1 INTRODUCTION
This chapter describes five successful KM implementations in the Canadian public sector, primarily in federal and provincial government organizations. The major focus is on the implementation with some discussion of how the success of their implementation was assessed and demonstrated. These five examples include: internal and external benchmarking on KM practices; incorporation of KM into government policy, notably for succession planning; narratives in the form of organizational storytelling for lessons learned capture and organizational memory systems; communities of practice or knowledge networks to create a network-centric anti-terrorist organization; and a social network analysis to improve response time for Access to Information requests. For each implementation, the degree of implementation and the outreach scope was assessed, using the Crossan, White and Lane (1999) 4I model of institutionalization. The types of results that can be assessed are characterized as either qualitative (e.g. improved ability to adapt to changes) to more measurable results (e.g. increased efficiency).

1.1 Country profile
Canada was one of the early adopters of a constitutional framework relevant for KM in the public sector and has been consistently highly ranked with respect to using information and communication technologies to interface with citizens. In a traditional model, citizens request document information and typically receive a paper copy. In the new model, governments provide “proactive disclosure” in order to increase transparency and citizen empowerment. This means that information is made available online and citizens can actively search for and retrieve the information they are interested in. Eggers (2005) coined the term “Government 2.0” to refer to the integration of new-generation digital media technologies into government structure and operations. Government 2.0 is also referred to as “e-government”, “e-governance”, “e-participation” or “open government,” to denote a more
bi-directional interaction, not only to request information from the government but to also provide feedback on service, statistics and policy (Davies and Lithwick, 2010).

The government of Canada expressed a goal of “becoming a model user of information technology and the Internet” for its citizens, and attempted to achieve this goal by making all governmental information and services available online to ensure all Canadian citizens are provided convenient and secure access regardless of location or time. The government’s commitment to “improving Canada's information infrastructure [to] support the exchange of ideas and the conduct of business over computer networks, connect[ing] Canadians to the information highway, and accelerate[ing] the adoption of electronic commerce” (Privy Council Office, 1999). The goal was to introduce legislation to become a model user of information technology and the Internet while protecting personal and business information (Fraser, 2009). To this end, Canada launched the Government Online Initiative (GOL) in 1999 and appointed a Chief Information Office as the coordinator. Initially, GOL focused on a producing and delivering content over the web (OECD, 2005) but this static model gradually gave way to a more interactive style of e-government where citizens were not only consumers but also producers of content (Roy, 2007).

In 2001, the Canadian government developed a one-stop shop website: a single centralized point of entry for citizens to most federal websites (Accenture, 2007). In 2005, GOL was extended to the whole of government to become the Government of Canada portal and became a part of a larger, cohesive strategy for a knowledge-based economy and society. At the same time, Service Canada introduced their portal to provide citizens access a wide range of government programs and services. This too began as an information push tool and later evolved into a more interactive transactional space (Roy, 2006).

In March 2011, The Government of Canada first launched its Open Government strategy as part of their efforts to foster greater openness and accountability, to provide Canadians with more opportunities to learn about and participate in government, to drive innovation and economic opportunities for all Canadians and, at the same time, create a more cost effective, efficient and responsive government. Historically, Canada has been a world leader in making information available and in being accountable to its citizens. Government of Canada legislation, policies, and practices have consistently advanced transparency and openness. Major advancements have included:

• 1977 – Privacy Commissioner: appointment of Canada’s first Privacy Commissioner to protect and promote the privacy rights of individuals.

• 1983 – Access to Information Act: Canada became one of the first countries to enact federal access to information legislation almost three decades ago.

• 1983 – Information Commissioner: appointment of the first Information Commissioner in Canada to ensure that individuals’ rights to information under the Access to Information Act are respected and that government operates within a culture of transparency and fairness.

• 1983 – Privacy Act: legislation enacted to place limits on the collection, use, and disclosure of personal information, and provides Canadians the right to see and correct personal information the Government of Canada holds on them.

• 2003 – Proactive Disclosure: began publication of information on government operations to allow Canadians and Parliament to better hold the Government and public sector officials to account.

• 2011 – Open Government Initiative: on March 18, 2011, the Government announced its commitment to an open government initiative along three main streams: open information, open data, and open dialogue.

• 2011 – Open Data Pilot Project: launched an Open Data Portal – data.gc.ca – which now has more than 272,000 datasets from 20 departments and which has already resulted in over 100,000 dataset downloads since its launch.

• 2012 – Access to information Request Summaries: all departments are now publishing summaries of completed ATI requests monthly on their websites.

• 2013 – Blueprint 2020: the major focus of the Canadian public service today is on a vision that integrates innovation, transformation and continuous renewal to promote shared values, high performance and excellence.

• 2014 – Open Government 2014: specifies ways the federal government is working towards creating a more open and transparent government and maximizing the sharing of government information and data.

The last 10 years provided a challenging environment for the successful development and implementation of a national vision and ICT policy for digital
inclusion and innovation in Canada. Nonetheless, putting the right policies, application programs, and networks in place to promote innovation has served to accelerate the knowledge transfer process needed to empower individuals and promote organizational change. The focus on capacity building, starting with youth, has been a critical factor towards furthering Canada’s national vision for digital inclusion and innovation. In the information society, the networking of people and organizations enables them to actively share information and knowledge, accelerating the technical, cultural, and managerial innovation processes. For the last two years in a row, Accenture has ranked Canada first among 22 countries for its leadership in eGovernment.

Canada succeeded in managing this change process through a combination of policy and application programs, focusing on capacity building. Today, 75% of Canadians and 83% of our SMEs use the internet. These achievements are no small feat considering that Canada is the second largest country geographically in the world; has two official languages; and has a population of just 31 million that extends into the remote areas of the Arctic Circle. Canada is rated highest in the Provision of e-Government Services due to the fact that it periodically consults its citizens on what kind of e-services they want. Unlike many countries, Canada’s e-Government action plan is built on a foundation of facts based on known information from its customer base. Canada regularly surveys citizens and businesses about their attitudes and needs – more so than any other country. Canada also actively markets its e-Government services to the citizens, business and non-citizens. It advertises on TV and radio, in airline magazines and newspapers to get citizens to use the portal, www.canada.gc.ca. Canada, like many nations, has a national Chief Information Officer (CIO), who has been given the muscle to drive standards and promote e-Government across the government.

