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Capability Based Planning Pilot Project

A report on partnership opportunities and the sustainability of emergency response across non-federal levels

Krista C. Simonds

Scientific Authority
Sheldon Dickie
DRDC Centre for Security Science

Defence R&D Canada – CSS

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Principal Author

Original signed by Krista C. Simonds

Krista C. Simonds

4C Success Inc.

With

The Associates Group of Companies

Approved by

Original signed by Sheldon Dickie

Sheldon Dickie

DRDC CSS Responder Capability Analyst

Approved for release by

Original signed by Mark Williamson

Mark Williamson

DRDC CSS Document Review Panel Chair

Abstract

Defence Research and Development Canada (DRDC), Centre for Security Science (CSS) is engaged in several initiatives toward the development of an all-hazards risk assessment model and tools that will contribute to Canadian preparedness for response to terrorism and other hazards. This Contract Report represents the findings of work conducted in support of the Capability Based Planning Pilot Project lead by the CSS Forensics Portfolio Manager. Specifically, the report identifies potential partnership opportunities with academic research institutes that share a common interest and expertise in analyzing risk to Canadians from all-hazards, including Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) threats; facilitates collaborative initiatives that support validation of risk assessment tools – specifically the connectivity between tools that assess intentional (CBRNE threats) and unintentional (natural hazards) threats; and, provides insights relating to sustainability of emergency response across non-federal levels of government.

Résumé

Le Centre des sciences pour la sécurité (CSS) de Recherche et développement pour la défense Canada (RDDC) a entrepris de nombreux projets visant l'élaboration d'outils et d'un modèle d'évaluation de tous les risques, qui contribueront à améliorer la préparation du Canada à une intervention en cas d'acte terroriste ou d'autre situation de menace. Le présent rapport de contrat fait état des conclusions du travail effectué à l'appui du Projet pilote sur planification axée sur les capacités, qui est dirigé par le gestionnaire du portefeuille judiciaire du CSS. Plus particulièrement, le rapport détermine les possibilités de partenariat avec des établissements universitaires et de recherche qui, comme nous, ont de l'intérêt et de l'expertise dans l'analyse des risques auxquels sont exposés les Canadiens et Canadiennes, y compris les menaces d'incidents liés aux dispositifs chimiques, biologiques, radiologiques, nucléaires et explosifs (CBRNE). De plus, il traite des initiatives réalisées, en partenariat à l'appui de la validation des outils d'évaluation des risques – notamment la connectivité entre les outils d'évaluation des menaces intentionnelles (CBRNE) et des menaces non intentionnelles (catastrophes naturelles) ainsi que de la viabilité des interventions d'urgence aux échelons non fédéraux.

Executive summary

Capability Based Planning Pilot Project: A report on partnership opportunities and the sustainability of emergency response across non-federal levels

The Centre for Security Science Capability Based Planning Pilot Project represents a fundamental component in support of Canadian preparedness for response to terrorism and other hazards. The Pilot Project seeks not only to validate a variety of risk assessment tools that analyze intentional and unintentional risks to Canadians, but is also concerned with the question of how risk assessment results may be most effectively used to shape capability and capacity decision-making at non-federal levels. This Contract Report represents the findings of work performed in support of these objectives.

The Academic and Research Institute Database developed as part of this project will facilitate future research partnerships and engagement of Canadian academic resources toward development of a reusable framework for analyzing risk to Canadians. Work on the database has identified opportunities for research partnerships with Natural Resources Canada and Environment Canada in support of the Capability Based Planning Pilot Project. Given that the researcher community is continually changing and growing, the database represents a snapshot in time; to remain relevant the database will require periodic updates to remain accurate and current.

Global findings of research conducted into the sustainability of emergency response across non-federal levels of government have identified:

- that risk-based methods are now commonly used at the non-federal level for appropriating funding and aligning resources in support of emergency response;
- there is considerable disparity in the efficacy and rigor of methodologies, analysis, and tools which impede the ability of municipalities to fully benefit from risk assessment as a capability and resource planning tool;
- availability of adequate funding, including responsive and accountable financial processes, remains a significant impediment to the development of sustainable emergency response capabilities;
- efforts toward collaborative public/private risk assessment, and/or partnerships in the area of critical infrastructure protection and emergency response, have had only mixed success due to confusion regarding roles, mandates, and authorities, fears about confidentiality of information, and regulatory constraints associated with public funding frameworks and mechanisms; and
- programs such as the Disaster Financial Assistance Arrangements (DFAA) and the Joint Emergency Preparedness Program (JEPP), while recognized as worthwhile, have significant weaknesses for achieving national emergency preparedness and response objectives.

