collective intelligence to bear on critical issues in management and organizations.

### Edmonton KM Network
http://KMNetwork.ca

- A KM CoP providing a forum where members (from private industry-including some of Edmonton's leading engineering firms, government, the university and consultants) share what they are doing and learning, as well as effective processes and tools for KM initiatives.

### Farm Credit Canada (FCC) CoPs
http://www.fcc-fac.ca

- Groups of lending and risk professionals in a variety of agriculture sectors that:
    - educate one another and FCC by sharing their knowledge and bringing external expertise to the table to learn more about what's going on in their sector and competitive environment;
    - aim to improve customer service by providing input into corporate strategic planning process, conducting in-depth analysis on industry issues, developing production benchmarks and creating innovative tools.

### Morris J. Wosk Centre for Dialogue at Simon Fraser University
http://www.sfu.ca/dialog/index.htm

- A conference centre dedicated to understanding effective communication at which practitioners, researchers and students of dialogue probe the nature of dialogue – that process of interaction whereby open-minded discussion leads to mutual understanding and positive action—and they nurture it in practice.

- Dialogue activities include undergraduate courses, graduate internships, professional development and programs of research into the application of dialogue and of lessons learned from experience.

### Networks of the Centres of Excellence
http://www.nce.gc.ca/nets_e.htm

- A joint program of the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council of Canada, the Canadian Institutes of Health Research and Industry Canada. The NCEs bring together partners from the academic, industry, public and non-profit sectors to conduct leading edge research and knowledge transfer activities in areas of strategic growth and opportunity for Canada.

### Networks Leadership Summits I-IV
http://www.searchca.net/users/folder.asp?FolderID=2917

- A series of open space opportunities that bring together practitioners, researchers, experts, and thought leaders involved in the theory and practice of networks to:

- engage in the power of good conversation;
- tap into the wealth of tacit knowledge that exists in this field;
- explore the role, impact, and structure of successful networks.

### Ontario Knowledge Transfer and Exchange Community of Practice
http://ktecop.com

- A network of Knowledge Transfer and Exchange (KTE) practitioners and research-ers who share KTE practices and experience; build collaborative relationships; advance knowledge of KTE effectiveness; and, share KTE events, career opportu-nities and other related KTE activities.

### ResearchImpact

http://www.researchimpact.ca

- Canada's emerging knowledge mobilization network, a partnership between York University and the University of Victoria, which connects university researchers with community government organizations seeking research to support the use of re-search in decision-making about social programming, and public policy and profes-sional practice.

## International Networks

### Agency for Healthcare Research and Quality (AHRQ) Learning Networks
http://www.innovations.ahrq.gov/learn_network/about.aspx

- A program that provides several ways for users with similar interests to connect with each other through learning networks, often called communities of practice. Users can exchange ideas, experiences, and information about specific topics; learn what works and what doesn't from peers; and collaborate to solve common problems.

- Innovations Exchange - an AHRQ program designed to support health care pro-fessionals in sharing and adopting innovations that improve the delivery of care to patients.
http://www.innovations.ahrq.gov/about.aspx

### Amherst H. Wilder Foundation
http://cooperativeconservation.gov/howworks/WilderCollaborationFactorsInventory.pdf

- A not-for-profit health and human services organization serving the greater Saint Paul, Minnesota, area that is well known for its partnership tools, including Wilder Collaboration Factors Inventory Scoresheet.

### Center for Innovation & Change Leadership: Helping People and Organizations Embrace Change through Collaboration, Suffolk University
http://www.suffolk.edu/business/8149.html

- A collaborative learning environment that enables our students, faculty, and clients to become successful leaders of change in the practice of innovation in global busi-ness and public service.

### The Cochrane Collaboration

http://www.cochrane.org/

- An international not-for-profit and independent organization, dedicated to making up-to-date, accurate information about the effects of healthcare readily available worldwide.

### National Collaborating Centre for Community Engagement

http://www.nccce.lancs.ac.uk

- The centre's core activity is focused on supporting capacity building programmes for individual practitioners, organizations and local health economies to build capacity for community engagement.