Blueprint 2020 promotes a unifying vision for all public servants to help build the Public Service of Tomorrow. The overarching goal is to improve services to Canadians and advance Canada’s social and economic interests. The key tenets are that constant improvement and innovation will lead to increased productivity. Engagement, collaboration, effective teamwork and professional development are some of the major ways of creating high performance. The role of KM is thus to contribute to collaborative ways of working and to help catalyze innovation (Government of Canada, 2013).

2 REVIEW OF THE LITERATURE AND METHODOLOGY

The author has been personally involved in the key Knowledge Management initiatives described here. A modified form of the case study method will therefore be used to present five illustrative examples of successful KM implementations in Canada. The key stakeholders were interviewed as needed to provide additional information and to provide context for the interpretation of results. A review of the literature was also done in by consulting primary scholarly and practitioner sources in the areas of e-government, knowledge management in Canada and in the specific types of initiatives described here. In this way, the Canadian case studies can be better situated in the extant literature as well as to provide an easier comparison and benchmarking with respect to KM implementations in other countries.

2.1 Description of Canadian case studies

2.1.1 Case 1. Internal and external benchmarking on KM practices

Benchmarking is an activity used to assess the performance, or progress towards goals, of an organization when compared to either a standard or an exemplary performer in their sector of activity. Leal and Roldan (2001) were among the first to apply this approach to KM initiatives. They focused on KM strategies and how companies could use intra and inter-organizational benchmarking to improve their chances of succeeding with KM. Spendolini (1992) defines benchmarking on the cover of his book as: “a continuous, systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement.” At the time the book was written, benchmarking was a relatively new practice; now it has become an expectation. Spendolini also developed three categories of benchmarking: external (comparison with other competitors), internal (comparison between different units of the same organization) and functional benchmarking (comparison to best in class or industry leaders) that were usually published or available to all.

The research question addressed was: could KM strategies and initiatives be benchmarked? Both internal and external benchmarking was carried out in order to help the corporate KM group at Natural Resources Canada (NRCan) develop and implement a KM strategy. The driving force behind this work was that NRCan wanted to know what had already been done, roughly where they stood with respect to general standards and specific comparable organizations (especially with respect to the US government) and to then use these findings as the starting point to craft their KM strategy and priorities. The external benchmarking was done with eleven (11) other similar organizations (similarly sized government departments). In addition, internal benchmarking was done with other units within Natural Resources Canada, notably the Canadian Forest Services unit, as they were significantly more advanced
in the implementation of core KM processes. From this analysis, 24 best practices in knowledge sharing and retention as well as best practices in general knowledge management were extracted from primary sources. The methodology used was to first consult publicly available resources and then to contact key stakeholders for telephone and face-to-face interviews at each of the selected benchmark organizations. In addition, 40 best practices were compiled from secondary sources, namely two key studies from the Conference Board of Canada and the American Productivity and Quality Control Centre, two benchmarking organizations. Some examples of KM benchmarking from these two organizations are provided in Appendix B.

A template for the successful transfer of these best practices was then developed. One of the key features of this template was the analytical process needed to identify first of all, whether the best practice could simply be applied “as is” without any modification. If not, then the specific changes needed to ensure its successful adoption within the Canadian government were identified. The notion of knowledge stickiness, as described by Szulanski (1996) and Argote et al. (2000) proved useful in adapting KM practices to a different setting. These authors note that the stickier knowledge is, the more likely it is to stay where it originated from. Sticky knowledge refers to best practices that are not easily applied in any other context. They are too specific, difficult to generalize and therefore do not move around too much. This template is shown in Table 1. The structure of this template was such that the information could be easily imported into a database of best practices. In this way, NRCan could continue monitoring KM initiatives both internally and externally in the future.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Template to characterize KM best practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of best practice</td>
<td>Unambiguous short label should be used</td>
</tr>
<tr>
<td>Site</td>
<td>Name of organization where this BP originated</td>
</tr>
<tr>
<td>Number of employees</td>
<td>Number of employees in organization; number of KM employees</td>
</tr>
<tr>
<td>Description</td>
<td>Short description (paragraph or so)</td>
</tr>
<tr>
<td>Target audience</td>
<td>Who should use this BP (and who should not)</td>
</tr>
<tr>
<td>Target practice</td>
<td>What is the objective of this BP (which process will it improve)?</td>
</tr>
<tr>
<td>Approach</td>
<td>How to implement the BP (including tools, training etc.)</td>
</tr>
<tr>
<td>Prerequisites (if any)</td>
<td>What needs to be in place before successfully implementing this BP?</td>
</tr>
<tr>
<td>Implementation recommendations</td>
<td>What needs to be modified, refined in order to implement within the public sector?</td>
</tr>
<tr>
<td>BTOPP</td>
<td>What are the expected benefits? Are the necessary people, process, organization and tools in place? See figure 1 below.</td>
</tr>
<tr>
<td>Additional notes</td>
<td>Comments (especially by anyone who has already made use of this BP, how well they succeeded, what they would change, challenges they had)</td>
</tr>
<tr>
<td>Other resources</td>
<td>Links to manuals, background documents, other useful readings</td>
</tr>
<tr>
<td>Related best practices</td>
<td>Describe similar best practices in other organizations where relevant</td>
</tr>
</tbody>
</table>

Author’s elaboration.
Part of the implementation feasibility analysis consisted of comparing the degree to which the two organizations were similar, particularly with respect to policies and legislation. In addition, a “BTOPP” analysis was conducted, which consisted of analysing the feasibility of transferring this best practice to NRCan. This consisted of answering five (5) questions, as shown in figure 1 below.

