Exploring Characteristics of Networks that Enable Knowledge Transfer and Exchange (KTE): A Mixed-Methods Study

by

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A thesis submitted in conformity with the requirements for the degree of Master of Science (MSc) Health Services Research
Institute of Health Policy, Management and Evaluation
University of Toronto

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2014

Abstract

**Background:** Social interaction promotes research use through knowledge transfer and exchange (KTE). Networks are increasingly used in healthcare to create, share, and apply knowledge for policy and practice. No prior studies explored network characteristics that enable KTE.

**Methods:** Phase one comprised a systematic review of healthcare, organization science, and sociological literature. Phase two entailed qualitative interviews with members of an international healthcare network to learn about characteristics that enable KTE.

**Results:** The literature review yielded 59 eligible studies and led to the development of a descriptive conceptual framework of network KTE. This framework illustrates input and output characteristics important to network KTE and is organized into network backbone, functional units and commodities. Interview findings showed various characteristics allow network members to contribute, learn, and connect internationally.
Conclusion: Many network characteristics enable KTE. Future efforts should focus on delineating explanatory or predictive pathways between network characteristics and KTE outcomes.
Acknowledgments

I wanted to acknowledge my co-supervisors Dr. Anna Gagliardi, and Dr. Whitney Berta for all the feedback throughout the years, publishing is the next item on my “to do” list! I also wanted to sincerely thank my defence committee: Dr. Fiona Webster who served as my internal examiner, Dr. Anita Kothari who served as my external examiner and Dr. Rhonda Cockerill chair of the defence. Merci à Tous!

It has been a long three years, full time, and many people helped get me to where I am today. Firstly I wanted to thank my parents (mami and daddy) who supported me throughout this entire process never losing faith in my ability to finish. Thank you to my sister Nicole and her husband Dan for always talking some sense into me and believing in me. To all the ladies: Corinne, Degan, Ellen, Emily, Jessica, Julie, Katy, Muriah, and Sarah who were there to brainstorm, who always gave excellent advice, provided unwavering encouragement, and never ceased to make me smile or laugh – Thank you so much! Lastly, to the team at The Change Foundation, your support and motivation has been amazing over this last year, I am extremely fortunate to work with such a progressive, passionate, and inspired group of people.

“You cannot create experience, you must undergo it” – Albert Camus. This thesis has been an experience of a lifetime… on to the next.
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# Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>AGM</td>
<td>Annual General Meeting</td>
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<td>ANT</td>
<td>Actor Network Theory</td>
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<td>BSP</td>
<td>Business Source Premier</td>
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<td>CINAHL</td>
<td>Cumulative Index to Nursing and Allied Health Literature</td>
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<tr>
<td>CME</td>
<td>Continuing Medical Education</td>
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<td>COREQ</td>
<td>Consolidated criteria for reporting qualitative research</td>
</tr>
<tr>
<td>CPD</td>
<td>Continuing Professional Development</td>
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<td>CPGs</td>
<td>Clinical Practice Guidelines</td>
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<td>EBM</td>
<td>Evidence Based Medicine</td>
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<td>EPHPP</td>
<td>Effective Public Health Practice Project</td>
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<td>EPOC</td>
<td>The Cochrane Effective Practice and Organization of Care</td>
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<tr>
<td>G-I-N</td>
<td>Guidelines International Network</td>
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<td>HSR</td>
<td>Health Services Research</td>
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<td>IKT</td>
<td>Integrated Knowledge Translation</td>
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<tr>
<td>KM</td>
<td>Knowledge Management</td>
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<td>KT</td>
<td>Knowledge Translation</td>
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<tr>
<td>KTE</td>
<td>Knowledge Transfer and Exchange</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>Medline</td>
<td>Medical Literature Analysis and Retrieval System Online</td>
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<td>NIH</td>
<td>National Institute of Health</td>
</tr>
<tr>
<td>PI</td>
<td>Principle Investigator</td>
</tr>
<tr>
<td>RAMESES</td>
<td>Realist and Metanarrative Evidence Synthesis Evolving Standards</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized Control Trial</td>
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<tr>
<td>REB</td>
<td>Research Ethics Board</td>
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<tr>
<td>SDT</td>
<td>Self Determination Theory</td>
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<tr>
<td>SNT</td>
<td>Social Network Theory</td>
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<tr>
<td>SR</td>
<td>Systematic Review</td>
</tr>
<tr>
<td>UofT</td>
<td>University of Toronto</td>
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<td>WHO</td>
<td>World Health Organization</td>
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</table>
Keywords

knowledge transfer and exchange (KTE); network; international knowledge network; systematic review; semi-structured interview; qualitative research; health services research (HSR)
Chapter 1
Introduction

Research knowledge used concretely can be instrumental; conceptually, it can be used to explain changes in attitudes and behaviours; and when used as evidence, ammunition, or power, it can be persuasive (Haas, 1990; Jelenic, 2011; Straus et al., 2010). It is a powerful resource, controlling access to opportunity, innovation, and advancement. Fortunately, it is also renewable. More than any other capital or investment, research knowledge has become the most important and powerful component of production, worldwide (OECD, 1996; Stein et al. 2001). A knowledge-based movement is underway, and the management of research knowledge including its distribution, creation, and organization is changing (Chichilnisky, 1998). The growth being experienced in various fields, including healthcare, is contributing toward this knowledge-intensive expansion (Bhojaraju, 2005; Chichilnisky, 1998; Hagel, 2008; OECD, 1996; Stein et al., 2001).

These changes are already well underway in healthcare, where knowledge and information from research are increasingly being recognized as the drivers of growth and innovation within the field (OECD, 1996). As research in healthcare grows, knowledge producers must ensure that the knowledge they generate is tailored and used by the appropriate stakeholders (Hagel, 2008; Jelenic, 2011; Kothari et al., 2012). Unused, underused, or unexploited research knowledge is of little value to society, limiting the ability of new research to offer valuable new input on which to build and further future research, innovation, and the economy (Hagel, 2008; Jelenic, 2011; OECD, 1996).

Relationships that can be leveraged to generate new knowledge are important to research and innovation because they promote, support, and enable knowledge transfer and exchange (KTE). In this interactive process, knowledge can be freely interchanged between research users and research producers and innovators (Hagel 2008; Mitton, 2007; Straus 2009), thereby bridging the “know-do” gap in research (Booth, 2011; Lang et al., 2007; WHO, 2006).

The “know-do” gap is described in the World Health Organization’s Department of Knowledge Sharing and Management (2006) as the chasm between what is known and what gets done. In the organizational context it is the gap between innovation and action; in the healthcare context
specifically, it is the gap between research and policy or clinical practice (Booth, 2011; Naveh et al., 2009; WHO, 2006). In healthcare the length of time required to transfer findings effectively from research into policy or clinical practice has often been underestimated (Balas, 2000; NIH, 2006; Westfall et al., 2007). The underuse of research knowledge and evidence is apparent, for example, in national and international studies of alcohol dependency and ankle radiography, discussed further in Chapter 2 (Holroyd et al., 2004; Institute of Medicine, 2001; Lang et al., 2007). Indeed, the National Institutes of Health (NIH) have found that it takes several years—sometimes decades—for discoveries to reach clinical practice (Westfall et al., 2007; NIH, 2006; Balas, 2000).

Strauss et al. (2011) and Norman and Huerta (2006) have observed that the science and practice of KTE has the potential to answer a wide variety of policy and practice challenges. However, other studies have shown that the methods currently used to get the results of research into practice are either not being used or are ineffective (Grimshaw et al., 2012). In fact, one of the most consistent findings coming out of the health services field to date is the failure to use research knowledge in practice and policy making (Grimshaw et al., 2012; Sales et al., 2006). A general failure to apply appropriate interventions in the proper context is evident, whether as a consequence of not understanding how to use them, or out of a general resistance to change (Grimshaw et al., 2012; Sales et al., 2006).

It is thought that selecting and tailoring interventions to context improves the use of research however we lack evidence on how to achieve this (Grimshaw et al., 2012; Sales et al., 2006). An important factor that distinguishes many interventions is flow of knowledge. Bi-directional knowledge flow is thought to be more effective than unidirectional passive diffusion or dissemination of information. Various interventions have been catalogued by the Cochrane Effective Practice and Organization of Care group (EPOC) into what is known as the EPOC taxonomy. This taxonomy lists professional, financial, organizational, regulatory, and “other” interventions (EPOC, 2002).

Certain interventions are better suited to certain contexts than others; there is no one-size fits all intervention to get the results of research into practice. The challenge then is to equip would-be users with the ability to distinguish among interventions that are unidirectional or bidirectional and
select those that are context-appropriate (Dill & Shera, 2012; Nutley et al., 2007; Sales et al., 2006). The importance of appropriate selection lies in the observation that when an appropriate intervention is selected and tailored to implement change, it has a much better chance of succeeding (Dobbins et al., 2009). Networks can be considered an intervention that enables interactive sharing and bi-directional flow of knowledge.

Networks are groups of stakeholders from various fields, backgrounds, organizations, and geographic locations that are organized and their knowledge systematized (Mendizabal, 2006; Randall, 2013; Stein et al., 2001). Networks that convene groups of people within a specialty topic or field can build on current research knowledge, clarify ambiguous knowledge, and facilitate understanding (Mendizabal, 2006; Randall, 2013). Networks are multipurpose. They have been used for brokerage and for increasing connections, spreading or sharing information, and creating social capital and social climate (Cunningham et al., 2012; Palm, 2013; Stein et al., 2001). Networks are especially useful for rapid learning and exchange of information, and for amplifying members’ effectiveness (Randall, 2013). They have also been used for delivering services, storing topic-specific information, and coordinating activities (Cunningham et al., 2012; Mitton et al., 2007; Randall, 2013). Networks are a post-bureaucratic form of organization, and some, such as the Guidelines International Network, which is used in this research, classify themselves as charitable organizations (Cunningham et al., 2012).

Interest is growing in how to use networks to exchange, and transfer research knowledge, forming professional relations, particularly in the clinical practice world (Cunningham et al., 2012; Mitton et al., 2007; Randall, 2013). While a seemingly useful structure by which to promote KTE, our understanding of how, such networks function—and the characteristics that enable their KTE functions—is poor (Cunningham et al., 2012; Inkpen & Tsang, 2005; Kramer & Wells, 2005; Mitton et al., 2007; Palm et al., 2013; Randall, 2013; Sibbald & Kossuth, 1998; Stein et al., 2001). Further research is needed on networks to understand how they might enable KTE. Others will be able to use this information in future to develop and optimize networks to achieve KTE.

This research thesis examines network characteristics that could enable KTE. The characteristics of networks and participants are discussed. This thesis focuses on hierarchically governed structured networks. These bring together researchers and research users with assigned, specific
member roles, to engage in bidirectional communication in an organized and logical fashion (Inkpen & Tsang, 2005). The detailed research objectives are outlined at the end of Chapter 2. No prior studies have explored characteristics that enable network KTE in this way.
Chapter 2
Background

This chapter provides background on knowledge transfer and exchange (KTE) and networks, presenting the rationale for pursuing research on network KTE.

2.1 Knowledge Transfer and Exchange (KTE)

This section describes knowledge transfer and exchange; situating within the field of knowledge translation (KT), describing its historical origins, importance in healthcare, underuse, and interventions used to increase it.

2.1.1 Defining KTE

Knowledge transfer and exchange is one part of knowledge translation (KT). KT is the dynamic and iterative process of linking individuals who use research to make decisions, to researchers (CIHR, 2013; Shantz, 2012). KT is the overarching concept used to refer to all the activities through which end users of research (i.e. policy makers and clinicians) are involved in the research process from design to dissemination (CIHR, 2013; Shantz, 2012). KT offers a variety of mechanisms/approaches for moving research into policy and practice; they can be distinguished according to how knowledge is shared or flows:

i) Unidirectional: Unidirectional movement of knowledge, usually from the researcher to the practitioner. This type of KT can be active or passive, but is generally the latter. It refers to such terms as: end-of-grant knowledge translation or knowledge transfer, pushing knowledge in one direction.

ii) Bidirectional: Bi- or multi-directional movement of knowledge between researchers and practitioners across the research continuum. This type of KT is usually active, integrated and dynamic. This type of KT encompasses integrated knowledge translation and knowledge transfer and exchange.

The literature on KT and specifically KTE is growing and evolving. As a new field there is some confusion on how its components are conceptualized and defined. (Contandriopoulos, 2012; Graham et al., 2006; Grimshaw et al., 2012). Many researchers working in healthcare describe
KTE as “getting the results of research into clinical or policy practice” (CIHR, 2013; Lang et al., 2007; Straus et al., 2009). However, in a study of 33 applied research-funding agencies in nine different countries, 29 different terms and definitions for putting research knowledge into practice were identified (Graham et al., 2006).

In Canada, two organizations have been at the forefront of conceptually examining and funding KTE research: the Canadian Institute of Health Research (CIHR) and the Canadian Foundation for Healthcare Improvement (CFHI). CFHI prefers the term knowledge transfer and exchange (KTE), whereas CIHR uses the term knowledge translation (KT). Frequently used terms and definitions of KT, KTE and related concepts are presented in Table 1 (pg. 6).

### Table 1: Terms and Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition and Source</th>
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<tr>
<td>Knowledge Translation (KT)</td>
<td>KT is a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge—within a complex system of interactions among researchers and users—to improve and accelerate the capture of benefits of research for patients and the health of Canadians, through the provision of more effective health services and products and strengthen the healthcare system (CIHR, 2013, D’amour et al., 2008; Tetroe, 2007).</td>
</tr>
<tr>
<td>Bidirectional OR Unidirectional</td>
<td></td>
</tr>
<tr>
<td>End-of-Grant Knowledge Translation</td>
<td>The dissemination of findings generated from research once a project is completed, depending on the extent to which there are mature findings appropriate for dissemination. Examples include but are not limited to: publishing in peer-reviewed journals and presenting at conferences. This concept incorporates a continuum of activities that can vary in level of intensity, from diffusion (letting it happen) to dissemination (helping it happen) to application (making it happen) which moves beyond awareness and actively attempts to engage knowledge users to adapt and adopt the research evidence—assuming there is a strong evidence base—to a practice or policy setting. It is often a fundamental component of</td>
</tr>
<tr>
<td>Knowledge Transfer</td>
<td>Integrated KT (CIHR, 2013).</td>
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<tr>
<td><strong>Unidirectional</strong></td>
<td>The transfer of knowledge within a complex system of relationships among researchers and users, to users who may be: other researchers, policy makers, or decision makers, healthcare providers, the general public and its representatives or the private sector (CIHR, 2013).</td>
</tr>
<tr>
<td>Knowledge Transfer and Exchange (KTE)</td>
<td>Collaborative problem-solving between researchers and decision-makers that happens through linkage and exchange resulting in mutual learning through the process of planning, producing, disseminating, and applying existing or new research in decision-making (CFHI, 2013; D’amour et al., 2008).</td>
</tr>
<tr>
<td>Bidirectional</td>
<td>The interactive means of action, which involves the sharing and exchange of knowledge and the subsequent application of this knowledge by relevant and interested stakeholders, to help accelerate benefits of global and local health system innovation in an effort to advance people’s health (World Health Organization, 2006).</td>
</tr>
<tr>
<td>Integrated Knowledge Translation</td>
<td>A way of doing research that requires the active collaboration between researchers and knowledge users throughout every stage of the research process—from shaping the research question, to interpreting the results, to disseminating the research findings into practice. This coproduction of research increases the likelihood that the results of a project will be relevant to end-users, thereby improving the possibility of uptake and application of findings (CIHR, 2013; Kothari et al., 2013; Graham et al., 2009).</td>
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The definitions in Table 1 (pg. 6), although similar, do refer to different processes. Knowledge Translation is an overarching term used for various unidirectional and bidirectional processes of sharing knowledge (CIHR, 2013). Knowledge Transfer, and End-of-Grant Knowledge Translation are the unidirectional processes. Knowledge Transfer and Exchange (KTE) and Integrated
Knowledge Translation (IKT) are the bidirectional processes. KTE from CHFI and IKT from CIHR are multidirectional, iterative, and involve active strategies or interventions that promote repeated interaction between researchers and research users throughout the research process (CHFI, 2013; CIHR, 2013).

Part of the challenge encountered in the KT field is that knowledge users, the stakeholders who would most benefit from knowledge, do not always actively seek out that knowledge. What KTE and IKT propose is that if these stakeholders were more involved in the research process perhaps they would be invested in its production, and in a better position to then use the research results to inform their clinical or policy practices (CIHR, 2013). Since these two definitions are similar, one was chosen for this research.

For the purpose of this thesis Knowledge Transfer and Exchange (KTE) as defined by CFHI was used.

2.1.2 Historical Origins of KTE

Work in the area of knowledge translation has been pursued for over 80 years. It has evolved in three waves; it is suggested that we are now entering a fourth wave, one that primarily focuses on KTE (Backer, 1991; Jacobson, 2007). The first wave of research spanned the 1920s to the 1960s. During this time, KT’s emphasis was on how innovations in technology and practice were accepted and adopted by individuals (Backer, 1991; Jacobson, 2007). Rogers (2003), a sociologist, was interested in why certain innovations spread more quickly than others, and why some fail outright. His theory of innovation diffusion describes how processes of evolution or reinvention of products and behaviour can become better fit to the needs of individuals and groups. He coined the term early adopter to describe individuals on the lookout for a strategic leap forward who are quick to make connections between innovations and their personal needs (Rogers, 2003). Rogers’ ideas speak to the importance of peer-to-peer communication and networks of peers whom are trusted resources for adoption of such innovations.

From the 1960s to the 1980s KT research shifted into its second wave. It began to focus on dissemination and the concerted use of innovations by organizations and individuals to solve problems (Backer, 1991; Jacobson, 2007).
KT research’s third wave began in the 1990s as it gained greater prominence and what Backer (1991) called sophistication. Governmental agencies and other decision-making bodies recognized KT for its potential (Backer, 1991; Jacobson, 2007) in their increasing drive to rationalize their methods and promote research-based knowledge. These organizations’ need for KT prompted them to create and tailor various strategies that made their way into the field of healthcare such as educational meetings and sessions that aimed to improve health, education, and human services (Backer, 1991). At this time, ample funding was available for research on KT so that KT research became prominent (Backer, 1991; Jacobson, 2007).

During this whole evolution, ironically, communication, exchange, and interaction between the research and practice communities were limited, giving rise to the “two communities theory”—the “great divide” between researchers on the one hand, and clinicians and policy makers on the other (Caplan, 1979). The two groups seem to live in two different worlds, with conflicting values and imperatives, different reward systems, and different languages (Caplan, 1979). Researchers are characterized as scientists who portray themselves as open-minded, rational, and objective creators of knowledge, while practitioners or policy makers characterize themselves as more pragmatic, responsible, and action-oriented individuals who use the research to resolve real problems (Caplan, 1979). The divide between the research community and the practice/policy community appears to be one of the key contributing factors to the underuse of research knowledge (Caplan, 1979; Levin, 2004; Levin, 2003). One of the main reasons KT first emerged was to address this divide in communication (Caplan, 1979).

KTE has been referred to as the fourth, and current wave of KT theory and practice. In essence, this fourth wave is marked by efforts to weave together the two communities—research and practice—equally and collaboratively (Caplan, 1979), through increased attention to quality and accountability of knowledge use, greater awareness of ethics, the globalization of knowledge, and advances in theory and information technology (Jacobson, 2007; Backer, 1991; Lavis et al., 2003a; Straus et al., 2009). The emphasis, in the fourth wave, is on trying to improve relationships among researchers, practitioners, clinicians, and policy makers to assist them in communicating more effectively—collaborating and exchanging information—throughout the research process (Caplan, 1979). The fourth wave is interested in the bidirectional flow of knowledge that KTE can provide to get research knowledge into healthcare.
2.1.3 The Underuse of Research Knowledge in Healthcare

Getting new research knowledge into practice serves to inform, guide, and support high-quality care delivery and outcomes. KTE aims to achieve this by engaging the correct communities and stakeholders (Booth, 2011; Lang et al., 2007; Padilla-Melendez et al., 2012); in generating, sharing and applying research knowledge in a timely and consistent manner.

Worldwide, billions of dollars are spent each year in the public and the private sectors on biomedical, clinical, and health services research, and training, patient safety, and risk management (Balas, 2000; Westfall et al., 2007). However, multiple studies report that compliance with research is quite low, ranging from 14% to 45% depending on the topic of research and the healthcare issue at hand (Balas, 2000; Westfall et al., 2007). Furthermore, these studies also show that it takes this research an average of 17 years to reach and impact day-to-day clinical practice. By that time, studies suggest that 20% to 25% of this care is actually outdated, unneeded, or potentially harmful (Balas, 2000; Graham et al., 2006; Westfall et al., 2007).

According to Grimshaw et al. (2012) one of the most consistent findings from clinical and health services research is that the best evidence from research fails to get used in clinical practice and policy decision making in a timely and effective manner. McGlynn et al. (2003) examined more than 400 quality indicators drawn from some 6,700 cases involving patients from a dozen varied metropolitan areas. They found that quality varied by medical condition. When it came to senile cataracts, the quality was 79%, demonstrating that evidence was being put into practice effectively. On the other hand, only 11% of recommended care for alcohol dependency was put into practice, which was far from optimal. These rates were attributed to the underuse of knowledge in these areas, especially where preventive care for alcohol dependency was concerned. The underuse of knowledge was also described in the landmark 2001 Institute of Medicine report “Crossing the Quality Chasm: A New Health System for the 21st Century.” This report describes the disconnect between medical advances (what we know) and medical care currently in place (what we do).

A local Canadian example, and one of the best-studied examples of this phenomenon, is the Ottawa Ankle Rule (Holroyd et al., 2004; Lang et al., 2007), a bedside instrument for determining radiography. It is reported to have a pooled sensitivity of 98% and specificity of 32% in a
multicentre, randomized controlled trial confirmed its diagnostic performance (Bachman et al., 2003). Nevertheless, in spite of support of the procedure by the Association of Emergency Physicians and attempts at implementing it, a survey in the United States and Canada found that 90% of respondents were unaware of the rule (Graham et al., 2001). Furthermore, in a recent Canadian survey, only 31% of physicians could correctly remember all of the components of the rule and only 42% based their decision-making on it (Brehault et al., 2005; Lang et al., 2007). The Ottawa Ankle Rule highlights the challenge of getting research knowledge—even of the most highly validated diagnostic interventions—into practice.

Similar challenges are evident in therapeutics. Examples include the significant underuse of established therapies such as aspirin and β-blockers for acute coronary syndromes, the suboptimal management of acute otitis media, and underuse of colorectal cancer screening (Ohman et al. 2004; Reuveni et al., 2006; Woolley et al., 2005). Better use of research knowledge in practice is needed.

The reasons behind this underuse of research are not well understood. Researchers have proposed several different perspectives. One such perspective is a failure to bridge practice and policy with the research world, resulting in missed opportunities on both ends (Lomas, 2009).

Theoretically, incorporating research into clinical and/or policy practice would effectively ground research in reality, providing researchers with expert advice from the field, and give practitioners and policy makers the evidence needed to make informed decisions and changes (Lomas, 2000; Lomas, 2009). KTE can mediate these relationships, using an appropriate intervention(s) tailored to the context in question.

2.1.4 The Effectiveness of KTE: Current Literature

Growing evidence suggests that learning requires more than the unidirectional communication of knowledge transfer (Lavis et al., 2003a; Mitton et al., 2007, Straus et al., 2011). KTE, which emphasizes collaborative exchange and iterative interaction between researchers and practitioners throughout the research process, may be of help (Lavis et al., 2003a; Mitton et al., 2007; Straus et al., 2009).
In policy and clinical decision-making, KTE of research knowledge is considered important for both ideological and evidence-based reasons (Graham et al., 2006; Greenhalgh et al., 2011). Collaboration between researchers and decision makers/practitioners has proved very fruitful in KTE interactions (Dill & Shera, 2012; Grimshaw et al., 2012; Innvaer et al., 2002 Lavis et al. 2003a; Mitton et al., 2007; Sackett et al., 1996). These kinds of interactions are important because research, when of good quality and relevant scope, has the ability to improve practice, and because practice and policy have also been seen to influence and improve research (Greenhalgh et al., 2011; Innvaer et al., 2002).

In the healthcare field, KTE begets evidence-based decision making, which may be espoused by practitioners who are immediate or upper management, peers, or cross-organizational colleagues in clinical care or policy. Other stakeholders who benefit include consumers, professionals, local administrators, national policy makers, regulatory bodies, industry, and research funders (Dill & Shera, 2012; Grimshaw et al., 2012; Lavis et al. 2003b; Mitton et al., 2007; Sackett et al., 1996). KTE has the potential to address complicated and interrelated issues, including:

- research not getting implemented into practice;
- research being implemented into practice but the interventions used not effectively integrating it; and
- contextual factors that influence the effectiveness of implementation.

However, the evidence-based effectiveness of interventions that enable KTE has not been routinely or consistently evaluated (Lavis et al., 2003b, 2010; Van Eerd et al., 2011). Van Eerd et al. (2011) cite the paucity of valid and reliable interventions and the confusion in terminology as reasons behind this lack of evaluation. Complicating this issues are the multiple and varied terms used to describe KTE. Different researchers use different terms and definitions to describe what is essentially getting the results of research into practice (CIHR, 2013; Lang et al., 2007; Straus et al., 2009). Furthermore, when a researcher does not clarify whether they are referring to unidirectional transfer of knowledge or bidirectional transfer and exchange of knowledge (i.e. KTE) confusion arises. KTE practitioners have noted the need to evaluate the interventions that exist in a more empirical manner, in order to improve their KTE practices (Eccles et al., 2005).
There is no lack of medical and health services research; research studies of medical and health services have increased exponentially in numbers. In Canada and the United States, more than 11,000 publicly funded research trials are underway at any given time (Clancy & Cronin, 2005), and this number is actually an underestimate, because it does not include all the qualitative studies underway as well (Clancy & Cronin, 2005). However, literature on the effectiveness of KTE as it pertains to research, clinical practice, and/or policy has yet to be reviewed in a single study (Lavis et al., 2003a, 2010).

More recently, a systematic review of 32 studies evaluated interventions enabling KT for allied health professionals (Scott et al., 2012). Of these, a single intervention was employed in 15 studies, and 17 used multiple interventions. The review followed the EPOC classification scheme, which provides a taxonomy of professional and organizational interventions (Mowatt et al., 2002). In 11 of the single-intervention studies, educational meetings predominated as the intervention; of the others, educational print materials predominated in two studies; educational outreach visits in one study; and a financial intervention in one study. The studies that used multiple interventions made use of at least one educational intervention and then used a mix of other interventions including outreach visits, reminders, mass media, or local opinion leaders. Interprofessional meetings seemed superior to lone educational interventions such as electronic reminders and newsletter, but without further analysis of individual studies it is unknown how interactive the interventions were (Davis et al., 2003; Grimshaw et al., 2001; Scott et al., 2012).

In one of the larger, frequently cited reviews of KTE strategies, Mitton and colleagues (2007) synthesized the KTE literature, examining peer-reviewed and grey literature research studies that evaluated KTE between researchers and policy decision-makers. They identified 81 articles on KTE. Sixty-three (or 80%) were non-empirical opinion pieces, reviews, or surveys about KTE issues and did not report on the application of KTE strategies (Mitton et al., 2007). Only 18 (20%) of the articles were empirical studies in which KTE impact was evaluated; In the 18 empirical studies that evaluated KTE impact, there was no “off-the-shelf” set of recommendations for developing and implementing interventions to enable KTE. The focus of the interventions was to generate bidirectional communication, however the eight interventions described as promising for enabling KTE in various contexts are not all bidirectional. All of these are KT interventions,
however some will enable unidirectional knowledge transfer while others will enable bidirectional transfer and exchange.

The interventions cited by Mitton and colleagues (2007) include:

1. face-to-face exchange through consultations or regular meetings;
2. educational sessions;
3. facilitated meetings;
4. interactive multidisciplinary workshops;
5. capacity building within health services and health delivery organizations;
6. web-based electronic communication;
7. steering committees which involve local opinion leaders, experts and stakeholders; and
8. networks and communities of practice (Mitton et al., 2007).

The authors concluded that more evidence was needed on the most useful interventions, which can enable KTE (Mitton et al., 2007), given that most of the interventions described were educational meetings, which generally involved one-way transfer of knowledge, and are not considered to be a KTE approach. From this list the only intervention meant to achieve bidirectional interaction through KTE is the use of networks.

To summarize, in considering some of the contemporary KTE literature Greenhalgh et al. (2004) tells us that we lack empirical tailored methods which related to specific contexts; Mitton (2007) echoes Greenhalgh et al. (2004) in the lack of empirical information on KTE interventions; and Scott et al. (2012) demonstrate an over-reliance on didactic educational strategies which are not KTE. Further research to understand the interventions that promote, enhance, and support KTE is clearly needed.

2.1.5 Interventions to enable KT and KTE

Various approaches and interventions exist to get the results of research into clinical and policy practice. There are over 50 different classification systems—including taxonomies, frameworks, and models—that can be used when designing or describing interventions to get research knowledge into clinical practice and policy (McKibbon et al., 2014). Some interventions involve the collaboration of the research and practice communities through bidirectional KTE. One
classification system that features interventions that are both unidirectional KT and bidirectional KTE is the EPOC (2002) group’s taxonomy, which assists in identifying approaches used to change behaviour and their related interventions (Grol & Grimshaw, 2003; Grimshaw et al., 2004). EPOC is used in this research as a basis to classify various interventions that may enable KTE.

The EPOC taxonomy reviews interventions designed to improve healthcare systems and healthcare delivery (Ballini et al., 2011). It has identified over 7,000 randomized and quasiexperimental studies and conducted over 80 systematic reviews of professional, organizational, financial, and regulatory interventions to get the results of research into clinical and policy practice (Ballini, et al., 2011; EPOC, 2002; Grimshaw et al., 2012).

EPOC’s intervention taxonomy includes: educational, social, financial, leadership, and management approaches which are organized in four domains: professional, financial, organizational, and regulatory (EPOC, 2002; Mazza et al., 2013).

Professional interventions

These interventions come from educational and social approaches to change, which promote learning from or connecting to individuals participating in the intervention. Examples include: distribution of published professional materials, audiovisual materials, educational meetings, audit and feedback mechanisms, and educational outreach. Some of the social approaches to change from EPOC’s professional interventions include local opinion leaders, communities of practice or even network interventions.

This group in EPOC’s taxonomy of interventions is similar to the list produced by Mitton et al. (2007) in their synthesis and review of interventions to promote the use of research informed decision-making. Mitton et al.’s list included consultations, meetings, educational sessions, facilitated meetings, workshops, capacity building, web-based electronic communications, steering committees involving local opinion leaders, communities of practice, and networks. Both Mitton et al. (2007) and EPOC suggest multiple interventions that could promote unidirectional KT but only one intervention – a network, can promote bidirectional KTE for various stakeholders and convene large or small groups of stakeholders in a formal setting across the entire research continuum.
Financial interventions

Financial interventions motivate or stimulate change through monetary gains or losses. Such interventions include: fee-for-service, prepaid care, and provider-salaried service.

Organizational interventions

In EPOC’s (2002) taxonomy, organizational interventions focus on top-down leadership approaches to change. These interventions can be provider-oriented such as reassignment of professional roles, and integration of services. Or structural such as: physical setting changes, medical record system changes, scope of services, or quality monitoring mechanisms.

Regulatory interventions

These interventions are part of the management approach to change (EPOC, 2002). They aim to change health services delivery or costs by governmental regulation and/or legislation. They include updating/changing medical liability and putting processes in place for managing complaints, peer reviews, and licensure.

In summary, despite the EPOC taxonomy’s identification of many interventions, it is not entirely clear which intervention should be used in which specific healthcare contexts (EPOC, 2002; Jacobson, 2007; Mitton et al., 2007). Also, the EPOC interventions have been categorized by approach, but not according to whether they support knowledge transfer and exchange. We know that KTE is an interactive form of getting the results of research into practice, using multiple stakeholders across several different fields of inquiry throughout the research process. A successful intervention to enable KTE must have the ability to convene groups of individuals from varying but complimentary fields. Ideally, such an intervention will stimulate communication and dynamic collaboration, in order to bi-directionally share current research knowledge relevant to the context in question.

The only group of EPOC interventions that could promote or enable KTE are the professional interventions. From this group of professional interventions there was only one that stood out: a network. Two sources, EPOC and Mitton et al. (2007) mentioned networks as able to formally assemble various stakeholder groups from across the research continuum. Thus this intervention warrants further exploration. Knowing that networks could enable KTE we now need to
understand what networks are and how they could function to promote this bidirectional transfer and exchange of research knowledge between research, policy makers and practitioners.

2.2 Networks: An Intervention to Enable KTE

This section describes networks from organizational science and healthcare standpoints. It then goes on to describe the contemporary literature on networks as an intervention, which have the ability to enable KTE, and the gaps that exist in the network literature.

2.2.1 Organizational Science Networks

In the organization sciences, several different types of social structures exist that may be referred to as networks. These comprise individuals, groups, or organizations interconnected in a domain of knowledge or practice that interact to share expertise, information, and topical knowledge. In the literature, three of the most prominent types of networks are intracorporate networks, strategic alliances, and industrial districts (Inkpen & Tsang, 2005).

2.2.1.1 Intracorporate networks

These are groups of different organizations operating under a unified corporate identity, such as franchises (Inkpen & Tsang, 2005). A network’s headquarters have controlling ownership interest in the subsidiaries that are under its umbrella (Inkpen & Tsang, 2005; Kuhn et al., 2012). This kind of network operates under a hierarchical power schema, acting more like a grouping than a unitary organization (Inkpen & Tsang, 2005).

2.2.1.2 Strategic alliances (joint ventures)

These are voluntary arrangements of groups of firms joined together to exchange, share, or co-develop a product, technology, or service (Inkpen & Tsang, 2005). This kind of network is usually unstable, however, because trust is low and competition is high (Kuhn et al., 2012).

2.2.1.3 Industrial districts (clusters)

These are firms operating in the same market segment and in the same geographical location (Kuhn et al., 2012). Industrial districts are dense in ties/connections but also have low stability because of the constant entry and exit of firms (Inkpen & Tsang, 2005; Kuhn et al., 2012).
This thesis focuses on nonprofit knowledge networks that seek to promote or support KTE. Nonprofit networks were chosen as the focus of this thesis because they rely on voluntarism, the basis of most KTE activities and interventions, instead of pay for performance methods, (CIHR, 2013; Ballini et al., 2011). Intracorporate networks, strategic alliances, and industrial districts have economic or competitive drivers, and because of this they are most often used in the pharmacological and biomedical fields to gain collaborative solutions to common problems while making a profit (Zukerman & Kaluzny, 1991). Networks with economic motivations or drivers were excluded from this thesis.

2.2.2 Healthcare Knowledge Networks

Networks in healthcare are relational, organizational entities comprising interconnected individuals, groups or organizations within a domain of knowledge and practice (CFHI, 2005; Robeson, 2009). Their members are experts from diverse fields who interact socially to share knowledge and collaboratively to achieve a common goal while promoting a culture of innovation through linkage and exchange (Robeson, 2009).

In the healthcare literature, networks have been referred to as partnerships, collaboratives, or communities of practice and are similar to strategic alliances, industrial districts and intracorporate networks from the organization and management literature (Cunningham et al., 2012; Inkpen & Tsang, 2005). They are largely mediated by the personal relationships built by the individual members (Cunningham et al., 2012). In the healthcare, business, and sociological literatures, many different structures and groups identify themselves as networks that facilitate relationship building (CFHI, 2005; Cunningham et al., 2012). In the healthcare literature, three types of networks were identified (CFHI, 2005): knowledge networks, communities of practice, and soft networks.

2.2.2.1 Knowledge networks

These networks recruit groups of experts to collaborate on issues or concerns that will strengthen the network’s knowledge base (Browman et al., 1995; CFHI, 2005; McGlynn et al., 2003; Robeson, 2009). They are formal; participation is usually by invitation or interest and experts from a variety of fields are recruited (CFHI, 2005). Members of knowledge networks share a clear sense
of purpose. They engage in regular and active communication and have a structured governance
(CFHI, 2005; Cunningham et al., 2012; Mendizabal, 2006, Robeson, 2009).\(^1\)

2.2.2.2 Communities of practice

These networks are self-organizing, nonhierarchical, informal groups of individuals belonging to a
specialized clinical community or field (CFHI, 2005; Cunningham et al., 2012; Li et al., 2009;
Norman & Huerta, 2006). They strive to improve practice and professional development
(Cunningham et al., 2012; Li et al., 2009; Norman & Huerta, 2006). Members of these
communities share a passion for their field; they interact on an ongoing basis to foster learning and
aid capacity development, much like a mentor-mentee relationship (Li et al., 2009).

2.2.2.3 Soft networks

Such networks are akin to referral systems or Listservs, where members enlist or sign up in an
electronic directory (CFHI, 2005; Russell et al., 2004). Soft networks’ primary purpose is to serve
as a catalyst for quick access to information, initial connection, and matchmaking (CFHI, 2005;
Russell et al., 2004). These networks are informal, voluntary, and mainly electronic; they are
broad-based groups in which each member has the flexibility to participate at different levels of
commitment (CFHI, 2005; Russell et al., 2004).