### Contact, Help, Advice and Information Network (CHAIN)

http://chain.ulcc.ac.uk/chain

- An online network for people working in health and social care based around specific areas of interest that gives people a simple and informal way of contacting each other to exchange ideas and share knowledge.

### Community Health Colleague Connection

http://www.naccho.org/topics/HPDP/CHCC

- Free, web-based referral service to connect public health practitioners with colleagues who are willing to share their experiences and answer questions.
- CHCC is sponsored by the National Association of County and City Health Officials.

### CPsquare

http://cpsquare.org

- A diverse community of practitioners that has gathered to share knowledge and build a practice around our passion for and belief in the potential of communities of practice as a vehicle for positive organizational and world change.
- In addition to the community's ongoing conversations, projects and occasional workshops, CPsquare designs and delivers some regularly scheduled workshops including:
    - Foundations of Communities of Practice;
    - Connected Futures: New social strategies and tools for communities of practice.
- Hosts "Tools for Communities" wiki on which definitions are provided for a variety of technological tools, along with its use in communities of practice and key features. http://technologyforcommunities.com/tools/tiki-index.php

### Health Protection Network

http://www.hps.scot.nhs.uk/about/HPN.aspx

- A network of existing professional networks in Health Protection across Scotland, with the aim of improving health protection services in Scotland, by bringing those working in this field together in ways which facilitate learning from each other in a structured manner.

### Multi-Organizational Partnerships, Alliances and Networks (MOPAN)
      http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/JUD-5292536-HRK

- A network of like-minded donor countries that jointly conduct an annual in-house survey of multilateral partnership behaviour in developing countries (partnerships with national governments, civil society and other bilateral and multilateral development agencies).

- CIDA aims to advance the understanding of the nature of multi-organizational partnerships, alliances and networks by providing an international platform for the exchange of ideas, experiences and methodologies.

### NHS Evidence
      http://www.nice.org.uk/aboutnice/nhsevidence/AboutNHSEvidence.jsp

- A web-based service that will help people find, access and use high-quality clinical and non-clinical evidence and best practice designed to meet the needs of users across the NHS – clinicians, nurses, pharmacists and commissioners, among others.

- NHS Evidence is expected to launch in April, 2009.

### National Collaborating Centre for Community Engagement
      http://www.nccce.lancs.ac.uk

- The centre's core activity is focused on supporting capacity building programs for individual practitioners, organizations and local health economies to build capacity for community engagement.

### National Institute for Health and Clinical Excellence (NICE)
      http://www.nice.org.uk

- An independent organization responsible for providing national guidance on promoting good health and preventing and treating ill health that has established several National Collaborating Centres.

### NHS Shared Learning (NSL)
      http://www.sharedlearning.scot.nhs.uk

- A web-based service that will help people find, access and use high-quality clinical and non-clinical evidence and best practice designed to meet the needs of users across the NHS – clinicians, nurses, pharmacists and commissioners, among others.

- NHS Evidence is expected to launch in April, 2009.

### Public Health Information Network (PHIN)
      http://www.cdc.gov/phin/

- A national inter-organizational business structure and technical architecture for public health information systems, that aims to improve the capacity of public health to use and exchange information electronically and coordinate public health information systems, by:
    - supporting the exchange of critical health information between all levels of

public health and health care;

- developing and promulgating requirements, standards, specifications, and an overall architecture in a collaborative, transparent, and dynamic way;
- monitoring the capability of state and local health departments to exchange information;
- advancing supportive policy;
- providing technical assistance to allow state and local health departments to implement PHIN requirements;
- facilitating communication and information sharing within the PHIN community;
- providing public health agencies with appropriate and timely information to support informed decision-making;
- harmonizing PHIN with other federal initiatives;
- sponsoring CoPs that work to strengthen PHIN as members collaborate, share and focus on issues prioritized by the PHIN Community and provide a participatory environment for members to learn, share expertise and develop solutions to improve public health's capacity to use and exchange information electronically.