**FIGURE 1**
The BTOPP framework to analyze the transferability of best practices

- Are people ready for KM?
- Are we getting value from KM?
- Do we have KM processes in place?
- Does our organization support KM?

The key findings were categorized as knowledge codification, knowledge sharing, knowledge preservation and general KM practices. The knowledge codification best practices include: storytelling, lessons learned training, know-how databases, after action reviews and exit interviews. These are all BPs that help convert tacit knowledge (which is contained in the heads of knowledge workers) into documented and “annotated” explicit knowledge. Once knowledge has been rendered concrete and, it becomes much easier to share, disseminate and preserve this valuable know-how. Stories are excellent at documenting tacit knowledge because they can capture the contextual elements – in what year did this event occur? What was the legislative
environment like then? What was the technological landscape like? Context is needed so BPs can be replicated by other organizations. Both best practices (what worked and why) and lessons learned (what didn’t work and why) can then be represented much like the templates shown in this report. Along with standard templates, training is required so that people understand what to document, who to submit their stories, BPs and LLs, and – perhaps most importantly – how to find them and use them in their own work. After action reviews and exit interviews are an excellent means of eliciting such content. AARs tend to be conducted with a project team while exit interviews tend to be individual interviews.

The knowledge sharing and dissemination best practices include: communities of practice, knowledge fairs, knowledge portals, BP manuals, collaboration software and initiatives aimed to facilitate inter-generational knowledge sharing. Tacit knowledge is generally best shared through communities of practice and informal networking events as people can interact directly with people. However, while the sharing occurs naturally, there is often only a minimal trace of the tacit knowledge that was shared. Collaboration software and knowledge portals serve to mediate knowledge sharing but they also preserve it for future reuse. Manuals and best practice and lessons learned documents/databases also help to share the content more widely and to preserve it in organizational memory. Training creates awareness of how knowledge sharing mechanisms work and helps people better understand their roles. The greater the level of diffusion of a given know-how, the less vulnerable the organization will be should someone with that knowledge leave. Knowledge sharing best practices highlights the prescription that knowledge should be shared and documented in a systematic manner throughout the organization as a continuous process. Often referred to as KR&T (Knowledge Retention and Transfer), this is something that should be part of how every employee performs their job and how every organization learns and remembers from past experience.

The knowledge preservation best practices of leading organizations are always some form of information system, typically a database combined with a user-friendly interface (intranet or web-based) where BPs, LLs and stories may be stored. Knowledge portals, described in the previous section, serve to help share knowledge but they also serve to preserve knowledge. The key processes are very similar to the information management or document management lifecycle, including criteria on what content to include, how to tag them (metadata to categorize them for future retrieval) and how to archive this content. The very nature of “best” practice means that this form of content will need to be updated fairly frequently as new and better practices should always be appearing. Lessons learned, on the other hand, remain more stable and, as long as they are generic enough, can continue to be applied. They will only need to be validated periodically to ensure that the context (environmental conditions
such as legislation, technological advances etc.) have not changed sufficiently to render the lesson no longer useful.

Some general KM best practices were that incentives are “in the eye of the beholder” and must be varied in order to suit different employees. The active participation of senior management in KM strategy development entails participation at meetings to ensure KM initiatives will result in concrete and measurable results and provide the “big picture” guidance throughout the strategy development process. Existing frameworks such as the RMAF (Results Based Management Accountability Framework) are used as starting points for KM performance evaluation but the leading organizations then go on to instantiate and customize these in order to answer the specific questions they have regarding KM contributions to organizational objectives. KM often requires an evolution in the organizational culture in order to promote more widespread knowledge sharing and leading organizations have succeeded by diagnosing the current cultural status quo and then using the same instrument to monitor progress. Finally, KM will require a strong governance structure. The U.S. has addressed this through the CHCO Act (Chief Human Capital Officer Act) which changes the traditional role of HR from an administrative unit to a more strategic one. Human capital is recognized as having very high value and each major government department is required to have a CHCO and each CHCO is required to network with the others through a CHCO Council (for work) and a CHCO Academy (for learning).

Initially, although NRCan had thought that they were very much behind when it came to KM, they were in fact pioneering some excellent best practices that even the private sector had not yet adopted. They had a “Vault” that had served as an excellent archive for all innovative initiatives – yet only a few units knew of its existence. As a result of the benchmarking, they were able to extend the scope of the Vault to become a department-wide vehicle for knowledge retention. They also found the CFS (Canada Forest Services) had successfully implemented an extended form of the exit interview that included videotaping employees who were about to leave the department (due to retirement or other reasons). Traditionally, exit interviews are performed by Human Resource (HR) departments and they typically focus on very operational requirements such as ensuring the employee has returned access cards and equipment and feedback on what they liked or didn't like about their employment and what areas of the organisation they feel need improvement.

More recently, the concept of exit interviewing has been revisited and expanded as a knowledge management tool, as a way of capturing knowledge from people who are leaving the organisation. Rather than simply capturing human resources information, the interview also aims to capture knowledge about what it takes to do the job. The primary focus of the knowledge-focused interview is on knowledge
that would be helpful to the next person who will do the job or to others in the organisation doing similar jobs (e.g. network of other similar knowledge holders). The best practice identified recommends that in the case of explicit knowledge, make sure that the employee moves relevant files – both hard copy and electronic – into shared folders or a document library. Ask them to prune and organise these files and to create role and task folders or notes for their successor. For tacit knowledge, you will need to interview the employee face-to-face. Prepare for the interview by reviewing the key tasks the person does based on a job description or annual performance plan. You can then use that information as the basis for discussing how they go about those tasks, what knowledge and skills are needed, any problems or pitfalls to be aware of, etc. It is also important to uncover the employee's network of contacts and other sources of knowledge. If possible, create an overlap period between the person leaving and their successor so that a “live” handover can be done.

While some knowledge capture needs to happen before the person leaves, it may be advantageous to keep in contact with the employee after they leave to ask specific questions or to conduct additional interviews when the employee is less stressed.