2.2.3 The Current Healthcare and Organizational Network Literature

This research thesis explores structured knowledge networks as an intervention that could enable
KTE. Network interventions are gaining popularity in the healthcare sector because of their
bidirectional knowledge transfer and exchange capabilities. However, networks have not been
subjected to the empirical examination that other unidirectional KT interventions listed in the
EPOC taxonomy have, such as: printed educational material opinion leaders, educational outreach,
and computerized feedback (Cunningham et al., 2012; Mendizabal, 2006; Mitton et al., 2007;
Perkins & Court, 2005).

\(^{1}\) Knowledge networks are the networks of interest in this thesis.
Braithwaite’s (2010) systematic review of between-group behaviour in healthcare revealed that much of the literature on networks is descriptive, so it does not list empirical outcomes that increase or decrease as a result of network activities, especially in healthcare. In this review, 158 studies were synthesized methodically to issue counts of concepts used in the literature related to network-like structures. Such terms included: group (100%), social (78%), network (38%), organizational (36%), boundaries (36%), knowledge (35%), networks (32%), learning (23%), information (19%), communication (16%), and culture (15%; Braithwaite, 2010). The common theme inherent in these terms is that network structure is vital for communicating and informing its members on the topic of interest. Few studies dealt with the mode of information transfer among network groups and instead only peripherally examined healthcare networks and resultant social structures (Braithwaite, 2010). However one study in the review found that oral messaging/communication was preferred over other forms of information transfer, as was personalized information.

In the systematic review by Greenhalgh et al. (2004), which focused on diffusion of innovation in service organizations, inter-organizational networks and networks of social influence were considered. But again the work on networks was predominantly descriptive. This review noted the complexity of interorganizational networks and found that the adoption of innovations was powerfully influenced by network structure. However, there was no specific mention of exchange, or communication of information, ideas, or knowledge via the network. Overall these systematic reviews provide little information about ideal network structure, and no information on how networks enable KTE. Hence, much has yet to be examined to better our understanding of how structured interorganizational networks enable KTE.

Networks have been described as especially useful for facilitating collaboration and communication among larger groups of stakeholders; they have been described as being capable of bridging the gap between research, practice, and policy (Perkins & Court, 2005). Inkpen & Tsang (2005) have done much work on networks, and contend that when studying networks and the flow of organizational knowledge, one must examine the network’s nature and type. This conclusion is in line with Rousseau and Fried’s (2001) call for conceptualizing organizational research. Furthermore, Braithwaite (2010) suggests that we do not do a very good job of thoroughly
examining network research knowledge—how it happens, its inputs or drivers, and its outputs or outcomes, which enabled or relate to KTE.

In summary, the current network literature describes the purported benefits of setting up a network as an intervention that could promote bidirectional knowledge exchange, but does not allow us to draw conclusions regarding the most beneficial characteristics of network interventions for sharing research knowledge. The limited quantity and quality of research on how to enable KTE by using network interventions requires further exploration.

2.2.4 Characteristics of Healthcare Knowledge Networks

Healthcare knowledge networks are put in place with the aim of exchanging or transferring information (Birdsell & Matthias, 2003). Networks contribute to knowledge management; Robeson (2009) described them as enabling knowledge creation, dissemination, transfer and exchange of knowledge within and among organizations. But the question remains: how can networks enable bidirectional exchange and transfer of knowledge, giving rise to various outcomes? What are the characteristics of a network? What inputs are provided to a network in the healthcare realm? And what are the subsequent network outputs?

A report released in 2013 by the European Observatory on Health Systems and Policies, an affiliate of the World Health Organization (Palm et al., 2013), states the various tasks structured knowledge networks in healthcare perform. They can:

1. organize knowledge and expertise (governance);
2. follow a multidisciplinary approach to learning and collaboration (objectives);
3. offer a high level of expertise or topical knowledge (function);
4. make contributions to research;
5. organize teaching and training activities; and
6. collaborate closely with other networks, nationally/internationally (geographic scope).

Table 2 (pg. 22) describes network dimensions that enable or contribute to these features.
Table 2: Network Dimensions. Source: Palm et al., 2013.

<table>
<thead>
<tr>
<th>Governance</th>
<th>Objective</th>
<th>Function</th>
<th>Material Scope</th>
<th>Geographic Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Formal</td>
<td>- Efficiency</td>
<td>- Referrals</td>
<td>- Prevalence</td>
<td>- EU-wide</td>
</tr>
<tr>
<td>- Informal</td>
<td>- Quality</td>
<td>- Transferring</td>
<td>- Cost</td>
<td>- Transnational</td>
</tr>
<tr>
<td>- Peer Structure</td>
<td>- Safety</td>
<td>- Knowledge</td>
<td>- Complexity</td>
<td>- National</td>
</tr>
<tr>
<td>- Hub-and-Spokes</td>
<td>- Equity</td>
<td></td>
<td>- Rare</td>
<td>- Interregional</td>
</tr>
<tr>
<td>- Organic</td>
<td>- Market position</td>
<td></td>
<td>- Critical</td>
<td>- Regional</td>
</tr>
</tbody>
</table>

The report by Palm et al. (2013) from which Table 2 (pg. 22) is excerpted was a scoping study based on the collaboration of several national health authorities to reflect the state of networks within the European Union. The authors carried out network case studies in various European nations and also in reviews of the literature. They noted a lack of common understanding of the exact characteristics and structure of networks. The authors note (and this research thesis is in agreement) that the evidence on networks is still limited. Table 2 (pg. 22) is the summary of the case study findings and shows the main concepts emerging from the network literature.

Table 2 (pg. 22) forms the basis for the conceptual framework presented in the next section. It defines network governance as the way in which the network is organized and operationalized. Similarly, the network objective is the purpose of the network, describing its goals. Network function describes how those network objectives are met. The material scope of the network is the extent of the subject matter that is relevant, and the network geographic scope is the geographic area relevant to the network (i.e. global, national, local).

Complementary to the aforementioned features, are network functions, including (Mendizabal & Hearn, 2011; Randall, 2013):

1. Community Building: Sustaining the values of the individuals within the group;
2. Filtering: Organizing and managing relevant information for members;
3. Amplifying: Taking new or little-known and little-understood ideas and making them public, giving them clout or making them understandable;
4. Facilitating: Helping members carry out their activities more efficiently and effectively;
5. **Investing or Providing**: Providing members with resources they need to carry out desired activities; and

6. **Convening**: Bringing together different people or groups with distinct strategies to support them.

According to the European Observatory on Health Systems and Policies, a network that is able to perform the aforementioned functions is theoretically able to support KTE (Randall, 2013). With an ability to exchange and transfer knowledge comes a sense of shared identity, ensuring that the network has a specific purpose. Furthermore, a network that is able to educate and provide information or knowledge to its members is said to meet members’ needs, creating strong relationships through adapted leadership and helpful outputs (Mendizabal & Hearn, 2011; Randall, 2013). Currently no research provides a preliminary or complete framework of network KTE.

Because the body of literature on networks is still emerging—particularly in healthcare—questions about network characteristics, inputs, and outcomes remain unanswered (Mendizabal & Hearn, 2011; Palm et al., 2013; Randall, 2013). In particular, the research suggests that networks can fail for various reasons, which may include (Mendizabal & Hearn, 2011; Palm et al., 2013; Randall, 2013):

- a lack of network purpose;
- network mismanagement;
- over-management, cementing processes that should remain dynamic and evolving;
- no initial design;
- unrealistically high expectations;
- prioritizing some network member interests over others;
- constraining network member independence;
- lack of recognition that leadership needs to rotate or change;
- insufficient impact; and
- failure to recognize the breadth and depth of different kinds of knowledge from within the network.
Given this multitude of reasons for failure it is clear that the personal and professional relationships in a network need to be carefully managed. Interestingly, a similar and equally important list of network characteristics that lead to network success is not mentioned in the contemporary network literature. Thus, further research is needed to investigate the essential characteristics and features of networks that enable KTE.

2.3 Conceptual Framework of Network KTE

Whether in healthcare or in another field, a network’s potential for collaboration, sharing, and exchange of research knowledge means it could ideally support a wide variety of KTE processes. These KTE processes have associated beneficial outcomes for groups of stakeholder in a specific field of inquiry who are seeking to connect and collaborate.

2.3.1 The Early Conceptual Framework

The use of networks to enable KTE seems promising for generating and subsequently disseminating research knowledge. However, we need to know how best to support the development, functioning, and maintenance of a network within healthcare.

Based on the background literature reviewed here on KTE and networks, this thesis defines network KTE as follows:

**Network KTE** is interactive and collaborative problem solving between various stakeholders in an area of practice or policy through network activities that enable learning, connecting, and collaborating with other network participants. The network’s structures, activities and relationships are the conduit through which knowledge and resources can be transferred and exchanged to enhance, personalize, or contextualize information, providing professional and/or social support to network participants.

Based on the background literature on KTE and networks, a nascent conceptual framework was compiled (see Figure 1, pg. 26). The framework is comprised of two parts: (a) Network inputs, or characteristics that make up the network, which are provided to the network by the participants and are needed for network KTE; and (b) Network outputs, or what the network produces that participants can use and/or benefit from. These include tangible outcomes (e.g., tools) and
intangible cognitive outcomes (e.g., cognitive, relational, or developmental outcomes). The terms input and output come from the organization/management literature on the knowledge-based economy (Afzal & Lawrey, 2012; Karahan, 2012; OECD, 1996). In response to the policy-focused, knowledge-based economy framework, knowledge inputs and outputs have been identified as characteristics needed for certain knowledge economies to function (Afzal & Lawrey, 2012; OECD, 1996). This thesis does not concern itself with the knowledge-based economy, but borrows the concepts inputs and outputs and applies them to network KTE.
Figure 1: Early Conceptual Framework of Network KTE

Characteristics of the Network

**Structure:**
- Structured
- Unstructured

**Type of Network:**
- Enclave
- Hierarchical
- Individualistic

**Governance/Leadership:**
- Brokered vs. Non-Brokered
- Participant vs. Externally governed
- Shared Governance
- Lead Organization

**Network Function:**
- Functional Goals:
  - Filter
  - Innovate
  - Amplify
  - Facilitate
  - Invest
  - Build
  - Convene

**Management:**
- Initiation
- Objective Negotiation
- Design
- Environmental management
- Production
- Adjustment
- Termination

**Human Resources:**
- Director
- Administrators
- Participants

**Knowledge:**
- Tacit Knowledge
- Explicit Knowledge
- Knowledge Management Mechanisms

**Governance Principles:**
- Legitimacy
- Accountability
- Direction
- Fairness
- Capacity Development

**Network KTE Products/Outcomes**

**Tangible Outcomes/Products:**
- Tools
- Algorithms

**Intangible Outcomes:**
- Knowledge (explicit/tacit)
- Performance
- Status
2.4 Research Objectives

The objective of this thesis was to explore the characteristics of structured knowledge networks and participating members that contribute to, enable, or facilitate KTE (inputs), and the impact of KTE (outputs), both benefits and challenges. This two-phase mixed methods research study addressed two queries.

Phase 1: Reviewed three relevant bodies of literature: healthcare (medical and nursing), organizational science, and sociology, to examine the evidence that currently exists on how knowledge networks enable KTE. This phase addressed the following research question:

How is network KTE characterized in the contemporary literature? What are the individual and network inputs (i.e., structures, processes, environment, tools, activities, and roles), and what are the resultant beneficial KTE outputs described in the network KTE literature?

Phase 2: Used semi-structured qualitative interviews among members of an international healthcare knowledge network to explore the unique features of such networks in the healthcare field. This phase addressed the following research question:

What perceived KTE benefits did participants gain from taking part in an international healthcare network, given their various participant characteristics such as network membership, network role, and level of involvement; and which network characteristics contributed to beneficial network outputs based on reporting by those affiliated with a knowledge network? What recommendation did participants cite to overcome their perceived network KTE challenges?
Chapter 3
Theoretical Underpinnings

Literature on the theoretical landscape of KTE and networks is vast, with no one overarching KTE theory (Estabrooks, 2006). Various theories have been applied to examine different aspects of KTE and networks (Rycroft-Malone, 2007). Thus, to be as theoretically comprehensive as possible, this research project was supported by three theories at three levels of analysis: actor network theory (ANT) at the macro organizational level; social network theory (SNT) at the meso or group level; and self-determination theory (SDT) at the micro or individual level (Dopfer 2004; Rycroft-Malone 2007). Figure 2 (pg. 28) relates the research questions and theories that apply to each phase of the research.

Figure 2: Research Phases and Theoretical Underpinning

Together, these theories complement one another, and substantiate networks as an intervention to enable KTE in a comprehensive, theoretical manner. Each theory applies to a different level of analysis of relevance. ANT considers the functioning and characteristics (inputs and outputs) of the network entity as a whole, considering it as a postbureaucratic organization. SDT considers individuals acting within the network and their individual motivations, inputs, and outputs when
participating in a network. SNT considers the social setting and subgroups that form within a network. It suggests that a single person can influence a group of people, be it a subgroup of the network, or the entire network itself.

3.1 Macro Level: Actor Network Theory (ANT)

Actor network theory (ANT) explains the big picture of organizational functioning, or, in this case, network functioning. A macro level theory (Dopfer, 2004; Greenhalgh et al., 2010; Rycroft-Malone, 2007; Cresswell, 2010), it is conceptually helpful in appreciating the complexity of organizations in healthcare. These organizations actively use information technology (IT) on a regular basis, so ANT’s exploration of the collective sociotechnical processes and relationships that humans have with inanimate objects in various settings is a suitable approach (Cresswell, 2010; Crawford, 2005).

Based in science and technology studies, ANT suggests that scientific knowledge is not fundamentally different from other sociological processes (Crawford, 2005; Latour, 1996). It asserts that science is a heterogeneous practice wherein the social, technical, conceptual, and textual elements in a process or a communication are melded together and transformed, translated, and exchanged (Crawford, 2005; Latour, 1996). Using this reasoning, all participants in a healthcare network are significant in relation to others—that is to say, all are equal (Greenhalgh, 2010; Latour 1996). ANT is helpful in addressing this research project because the characteristics, activities, and tools used to exchange and transfer knowledge are considered as important as the people who hold the knowledge (Crawford 2005; Cresswell 2010; Latour 1996).

It is important to understand that, from the ANT perspective, all parts of a network or KTE within the network are important —be they knowledgeable people or technological IT objects (Latour, 1996). All parts and participants of a network are collectively referred to as actors or actants, who enter into networks that can then define them, categorize them, and provide them with substance, action, intention, and subjectivity (Latour, 1996). A network, thus, ultimately comprises a variety of actants, representing a vast array of knowledge and experience. This heterogeneous network encourages voluntary participation, because actors want to contribute to the network, to enlarge it or improve it, as described in the Phase 1 literature review. Having voluntary actants participating within a network increases network KTE.
ANT sets the stage in this research project by placing all actors (i.e., individuals) and actants (i.e., groups of individuals, and IT/communication devices) on the same level, as equals. For example, the expert who gives her presentation via webinar is just as important as the technology used to transmit her presentation globally (Cresswell, 2010) or, as Greenhalgh (2010) put it, “Social structures and human agency are recursively linked and coevolve” (p. 1285).

Phase 2 of the project, the qualitative interviews, focuses on delving deeper into this concept. Not only do people affect the network’s success and network KTE, but the tools, activities, implements, communication technologies, and forums also affect the network KTE. If there were no video conferencing technologies, no annual meetings/conferences, no email, telephone, fax, or other such tools and technologies, there would be no network. Importantly, Phase 2 of the research project reiterates the significance of the human participants in the network while highlighting the significance of the technology that mediates, facilitates, and enables KTE between participants in an international healthcare knowledge network.

3.2 Meso Level: Social Network Theory (SNT)

Social network theory (SNT; sometimes called social influence network theory) explains the interworking of the people in an organization—or in this case, in a network entity—and the connections or ties between them. Social movements, or the interactions of individuals in a larger entity in a social manner, are said to constitute a unified, empirical phenomenon (Bevir, 2007). SNT is a meso level theory (Dopfer, 2004; Rycroft-Malone, 2007), stemming from work in social psychology. It posits that any observable behaviour is not just a response, but also a trigger or a stimulus perceived by others in the group (Dunn, 1983; Friedkin, 2011).

SNT assumes that social relations are key to explaining individual actions and collective outcomes (Bevir, 2007). It sees that networks are bounded sets of actors—be they organizations, institutions, or individuals—that are connected by specific relationships and interests (Bevir, 2007). SNT is the study of this structured form or pattern and of the ties that link the actors in a network (Bevir, 2007; Wasserman, 1994). The theory also posits that a single individual in a group has the ability to influence the entire group through social means or social interaction (Bevir, 2007; Wasserman, 1994).
SNT is one of the major research traditions in the study of knowledge creation, diffusion, and use. It is centrally concerned with the structured relations among persons who create, disseminate, and use various types of knowledge (Dunn, 1983). The theory describes how social processes and attitudes change and unfold in a network where social influence from peers and other participants is present (Dunn, 1983; Friedkin, 2011). Real-world phenomena, such as increasing KTE between researchers, practitioners, and policy makers in the healthcare field, have increased the interest in network approaches (Dunn, 1983; Wasserman, 1994). In this project, SNT is used to explore the social interactions, relationships, and subgroups formed within the network.

Social network theory informs both Phases 1 and 2 of this study in underscoring the importance of learning in social settings (Friedkin, 2011). Networks bring people together, providing a social dimension to learning and KTE. Since SNT posits that social relations and ties are key to the network’s collective outcomes, we should see this social element reflected in the literature review and/or the interviews. Karlan (2009) says that trust is the lubricant of any functioning and successful social system; based on SNT, we should observe how trust emerges in the literature review and is explained in the interviews (Karlan, 2009). Phase 2 of the research thesis delves deeper into the relationships and ties formed in a network, while, considering the importance of trust.

Also, Phase 2 will explore working relationships in a more intimate manner. It will examine how they relate to the social experience in the network, whether participants view these relationships as crucial to the social aspect of the network, how they found the social aspect to be fostered, and why it was important to them. Using findings from Phase 1 of the research project, Phase 2 will expand the inquiry into the “how” and the “why,” using the basic assumptions of social network theory.

3.3 Micro Level: Self-Determination Theory (SDT)

Self-determination theory (SDT) is a micro-level motivation theory (Dopfer, 2004; Rycroft-Malone, 2007) that focuses on volitional or self-determined behaviour and the conditions that promote it (Darity, 2008). SDT assumes people are active organisms, with inherent tendencies towards psychological growth and development (Darity, 2008; Ryan 2000a). The theory describes a set of basic and universal psychological needs that motivate humans—autonomy, competence,
and relatedness—the fulfillment of which is considered essential to healthy human functioning (Darity, 2008; Ryan & Deci, 2000a).

Perhaps most importantly, SDT focuses on how social and cultural factors facilitate or undermine people’s sense of volition and initiative in addition to their well-being and the quality of their performance (Ryan & Deci, 2000a). In this project, we considered the participants who joined the network either individually or through their organization, and those who did not join. Using SDT, Phase 2 investigated the homogeneity and heterogeneity of network participants from a variety of developed and developing countries, taking into account the similarities and differences between network participants who held various network roles and who became involved at different levels. Phase 2 investigated this through qualitative interviews with managers, board members, working group members, regular registered members, and any nonregistered members who participated in the network. The interviews considered whether there was something inherently similar or different between certain types of members, such as those who were highly active in the network (e.g., board members and working group member leaders) and those who were not so active (e.g., some working group members, general members, and non-members). This was explored by considering the participants’ intrinsic and extrinsic motivations behind their actions. Intrinsic motivation would drive participants to act due to personal reasons, while extrinsic motivation would prompt participants to act due to external factors.

An intrinsic motivation is a personal incentive derived from enjoyment or interest in the task at hand (Ryan & Deci, 2000b). It is an innate tendency to seek out novelty, challenges, and opportunities to learn for one’s own development (Ryan & Deci, 2000b). Intrinsic motivation is evident in the phenomenon of internalization, where a person adopts or integrates social norms and values from a group into their own behaviour (Ryan, & Deci 2000b). SDT expands on intrinsic motivation, positing that environmental factors must be considered when looking at the motivation and self-determination of individuals (Ryan & Deci, 2000a). Clearly, this would come into play when considering an international network where different values and cultural norms are present. It would affect how individuals participate in the network and contribute to network KTE. This cultural intrinsic motivational theme was considered in Phase 2’s qualitative interviews of network participants whose membership included people from national, international, developed, and developing countries.
Extrinsic motivation refers to the environmental factors that might motivate people to perform tasks such as joining a network, creating connections, communicating with other members, and contributing in some way to the network (Ryan, 2000b). This kind of motivation comes from a source external to the individual, such as being paid. Extrinsically motivated actions can be done with resentment, resistance, and disinterest—or alternatively, with an attitude of willingness that reflects an inner acceptance of the value or utility of a task (Ryan, 2000b).

Self-determination of those more involved versus those somewhat involved in the network was examined in Phase 2. Self-determination theory, a theory of motivation, describes the willingness (the “push”) to do something or not to do something. Figuring out what drives a participant to actively engage in a network and pursue KTE within the network was important to exploring the individual differences in motivation among network participants, and to understand how network characteristics enabled or motivated KTE.

Further discussion of how these three complementary macro, meso, and micro theories were used to analyze and organize the findings will be presented in Chapter 4.
Chapter 4
Research Methodology

This research into the concept of network KTE was undertaken by Stephanie Hylmar (SH), a graduate student at the Institute of Health Policy, Management, and Evaluation (IHPME), guided by a research team comprised of Anna Gagliardi (AG) and Whitney Berta (WB), both associate professors at IHPME.

The thesis was completed in two sequential interrelated phases. This chapter describes the setting of the research and the research methodology relevant to each phase. Phase 1 consisted of a systematic review of the relevant literature using a blend of metanarrative and realist approaches. Phase 2 involved qualitative semi-structured interviews with key stakeholders from an international healthcare knowledge network. The results of Phase 1’s systematic review were used to inform questions in the Phase 2 semi-structured interviews. Because the latter phase of the study built on the former, Phase 1 and Phase 2 data were not collected simultaneously. Figure 2 (pg. 28) presents the research question, the phases of research, and the theoretical underpinnings. A description of the study design, methods, sampling strategy, data analysis, and research ethics follows.

4.1 Phase 1: Systematic Review of the Literature

A systematic review collates all relevant empirical evidence answering a specific question into a contemporary area of interest—in this case into the area of networks and KTE (Clarke, 2011; Davies, 2009). The systematic review is a methodical review that minimizes bias, making the findings more comprehensive and reliable, thereby allowing the researcher to draw conclusions about network KTE (Higgins & Green, 2011; Lloyd Jones, 2004). Once an appropriate question is formulated the steps of the systematic review include searching the literature, assessing the studies, validating the findings, and combining the results, placing them into context (Clarke, 2011; Davies, 2009; Lloyd Jones, 2004). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses: (The PRISMA statement) and the consolidated criteria for reporting qualitative research (COREQ) were used to inform the conduct and reporting of this research. Both are
reporting guidelines recommended by the EQUATOR network, an international centre that provides guidance on good research reporting.

The systematic review was exploratory since no others have previously examined how networks enable KTE within these three fields of inquiry. The chosen systematic review approaches are meant to identify how interventions are conceptualized and operationalized, and the factors that influence their success. The review was used in this thesis for two reasons: to familiarize ourselves with the network KTE literature, and to identify any gaps in the current network KTE research (Phase 1) that could be explored in depth using qualitative interviews (Phase 2; Clarke, 2011; Higgins & Green, 2011). The review was conducted using a blended approach following realist review methods according to Pawson et al (2005) and meta-narrative methods according to Greenhalgh et al. (2005). Greenhalgh et al.’s (2011) realist and metanarrative evidence synthesis evolving standards (RAMESES) served a guide and were used for reporting. This blended approach was used because it allowed us to explore contextual influences on why and how networks enable KTE (Greenhalgh et al., 2005; Greenhalgh et al.,2011; Pawson et al, 2005).

The meta-narrative review looks historically at how an intervention has unfolded over time and tells the story of how a topic has been researched in different ways and from different fields (Greenhalgh et al., 2005). The metanarrative approach was used to explore and blend the concept of network KTE from three different disciplines: health services research, organization and management science, and sociology (Greenhalgh et al, 2005; Wong et al., 2013a). The realist review focuses on understanding the mechanism of why an intervention exists and how it functions, specifically it considers the context, mechanism, and outcomes of an intervention (Pawson et al., 2005). This approach was used to extract these details about networks (Pawson et al., 2005; Wong et al., 2013b). The realist approach could illuminate certain characteristics necessary for network KTE (Wong et al., 2013b). This blended review was conducted in preparation for a more in-depth inquiry into network roles, network tools, participant motivations, perceived KTE benefits, and challenges in Phase 2’s semi-structured qualitative interviews with G-I-N members.
4.1.1 Phase 1 Methods

4.1.1.1 The Three Disciplines of Literature

As mentioned above, the blended systematic review investigated the characteristics of networks that foster KTE in three disciplines. The healthcare field, encompassing both medicine and nursing, was chosen because this is the field of interest for this research thesis. The organization science field was used because network research originated in this field, and networks are prevalent structures within the business and management world (Håkansson & Snehota, 1989). Lastly, the field of sociology was chosen because sociology is the study of human social behaviour—its origins, development, organization, and institutions. Since networks are social interventions involving social interaction, sociologists in various fields (including healthcare and organizational science) study them. Thus, examining the sociological literature serves as verification for any extra relevant research on networks and KTE published outside of organizational science and healthcare journals.

4.1.1.2 The Eligibility Criteria

In defining the research question for the systematic review, a set of eligibility criteria was created by the research group (WB, AG, and SH) to guide the search for evidence. In a realist review the initial search for evidence is undertaken to include any study that meets the broad criteria set out for the search. Eligible study characteristics included empirical research; English language; published between 1990 to 2012 inclusive, the current year at the time of the systematic review; human subjects; describing a network; and describing KTE within the network. Studies were eligible for review if they described or evaluated how networks enabled KTE. The complete list of eligibility criteria can be found in Appendix A. The definition of a network used in the eligibility criteria was:

A relational entity that involves interconnected individuals, groups or organizations within a specific domain of knowledge and practice that interact socially and professionally to share knowledge with each other to achieve a common goal. Participation is voluntary; the network spans organizational boundaries encompassing people from different places/ organizations/ entities/ groups/ associations who are linked and come together collaboratively for a
common interest or end goal.

Studies employing similar terms to network were also included. Such terms were soft network, group of experts, community of practice, interorganizational networks, alliances, bridging-ties, interorganizational collaboration, cluster, bridging ties, intercorporate network, joint venture, and social network.

The definition for knowledge transfer and exchange in the eligibility criteria was:

*The collaborative problem-solving between researchers and decision makers, clinicians, managers that happens through linkage and exchange resulting in mutual learning, through the process of planning, producing, disseminating, and applying existing or new research in decision-making.*

A publication was selected as relevant if it described network characteristics identified in the early conceptual framework depicted in Figure 1 (pg. 26), including structure, setup, type, governance, incentives, composition, eligibility, roles and tasks of participants, communication, formality, activities, products, outcomes, and impact or evaluation of a network. Eligible publication types included systematic reviews or meta-analyses, randomized controlled trials, network evaluations, before/after studies, cohort studies, surveys, interview or focus groups, and case studies.

Exclusion criteria were prospectively developed and expanded during the search for evidence (see Appendix A). Studies were ineligible if they were of nonempirical research, neural networks, computer networks, online social media networks (such as Facebook, Foursquare, Twitter, or LinkedIn), single organizational learning, or for-profit networks.

4.1.1.3 Literature Search

A systematic review of the literature in healthcare (medical and nursing), organizational science, and sociology was conducted in four databases: MEDLINE, CINAHL, Sociological Abstracts, and Business Source Premier. MEDLINE is the United States National Library of Medicine’s bibliographic database, containing references to journal articles in the life sciences and biomedicine (Library of Medicine, 2013). CINAHL is the Cumulative Index to Nursing and Allied Health Literature; it is the largest and most in-depth nursing research database. Sociological
Abstracts is the largest database for literature in sociology, while Business Source Premier is the most popular, widely used business research database.

Search strategies were crafted specifically for each database of interest, to accommodate differing indexing systems (see Appendix B). The iterative search “enforcement” was used as described in the methods of a realist review, until a search strategy for each database was selected by SH and the research team (Pawson et al., 2005; Greenhalgh et al., 2005; Wong et al., 2013b).

The concept of KTE was captured with terms such as information dissemination, communication, learning, knowledge management, knowledge translation, knowledge transfer, knowledge exchange, diffusion of innovation, and organizational learning to represent KTE in the searches. The concept of networks was captured using terms such as community network, health information network, organization, group, joint venture, strategic alliance, business network, and interorganizational network. The searches were executed during the week of April 22, 2012 by SH and included a 22-year time span, from 1990 to 2012, the most current year at the time.

4.1.1.4 Assessing the Studies: Pilot Testing

All 2,947 relevant search results were imported into RefWorks referencing system, and separated based on their respective databases. Pilot testing of the eligibility criteria and selection took place among teams of two reviewers including Anna Gagliardi (AG), Iliana Hernandez (IH; research analyst), Stephanie Hylmar (SH), and Muriah Umoquit (MU; research associate). In round 1 of the pilot testing, all four reviewers were assigned the same set of eight titles and abstracts, two from each database, and independently assessed their inclusion or exclusion. Upon completion the four reviewers met and discussed their results, building the list of exclusion criteria. In round 2 of the pilot testing, all reviewers were assigned 16 titles and abstracts, and in round 3, the final round, all reviewers were assigned 24 titles and abstracts to review independently. They then met to discuss their selections. By the final round of pilot testing, the four reviewers were selecting titles and abstracts with 85% congruence.

4.1.1.5 Assessing the Studies: Primary and Secondary Screening

Once pilot testing of the eligibility criteria was complete, primary screening began with the selection of titles and abstracts. One reviewer (SH) reviewed all 2,947 titles and abstracts while the
other two reviewers (IH and MU) each reviewed half the titles and abstracts. Any disagreement on the inclusion or exclusion of a title or abstract was solved by discussion and third-party adjudication by the third reviewer who had not seen the title or abstract in question. Upon completion of selection by all reviewers, a total of 98 titles and abstracts were judged as eligible for full text review, and they were retrieved.

In the secondary screening, two of the reviewers (SH and MU) independently screened all 98 full text journal articles. Upon independent review both reviewers compared their selections. At the time of the systematic review SH was enrolled in a graduate class on KTE and the professor suggested two research articles to her that could be eligible. Upon full text review the two articles were judged eligible and included. Appendix C diagrammatically illustrates the flowchart of evidence in this systematic review.

4.1.1.6 The Data Extraction Form

A data extraction form was developed based on the background information presented in Chapter 2 and the early conceptual framework in Figure 1 (pg. 26). The data extraction form was piloted by two reviewers independently (SH and MU) and refined. In the first pilot test of the data extraction form, SH and MU independently extracted data from three articles, one from each database. Upon completion of the first pilot test the reviewers met to discuss their extraction and any additions, deletions, or changes that would be useful. After the first round of pilot testing, to better reflect the realist approach and capture more information about context of the network and its purpose, “Network Context” was added to extract the scope of the network, whether international, national, both, or unclear. Also, the “Network Purpose” was added to the data extraction form to extract the motivation behind creating the network-like entity, whether to learn, implement a process, increase KTE, increase communication, increase collaboration, or another reason.

Once the data extraction form was updated, the two reviewers (SH and MU) once again chose three articles to pilot-test the data extraction form for a second time, and three articles to pilot-test the data extraction form for a third time. No more additions or deletions were made to the extraction form after round 2 of the pilot testing, and by round three the two reviewers were extracting data at 82% congruence. One reviewer (SH) extracted all the data from eligible articles, including: author, year of publication, country, and study design. To reflect the context of the
network intervention the number of participants, network context, network name, network purpose were extracted. To better understand the mechanism behind the network interaction: network activities and content, interaction of network members, structure/governance of the network, incentive, participant eligibility, and participant roles were extracted. Finally to reflect outcomes of the intervention: the use of knowledge, and any quantitative or descriptive outcomes were extracted. The complete data extraction form for the blended systematic review appears in Appendix D.

4.1.1.7 Validating the Findings: Quality Scoring

The design or execution of studies performed in healthcare may raise questions about the validity of the findings (Higgins & Green, 2011). Assessing the validity of the studies included in a systematic review with either a risk of bias assessment or quality score provides readers with an idea as to the quality of the studies included in the review, and thus how much they should trust the review and its findings. Quality of the included studies was assessed by SH using tools that were appropriate for the design of eligible studies. In this systematic review, 30 of the included studies were quantitative studies: four network analyses, four cohort studies, and 22 surveys. Twenty-nine of the included studies were qualitative or mixed methods studies; nine were interviews or focus groups and 20 were mixed-methods network case studies (Higgins & Green, 2011).

The Effective Public Health Practice Project’s (EPHPP) quality assessment tool for quantitative studies (Appendix E) was used to assess the quality of the included quantitative studies. EPHPP’s tool uses a 6-item global rating scale to score the quantitative articles. EPHPP’s tool has been described as comparable to but more versatile than the Cochrane Collaboration’s tool for assessing risk of bias, because it can be used to assess the quality of studies employing different quantitative study designs (Armijo-Olivo et al., 2012).

COREQ is a qualitative research reporting guideline checklist with 32 items separated into three categories. We adapted it specifically to be used as a quality assessment tool because it was validated and commonly used by authors reporting qualitative studies in high-quality publications (Vandenbroucke, 2009). Criteria for assessing the quality of qualitative studies are controversial. There are many criteria, but none are standardized or validated (Vandenbroucke, 2009). However,
since COREQ was rigorously developed, it reflects key components thought to be important to qualitative reporting, and thus is used here for scoring (Tong et al. 2007). A modified version of the consolidated criteria for reporting qualitative research (COREQ) was used to judge the quality of qualitative and mixed methods studies (see Appendix F).

4.1.2 Phase 1 Data Analysis

Data synthesis was undertaken by SH and synthesis results were shared and discussed with the research group (AG and WB) between January and October of 2012, to ensure the validity and consistency of the inferences that were made. Several steps were used to synthesize and analyze the data extracted from eligible articles. The methods of the included studies were variable, therefore pooling of the data was not possible. Quantitative categorical data and qualitative descriptive data from the review were analyzed separately to answer Phase 1’s exploratory research question. The methods followed realist and thematic synthesis approaches (Cipriani & Geddes, 2003; Garg et al., 2008; Greenhalgh et al., 2005; Higgin & Green, 2011, Thomas & Harden, 2008; Wong et al., 2013ii). Data were grouped and analyzed by study design (quantitative versus qualitative, and mixed methods).

The realist approach was used to gather and identify information about what characteristics were involved in the network intervention (Wong et al., 2013ii). The quantitative categorical data from the systematic review used to refer to similar types of network characteristics and activities were extracted in a manner similar to that used by: Rycroft-Malone et al. (2012) in a realist review of implementation methods, and Scott et al. (2012) in a systematic review of KT strategies in allied health. Categorical data, which describe network characteristics and activities, were aggregated based on the categories from the data extraction form (Appendix D). These included study design, network context, name of entity, purpose of entity, network KTE activities (format and content), interaction of members (duration and intensity), governance structure, incentives, participant eligibility, participant roles, and use of knowledge. These categorical data were quantitatively analyzed for frequency. All data summary tables appear in Appendix G.

As is outlined by the realist methodology, data were extracted on network characteristics (inputs) and outcomes, impacts, and products (outputs). Then prominent recurrent patterns in inputs and outputs were identified. In particular the consistency of specific inputs or outputs associated with
positive outcomes were examined. This analysis is summarized in Table 3 (quantitative studies of network KTE, pg. 61) and Table 4 (qualitative studies of network KTE, pg. 66) in Chapter Five (Cipriani & Geddes, 2003; Garg et al. 2008; Wong et al., 2013b). Social network theory states that a single network participant has the ability to influence a group. Guided by this, in our analysis of inputs and outputs we noted whether an individual network participant’s characteristics was influencing the network, or whether network level characteristics as a whole were influencing the network. Using SNT to guide the analysis enabled us to attribute the significant increases in key findings to either an individual’s input/output or to the network’s input/output.

Thematic synthesis was used to analyze the qualitative descriptive findings from the systematic review; specifically, the descriptive network inputs (Barnett-Page & Thomas, 2009; Thomas & Harden, 2008). The methods from Thomas and Harden (2008) that were used included free-coding the descriptive findings and organizing them into “analytical“ themes. Five such analytical themes emerged in the systematic review and are described in detail in Chapter 5. This approach is more so inductive, the themes are developed based on a constant comparative method that attempts to supply evidence to a theory. In this case, the thematic synthesis supplied evidence to both SNT and ANT. SNT was supported through the social themes that emerged in the analysis, and ANT, which is interested in the elevated status of scientific knowledge, was supported through the various uses of knowledge that emerged in the findings.

In Chapter 5 the results of the systematic review, including the quantitative characteristic findings from inputs and outputs, and the five qualitative analytical themes, with the resulting conceptual framework of Network KTE, are discussed in detail.

4.2 Phase 2: Qualitative Semi-Structured Interviews

Qualitative research is a method of inquiry that uses analysis and interpretation to explain a phenomenon of interest (Auerbach & Silverstein, 2003). Qualitative methods are typically used when little is known about a topic, or when individuals are in a socially constructed environment, so as to understand the nuances of a phenomenon as it relates to the specific situation or context (Hermanowicz, 2002; Kvale & Brinkmann, 2009; Patton, 1990; Roulston, 2010). A qualitative descriptive methodology was used to explore network KTE. Qualitative descriptive studies comprehensively summarize events in every day terms, answering practical questions for practice
and policy (Sandelowski, 2000). These studies are the least “theoretical” in that they can be guided by theory but are not encumbered by pre-existing theoretical frameworks (Sandelowski, 2000). This qualitative descriptive method was used here because there was no precedent study that explored how networks enable KTE. Also, a qualitative descriptive methodology was used because qualitative research has the capacity to reveal detailed information about views and experiences that offer rich insight into whether and how interventions are used, and the many factors that could influence or challenge their success.