These global findings confirm the need for and utility of a reusable all-hazards framework for analyzing risk that is linked to capability and resource planning. The Capability Based Planning Pilot Project, the Canadian National Incident Management System (CNIMS), and the Natural Resources/Environment Canada initiative offer strategically important tools toward development of national emergency response capabilities, multi-level decision-making, and sustainable funding for non-federal levels of government.

Potential Future Research Initiatives:

- Research and identify municipal expenditures on all-hazard emergency services and response activities in order to establish the trend in costs, baseline funding requirements, and methods to differentiate between routine and incremental expenditures at non-federal levels of government;
- Monitor and assess the implications of the Treasury Board approval process for renewal of the JEPP program terms and conditions, which is scheduled to commence post-March 31, 2009;
- Research and identify the process linkages between Capability Based Planning, CNIMS, and all-hazard risk assessment models that will enable non-federal level resource and capability management; and
- Research and identify specific insights public management, performance measurement and accountability literature offer for development and implementation of a multi-jurisdictional, multi-agency, all-hazard risk assessment framework.

Sommaire

Projet pilote de planification axée sur les capacités : Rapport sur les possibilités de partenariat et la viabilité des interventions d'urgence aux échelons non fédéraux

Le Projet pilote de planification axée sur les capacités du Centre des sciences pour la sécurité constitue un élément essentiel pour assurer la préparation du Canada à une intervention en cas d'acte terroriste ou d'autre situation de menace. Le projet pilote vise non seulement à valider divers outils d'évaluation des risques permettant d'analyser les menaces intentionnelles et les menaces non intentionnelles auxquelles sont exposés les Canadiens et Canadiennes, mais aussi à examiner la façon la plus efficace d'utiliser les résultats des évaluations des risques afin de développer des capacités et la prise de décision connexe aux échelons non fédéraux. Le rapport de contrat porte sur les conclusions d'un travail effectué à l'appui de ces objectifs.

La base de données sur les établissements universitaires et de recherche mise sur pied dans le cadre de ce projet facilitera les partenariats futurs en matière de recherche ainsi que la participation des universitaires canadiennes à l'élaboration d'un cadre réutilisable pour l'analyse des risques auxquels sont exposés les Canadiens et Canadiennes. Le travail sur la base de données a permis de déterminer des possibilités de partenariats de recherche avec Ressources naturelles Canada et Environnement Canada à l'appui du Projet pilote de planification axée sur les capacités. Compte tenu du fait que la communauté des chercheurs change et croit continuellement, la base de données constitue un instantané d'une situation à un moment donné. Elle doit donc être mise à jour continuellement pour rester complète et utile.

Les conclusions globales de la recherche menée sur la viabilité des interventions d'urgence aux échelons non fédéraux montrent que :

- les méthodes axées sur les risques sont maintenant utilisées aux échelons non fédéraux pour l'attribution de fonds et l'ajustement des ressources à l'appui des opérations d'intervention d'urgence;
- il y a une grande disparité au niveau de l'efficacité et de la rigueur des méthodologies, de l'analyse et des outils, ce qui nuit à la capacité des municipalités de bénéficier pleinement de l'évaluation des risques en tant qu'outil de planification des capacités et des ressources;
- le manque de financement approprié, y compris des processus financiers souples et comprenant une reddition de comptes, demeure un important obstacle au développement de capacités viables d'intervention d'urgence;
- les activités visant la collaboration publique/privée pour l'évaluation des risques, et/ou les partenariats dans le domaine de la protection des infrastructures essentielles et l'intervention d'urgence n'ont eu que des succès mitigés à cause de la confusion en ce qui concerne les rôles, les mandats, les pouvoirs, les craintes

concernant la confidentialité de l'information ainsi que les contraintes de réglementation connexes aux cadres et mécanismes de financement public;

- des programmes tels que les Accords d'aide financière en cas de catastrophe (AAFCC) et le Programme conjoint de planification d'urgence (PCPU), bien que reconnus comme étant utiles, ont d'importantes faiblesses en ce qui concerne la réalisation des objectifs de préparation aux situations d'urgence et l'organisation des secours à l'échelle nationale.