2.1.2 Case 2. Incorporation of KM into government policy, notably for succession planning

One of the earliest KM successes in the Canadian government consisted of a knowledge retention and transfer policy to ensure valuable knowledge was not lost when experience employees retired. Robertson and Davidson (2011) note that the area of KM government policy is one of the most challenging: “they are messy and irregular processes that are hard to summarize in a few precepts that policy makers can use as levers for change” (p. 2). Green, Stankosky and Vandergriff (2010) point out that this is becoming an increasingly urgent requirement for the US government as more and more Babyboomers are expected to retire from the federal government in the next few years. The research question was: can KM policy be developed and implemented within the Canadian government?

A series of three pilot studies were carried out with Transport Canada on how best to capture, preserve and transfer the experience and expertise of senior researchers, engineers and scientists who were about to retire from public service (Dalkir, 2002, 2010). The results of these pilot studies were then implemented as a nation-wide policy by the federal Treasury Board and serves to this day as a best practice in succession planning. The pilot study showed that knowledge capture, transfer and preservation needed to occur at three levels: the individuals (retiree and successor), their knowledge networks (teams, associations) and the organizational level (organizational memory). A three-tiered approach was developed and this was
later implemented as policy and guidelines for both retiring employees and their managers in the public sector (the succession planning and management guide.  

The three-tiered approach to knowledge transfer is shown in table 2 and consists of:

1) Individual: knowledge mapping of expertise and task support systems to transfer operational knowledge from an expert individual to less experienced individuals just-in-time and within the context of their task at hand.

2) Community: social interaction mapping to identify the networks and connections involved in the transfer of knowledge members of a community of practice.

3) Organization: intellectual asset mapping to help visualize where the valuable knowledge points are (systems, people, processes, communities) and to easily pinpoint those at risk of being lost to the organization.

**TABLE 2  
Three-tiered approach to knowledge transfer**

<table>
<thead>
<tr>
<th>Knowledge transfer (KT) approaches</th>
<th>Types of knowledge</th>
<th>Tangible by-products of the transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual structured interviews with experts KT at individual level</td>
<td>Operational Anecdotal Lessons learned Best practices Where to find knowledge and experts</td>
<td>Map of key knowledge Map of key contacts, memberships Glossary of discipline Interview templates Interview transcripts Key tasks and task support systems</td>
</tr>
<tr>
<td>Facilitated workshops with community of practice (CoP) members KT at group level</td>
<td>Tactical Knowledge flow facilitators Knowledge flow blocks Identification of CoP</td>
<td>Workshop notes Knowledge repository design and implementation Map of social interactions within CoP and with external stakeholders</td>
</tr>
<tr>
<td>Storytelling workshops and individual interviews with key senior managers KT at executive levels</td>
<td>Strategic Consensus re. key intellectual assets Criteria for evaluation of intellectual assets’ business value</td>
<td>Map of key intellectual assets of the organization Organizational lexicon of key concepts Springboard stories Historical knowledge (organizational &quot;saga&quot;)</td>
</tr>
</tbody>
</table>

Author’s elaboration.

At the individual level, interviews are necessary to map out where knowledge exists, in both tangible documents and in the minds of human experts. At the group level, a social network analysis of knowledge flows can be very beneficial. This type of analysis is particularly good at identifying who asks whom for what type of assistance, the so-called unofficial experts. Finally, at the organizational level, it is important to identify the strategic criteria used to determine the value of specific types of knowledge and expertise. This is typically represented as a map
of intellectual assets. In addition, interviews are needed with key decision-makers to understand the procedural, legislative and policy constraints that need to be respected. There is not one specific approach that should be used with each of the three tiers. Rather, a wide range of knowledge retention and transfer approaches should be used with at all three levels in order to identify what is fairly easy to transfer, hard to transfer and impossible to transfer from one individual to another, in a retirement or succession planning situation.

The results of the pilot studies formed the basis of new knowledge retention and transfer policies implemented by the Treasury Board of Canada. These new policies were applicable to all government units and agencies. Some of the key tools included online guides for employees about to retire and another guide for the managers of those employees, outlining their key roles, and expectations of each. Some of the innovative new programs that were put into place included the 3/3/3 plan where highly qualified government researchers, scientists and engineers could elect to spend the last 3 years before their retirement in the following manner: in year 1, they would spend 1/3 of their time on knowledge retention and transfer activities; in year 2, this would comprise 2/3 of their time; and in year 3 they would be full-time on these activities.

2.1.3 Case 3. Narratives in the form of organizational storytelling for lessons learned capture and organizational memory systems

Denning (2000, 2005) was among the first to highlight the role of storytelling as a springboard to gain management support and catalyze organizational change. He noted stories can be very effective in motivating others to action, transmitting organizational values, getting people to work together, sharing knowledge, solving problems, and innovating. Storytelling was implemented as a KM practice that could help embed the learning from experience in training, practice, policy and continuous improvement programs (Dalkir, 2007; 2011b; 2014). The research question for this study was: could stories serve as a way of eliciting, documenting and making available to future employees’ important lessons learned?

Hydro-Quebec is Quebec’s hydroelectric public utility company. The sole shareholder is the Quebec provincial government. Following a major ice storm in 1998, the senior management and the Quebec government were very concerned about learning from this catastrophic natural disaster. The organization was very good at doing after action reviews but there was little evidence that lessons were actually learned or institutionalized. The objective of the senior management team was to document what they had learned from their responses to catastrophes, in particular the Quebec ice storm of 1998. There were a number of knowledge

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sources, including photos, videos, reports, newsletter capsules but these were not organized in any manner (other than chronologically). The challenge was to convert these documents, in addition to individual testimonials, to answer the question: if this occurs again, are we better prepared? Content analysis was done on all documents relating to the ice storm response. In addition, 15 individuals were interviewed and five focus groups were convened to discuss this question of whether or not organizational learning had occurred, and if it had, to what extent.