4.2.1 Interview Setting: The Guidelines International Network (G-I-N)

The interviews were conducted within a specific network, the Guidelines International Network (G-I-N). G-I-N is a global not-for-profit network that encourages and supports international collaboration on development and implementation of clinical practice guidelines (CPGs; G-I-N, 2013). G-I-N is a structured knowledge network open to individuals or organizations. Its members are in some way interested or invested in the development, implementation, and use of clinical practice guidelines, and/or related research.

G-I-N comprises 83 organizations from 43 countries with hundreds of registered official and unofficial individual members (G-I-N, 2013). G-I-N “seeks to improve the quality of healthcare by promoting systematic development of clinical practice guidelines and their application into practice by supporting international collaboration” (G-I-N, 2013, About G-I-N, Members Benefits, pg. 3). Founded in 2002, the organization has three objectives:

1. provide a network and partnerships for guideline organizations, implementers, end users, researchers, students and other stakeholders;
2. assist members of the network in reducing duplication of efforts to improve efficiency and effectiveness of evidence based guideline development, adaptation, dissemination and implementation; and
3. promote best clinical practice through the development of opportunities for learning and capacity building and the establishment of high quality standards of guideline development, adaptation, dissemination, and implementation.
G-I-N provides information and tools on its website that can be used by members to develop, implement, or adapt clinical practice guidelines. A few of the learning and KTE resources available to G-I-N members include access to in-person forums such as the annual general meeting/G-I-N conference, electronic tools, and reminders such as the e-newsletter updates from the working groups and committees. Also, membership includes access to various educational meetings from the G-I-N subgroups such as the Evidence Tables, Implementation, Allied Health, and/or Adaptation Working Groups. Other educational resources available include workshops, courses, webinars, and access to the International Guideline Library and other complementary online library tools (G-I-N, 2013).

The Chair of G-I-N manages the Guidelines International Network, supported by an executive committee and an executive officer (G-I-N, 2013). The executive committee produces and implements the action plan to address strategies decided by the Board; develops yearly performance plans for the executive officer; performs day-to-day liaisons with the members and the executive officer; and any other managerial tasks necessary (G-I-N, 2013). The executive officer manages the webmaster, who is responsible for the web content of G-I-N’s online presence (G-I-N, 2013). Appendix H shows the organizational arrangement of the Guidelines International Network.

The G-I-N board of trustees comprises 12 elected members, three co-opted members, the treasurer, and the past chairman; all fall directly under the executive committee (G-I-N, 2013). The board of trustees has the responsibility of ensuring that G-I-N complies with its mandate and abides by the laws, which define it as a charity (G-I-N, 2013). The board supports six specialty groups for G-I-N’s larger membership: the Evidence Tables Working group, the G-I-N Public Group, the Adaptation Group, the Implementation Group, the Allied Health Community, and the Emergency Medicine Community (G-I-N, 2013). The board is supported by three subcommittees: the conference and promotions group, the membership group, and the finance and risk group (G-I-N, 2013). Each of these subcommittees provides advice as needed on these topics.

It is this network’s aim to create an environment of KTE to help support research, sharing, and collaboration for the many organizations in the field of CPG development and implementation. To aid the collaboration of individuals and organizations alike, G-I-N encourages multilateral
collaboration, and works in partnership with many other groups, including: the AGREE research trust, the International Federation for Emergency Medicine, the International Network of Agencies for Health Technologies Assessment, the GRADE working group, the World Medical Association, and the ADAPT collaboration. They do this by providing a forum and linking individuals, groups, and organizations within the CPG world to one another and themselves, encouraging collaboration, research, and innovation (G-I-N, 2013).

G-I-N has been operating for over 10 years. Because of its diverse international membership and its focus on collaboration within healthcare, G-I-N afforded an ideal setting to explore KTE within a network. In qualitative semi-structured interviews with G-I-N members, this research thesis explored why G-I-N participants chose to join such a network, how they used the network for KTE, why they continued to participate in the network, the benefits/outcomes they felt were the result, the challenges they encountered, and suggestions/recommendations they had for improving network KTE. These questions and others that remained unanswered from the systematic review were explored in the interviews.

4.2.2 Phase 2 Methods

Qualitative semi-structured interviews were used because they add information for the continued development and expansion of the systematic review’s findings, adding to the conceptual framework of network KTE. Rather than simply corroborating the framework with predetermined survey answers, qualitative interviews unfold the meaning of participants’ lived experience using the participants’ own dialogue to explain the “how” and “why” of a situation (Hermanowicz, 2002; Kvale & Brinkmann, 2009; Roulston, 2010). The semi-structured interview method used here is the most widely used qualitative approach (Hermanowicz, 2002; Kvale & Brinkmann, 2009). In this method, interviews follow an interview guide with specific predetermined questions and probes to allow specific information to emerge. However, the semi-structured quality of the technique allows the interviewer to change the order of the questions based on what participants disclose, creating more natural, conversation-style interview (Kvale & Brinkmann, 2009; Patton, 1990; Roulston, 2010).

The qualitative semi-structured interviews conducted by telephone and Skype with members of G-I-N helped the researcher learn more about G-I-N’s KTE activities, needs, and preferences when
transferring and exchanging knowledge in a network. Sampling network members with a variety of characteristics ensured rigour in the interviews (Babour, 2011). Interview participants held various network membership designations (organizational, general, or nonmember); they had different network roles (employee, board member, working group member, general member); and these designations and roles determined their level of involvement (active, moderate, or minimal). Furthermore, since the network was international, members from a variety of countries worldwide (developed and developing) were interviewed. Responses from this wide variety of participants are presented in the Chapter 5, showcasing the thematic coding and relevant exemplary quotes (Barbour, 2011; Bradley et al., 2007; Braun & Clark, 2006).

4.2.2.1 Participant Sampling, Recruitment, and Consent

G-I-N, the Guidelines International Network, was chosen as the sample network and setting of this research for the qualitative semi-structured interviews because it was a healthcare network, large enough from which to draw an adequate sample of participants with different views. In qualitative research, sampling is guided by the ability of participants to express their experiences from various dimensions of a phenomenon (Patton, 1990; Bassette, 2004). According to Patton (1990) there are no rules for sample size in qualitative research because sample size depends on what you want to know, and the purpose of the inquiry. Thus, SH, guided by the research team (AG and WB), used thematic saturation to identify a cut-off point for recruitment and interviewing. SH in her interviewing was conscientious in recognizing when thematic saturation was achieved (Bradley et al. 2007; Braun & Clark, 2006; MacQueen et al., 1998).

The sampling approach was purposive maximum variation, and the goal of the sampling was to explore multiple heterogeneous views from network participants whose perspectives varied based on their nationality, their network membership type (organizational, general, or nonmember), network role (employee, board member, working group member, general member), and resultant level of network involvement (active, moderate, or minimal; Patton, 1990). Initially, most participants sampled were from developed countries. However, to get the full spectrum of rich international detail and perspective, a second round of sampling from developing countries was undertaken. Despite sampling from both developing and developed countries, due to a lack of resources participants who spoke English were favoured so that transcription and analysis could be done without the use of an interpreter.
The Dillman method was used for interview recruitment. G-I-N members were identified using the conference attendee lists from the last three G-I-N conferences, as well as new member announcements in the official G-I-N newsletter (*enGINe*) and the G-I-N member database. All three of these resources were freely available on the G-I-N official webpage. Once member names were ascertained, Google searches were used to identify participant email addresses, which were freely available on professional and academic webpages. Individuals were recruited by email with a brief invitation. Attached was an official letter of invitation and the consent form. Nonresponders were contacted by email with a reminder after two weeks, with a final email reminder to remaining nonresponders after an additional week (Dillman, 1991). If after three weeks they had not responded to any of the three messages they were considered to have declined the invitation. A copy of the email recruitment message, reminder message, official letter of invitation and consent form can be found in Appendix I.

4.2.2.2 Data Collection, the Semi-structured Interview Guide, and Rigor

A semi-structured interview guide was developed based on the conceptual framework generated following the systematic review. The interview guide was created based on the gaps in the literature found during the blended systematic review. The included literature in the systematic review focused on macro level and some meso level functioning of networks. However, the literature was lacking a micro or person centred viewpoint of network KTE. Thus the interview guide was created to solicit information about participants’ role, motivation, activities, perceived benefits, perceived challenges, and recommendations for improvement (see Appendix J). Once the guide was developed, it was pilot-tested in December 2012 with two participants from G-I-N to refine the wording and flow of the questions and to test the length of time it took to complete.

Between the months of January and April 2013, the qualitative semi-structured interviews were conducted with recruited, consenting participants. The interviews were generally conducted over the telephone using a conferencing line. The members who could not access the conferencing line from their country were called by SH using Skype. The interviews generally lasted 30 minutes; they were audiorecorded using the teleconferencing centre or Skype technology. Once they were audiorecorded they were converted to verbatim text by a professional transcriptionist. The interviews started with a brief introduction by the interviewer (SH), stating the purpose of the
interview and the participants’ rights during the course of the interview. Once formal introductions were made the interviews began.

The first question was “What is your role in G-I-N?” This question established the participants’ baseline involvement in the network and the capacity in which they participated. It was asked to determine if different network members had a higher or lower involvement than others in network life, based on their role. If participants did not elaborate on the tasks and nuances of their role, prompts were used, such as “What is it that you do for the network?,” “How long have you been a member of G-I-N?,” and “How are you involved with G-I-N activities?” The second interview question was “What was your initial motivation to join G-I-N? Why did you join?” This question elicited the participants’ drive to engage and participate in the network, and what prompted or enticed them to be members. The question was important because it elicited why participants decided to join a network and stay involved. If participants did not elaborate on the question, prompts were used, such as “What was the purpose of joining G-I-N?,” “What does the network do to make you want to continue participating?,” and “Were your expectations met? Did you get from the network what you thought you would?”

The third question in the interview asked, “In what ways do you participate in the network?” This question was important because it asked about the KTE activities. It elicited how participants exchanged knowledge with the network—specifically what resources, activities, tools, and mechanisms they used and preferred to use when contributing knowledge to or getting knowledge and connections from the network. If participants did not elaborate on the activities they were involved in, follow-up questions were used, such as “How did G-I-N help you build connections with others?,” “Whom did you connect with in G-I-N?,” “How did G-I-N help you get your knowledge out to other participants?,” “How did G-I-N help you increase your knowledge on a certain topic?,” and “What tools or aids or resources were helpful in engaging in KTE within G-I-N?”

The fourth and fifth questions in the interview were: “What are the benefits of participating in G-I-N?” and “What are the challenges of participating in G-I-N?” These two questions elicited the positive and the negative outcomes of participating in the network. Knowing what the participants got out of their participation or how they felt their participation had been helped or hindered by the
network was important in understanding their initial and continued motivation to participate and exchange knowledge in the network.

The sixth and last question asked about any recommendations or improvements they had for better enabling KTE within the network: “In what other ways would you like to exchange knowledge in a network such as G-I-N?” If the participant did not offer any suggestions, a prompt about unintended outcomes was asked: “Were there any unintended positive OR negative consequences of participating in such a network?” Once the participant answered the final question, the interviewer (SH) asked if there was anything else they wanted to share or if they had any questions about the research. Once these closing remarks were given, goodbyes were exchanged and the interview was complete.

Rigor in the interviews was assured by two methods: reflexivity, and triangulation (Lincoln & Guba, 1985; Guion, 2002). Five types of triangulation were used to increase rigor of the study. Data, investigator, theoretical, methodological, and environmental triangulation were used (Guion, 2002). Data and methodological triangulation was achieved because different methods were used to gather data such as, use of the literature review to compliment the interviews (Guion, 2002). Investigator triangulation was achieved by using multiple investigators from the research team to triangulate the themes and sub-themes coming out of the data, also analyzing the interview results, keeping the three theories in mind attained theoretical triangulation (Guion, 2002). Lastly environmental triangulation was used because the interviews were conducted during different times of the year, between December 2012 and April 2013.

Reflexivity was also used by engaging multiple investigators and reporting perspectives, positions or beliefs held by the team members that would inhibit un-bias analysis of the interview data (Lincoln & Guba, 1985).

4.2.3 Phase 2 Data Analysis

Interview analysis used Braun and Clark’s (2006) six steps of thematic analysis, with a blend of Bradley et al.’s (2007) taxonomy, themes, and theory development and MacQueen et al.’s. (1998) codebook development for team-based analysis. A codebook was developed throughout the analysis of the first few interviews. It was a data dictionary, which organized and clarified
qualitative data by categorizing the emergent themes and subthemes from the analysis. The codebook included overarching interview question, main themes, subthemes, and an exemplary quote from the analysis (MacQueen et al. 1998). SH familiarized herself with the interview transcripts and the overarching interview questions. From reading and rereading the first few transcripts, SH generated the main themes. Once these main themes were defined, data in the form of verbatim quotes representing each theme were extracted from the interviews. Through examining all the related data for each main theme, salient subthemes were identified. The subthemes were defined and all relevant data from each main theme were arranged into their appropriate subtheme category. Once themes and subthemes were defined, exemplary quotes were selected to illustrate the subthemes. In this way the codebook for the interviews was created iteratively, refining the themes and subthemes over the course of the 30 interviews. The iterative process continued until the research team was satisfied with the descriptors, definitions, and exemplary quotes that showcased key themes and subthemes from the interview analysis.

These stages of data analysis occurred concurrently with recruiting and interviewing participants. SH and the research team (WB and AG) met four times between January and June 2013, and conducted four rounds of interview transcript co-coding (Bradley et al., 2007; MacQueen et al., 1998). For co-coding, each member of the team was provided with two interview transcripts and the evolving codebook a week before the coding meeting. Independently, each reviewer read through and coded the transcripts accordingly. The team then met to discuss, compare, and contrast their codes, strategy, and the evolving codebook. SH was responsible for updating the codebook based on the discussions (MacQueen et al., 1998). The interview codebook went through six iterations between February and August 2013, until the project team was satisfied with the representativeness and appropriateness of the resultant codes, themes, definitions, subthemes, and exemplary quotes.

The interviews and analysis proceeded until thematic saturation was accomplished; that is, until no further unique themes emerged from the interviews (Bradley et al., 2007; Braun & Clark, 2006; MacQueen et al., 1998). This was accomplished using constant comparative analysis as outlined by Glasser (1965), an inductive method of qualitative analysis. Thematic saturation was reached at 30 interviews. In Chapter 5, the results of the qualitative semi-structured interview analysis and the resulting codebook of themes, subthemes and exemplary quotes are discussed in detail.
4.3 Data Integration of Systematic Review and Interviews

The combination of results from the mixed research methodologies of systematic review and interviews is called *data integration*. This has been described as empowering, because all parts of the inquiry are unified in one overall research product (Robinson, 2011; Strøm, 2012). Data integration enhances the results, making them more adaptable and more widely applicable (Robinson, 2011). The data integration method used in this research thesis was relational analysis, conceptualized by Palmquist and Carly (1997) and refined by Robinson (2011). The approach was blended with Strøm’s (2012) systematic data integration method, which is specifically for integration of qualitative interview data (see Figure 3, pg. 51).

Data integration was used to blend the results of the two phases of research into a unified set of outcomes. This provided a deeper, more comprehensive view of the overall characteristics that enable knowledge transfer and exchange within a network.

**Figure 3: Strøm’s Systematic Data Integration Method**

Once the systematic review and the interviews were completed and analyzed, the prominent categorical and descriptive outcomes of network KTE from both methodologies were tallied in an integration table (see Appendix K). The network KTE characteristics considered for integration analysis in this table included network context, network purpose, motivation, network environment, role within the network, activities in the network, network outcomes, network management, network challenges, and recommendations for improvement. The characteristics that
were found in the systematic review and/or in the interviews were marked with a Yes and those that were not found in the systematic review and/or in the interviews were marked with a No. Those characteristics marked with a Yes detailed the sub characteristics found in the outcomes and were marked with a checkmark (√) if they appeared in one of the phases of the research. This way the outcome characteristics from each phase were systematically catalogued by SH who could then identify which themes came from which research method.

Once the individual outcomes of both were assembled, unique network features that enabled network KTE—extracted from the systematic review and revealed in the interview participants’ responses—were merged into an integrated descriptive, conceptual framework of network KTE. A descriptive framework is a visual representation that describes the properties and characteristics of a qualitative phenomenon of interest (Rycroft-Malone & Bucknall, 2010). It does not explain or predict outcomes or behaviours, but simply describes them in an organized and logical fashion (Rycroft-Malone & Bucknall, 2010).

Because qualitative interviews provide rich and descriptive data, diagrams or models can be used to visually represent complicated and detailed findings, showing an overview of how key concepts are related to one another (Suter, 2012). Thematic maps, for example, are hierarchical diagrams that represent themes and their connections (Braun & Clark, 2006; Guest &McLellan, 2003). These diagrams are typically created at the conceptual level in response to the perceived logical relationship among codes of qualitative data (Braun & Clark, 2006; Guest &McLellan, 2003). Thematic maps were created to illustrate the interlinking conceptual themes and subthemes from the interviews, based on the interview codebook and its emergent themes and subthemes. These thematic maps appear in Appendix L. Once the overlap and gaps were established between the systematic review and interviews, the conceptual framework and the thematic maps were merged. Chapter 5 presents the outcomes of the integration analysis.

4.4 Research Ethics

Ethics approval for this study was granted by the University of Toronto Research Ethics Board (REB) on August 20, 2012, based on an expedited ethics review, because the study methodology was considered minimal risk (Protocol Reference # 28033). Renewal of the ethics approval was applied for on July 30, 2013, in order to finish working on analysis of the data. Ethics renewal was
granted again on August 13, 2013 under the same protocol reference number. Appendix M shows a copy of the original study approval letter and renewal from the University of Toronto REB.
Chapter 5

Results

The Phase 1 systematic review explored input and output characteristics resulting in positive network KTE outcomes. This chapter sets out the quantitative and qualitative themes of this review in detail and presents them in Tables 3 and 4 (pg. 61 and pg. 66). This chapter then describes the thematic findings from the Phase 2 qualitative semi-structured interviews with 30 G-I-N members. The results of the interviews are presented narratively, incorporating quotes that represent the main salient themes.

5.1 Results of the Systematic Review

A systematic review of the healthcare (medical and nursing), organizational science, and sociological literatures was undertaken. By examining the network related KTE inputs and outputs, the researcher wished to explore how structured knowledge networks enable KTE, and what characteristics—structures, processes, environment, tools, activities and roles—are essential to KTE in a network. In this section the quantitative outcomes from 59 eligible studies are summarized in Table 3 (quantitative studies, pg. 61) and Table 4 (qualitative studies, pg. 66). These tables describe the network from each study, the main KTE purpose, context, use, inputs, outputs, and key study findings. These categories of extracted data are defined in the legend for Tables 3 (pg. 61) and 4 (pg. 66). Raw data extracted from each article are available in Appendix G.

5.1.1 Characteristics of Eligible Studies

In the blended systematic review of the literature conducted on network KTE, three databases were searched for relevant literature, yielding a total of 2, 947 possible relevant titles. MEDLINE yielded 1, 629, CINAHL yielded 55, BSP yielded 511, and Sociological Abstracts yielded 752. From these searches 59 studies were found to be eligible for data extraction and synthesis. Of those 59 studies, 12 (20%) were from the medical literature in MEDLINE; one single study (2%) was from the nursing literature in CINAHL; 38 (65%) were from the organizational science literature in BSP; six (10%) were from the sociological literature from Sociological Abstracts; and two (3%) were suggested to SH were from the healthcare literature. Appendix C offers a flowchart diagram showing identified and eligible articles.
The quality of the 59 studies was assessed by SH using EPHPP and COREQ. Seven (23%) of the quantitative studies were judged to be of strong quality, 14 (47%) were judged to be of moderate quality, and nine (30%) were judged to be of weak quality. As for the mixed-methods and qualitative studies, which included interviews, focus groups, and case studies, nine (31%) were judged as strong quality, nine (31%) were judged to be of weak quality and 11 (38%) were judged to be of moderate quality. Taking into account that 77% of the quantitative studies and 69% of the qualitative and mixed-methods studies were judged to be of low to moderate quality, these findings and their implications should be interpreted with some caution. Armijo-Olivo et al. (2012) commented on issues with applicability and generalizability of quality scoring. This issue is further discussed in the limitations section in Chapter 6. For the rating of individual study quality refer to Tables 3 and 4 (pg. 61 and pg. 66). Overall, quality scoring serves as a gauge by which to comment on whether and how the results can or should be applied.

5.1.1.1 Study design, time frame, and nomenclature

The study designs varied and were split relatively evenly into quantitative and qualitative methodologies, with a few mixed-methods designs, as follows. The 30 quantitative studies included four (7%) network analyses, three (7%) cohort studies, and 22 (37%) surveys. The 27 qualitative studies included seven (12%) interview/focus group studies and 20 (34%) network case studies. The two mixed-methods studies (3%) were both mixed-case studies.

As to how up-to-date the studies were, the earliest publications included nine studies (15%) published between 1996 and 1999. Fifteen of the studies (25%) were published between 2000 and 2006 and 35 of the studies (60%) were published between 2007 and 2011. None of the studies were from 2012, the most recent year at the time. Out of all 59 of the eligible studies, the most frequently used term to describe the group that was aiming to share knowledge was network (26,
These 26 studies found that networks were hierarchically structured and that their typical purpose was to learn or collaborate. Within the 26 studies the topic of learning and collaboration within the networks largely varied. Some networks focused on automotive, and construction knowledge or competencies, others on quality improvement and smoking cessation knowledge or competencies. The mechanisms of collaboration also varied, from in-person, to online, individual or group collaboration. Nine of 59 studies (15%) used the term communities of practice (COP). These were less formal structures than networks. COPs were communities of professionals in an area of practice that informally exchanged knowledge, usually without hierarchical structure. COPs were prevalent in the healthcare literature and were specifically favoured by clinicians. Another nine studies (15%), all from the organizational science literature, referred to joint ventures. In these studies, one company typically learned from another company in a formal hierarchical relationship. Twelve (20%) of the 59 studies, again all from the organizational science literature, were alliances. They were competitive in nature, although not with each other. Typically, they would team up hierarchically to pursue a goal or a defined organizational objective. Three (5%) studies referred to linking ties, collaborations, and systems.

5.1.1.2  Context, exclusivity, and scope

The 59 studies from the four databases were separated into two overarching categories: organizational science and healthcare, based on the described study setting. Out of all 59 included studies, 23 (39%) \(^{10}\) focused on networks in healthcare including networks in nursing, public health and community health, health systems and policy, women’s health, dementia, tobacco control, and health quality improvement. Thirty-six (61%) of the 59 studies\(^{11}\) examined networks in various industrial or business settings, including automotive, marketing, biotechnology, manufacturing, research, aerospace, ceramics, textile, construction, maritime rescue, and government. Out of all 59 studies included, 49 (83%) of the networks were exclusive in their membership, meaning only firms from certain industries or sectors such as those described were allowed to participate, while 10 (17%) included anyone wanting to join and participate. Out of all 59 studies included in the

\(^{10}\) 4, 6, 7, 11, 15, 22, 25-27, 31-34, 37, 41 - 44, 46, 48, 53, 57, 58

\(^{11}\) 1 - 3, 5, 8 - 10, 12 - 14, 16 - 21, 23, 24, 28 - 30, 35, 36, 38, - 40, 45, 47, 49, 50 - 52, 54 - 56, 59
systematic review, 29 (49%) of the networks were national; that is, all participants were from the same country, spoke the same language, and were of similar cultural backgrounds. 22 (37%) were international in scope, and eight (14%) included both national and international participants.

5.1.1.3 Purpose, structure, duration, governance, incentives, and roles

Thirty-seven (63%) of the included studies stated that the network was created for more than one purpose. Studies that listed multiple network purposes included KTE, learning, innovation, collaboration, and communication. Twenty-two (37%) studies stated a single purpose: KTE was listed in 13 (59%); learning in two (9%); innovation in two (9%); collaboration in four (18%); and communication in one (5%). KTE is the collaborative problem solving between researchers and decision-makers that happens through linkage and exchange resulting in mutual learning through the process of planning, producing, disseminating, and applying existing or new research in decision making. Together the other purposes: learning, innovation, collaboration, and communication combined make up KTE, but separately they only make up one part of it and are thus independent purposes. Since these are the purposes of the network we can see them in the framework under the intangible outcomes in the network commodities. These purposes were defined in the 59 studies as:

**Learning**: gaining or acquiring knowledge or skill by study, experience or teaching.

**Innovation**: making changes to something established (i.e. a process, method, product, or idea).

**Collaboration**: working with someone to produce, create, or improve something.

**Communication**: a means of relaying information or news through connections.

Of the 59 eligible studies in the systematic review, 35 (59%) reported the structure of the network, defined the way in which the network was run and organized, how it was structured, and the format it took, whether online or in-person. Thirteen (37%) regularly convened in person, eight (23%) were purely online mediated, and 14 (40%) were a mix of online, in-person, and telephone-
based forums. Nine (15%) studies listed the network’s duration: six months was the shortest duration and 30 years was the longest; the average duration and longevity of a network was between five and 10 years. All of these studies are detailed below in Tables 3 and 4 (pg. 61 and pg. 66).

Of the 59 networks examined, 30 (51%)\textsuperscript{15} had a hierarchical governance structure, with a top-down approach. In these, a core group or individual was at the top of the governance structure and held the main executive decision-making role in the network. Below this group, at the middle and bottom levels of the hierarchy, were people who had smaller roles but who made up a much bigger portion of the network. Three (5%)\textsuperscript{16} of the networks had unstructured forms of governance; the network operated in an egalitarian scheme, in which all members had equal amounts of work and decision-making abilities. These networks were smaller and simpler than those that had a hierarchical, top-down structure. Twenty-six (44%)\textsuperscript{17} of the studies did not report their network structure.

Of the 59 eligible studies in the systematic review, 39 (66%) of the networks were voluntary entities, and three (5%) were incentivized in some way—two with monetary rewards and one with professional organizational incentives, while 17 (29%) studies did not report on incentives. Finally, roles of the network members were reported in 36 (61%) of the included studies. The most prominent network roles were general manager, executive/CEO, project manager/leader, board/steering committee, scientist, administrative support instructor/trainer, information technology engineer, and financial accountant.

5.1.1.4 KTE in networks

All 59 (100%) studies reported on the network’s knowledge practices. Seven types of knowledge practices were described; these definitions were drawn from the 59 eligible articles and simplified for use here:

\textsuperscript{15} 1, 2, 4, 5, 7, 9–11, 15, 24–29, 33–36, 39, 40, 43, 45, 46, 48, 53, 54, 56, 57, 59
\textsuperscript{16} 3, 31, 58
\textsuperscript{17} 6, 8, 12, 13, 14, 16—23, 30, 32, 37, 38, 41, 42, 44, 47, 49, 50, 51, 52, 55
i) knowledge transfer and exchange: the collaborative problem solving between multiple stakeholders through linkage and exchange which results in mutual learning, planning, producing, disseminating and applying knowledge;

ii) generating knowledge: creating or producing new knowledge;

iii) acquiring/harvesting: seeking out knowledge (new or old);

iv) storing: keeping or accumulating knowledge for future use;

v) diffusing: passive unidirectional dispersal of knowledge; and

vi) translation / transformation: a dynamic and iterative process that includes the synthesis, dissemination, exchange, and ethically sound application of knowledge. This can include passive and active forms of uni or bi directional knowledge translation and transformation.

vii) synthesizing knowledge: combine knowledge into a coherent whole body.

All the quantitative studies and their knowledge practices, characteristics, and findings are summarized in Table 3 (pg. 61). All the qualitative studies are summarized in Table 4 (pg. 66). The table legend explains the different categories of data that were extracted.

Of these seven types of knowledge practices, 38 studies (64%)\(^\text{18}\) described practising KTE through networking with other individuals through bidirectional active formats. Twenty-eight (47%) studies\(^\text{19}\) described knowledge sharing / diffusion, while 23 (39%)\(^\text{20}\) described knowledge generation. In the systematic review, four studies (7%)\(^\text{21}\) described knowledge acquisition / harvesting, six studies (5%)\(^\text{22}\) described knowledge translation / transformation. Five (8%)\(^\text{23}\) described knowledge synthesis, ten (17%)\(^\text{24}\) described knowledge storing. Finally, six studies (7%)\(^\text{25}\) described unique uses of knowledge: verification, protection, fusion, request, combination, and centralization, respectively.

\(^{18}\) 1–10, 14, 16–20, 23, 25, 26, 27, 32, 35, 36, 37, 40, 45, 50, 56, 57, 58

\(^{19}\) 7, 10 - 15, 17, 21–26, 28, 30, 31, 33, 34, 38, 39, 41, 43, 44, 46, 53, 55, 57

\(^{20}\) 6, 7, 14, 15, 17 20, 23, 24, 30, 33, 34, 42, 43, 44, 45, 46, 49, 51, 52, 54, 58

\(^{21}\) 3, 4, 22, 29

\(^{22}\) 3, 4, 17, 33, 42, 44

\(^{23}\) 9, 27, 28, 30, 45

\(^{24}\) 6, 7, 9, 15, 23, 31, 48, 51, 52, 57

\(^{25}\) 6, 13, 28, 48, 54, 57
### Legend for Tables 3 and 4

<table>
<thead>
<tr>
<th>Study</th>
<th>Author last name, year of publication, reference number for study from the systematic review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>Design of the study: Case study, interview/focus group, network analysis, cohort study, cross sectional survey, mixed methods</td>
</tr>
</tbody>
</table>
| Network context and name | Context: Healthcare or organizational science  
Name of the network-like entity: Network, community of practice (COP), joint venture, alliance |
| Network purpose | Stated network purpose: Learning, implementation, KTE, communication, collaboration, other |
| Use of knowledge | How knowledge was discussed in the study’s network-like entity: generated, translated, transferred, shared, transformed, acquired, synthesized, stored, collaborated, integrated |
| Descriptive network KTE / KT characteristics: Inputs and outputs | Network characteristics: either input or output by an individual participant in the network (i) or by the network (n) itself.  
**Inputs:** demonstrate investment or capacity building efforts towards KTE in the network through activities that support KTE  
**Outputs:** demonstrate the impact of the inputs on network KTE |
| Key findings | The results/findings of the research study.  
The studies did not always study KTE exclusively there were other areas of interest which are reflected in the key findings. |
| Quality score | The score from the quality assessment using the EPHPP and COREQ tools for assessing quality and risk of bias |
Table 3: Systematic Review of Quantitative Studies (N = 30) Organized Alphabetically by Author Then Publication Year

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Findings</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becerra et al., 2008 [1]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Alliance</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td>Inputs (i): Trust, Risk Outputs (i): Tacit Knowledge</td>
<td>Network Size and Experience: + Trustworthiness + Integrity</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bennett et al., 2008 [2]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Joint Venture</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td>Inputs (n): Communication (monthly, weekly, quarterly) Outputs: N/R</td>
<td>KTE: NSD Absorptive capacity NSD Use of interorganizational team</td>
<td>Strong</td>
</tr>
<tr>
<td>Choe et al., 2008 [3]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management InterOrganizational Information System (IOS)</td>
<td>Increase KTE (Specifically: Communication)</td>
<td>Transferred</td>
<td>Inputs (i): Interactions (In-person or Online) Outputs (i): Information</td>
<td>Interfirm Knowledge Exchange: + Transaction of Info. + In-person Info + Traditional Communication + Informational Management NSD Quality and Flexibility</td>
<td>Strong</td>
</tr>
</tbody>
</table>

N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to the EPHPP Quality Assessment Tool (Appendix G)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Findings</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gibbons et al., 2007 [11]</td>
<td>Network Analysis</td>
<td>Healthcare Network</td>
<td>Increase Communication</td>
<td>Diffused</td>
<td><strong>Inputs (n):</strong> Knowledge, Ties, Partnerships, Structured SubGroups &lt;br&gt; <strong>Outputs (n):</strong> Information Diffusion</td>
<td>Meetings in a year &lt;br&gt; Regular Participation &lt;br&gt; Networks: &lt;br&gt; + Partnering &lt;br&gt; + Connections &lt;br&gt; + Chain Structure (ties) &lt;br&gt; + Clusters &lt;br&gt; + Acting as Diffuser &lt;br&gt; NSD SD Partnering</td>
<td>Weak</td>
</tr>
<tr>
<td>Hau et al., 2007 [13]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Joint Venture</td>
<td>Increase KTE</td>
<td>Shared and Protected</td>
<td><strong>Inputs (n):</strong> Intent, Staff, Cultural Distance &lt;br&gt; <strong>Outputs (i):</strong> Knowledge</td>
<td>Transfer tacit and explicit Knowledge: &lt;br&gt; Intent: + tacit/+explicit &lt;br&gt; Capability: + tacit/+explicit &lt;br&gt; Partner Assistance: NSD tacit/+ explicit Knowledge Protectiveness: + tacit/ NSD explicit Cultural Distance: + tacit/ NSD explicit</td>
<td>Weak</td>
</tr>
<tr>
<td>Idris et al., 2011 [16]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Joint Venture</td>
<td>Increase Efficiency (in Marketing)</td>
<td>Transferred</td>
<td><strong>Inputs (n):</strong> Knowledge Motivation, Strategic Fit, Macro Environment &lt;br&gt; (political, economic, sociocultural, technological), KTE &lt;br&gt; <strong>Outputs (n):</strong> Innovation, Performance</td>
<td>In Joint Ventures: &lt;br&gt; Marketing Innovation= + KTE Strategic Innovation= +KTE Strategic Fit = +KTE Strategic Fit = + Market Innovation Strategic Fit = Strategic Innovation</td>
<td>Weak</td>
</tr>
<tr>
<td>Jin et al., 2009 [21]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Network</td>
<td>Increase KTE</td>
<td>Shared</td>
<td><strong>Inputs (n):</strong> Social Embeddedness, Intent, Information Usefulness, Credibility &lt;br&gt; <strong>Outputs (i):</strong> Satisfaction</td>
<td>+ Satisfaction with network: &lt;br&gt; Information Usefulness Source Credibility</td>
<td>Weak</td>
</tr>
</tbody>
</table>

*Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)*
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Findings</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim et al., 2007[22]</td>
<td>Network Analysis</td>
<td>Healthcare Network</td>
<td>Increase KTE</td>
<td>Shared and Acquired</td>
<td>Inputs (n): Ties, Knowledge Outputs (i): Learning</td>
<td>+ Interfirm Learning due to: Technical Links, Network Links, Alliance Ties, Patents, Subsector Involvement, NSD Interfirm Learning due to: Network Ties, Alliances</td>
<td>Moderate</td>
</tr>
<tr>
<td>Marsteller et al., 2007[32]</td>
<td>Cross Sectional Survey</td>
<td>Healthcare Network</td>
<td>Increase Collaboration and Social Support</td>
<td>Transferred</td>
<td>Inputs (i): Teams and Learning Outputs: N/R</td>
<td>+ Change to practice due to: More contact with Network</td>
<td>Moderate</td>
</tr>
<tr>
<td>Mowery et al., 1996[35]</td>
<td>Cohort Study</td>
<td>Organizational/Management Alliance</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td>Inputs (i): Voluntary Involvement Outputs (i): Complex Capabilities</td>
<td>Joint Venture: + InterFirm Knowledge Transfer</td>
<td>Moderate</td>
</tr>
<tr>
<td>Muthusamy et al., 2005[36]</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Alliance</td>
<td>Increase KTE (Specifically Learning)</td>
<td>Transferred</td>
<td>Inputs (i): Social Exchange, Trust Outputs (i): Learning</td>
<td>+ Interfirm Learning due to: Social exchange Trust</td>
<td>Moderate</td>
</tr>
<tr>
<td>Norman et al., 2006[37]</td>
<td>Cross Sectional Survey</td>
<td>Healthcare COP</td>
<td>Increase: KTE, (Specifically: Collaboration)</td>
<td>Transferred</td>
<td>Inputs (n): Intent, Engagement Outputs: N/R</td>
<td>Due to Network NSD in: Collaboration, Research Opportunities, Relationship Strength, Colleagues, Behaviour</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Findings</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okamura et al., 2006</td>
<td>Network Analysis</td>
<td>Organizational/Management</td>
<td>Increase KTE</td>
<td>Shared</td>
<td>Inputs (n): Communication</td>
<td>Knowledge Network:</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network</td>
<td></td>
<td></td>
<td>Outputs (n): Positioning</td>
<td>+ Alliance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Citing Patents</td>
<td></td>
</tr>
<tr>
<td>Pérez-Nordtvedt et al., 2008</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td>Inputs (n): Intent</td>
<td>Relationship quality:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alliance</td>
<td>(Specifically</td>
<td></td>
<td>Outputs (n): Efficiency,</td>
<td>+ Speed of KTE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Learning)</td>
<td></td>
<td>Learning, Value</td>
<td>+ Economy of KTE</td>
<td></td>
</tr>
<tr>
<td>Powell et al., 1996</td>
<td>Cohort Study</td>
<td>Healthcare</td>
<td>Increase: Learning</td>
<td>Generated, Shared</td>
<td>Inputs (n): Collaboration,</td>
<td>More Ties:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network</td>
<td>Innovation, R&amp;D</td>
<td></td>
<td>Diversity, Centrality, Ties</td>
<td>+ Size</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outputs (n): Growth,</td>
<td>+ Growth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Experience</td>
<td>+ Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Centrality (closeness)</td>
<td>+ Centrality (closeness)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NSD Diversity, R&amp;D, Finance</td>
<td></td>
</tr>
<tr>
<td>Revilla et al., 2004</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management</td>
<td>Increase KTE,</td>
<td>Generated,</td>
<td>Inputs: N/R</td>
<td>Network:</td>
<td>Weak</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joint Venture</td>
<td>Innovation, R&amp;D</td>
<td>Sythesized,</td>
<td>Outputs (n): R&amp;D, Knowledge</td>
<td>NSD Knowledge Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Transferred</td>
<td></td>
<td>NSD Behaviour</td>
<td></td>
</tr>
<tr>
<td>Schilke et al., 2010</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management</td>
<td>Increase: Learning</td>
<td>Transferred</td>
<td>Inputs (n): Management</td>
<td>Alliances:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alliance</td>
<td>Innovation,</td>
<td></td>
<td>Outputs (i): Performance,</td>
<td>+ Coordination</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cooperation,</td>
<td></td>
<td>Coordination, Learning</td>
<td>+ Portfolio</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Innovation and</td>
<td></td>
<td></td>
<td>+ Learning</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>R&amp;D</td>
<td></td>
<td></td>
<td>+ Performance</td>
<td></td>
</tr>
<tr>
<td>Schoenmakers et al., 2006</td>
<td>Cohort Study</td>
<td>Organizational/Management</td>
<td>Increase Learning</td>
<td>Generated,</td>
<td>Inputs (i): Ties</td>
<td>Alliances with Strong and Weak Ties have an equal:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alliance</td>
<td></td>
<td>Stored</td>
<td>Outputs (i): Learning</td>
<td>+ Learning</td>
<td></td>
</tr>
<tr>
<td>Simonin, 1997</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management</td>
<td>Increase KTE</td>
<td>Generated,</td>
<td>Inputs (i): Collaboration,</td>
<td>Network Collaboration:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alliance</td>
<td>(Specifically</td>
<td>Stored</td>
<td>Experience</td>
<td>+ Collaborative Knowledge</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Learning and</td>
<td></td>
<td>Outputs (i): Knowledge</td>
<td>+ Collaborative Know-how</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Collaboration)</td>
<td></td>
<td></td>
<td>+ Intangible Benefits</td>
<td></td>
</tr>
<tr>
<td>Spallek et al., 2008</td>
<td>Cross Sectional Survey</td>
<td>Healthcare</td>
<td>Increase</td>
<td>Shared</td>
<td>Inputs (n): Social exchange,</td>
<td>Community of Practice:</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>COP</td>
<td>Communication</td>
<td></td>
<td>Information (electronic)</td>
<td>+ General Info</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and Collaboration</td>
<td></td>
<td>Outputs (i): Knowledge</td>
<td>+ Funding Info</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Peer Networking</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Research Opportunity</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Advocacy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Expert Identification</td>
<td></td>
</tr>
</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>Tolstoy et al., 2010</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Network</td>
<td>Increase KTE and Knowledge Generation</td>
<td>Generated, Combined</td>
<td>Inputs (n): N/R Outputs (i): Knowledge Creation, Knowledge Combination, Growth</td>
<td>Network Development: + Knowledge Creation + Network Combination</td>
<td>Strong</td>
</tr>
<tr>
<td>Tortoriello et al., 2010</td>
<td>Cross Sectional Survey</td>
<td>Organizational/Management Linking Ties</td>
<td>Increase Innovation and R&amp;D</td>
<td>Shared</td>
<td>Inputs (n): Ties Outputs: N/R</td>
<td>Ties: NSD Innovation</td>
<td>Strong</td>
</tr>
<tr>
<td>West et al., 1999</td>
<td>Cross Sectional Survey</td>
<td>Healthcare Network</td>
<td>Increase KTE (Specifically Learning)</td>
<td>Shared, Transferred, Centralized, Stored</td>
<td>Inputs (n): Ties Outputs (i): Knowledge Exchange</td>
<td>Nursing vs. Medicine Knowledge Networks NSD on Network Density NSD on Network Centrality NSD on Network Information Centrality</td>
<td>Weak</td>
</tr>
<tr>
<td>Zhang et al., 2010</td>
<td>Cohort Study</td>
<td>Healthcare Alliance</td>
<td>Increase Collaboration, Innovation and R&amp;D</td>
<td>Generated, Transferred</td>
<td>Inputs (n): Information Outputs (n): Alliance Formation, R&amp;D, growth</td>
<td>Depth, Breadth and Centrality: + R&amp;D + Size (growth) + Alliances</td>
<td>Strong</td>
</tr>
</tbody>
</table>

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Table 4: Systematic Review of Mixed Methods and Qualitative Studies (N=29) Organized Alphabetically by Author then Publication Year

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
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<th>Key Outcomes</th>
<th>Quality Score</th>
</tr>
</thead>
</table>
| Berdrow et al., 2003[3] | Interview/ Focus Group | Organizational/ Management COP | Increase KTE and Sharing | Transferred/ Transformed, Harvested | **Inputs**: N/R  
**Outputs (i)**: Value, Mindset, Integration, Training, Relationships | Joint ventures could pass combined knowledge and create value through transformation of knowledge. | Moderate |
| Dalcanale et al., 2011[7] | Case Study           | Healthcare Network | Increase: KTE, (Specifically Learning, Communication, Collaboration) | Generated, Stored, Shared, Transferred | **Inputs (i)**: Knowledge, Data, Networking,  
**Outputs (i)**: publications, news, funding, datasets, models, networking, education, communication, perception, collaboration | Benefits Identified: resources; disseminate information quickly; provide a forum to raise water quality issues; reduce time-consuming information gathering, links to direct channels and tracing information to the source; enhance participatory process and; facilitate a forum for effective communication | Moderate |
| Dhanaraj et al., 2007[8] | Mixed Methods Case Study | Organizational/ Management Joint Venture | Increase KTE | Transferred | **Inputs (i)**: Trust and Social Embeddedness  
**Outputs (i)**: Tacit and Explicit Information | Trust :  
+ Tacit info. transfer  
NSD Explicit info transfer Social Embeddedness:  
+ Tacit learning | Strong |
| Dulaimi, 2007[9] | Case Study            | Organizational/ Management Joint Venture | Increase Knowledge Sharing | Stored, Synthesized, Transferred | **Inputs (n)**: Motivation, Cultural environment  
**Outputs (i)**: Knowledge Sharing, Learning | Knowledge is only shared when motivated by the need to learn locally  
Different learning cultures and language complicate | Weak |

Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)
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<tr>
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<th>Key Outcomes</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hackney et al., 2008 [12]</td>
<td>Interview/ Management</td>
<td>Organizational/</td>
<td>Increase KTE and</td>
<td>Shared</td>
<td><strong>Inputs (i): Knowledge</strong></td>
<td>Intergovernmental networks are facilitated by knowledge sharing and consolidation</td>
<td>Weak</td>
</tr>
<tr>
<td></td>
<td>Focus Group</td>
<td>Management</td>
<td>Funding</td>
<td></td>
<td><strong>Sharing, Trust, Consolidation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network</td>
<td></td>
<td></td>
<td><strong>Outputs (i): Capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hervas-Oliver et al., 2008</td>
<td>Interview/ Management</td>
<td>Organizational/</td>
<td>Increase KTE,</td>
<td>Generated,</td>
<td><strong>Inputs (n): Ties, Knowledge</strong></td>
<td>External ties help create basic local knowledge essential for competition</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management</td>
<td>Innovation and R&amp;D</td>
<td>Transferred and</td>
<td>(local and global)</td>
<td>Global knowledge matters but to a lesser extent to competition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network</td>
<td></td>
<td>Diffused</td>
<td><strong>Outputs (i): Success</strong></td>
<td>Multinational enterprises allow knowledge transfer from a local to a global scale</td>
<td></td>
</tr>
<tr>
<td>Ho et al., 2010 [15]</td>
<td>Case Study</td>
<td>Healthcare</td>
<td>Increase Learning</td>
<td>Generated,</td>
<td><strong>Inputs (i): Voluntariness</strong></td>
<td>6 Guidelines for COPs: i. Voluntary self-organization</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>COP</td>
<td></td>
<td>Stored and Shared</td>
<td><strong>Leadership, Shared Identity</strong></td>
<td>ii. Problem Focused</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Outputs: N/R</strong></td>
<td>iii. Distributed leadership, transparency and public accountability</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>iv. Accessibility</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>v. Shared identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>vi. Sustainability</td>
<td></td>
</tr>
<tr>
<td>Inkpen, 1996 [17]</td>
<td>Case Study</td>
<td>Organizational/</td>
<td>Increase Collaboration and Knowledge Creation</td>
<td>Generated, Shared, Tranferred / Transformed</td>
<td><strong>Inputs (i): Learning, Intent, Leadership, Trust, Creativity</strong></td>
<td>Organizational knowledge creation is useful at an operational level</td>
<td>Strong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management</td>
<td></td>
<td></td>
<td><strong>Outputs: N/R</strong></td>
<td>Knowledge creation is a result of amplification and internalization of an organization’s knowledge base</td>
<td></td>
</tr>
<tr>
<td>Inkpen et al., 1998 [18]</td>
<td>Interview/ Management</td>
<td>Organizational/</td>
<td>Increase KTE</td>
<td>Generated and</td>
<td><strong>Inputs (n): Management</strong></td>
<td>Knowledge management can enhance a firm’s competitive advantage. It is needed in longitudinal International</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Management</td>
<td></td>
<td>Transferred</td>
<td><strong>Outputs (i): Tacit Information, Learning, Relationships</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<th>Key Outcomes</th>
<th>Quality Score *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inkpen et al., 2006</td>
<td>Case Study</td>
<td>Organizational/Management Alliance</td>
<td>Increase Collaboration and Sharing</td>
<td>Generated and Transferred</td>
<td><strong>Inputs</strong> (i): Training, Teaching, Collaboration, Commitment, Interaction, Social Capital <strong>Outputs</strong> (i): Relationships</td>
<td>Joint Venture partnerships. Knowledge creation is responsive to managerial influence</td>
<td>Moderate</td>
</tr>
<tr>
<td>Inkpen, 2008</td>
<td>Case Study</td>
<td>Organizational/Management Alliance</td>
<td>Increase KTE</td>
<td>Generated, Transferred and Shared</td>
<td><strong>Inputs</strong> (n): Interaction, Consensus Building, Knowledge Activists (Mavens/Brokers) <strong>Outputs</strong>: N/R</td>
<td>Personalized knowledge is useful to an alliance if the individual with the knowledge is involved. Collaboration and Interaction facilitate KTE. The weaker social capital between alliance partners the less likely partners develop relationships</td>
<td>Weak</td>
</tr>
<tr>
<td>Lam, 1997</td>
<td>Case Study</td>
<td>Organizational/Management Joint Venture</td>
<td>Increase Collaboration</td>
<td>Generated and Shared</td>
<td><strong>Inputs</strong> (n): Governance, Structure, Work Systems, <strong>Outputs</strong> (n): Performance</td>
<td>Knowledge in organizations, its: tacitness, structure, use, and transmission can varies considerably between firms. These differences contributed to: project failures, weakened the technological relationship between the partner firms over time and led to asymmetry in KTE</td>
<td>Weak</td>
</tr>
</tbody>
</table>

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<th>Key Outcomes</th>
<th>Quality Score *</th>
</tr>
</thead>
</table>
ii. Liaisons  
iii. Implementation  
iv. Time  
v. Training  
vi. Facilitation  
vii. Integrated  
viii. Design  
ix. Relationships (social)  
x. Results | Moderate          |
| Lemieux-Charles et al., 2005 [26] | Case Study | Healthcare Network | Increase Collaboration and Synthesis | Shared and Transferred | Inputs (n): Funding, Staff, Training, Information Outputs (n): Coordination, Referrals, Information Sharing | Networks differ in perception of effectiveness and admin. Practices  
Exchange within the subnetwork groups are more critical than those between individual agencies in the network | Moderate          |
| Liebeskind et al., 1996 [27] | Case Study | Healthcare Network | Increase KTE (Specifically Collaboration) | Synthesized and Transferred | Inputs (n): Learning, Integration, Ties Outputs: Learning | Network exchange makes two important contributions to organizational learning:  
1. They extend the scope of organizational learning  
2. They contribute to the integration between participating firms | Strong            |
| Lorenzoni et al., 1999 [29] | Case Study | Organizational/Management Network | Increase KTE       | Transferred and Acquired | Inputs (i): Trust Outputs (i): Relationships Information | 1. Lead firms can lower coordination and production costs of a network through multiple repeated trust based relationships with suppliers  
2. Multiple related trust based relationships are key for suppliers to access complimentary capabilities and specialized knowledge | Weak             |

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<tbody>
<tr>
<td>Low et al., 2010 [30]</td>
<td>Case Study</td>
<td>Organizational/Management Network</td>
<td>Increase KTE, Innovation and R&amp;D</td>
<td>Generated, Shared and Synthesized</td>
<td>Inputs (i): Knowledge Outputs (n): Innovation, Knowledge Sharing, Creation, Interpretation</td>
<td>Emerging technologies are jointly developed in knowledge networks. These networks produce: + Knowledge creation + Sharing + Interpretation</td>
<td>Strong</td>
</tr>
<tr>
<td>MacPhee et al., 2009 [31]</td>
<td>Case Study</td>
<td>Healthcare Network</td>
<td>Increase Innovation and R&amp;D</td>
<td>Stored, Shared and Transferred</td>
<td>Inputs (i): Time, Trust Outputs: N/R</td>
<td>Takes 1-3 years for network members to build a rapport, trust and engage in higher level activities</td>
<td>Weak</td>
</tr>
<tr>
<td>McDonald et al., 2007 [33]</td>
<td>Case Study</td>
<td>Healthcare COP</td>
<td>Increase Communication and Collaboration</td>
<td>Generated, Shared and Translated</td>
<td>Inputs (n): Engagement, exploring/exploitation (i.e. enterprise) Outputs (i): Collaboration, Funding through agencies</td>
<td>COP helped: + Participants (students and scientists) + Collaboration + Funding Agency Involvement</td>
<td>Weak</td>
</tr>
<tr>
<td>Palm et al., 2008 [39]</td>
<td>Case Study</td>
<td>Organizational/Management Network</td>
<td>Increase Communication, Collaboration, Coordination, and Learning</td>
<td>Shared and Transferred</td>
<td>Inputs (i): Trust, Legitimacy, Knowledge, Communication, Language Outputs (i): Relationships, Culture, Innovate</td>
<td>Learning requires: i. Training ii. Follow-Up</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Outcomes</th>
<th>Quality Score *</th>
</tr>
</thead>
</table>
| Perrault et al., 2011 [41] | Case Study | Healthcare Consortium | Increase Collaboration | Shared | **Inputs (i):** Time, Language/Terminology, Intent, Funding, Trust  
**Outputs (i):** Collaboration | Successful Collaboration:  
i. Relationships  
ii. Respect, Understanding and Trust | Moderate |
| Poole, 2008 [42] | Case Study | Healthcare COP | Increase KTE (Specifically Collaboration) | Generated, Translated / Transferred | **Inputs (i):** Sharing and Collaboration, Planning  
**Outputs (n):** Information Sheets, Publications, Presentations, Webcasts, Newsletters | Collaboration leads to engaged action by participants  
Consciousness-raising practices +KTE | Moderate |
| Provan et al., 2011 [44] | Mixed Methods Case Study | Healthcare Network | Increase Communication, Collaboration, Capacity | Generated, Shared and Translated | **Inputs (n):** Roles, Hierarchy, Intent  
**Outputs:** N/R | Network entities emerge as a back-and-forth between internal needs and goals or members  
Network formation and governance is driven by important events in the external environment  
Formal Network:  
+ Coordination  
+ Synthesis | Strong |
| Robinson et al., 2005 [46] | Case Study | Healthcare COP | Increase Learning, Collaboration | Generated and Shared | **Inputs:** N/R  
**Outputs (n):** Status/Power, Information, Relationships, Commitment | Collaboration enhanced by:  
i. Coordination  
ii. Commitment culture | Weak |

*Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)*
<table>
<thead>
<tr>
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<th>Study Design</th>
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<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Outcomes</th>
<th>Quality Score *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rottman, 2008 [47]</td>
<td>Interview/ Focus Group</td>
<td>Organizational/ Management Alliance</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td>Inputs (i): Social Capital (i.e., Ties, Intent, Culture, Trust) Outputs (n): Knowledge transfer, Relationships</td>
<td>These practices enable: + Knowledge Transfer -- Development Cost -- Cycle times + Quality + Change + Strength of relationships</td>
<td>Moderate</td>
</tr>
<tr>
<td>Sammarra et al., 2008 [49]</td>
<td>Case Study</td>
<td>Organizational/ Management Network</td>
<td>Increase KTE (Specifically Collaboration)</td>
<td>Generated and Transferred</td>
<td>Inputs (i): Collaboration, Ties/ Connections, Knowledge, Heterogeneity Outputs (n): KTE, Density</td>
<td>1. Collaboration happens in heterogeneous knowledge 2. KT networks have patterns of access to knowledge through ties 3. + Reliance on innovation increase through ties 4. + Reliance on network increases opportunity to exchange knowledge in ties 5. Greater variety of connections + KTE 6. Greater heterogeneity + knowledge, +collaboration 7. Multiple combinations of knowledge in interfirm</td>
<td>Strong</td>
</tr>
</tbody>
</table>

*Note.* N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Context and Name</th>
<th>Network KT Purpose</th>
<th>Use of Knowledge</th>
<th>Descriptive Network Inputs &amp; Outputs</th>
<th>Key Outcomes</th>
<th>Quality Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhao et al., 2004 [59]</td>
<td>Case Study</td>
<td>Organizational/ Management Network</td>
<td>Increase KTE</td>
<td>Transferred</td>
<td><strong>Inputs (n): Teaching</strong> &lt;br&gt; <strong>Outputs (n): Integration, Knowledge</strong></td>
<td>Group teaching is more effective than individual teaching. &lt;br&gt; Group learning is more effective than individual learning to help trainees integrate learning. &lt;br&gt; Among four teaching-learning positions, group learning is the most effective transfer strategy for collective knowledge.</td>
<td>Strong</td>
</tr>
</tbody>
</table>

*Note. N/R (not reported); NSD (No Significant Difference); (i) Individual Level input/output; (n) Network Level input/output; + (Improved with a Significant Difference); Quality Scoring According to Adapted COREQ (Appendix F)*
5.1.1.5 Healthcare literature compared to the organizational science literature

Findings from the systematic review, an exploratory review of network KTE, point to some interesting trends in knowledge use and network outputs. Considering the seven uses of knowledge we see KTE can be a process within the network, or an outcome of the network activities. From the seven uses of knowledge identified in the literature review there appeared to be interesting trends within the organizational science and health services research literatures in three of the uses of knowledge: knowledge transfer and exchange, knowledge sharing/diffusing, and knowledge generating.

5.1.1.5.1 Transferring and exchanging knowledge. KTE, both the healthcare and organizational sciences literatures described the transfer and exchange of knowledge in a similar fashion, it is one of the seven uses of knowledge found in the systematic review. In the systematic review, transferring knowledge was described as the transfer of competencies, experience and knowledge across collaborative partners through networking, innovating, collaborating, learning, and communicating. Such similar definitions within two fields of inquiry make it clear that these are some of the characteristics associated with the transfer and exchange of knowledge.

Fourteen\textsuperscript{26} of the 23 studies from healthcare described the transfer of knowledge. They found that the network-like entity provided a forum for participants to collaborate—helping extend the scope of learning, increasing the use of knowledge, and creating more contact with others. Six\textsuperscript{27} of the 14 studies mentioned group sharing and collaboration, as a network input, suggesting that sharing and collaboration were part of the knowledge exchange process. One study\textsuperscript{28} commented on how the network contributed not only to the transfer of knowledge but also to how transfer begets the exchange of knowledge in the network. In this study Liebeskind et al. (1996) investigated how biotechnology firms source their knowledge. Their findings suggested that the use of a network increases learning from external sources in a way that a lone hierarchical

\textsuperscript{26} 4, 6, 7, 9, 25–27, 31, 32, 37, 42, 48 57, 58
\textsuperscript{27} 6, 7, 26, 32, 37, 42
\textsuperscript{28} 27
organization could not achieve. Thus, when information is transferred to a partnering entity, outside the original hierarchical organization it encourages, and thus begets the exchange of knowledge back, creating that bidirectional active KTE relationship.

The inputs for these 14 studies included collaboration and sharing. The network-like entity achieved its stated goals when the individuals/groups/organizations participating were collaborating and sharing informational resources, administrative resources, ideas, and data.

Similar to the healthcare studies, the majority of the 36 organizational science studies in the review, 24\textsuperscript{29} reported transferring knowledge. Six organizational science studies\textsuperscript{30} focused on sharing knowledge, three\textsuperscript{31} focused on generating knowledge and two\textsuperscript{32} focused on both generating and subsequently sharing knowledge.

Several trends and similarities emerged from the studies in the healthcare and organizational science literatures that detailed transferring knowledge. Inputs into network-like entities that aimed to transfer knowledge included trust,\textsuperscript{33} culture and/or a similar language,\textsuperscript{34} management,\textsuperscript{35} and communication.\textsuperscript{36} The most prominent network input found in the organizational science literature for network KTE was trust.

When trust was examined as an input into the network, four studies\textsuperscript{37}—one in healthcare\textsuperscript{38} and the other three from organizational science—found that trustworthiness within the network significantly increased. This was telling, since in the healthcare literature trust was not as imperative as in the organizational science literature. Perhaps this has to do with the nature of the organizational science field, which is concerned with transfer and exchange knowledge, but also has to remain vigilant on remaining profitable. Trust plays into that aspect of profit because

\textsuperscript{29} 1–3, 5, 8–10, 14, 16–20, 23, 35, 36, 39, 40, 45, 47, 49, 50, 56, 59
\textsuperscript{30} 12, 13, 21, 28, 38, 55
\textsuperscript{31} 51, 52, 54
\textsuperscript{32} 24, 30
\textsuperscript{33} 1, 8, 17, 29, 36, 47
\textsuperscript{34} 9, 39, 56
\textsuperscript{35} 18, 50
\textsuperscript{36} 2, 5
\textsuperscript{37} 1, 29, 36, 41
\textsuperscript{38} 41
when businesses are exchanging and transferring knowledge they need to be assured that the knowledge remains within the network-like entity and is not leaked to other competitive sources. Although profit and financial motivations were not considered in these articles, profit margins and yields are still important considerations for any organization, be it in the organizational science field or in the healthcare field.

From the organization sciences literature, seven studies\textsuperscript{39} found that knowledge transfer throughout the network increased, one of which in particular\textsuperscript{40} linked the network to increased speed of KTE. However, this was the only study that did so. Also, of note within the organization science and healthcare literature were studies indicating an increase in learning\textsuperscript{41} and research and development.\textsuperscript{42} However, only studies within the organizational science literature\textsuperscript{43} noted an increase in business success and performance.

5.1.1.5.2 Sharing knowledge. Sharing knowledge was a characteristic included in knowledge transfer, and is one of the seven uses of knowledge identified in the systematic review. It was unique in that many studies did not mention knowledge transfer per se but mentioned this specific characteristic. It was described as accessing knowledge between participants in the network through ties. Sharing knowledge was also unique compared to other KTE characteristics because it relied on knowledge flow—the constant flow or generation of knowledge that is then accessed by participants in the network.

In the healthcare context, 13\textsuperscript{44} of 23 studies stated the network entities’ purpose as sharing knowledge. The findings for these studies varied. Four\textsuperscript{45} studies reported an increase in learning and/or increased network growth. Six\textsuperscript{46} studies cited linking ties or liaisons as a network input and three\textsuperscript{47} said that specific knowledge inputs were required, based on the field in which the

\textsuperscript{39} 10, 17, 20, 35, 40, 47, 56
\textsuperscript{40} 40
\textsuperscript{41} 8, 9, 36, 39, 50, 56
\textsuperscript{42} 3, 10, 23
\textsuperscript{43} 10, 14, 16, 50
\textsuperscript{44} 7, 15, 22, 25, 26, 31, 33, 34, 41, 43, 44, 46, 57
\textsuperscript{45} 9, 22, 34, 43
\textsuperscript{46} 7, 22, 25, 43, 46, 57
\textsuperscript{47} 7, 22, 34
network operated. These findings suggest that linking ties or liaisons coupled with specific knowledge could be a precursor to successfully sharing information in a network-like entity. However, further empirical evaluation would be required.

Within the organizational science literature five\(^{48}\) studies focused on sharing knowledge. Three\(^{49}\) of these studies found that knowledge and products (e.g., patents and innovations) increased as a result of the network-like entity sharing. This was unique to organizational science. One study\(^{50}\) found that satisfaction and credibility were positively affected by the network knowledge sharing. The inputs that were of interest here included the network intent, cited by two studies,\(^{51}\) and synthesis and consolidation of knowledge.\(^{52}\)

5.1.1.5.3 Knowledge generation. Knowledge generation was one of the seven uses of knowledge found in the systematic review. Knowledge generation was similarly described in both healthcare and organizational science as: creating new knowledge and research through the network among key network participants. Knowledge generation was said to hinge on the network’s effective management, experience, and expertise. In this case knowledge generation means that the network itself is creating knowledge or innovating for its participants. This ties into management experience and expertise because generating knowledge requires a strategic plan and direction for the type of knowledge to be generated. With strong leadership and management, the knowledge generated in a network should be closely tied to the network’s strategic priorities and direction making the knowledge relevant and useful to network participants.

Ten research studies from the healthcare literature\(^{53}\) examined knowledge generation in the network. Most found that collaborative knowledge creation significantly increased in the network-like entity; however, none of the inputs in these studies were the same. Four studies

\(^{48}\) 12, 13, 21, 28, 38
\(^{49}\) 13, 28, 38
\(^{50}\) 21
\(^{51}\) 13, 21
\(^{52}\) 12, 28
\(^{53}\) 6, 7, 15, 33, 34, 42–44, 46, 58
from the healthcare literature that focused on the generation of knowledge found that collaboration in the network led to growth in network participation, which increased in size and number of ties between participants. An important input into the network for generation of knowledge was access to knowledge structures. Unfortunately, there were no consistencies in positive findings from the healthcare studies.

Thirteen research studies from the organizational sciences literature examined knowledge generation in a network. Similar to healthcare studies, knowledge generation created positive outcomes in organizational science studies that increased the growth and development of the network (i.e., density of relations or ties). The five studies that noted this increase in growth or development had inputs related to ties and connectivity, networking, or social capital. From both the organizational science literature and the healthcare literature it can be seen that ties and connectivity through networking are important to the growth and development of a network-like entity.

In summary, findings from the organizational science and healthcare studies point to little consistency in the inputs, outputs and resultant positive outcomes of network KTE. Where knowledge transfer and exchange, knowledge sharing, and knowledge generation were concerned, some similarities did emerge in how the terms were defined, how they were used in the studies and how they impacted the network. However, between these uses of knowledge there was a lack of consistency in what the different studies focused on within the different fields they came from i.e. healthcare and organizational management. More in-depth exploration is needed on the topic of transfer and exchange of knowledge and trust within a network. Also, further inquiry into linking ties and growth of the network would be warranted, as would the characteristic of sharing, and how sharing is unique from knowledge transfer.

54, 6, 43, 42, 58
55, 7, 15
56, 14, 17–20, 23, 24, 30, 45, 49, 51, 52, 54
57, 14, 19, 23, 49, 51
5.1.2 Conceptual Framework of Network KTE

Characteristics of the network KTE inputs and outputs were extracted from the 59 studies—both qualitative and quantitative—including in the systematic review of network KTE literature. Tables 3 and 4 (pg. 61 and pg. 66) list all the relevant KTE inputs and outputs. Using this list of characteristics, a revised conceptual framework of network KTE was created by adding the findings of the systematic review to the early conceptual framework shown in Figure 1 (pg. 26). A descriptive framework aims to describe the properties, characteristics, or qualities of a phenomenon, as opposed to explaining or predicting it (Rycroft-Malone & Bucknall, 2010). The descriptive conceptual framework of network KTE from the systematic review appears in Figure 4 (pg. 86).

During analysis of the systematic review, and creation of the descriptive framework, SH conceptualized and split the framework into two overarching categories with three subcategories of network parts. The framework is first separated into network KTE inputs and network KTE outputs. The network inputs encompass the subcategories: network backbone and network functional units. The network outputs comprise the network commodities.

5.1.2.1 Network inputs

*The network backbone* is the foundation of the network; it encompasses characteristics and network provided motivations, which underpin the network.

Characteristics of the network are the formative characteristics input into the network such as structure, typology, leadership, goals, management, eligibility criteria, and incentives. These characteristics make up the backbone of a network, facilitating its formation, evolution, and growth to start performing KTE-related activities.

*Network Provided Motivations* are motivating factors that the network has ‘built in’ upon its inception, which serve as motivators for participants to join.
The network functional units are the parts of the network that facilitate its day-to-day functioning such as environment, roles, types of knowledge, and the principles of governance and demographics.

Environment refers to situations external to the network that can have an effect on network function. These political, social, cultural, technological, and economic situations, external to the network but within which the network must operate, can affect network KTE.

Roles of the participants in the network can be, are key to network functioning. The way in which participants are assigned certain roles and perform those roles can affect the entire network and network KTE, positively or negatively.

Knowledge, whether tacit or explicit, can affect network function. Knowledge permeates the network and its members, and the way in which these two types of knowledge are managed can affect network KTE.

Governance principles and demographics can affect how the network functions and performs on a day-to-day basis. Governance principles that can affect network functions include accountability, direction, and performance measures, among other things. Demographic principles include size and experience, which can affect functioning and productivity of network KTE.

5.1.2.2 Network outputs

Network commodities are the outcomes and products of network KTE that participants can use or benefit from. Network outcomes have been separated into tangible outcomes (products) and intangible outcomes. Tangible outcomes are output products and tools that can be used by network members, and stored in the network for future participants to use. Intangible outcomes are outputs experienced by individual network participants or groups of participants that cannot necessarily be stored and passed down to the next generation of network participants.

Tangible outcomes (products) are tangible materials used in or developed by the network or network members and passed down to later generations. Some of the tangible outcomes include tools (e.g., guidelines); common sets of terminology and nomenclature; publications or news
stories, verbal or written presentations (e.g., oral, poster, online web casts); information sheets; pamphlets; guidelines for obtaining funding, sponsorships, and grants; databases for storing or synthesizing information, algorithms, and models or conceptual frameworks; and training programs.

Intangible outcomes are intangible products that cannot be used or shared, but are experienced by the network participants as their skills and experiences grow and develop. They include tolerance, growth, status, and power. Intangible outcomes can be separated into three types: cognitive, relational, and developmental. Cognitive outcomes allow new tasks, skills, and experiences to be learned. These kinds of outcomes include, but are not limited to: innovation, performance, implementation staging, tacit knowledge generation, sharing and storing, collaboration, communication, and experience. Relational outcomes are relationship-building mechanisms. They include informal and formal relationships, trust, patience, understanding, respect, liaisons, and consensus building. Developmental outcomes allow for a participant’s personal and professional growth. They include public perception, goals, mission statements, growth, leadership, purpose, status in one’s field, and power.

Combined, the network backbone, functional units, and commodities make up the descriptive conceptual framework from the literature review of network KTE. The full list of included backbone, functional unit, and commodity features appear in Figure 4 (pg. 86).

5.1.3 Five Themes Emerging from the Qualitative Data in the Systematic Review

Alongside quantitative data, descriptive data on network KTE inputs and outputs were extracted from the 59 quantitative, qualitative, and mixed-method studies of the systematic review. The data extraction form appears in Appendix D. The descriptive data extracted from all 59 articles was subject to thematic synthesis according to the methods of Barnett-Page and Thomas (2009) and Tomas and Harden (2008). Five analytical themes resulted, reflecting factors that influenced network KTE: strength of network ties, voluntarism, network intent, trust, and social learning. These are described below with reference to the research studies they came from since these five themes were seen across several research studies.
5.1.3.1 Strength of network ties

The strength of network ties refers to the number of ties or connections made in a network, and how close those ties are. This is a network commodity because it is a tangible output of the network, which can be measured with social network analysis. The number of ties that exist in a relationship, the more connections—how many people are collaborating or connected with one another—the denser the tie the stronger the resulting relationship. This theme relates to social network theory (SNT) where one person in the network, via ties formed can impact another person, or the whole network by transferring information through the connections made in the network.

Six quantitative studies\(^{58}\) and three qualitative studies\(^{59}\) listed ties as important to network KTE. The stronger the network ties, the more satisfied participants were with the network. How many ties make a strong as opposed to a weak tie has not been quantified. Quantifying is related to network analysis and as such is beyond the scope of this research thesis. However, clearly, the more ties or connections in a network, the more people will speak, communicate, transfer and exchange information, research findings, knowledge, and ideas with one another. The more ties that exist, the faster and easier KTE can happen. When junior researchers or clinicians and students make ties linking them with more experienced practitioners and researchers, they create beneficial relationships. Expertise is thereby funnelled to this younger generation for them to use and to build on.

5.1.3.2 Voluntarism

Voluntarism describes the elective, noncompulsory participation of members in a network. It is an input and is part of the network backbone. Voluntarism relates to self-determination theory (SDT) which is a motivational theory. When participants are not directly incentivized, for example with money, they volunteer their time based on some other incentive or motive internal to him or herself. SDT posits that there are intrinsic and extrinsic motivations at play when someone volunteers for something, the underpinnings of this motivational theory was more

\(^{58}\) 11, 22, 43, 51, 55, 57
\(^{59}\) 14, 47, 49
fulsomely explored in phase 2. Generally motivation is a personal incentive derived from enjoyment, interest, or self-development. Since the purpose of the networks in the systematic review revolved around knowledge; self-development or interest could logically explain the voluntarism from the included studies.

In the systematic review, a large majority of the network-like entities (in 39 studies or 66% of the 59) did not incentivize participation, but rather but encouraged individuals’ voluntary, self-motivated participation. Two studies specifically explored voluntarism, and found it was a necessary input for the transfer of complex information. Although most studies did not explore voluntarism itself, the two that did found that when participation was voluntary, the type of information transferred was usually more complex and specialized. Mowery et al. (1996), for example, found that alliances could promote increased specialization; thus, more tailored, specific knowledge could be transferred between entities. In Mowery et al.’s study, voluntary participation was an effective mechanism for the transfer of complex information, capabilities and skills. The authors found that the network-like entity was an alliance, and the individual participants contributed their complex skills, sharing them among alliance partners. Mowery et al. also went on to suggest the need for a richer conceptual framework in considering the effects of alliance activities on knowledge, something this thesis is indeed exploring and creating.

5.1.3.3 Network intent

The intent of the network was an input that was part of the network backbone. When there was an explicit mandate, statement of intent or formal directive, the network increased KTE and the exchange of tacit or explicit knowledge around that topic of interest. When participants were clear on what they were joining the network to do (e.g. to learn, engage, or exchange information) participants were more likely to actually do it. Having a clear purpose or intent meant the network members recognized the KTE role. Intent relates to self-determination theory. Knowing the intent of the network, and having the option to participate voluntarily the participant will only do so if it will benefit them in some way or encourage some form of self-

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60 15, 35
development. Four quantitative studies\textsuperscript{61} but no qualitative studies listed intent as a network input.

5.1.3.4 Trust

Trust is a network backbone input. Trust is of particular importance to the exchange and transfer of knowledge within a network. In network-like entities, trust increased KTE and furthered the goals of the network. In an overall environment of trust, which included confidence and assurance, participants were more likely to engage with others. This suggests that trust begets voluntarism. Also, trust relates to social network theory, which elucidates the interworking of a network. If trust is important for KTE and SNT sheds light on how knowledge is spread from person to person in a network, SNT will require some degree of trust to be present in every network relationship. However, although the connection was alluded to, none of the 59 studies empirically investigated it or explicitly made the connection between trust and voluntarism. In a few of the studies, engaging with others created more sharing of information and knowledge, and decreased the concern around disclosing information or losing the “power” inherent in the knowledge. Two quantitative studies\textsuperscript{62} and eight qualitative studies\textsuperscript{63} listed trust as a network input.

5.1.3.5 Social learning

Social learning refers to the learning that comes out of social relationships formed in the network-like entities. This is an intangible network output part of the relational outcomes and should not be mistaken for social networking, which is a form of social structure that is used mainly for exchange of personal information, not professional information.

The social context here was the atmosphere of a network that was primed to foster social exchanges—namely, the activities provided by the network that enabled participants to create friendships and bonds. There was a greater likelihood of KTE within the network-like entity if a social atmosphere was provided. The social context encouraged KTE because socializing

\textsuperscript{61} 13, 21, 40, 56 \textsuperscript{62} 1, 36 \textsuperscript{63} 8, 12, 17, 29, 31, 39, 41, 47
fostered trust between participants. Social learning was actually listed as one of the most effective ways to learn, if the network provided a social experience.

Social learning is related to social network theory. SNT supports this theme in that network participants exchange and transfer knowledge more readily in a social environment. Five quantitative studies and six qualitative studies listed social learning as a network input.