Ces conclusions globales confirment le besoin et l'utilité d'un cadre tous risques réutilisable pour l'analyse des risques liés à la planification des capacités et des ressources. L'initiative du Projet pilote de planification axée sur les capacités, du Système national de gestion des incidents (SNGI) du Canada et de Ressources naturelles et Environnement Canada offre des outils stratégiques importants pour le développement de capacités d'intervention d'urgence à l'échelle nationale, la prise de décisions à plusieurs niveaux et un financement durable pour les administrations non fédérales.

Futurs projets de recherches envisageables :

- Effectuer des recherches et déterminer les dépenses municipales pour les services d'urgences tous risques et les activités d'intervention d'urgence afin d'établir les tendances en matière de coûts, de besoins en financement de base et de méthodes pour faire la différence entre les dépenses courantes et les dépenses supplémentaires aux échelons non fédéraux;
- Observer et évaluer les répercussions du processus d'approbation du Conseil du Trésor pour le renouvellement des conditions du PCPU, dont le début est prévu après le 31 mars 2009;
- Effectuer des recherches et déterminer les liens entre les processus pour la Planification axée sur les capacités, le SNGI du Canada et le les modèles d'évaluations des risques qui permettront la gestion des capacités et des ressources aux échelons non fédéraux;
- Effectuer des recherches et déterminer ce que prévoient les documents portant sur la gestion publique, la mesure du rendement et la reddition des comptes en ce qui concerne le développement et la mise en œuvre d'un cadre d'évaluation plurigouvernemental, pluriorganisationnel et tous risques.

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1 Introduction

1.1 Background

Defence Research and Development Canada (DRDC), Centre for Security Science (CSS) is engaged in several initiatives toward the development of an all-hazards risk assessment model and tools that will contribute to Canadian preparedness for response to terrorism and other hazards. The Capability Based Planning Pilot Project, lead by the CSS Forensics Portfolio Manager, is one such initiative which seeks to validate a variety of risk assessment tools – specifically the connectivity between tools that analyze intentional and unintentional risks to Canadians stemming from all-hazards, including Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) threats, industrial, accidental and natural hazards. Other aspects of the Pilot Project will examine how risk assessment results may be most effectively used to shape capability and capacity decision-making across the emergency response spectrum, responder communities, and for policy and program development at non-federal levels. A main deliverable from the Pilot Project will be the development and validation of a Canadian National Incident Management System (CNIMS). Based on best practices and consistent with the U.S. Homeland Security version of NIMS, the tool(s) developed by the Pilot Project will represent the first phase in an iterative process toward an integrated and sustainable all-hazard risk assessment and management process.

1.2 Aim

The aim of this Contract Report is to document the global findings of research work conducted in support of the Capability Based Planning Pilot Project. The report addresses two specific areas of focus: Development of an initial database of Canadian academic research institutes, academics, and consultants that share a common interest and expertise in analyzing risk to Canadians from all-hazards, including CBRNE threats; and, provides insights relating to the sustainability of emergency response across non-federal levels of government.

2 Academic and Research Institute Database

This section covers the format of the electronic database of Canadian academic and research institutes that have been identified as sharing a common interest and expertise in analyzing risk to Canadians from all-hazards, including CBRNE threats.

The information contained in the Database is the result of a detailed review that was conducted across all Canadian universities, their associated academic research centres and institutes, and relevant Canadian community colleges.