The springboard story (Denning 2000, 2005) was used as these stories have the purpose of triggering transformative change in the organization. A springboard story is one that incites the audience to reframe their mental models and to thus act fairly immediately in order to effect the desired change. This is the type of story that was selected for this research. The narrative database (Snowden, 2003) was selected as the best type of story (content) and tool (container) to capture and make available things that were “learned the hard way.” The objective is to ensure that even if an individual or unit was not involved in the actual incident, they can still learn and not repeat the same mistakes. The design is shown in figure 2.

FIGURE 2
Narrative database design

<table>
<thead>
<tr>
<th>Capturing of stories</th>
<th>Narrative database</th>
<th>Applying knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Staff learning on the job</td>
<td>Knowledge organizers</td>
<td>Staff</td>
</tr>
<tr>
<td>• Story elicitation</td>
<td>Knowledge managers and Staff in networks</td>
<td>Clients</td>
</tr>
<tr>
<td>• ID of knowledge gaps</td>
<td>Help Desk</td>
<td>Partners</td>
</tr>
<tr>
<td>• Lessons learned</td>
<td>Information Technology</td>
<td></td>
</tr>
<tr>
<td>• Staff research and analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Knowledge from outside sources</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Author’s elaboration.
The database proved to be a successful method of preserving the ice storm stories and making them easily accessible e.g. through a search on a specific event, date, emergency response team or theme such as communication errors. One of the major themes that emerged were that the response teams were highly efficient and effective in normal operations but less so in emergency situations. The company is a fairly stable one with little turnover. It was found that roles, standard operating procedures and communications channels had to be radically modified in times of crisis. One of the more difficult challenges was to remove the hierarchical, formal communication processes that were so ingrained in all individuals and project teams. In order to increase the adoption of the lessons to be learned, the content of the database was also deployed in employee training sessions which involved role playing: managers and operational agents were asked to switch roles in order to gain an appreciation of the challenges faced by them. Our recommendation was to add organizational learning competencies to employee skills for recruitment, performance evaluation and promotion criteria purposes. However, to date this has not yet been adopted as a company-wide policy.

2.1.4 Case 4. Communities of practice or knowledge networks to create a network-centric anti-terrorist organization

Following the events of 9/11, Canada established CRTI, the Chemical, Biological, Radiological, Nuclear (CBRN) Research and Technology Initiative (now called the Centre for Security Science) to bring together government departments, agencies, research institutes, universities and technology developers/vendors to increase capability to address any terrorist threats on Canadian soil. This was part of the Canadian government’s initiative to promote innovation and knowledge creation through communities of practice, which they named ‘knowledge clusters’ (Barthelt, Malmberg and Maskell, 2004; De la Mothe and Foray, 2001). The creation of clusters around the different types of terrorist threats (chemical, biological and nuclear) resulted in knowledge networks that could mobilize experience and expertise quickly in order to respond to threats more efficiently and more effectively. KM played a key role in forging this new organizational structure and way of working. The KM Secretariat was established to serve as knowledge brokers who could transverse the different cluster, thus preventing them from becoming new silos. The research question was: could communities of practice be used to better mobilize knowledge resources and experts within the context of the federal government?

9. The Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) Research and Technology Initiative (Defence Research and Development Canada’s Centre for Security Science).
The network-centric model for anti-terrorism proved to be very successful for the Canadian government. The US Department of Homeland studied the Canadian case study to better understand the power of networked connections, especially when the 20 or so KM Secretariat was compared to the 720,000 employee US department. The CRTI KM initiative was assessed five years into the program before it was renewed for another five years (as the Centre for Security Science). The strength of this approach was to harness the benefits of community networks so that anti-terrorist experts knew who knew what and could access both documented and human expertise as needed. The clusters met face-to-face at least once a year at a symposium and it was at one of these that a new cluster was identified: bomb disarming experts from different parts of the country were found seated at the same roundtable. A new cluster was formed around explosives expertise due to this fortuitous interaction.

Equally innovative was the method used to assess its performance after five years, based on a results or outcome-focused assessment. Some of the questions posed by the government were to help them decide whether they should continue to fund the program:

Did the KM program contribute to the success of the program?
Did it impact the Federal Laboratories’ capability and capacity to respond to CBRN incidents or contribute to focused expertise, knowledge and capabilities of Canadian CBRN science and technology performers in the short-term?
Did it assist in any way in engaging the Canadian Innovation System in CBRN counter-terrorism or help the creation of industrial products, technologies and knowledge for CBRN counter-measures in the medium term?
Does the KM program contribute to the long-term goals of building the Canadian S&T capacity and capability to prepare for, prevent and respond to CBRN attacks, or enhance the communication, cooperation, collaboration, and interoperability amongst Canadian and international CBRN counter-terrorism communities, or eventually to a effectively positioned Canadian S&T innovation system that contributed to national and international security? (Dalkir, 2007, p. 157).

A combined measurement model was used, with quantitative, qualitative and anecdotal evidence. An online survey with 32 questions (multiple choice and short answers) was administrated to 213 CRTI members. A 20% response rate was obtained. In addition, members were also interviewed in order to better interpret the results of the survey. The survey showed that the knowledge portal was hardly used at all and the interviews showed that most people felt the content was not up-to-date and they had concerns over the security of the environment. The community and networking aspects, however, were extremely highly rated in both interviews and the survey. Anecdotes such as the one describing how the new
explosives cluster was formed were gathered through the interviewing process. It was then felt that the best way to get a broader picture of whether or not CRTI was meeting its objectives was to focus on the expected outcomes. The RMAF (Results-based Management Accountability Framework) was selected as the assessment tool. This method was adopted by the Treasury Board of Canada in 2005. Our team was surprised to find that it was indeed a strong framework to assess the contributions of KM initiatives – surprised because the Treasury Board had already mandated it use by all federal government departments and any organizations funded by them. However we quickly found that as with any tool, it was not always effectively applied (Dalkir et al., 2007; Dalkir and McIntyre, 2011, 2013).