Network ties, voluntarism, intent, trust, and social learning emerged as important characteristics that contributed to network KTE. These five analytical themes emerged in both the healthcare and organizational science literature. Through them it is easy to see how network intent can beget participant voluntarism, which fosters social learning, which in turn brings about connections and ties with others, which creates trust in the network. Logically these themes fit together but the systematic review did not explicitly link them to one another. However, building on these thematic findings, the qualitative semi-structured interviews explored voluntarism and network intent through participant role and motivation, ties, trust, and social learning through network activities, advantages, and challenges.

64 16, 21, 32, 36, 53
65 8, 19, 20, 27, 47, 48
Figure 4: Descriptive Conceptual Framework of Network Knowledge Transfer and Exchange
5.2 Results of the Qualitative Semi-structured Interviews

The sequential phases of this study build on one another. The results from the Phase 1 systematic review informed the questions for the qualitative interviews in Phase 2. This section presents thematic results from the 30 semi-structured interviews with members from the structured international healthcare knowledge network, G-I-N. The interviews were conducted by telephone or Skype with staff, board members, working group members, and general members of the network. They were asked about their role in the network, their motivation for joining the network, KTE activities they participated in using the network, advantages and disadvantages of participating in network KTE, and any recommendations they had to support network KTE. The overarching question, main themes of the interviews, and subthemes from the codebook are discussed, defined, and illustrated with exemplary verbatim quotes here. The complete codebook appears in Appendix O and the thematic maps for each theme appear in Appendix L.

5.2.1 Description of Interview Participants

5.2.1.1 Description of participant recruitment and characteristics

Ninety-eight G-I-N participants from developed and developing countries around the world were contacted by email, and invited to participate in an interview about network KTE. In total, 30 individuals from 14 countries participated in the interviews. Twenty-four of the 30 participants were from developed countries: Canada, the United States, New Zealand, Australia, the Netherlands, Finland, Norway, Germany, and the UK. The other six participants were from developing countries: Saudi Arabia, India, Colombia, Argentina, and Singapore. No differences were found between the opinions, views, and emergent themes of the participants from the developing and those from developed nations, so that the results were distinguished not by country but rather by network member type and role.

There were two member types: individual members who joined on their own and paid their own membership fees, and organizational members who were members of G-I-N through their professional organization. Twenty-one organizational members and nine individual members were interviewed. Members with different roles were also interviewed: six board/staff members, eight working group members, 15 general members and 1 non-member were interviewed. Tables 5 and
6 (pg. 88) show the participants based on their affiliation and member type. Also, Appendix N has a complete list of the participants identified by an anonymized code, official type of membership in G-I-N, and reported functional role in G-I-N governance and activities.

**Table 5: Interview Participants: Member Type List**

<table>
<thead>
<tr>
<th>Member Type</th>
<th>Totals</th>
<th>N = 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Members</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Individual Members</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Developing Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Members</td>
<td>5</td>
<td>N = 6</td>
</tr>
<tr>
<td>Individual Members</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td>N = 30 Participants</td>
</tr>
<tr>
<td>Organizational Members</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Individual Members</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6: Interview Participants: Member Role List**

<table>
<thead>
<tr>
<th>Participant Role</th>
<th>Totals</th>
<th>N = 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General member</td>
<td>12</td>
<td>N = 24</td>
</tr>
<tr>
<td>Working group member</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Board/employee</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Nonmembers</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Developing Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General members</td>
<td>3</td>
<td>N = 6</td>
</tr>
<tr>
<td>Working group members</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td>N = 30 Participants</td>
</tr>
<tr>
<td>General members</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Working group members</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Board members</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Nonmember</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
5.2.2 Network Affiliation: Membership, Role, and Involvement

The overarching question about role asked what the members’ role was within the network, and what part they played in the network configuration. Network membership was pre-determined by the network itself into two categories: network role, and network involvement.

5.2.2.1 Network membership

The fee payable to G-I-N for yearly network membership is based on membership type. The descriptors identified for network membership were: G-I-N organizational members, individual members, and non-members.

**Organizational members**

Organizational members participated in the network by virtue of their employment: “I’m not a personal member, but through my organization, and we have been a founder member” (021). This kind of membership was available to non-profit organizations that would benefit from being involved with the network because of their involvement in developing, disseminating, implementing, or evaluating clinical practice guidelines: “We have joined up to be an organizational member of G-I-N” (008).

**Individual members**

Individual members participated in the network on their own behalf: “I am just a single member” (016). Such members were not necessarily independently employed; they could still be part of a guideline organization, but the entire organization was not a member: “Our institution isn’t actually a formal member, but I am” (019).

**Non-members**

Non-members were individuals who could be uninvolved or very involved in the network; they might attend conferences, use tools freely available on the website, and network with others in the network, but they did not pay any dues, and thus did not have access to certain resources that paying members had. These kinds of members benefited from the network and contributed to it, but not financially. They were rare; only a single such member was identified, recruited, and interviewed: “I’m not a member, and not active in G-I-N” (004).
5.2.2.2 Network role

Network Role indicates the participant’s formal role and responsibilities within the G-I-N hierarchy, which follows a typical structured hierarchical governance scheme (depicted in Appendix H). The descriptors identified for network role were paid employee, board leadership position, working group position, and participant.

Paid employee

Paid employees were paid for their role, which included administrative tasks, guiding, or organizing certain network activities or initiatives; managing external liaisons between members; and hiring new employees: “Working with the organization of the conferences, mostly in terms of contact . . . but also supporting . . . how the G-I-N conference could run” (009). Being a charitable organization, the network had fewer than five full-time employees. Only a single employee of the network was interviewed.

Board leadership position

Board leadership positions were voluntary positions. Members had judiciary responsibilities and performed financial and administrative tasks such as planning, governance of the network, completing research work for the network, and vetting new members. Essentially, members in leadership positions led the network: “My responsibility’s essentially reading the network . . . Making sure that we’re meeting its mission and goal” (003). Although these members were unpaid volunteers, they performed these tasks on a daily basis, sacrificing their own time towards the network: “Handling network business on a daily basis” (023).

Working group position

Working group members were involved in leadership positions or in general positions within one of the eight working groups: evidence tables working group, G-I-N public, emergency care community, allied health community, implementation community, adaptation working group, performance measures group, and G-I-N North America. These groups acted as specialty subnetworks within the larger network and dealt with collecting and collating information, tools, and materials on their specialty topics and presenting this specialty information at the larger
network events as well as through separate interest group teleconferences and meetings. “I have been a member of the emergency care interest group of G-I-N for seven or eight years” (012).

Participants: General members and non-members

These were all the remaining participants in the group of general members or non-members whose role and participation was determined by their own initiative. They could be very involved in network life and activities: “I was very involved, from the beginning of the network” (013), or not at all. It was completely up to them: “I don’t need a ton of interaction with G-I-N as a network” (002), “As a general G-I-N member, you tend to have involvement with G-I-N primarily at the conferences” (024).

5.2.2.3 Level of network involvement

This descriptor refers to the members’ participation in network life and network activities. Based on self-descriptions of their level of participation, members’ involvement ranged from very involved and active in the network to minimal involvement. Emerging from this theme were three types of involvement: active, moderate, and minimal to no involvement.

Active members

Actively involved participants took a big part in network activities and duties. They actively sought knowledge or connections from the network and actively transferred and exchanged knowledge: “I was very involved, from the beginning and during the last year. I co-invented the organizational framework, established the administration, the first aims, goals and the first projects. . . . We established everything that one has to do in establishing an international network” (013). Such involvement included attending conferences, participating in online forums from the network, participating in working groups, using various tool and resources promoted by the network, submitting to the newsletter, and giving feedback, to name only a few.

Moderately involved members

Moderate involvement described participants who took had a smaller part in network activities because they have chosen not to be as involved. “G-I-N was kind of incidental to my own networks” (002). These participants might be involved in some of the activities online or in
person, but not on a regular basis: “[I have] a general role . . . so no, I haven’t gone to any meetings (029).

Minimally involved to uninvolved members

This last subtheme describes participants who were very peripheral to the network. Their involvement, if any at all, was of the lowest and simplest form. They were not engaged from an organizational standpoint, and they barely keep up to date on the network: “I’m not so actively involved in G-I-N” (004).

5.2.3 Thematic Findings From the Interviews

The key overarching questions, main themes, and subthemes are discussed below with illustrative exemplary quotes from a range of participants. They include inputs and outputs. Themes relating to network inputs include: motivation, activities, challenges, and recommendations. The theme relating to network outputs is the benefits theme. The complete codebook that was developed over the course of the analysis is included in Appendix O.

5.2.3.1 Motivation

The overarching question of motivation asked why participants were motivated to join the network. This question, relating back to the theoretical underpinning of self-determination theory (SDT), considered what pushed participants to join, and become members of G-I-N. In response, participants articulated motivations that were categorized in six main themes: collaboration, network credibility/legitimacy, access to tools/resources, natural progression, cost savings, and promoting network development.

Collaboration

This theme describes why participants joined the network: they wanted to collaborate, work together, and jointly participate with others in their field to share and exchange knowledge, tools, and resources towards achieving a common purpose, benefit, or goal. This theme was voiced by newer members who had general roles within the network as well as by veteran members who were very involved in the network and had been participating for a number of years. The theme has six subthemes: international collaboration, learning through collaboration, sharing through
collaboration and receiving feedback, promoting their work through collaboration, “made sense,” and networking and connecting with other members.

International collaboration
Many network participants wished to promote further collaboration internationally using the network, particularly on topic-specific clinical practice guidelines: “There were some strong needs for more international collaboration between ours and other guideline organizations” (005). Whether it was the participants themselves, their employers, or others who needed or wanted it, they were motivated to join and be part of the network for the opportunity to collaborate on a global scale: “What it was for me, it was the sharing. It was just being able to be in contact with people from around the globe, share my experiences, learn from them. This was really my objective” (009).

This subtheme applied to new and long-standing members alike. Interestingly, many participants from North America were not as concerned with international collaboration as were participants from Europe, Australia, and New Zealand. This could be because the North American participants can connect with people who are geographically closer and have similar working standards through the Guidelines International Network North America (G-I-N/NA) network: “We could get along just as well with G-I-N/NA, as with G-I-N. So it doesn’t make or break what we’re doing” (015). This was a member of G-I-N, was from North America, and had only collaborated using G-I-N/NA due to the geographic proximity of the meetings.

Learning through collaboration
This subtheme describes participants’ motivation to join and be part of the network because they wanted to collaborate with individuals from whom they could learn: “I want to see what I can learn from what other folks are doing right” (003). The subtheme refers specifically to learning through collaboration within the guidelines field, because the network was the only forum that could connect them to guideline experts from whom they could learn: “It’s the only worldwide forum of guideline experts . . . to learn from each other” (013).

Sharing through collaboration and receiving feedback
This subtheme describes the motivation to participate in the network in order to share their work with others in the guideline field and get feedback on their work by doing so: “Personal incentive
to be able to present what you’ve been working on . . . an opportunity to bounce your ideas in a more informal situation” (020).

Promoting their work through collaboration
People also wanted to collaborate in the network in order to put their work on display—to really promote, contribute, and boost the visibility of their own guideline-related work: “There was that opportunity to kind of promote the business . . . that’s developed into quite an internationally recognized guideline brand” (007). Few participants expressed this theme, but those who did seemed to have had more experience with the network and wanted or needed exposure or recognition for their work to be successful or continue.

Made sense
Many participants were motivated to join and be part of the network because it was logical. It was in line with their work or professional role and thus it made sense to be members: “The reason for joining G-I-N was primarily linked to my work, which as a guideline developer, it made sense to join this emerging group” (024). Their motivation rested in logic—their work was inextricably linked to the guideline field, and thus to the topics and work of G-I-N. This theme was cited by a variety of participants, both new members and long-standing members, and from developed as well as developing nations.

Networking and connecting with other members
This final subtheme represents the motivation of connecting and linking to other members as the reason for joining and participating in the network. Participants wanted to meet new people in the network: “For the day job it’s a great networking opportunity” (012). This motivation led people to look for others whose interests were aligned with their own and with whom they could connect: “Looking for people and groups that had similar interests, where it would be possible to have the kind of exchange and learning and values that you can only get when there are a meeting of people and individuals and organizations that have aligned interested” (008). Some long-standing members also mentioned this theme but for the most part it was the newer members who were eager to connect and network using the activities available. These were people who were just getting into the guideline field or had started new research on a guideline-related topic, and were acutely aware of the networking and connections available through the network.
Network credibility and legitimacy

Some people joined because they wished to increase their own credibility or their organization’s credibility in the eyes of others, through participating in a network that was a credible entity related to their professional role and interests. This theme mainly emerged for participants who were individual members or who were part of a newer guideline group. One person spoke to building and then maintaining credibility by belonging: “It just really takes a number of people who are willing to put the effort in to maintain credibility” (006). Another idea that arose in this theme was creating credibility or legitimacy for oneself or one’s research partners by being a member of the network: “The main motivation to join was while working with partners on a guideline project, and it was to really show them that it’s important to belong to different associations and memberships” (006). This was a stand-alone theme; no subthemes emerged.

Access to guideline tools and resources

Some people joined the network to access the various tools and resources to which only G-I-N members have access: “To be blunt it was to have access to the G-I-N database” (016). This main theme was also a stand-alone. No specific trend emerged in who mentioned using these resources— many people mentioned the guidelines library and other online resources available in the G-I-N working groups.

Natural progression

A single participant had been with the network from the very start. This member of G-I-N’s founding group described wishing to remain involved in the network as it grew and evolved over the years: “As a natural progression from the original work that we did on the AGREE framework” (001). This main theme was also a stand-alone.

Cost savings

One participant from a developed country, an individual member who paid their own dues, mentioned the cost savings they received when attending the annual general meetings: “It’s financially advantageous to be a member when you register for the conference” (002). This was another stand-alone main theme. It was actually somewhat of an anomaly because most
participants said that the cost of network membership was too high. This is discussed further in the section on the theme of challenges.

**Promote the network development and growth**

Some participants wanted to promote the network itself: “At that stage kind of be a good corporate citizen and try to facilitate the development of this network” (001). This was a stand-alone theme cited by members who were highly invested in the network and had been participating for quite a while. Their frame of mind was ‘what can I do for the network,’ whereas, alternately, newer members were more likely to have the frame of mind of ‘what can the network do for me.’ This speaks to loyalty long-standing members had to the network. They felt invested in and their success became linked to the success of the network.

**5.2.3.2 Activities and outcomes**

This overarching question asked about the undertakings of the network, what activities G-I-N members participated in within the network and in what way they participated in them. It was underpinned by actor network theory (ANT), which explores collective sociotechnical processes, and seeks to understand the relationship people have to inanimate objects or tools that they use to connect with others (e.g., the telephone or email) or learn from others (e.g., webinars, posters) in various settings. The question resulted in three main themes: using the network, contributing to the network, and fixed products or static tools.

**Using the network to participate and learn**

Participants used the network for its resources or materials and participated in network activities to either learn or connect. In this theme the network could have been used for bidirectional or unidirectional exchange of knowledge. The theme encompasses using, gaining, and seeking any sort of knowledge, resources, materials, skills, and expertise from the network through available passive or active means. The subthemes that emerged from this main theme were: attending the annual general meeting (AGM) to learn; attending the AGM to connect; using teleconferences/webinars to learn; using the newsletter to learn; and using the G-I-N working groups to learn
Attending the AGM to learn and connect

Many participants attended the annual conference and its activities and resources to learn and take away new, interesting, or relevant information: “I have learned a lot from the conferences. I have learned a lot from the colleagues, when I attended the workshops and listened to their presentations” (017). Attending and participating in the AGMs was an active bidirectional form of KTE, where the participants specifically sought out opportunities to learn.

The activities at the AGM facilitated making new connections, fostered old connections, and linked up with people from the same field: “Connections evolved through the network, especially through the annual conferences” (013). The AGM also provided a venue wherein to make connections with other individuals in the guideline field. Participants described going to the meeting intending to talk to specific people, or identifying the types of connections they wanted to make at the meeting based on the guideline-specific topic they were interested in: “Through G-I-N meetings I was able to identify a lot of different key players in guideline development, people who are really interested in moving the profession forward” (006).

Participating in teleconferences and webinars to learn

Many interview participants specifically described using the monthly G-I-N North America (G-I-N/NA) webinars and teleconferences for learning: “The G-I-N North America webinars are extremely useful and informative” (019). These were G-I-N/NA chapter-specific activities; however, they were open to anyone from the international network that wanted to join them. This could be a unidirectional or bidirectional form of exchanging knowledge based on how the participant interacted on the teleconference or webinar.

Using the newsletter to learn

Participants described using the monthly newsletter, enG-I-Ne, as a source of information and learning: “I more or less use the information which comes to me from . . . the newsletter” (011). This is a more passive form of using the network which is a unidirectional exchange of knowledge, but it is one that also keeps participants regularly up to date on the network happenings: “The newsletters are good because they keep me up to date with new publications” (007).
Participating in G-I-N working groups to learn

Eight G-I-N working groups are available for members to join. In them, they can learn from one another about a specialty topic to do with CPGs: “Working together [in the working groups] . . . from my personal point of view, is the best way to learn from each other” (013). Another participant stated: “The involvement in a working group, that helped . . . open my mind” (009). Participants who cited taking part in the working group to learn were generally people who had been G-I-N members for a few years. Newer members interviewed seemed to be less familiar with the working groups and instead preferred in-person networking using the AGM rather than the working groups, which often met via teleconference.

Contribute/giving to the network

People gave back to the network, by mentoring and/or teaching others from the network, or disseminating their work and knowledge through various network activities and avenues.

Mentoring or teaching others

Global experts participated in and contributed to the network by imparting knowledge to others, through consultations, teaching, feedback and mentoring: “I’m one of the experts, so people ask questions of me, and I share my knowledge with others” (005).

Disseminating knowledge

Various avenues existed within the network for disseminating knowledge: the AGM, the working groups, publishing papers, and the monthly G-I-N newsletter. These avenues for disseminating knowledge were both interactive bidirectional as well as unidirectional exchanges of knowledge depending on the activity.

At the AGM, members could present a poster, do an oral presentation, or host a workshop: “I’ve had the opportunity to present. . . . I’ve attended these meetings that are under the G-I-N umbrella. . . . I’ve felt I have a very nice platform for expressing my views or letting people know what I think” (012). Members could also disseminate knowledge through participating in the working groups. Joining one of the eight specialty working groups allowed network participants to disseminate their knowledge or research about a specialty area to that specific audience: “Through the working groups, we have been able to contribute knowledge” (010). Another way to disseminate knowledge was by publishing papers. Whether on behalf of the network, their
organization, or themselves individually, participants described publishing in research journals and then making the publication known or available to share within the network: “I’ve been involved in publishing papers” (023). “Sharing information or knowledge through papers that have been produced” (014). Lastly, participants could choose to disseminate knowledge via the newsletter, enG-I-Ne, which was circulated monthly in the network. This online newsletter was used to push knowledge out to the G-I-N community: “Through their newsletter, advertise our stuff; our projects” (001).

**Fixed products or static tools**

Emerging from the question about activities, this theme describes the static tools or fixed products advertised by the network. Although these are also forms of contributing to and using the network, they are static, noninteractive mechanisms. These static products or tools are more closely aligned with unidirectional KT and are not the interactive mechanisms needed and used for KTE. Network members use them to post information, look up information, or use in some other way in their professional work. Three main products identified by members as the static KTE tools used most often are also the subthemes for this section: the G-I-N website, tools advertised by the network, and the international guidelines library.

The G-I-N website

The G-I-N website is hosted by the network. It lists network activities and houses tools, contacts, back issues of the newsletter, information about membership, contact information, and a history of the network. This is what some of the participants said about the website: “I look at the website and use some of the tools that are available” (004), “Using the G-I-N website as a kind of information resource area” (019), “I have accessed the material available on the website that is free to access” (026). The website was the main point of contact for G-I-N related activities and almost all participants mentioned using it directly or in passing. The website is a unidirectional source of knowledge and information, passively being used. Interestingly, those participants who were not as active in person at the G-I-N AGMs seemed to rely more on the website to get information and access tools and resources made available to them. No trends stood out for this subtheme.

Tools advertised by the network

G-I-N advertised tools on the network website, another unidirectional source of knowledge and
information. The network did not develop them but they were advertised as appropriate for use in relation to guidelines-related work by the network. Some of the tools used by participants were: “The ADAPT process, the AGREE toolkit and ADAPT Version 2” (025), “The methodological tools: ADAPT and the new AGREE formulary mostly” (029). Participants interested in guideline adaptation and implementation generally used these tools. There was no difference in network role or participation where the use of these tools was concerned.

The international guidelines library
Participants noted that the international guidelines library was a database of housing guidelines, guideline products, relevant links, and additional tools available to members of the network. Members found the library a useful tool, and said that it was amenable to independently retrieving and accessing the guidelines of interest to them for research: “The G-I-N database got up and running was a useful tool” (019), “G-I-N offers this large [guidelines] library where you can do your research” (021). This static unidirectional tool was undoubtedly the most cited tool in the 30 interviews. Every participant had either heard of the guideline library or had used it at some point. It is one of the biggest resources for clinical practice guidelines in the world, housing hundreds of international guidelines for various clinical conditions. Participants who mentioned accessing it said that they did so on a regular basis and that it was the most important informational static resource they had access to through G-I-N.

5.2.3.3 Perceived benefits of participating
This overarching question asked participants about the benefits they experienced from participating in an international network. “Benefit” was defined as the advantage or gain that participants had from participating in the network. Benefits could be anticipated or unanticipated. Anticipated benefits might have prompted membership, or membership could have brought unanticipated benefits. The main themes that emerged from this overarching theme were connecting, learning, sharing, rejuvenating their interest, recruitment, interacting socially, and developing the field of guidelines itself.

Connecting
Participants described the benefit of being part of the network as having the ability to use the network activities, resources, tools and network access as a source for making new connections,
fostering old connections and linking up with people in the same field, locally and internationally.

Three subthemes were associated with this main theme: connecting to a community, in-person connecting as an aid to trust, and international reach.

Connecting to a community
Connecting to a community or to people with similar interests was a popular subtheme. Many said that the network brought together people who were in the same or complimentary specialty group: “G-I-N is like a bridge to connect with people . . . through G-I-N you have access to people” (027). To this end, participants described the benefits of participating in the network as making new connections and fostering old ones, to work or collaborate with and gain knowledge from on a topic of interest in the guidelines field: “I was able to build connections with folks who were in a very similar situation that I am in and who had similar interests” (003). Also, another benefit of participating in the network was the ability to link into an established guidelines community, to connect with like-minded people collaboratively to share resources such as knowledge, information, tools, and connections. Connecting with others in the network allowed participants to work with others in the network towards a common end, goal, or product while building trust: “G-I-N is a network and brings people together. It connects people. . . . The real work is not done by the network, is not done by the working groups . . . it’s only for exchanging knowledge and experience” (005). By linking into such a community people said they had access to various resources in the community’s possession: “It’s been professionally really excellent . . . connecting with people who are interested in consumer engagement” (007).

Connecting in person aided trust
Participants described the benefit of participating in the network for that human element, contact: “I think once you’ve established that connection in-person, then you can pick up the thread so much more easily via teleconference and email system” (023).

Meeting in person at the conferences allowed connections and working relationships to be formed while fostering trust: “If you’re going to collaborate you have to trust the people that you’re working with. And I think that that only really happens when you’ve actually met these people and talk to them in-person” (006). Many participants described meeting face-to-face as trust enhancing; participants mentioned that trust helped foster collaboration and the ease of doing work remotely. A few participants, as illustrated by the quotes above, mentioned that once you had met
someone in person it was easier to communicate with them over the phone or on a teleconference because you knew their likeness and had had a chance to observe their body language. Several participants mentioned that despite all the communication technology to link to others internationally there was still something special about being able to connect and network in-person, such as at the G-I-N AGM.

International reach
Several people mentioned the benefit of participating in the network as the ability to connect with organizations and people through the network who came from many different continents and cultures, to discuss the same topic or issue (i.e., guidelines) and to collaborate on topics of relevance and interest globally: “Benefits are actually a very rapid way of connecting with similar/relevant organizations around the world . . . You can garner views across an international audience” (023). Another participant stated: “I get a lot of good ideas because the network is not limited to the United States; there’s been very, very good opportunity for me to learn” (003).

Learning
Learning was described as a benefit of being part a network and participating in the network activities. For participants, learning meant acquiring knowledge or skills through experience, practice, study, or by being taught. Two subthemes emerged from this main theme.

Gaining knowledge
Participants said they gained knowledge from the network by active studying, experiencing, or seeking out learning opportunities: “I’ve gained more knowledge from my G-I-N involvement than what I’ve provided” (012).

Generating ideas
Idea generation overlaps with the systematic review’s notion of knowledge generation. A few participants in the network mentioned that they benefited from the ideas that were generated while they were taking part in a forum with various people: “Whenever you meet with other people that always generates some discussion . . . and good ideas” (003). Members who participated in G-I-N subgroups mentioned the theme of idea generation. This could be because the subgroups dealt with specialty guideline topics, rather than broad general guideline topics, and members of these groups could more easily zero in on a specific idea or innovation to pursue.
Sharing

For participants, disseminating their ideas to the network and receiving constructive feedback from other members based on shared information was an important benefit. Two subthemes emerged: disseminating guideline knowledge throughout the network, and getting feedback.

Disseminating guideline knowledge through the network

This benefit gave participants the chance to spread ideas, knowledge, and resources throughout the network to the people who wanted it: “The ability to post the guidelines and therefore to make it known to others that you have a guideline available or that you’re working on a guideline” (009). This can be a passive benefit, if network members have seek them out and approach them. But it can be more active or interactive if they make their information available through one of the avenues at the AGM: “I find that I can share knowledge that I’ve learned in my own work by participating [in G-I-N]” (023).

Getting feedback

Some participants mentioned the usefulness of getting constructive feedback on their research work or ideas: “It’s a conduit, to vet some of our ideas” (019). Two participants mentioned this, both of whom were newer G-I-N members and newer investigators.

Rejuvenation

The advantage of being part of the network is to reengage in the field of guidelines, to be recaptured by the work by speaking to others and collaborating and participating: “You can have that sort of rejuvenation of your interest about your own work when you go and speak to other people in the network” (020). Being refreshed and motivated to continue on in the field was voiced as a benefit by one single participant who had been a long-time member of the network and had been working in the clinical practice guideline field for a number of years. It was not a popular or common theme, and had no subthemes.

Recruitment

Finding interested allies/participants for research was important to one: “The one thing that G-I-N has done is they have helped us to recruit participants for different studies . . . That has been a big benefit” (001). Being part of the network or participating in activities allowed this single
participant to create a larger, more diverse group of connections to use in their professional work. This was a stand-alone theme.

**Social interaction**

Participants described using the network as a means of social interaction. That is, being a part of a network and taking part in network activities meant that people could connect with colleagues for social/amicable reasons and to foster friendships. This is an interpersonal theme: “The unstated reasons why people belong to networks is the collegiality, I guess is how you would say it in an organizational context, but the friendships are the way that you would say it in a personal context” (008). It was also about relating to the types of people you were meeting and appreciating them not only professionally but amicably as well: “You want to hang out with people who you can relate to” (003).

People who were more involved in the network or who had been involved for a longer period of time cited this social interaction theme. Newer members and general members spoke a bit more about professional connections whereas the people who had specific roles and invested more time in participating also mentioned this social aspect. This could indicate that although networks are social interventions perhaps it takes time to build friendships from professional connections.

**Developing the field of guidelines**

Network participants saw that they were helping to develop and enhance the field of clinical practice guidelines. This stand-alone theme refers to the perceived advantage of being part of the G-I-N group and participating in the activities of G-I-N in developing this field: “You’re helping [to make] progress [in] working knowledge in an important area that wouldn’t occur if you weren’t contributing in that way” (008).

5.2.3.4 Challenges of participating in an international network

Participants were asked about challenges and barriers they faced in participating in an international network. Five themes emerged: multinational collaboration, participant contributions, change management, standards, and membership fees.
**Multinational collaboration**

Participating in a network that spans international boundaries presents difficulties. Challenges emerged in the form of two subthemes: scheduling and language.

**Scheduling**

The physical location of different collaborators sometimes created an obstacle to collaborating: “I think . . . we could do better. It’s hard to get people on phone calls. It’s hard with meetings” (012). Also, navigating different time zones and the inability to travel so as to meet in person created barriers when connecting and collaborating through webinars and teleconferences: “It’s much, much harder to get involved in complex discussions, when you have to be quite regimented going round the call [teleconference]” (023).

Participants who were from the eastern hemisphere (including the Middle East, Asia, Australia, and New Zealand) cited this scheduling theme predominantly. Although there are still time difference between Europe, North America, and South America, 6- to 9-hour time differences were found to be less extreme and easier to plan teleconferences and web-ex meetings around than 12-to-20 hour time differences. This demonstrates how KTE is affected by the global scope of the network on a very practice issue.

**Language**

English as the main language of communication presented problems for some participants, based on how extensive their familiarity was with it: “One of the difficulties that I think you have with G-I-N is that first of all it is an Anglophone organization” (024), “Difficulties I guess are language difficulties” (023). Participants who were from non-English-speaking countries cited this subtheme. Although participants cited this as a challenge they navigated it rather willingly, knowing that most international organizations are now predominantly English speaking. This again illustrates how KTE is affected by the network’s international scope.

**Participant efforts**

This theme emerged in the interviews as the participants described the costs they experienced as a consequence of participating in the network. These costs included time, energy, and effort, which were given voluntarily to participate in network activities. Two subthemes emerged from this main theme.
Participant time and voluntarism
Volunteers make a substantial investment of their personal time: “Being a very active partner in a group like G-I-N, yes you do have to give up a lot of personal time” (008). People who cited this theme were predominantly those who were heavily invested in the network—those who held central roles on either the board or working groups, for example.

Participant engagement.
Conversely, participants who were less involved or were newer to the network were more likely to cite engagement: “I think it’s just a lifestyle, you always have to be thinking of how to network, and you have to recognize individually that if you’re not participating, it’s not working to its fullest” (016).

Together, these two subthemes illustrate the costs in terms of contributions it takes to engage and participate in an international network, using and donating one’s own time. The newer participants who cited engagement were aware of the need to be active and outgoing, engaging themselves in the network in order to see benefits related to increased networking, collaboration, and connections.

*Change management*

Change management refers to network management, and evolution of that management over time. This was cited as a challenge by people more involved in the network who currently or previously occupied leadership or working group roles. As the network grew and evolved over time, change and turnover of membership, the management of the network by the board, and the revenue stream for the network (a charitable organization) also changed. Three subthemes emerged: stagnation and sustainability, oversight of operations, and network revenue.

Stagnation and sustainability
To avoid membership stagnation, participants saw that the network needed to manage its growth and size to keep it functioning effectively and efficiently, while getting new, relevant membership: “The challenge now might be to develop the network with respect to the community, from my personal point of view it is only able to survive if there is continuous growth” (013). Objectives and values to keep the network relevant are also needed, so that the network can make itself sustainable and relevant to the community now and into the future: “One of the other sort of
difficult things for a network is [that] . . . stagnation is a really big risk and I think that it’s important that there’s a capacity to engage new people” (008).

Overseeing operations
How the network handled issues of management longevity and operating practice into the future was noted by some. Was the network being led appropriately? “Not many people on the board have been responsible for running their own organizations, in terms of leadership and the business skills of bringing organizations to life and leading them” (007). One participant in particular was very concerned about this point. This person had previously been a member of the board and spoke about the network as an organization that needed guidance, leadership and business skills to operate and grow.

Network revenue
Speaking about revenue sources to support its small staff and activities, one participant said: “We are kind of naked now when it comes to financing the network” (014). Another participant noted: “For a network, particularly an international network, to exist and prosper, it needs to have other resources that are more than just membership fees” (008). These two participants were more highly involved in the network and occupied board and working group roles. They especially expressed doubts and worries about how the network planned to sustain itself into the future, mentioning that the AGM was losing money, and if that did not change the network’s future could be in jeopardy.

Standards: Collaboration limited by inconsistent use of methods
Some participants noted that different countries had different standards for guideline methodologies, which could be problematic: “What we’re finding to be very difficult is that all the groups kind of use different methodologies . . . I think as we all start to use the same methodology and hopefully similar grading systems, you know like the grade system, there will be much more of an opportunity for us to collaborate” (006). The example here describes more of a technical issue to do more with guidelines than with KTE in the network. However, KTE within the network could be a solution to this technical guideline problem. The more KTE occurs within the network, the greater likelihood that international collaboration would occur and perhaps a standard
methodology will be favoured and chosen as a standard or best-practice methodology. This was a stand-alone theme.

**Membership fees**

As a theme, membership fees echoes what was said about network revenue, and how participant membership fees cannot be the only source of revenue. Participants mentioned feeling the pinch in their pocketbooks; when asked about challenges, a participant from a developed country noted: “The negative side is that it is not an inexpensive organization to join. I have no problem with the concept of paying. It is how much you pay” (001), and a participant in a developing country expressed the same sentiment: “The issue was the financing issue, the high membership fees” (025). This was a rather controversial theme. A few participants, long-standing members who at one time had occupied or currently did occupy board level positions, put forward the idea that membership should be free. One interesting finding, consistent among members from developed and developing countries, was that membership was expensive and a few members mentioned that if it continued to increase they might have to revaluate the status of their membership.

5.2.3.5 Recommendations for Improvement

Participants were asked about how their network experience could be improved specifically in regards to KTE. For example, they were asked how else they wanted to exchange knowledge, or what they were not getting out of participating that they would like to get. Six main themes emerged: products/outputs, strong board level leadership, better engagement at the annual general meeting, translation, social media, and more topic-specific subgroups.

*Network products/outputs*

Participants wanted the network to produce more tools or innovate more. Three subthemes emerged: guidelines topical tools, publications/scientific journal, and seeking government sponsorships. These themes were not cited by many participants, but are worth mentioning here because they are tangible products that a network could produce and perhaps sell, as suggested by a minority of participants.

*Guideline-specific products*

Members wanted G-I-N to create tools or products for developing and implementing guidelines,
instead of just suggesting which tools, conceptualized by others, should be used or were good: “There is value in looking at the way that you could develop tools to help other countries use existing guidance, particularly because the evidence of existing guidelines is already of high quality. I guess that is what I would obviously hope G-I-N could be doing” (024).

Publication/scientific journal

One participant suggested that G-I-N put out publications having to do specifically with guidelines: “It’s now not so difficult to start a scientific journal. . . . It’s something to consider” (004). This was one participant’s recommendation about increasing KTE, however the finding should be interpreted with caution because publication in scientific journals, or starting up a publication is mainly a unidirectional “push” strategy and does not account for the “pull” or bidirectional exchange inherent in KTE. While most other members simply suggested publication, this member in particular suggested that G-I-N itself produce a publication, perhaps as a way to secure funds or to gain wider recognition/credibility internationally for guideline collaboration. The participant did not expand on this point and when prompted simply stated that they had experience with a journal and it was “not so difficult.”

Sponsorship

One participant ruminated about how the revenue stream in the network could be created: “Get sponsored by government. It could be a lot of these big funders, internationally, who are funding research. . . . We haven’t checked out that market at all. . . . G-I-N has never participated in anything like that” (014). The few participants who mentioned this had previously occupied positions on the board of G-I-N and were perhaps more strategic in thinking about how to ensure G-I-N’s survival through funding and sponsorships. Newer members who occupied general positions within the network did not have the same insight into network finances and were not as concerned with the longevity of the network as those who were long-standing members and who had experience leading the network in some capacity. Although this theme was not popular it did point to the differences in newer and long-standing members’ foresight based on experience.

Strong board level leadership

One participant who occupied a leadership role in G-I-N spoke about how the network needed to have leadership at the board level, which in this person’s experience would translate into
transparency, confidence, and engagement in the leadership as the network grew and evolved. Strong upper executive-level leadership was equated with confidence and the ability to engage members: “I think you need leadership. You need to have the confidence to articulate what it is that you want to do . . . [and] have the ability to talk to your network and not operate secretly. And find ways to get the network to contribute and not say the network is only a cluster of people on the board” (007). Again, because this idea was most strongly voiced by one participant it should be interpreted with prudence.

**Better engagement at the Annual General Meeting**

Here, participants described wanting to get people more involved at conferences through icebreakers, mentorship, and workshops. Participants who expressed this were members who had been participating in G-I-N since its inception. They said that the conference is actually the reason they are members. They mentioned that they gained a lot by interacting with other members at the meeting. These few long-standing members who were still very involved with the network suggested ways in which the AGM could further enhance their KTE experience; they said that it was the one place where all in-person networking and connections in the organization were initially fostered among attendees: “Creating a culture of inclusion . . . [to] have people interested in mentorship. . . . With workshops, with a sense like you’re working toward something” (002), “Have some type of icebreaker at these receptions that would force people to interact” (006). No subthemes emerged here.

**Translation**

One participant desired translations to be made for popular guidelines. This participant had a unique role within the network, assisting with having other non-English-speaking countries adopt and adapt guidelines. Having G-I-N resources in several languages would be an asset: “For G-I-N to help with is actually translation . . . a huge, huge barrier . . . you have to get permission to translate that guideline before you can adapt it. You know, most people get around that by just simply ignoring copyright rules, which I don’t think is a good approach. And so that’s been a huge problem and barrier for us . . . because again . . . these countries will just break the copyright rules” (016). This was a stand-alone theme, which demonstrates how KTE is impacted by the network’s international scope where language must be considered.
**Social media**

Many participants expressed the desire to use various platforms to help promote and advertise the work of G-I-N and its members, such as Twitter, LinkedIn, and Facebook. Although in-person strategies were favoured by a large majority of participants, several participants voiced these ideas about online social media as well: “A meeting is not enough, how can we develop . . . electronic ways to put people in contact with each other?” (003), “Perhaps Twitter . . . I do use Twitter but for following a number of major medical journals, I could imagine to add G-I-N to it” (004), “It would nice to start to offer, sort of LinkedIn-style groups that can sort of follow a thread of discussion together, on topical issues” (023).