2.1 Format

The data contained in the Canadian Academic and Research Institute Database is contained in four separate Excel Tables, (an electronic copy of the Database accompanies this report):

1. Research Institutes Short List – Provides details pertaining to four academic institutions (and their selected Centres of Expertise) that have been identified for primary consideration in support of the Capability Based Planning Pilot Project. The universities include: University of Western, University of Waterloo, Simon Fraser University, and the École Polytechnique de Montréal. A short list of selected universities with specialized expertise for future consideration has also been identified. These include: Dalhousie University, McGill University, Simon Fraser University, University of Ottawa, Carleton, McMaster University, and York University. The data contained in this table is provided in Annex A.

2. Research Institutes Long List – Identifies and provides details pertaining to the academic and research institutes across Canada that have developed an expertise relating to, or relevant to, all-hazard risk assessment. The data contained in this table is provided in Annex B.

3. Academic Specialists by University – Identifies and provides details of academics and their specific areas of expertise relevant to the development of a re-useable all-hazard risk framework. The data contained in this table is provided in Annex C.

4. Specialist Consultants – Identifies and provides details of specialist consultants and their specific expertise relevant to all-hazard risk assessment. The data contained in this table is provided in Annex D. Note: This is not an exhaustive list; it represents only an initial sampling of the expertise that may be available for support to the Capability Based Planning Pilot Project, and/or related initiatives.

2.2 Description of Tables

The Academic and Research Institute Database utilizes a generic DRDC CSS Database template and format; minor adjustments were made to support more detailed information categories. Use of the common template facilitates the merging of information between complementary data banks, when appropriate to do so, and allows for expansion and/or updates of the database over time. The format of Tables 1 and 2 include the following information categories: Academic Research Institute; Research Objectives; Current Research Projects; Primary Point(s) of Contact; Contact Information; and, Website. Tables 3 and 4 contain more detailed information categories: University; Specialist Research area Checklist that includes Biological, Chemical, Explosives, Forensics, Radiation/Nuclear, Security Intelligence, Environment and Health, Transportation and Logistics, Critical Infrastructure, Public Policy and Governance, Public Economy, Psycho-Social, Risk Communications, Decision-Analysis and Modelling; Risk Assessment Expertise (a detailed description); Contact Information; Website.

3 Summary of Database

The database has been developed to identify Canadian academic and research institutes that share a common interest and expertise in analyzing risk to Canadians from all-hazards, including CBRNE threats. The immediate objective is to facilitate future research partnerships and engagement of Canadian academic resources toward development of a reusable framework for analyzing risk to Canadians.

To date, the database has assisted with the identification of several Academic Centres of Excellence with a depth of expertise and research activities that complement DRDC CSS program initiatives. Most notably, the database project has lead to and facilitated a potential research partnership with Natural Resources Canada and Environment Canada in support of CSS program objectives, as well as the Capability Based Planning Pilot Project.

4 Conclusion

The Academic and Research Institute Database has been developed as a source of information to facilitate engagement of academic institutes, individual academic researchers, and/or those with specialized expertise, in analyzing risk to Canadians from all-hazards, including CBRNE threats. This community of researchers is continually growing; as such the database represents a work in progress that will require periodic updates to remain accurate and current.

5 Non-Federal Level Sustainability Issues

This section delineates the global findings of research work conducted in support of the Capability Based Planning Pilot Project specific to issues of sustainable emergency response across non-federal levels of government. The scope of work focused on identifying shortcomings and gaps in existing policy and programs, giving particular consideration to the following:

A) whether or not organizations responsible for emergency response periodically align resourcing requirements using a risk-based method;

B) whether or not non-federal levels of government use a risk-based method for appropriating funding in support of response organizations, including identification of the primary source of funding for non-federal levels of government;

C) whether or not non-federal response capabilities and organizations involve the private sector in the risk assessment process, have mechanisms in place that allow for public/private emergency response funding partnerships, and/or have mechanisms in place to accept general public contributions in support of emergency response;

D) whether or not non-federal levels of government make use of funding through the Public Safety – Joint Emergency Preparedness Program (JEPP), including observations about the program, best practices, if any, and barriers which may exist to making this program more dependable for increasing preparedness across all hazards

Relevant information and key issues identified by this study result from the review and assessment of selected publications, reports, policies, procedural manuals, and survey materials, as well as from targeted discussions with emergency responders, planners and a number of subject matter experts, including both practitioners and academics.