The RMAF is well suited to assess the contributions specific activities (projects, activities) make to strategic outcomes and intermediate outputs that lead to these outcomes. It is a visual depiction of a logic chain and has an accompanying set of indicators or metrics for all immediate and intermediate outcomes. The contribution to the ultimate outcome is shown as a percentage. Figure 3 shows a simplified version of the CRTI logic chain. Two projects were assessed (among others): the knowledge portal and the clusters (communities of practice). Each of these projects were expected to contribute to more rapid location of expertise, an intermediate outcome. The indicators used were the survey and interviews. The portal was found to have a very low contribution (only 10%) while the clusters contributed much more than initially expected (90%). The intermediate outcome in turn is estimated to contribute to the increased capability to respond to terrorist attacks but the quantitative amount of the contribution cannot be as easily assessed. It is not unusual to have less quantitative measures for the final outcome as these tend to be fairly high-level missions, objectives and goals of the overall organization.

The RMAF proved to be an easy to communicate measure of how well CRTI was meeting its stated goals. The evidence showed that KM did indeed contribute to the overall success of the new network-centric organization, that it did improve science and technology capability, as well as to the longer term goal of improving Canada’s ability to respond to terrorist attacks.
2.1.5 Case 5. Social network analysis to improve response time for access to information requests

Social network analysis is defined by Krebs as: “the mapping and measuring of relationships and flows between people, groups, organizations, computers or other information/knowledge processing entities. The nodes in the network are the people and groups while the links show relationships or flows between the nodes. SNA provides both a visual and a mathematical analysis of complex human systems”. Prell (2012) was one of the first to outline how SNA can be used to track the flow of information in governments. She referred to “gatekeeper functions where government officials take in information from the public to pass on to others” (p. 127). While the Canadian government still holds on to the notion that social networks are not for serious work (and indeed the use of instant messaging and Facebook was, for a long time, blocked for all government employees), there have been inroads in establishing the legitimacy and the growing importance of understanding what they are the role they play in connecting people in the modern age (Bronskill, 2013). The research

question was: could social networks and their analysis serve as a method to better understand and ultimately improve government procedures?

Canada’s Access to Information Act\textsuperscript{12} was implemented in 1983 to allow Canadians to retrieve information from government files. The Act clearly establishes what information could be accessed and it mandates timelines for responses. This Act provides every Canadian citizen with the possibility of requesting any information held by the Government to be provided in response to a question they ask. The Tobacco Control Branch of Canada’s Department of Health was being criticized for not respecting these mandated timelines. There had been some fairly negative press and some accusations that they were holding back information on purpose. Many of their files had to do with health risks associated with smoking and therefore there was much interaction with the tobacco industry and many lawsuits were underway. Any delays in compliance were quickly denounced as the government trying to hide something and the media reports were largely negative. In order to decrease the average length of time they needed to provide the requested information, the KM team conducted a social network analysis (SNA) over a 3-month period to try to identify any bottlenecks and to see if the information seeking and finding processes could be streamlined (Dalkir, 2011a).

A facilitated brainstorming session was then held to identify ways in which they could improve their performance. A first session was held to map out the knowledge flows associated with an ATIPS request. This analysis quickly showed that the progression of the request was largely dependent on personal rather than role-based networks. In other words, people tended to talk to people they knew or who were in close proximity to them. This preference was not necessarily the optimal or even the formal process that should have been followed. There was a further vulnerability in that if a given person was absent, the request could be delayed for a significant amount of time as there were no contingency plans that were used. The speed with which the set of historical requests was analyzed post-hoc. In addition, the percentage of “incorrect” responses, defined as any situation in which the citizen making the request was not satisfied with the response, were noted. It was found that a request took an average of three (3) weeks to answer and that the accuracy rate was less than 50%. In other words, using the premise that customer (in this case citizen) is always right, they were not satisfied with the response.

Next, a second group session was held. This time participants were asked to brainstorm ideas on how they could improve upon their performance. A suggestion was made by our research team to explicitly define roles and have at least a plan B or alternative person to go to should anyone not be available. Once these organizational and procedural changes were implemented, the same analysis was carried out on a comparable sample of requests. This time, the processing time was found to have decreased to an

\textsuperscript{12} Available at: <http://laws-lois.justice.gc.ca/eng/acts/A-1/>. 
average of 6 days for a response with fewer than 30% unsatisfactory outcomes. A pre/post comparative analysis showed considerable improvements. In addition, the social network analysis method was found to be an effective tool that could be generalized to measure the effectiveness of a number of other government functions.

3 EVALUATION OF THE RESULTS

Each of the five KM initiatives discussed here can be evaluated using the Crossan, White and Lane (1999) 4I model of institutionalization (shown in figure 4) and also in terms of qualitative and quantitative outcomes. Table 3 summarizes the types of outcomes that were measured for each. Crossan, Lane and White (1999) developed a model organizational learning called “The 4I framework” that identified four key processes (intuiting, interpreting, integrating and institutionalizing) as being critical to organizational learning. These four processes occur at three different levels: individual, group and organizational level. Intuiting and interpreting occur at the individual level. Interpreting and integrating occur at the group level. Integrating and institutionalizing occur at the organizational level.

FIGURE 4
The 4I framework of organizational learning

Author’s elaboration.

13. Note that in the original model, there is not label given to the middle box representing organizational learning processes at the group level. In present-day terminology, KM researchers would typically refer to this the emergence of a community of practice.
Intuition is a uniquely individual process that occurs when individuals recognize patterns in their own past or present experiences and subsequently identify their potential use in their current work environment. At this stage, knowledge tends to exist in a tacit state. Interpreting is the process through which individuals verbalize or put into action their own insights and ideas. At this stage, the knowledge is transformed from tacit to explicit form in order to share with other individuals. Language and metaphors are often used to help individuals interpret and share their intuitions with others. As the interpretation process moves beyond the individual and the ideas become embraced by the group, the process becomes integrative.