- InfoLinks Community of Practice (CoP) - a community of experienced public health professionals from across the United States that promotes the use of Health Information Exchanges and encourages innovation by sharing knowledge and openly discussing the frontline challenges of implementing HIE's in the United States. http://infolinksproject.org

- PHIN CoP Resource Kit includes tools to: http://www.cdc.gov/phin/communities/resourcekit/index.html

  - align with PHIN; http://www.cdc.gov/phin/communities/resourcekit/pdf/Align.pdf

  - launch and sustain CoPs; http://www.cdc.gov/phin/communities/resourcekit/pdf/Launch.pdf

  - evaluate. http://www.cdc.gov/phin/communities/resourcekit/pdf/Evaluate.pdf

## Scottish Public Health Networks
http://www.healthscotland.com/resources/networks/scotphn/about.aspx

- A network, hosted by NHS Health Scotland and accountable to the Directors of Public Health, of people living in Scotland who have a professional interest and significant involvement in the wider health improvement agenda including staff from the NHS, local authorities, academia and others that aims to:
  - undertake prioritised national pieces of work where there is a clearly identified need;
  - facilitate information exchange between public health practitioners, link

with other networks and share learning;

- create effective communication amongst professionals and the public to allow efficient co-ordination of public health activity.

## Social Science Research Network
http://www.ssrn.com

- A network devoted to the rapid worldwide dissemination of social science research. The SSRN is composed of a number of specialized research networks in each of the social sciences.

## South Central Public Health Knowledge Exchange
http://www.southcentralpublichealth.org.uk

- The public health knowledge sharing hub for those in the South Central area of the UK that:
  - brings together the wider public health community from the wider geographic region to share knowledge and information;
  - offers a more dynamic way to share, network and learn;
  - allows members to publish information;
  - enables interaction using forums and blogs.

## South East Coast Public Health Knowledge Exchange
http://www.southeastcoastpublichealth.org.uk/Default.aspx

- The public health knowledge sharing hub for those in the South East area of the UK that:
  - brings together the wider public health community from the wider geographic region to share knowledge and information;
  - offers a more dynamic way to share, network and learn;
  - allows members to publish information;
  - enables interaction using forums and blogs.

## Tees Public Health
http://www.teespublichealth.nhs.uk

- The public health knowledge exchange hub for those in Hartlepool, Middlesbrough, Redcar and Cleveland, and Stockton-on-Tees that:
  - brings together the wider public health community from the wider geographic region to share knowledge and information;
  - offers a more dynamic way to share, network and learn;
  - allows members to publish information;
  - enables interaction using forums and blogs.

## The World Bank
http://www.worldbank.org/

- A source of financial and technical assistance to developing countries around the world.
- Hosts the Knowledge for Development (K4D) Program initiative that aims to enhance the capacity of development-oriented organizations in the client countries to achieve greater impact through the application of knowledge management tools and practices.
http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/0,,menuPK:461238~pagePK:64156143~piPK:64154155~theSitePK:461198,00.html

### World Health Organization's Knowledge Networks
http://www.who.int/social_determinants/knowledge_networks/en/index.html

- A collection of Knowledge Networks, each of which is managed by organizational hubs or organizational co-hubs that coordinate and contribute towards the knowledge generation and manage the budget for one of the networks. There are a minimum of 10-12 members in each KN (some KNs have up to 20 active members) who were selected for their social determinants and equity expertise/experience in the KN theme area and include leading:
    - scientists;
    - practitioners (eg. program managers);
    - policy and senior decision-makers;
    - representatives from global institutions, civil society and non-governmental organizations.
- Most members come from more than one of the above areas, for example, academics who are also active members of civil society organizations.

# Appendix E: Limitations

This briefing paper was not intended to provide a comprehensive or systematic review of the literature related to networks. In fact, that body of knowledge is too complex, multidisciplinary and extensive to be covered within the resources allocated for the development of this resource. Further complicating the task are the multiple terms used to describe networks and the various organization forms described using that single term.

In addition, the selected key informants were a convenience sample and by no means representative of the public health and knowledge translation networking experts across Canada.