**More topic-specific subgroups**

Lastly, this theme reflected a few participants’ recommendations to have more topic-specific subgroups than the eight that already exist: “In the steering group they all have the same agenda and they’re all very keen . . . Having more . . . little hubs or a steering group . . . [would enable] much more concentrated transfer of information” (019). This was not a very popular subtheme and when probed about what kind of topic-specific subgroups, the few participants who mentioned it did not have any specific topical suggestions. These participants were newer participants who were perhaps not as familiar with the network and all its resources.

**5.2.4 Summary of Interview Findings**

In summary, the 30 qualitative semi-structured interviews conducted with participants from developing and developed nations in G-I-N provide clarity on the unique characteristics of this international healthcare network and its KTE functions. The interviews revealed how the network was structured, the types of members that participated, and the roles they played within the network. The interviews further clarified the participants’ motivations for joining the network, which pertained to the perceived benefits they believed they would get from taking part in the network. Motivation is part of the network backbone, it is related to self-determination theory, the micro level theory in this work. Motivation for self-improvement and development was a driving factor that pushed participants to join and take part in the network. Another part of the participants’ motivation was related to collaboration and accessing benefits related to network membership.
The activities undertaken in the network were described in three main categories: contributing, using, and static products. The activities listed in contributing and using are akin to the network KTE “inputs” and “outputs” as described in the systematic review. These activities consisted of KTE activities that encouraged active bidirectional knowledge exchange such as: the AGM, teleconferences, webinars, and working groups. There were also network activities that were more KT related static and unidirectional, such as: the newsletter, publications, the website, and the guidelines library. Here, as in the systematic review, participants were either “inputting” their contributions and/or using the “outputs.”

Many of the activities were reliant on online or web-based communication. This relates back to actor network theory, where the mechanisms used to communicate are as important to the exchange process as the communication itself. However, face-to-face in-person interactions were still favoured, especially at the AGM. What became evident in the interviews was that the involvement the participant had; whether active, moderate, or minimal was a factor in whether they engaged in more active bidirectional KTE or passive unidirectional KT. Generally when a participant was more involved they would engage in the bidirectional KTE activities on a more regular basis, especially the in-person activities at the AGM.

Benefits, challenges, and recommendations for improved network KTE were described. The benefits pertained largely to connecting, learning, sharing, and interacting socially. The benefits were categorized as outputs of the network in the descriptive conceptual framework. The social aspect of the network relates to social network theory. This meso level theory states that in a network one participant has the ability to impact several or all participants through social means. We saw this finding in the systematic review as one of the five key themes and it emerged here in the interviews as well. Participants want to transfer and exchange knowledge in a social environment where they can connect, learn, collaborate, share and interact with their peers.

The challenges to participating in the network were also described by participants. Participants related most challenges back to the internationality of the network; the cost to their time, energy, and funding; language; and the management of the ever-changing face of the network itself. The recommendations provided by interview participants to improve their KTE experience in the network related to increasing the presence of the network in online social media, providing
specialized services such as translation, and increasing opportunities for networking and engagement at the popular AGM.

One of the interesting findings that came out of the challenges and recommendations themes was the internationality of the network. Two of the challenges cited by participants were language and time zone, and then one of the recommendations was to make translation of guidelines available. Challenges and recommendations are inputs that need to be considered when forming the network; they make up the functional units of the network. When a network is international in scope, such as G-I-N, certain consideration around language, accessibility of documents and time zones or scheduling need to be taken into consideration. These practical considerations need to be address in order for the network to enable the active bidirectional KTE activities and passive unidirectional KT activities it provides for its participants. The complete interview codebook is in Appendix O.

5.3 Results of the Integrated Relational Analysis

In this section results from the integration of Phases 1 and 2 of this research thesis are presented. In the integration analysis, the results of the systematic review were combined with the results of the semi-structured interviews. The relational analysis was complemented by systematic data integration. Considering the systematic review’s conceptual framework and the codebook from the interviews, data were considered based on: how different elements fit together, the unique thematic attributes from each phase, and the overlaps in complementary characteristics of network KTE.

The data that was integrated from both the systematic review and the interviews included information about: context, the network purpose, the participant motivation, the role of participants, the activities and interactions, outcomes and management characteristics. The data that came only from the systematic review was information on the environment. The data that came only from the interviews was information on challenges and recommendations. This data was put into a table and each detail found in the systematic review and the interviews catalogued. Those that overlapped were noted with a checkmark (✓) and were placed into the framework based on SH’s understanding of network KTE. The information that was unique from the interviews or systematic review was placed into the conceptual framework to complete the missing information. Furthermore, any information such as structure, leadership, and environment that was not investigated in the systematic review or the interviews but was a product of the background
literature review was kept because it came from peer reviewed publications or published documents from reputable organizations such as WHO, OECD, and The Health Foundation UK.

A table summarizing all the nuanced unique and overlapping themes from the interviews and the systematic review is presented in Appendix K.

5.3.1 The Integrated Conceptual Framework

Based on these categories of characteristics found in the two sequential phases of this study, the integrated conceptual framework shows the details of each theme and its related wed diagram. The integrated conceptual framework appears in Figure 5 (pg. 116). The large bolded text labeled: **Role, Motivation, Activities, Benefits, Challenges**, and **Recommendations** are where themes from the thematic maps fit into the descriptive framework (additionally these themes are colour coded). The complete thematic maps for each of these themes appear in Appendix L.

**Role** denotes the roles specific to G-I-N participants. The descriptors and themes from participant roles are a network input; they appear in the network functional units and were grouped with the list of general roles. These role intricacies appear in Appendix L and include: network membership, network role and network involvement.

**Motivation** is a personal incentive in the framework and is part of the network backbone. The accompanying thematic map from Appendix L illustrates the subtleties of participant motivation, which includes: collaboration, credibility, tools/resources, a natural progression, cost savings and network development. This is a personal incentive that each participant in a network will experience differently, as outlined by self-determination theory.

**Activities** are themes that were captured in the interviews that outline inputs to the network including: how participants use network resources, contribute to network resources and the static network resources available. This theme is grouped in network undertakings as a functional unit.

**Benefits** are the advantages experienced and gained by participants as a result of their participation in the network. This is a network output and has been grouped with the network commodities. Some of these benefits are tangible: recruitment, and connecting. While the rest of the benefits are intangible: learning, sharing, rejuvenating, collegiality, friendship, and developing the field. A few of these benefits relate to self-determination theory and could serve as a perceived
motivation to participating. Furthermore, the benefits, which speak of collegiality, friendship, and connecting, relate to social network theory.

**Challenges** are the difficulties encountered when participating in a network. Challenges were grouped in the framework as a functional unit. They are listed as an undertaking in the framework because networks want to work to overcome these and any other challenges faced by its members. The thematic map of challenges includes: multinational collaboration, participant contributions, change management, standards, membership fees, and developments in the field.

**Recommendations** are the ideas this group of interview participants had to improve network functioning towards optimal KTE. Similarly to challenges, the recommendations were grouped in the framework as a network functional unit. They are an input, and were grouped with the network undertakings because these are ideas that could help improve network function and network KTE if applied. The thematic map of recommendations includes: products, strengthening leadership, better engagement, translation, social media and topic specific subgroups.

Figure 5 (pg. 116) is a next-generation conceptual framework, based on Figure 4 (pg. 86). The integration of results can be seen in multiple areas of the framework. First, in the Network Backbone section of the conceptual framework, incentives to participate in a network were noted, as were personal incentives in the form of motivation. Motivation was added under this section because the motivations described by participants related to the perceived benefits, or incentives they would receive from participating in the network. Thus, in order to be attractive to potential participants the network must be aware of what motivated people to join, and exhibit those desirable, perceived characteristics.

Secondly, within the Network Functional Units section of the conceptual framework, in the category of roles, themes from the semi-structured interviews’ overarching questions about role were added which specifically related to G-I-N’s roles. Also within the Network Functional Units section of the conceptual framework in the category Network Undertakings, the findings of the semi-structured interviews’ overarching themes on Activities, Challenges and Recommendations were added. Thirdly, the Network Commodities section of the integrated conceptual framework, now describes the benefits to be expected. Integrating the results of the systematic review and the semi-structured interviews generates a most complete and comprehensive descriptive framework of network knowledge transfer and exchange (Figure 5, pg. 116).
Figure 5: The FULL Integrated Descriptive Conceptual Framework of Network KTE
Chapter 6
Discussion

This chapter discusses the results of the systematic review and the semi-structured interviews as they contribute to a deeper theoretical understanding of the field of network KTE. This chapter considers limitations of the study and the implications of the findings, it highlights new ideas, and offers suggestions for future research on network KTE.

6.1 Research Findings & Practical Implications

This section considers how the research findings detailed in Chapter 5 inform the overall aim of this research thesis, which was to explore the characteristics that contribute to network KTE. In addition, this discussion considers some questions that arose from the background review on networks and KTE in Chapter 2. The following three sections consider network structure initiation, and uses of knowledge, participant motivations and roles, and the inputs and outputs of network KTE.

Networks have been shown here as an intervention to increase the use of research knowledge. They are a social intervention, one that allows various stakeholders to interact, share, transfer, and exchange knowledge. Some network members use knowledge from the network, while others contribute knowledge to the network. This research has illuminated certain characteristics of network interventions and network KTE, which can be used to create or refine networks to better achieve the research knowledge, transfer and exchange they wish to achieve.

It was clear from the systematic review that network-like entities use knowledge in many different ways. These entities most frequently transferred, shared, and generated knowledge within the network, which were three out of the seven most cited uses of knowledge. The inputs or characteristics contributing to the use of knowledge and KTE—although KTE was not the only term used—in the network included trust, social interactions, intent, culture, integration, and consolidation. These inputs were found to relate back to social network theory (SNT), the meso level theory, as well as self-determination theory (SDT), the micro level theory supporting this research thesis. In SNT, trust and social ties are important for effecting change in a larger group of individuals, and SDT describes motivation towards self-improvement. The social relations here
explain individual actions and collective outcomes, which are beneficial to the individual voluntarily involved in the network. Findings from this research thesis about network inputs corroborate SNT and SDT’s perspectives.

6.1.1 Network Structure, Initiation, and Uses of Knowledge

Inputs initiated outputs in tangible and intangible formats; the specific causal relationships between inputs and outputs (i.e., where a specific input produces a predictable output) were not identified. However some interesting details emerged. Findings in the systematic review highlighted the importance of different uses of knowledge. Seven uses of knowledge were identified in the systematic review; three of them were consistently of note throughout the analysis from both healthcare and organizational management studies. The three types of knowledge uses prevalent in networks include: knowledge transfer and exchange, knowledge sharing, and knowledge generation. The inputs that overlapped for both healthcare and organizational management studies in respect to KTE included: trust, culture, language, management and communication. Inputs unique to healthcare were: collaboration and sharing. Inputs unique to organizational management were R&D and learning. There were no strong trends that emerged in these outcomes.

In respect to sharing knowledge; within healthcare the interesting inputs were learning, growth and linking ties, with no strong trends in outcomes. Whereas in the organizational management literature there were no strong trends in inputs but there was an increase in patents and innovations, satisfaction and credibility as network outputs. Finally as a result of knowledge generation; the healthcare literature saw a trend in the input collaboration which seemed to lead to growth in network participation as an outcome. In the organizational management studies there was a trend towards increased density of ties as an output of knowledge generation, while inputs related to ties, connectivity, networking and social capital.

Five thematic inputs and outputs from the systematic review identified inputs in the form of trust, voluntarism, and network intent. Thematic outputs included strength of network ties and social learning.
Another nuance that emerged from the systematic review was the organization of all the characteristics. The conceptual framework was split into three categories: network backbone, network functional units, and network commodities. These classifications were meant to be instructive on how to interpret all the characteristics that emerged. The network backbone was an input into the network and was the foundation of characteristics that form the network. The network functional units are inputs, they are the parts of the network that facilitate day-to-day functioning. While network commodities are the outputs of the network separated into tangible and intangible outcomes. This classification system sets up the relationship between the various categories and characteristics and how they are organized in the framework of network KTE.

Interesting and rich findings emerged from the interviews with network participants. As a postbureaucratic form of organization, networks are often structured hierarchically. For example, the G-I-N network had three levels at which participants could participate—the board or staff level, the working group level, or the general participant level (G-I-N also accommodated nonparticipants.) The higher up in the postbureaucratic organization participants were, the more involved they seemed to be and the more time and voluntary resources they would contribute to the network. For example, a network Chair and Executive will be the most active, volunteering the most time to the network since they are in charge of the leadership. Some of the themes and data that emerged from the interviews included information about motivation, activities, benefits, challenges, and recommendations.

The final integrated conceptual framework is descriptive; it neither explains nor predicts network KTE relationships. Future work in the network KTE field could explore whether any such predictable relationships among inputs and outputs exist. A detailed discussion of the possible future work arising from this research appears in section 6.4.

6.1.2 Motivation, Roles, Benefits, and Challenges within Networks

Network participants’ motivations and the objectives of the network were considered in this research—why participants became involved and why the network was established in the first place. The objectives and motivations of participants to join the network were first reported on in the systematic review, where incentivized networks, non-incentivized networks, and voluntary networks were identified as the key network-like entities in existence.
The systematic review found that participation was largely voluntary in the network-like entities. The importance of voluntarism was hinted at, but the important motivational factors behind why people would volunteer were not made clear in the systematic review. Voluntarism and the aforementioned motivational factors relate back to self-determination theory (SDT), the micro-level theory supporting this research thesis. SDT speaks to the incentives behind voluntary participation. Ideas and gaps in the systematic review that had to do with voluntarism and motivation were expanded on, using the interviews.

This research project did not investigate how the G-I-N network was started, but an interesting theme from the roles in the network revealed that there was a kind of founder-member loyalty these members felt towards the network. Members who had been part of the original group before the network officially started said that their loyalty “made sense,” that it was a “natural progression,” or that they were interested in “developing the network itself” (see the codebook, Appendix O, under the theme of motivation). It was obvious that founding members had a degree of attachment or loyalty to the network they had started out with.

The motivation for participants to take part in the network voluntarily included: collaboration, credibility, access to resources, and promoting network growth. Interestingly the interview findings indicated that some network participants were mandated by their employers to be members of G-I-N—thus, membership would come with the job. Nevertheless, these members were willing participants of G-I-N even though their membership hinged on their employment. This idea about mandating (or “forcing”) participants to belong was echoed in the theme on roles, where it was noted that participants who were organizational members participated on behalf of their larger organization, yet they still viewed their membership as voluntary. Some participants even commented on this under the motivation theme, where it made sense because it came with their job. This implies that forced participation in a network is nonexistent, because, even though a professional role may demanded people’s participation, the participants cited benefits that they received and motivations, regardless.

Rich themes emerged in the interviews, which spoke to some participants having relational needs that KTE could meet, such as collaboration, connections, learning through sharing, and receiving feedback. These motivated their choice to be part of the network and to stay engaged, year after
other participants’ motivations were less relational and more practical — they wanted to save on the membership fees to attend meetings, and to gain access to KTE resources.

Participants invested much time, effort, and energy into the network as voluntary participants, especially when participants were more heavily involved in the network by virtue of their role in the network. The systematic review revealed that voluntarism was important, and possibly begat trust. This was echoed in the interviews but not completely answered. Trust and voluntariness are factors that could warrant further exploration.

The KT and KTE activities that emerged as essential to the network included: using the network: learning and connecting; contributing to the network: disseminating their knowledge; and accessing tools or products. The benefits that were detailed in the interviews and were categorized as the only output from the interviews included: connecting, building trust, learning, sharing, getting feedback, re-engaging, recruitment, social interaction, and developing the field of guidelines itself.

The network challenges included some interesting themes around the internationality of the network and included: multinational collaboration, language, contributing voluntary time, change management (growing the network and leading it), revenue, standards, and membership fees. Lastly the recommendations found were a bit scattered, which could indicate that there were no real issues or problems in this network. Some of the recommendations included: create more products to sell, keep strong board level leadership, more engagement for newer members, translation to different languages, use more IT solutions, and more sub-groups for specialty participants. These themes were integrated with those from the systematic review to create the integrated conceptual framework of network KTE (Figure 5, pg. 116).

6.1.3 Inputs and Outputs of Network KTE

The network’s activities and resources and what they were used for were important characteristics in healthcare networks. These were investigated in relation to the inputs and outputs of the network and the individuals who participated in the network. Such characteristics of network KTE were found in the systematic review, but a gap was identified: actual, tangible network activities responsible for the benefits or challenges of network KTE were not mentioned. This topic was
expanded upon in the interviews. The benefits and challenges themes in the interviews illustrated this feature of network KTE, especially in G-I-N, where network leadership decided upon the topic and scope of the network, related to clinical practice guidelines. Participants expressed benefits specific to four categories: learning, sharing, connecting, and using static tools. These benefits related back to actor network theory (ANT), the macro-level theory supporting this work. ANT states that all participants in a network are important, and widely defines “participant” to include people and the inanimate objects or static tools they use. The findings suggest that benefits accrued not only to the connections people made with each other but also with the products and tools they gained access to by participating in the network.

Network participants were asked about challenges and recommendations. Participants who were part of the network leadership found that group leadership had to be forward thinking. Leadership and management needed to have goals and future visions for the network.

The theme surrounding leadership in the network was important. The network leaders decided what was put on the network agenda, what was considered a priority area to the network, and thus what information and knowledge participants would have access to and be able to share. In the interviews, upper management mentioned leadership, organization, the ability to engage people, and vision as key features to have and to foster. The network executives and former executives were very self-aware in citing their need to continually grow, evolve, and attract new potential to the network. The leaders themselves knew that their leadership would determine if the network would be able to engage people and establish a solid, clear vision for the network. They knew that the network needed to pass from one set of capable hands to another, while maintaining the resources and elements built by previous generations.

The most recent network literature by Long et al. (2013) echoed this theme. The authors explored leadership in complex networks. Their findings showed that the leaders’ perceptions of their roles accord with both the potential inherent in their network positions and the activities known to increase the success of the network. This theme speaks to the need for people in leadership positions to be very self-aware and self-motivated, whether using the network for KTE or another purpose, and is a theme warranting further exploration.
This study also considered the undertakings of the network and what it provides to its participants in terms of activities, advantages, and disadvantages. Rich descriptive data came out of the interviews specifically about the activities they participated in, either using the network or contributing to the network. The interviews indicated that networks essentially provide three overarching KTE mechanisms, under which all activities are undertaken by participants, and which many participants listed as advantages in belonging to the network, namely, the chance to learn, share, and connect.

Participants wanted information, tools, or activities that they would use in their work to be successful. They also wanted to share that knowledge, perhaps through teaching other participants and making their research or work available to others in the network. However, they cited that with sharing comes learning as well, because when they shared in the network they also wanted to receive feedback and comments on their work. Connecting was found to be a two-way interaction, the participants themselves would decide who they would connect with and on which topic. However, in the recommendations section of the interviews, participants also stated that they wanted formally mediated network introductions; but once the introductions were made they enjoyed the autonomy of mediating and nurturing their connections. This theme spoke to the evolution of relationships in the network; from a strictly professional to a more inter-personal and amicable relationship.

6.2 Theoretical Contributions

This study has theoretical implications. It contributes to the scarce body of literature on empirical investigations into the ability of networks enable the use of activities, tools, and mechanisms that enhance KTE, specifically in the healthcare realm. This research stands to make a contribution to stakeholders, to the concepts and ideas surrounding the network KTE field, and to future inquiry into networks and KTE.

By exploring network KTE, the three theories used to underpin this work have been confirmed as appropriately illustrating and elucidating why certain characteristics are exhibited and how they relate to network KTE.
Firstly from the macro perspective actor network theory (ANT) equalized actants, both human and technological. This was confirmed by the data in both the systematic review and the interviews. In the systematic review the mechanism of the network was examined by extracting data related to network format. A majority of networks used multiple formats; in-person, online, or by phone. However, online and telephone methods were preferred, which tells us that technology plays a central role in network function. It was challenging, and there was no valid way to tell if technology and humans really were perceived as equal, but technology was vital to the transfer and exchange of people’s knowledge. In the interview portion of this study ANT was confirmed by sub-themes that emerged in the overarching theme on activities. People cited using or contributing knowledge to the network through: teleconferences, webinars, e-newsletters, email exchange and website use. What further confirmed ANT here was that when many people cited their preference for exchanging information in-person, they actually mentioned that once you met in person for the first time the rest of the communication could be handled using technologies. Many participants cited that having that first face-to-face interaction aided or supplemented other forms of communication which were vital subsequently to communicate internationally. Each format facilitated different things: the in-person built trust and a relationship for KTE whereas the technology mediated communication aided the internationality of the network where people were communicating and collaborating from forty three countries. ANT here was confirmed.

Secondly from the meso perspective social network theory was confirmed in both the systematic review and the interviews. In the systematic review social network theory was confirmed by two of the five emergent qualitative themes: strength of ties, and social learning. The theme strength of ties confirmed SNT because the amount of people you were networking and communicating with was essentially the network you were building in order to engage in KTE. Social learning also confirmed SNT because it spoke to learning via relationships, whether it was a “weak” single tie relationship between two people or a “strong” multi-person tie for KTE each scenario enable the transfer and exchange of knowledge among participants in te network. The interviews confirmed SNT because when people were asked about their motivations to participate, of perceived benefits they stated that the strongest motivation was collaboration and the biggest benefit was connecting. These two main themes spoke to those relationships, those ties that were inherent in networking and creating bonds between people for the purpose of KTE. SNT here was confirmed in this work.
Third, and finally from the micro perspective self-determination theory was confirmed through the interview portion of this research. Self-determination theory was confirmed by participants once again talking about their motivations and perceived benefits to joining and participating in the network. For the overarching theme of motivation people stated that they wanted to collaborate. The sub-themes that came out of this main theme were: collaboration to learn and share and promote their work. SDT speaks to the innate desire for people to better themselves. Through learning and sharing and promoting their work people were engaging in KTE and that self-development was what they were after. Furthermore for the overarching theme of benefits people said they wanted to learn and share and develop their field of interest. This showed their desire to develop their field they were interested in and to develop and take away new knowledge and information to better their own practice, research or policymaking. SDT was confirmed here.

The themes that emerged from the systematic review and the semi-structured interviews with network participants have furthered our understanding of network KTE. Through this work we have identified all the elements in the process that is network KTE, they make up the integrated conceptual framework (Figure 5, pg. 116). Recently the OECD and the World Health Organization released a report on building networks in healthcare (Palm et al., 2013). Using several European case studies they identified a few features of networks (Table 2, pg. 22). These features provide scarce detail on: governance, objective, function, scope and geography. However, there is limited detail as to whether these features are present at the outset of the network, are later provided or input, or whether they are resultant outputs of the network. The OECD / WHO report lacks the detailed description of the characteristics that enable KTE. This research thesis delineated the KTE input characteristics and the resulting network KTE outputs descriptively.

Similarly Braithwaite (2010) suggested that we do not do a very good job of thoroughly examining network research knowledge—how it happens, its inputs or drivers, and its outputs or outcomes related to KTE. Braithwaite’s systematic review only revealed terms in the contemporary literature that were important to network-like structures in healthcare. He found that networks were essential in communicating and informing members on the topic of interest, but beyond that the features used to inform and communicate were not investigated.
Similarly to Braithwaite and the OECD / WHO report, Cunningham et al. (2012)’s systematic review revealed that producing collaborative healthcare using a network requires efficient transmission of information as well as social and professional interactions. But the structure, format, functional characteristics, eligibility, management incentives, undertaking, governance, demography, roles and environment needed to enable that transmission and interaction was again not explored.

The research here has outlined the network characteristics that serve to enable KTE. Using the systematic review to examine the peer-reviewed contemporary literature we identified the characteristics that networks input and output when enabling KTE. Using the findings from the systematic review, we expanded on topics that were unknown from the systematic review including: motivation, benefits, challenges, activities and recommendations for network improvement. Integrating the results of this work we now know the inputs, we now know the outputs and related outcomes, which enable KTE in a network. What we need to know further from this research is how these characteristics work together, and what are the validated, measured, or proven causal relationships among these characteristics.

6.2.1 The Integrated Conceptual Framework of Network KTE

The promising conceptual and theoretical contribution of this research is the descriptive conceptual framework of network KTE seen in Figure 5 (pg. 116). This framework begins to detail the contributions and the structure of the network, as well as the outcomes (i.e. benefits and challenges) that are a result of participating in a network. The framework includes the possible characteristics of a network, including its structure, type, governance and leadership, functional goals and intent, management, eligibility, incentives, undertakings, and the motivations that are present in undertaking KTE. As well, the environment, roles, tools, activities, knowledge, governance principles, and the organizational or firm characteristics are all included in this framework as the possible characteristics and contributors to creating and forming a network and managing the network and the network KTE within it. All of these characteristics are possible promising contributors to the development and evolution of a network towards enabling bidirectional transfer and exchange of knowledge.
Within the outputs, the framework also outlines the KTE outcomes of the network; namely, the tangible product outcomes such as the tools, guides, programs, funding, newsletters, and terminology that come from a network. These are the possible tangible goods that network members produce collaboratively and share with other network members. The individuals, groups, and organizations that are network members have access to and can use such tangible product outcomes. Sometimes these products are even made available to the larger public.

There is also a set of intangible outcomes, which include cognitive outcomes such as research and development, innovation, performance, implementation, knowledge, collaboration, experience, and implementation staging. The intangible outcomes may also include relational outcomes which relate to the relationships formed in the network, whether social, professional, formal, or informal, as well as the attitudes, respect and tolerance shown by members to each other. Lastly, intangible outcomes also include developmental outcomes such as public perception goals, growth purpose, stature, and power.

Also in the section on network KTE products and outcomes we see the possible expectations: the benefits and challenges that network members may encounter and the ideas and recommendations that can perhaps further improve the network. The aforementioned stakeholders will be able to use the complete integrated conceptual framework to inform network creation, revitalization, and evaluation, and help policy makers and healthcare leaders understand how to best use networks to enable KTE.

6.3 Limitations

The research was limited both in the systematic review and in the interviews. Limitations of the systematic review included inclusion and exclusion of studies for review, comprehensiveness of search strategy, quality scoring tools, and quantity of existing research related to the KTE and network fields. Limitations arising from the interviews included the setting of the research, and the choice of one single network, the Guidelines International Network, as a model.
6.3.1 Systematic Review Limitations

6.3.1.1 Inclusion and exclusion criteria
Although inclusion and exclusion criteria were developed in several iterations of multireviewer pilot testing sessions, this facet of the study could be critiqued. Individual research team members (SH, AG, MU) agreed that the given research study fit within a relevancy statement outlined for the review and for the research thesis itself, but were aware that agreement on inclusion and exclusion criteria (see Appendix A) was not the same as the worthiness of scientific endeavour.

6.3.1.2 Comprehensiveness of the search strategy
The comprehensiveness of the search strategy posed a limitation to this research thesis. First, electronic databases are not perfect; they have been known to misidentify certain research or to mislabel studies with incorrect mesh terms. Thus any errors on the part of the database would affect the comprehensiveness of the search strategies if important articles or pieces of research were missed. SH attempted to mitigate this limitation by asking trusted resources such as professors in her graduate classes for any recommendations on literature they might know of that related to networks and KTE.

Secondly, barring any errors on the part of the electronic databases, the search strategies themselves could have misidentified articles based on the terminology with which they were conducted. If an identifying term describing networks or KTE were omitted from the searches, it is possible that certain relevant articles would have not been brought up in the search results, creating an incomplete systematic review. SH and the research team attempted to mitigate this limitation by running the searches in each database multiple times with multiple combinations of mesh and descriptive terms. Also, only databases that had a dictionary of terms were used, these identified the root word and the meaning of the term in question, so that in searching the literature the research team knew exactly what the terms they were using meant in the database they were searching. However, multiple databases and detailed search strategies were used that optimized search outcomes.
6.3.1.3 Quality scoring of qualitative research

Two tools were used for the quality scoring of the articles in the systematic review: the Effective Public Health Practice Project’s (EPHPP’s) quality assessment tool for quantitative studies and a modified version of the consolidated criteria for reporting qualitative studies (COREQ), which was adapted for use as a quality assessment tool in qualitative studies. COREQ was not a tool generally used for assessing the quality of qualitative work, which may have limited its usefulness; it is a reporting guideline for qualitative work and has been adapted here to serve as a scoring tool. COREQ lacks empirical validation as a quality assessment tool and perhaps it also lacks a certain level of generalizability for evaluating the quality of the included studies. Being a set of guidelines, it could be overly detailed in the requirements for reporting, when not all journals allow that level of detail for publication. Thus it may underestimate the quality of the included studies. Currently, a validated tool is being developed by the Cochrane Collaboration to judge the quality of qualitative studies; however, it is not yet available.

From this limitation of tools comes another limitation mentioned earlier: namely, although many studies were judged to be of high quality, much of the literature included in the review was of moderate quality. Whether this was due to the literature itself, or to the tools used to judge it, the quality remains ambiguous. Nevertheless, the researcher feels that conclusions drawn in this study can be trusted, because the literature was not the only source of information; two methods of research were used, a systematic review that was complemented, corroborated, and expanded upon by semi-structured qualitative interviews. A strong set of research findings was thus provided.

6.3.1.4 The amount and quality of research in the KTE and network fields

The paucity of literature in these two fields of research, KTE and networks, combined with the variation in described outcomes and measures across studies, made it difficult to synthesize and draw concrete conclusions. In addition, a limitation of the systematic review was the difficulty of disentangling the meaning and use of the term knowledge in the various research articles. Many studies used KTE and KT interchangeably, or referred to other meanings, such as dissemination, without providing conceptual clarity as to what their definitions meant or encompassed in regards to the two-way exchange of knowledge being studied in this project. SH and other reviewers used their best judgment with the definition of KTE that was decided upon in reviewing the background
literature in Chapter 2, and were careful to select studies which fit with the definition of KTE that was outlined in the eligibility criteria. Those who study network KTE should be mindful of the confusion surrounding KTE terminology and conscious of the aforementioned constraints of the systematic review.

6.3.2 Interview Limitations

6.3.2.1 A Single network sample

The setting for the semi-structured qualitative interviews was Guidelines International Network (G-I-N), a global network of clinical practice guideline developers, implementers, clinicians, researchers, policy makers, industry representatives, and consumers with some vested interest in the CPG field. G-I-N provided the sample for the qualitative interviews, drawn from members of the staff, board executive, working groups, general membership, and non-membership. Using a single network in which to conduct the research would inevitably limit the applicability of results to other networks, since no two networks are identical. However, conversely this can be considered one of the advantages of qualitative research, which explores unique phenomena of interest. However, the fact that some form of participant bias may have been present due to the use of a single network remains a limitation to this work.

6.3.2.2 Participant bias and applicability

With one exception, all the interviewees were members of the G-I-N network. Since network participation is voluntary it can be assumed that the participants appreciated or enjoyed taking part in the network and related activities. Thus, if they had a positive attitude towards network membership the likelihood that they would express negative ideas, thoughts, or impressions of the network is somewhat unlikely, resulting in participant bias which would tend towards being more positive.

Furthermore, participant bias may have occurred as a result of participants not trusting that their anonymity would be kept. If a participant were sceptical about their anonymity being maintained they might have disclosed less sensitive thoughts, ideas, and impressions about the network, particularly if they suspected that perhaps their role or involvement might unintentionally disclose who they were in the network.
These results pertain to a specific population of people, who were interested, worked, or had some relation to the clinical practice guideline field. Their views and experiences with the network roles, motivations, activities, benefits, challenges, and recommendations could be unique, given their special interest and the internationality of the network and this field. Thus the applicability of the results of the interviews might be minimized; these results might be better suited to describe populations similar to this G-I-N group within the healthcare realm, rather than be applicable to organizational science and sociology as well.

Also, using a single network might present participant bias. People more interested and more invested in the network might have participated more readily in the interviews because they wanted to further develop the research about the network. Also, one of the project team members (AG) is a chair of the G-I-N implementation working group, which could have swayed participants to volunteer, if they recognized her name on the project group list, and thus have been more prone to participate in the interviews. Although these factors could present participant bias limitations, it was countered to the best of the researcher’s (SH) ability by targeted recruitment of various people from among the G-I-N hierarchy who were highly involved, less involved, and involved to a medium extent. Also, recruitment of participants targeted both developed and developing nations to get as broad a perspective as possible to limit participant bias. Representation was achieved from six out of the seven continents (North America, South America, Africa, Europe, Australia, and Asia). Although participant bias might have been a limitation, it was countered wherever possible.

6.4 Future Directions

This was an exploratory study into the concept of network KTE. The research identified some key characteristics inputs and outputs that resulted in various products and outcomes through network KTE. This project was the first of its kind; the resultant framework was not based on a prior framework or model of network KTE. The project laid the groundwork for future in-depth research of key KTE mechanisms and their implementation within a network. Since this project and resultant conceptual framework is descriptive more work needs to be done that can enhance network KTE in an explanatory or predictive and measurable way. The popular inputs such as: trust, intent, motivation, and voluntarism with popular outputs such as: social learning, tie strength
and developmental outcomes should serve as the basis for future research. Focusing on these topics will give future researchers more information to base their work on in order to advance the field as opposed to focusing on less prevalent inputs and outputs.

Further research would benefit from an exploration into the nuances between specific KTE activities preferred by healthcare as opposed to organizational management networks within the conceptual framework. For the systematic review the information, in large part, came from the organizational literature. Thus, perhaps the trends in the results reflect more organizational management priorities than healthcare priorities. It would be beneficial to the healthcare specific KTE network field to investigate the nuances in healthcare networks exclusively.

Another fruitful idea for future research would be to identify or develop causal pathways of KTE, delineating the path from input to network output, be it a product, outcome, or benefit. This would be a practical avenue of research because as it stands the conceptual framework is overwhelmingly vast. It describes a plethora of inputs and outputs without linking them in any reproducible manner, at this stage of the exploratory research into network KTE that was not possible. However, for a researcher to take this framework and carve out a specialty topic or area of framework that is of interest to their KTE or network related research would be practical and valuable, expanding the framework one concept at a time using a single trajectory to garner as much detail as possible.

A specific topic that could be of interest to future research could be building on this work by elaborating on the concept of trust. Trust was found to be not only a network backbone input through the systematic review but also a relational intangible outcome in the network commodities as a result of the qualitative interviews. The organizational science literature revealed that trust in the network-like entity was a popular input provided to the network. Also, in the thematic analysis there was allusion to the fact that voluntarism may beget trust. Furthermore, from the interviews we know that time and effort are voluntarily contributed by participants. Looking more closely at how voluntarism can influence trust, and what characteristics result once trust is input into a network, could be telling in how trust is built upon to strengthen a network in the healthcare realm.

Another future direction could involve elaborating on the concept of linking ties in healthcare networks— an important topic in the field of healthcare when it came to sharing knowledge. It
would be interesting to delve into this topic further, to see how sharing knowledge compared to KTE specifically, and how ties facilitated sharing in healthcare. Building on that topic for further inquiry from the systematic review, the interviews revealed that many people used the network for collaboration and networking with/through the connections they had made in the network. It would be thought-provoking to further investigate the specific activities that helped foster those linking ties for sharing knowledge throughout the network, and to consider which of those activities are preferred. These preferred activities could lead to more intimate investigation and possibly reveal other unique network KTE inputs or outputs.

Yet another area that warrants further investigation is leadership in networks and the type of people who lead networks voluntarily. As the interviews showed, leaders in the top executive network positions were very self-aware of their potential impact on the network in the present and into the future. It is important to explore in greater detail what traits and attributes make a leader successful and able to lead a network, and what motivates such leaders to give their time, energy, and effort voluntarily to a cause such as a global knowledge network. This is important to the network literature because structured knowledge networks such as G-I-N rely on leadership and guidance in order to survive and stay relevant (Long et al., 2013). Long et al. (2013) specifically considered leadership in complex networks and found that leadership was of absolute importance to the longevity and sustainment of a network. The foresight in management that some of the interview participants mentioned was echoed in Long et al.’s work on networks.