Integrating is the collective development of a shared understanding of new ideas and of how to put them into action (typically seen in communities of practice). The focus at this stage is on collective knowledge that is coherent and that is shared by a group (e.g. best practices for a community of practice). Knowledge sharing remains informal and repeatable only by group members – the knowledge has not been fed into organizational memory yet. When new ways of thinking and acting are recurrent and have a sufficiently significant impact on organizational action, the changes become institutionalized.

“The process of embedding learning that has occurred by individuals and groups into the institutions of the organization including systems, structures, procedures, and strategy” (Crossan and Bedrow, 2003, p. 1090). Lawrence et al. (2005) view institutionalization as organizational learning and organizational memory development. Institutionalization means that a deliberate effort has been made to embed knowledge in the organizational level so that it may persist and be reused in the future. When knowledge has been institutionalized, this means that individuals may come and go but that what they have learned as individuals and as members of a group will not necessarily leave with them. The learning of
individuals and groups has been embedded in organizational memory in the form of systems, structures, procedures, policies and strategy.

The 4I model phases can be used to measure the reach of the KM initiatives with respect to the individual, group and/or organizational levels being involved as well as with respect to the four phases of intuiting, interpreting, integrating and institutionalizing. The greatest reach is found when the organizational level is involved and when KM initiatives have become institutionalized: that is, they have become part of the way of doing things. The five KM initiatives presented here can be situated on the 4I model and characterized with respect to qualitative and quantitative measures used to assess their effectiveness as shown in table 3.

The reach of the KM initiatives ranged from impacting on individual employees at the interpreting phase all the way to the organizational level where there was institutionalization.

4 CONCLUSIONS AND NEXT STEPS
These five examples show that Canada has experimented with and successfully implemented a wide range of KM initiatives. The results of these studies can be generalized and applied to other organizational settings as long as the contextual and cultural factors are accounted for. Benchmarking, both internal and external, can and should be carried out for KM applications in the public sector. It may soon become possible to carry out functional benchmarking when KM standards become established and published (e.g. Association for Information and Image Management – AIIM – Standards Board call for KM standards). While KM often deals with unstructured and undocumented knowledge, it is possible, and highly desirable, to formulate and implement KM policies. In particular, given the potential for knowledge loss, a priority would be KM policy on knowledge retention and transfer. Equally important is the implementation of an organized way of capturing tacit lessons learned in the form of a story or narrative database. Stories are a particularly good way of capturing otherwise hard to document contextual knowledge which is of critical important for organizational learning and continuous performance improvement. Communities of practice have played a significant role in the organizational restructuring of the Canadian anti-terrorist effort. The Treasury Board agreed to finance a network-centric organization governed by a small KM Secretariat in order to effectively mobilize antiterrorist expertise. The outcome-based RMAF assessment tool proved to be an excellent way of showing the contributions KM made to this effort and resulted in the program being renewed for another five-year period. Finally, some of the newer technologies, while often (and still) viewed with some apprehension in the public sector are starting to make inroads.

The use of social network analysis was demonstrated to be one way of analyzing and subsequently improving upon standard operating procedures, particularly those concerned with citizens’ access to government information.

Some of the unique characteristics of the Canadian government landscape continue to provide challenges to the application of KM. These include:

- **Multilingual requirement**: Canada’s Official Language Act\textsuperscript{15} ensures that all public sector organizations provide service to citizens in their preferred choice of official language: English or French. This has proved to be a significant challenge to many KM practices, in particular in being able to implement a multilingual taxonomy for search engines and to provide additional support to ensure knowledge sharing can take place across languages.

- **Provincial vs. federal jurisdictions**: When Canada was founded in 1867 it was designed as a federal system with shared jurisdictions between the central federal power and the provinces (a government in each province). The federal jurisdiction covers such areas as trade, defence, currency, taxes and criminal law. The provincial jurisdiction covers such areas as health, education while shared jurisdiction covers agriculture, economic development and transportation. There are multiple challenges to implementing good KM governance such as policies and providing incentives for all the stakeholders.

- **Geographical distances**: The sheer size of Canada makes face-to-face interactions costly and difficult to organize. As a result, technology-mediated knowledge sharing channels are often used but these are never as effective as in-person knowledge exchanges (Dalkir, 2009).

- **Continuity issues**: The advancing age of baby-boomers will bring about a large scale retirement. The public sector is particularly vulnerable according to the latest figures from Statistics Canada\textsuperscript{16}.

- **Security and information privacy concerns**: The Access to Information Act enforces government transparency which can impact on information and knowledge management practices. In addition, public sector work places often bar instant messaging and social network sites such as FaceBook. Procurement policies are long as tools are purchased centrally in order to standardize across the public sector. These factors combine to make it difficult to implement many collaborative tools that have been proven to facilitate KM practices.

\textsuperscript{15} Available at: <http://laws-lois.justice.gc.ca/eng/acts/o-3.01/>.

\textsuperscript{16} Available at: <http://www.statcan.gc.ca/pub/11-621-m/11-621-m2008068-eng.htm>.
Current work in the Canadian public sector include the development of organizational stories to transform leadership models, sentiment analysis to track public opinion and citizen trust in the government, big data analytics to support the use of evidence-based policy development and the evaluation of efficiency and achieving objectives. Canada was one of the early adopters of e-government and its continuing quest to apply knowledge management principles and applications shows its commitment to harnessing new means of providing the best possible service to its citizens.

Blueprint 2020 (Government of Canada, 2013) emphasizes the need to take advantage of networks amongst public servants and with their partners in order to produce meaningful policy advice, better program designs and better service while at the same time ensuring that there is adequate accountability, appropriate values and ethics. Two policy instruments have recently been issued by the Treasury Board Secretariat. The Policy on Acceptable Network and Device Use encourages open access for employees to the internet, including social media. The Standard on Social Media Account Management sets out a framework for managing the official social media presence of federal departments and agencies. These policies aim to make the public service a more networked environment where there is more fluid use of technologies such as social media. For example, Industry Canada and Heritage Canada carried out a national consultation to update Canada’s copy law. Whereas traditionally this would have been done through focus groups, this time public servants made use of an interactive website that received more than 30,000 unique visits and social media that yielded approximately 2,500 threaded discussions. Another example is the creation of a young professional’s network bringing together young public servants from 11 different departments to form peer-to-peer networks share ideas and promote innovation as they discuss key issues facing the public service today.

The second emphasis is on the need to encourage innovation and risk-taking. This also means that we need to ensure public servants have the necessary competencies and leadership skills so that we can generate, identify and leverage the best ideas. A recent initiative is the new Government of Canada Innovation Hub (May, 2015). This is a new think tank that brings together the best thinkers to brainstorm ways in which policy is made and services are delivered. The hub will help public servants become less risk-averse by offering advice, expertise, the ability to test new tools and ideas and help government departments tackle difficult policy and service delivery problems. The hub will play a pivotal role in helping public servants deal with continuing budget cuts, ever-increasing volumes of data and a never-before seen level of retirement and turnover in the public service. Some of the themes will include big data analytics, social innovation and behavioural economics. The hub will consist of experts from such fields as psychology, anthropology, sociology and product designers. Similar initiatives have been implemented in other countries.
such as the Mind Lab in Denmark created to redesign its tax service and the “nudge unit” in Great Britain which uses behavioral economics to “nudge” citizens to change their behavior so that policy outcomes are improved (Thaler and Sunstein, 2008). The idea is to quickly test ideas to see what would work and what would not without fear of failure. This of course involves transforming the culture of the public service.

The Department of Defence is currently implementing its World Class Knowledge Sharing initiative that focuses on an organizational learning strategy to learn from past successes and failures (DND, 2013). They will benchmark best practices on an international level and implement an organizational process for lessons learned (McIntyre et al., 2015). Finally, the Open Government initiative is now underway with the aim of “helping the Government of Canada is working with the national and international open government community to create greater transparency and accountability, increase citizen engagement, and drive innovation and economic opportunities through Open Data, Open Information, and Open Dialogue”. This initiative encourages greater citizen participation, greater transparency and increased national and international collaboration to advance economic development. Code (The Canadian Open Data Experience) is a national competition that consists of an “intense 48-hour coding sprint where innovators from coast to coast compete to build the best app utilizing federal government data from the Canadian Open Government Portal”.

Knowledge management in the Canadian Public Sector has thus become embedded in more global priority themes revolving around collaboration: networking, knowledge sharing in order to improve and in order to innovate.

REFERENCES


APPENDIX A

BEST PRACTICE CATEGORIES USED IN BENCHMARKING STUDY

1) Codification best practices
   a) Knowledge capture techniques for tacit and explicit knowledge;
   b) After action reviews;
   c) Exit interview practices; and
   d) Databases and knowledge capture tools.

2) Collaboration best practices
   a) Communities of practice;
   b) Knowledge fairs;
   c) Government outreach programs; and
   d) Portals and collaboration tools.

3) Preservation best practices
   a) Succession planning;
   b) Policies;
   c) Taxonomy and tagging; and
   d) Archives and knowledge preservation tools.

4) General KM best practices
   a) KM strategy;
   b) Role of managers;
   c) Performance measures;
   d) Legislation (US Chief Human Capital Officer Act);
   e) Governance; and
   f) Culture.
APPENDIX B

EXAMPLES OF BENCHMARKING REPORTS FROM THE CONFERENCE BOARD OF CANADA AND THE AMERICAN PRODUCTIVITY AND QUALITY CONTROL CENTRE (APQC)

Conference Board of Canada


APQC


Key approaches for knowledge retention and transfer. Available at: <http://www.apqc.org/knowledge-base/documents/key-approaches-knowledge-retention-and-transfer>.


APPENDIX C

GLOSSARY OF TECHNICAL TERMS

Benchmarking – A measurement of the quality of an organization’s policies, products, programs, strategies, etc., and their comparison with standard measurements, or similar measurements of its peers. The objectives of benchmarking are (1) to determine what and where improvements are called for, (2) to analyze how other organizations achieve their high performance levels, and (3) to use this information to improve performance (http://www.businessdictionary.com).

Best Practice – Context-independent, unambiguous, prescriptive activities that have consistently shown results superior to those achieved with other means.

Explicit Knowledge – Consists of anything that can be codified, or expressed in words, numbers, and other symbols (such as plans, marketing surveys, customer lists, specifications, manuals, instructions for assembling components, scientific formulae, graphics) and can, therefore, be easily articulated, usually in the form of documents, processes, procedures, products, and practices.

Knowledge Management – The process through which organizations generate value from their intellectual and knowledge-based assets; a conscious strategy of putting both tacit and explicit knowledge into action; a discipline that promotes an integrated approach to identifying, managing and sharing all of an enterprise’s information assets.

Knowledge Retention – The process of capturing the knowledge and expertise from employees before they leave an organization.

Knowledge Transfer – The one-way dissemination of knowledge given or sent for the purpose to inform.

Knowledge Stickiness – The stickier knowledge is, the more it is “glued” to its point of origin; it will be very difficult to move the knowledge around – it is usually only shared very locally, within limited proximity. The stickier knowledge is, the more important is context is. This attribute is important to consider when attempting to apply best practices and lessons learned to new contexts.

Story – The telling of a happening or connected series of happenings, whether true or fictitious; account; narration.

Springboard Story – A story that enables a leap in understanding by the audience so as to grasp how an organization or community or complex system may change. A springboard story has an impact not so much through transferring large amounts

1. Definitions are provided by the author unless otherwise referenced.
of information, but through catalyzing understanding. It enables listeners to visualize from a story in one context what is involved in a large-scale transformation in an analogous context.

Tacit knowledge – Knowledge or understanding which is stored in an individual’s head or embedded within the culture of an organisation. It is not written down and therefore is difficult to share without direct contact and coaching by the individual who holds the knowledge.