This exploratory study has answered a range of questions on the characteristics of network knowledge transfer and exchange. It has also brought up questions and found information that would warrant further detailed exploration. By expanding on this work, and building on the integrated descriptive conceptual framework of network KTE – the first of its kind, the network KTE field will begin to grow and mature.
References


http://www.nccmt.ca/pubs/NetworkingPaperApr09EN_WEB.pdf


# Appendix A: Eligibility and Ineligibility Criteria Screening Tool

**Knowledge Networks for Guideline Implementation: Eligibility Screening Tool**

<table>
<thead>
<tr>
<th>Eligibility Criteria</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
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<tbody>
<tr>
<td>- Time Frame 1990 to 2012</td>
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<td>- English Language Publication</td>
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<tr>
<td>- Study of Humans</td>
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<tr>
<td>NETWORK:</td>
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<tr>
<td>A relational entity that involves interconnected individuals, groups or organizations within a specific domain of knowledge and practice that interact socially and professionally to share knowledge with each other to achieve a common goal. Participation is voluntary; the network <em>spans organizational boundaries</em> encompassing people from different places/organizations/entities/groups/associations who are linked and come together collaboratively for a common interest or end goal. Similar terms relevant if defined in the same manner: soft network, group of experts, community of practice, inter-organizational networks, alliances, bridging-ties, inter-organizational collaboration, inter-professional health services research groups, joint venture, social network</td>
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<tr>
<td>KNOWLEDGE TRANSFER AND EXCHANGE:</td>
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<tr>
<td>The collaborative problem-solving between different players in an entity (players can include but are not limited to: researchers, decision/policy makers, clinicians, managers, internal/external stakeholders) that happens through linkage, sharing and exchange of information, knowledge, ideas and research results. Effective knowledge exchange involves interaction between these actors resulting in mutual learning, production, development application, sharing, transferring, translating, banking and harvesting of knowledge in relation to the topic of interest. Publication is relevant if it describes knowledge exchange in relation to: Structure, Set up, Type, Governance, Incentives, Composition, Eligibility, Roles and tasks of participants, Communication, Formality, Activities, Products, Outcomes, Impact or Evaluation of the knowledge network.</td>
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<tr>
<td>Publication is an <strong>Empirical Study</strong>:</td>
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<tr>
<td>- Survey/questionnaire</td>
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<tr>
<td>- Meta-analysis/Systematic review</td>
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<td>- Observational (including before/after)</td>
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<tr>
<td>- Randomized controlled trial</td>
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<tr>
<td>- Interview/Focus group</td>
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<tr>
<td>- Descriptive examination of information resources, tools or services</td>
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<tr>
<td>Not Eligible:</td>
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<tr>
<td>- Concept analysis (theoretical discussion paper)/Theoretically driven analysis</td>
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<tr>
<td>- Addresses/Comment/Erratum/Editorial/Interviews/Lectures/Letter/News/Book Review</td>
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<tr>
<td>- Computer Networks/Computer Engineering/Computer Science/Computer Programming</td>
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</tbody>
</table>
- Neural Networks/ Brain waves/ Physiological networks/Natural neural networks
- Social Networks: an online service, platform, or site that focuses on building and reflecting of social networks or social relations among patients, circles of friends, family members, and associates who provide love, care, and need gratification (ex: Facebook, Twitter, Foursquare)
- Organizational Learning: knowledge of models and theories about the way a SINGLE organization learns and adapts. Not interested in individual organizations and how departments of that organization work/collaborate, we are interested in inter-organizational workings/dealings and how different/separate entities work together
- Care delivery optimization for patients (ie. Clinical Networks)
- Economically or resource driven networks which compete or eliminate one another through economic means or alignment

A FEW HELPFUL DEFINITIONS FOR SCREENING:

<table>
<thead>
<tr>
<th>Tacit knowledge</th>
<th>Knowledge that resides within the people of the organization and is not formalized into written or documented forms; accessible only through conscious efforts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit knowledge</td>
<td>Knowledge that is available in spoken or written form; the ordering of data and information according to well-defined, formalized procedures or rules.</td>
</tr>
<tr>
<td>Enclave networks</td>
<td>have a flat internal structure with no central authority; they are based on shared commitment. Such networks are often most successful in enabling information and ideas to be shared among professionals with a common interest.</td>
</tr>
<tr>
<td>Hierarchical networks</td>
<td>have an organizational core and authority to regulate the work of members via joint provision, inspection and/or accreditation. They are most successful in coordinating and controlling a pre-defined task that involves complex division of labour.</td>
</tr>
<tr>
<td>Individualistic networks</td>
<td>are those in which an individual or organization develops a loose association of affiliates. They are often based on the procurement of a network of service providers through the negotiation of contracts. Individualistic networks are highly responsive to change and are most successful for exploring innovations and flexible working practices.</td>
</tr>
</tbody>
</table>
Appendix B: Systematic Review Search Strategies

Database: Ovid MEDLINE(R) <1946 to April Week 2 2012> Search Strategy:

1 Community Networks/ (4602)
2 models, organizational/ (13208)
3 Information Services/og [Organization & Administration] (1362)
4 organizational culture/ (11226)
5 "Organization and Administration"/ (14260)
6 Organizations/ (6030)
7 1 or 2 or 3 or 4 or 5 or 6 (48345)
8 *cooperative behavior/ (8548)
9 knowledge management/ (54)
10 "diffusion of innovation"/ (5939)
11 *information dissemination/ (3836)
12 *communication/ (23854)
13 8 or 9 or 10 or 11 or 12 (41350)
14 7 and 13 (2007)
15 communities of practice.mp. (173)
16 14 or 15 (2172)
17 limit 16 to (english language and yr="1990 -Current") (1741)
18 limit 17 to (addresses or case reports or comment or editorial or interview or lectures or letter or news or video-audio media or webcasts) (112)
19 17 not 18 (1629)

Database: CINAHL EBSCO Search Strategy:

1 MH "Community Networks") (494)
2 (MH "Health Information Networks") (285)
3 MH "National Health Information Network") (2)
4 S1 or S2 or S3 (776)
5 Limiters - Published Date from: 19900101-20121231; English Language; Exclude MEDLINE records; Human (55)
Database: **BUSINESS SOURCE PREMIER** EBSCOhost Search Strategy:

1. DE "INFORMATION resources management" OR DE "KNOWLEDGE management" OR DE "INFORMATION sharing" OR DE "KNOWLEDGE TRANSFER" OR DE "ORGANIZATIONAL LEARNING" (37719)
2. SU "interorganizational networks" OR "strategic alliances" OR "business networks" OR "joint ventures" (66140)
3. S1 and S2 (742)
4. S1 and S2 Published Date from: 19900101-20121231; Publication Type: Academic Journal (511)

Database: **Social Sciences Abstracts** PROQUEST Search Strategy:

1. (SU(social networks) OR SU(interorganizational networks) OR SU(organizational structure) OR SU(task oriented groups)) AND (SU(knowledge utilization) OR SU(information dissemination) OR SU(diffusion) OR SU(adopting innovations) OR SU(cooperation) OR SU(organizational communication)) ADDITIONAL LIMITS: Peer Reviewed, Scholarly Journals, from 1990 to 2012, English Language, Remove Duplicates (752)
Appendix C: Diagrammatic Flow of Evidence

**Titles and abstracts:** Primary Screening  
\( N = 2,947 \)

**Full text articles retrieved:** Secondary Screening  
\( N = 98 \)

**Data Extraction and Analysis**  
\( N = 59 \)

Ineligible articles as determined by eligibility criteria:  
Eliminated \( N = 2,849 \)

Ineligible articles as determined by eligibility criteria:  
Eliminated \( N = 41 \)

Suggested \( N = 2 \)
### Appendix D: Data Extraction Form for Systematic Review

<table>
<thead>
<tr>
<th>Author:</th>
<th>Year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country:</td>
<td>Journal:</td>
</tr>
</tbody>
</table>

**Study Design:**
- review/concept analysis
- syst review/meta-analysis
- RCT
- network KTE eval
- before/after
- cohort
- survey
- interview/focus group
- case study
- other: ___________

**Network Context:**
- Healthcare
- Organizational/Management
- Other: ________________
- unclear

**The Network Entity** *(include pg numbers where appropriate):*  
- National
- International

Name of the Entity:
- Network
- (Strategic) Alliance
- Community of Practice
- Linking Ties
- Joint Venture
- Industrial District
- other *(specify):* ________________

Purpose of the Entity:
- increased learning
- increased communication
- implementation of a novel idea/process
- increased collaboration
- increased KTE
- other *(specify):* ________________

**Network Details** *(include pg numbers where appropriate):*

Network KTE Activities:
- no details
- yes *(specify activities and participation rates as provided):

Format *(in-person, online):*

Content *(what was done):*

Interaction of Network Members:
- no details
- yes *(specify time, frequency and total duration as provided):

Duration *(for how long):*

Intensity *(how many times):*

Structure/Governance:
- no details
- Structured
- Unstructured *(Details):*

Incentives to participate in network:
- no details
- Yes
- No *(Details):*

Participant Eligibility:
- no details
- Exclusive
- Inclusive of anyone *(Details):*

Participant Roles:
- no details
- yes *(specify roles as provided):*
### Knowledge Details:

**Use of Knowledge:**
- [ ] No details
- [ ] Yes (specify what and how these were done):
  - Knowledge Generated:
  - Knowledge Stored:
  - Knowledge Shared:
  - Knowledge Integrated:
  - Knowledge Collected:
  - Knowledge Synthesized:
  - Knowledge Translated:
  - Knowledge Transferred:
  - Other:
  - Other:
  - Other:

**Findings** (specify measures of interest, number sites/professionals/articles evaluated, and concise quantitative or qualitative results with key statistics)

**Outcome/Impact/Products:**
- [ ] N/A
- [ ] No details
- [ ] Yes (specify QUANTITATIVE OUTCOMES):

**Overall Results/Recommendations:**
- [ ] N/A
- [ ] No details
- [ ] Yes (specify DESCRIPTIVES):
Appendix E: EPHPP’s Quality Assessment Tool for Quantitative Studies

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?
   1  Very likely
   2  Somewhat likely
   3  Not likely
   4  Can’t tell

(Q2) What percentage of selected individuals agreed to participate?
   1  80 - 100% agreement
   2  60 – 79% agreement
   3  less than 60% agreement
   4  Not applicable
   5  Can’t tell

<table>
<thead>
<tr>
<th>RATE THIS SECTION</th>
<th>STRONG</th>
<th>MODERATE</th>
<th>WEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td>See dictionary</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

B) STUDY DESIGN

Indicate the study design
   1  Randomized controlled trial
   2  Controlled clinical trial
   3  Cohort analytic (two group pre + post)
   4  Case-control
   5  Cohort (one group pre + post [before and after])
   6  Interrupted time series
   7  Other specify
   8  Can’t tell

Was the study described as randomized? If NO, go to Component C.
   No             Yes
If Yes, was the method of randomization described? (See dictionary)
   No             Yes
If Yes, was the method appropriate? (See dictionary)
   No             Yes

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<tr>
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</table>
C) **CONFOUNDERS**

(Q1) Were there important differences between groups prior to the intervention?

1. Yes
2. No
3. Can’t tell

The following are examples of confounders:

1. Race
2. Sex
3. Marital status/family
4. Age
5. SES (income or class)
6. Education
7. Health status
8. Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1. 80 – 100% (most)
2. 60 – 79% (some)
3. Less than 60% (few or none)
4. Can’t Tell

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<td>3</td>
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</table>

D) **BLINDING**

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1. Yes
2. No
3. Can’t tell

(Q2) Were the study participants aware of the research question?

1. Yes
2. No
3. Can’t tell

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<td>2</td>
<td>3</td>
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</table>

E) **DATA COLLECTION METHODS**

(Q1) Were data collection tools shown to be valid?

1. Yes
2. No
3. Can’t tell

(Q2) Were data collection tools shown to be reliable?

1. Yes
2. No
3. Can’t tell

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<th>WEAK</th>
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<td>2</td>
<td>3</td>
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</table>
F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?
   1. Yes
   2. No
   3. Can’t tell
   4. Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).
   1. 80 -100%
   2. 60 - 79%
   3. less than 60%
   4. Can’t tell
   5. Not Applicable (i.e. Retrospective case-control)

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<th>WEAK</th>
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<td>2</td>
<td>3</td>
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</table>

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?
   1. 80 -100%
   2. 60 - 79%
   3. less than 60%
   4. Can’t tell

(Q2) Was the consistency of the intervention measured?
   1. Yes
   2. No
   3. Can’t tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?
   4. Yes
   5. No
   6. Can’t tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)
   community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)
   community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?
   1. Yes
   2. No
   3. Can’t tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?
   1. Yes
   2. No
   3. Can’t tell
GLOBAL RATING

COMPONENT RATINGS
Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

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<th>WEAK</th>
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<td></td>
<td></td>
<td>Not Applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLOBAL RATING FOR THIS PAPER (circle one):

1 STRONG (no WEAK ratings)
2 MODERATE (one WEAK rating)
3 WEAK (two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No
Yes

If yes, indicate the reason for the discrepancy

1 Oversight
2 Differences in interpretation of criteria
3 Differences in interpretation of study

Final decision of both reviewers (circle one):

1 STRONG
2 MODERATE
3 WEAK
Appendix F: COREQ 32 Item Checklist Adapted for Quality Scoring

Quality Scoring Tool: Qualitative articles

*Networks and KTE: Adopted from Tong et al. 2007*  
November 2013

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td>1.</td>
<td>Research team and reflexivity</td>
</tr>
<tr>
<td>2.</td>
<td>Personal Characteristics</td>
</tr>
<tr>
<td>3.</td>
<td>Interviewer/facilitator</td>
</tr>
<tr>
<td>4.</td>
<td>Credentials</td>
</tr>
<tr>
<td>5.</td>
<td>Occupation</td>
</tr>
<tr>
<td>6.</td>
<td>Gender</td>
</tr>
<tr>
<td>7.</td>
<td>Experience and training and motivation</td>
</tr>
<tr>
<td>8.</td>
<td>Relationship with participants</td>
</tr>
<tr>
<td>9.</td>
<td>Participant knowledge of the interviewer</td>
</tr>
<tr>
<td>10.</td>
<td>Interviewer characteristics</td>
</tr>
<tr>
<td>11.</td>
<td>Theoretical framework</td>
</tr>
<tr>
<td>12.</td>
<td>Methodological orientation and theory</td>
</tr>
<tr>
<td>13.</td>
<td>Participant selection</td>
</tr>
<tr>
<td>14.</td>
<td>Sampling</td>
</tr>
<tr>
<td>15.</td>
<td>Method of approach</td>
</tr>
<tr>
<td>16.</td>
<td>Sample size</td>
</tr>
<tr>
<td>17.</td>
<td>Non-participation</td>
</tr>
<tr>
<td>18.</td>
<td>Setting</td>
</tr>
<tr>
<td>19.</td>
<td>Setting of data collection</td>
</tr>
<tr>
<td>20.</td>
<td>Presence of non-participants</td>
</tr>
<tr>
<td>21.</td>
<td>Description of sample</td>
</tr>
<tr>
<td>22.</td>
<td>Data collection</td>
</tr>
<tr>
<td>23.</td>
<td>Interview guide</td>
</tr>
<tr>
<td>24.</td>
<td>Repeat interviews</td>
</tr>
<tr>
<td>25.</td>
<td>Audio/visual recording</td>
</tr>
<tr>
<td>26.</td>
<td>Field notes</td>
</tr>
<tr>
<td>27.</td>
<td>Duration</td>
</tr>
<tr>
<td>28.</td>
<td>Data saturation</td>
</tr>
<tr>
<td>29.</td>
<td>Transcripts returned</td>
</tr>
<tr>
<td>30.</td>
<td>Analysis and findings:</td>
</tr>
<tr>
<td>31.</td>
<td>Data analysis</td>
</tr>
<tr>
<td>32.</td>
<td>Description of the coding tree</td>
</tr>
<tr>
<td>33.</td>
<td>Derivation of themes</td>
</tr>
<tr>
<td>34.</td>
<td>Software</td>
</tr>
<tr>
<td>35.</td>
<td>Participant checking</td>
</tr>
<tr>
<td>36.</td>
<td>Reporting</td>
</tr>
<tr>
<td>37.</td>
<td>Quotations presented</td>
</tr>
<tr>
<td>38.</td>
<td>Data and findings consistent</td>
</tr>
<tr>
<td>39.</td>
<td>Clarity of major themes</td>
</tr>
<tr>
<td>40.</td>
<td>Clarity of minor themes</td>
</tr>
</tbody>
</table>

**Scoring**

- Research Team and Reflexivity: 1 pt
- Study Design: 1 pt
- Analysis and Findings: 1 pt

**Total** 3 points

**Awarding points:**

- The section will be awarded a point if more than half the criteria are found present

---

Low Quality: 0-1  
Medium Quality: 2  
High Quality: 3
Appendix G: Quantitative Data Summary Tables

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</tr>
<tr>
<td>2000 – 2006</td>
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<td>25%</td>
</tr>
<tr>
<td>2007 – 2011</td>
<td>35/59</td>
<td>60%</td>
</tr>
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<td>CINAHL</td>
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<tr>
<td>Soc. Abst.</td>
<td>6/59</td>
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<tr>
<td>BSP</td>
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<tr>
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<th>Average (N) Participants by Study Design</th>
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<td>Cohort Study</td>
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<td>Network Analysis</td>
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<tr>
<td>Survey</td>
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<td>Case Study</td>
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<td>Total</td>
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<td>100%</td>
<td>Total N_{avg} = 148</td>
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<td>Organizational/Management</td>
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<td>Total</td>
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Network Scope:
(Who did the network include, national, international or both partners)

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<td>International</td>
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<tr>
<td>Both (National and/or International)</td>
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Name of the Entity:

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<td>Joint Venture</td>
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<td>Alliance</td>
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<tr>
<td>Other (Collaboration/System/linking tie)</td>
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**Stated Purpose of the Entity:** (Sixteen articles listed a single purpose for formation of the entity, forty three stated multiple purposes for the entity’s existence)

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<td>Research &amp; Development/Innovation</td>
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<tr>
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</tr>
<tr>
<td>KTE &amp; Learning &amp; Collaboration &amp; Communication</td>
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<td>5%</td>
</tr>
<tr>
<td>KTE &amp; “Other” <em>(Other Being: Knowledge generation, integration, sharing (KM), R&amp;D/Innovation, Diversification, Efficiency, Intellectual capacity, Funding, Financial reasons)</em></td>
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<td>32%</td>
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**Reporting on Network Details:**

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Of the 39 studies which reported details:

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**Format** Reported (N=35)

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<tr>
<th>Format (N=35)</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In person</td>
<td>13/35</td>
<td>37%</td>
</tr>
<tr>
<td>Online/Web-based</td>
<td>8/35</td>
<td>23%</td>
</tr>
<tr>
<td>Online/Web-based and In person</td>
<td>5/35</td>
<td>14%</td>
</tr>
<tr>
<td>Online/Web-based and Phone</td>
<td>2/35</td>
<td>6%</td>
</tr>
<tr>
<td>Online/Web-based, In person, and Phone</td>
<td>7/35</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>35/35</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Reporting on Within-Network Interaction:**

<table>
<thead>
<tr>
<th>Network Interaction</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Details Reported</td>
<td>47/59</td>
<td>80%</td>
</tr>
<tr>
<td>Details Reported</td>
<td>12/59</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td>100%</td>
</tr>
</tbody>
</table>

Of the 12 studies which reported on the within-network interactions:

<table>
<thead>
<tr>
<th>Within-Network Interaction (N=12)</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of interaction</td>
<td>8/12</td>
<td>67%</td>
</tr>
<tr>
<td>Intensity of interaction</td>
<td>3/12</td>
<td>25%</td>
</tr>
<tr>
<td>Duration and Intensity of interaction</td>
<td>1/12</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12/12</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Duration** *(within the 9 networks which reported duration):*

- 6 months was the shortest interaction of a network
- 30 years was the longest lasting interaction of a network
- 5-10 year of interaction between network members was the average

**Intensity** *(within the 4 networks which reported intensity):*

- 1-4 times per month was the average interaction intensity

**Network Governance/Structure:**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Reported</td>
<td>26/59</td>
<td>44%</td>
</tr>
<tr>
<td>Structured</td>
<td>30/59</td>
<td>51%</td>
</tr>
<tr>
<td>Unstructured</td>
<td>3/59</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Network Incentives:**

<table>
<thead>
<tr>
<th>Incentives Given</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Reported</td>
<td>17/59</td>
<td>29%</td>
</tr>
<tr>
<td>Yes an Incentive was given</td>
<td>3/59</td>
<td>5%</td>
</tr>
<tr>
<td>No Incentive, Voluntary Participation</td>
<td>39/59</td>
<td>66%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the three cases where incentives were given:

- 2 monetary incentives
- 1 forcible participation
Eligibility Criteria to Participate in the Network:

<table>
<thead>
<tr>
<th>Network Eligibility</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Reported</td>
<td>9/59</td>
<td>15%</td>
</tr>
<tr>
<td>Network was Exclusive</td>
<td>49/59</td>
<td>83%</td>
</tr>
<tr>
<td>Network was Inclusive of anyone</td>
<td>1/59</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Of the 49 Studies listed as Exclusive Networks
The Most Prevalent Industries Included:

<table>
<thead>
<tr>
<th>Exclusive Network Context</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine <em>(4 Medical Practice/Nursing, Psychiatry, Dementia, Long-Term Care, Diabetes, 3 Smoking Cessation, Surgery, Dental, Optometry)</em></td>
<td>14 studies</td>
</tr>
<tr>
<td>Automotive Industry</td>
<td>7 studies</td>
</tr>
<tr>
<td>Multiple Different Sectors <em>(automotive, chemical, pharmacy, textile, telecommunications, manufacturing, plastics, construction, electronics)</em></td>
<td>7 studies</td>
</tr>
<tr>
<td>Biotech/ Pharma</td>
<td>5 studies</td>
</tr>
<tr>
<td>Marketing</td>
<td>2 studies</td>
</tr>
<tr>
<td>Research</td>
<td>2 studies</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2 studies</td>
</tr>
<tr>
<td>Electronics/IT</td>
<td>2 studies</td>
</tr>
<tr>
<td>Trading</td>
<td>1 single study each</td>
</tr>
<tr>
<td>Telecommunications</td>
<td></td>
</tr>
<tr>
<td>Aerospace</td>
<td></td>
</tr>
<tr>
<td>Ceramic Tile Industry</td>
<td></td>
</tr>
<tr>
<td>Textile</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Maritime Search and Rescue</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49 studies</strong></td>
</tr>
</tbody>
</table>

Network Participant Roles:

<table>
<thead>
<tr>
<th>Roles</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Details Reported</td>
<td>23/59</td>
<td>39%</td>
</tr>
<tr>
<td>Roles Identified</td>
<td>36/59</td>
<td>61%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Of the 36 studies which identified roles
The Most Prevalent Roles:

<table>
<thead>
<tr>
<th>Roles</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Manager (network/alliance/Joint</td>
<td>15 studies</td>
</tr>
<tr>
<td>Venture/COP manager)</td>
<td></td>
</tr>
<tr>
<td>Executives/CEO/President</td>
<td>13 studies</td>
</tr>
<tr>
<td>Project Manager or Leader (sales, marketing, manufacturing)</td>
<td>12 studies</td>
</tr>
<tr>
<td>Board/Steering Committee</td>
<td>10</td>
</tr>
<tr>
<td>R&amp;D Scientists</td>
<td>9 studies</td>
</tr>
<tr>
<td>Administrative Support</td>
<td>8 studies</td>
</tr>
<tr>
<td>Director/VP/Chief Info. Officer</td>
<td>7 studies</td>
</tr>
<tr>
<td>Trainers/Instructors</td>
<td>4 studies</td>
</tr>
<tr>
<td>IT/software engineers</td>
<td>3 studies</td>
</tr>
<tr>
<td>Financial/Fund manager</td>
<td>3 studies</td>
</tr>
<tr>
<td>Knowledge/Academic Advisor</td>
<td>3 studies</td>
</tr>
<tr>
<td>Moderator/Quality Control</td>
<td>2 studies</td>
</tr>
</tbody>
</table>

*Other roles described in a single instance: clique group, suppliers, customers, core members, peripheral members, mentors and mentees.*

Knowledge Utilized to the Advantage of the Network Entity:

<table>
<thead>
<tr>
<th>Knowledge Details</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Utilized</td>
<td>59/59</td>
<td>100%</td>
</tr>
<tr>
<td>No Details</td>
<td>0/59</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>59/59</td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Utilization of Knowledge:
- 21 studies Utilized a SINGLE form of knowledge
  - 6 Knowledge Sharing
  - 14 Knowledge Transfer and Exchange
  - 1 Knowledge Diffusion
- 18 studies Utilized TWO forms of knowledge
- 20 studies Utilized THREE or more forms of knowledge
<table>
<thead>
<tr>
<th>Type of Knowledge Utilization</th>
<th>How this knowledge format was utilized</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Transferred and Exchanged</td>
<td>networking, competence building, through trust and reciprocity, email updates, teaching sessions, collaborative activities, regular communication, site visits, meetings, transaction decision making, various media</td>
<td>38</td>
<td>31%</td>
</tr>
<tr>
<td>Knowledge Shared</td>
<td></td>
<td>26</td>
<td>21%</td>
</tr>
<tr>
<td>Knowledge Generated</td>
<td></td>
<td>23</td>
<td>19%</td>
</tr>
<tr>
<td>Knowledge Stored/Harvested</td>
<td></td>
<td>12</td>
<td>10%</td>
</tr>
<tr>
<td>Knowledge Acquisition/Diffusion</td>
<td></td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Knowledge Integrated/ Synthesized</td>
<td></td>
<td>5</td>
<td>4%</td>
</tr>
<tr>
<td>Knowledge Translated/ Transformation</td>
<td></td>
<td>6</td>
<td>5%</td>
</tr>
<tr>
<td>Other (Centralized, Combined, Collaborated, Fused, Leaked, Managed, Protected, Requested and Verified)</td>
<td></td>
<td>9</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total by Number (including “Other”)</strong></td>
<td></td>
<td>123</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Different Types of Knowledge Transfer and Exchange**
- KTE (31%)
- Generated (19%)
- Acquired/Diffused (3%)
- Stored/Harvested (10%)
- Shared (21%)
- Translated/Transformed (5%)
- Integrated/Synthesized (4%)
- Other (Fused, Leaked etc.) (7%)

**Types of Network Like Entities**
- Network (45%)
- COP (15%)
- Joint Venture (15%)
- Linking Tie (2%)
Appendix H: Organizational Chart for the Guidelines International Network
Appendix I: Email Recruitment, Invitation Letter and Consent Form

Email Recruitment Messages

Dear Dr.______________

As a member of the Guidelines International Network (G-I-N) you are being invited to take part in a single telephone interview on the topic of knowledge transfer and exchange (KTE) within networks. This research was reviewed and approved by the G-I-N Board, and is part of my Master’s research thesis, supervised by Dr. Anna Gagliardi, at the University of Toronto.

The interview may require up to 20 minutes where you will be asked about your experiences participating in an international network, such as G-I-N. Attached is a consent form with further information. If you wish to participate please review, sign and return the attached consent form by email or fax to +1-416-340-4814 (please alert me if you are faxing it). Once you have done so we can schedule a time for the interview that is most convenient for you.

Thank you for your consideration, if you have any questions please contact me anytime.

Best Regards,
Stephanie

---
Stephanie Hylmar
MSc Candidate, Health Services Research
Institute of Health Policy, Management and Evaluation
University of Toronto
Mobile: +1-647-654-2657
Fax: +1-416-340-4814
Email: stephanie.hylmar@mail.utoronto.ca

Dear Dr.______________

I am sending a quick reminder of the invitation to participate in a single telephone interview on your knowledge sharing experiences in a network, specifically G-I-N. This research was reviewed and approved by the G-I-N Board, and is part of my Master’s research thesis, supervised by Dr. Anna Gagliardi, at the University of Toronto.

Attached is the official invite and consent form which further outline the project and interview. I do hope you would be interested in participating, if you have any questions please contact me.

Best,
-Stephanie

---
Stephanie Hylmar
MSc Candidate, Health Services Research
Institute of Health Policy, Management and Evaluation
University of Toronto
Mobile: +1-647-654-2657
Fax: +1-416-340-4814
Email: stephanie.hylmar@mail.utoronto.ca
Official Invitation Letter and Consent Form

Dear Dr. ____________

I am a graduate student at the University of Toronto, supervised by Dr. Anna Gagliardi, chair of the Guidelines International Network’s (G-I-N) Implementation Working Group, and leader of the Guideline Implementability Research and Application Network (GIRAnet).

My thesis focuses on exploring optimal conditions for knowledge transfer and exchange (KTE) in healthcare networks. I am contacting G-I-N members for interview to learn about their KTE experiences in a network. This research was reviewed and approved by the G-I-N Executive Board. The information learned here will inform future research on the topic of optimal KTE conditions in networks and add to the scarce literature on this topic.

You are being invited to participate in a single telephone interview, scheduled at your convenience, which may require approximately 20 minutes. Attached is a consent form with further information. If you are interested in participating, please review, sign and return page 5 the signature page of the consent form via email to: stephanie.hylmar@mail.utoronto.ca or by fax to +1-416-340-4814 (please alert me if you are faxing it).

If you have any questions please do not hesitate to contact me by email or phone.

With thanks in advance for your consideration,

Best Regards,

Stephanie Hylmar
MSc Candidate, Health Services Research
Institute of Health Policy, Management and Evaluation
University of Toronto
Mobile: +1-647-654-2657
Fax: +1-416-340-4814
Email: stephanie.hylmar@mail.utoronto.ca
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title
Exploring Optimal Conditions Necessary for Knowledge Transfer and Exchange within National and International Knowledge Networks

Principal Investigator
Stephanie Hylmar, MSc Candidate, Faculty of Medicine, Institute of Health Policy, Management and Evaluation, University of Toronto
Mobile: +1-647-654-2657
Email: stephanie.hylmar@mail.utoronto.ca

MSc Supervisors
Anna R. Gagliardi PhD, University of Toronto
Whitney Berta PhD, University of Toronto

Study Sponsor
This study is a graduate research thesis, conducted by Stephanie Hylmar MSc Candidate, Department of Health Policy, Management and Evaluation, University of Toronto

Introduction
You are being asked to take part in a research study. Before agreeing to participate it is important that you read and understand the study description, including the purpose, procedures, benefits, and risks. It also describes your right to refuse to participate or withdraw from the study at any time. In order to decide whether you wish to participate in this research study, you should understand enough about the risks and benefits to be able to make an informed decision. This is the informed consent process. Please ask the study investigator to explain anything you do not understand before signing this consent form.

If you have any questions, please contact Stephanie Hylmar, at: stephanie.hylmar@mail.utoronto.ca or +1-647-654-2657

Background/Description of Research:
Knowledge transfer and exchange (KTE) is the collaborative problem solving between different players in an entity (players can include but are not limited to: researchers, decision/policy makers, clinicians, managers, and internal/external stakeholders) that happens through linkage, sharing and exchange of information, knowledge, ideas and research results. Effective knowledge exchange involves interaction between these actors resulting in mutual learning, production, development application, sharing, transferring, translating, banking and harvesting of knowledge in relation to the topic of interest.

Knowledge networks are a type of tool used to enhance KTE between different people in difference places. Knowledge networks are relational entities involving interconnected individuals, groups or organizations within a specific domain of knowledge and practice, that
interact socially and professionally to share knowledge with each other to achieve a common goal. Participation in a network is usually voluntary; the network spans organizational boundaries encompassing people from different places/organizations/entities/groups and associations who are linked and come together collaboratively for a common interest or end goal. Networks have long been utilized as a tool to enhance KTE among groups of individuals or organizations, helping them collaborate with others in similar or complimentary fields.

However, the exact conditions and elements necessary to enable, encourage and sustain KTE within such knowledge networks are still unknown. At a very high level, the objective of this research study is to explore the optimal conditions necessary for knowledge transfer and exchange within a knowledge network spanning international boundaries. This research question will be addressed using two interrelated inquiries:

**Purpose**

1. **Systematic Review of the Literature**: To investigate how KTE in a network is characterized in the literature of three relevant disciplines: healthcare, organizational management and sociology. How do network structures, processes, activities and incentives are essential to achieve short-term, intermediate and long-term KTE outcomes?

2. **Key Informant Interviews**: To investigate the optimal conditions necessary for knowledge transfer and exchange in an international healthcare knowledge network. Key Informant interviews will explore the experiences of participants in a healthcare network in sharing and exchanging knowledge locally and internationally. Members of the Guidelines International Network will be recruited for interviews as an example of such an international healthcare knowledge network.

**Procedures**

As a member of the Guidelines International Network (G-I-N), you are being invited to take part in a research study involving a single 20 minute telephone interview. The purpose of the study interview is to investigate the needs and optimal conditions necessary for knowledge transfer and exchange (KTE) within a knowledge network such as G-I-N. The information learned will be of value to anyone interested in implementing a network for the exchange of healthcare specific knowledge locally or abroad. Furthermore, this information will contribute to the scarce literature on networks; specifically healthcare networks, and will be used to inform future research on this topic.

**Confidentiality: Protecting your Personal Information**

Your answers and comments will be confidential and only shared amongst the research team. All information will be reported and remain absolutely confidential and anonymous. The research team will not share individual answers and will not specify individual names to anyone outside the team. Furthermore, you will not be named in any report, presentation or publication that may arise from this study. An anonymous code will be used to identify your responses, and all data will be kept on a computer under password protection. Any notes from the interview will be kept in a locked cabinet in a locked office at Toronto General Hospital. All data will be destroyed five years after conclusion of the study.
The final thesis will include direct, but anonymous quotes in the text as part of the study methodology. Should you feel that for whatever reason a quote may be attributable to you, you will have the ability to bring this to the attention of the investigator before the dissertation is published. When the findings of the study are released all data will be anonymous.

If you decide to leave the study, the information collected will still be (anonymously) used. However, no new information will be collected without your permission. Representatives of the University of Toronto Ethics Board may look at study records to check that the information collected for the study is correct and to make sure that the study followed proper regulations and guidelines.

**Voluntary participation and Withdrawal**

Your participation in this study is voluntary. You can choose not to participate or you may withdraw from the study at any time, with no consequences. You may refuse to answer any question you do not want to answer by saying, “pass”. We will give you new information that becomes available during the course of the study that might affect your decision to remain in the study.

**Risks and benefits related to participating in the study**

There are no direct risks associated with participating in this study. You will not receive compensation, but we will share the research findings with you and the findings of our related research concerning the needs and conditions necessary for KTE within international healthcare knowledge networks.

**Expenses associated with participating in the study**

There is no cost associated with participating in this study. All interviews will be conducted through a conferencing centre, which has a toll free number.

**Questions and Research Ethics Board Contact:**

If you have any questions, concerns or would like to speak to the study team for any reason please call the principle investigator Stephanie Hylmar: Mobile: +1-647-654-2657. If you have any questions about your rights as a research participant or have concerns about this study, you may contact the Office of Research Ethics at the University of Toronto: ethics.review@utoronto.ca or +1-416-946-3273. The office of research ethics is a group of people who oversee the ethical conduct of research studies at the University of Toronto. These people are not part of the study team. Everything that you discuss with them will be confidential.

**Consent**

The research study has been explained to me and any questions I had have been answered to my satisfaction. I have the right not to participate and the right to withdraw from this study. I have been told that I have not waived my legal rights nor released the investigators, sponsors, or involved institutions from their legal and professional responsibilities. I know that I may ask any questions now or in the future, relating to the study and my participation in the study. I have been told that records relating to my interview will be kept confidential and that no information will be disclosed without my permission unless required by law. I have been given sufficient time to read the above information.
My signature below indicates my consent to participate in this research study. I have been told that upon consenting to participate in this study I will be given a copy of this consent form signed by the principal investigator.

For information or questions, please contact Stephanie Hylmar at +1-647-654-2657 or stephanie.hylmar@mail.utoronto.ca

_____________________________          _____________________________      ______________
Your Name (please print)                             Your Signature                                       Date

_____________________________          _____________________________
Your E-mail (please print)                           Your Preferred Contact Number

My signature means I have explained the study and answered all questions to the consenting participant named above.

Stephanie Hylmar

_____________________________          _____________________________      ______________
Name of Person Obtaining Consent                Signature                                       Date
Appendix J: Qualitative Semi-Structured Interview Guide

Hello and thank you for agreeing to participate in this telephone interview. This is Stephanie Hylmar, I am a graduate student with the Institute of Health Policy, Management and Evaluation, at the University of Toronto supervised by Dr. Anna Gagliardi, Chair of the G-I-N Implementation working group. This interview is contributing to my Master’s thesis project.

This project explores the needs, conditions and elements which support knowledge transfer and exchange in a network. I am interested in learning about the roles played by different network members, the ways in which they interact with other members, making connections and sharing or acquiring knowledge internationally and the benefits or difficulties that international network face when enabling knowledge transfer and exchange.

The Guidelines International Network (G-I-N) is serving as an example of such a network. This is NOT an evaluation of G-I-N.

You are free to pass on any questions and can stop the interview at any time. The interview is being audio recorded but your responses and your participation will remain anonymous.

Before we begin do you have any questions for me?

Role in Network ie. G-I-N:

- In what way(s) are you involved in G-I-N?
  - Prompt: What do you do for the network?
  - Prompt: How long have you been a member of G-I-N?
  - Prompt: How are you involved in the G-I-N activities? (participant / organizer)

Motivation:

- What was your initial motivation to join G-I-N? Why did you join?

- IF NOT a member why did you/do you participate in G-I-N?
  - Prompt: What was the purpose to joining G-I-N?
  - Prompt: What does the network do to make you want to continue participating?
  - Prompt: Were your expectations met? Did you get from the network what you thought you would? (Did you get more or less?)
Network KTE Characteristics/Activities:

- In what ways do you participate (contribute) to the network?
  - Prompt: Did G-I-N help you build connections with others? How?
  - Prompt: Whom did you connect with in G-I-N? (other users, executives etc.)
  - Prompt: IF NOT: why do you think G-I-N wasn’t helpful? How could they improve?

  - Prompt: HOW did G-I-N help you get your knowledge out to other participants?
  - Prompt: HOW did G-I-N help you increase your knowledge on a certain topic?
  - Prompt: What tools or aids or resources were helpful in engaging in KTE within G-I-N?

- What are the benefits of participating in G-I-N?
- What are the challenges to participating in G-I-N?

Other Suggestion:

- In what other ways would you like to exchange knowledge in a network such as G-I-N?
  - Prompt: Were there any unintended positive OR negative consequence of participating in such a network as G-I-N?

Before closing down the interview do you have any last thoughts or reflections on your experiences with knowledge sharing and KTE in networks?

Do you have any questions about the interview and this research?

Also, would you like to receive a synthesis of the findings of this research once we have concluded this study? If so I will send it along upon completion of this thesis research.

Thank you very much for your time and participation. Goodbye
## Appendix K: Data Integration Table for Systematic Review and Interviews

<table>
<thead>
<tr>
<th>Characteristics Considered for Integration</th>
<th>FOUND in the Literature Review Yes (√) or No</th>
<th>FOUND in the Interviews Yes (√) or No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Healthcare</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>✓ Business</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial Network Purpose and/or Motivation</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>✓ KTE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>✓ Increase Intellectual capacity</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Communication</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Collaboration (national or international)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Learning</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Innovation</td>
<td>Yes</td>
<td></td>
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<tr>
<td>✓ Research and/or Development</td>
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<td>✓ Efficiency</td>
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<td>✓ Marketing</td>
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<td></td>
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<tr>
<td>✓ Integration</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Credibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Tools/Resources</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>✓ Natural Progression</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>✓ Cost Savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Sharing</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>✓ Incentives</td>
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<td>✓ Logical Progression</td>
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<td>✓ Exec/President</td>
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<tr>
<td>✓ Directors/General Management</td>
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<tr>
<td>✓ Board/Steering Committee</td>
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<tr>
<td>✓ Admin</td>
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<tr>
<td>✓ Employees (ie.IT software)</td>
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<td>✓ Participants</td>
<td>Yes</td>
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<td><strong>Activities/Interactions</strong></td>
<td>Yes</td>
<td>Yes</td>
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<td>(80% NR)</td>
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<td>✓ Making use of Network Resources</td>
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<tr>
<td>✓ Contributing to Network Resources</td>
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<td>✓ Static Network Resources</td>
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<td><strong>Outcomes: Needs and Benefits</strong></td>
<td>Yes</td>
<td>Yes</td>
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<td>✓ Voluntariness</td>
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<td>✓ Connecting</td>
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<td>✓ Stated Intent</td>
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<tr>
<td>✓ Learning</td>
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</tr>
<tr>
<td>✓ Sharing</td>
<td></td>
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<tr>
<td>✓ Re-juvinating/Re-engaging</td>
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</tr>
<tr>
<td>✓ Recruitment</td>
<td></td>
<td></td>
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<tr>
<td>✓ Collegiality/Friendship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Developing the field</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Hard Products Tools**  
(INCLUDING BUT NOT LIMITED TO: TOOLS, COMMON, TERMINOLOGY/NOMENCLATURE, PUBLICATIONS/NEWS, PRESENTATIONS/INFORMATION SHEETS, WEB CASTS, NEWSLETTERS, FUNDING/SPONSORSHIPS, DATASETS/ALGORITHMS/MODELS, TRAINING) | ✔️ | ✔️ |
| **Cognitive Outcomes**  
(INCLUDING BUT NOT LIMITED TO: R&D INNOVATION, PERFORMANCE, IMPLEMENTATION STAGING LEARNING ABOUT TOOLS, TACIT KNOWLEDGE, KNOWLEDGE CREATION, COLLABORATION, INFORMATION/COMMUNICATION/EDUCATION, EXPERIENCE) | ✔️ | ✔️ |
| **Relational Outcomes**  
(INCLUDING BUT NOT LIMITED TO: INFORMAL RELATIONSHIPS, FORMAL RELATIONSHIPS, TRUST/PATIENCE/UNDERSTANDING, TOLERANCE, MUTUAL RESPECT, TECHNOLOGICAL LIAISONS, CONSENSUS BUILDING) | ✔️ | ✔️ |
| **Developmental Outcomes**  
(INCLUDING BUT NOT LIMITED TO: PUBLIC PERCEPTION, GOALS/MISSION, GROWTH, LEADERSHIP, PURPOSE/PROBLEM FOCUSED SOLUTIONS, STATUS/POWER) | ✔️ | ✔️ |

<table>
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<th><strong>Management Characteristics</strong></th>
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<td>✔️ Structure/Format</td>
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<td>✔️</td>
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<tr>
<td>✔️ Types of Network</td>
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<tr>
<td>✔️ Governance/Leadership</td>
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<td>✔️</td>
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<td>✔️ Eligibility</td>
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<td>✔️ Change Management</td>
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<td>✔️ Standards</td>
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<td>✔️ Membership Fees</td>
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<td>✔️</td>
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<tr>
<td>✔️ Future Sustainability</td>
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<table>
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<tr>
<th><strong>Recommendations</strong></th>
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</thead>
<tbody>
<tr>
<td>✔️ Products/Outputs</td>
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<td>✔️</td>
</tr>
<tr>
<td>✔️ Publications/Journals</td>
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<td>✔️</td>
</tr>
<tr>
<td>✔️ Tools</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ Seek Sponsorship</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ Strong Leadership</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ Better Engagement</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ Translation</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>✔️ Social Media</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>✔️ Topic Specific sub-groups</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Appendix L: Interview Thematic Maps

Role

Network Membership
- Organizational Member
- Individual Member
- Non-Member (rare)

Network Role
- Paid Employee
- Board Leadership
- Working Group Member
- General Member/Participant

Involvement
- Active
- Moderate
- Passive

Motivation

Collaboration
- International Collaboration
- Learning by Collaboration

Credibility
- Sharing by Collaboration

Tools/Resources
- Promoting by Collaboration

Natural Progression
- Networking and Connecting by Collaboration

Cost Savings
- Made Sense/Logical

Network Development
Appendix M: Research Ethics Approval Letter U of T REB

UNIVERSITY OF
TORONTO

OFFICE OF THE VICE PRESIDENT, RESEARCH

PROTOCOL REFERENCE # 28033

August 20, 2012

Dr. Anna Gagliardi
DEPT OF HEALTH POLICY, MANAGEMENT & EVALUATION
FACULTY OF MEDICINE

Ms. Stephanie Hylmar
DEPT OF HEALTH POLICY, MANAGEMENT & EVALUATION
FACULTY OF MEDICINE

Dear Dr. Gagliardi and Ms. Stephanie Hylmar,

Re: Your research protocol entitled, “Exploring optimal conditions necessary for knowledge transfer and exchange within national and international knowledge networks”

ETHICS APPROVAL

Original Approval Date: August 20, 2012
Expiry Date: August 19, 2013
Continuing Review Level: 1

We are writing to advise you that the Health Sciences Research Ethics Board (REB) has granted approval to the above-named research protocol under the REB’s delegated review process. Your protocol has been approved for a period of one year and ongoing research under this protocol must be renewed prior to the expiry date.

Any changes to the approved protocol or consent materials must be reviewed and approved through the amendment process prior to its implementation. Any adverse or unanticipated events in the research should be reported to the Office of Research Ethics as soon as possible.

Please ensure that you submit an Annual Renewal Form or a Study Completion Report 15 to 30 days prior to the expiry date of your current ethics approval. Note that annual renewals for studies cannot be accepted more than 30 days prior to the date of expiry.

If your research is funded by a third party, please contact the assigned Research Funding Officer in Research Services to ensure that your funds are released.

Best wishes for the successful completion of your research.

Yours sincerely,

Judith Friedland, Ph.D.
REB Chair

Daniel Gweku
REB Manager

OFFICE OF RESEARCH ETHICS
McNamara Building, 12 Queen's Park Crescent West, 2nd Floor, Toronto, ON M5S 1S8 Canada
Tel. +1 416 946-3273 • Fax. +1 416 946-3763 • edr.mailreview@utoronto.ca • http://www.research.utoronto.ca/for-researchers-administrators/ethics/
August 13, 2013

Dr. Anna Gagliardi
DEPT OF HEALTH POLICY, MANAGEMENT & EVALUATION
FACULTY OF MEDICINE

Ms. Stephanie Hylmar
DEPT OF HEALTH POLICY, MANAGEMENT & EVALUATION
FACULTY OF MEDICINE

Dear Dr. Gagliardi and Ms. Stephanie Hylmar,

Re: Your research protocol entitled, "Exploring optimal conditions necessary for knowledge transfer and exchange within national and international knowledge networks"

ETHICS APPROVAL

Original Approval Date: August 20, 2012
Expiry Date: August 19, 2014
Continuing Review Level: 1
Renewal: 1 of 4

We are writing to advise you that you have been granted annual renewal of ethics approval to the above-referenced research protocol through the Research Ethics Board (REB) delegated process. Please note that all protocols involving ongoing data collection or interaction with human participants are subject to re-evaluation after 5 years. Ongoing research under this protocol must be renewed prior to the expiry date.

Please ensure that you submit an Annual Renewal Form or a Study Completion Report 15 to 30 days prior to the expiry date of your protocol. Note that annual renewals for protocols cannot be accepted more than 30 days prior to the date of expiry as per our guidelines.

Any changes to the approved protocol or consent materials must be reviewed and approved through the amendment process prior to its implementation. Any adverse or unanticipated events should be reported to the Office of Research Ethics as soon as possible. If your research is funded by a third party, please contact the assigned Research Funding Officer in Research Services to ensure that your funds are released.

Best wishes for the successful completion of your research.

Yours sincerely,


OFFICE OF RESEARCH ETHICS
McMurtry Building, 12 Queen's Park Crescent West, 2nd Floor, Toronto, ON M5S 3G8 Canada
Tel: +1 416 946-3235 • Fax: +1 416 946-5763 • ethicsreview@utoronto.ca • http://www.research.utoronto.ca/for-researchers-administrators/ethics/
Appendix N: Detailed Interview Participant List and Membership Attributes

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Member Type</th>
<th>Member Role</th>
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<tr>
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<td>Developed Countries</td>
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</tr>
<tr>
<td>001</td>
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</tr>
<tr>
<td>002</td>
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</tr>
<tr>
<td>003</td>
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<td>Board Member</td>
</tr>
<tr>
<td>004</td>
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<tr>
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</tr>
<tr>
<td>006</td>
<td>Organizational Member</td>
<td>Working Group</td>
</tr>
<tr>
<td>007</td>
<td>Individual Member</td>
<td>General Member</td>
</tr>
<tr>
<td>008</td>
<td>Organizational Member</td>
<td>Working Group</td>
</tr>
<tr>
<td>009</td>
<td>Organizational Member</td>
<td>Employee/Board Member</td>
</tr>
<tr>
<td>010</td>
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</tr>
<tr>
<td>011</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>016</td>
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<td>017</td>
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<td>025</td>
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<td>Working Group Members: 8</td>
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<td></td>
<td>General Members: 15</td>
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Appendix O: Interview Codebook from the Qualitative Semi-Structured Interviews (N= 30)

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<tr>
<th>Overarching Question</th>
<th>THEME</th>
<th>Sub-Theme</th>
<th>Example/Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROLE: What are the member roles and activities?</td>
<td>Network Membership Formal designation within G-I-N</td>
<td>G-I-N Organizational Member participating as part of a larger guideline organization: The organization they work for is a member. Available to non-profit-distributing organizations involved in developing, disseminating, implementing, or evaluating clinical practice guidelines, or otherwise active in the guideline field</td>
<td>We have joined up to be an organizational member of GIN simply because… it can bring value back to your organization and your work (008)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I work in a member organization (010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes. They are an organizational member (011)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I'm not a personal member, but my organization and we have been a founder member (021)</td>
</tr>
<tr>
<td></td>
<td>Individual Member participating on their own behalf: They themselves are a member. Available to individuals working in the field of clinical practice guidelines and to profit-distributing organizations</td>
<td></td>
<td>I am just a single member (016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Our institute isn't actually a formal member but I am (019)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>I don't think I do anything particularly as an individual member (019)</td>
</tr>
<tr>
<td></td>
<td>Non-Member (rare): Participate in activities, do not pay dues</td>
<td></td>
<td>I’m not a member and not active in GIN (004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network Role The member’s formal role within G-I-N</td>
<td>Paid Employee: Administrative Guiding/Organizing Managing external relations/Liaising Hiring</td>
<td>I was looking at it in terms of administration as well as contacting the members (009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Working with the organization of the conferences, mostly in terms of contact... but also supporting … how the GIN conference could run (009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Board Leadership Positions: Leading the network Judiciary responsibilities Financial tasks Planning/Governance Research work Vetting Members</td>
<td>My responsibilities' essentially reading the network, making sure that we’re meetings its mission and goals (003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Handling network business on a daily basis (023)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working Group Positions (Leaders and Members): Collecting information Organizing teleconferences/meetings</td>
<td>I have been a member of the emergency care interest group of GIN for seven or eight years (012)</td>
</tr>
<tr>
<td>Involvement</td>
<td>Active Involvement:</td>
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<tr>
<td>-------------</td>
<td>---------------------</td>
<td></td>
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</tr>
<tr>
<td>Members’ involvement ranges from heavily involved to moderate and minimal involvement based on a self-description of their participation or non-participation in network life/activities; interacting with other members through the online forums, meetings, educational sessions, conferences, sharing their research, presenting, and contributing to network growth and development</td>
<td>Take a big part in network activities and duties because of the level of involvement they have chosen to take. They are actively seeking knowledge or connections for knowledge sharing while, contributing their own. This includes but not limited to: attending conferences, participating in online session, being involved in a working group, using the resources provided by the network, submitting to the newsletter, giving feedback etc</td>
<td></td>
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<tr>
<td>Moderate Involvement:</td>
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<td></td>
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<tr>
<td>Take a smaller part in network activities and duties because they have chosen to not be as involved or cannot find the time to be involved in the activities of the network or because they don’t have the resources to be involved in the network at such a highly committed level. Their participation may include using some online tools, or having attended a conference however they are not actively engaging with other networks members and they are not sharing, exchanging</td>
<td>GIN was kind of incidental to my own networks (002)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Minimal or No Involvement: These participants are very peripheral to the network. They are not motivated to participate either due to lack of time or resources or interest. They are not engaged from an organizational standpoint and they barely keep up to date on the goings on in the network. Their involvement is the lowest and simplest form | I'm not so actively involved in GIN (004)  
I don't have an actual role in the Guidelines International Network yet (011)  
[I have] a general role… so No I haven't gone to any meetings (029) |
<table>
<thead>
<tr>
<th>Overarching Question</th>
<th>THEME</th>
<th>Sub-Theme</th>
<th>Example/Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MOTIVATION</strong></td>
<td><strong>Collaboration:</strong></td>
<td><strong>International Collaboration:</strong></td>
<td>There were some strong needs for more international collaboration between ours and others of the guideline organizations (005)</td>
</tr>
<tr>
<td>Why did they join the network and continue to participate in the network, what motivated their behaviour?</td>
<td>Individuals joined and participated in the network because they wanted to work together, and jointly participate in sharing knowledge, tools and resources among one another for a common purpose, benefit or goal</td>
<td>Collaborating internationally and promoting that international collaboration throughout the network and the network individuals. Whether they themselves, their organization or others needed and or wanted it, they were motivated to join and be part of the network for the opportunities available to collaborate together</td>
<td>My mission until I retire is to push towards guideline collaboration… to try to get collaboration amongst guidelines developers within the North American community but also involving groups from Europe and other parts of the world (006)</td>
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<td><strong>Learning through Collaboration:</strong></td>
<td><strong>We wanted to learn from other people, it’s the education, I want, to see what I can learn from what other folks are doing right (003)</strong></td>
<td>When I started out, just a regular member…. What it was for me, it was the sharing. It was just being able to be in contact with people from around the globe, share my experiences, learn from them. This was really my objective. And I would say they have really been met (009)</td>
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<td><strong>Sharing through Collaboration and Receiving Feedback:</strong></td>
<td><strong>it’s the only worldwide forum of guideline experts… to learn from each other (013)</strong></td>
<td>We wanted to learn from other people, it’s the education, I want, to see what I can learn from what other folks are doing right (003)</td>
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<td>Promoting their work through Collaboration:</td>
<td>There was that opportunity to kind of promote the business… that's developed into quite an internationally recognized guideline brand (007)</td>
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<td>Collaborating with the individuals in the network allowed them to promote or boost the visibility of their own work within the guidelines field</td>
<td>It is required that in your position you either are very, very centrally involved with this [guidelines] as being the main blood of what your organization does (008)</td>
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<td>There was that opportunity to kind of promote the business… that's developed into quite an internationally recognized guideline brand (007)</td>
<td>It just came with the job… You know, it's [GIN is] the main organization that guideline developers would look to for networking (020)</td>
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<td>“Made Sense”: Collaborating with the individuals in the network made sense, it was in line with their work, where the work of their organization or their own work was inextricably linked to the guideline field and in line with their informational wants, needs or interests</td>
<td>The reason for joining GIN was primarily linked to my work, which as a guideline developer, it made sense to join this emerging group (024)</td>
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<tr>
<td>It is required that in your position you either are very, very centrally involved with this [guidelines] as being the main blood of what your organization does (008)</td>
<td>The second [motivation] was networking and building contacts essentially (003)</td>
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<td>“Made Sense”: Collaborating with the individuals in the network made sense, it was in line with their work, where the work of their organization or their own work was inextricably linked to the guideline field and in line with their informational wants, needs or interests</td>
<td>I was the only agency writing guidelines and we were kind of professionally lonely (007)</td>
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<td>When the Guidelines International Network was started, the organization I was leading, its core business was the implementation of evidence into action … there was a very small international pool of that kind of expertise... that inevitably led me to looking for people and groups that had similar interests, where it would be possible to have the kind of exchange and learning and values that you can only get when there are a meeting of people and individuals and organizations that have aligned interested (008)</td>
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<td>For the day job it’s a great networking opportunity (012)</td>
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<p>| Networking and Connecting with Other Members: | The second [motivation] was networking and building contacts essentially (003) |
| Individuals joined and participated in the network because they wanted to meet, connect with, network with and get to know other people in the guideline field | I was the only agency writing guidelines and we were kind of professionally lonely (007) |
| Networking and Connecting with Other Members: | When the Guidelines International Network was started, the organization I was leading, its core business was the implementation of evidence into action … there was a very small international pool of that kind of expertise... that inevitably led me to looking for people and groups that had similar interests, where it would be possible to have the kind of exchange and learning and values that you can only get when there are a meeting of people and individuals and organizations that have aligned interested (008) |
| Networking and Connecting with Other Members: | For the day job it’s a great networking opportunity (012) |</p>
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<tr>
<td><strong>Credibility and Network Legitimacy:</strong></td>
<td>Individuals joined and participated in the network because they wanted to increase their own credibility or their organization’s credibility in the eyes of others by belonging to an entity related to their professional role/work/interests</td>
<td>It just really takes a number of people who are willing to put the effort in to you know develop and maintain credibility. And then you get accepted into these organizations and people are more willing to work with you (006) The main motivation to join was while working with partners on a guideline project, and it was to really show them that it’s important to belong to different associations and memberships (016)</td>
</tr>
<tr>
<td><strong>Access to Guideline Tools and Resources:</strong></td>
<td>Individuals joined and participated in the network because they wanted access to the guideline specific topical adaptation, development and implementation tools, and resources available through the network that are not found elsewhere</td>
<td>To be blunt it was to have access to the G-I-N database (019)</td>
</tr>
<tr>
<td><strong>Natural Progression:</strong></td>
<td>Individuals joined and participated in the network because they were a member from the original “AGREE” collaboration, the founding group of G-I-N</td>
<td>As a natural progression from the original work that we did on the Agree Framework (001)</td>
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<td><strong>Network Membership Provides Cost Savings:</strong></td>
<td>Individuals joined and participated in the network because they wanted to save on network fees (ie: fees related to attending conferences and having access to the tools available)</td>
<td>It’s financially advantageous to be a member when you register for the conference (002)</td>
</tr>
<tr>
<td><strong>Promote Network Development and Growth:</strong></td>
<td>Individuals participated participant wanted to promote the network’s growth and development within the guideline arena and thus was motivated to contribute and stay on with the network</td>
<td>At that stage kind of be a good corporate citizen and trying to facilitate the development of this network (001)</td>
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<tr>
<td>Overarching Question</td>
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<td>Sub-Theme</td>
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<td><strong>ACTIVITIES:</strong></td>
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<td>What activities do you participate in within the network and have they helped you increase your knowledge or make new connections within the network?</td>
<td>USING the Network Activities in an interactive way to gain new Information, or Connections:</td>
<td>Attending the Annual General GIN Meeting to learn: Using the network’s Annual General Meeting and network activities or resources provided therein as a source for learning and taking away new information or knowledge</td>
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<td>Using, gaining, seeking any sort of knowledge, resources, materials, skills, expertise from the network through various active or passive means available</td>
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<td>Attending the Annual General GIN Meeting to connect: Using the network’s Annual General Meeting and network activities or resources provided therein as a source for making new connections, fostering old connections and linking up with people in the same field</td>
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<td>Using Teleconferences and Webinars to learn:</td>
<td>A monthly webinar series that we host for people in the North American guideline community (006) I’ve been involved in having teleconferences (007) The GIN North America webinars, are extremely useful and informative (019)</td>
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<td>Using the Newsletter to learn:</td>
<td>The newsletters are good because they keep me up to date with new publications (007) I more or less, use the information which comes to me from… the newsletter (011)</td>
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<td>Using the G-I-N Working Groups to learn:</td>
<td>The involvement in a working group, that helped… opening my mind (009) Working together [in the working groups]… from my personal point of view, is the best way to learn from each other (013)</td>
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<tr>
<td>CONTRIBUTING/ GIVING to the Network in an interactive manner, participating in the Network to PROVIDE or SHARE new information or Resources to the network community:</td>
<td>I love presenting at the sessions at the conference (003) I've had the opportunity to present… I've attended these meetings that are under the GIN umbrella… I've felt I have a very nice platform for expressing my views or letting people know what I think (012)</td>
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<tr>
<td>Disseminating Knowledge to the Network using the Annual General Meeting:</td>
<td>I contribute new ideas for the working group (008) Through the working groups, we have been able to contribute knowledge (010) I’ve presented or chaired at [the working group] and provided some specific input (018)</td>
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<tr>
<td>Dissemination Knowledge to the Network using the working Groups:</td>
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| Disseminating Knowledge to the Network by Publishing Papers: | I’ve been involved in… writing Papers (007)  
Sharing information or knowledge through papers that have been produced (014)  
I’ve been involved in publishing papers (023) |
|---|---|
| Disseminating Knowledge to the Network through the Newsletter: | the communication via the newsletter, which enabled us to reach out to others (009)  
Through their newsletter... advertise our stuff; our projects (001) |
| Mentoring or teaching other Individuals in the Network: | I’m one of the experts, so people ask their knowledge to me, I share my knowledge with others (005)  
From the feedback during our sessions, we have imparted knowledge that has been useful for [other] people (019) |
| Fixed Products or Static Tools Provided by the Network and Used at the Participant’s Discretion: | The G-I-N Website:  
I look at the website and use some of the tools that are available (004)  
The website’s really good if I want to search for a guideline topic (007)  
Using the GIN website as a kind of an information resource area (019)  
I have accessed the material available on the website that is free to access (026) |
| The G-I-N Website: |   
G-I-N hosts a website which lists activities in the network, houses the guidelines library, various guideline tools and contacts, has back issues of the newsletter, and provides information about membership, contact, history and evolution |
| The TOOLS available through the network. They were not developed by the network but they are advertised as the appropriate tools to use in relation to guidelines related work by the network: | Mainly [use] the AGREE tool (004)  
The ADAPT process, the AGREE toolkit and the ADAPT version two (025)  
The methodology tools: ADAPT and the new AGREE formulary mostly (029) |
<p>| The TOOLS available through the network. They were not developed by the network but they are advertised as the appropriate tools to use in relation to guidelines related work by the network: | The tools available or promoted by GIN as the tools to use for various guideline related endeavors ex: AGREE I &amp;II and ADAPT process Tools. These were not network initiatives per say but they are promoted by the group |</p>
<table>
<thead>
<tr>
<th>The International Guidelines Library:</th>
<th>My colleagues in the organizations I worked in were using G-I-N [library]… to retrieve guidelines from other organizations (009)</th>
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<tr>
<td>*The Working Groups which are a type of sub-network for members to participate based on interest:</td>
<td>The GIN database got up and running, that was a useful tool (019)</td>
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<tr>
<td>- Evidence Tables Working Group</td>
<td>GIN offers this large [guidelines] library, where you can do your research (021)</td>
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<td>- GIN Public</td>
<td>The G-I-N search engine, that's a big one, the Guidelines International Library, I use a lot (025)</td>
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<td>- Emergency Care Community</td>
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<td>- Allied Health Community</td>
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<td>- Implementation Community</td>
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<td>- Adaptation Working Group</td>
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<td>- Performance measures group</td>
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<td>- GIN North America</td>
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<td>BENEFITS TO PARTICIPATING:</td>
<td>CONNECTING: The benefit of being part of the network was having the ability to use the network activities, resources, tools and network access as a source for making new connections, fostering old connections and linking up with people in the same field, locally and internationally.</td>
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<td>Connecting in-person aids collaboration creating Trust: The benefit of participating in the network was that human element to the contact. Meeting in person at the conferences allows connections and working relationships to be formed while fostering Trust. The opportunity to meet face-to-face enhances connections and trust in that relationship and helps foster collaboration, and the ease of doing work remotely</td>
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| International Reach: | \textbf{International Reach:}  
\textit{The benefit to participating in the network was the ability to connect with organizations and people through the network who were also members from many different continents and cultures around the same topic or issue (i.e., guidelines) and to collaborate on topics of relevance and interest globally} | I get a lot of good ideas because the network is not limited to the United States, there’s been very, very good opportunity for me to learn \(003\)  
Benefits are actually a very rapid way of connecting with similar/relevant organizations around the world… you can garner vies across an international audience \(023\) |
| LEARNING: The benefit of being part of the network and participating in the network activities is the acquisition of knowledge or skills through experience, practice, or study, or by being taught | \textbf{Gaining/Obtaining Knowledge:}  
\textit{An active form of gaining knowledge from the network by; study, experience or seeking out learning opportunities. The participant consciously and intentionally has joined the network and participates in the network because they seek out specific or specialized knowledge} | There is valuable learning and awareness that comes from it and changes your mindset on something’s that manifest themselves in different ways and different kinds of decisions that you make thereafter, I do think it's valuable \(018\)  
I’ve gained more knowledge from my GIN involvement than what I’ve provided \(012\) |
| Idea Generation: The benefit of being part of the network and participating in it is the generation of new ideas for their research or their professional work building off of work they have seen in the network | \textbf{Idea Generation:}  
\textit{The benefit of being part of the network and participating in it is the generation of new ideas for their research or their professional work building off of work they have seen in the network} | Whenever you meet with other people that always generates some discussion… and good ideas \(003\) |
| SHARING: The benefit of being part of the network and participating in the network activities is the sharing and dissemination of ideas and receiving constructive feedback from other members based on their shared information | \textbf{Disseminating Guideline knowledge throughout the network:}  
\textit{The benefit of participating and being part of the network was being in a position to spreading ideas, knowledge, resources, etc. throughout the network to the people who wanted it or have use for it. This is done by having people come to them for information or advice. Typically network members will seek them out or they will make their information available through one of the avenues at the annual general meeting} | The ability to post the guidelines and therefore to make it known to others that you have a guideline available or that you're working on a guideline \(009\)  
The benefits are about being with like-minded people, who do similar things and sharing issues and trying to come up with solutions together, that is definitely the benefit \(010\)  
I find that I can share knowledge that I've learned in my own work by participating [in GIN]\(023\) |
| **Getting Feedback:** | The benefit of participating and being part of the network was being able to get feedback on their work and their ideas | Useful for me was the knowledge one would get from the conferences and from meeting people there, from presenting each project and getting feedback (009)
It’s a conduit…to vet some of our own ideas (019) |
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<td><strong>Rejuvenation/Re-Engage:</strong></td>
<td>The advantage of being part of the network is to re-engage in the field of guidelines, to be re-captured by the work by speaking to others and collaborating and participating. Being refreshed and motivated to continue on in the field</td>
<td>You can have that sort of rejuvenation of your interest about your own work when you go and speak to other people in the network (020)</td>
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<td><strong>Recruitment:</strong></td>
<td>The advantage of being part of the network is in finding interested allies/participants for research. Being part of the network or participating in activities allows participants to create a larger, more diverse group of connections to use in their professional work</td>
<td>The one thing that GIN has done is they have helped us too recruit participants for different studies … that has been a big benefit (001)</td>
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</table>
| **Collegiality and social interaction with like-minded individuals:** | The advantage of being part of the network and participating in network activities was the ability to connect with people who were colleagues for social/amicable reasons and foster friendships | You want to hang out with people who you can relate to (003)
The unstated reasons why people belong to networks: the collegiality, I guess is way that you would say it in an organizational context, but the friendships are the way that you would say it in a personal context (008)
It’s fun to be together with peers during the conferences (013)
Doing more personal networking with folks who are active in the guidelines world that I might not otherwise come across (015) |
<p>| <strong>Developing the Field of Guidelines itself:</strong> | The advantage of being part of the GIN group and participating in the activities of GIN is the development of the field over which people are interested and linking up for ie. Guidelines. The network participants are helping to develop and enhance the field of clinical practice guidelines. | You’re helping progress working knowledge in an important area that wouldn't occur if you weren't contributing in that way (008) |</p>
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<td><strong>CHALLENGES TO PARTICIPATING:</strong></td>
<td><strong>MULTINATIONAL COLLABORATION:</strong> The network spanning international boundaries presents challenges or obstacles to the participants</td>
<td><strong>Scheduling meeting times through different time zones and medias to connect globally:</strong> The physical location of different collaborators poses obstacles to collaborating. Navigating the difference in time-zones and inability to meet in-person (inability to travel) creates barriers to connecting and collaborating through webinars and teleconferences</td>
<td>I think... we could do better. It's hard to get people on phone calls. It's hard with meetings (012) It's much, much harder to get involved in complex discussions, when you have to be quite regimented going round, the call [teleconference] (023)</td>
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<td><strong>Language:</strong> English is the main language of communication which presents problems for some participants based on how expansive their familiarity with it</td>
<td></td>
<td>The other difficulties I guess are language difficulties. So if you're dealing with a particular topic, then you have to hear people for whom English their first language. And so you concentrate very hard to understand what people are saying (023) One of the difficulties that I think you have with GIN is that first of all, it is an Anglophone organization. So, I do think that that then means that what is presented and what is discussed, the people are generally fluent, are going to be those from North America, Canada, and the UK, and Australia and New Zealand. So I think there's elements there, because of the nature of exchange of ideas… I think there's an issue there. I think one of the issues is for those other countries, say other European countries that aren't in that group.... one of the challenges I've certainly had, I think, in working with Germany, is that an awful lot of work done on guidelines in German, in Germany, but relatively little of that literature or that work is translated into English. So it doesn't then become accessible to a wider Anglophone community (024)</td>
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| **PARTICIPANT CONTRIBUTIONS:** | **Participant Time and Voluntariness:** | **Being a very active partner in a group like GIN, Yes you do have to give up a lot of personal time, and that's particularly if you are resident in the southern hemisphere (008)**
> Participating is all on a voluntary basis, so it’s just a matter of how many people can actually, you know find the time to work on this in a voluntary capacity (019)

| **Participant Engagement:** | **Stagnation and Sustainability:** | **The dilemma is that GIN has, is that you actually need the engagement of the people (008)**
> I think it’s just a lifestyle, you always have to be thinking of how to network and you have to recognize individually that if you’re not participating, it’s not working to its fullest (016)

| **CHANGE MANAGEMENT (or Network Evolution):** | **Sustainability:** | **It’s still relatively small you know in terms of conferences, like 500-600 people (006)**
> There needs to be some wakeup call that GIN has to offer something other than membership and conference engagement if it's going to survive (007)

> One of the other sort of difficult things for a network is… stagnation is a really big risk and I think that it's important that there's a, there's a capacity to engage new people (008)

> GIN is a bit looser in that, you know, it's sort of, whatever the members want to initiate. Other than the meetings, there's no specific agenda or objectives or deliverables that are expected of members (012)

> The challenge now might be to develop the network with respect to the community, from my personal point of view is only able to survive if there is continuous growth (013)

> The challenge is whether such a kind of network would become a sustainable entity (013)
| **Overseeing network operation and leadership of the board:**<br>
*How is the network dealing with issues of management “turnover”, longevity and representation. Is the network being lead appropriately* | **Not many people on the board have been responsible for running their own organizations, in terms of leadership and the business skills of bringing organizations to life and leading them (007)**<br>
Things aren’t functioning well, it takes a new board a while to gel together and to decide on which direction to go and what their strategies are (007)<br>
It's very important that the people who are running the network maintain values about ensuring that there's a turnover of new people and that there's a proper mix in the running of the network of people who've got the corporate knowledge and the corporate memory and the values that were behind the network being set up (008) |
|---|---|
| **Network Revenue:**<br>
*How is the network making money to support it’s staff and activities/tools. How is future financial sustainability going to be maintained for this network which is in fact a charitable organization* | **For a network, particularly an international network to exist and prosper, it needs to have other resources that are more than just membership fees (008)**<br>
We are kind of naked now, when it comes to financing the network [no direct revenue sources] (014) |
| **Standards:**<br>
*Different countries have different standards and methodologies when it comes to guideline development and implementation, especially considering developing versus developed nations* | **We’re finding to be very difficult is that all the groups kind of use different methodologies… I think as we all start to use the same methodology and hopefully similar grading systems, you know like the Grade System. There will be much more of an opportunity for us to collaborate (006)** |
| **Membership Fees:**<br>
*The monetary cost of participating in the network is high for participants from both developing and developed nations* | **The negative side is that it is not an inexpensive organization to join, I have no problem with the concept of paying. It is how much you pay (001)**<br>
The membership fees (008)<br>The issue was the financing issue, the high membership fees (025)** |
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| **RECCOS.**  
*Improvements to the network; how else can we exchange knowledge in a network, or what is the network not providing currently that they could be?* | **PRODUCTS/OUTPUTS:**  
The network should be producing more tools, products and innovating. | **Guidelines Specific or Topical Tools by GIN:**  
*Have G-I-N create tools or products for their membership for development and implementation of guidelines* | I think... they should develop that themselves, GIN tools or GIN instruments… with different aims and different purposes (005)  
There is value in looking at the way that you could develop tools to help other countries use existing guidance, particularly because I think often, the evidence of high quality. I guess what I would obviously hope GIN could be doing (024) |
| | | **Publication/Scientific Journal:**  
*Have GIN put out a more sophisticated peer reviewed publication which is specific to guidelines* | It’s now not so difficult to start a scientific journal… It’s something to consider (004) |
| | | **Seek Sponsorship from Government or Research Funding Agencies:**  
*Approach major international funders to sponsor work and innovation in GIN* | Get sponsored by government. It could be a lot of these big funders, internationally, who are funding research…. We haven't checked out that market at all…. GIN has never participated in anything like that (014)  
Sponsored by … the Gates Foundation (014) |
| | | **Strong Board level Leadership:**  
The network needs to have Leadership at the board level which translates into transparency, the capability to lead as it evolves, with confidence and the ability to engage members | I think you need leadership. You need to have the confidence to articulate what it is that you want to do... have the ability to talk to your network and not operate secretly. And find ways to get the network to contribute and not say the network is simply the cluster of people on the board (007) |
| | | **More Engagement of participants at the Annual General Meetings:**  
*Getting people more involved at conferences through icebreakers or mentorship and workshops ect. Creating a culture. This meeting is the one big yearly meeting where all the in-person networking and connections are initially fostered for most participants* | Creating a culture of inclusion…have people interested in mentorship … with workshops, with a sense like you’re working toward something (002)  
Have some type of icebreaker at these receptions that would force people to interact (006) |
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<th><strong>Translation of Guidelines into Different Languages:</strong></th>
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<td>Translate guidelines into various languages, or assist organizations/people to find help translating their guidelines into various languages</td>
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<td>For GIN to help with is actually translation… a huge, huge barrier… you have to get permission to translate that guideline before you can adapt it. You know, most people get around that by just simply ignoring copyright rules, which I don't think is a good approach. And so that's been a huge problem and barrier for us.... because again.... these countries will just break the copyright rules (016)</td>
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<table>
<thead>
<tr>
<th><strong>Electronic or Social Medias:</strong></th>
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<tbody>
<tr>
<td>Using various platforms to help promote and advertise the work of G-I-N and its members</td>
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<tr>
<td>Examples:</td>
</tr>
<tr>
<td>- Twitter</td>
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<tr>
<td>- LinkedIn</td>
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<tr>
<td>- Facebook</td>
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<tr>
<td>A meeting is not enough, how can we develop … electronic ways to put people in contact with each other? (003)</td>
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<tr>
<td>Perhaps Twitter… I do use Twitter but for following a number of major medical journals, I could imagine to add GIN to it (004)</td>
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<tr>
<td>It would nice to start to offer, sort of LinkedIn style groups that can sort of follow a thread of discussion together, on topical issues (023)</td>
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<tr>
<th><strong>More Topic-Specific sub-groups:</strong></th>
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<tbody>
<tr>
<td>More topical subgroups which are specialized to certain clinical or development areas that people can join and be part of based on a more narrow interest. Being plugged into a specialty “hub”</td>
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<tr>
<td>In the steering group they all have the same agenda and they’re all very keen…Having more…little hubs or a steering group… enables much more concentrated transfer of information (019)</td>
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