Quantitative and qualitative findings are based upon an examination and analysis of primary data collected between 13 April and 15 May 2007, as part of an Emergency Management Survey conducted by the Standing Senate Committee on National Security and Defence *Emergency Preparedness in Canada* (2008). Of 100 communities surveyed across ten Canadian provinces, 92 responses were received. The data and observations drawn from the questionnaire for use in this report reflect the views of first responders and emergency management officials in Canadian municipalities with populations ranging from 20,000 people to those with over 500,000. Relevant information and data is also presented from the Standing Senate Committee on National Security and Defence Report *National Emergencies: Canada's Fragile Front Lines* (2004); reports

commissioned by the Federation of Canadian Municipalities (GCSI 2004; National Security Group 2006); as well as data obtained from the federal, and provincial Financial Public Accounts, and from Municipal Budget documentation.

5.1 Global Findings

Emergency Management Organizations (EMO) are now an integral component at the municipal level of government; results indicate that 98% of 92 communities surveyed have an active EMO. The ability to identify hazards and analyze the implications for a given community is commonly recognized as important; 95% of 92 communities who responded to the survey indicated they conduct regular risk assessments, and of these 43% did so annually, with another 35% conducting such assessments every 2 to 5 years. While the vast majority (71%) base such assessments on the provincial standardized process of relevance to them, the comments provided by respondents indicate that, in reality, a wide variety of methods and prioritization processes are being applied, including best practices. Of particular interest are the comments that indicate that provincial standardized processes were most often used as a guideline, which is subsequently modified to reflect local realities. As part of this study, an informal review was conducted of the risk assessment tools available to communities through provincial EMOs; the review has confirmed that there are a wide range of assessment processes available to municipalities, some however, are more sophisticated and/or user friendly than others.

When conducting risk assessments, communities do so using a collaborative approach, with 52% actively including Police, Fire, Paramedic, Public Health, Local EMO and Municipal Government representatives in the process. While 60% of respondents indicated that industry was also consulted, the comments made by Emergency Managers indicate varied results and levels of satisfaction with the openness and the willingness of the private sector to share information and/or resources. Levels of satisfaction were also mixed when communities consulted with provincial and federal representatives. While the province was most often consulted with 60% of respondents seeking their support, only 14% sought to involve the federal level.

There are significant challenges and issues associated with emergency management funding. While available funding mechanisms will be discussed in greater detail later in this section, a few key points will be presented here. For instance, 98% of the survey respondents identified that the primary source for emergency management funding came from their municipality. The survey also confirmed that 64% of communities surveyed use the risk assessment process as a means to obtain funding. However, comments offered by the respondents, as well as observations in almost all the literature reviewed, acknowledge that the potential of risk assessment for fiscal planning and decision-making has not been fully realized given that there is still great disparity in the methodologies, analysis, and the tools that are used across municipalities and levels of government.

Sustainability of emergency planning, preparedness and response capability across non-federal levels is not only affected by available funding, but is also significantly impacted by insufficient human resources or workers with the requisite skills and training; a circumstance which is expected to worsen with the demographic pressures of an aging workforce. These are chronic gaps that have been reflected throughout the literature that has been reviewed in support of this study, both historic and current. Given the importance that funding and human resources capacity represent for sustainability, it would be useful to conduct a detailed examination of these areas of weakness; for instance there is currently a lack of coherent information specific to municipal expenditures on emergency services and response activities in relation to the available municipal tax base. While the study undertaken by Casey Ploeg for the Canada West Foundation in 2004 focused in part on such issues, only selected Western cities in Canada were examined. More broadly based research would provide useful insights and analyses for understanding the current dynamic for sustainable funding of emergency services at the municipal level.

While terrorism was confirmed to be of concern to 61% of the municipalities surveyed, natural hazards, such as extreme weather events, and risks associated with hazardous materials, were considered to be the greater threat to communities. This is a perspective that is consistently reflected in the historical EMO literature, as well as in reports commissioned by the Federation of Canadian Municipalities (GCSI 2004; National Security Group 2006). Only 36% of the communities surveyed had counter-terrorism response plans. There are several observations of note here: first, respondents identified confusion regarding mandates, responsibilities and roles between the various levels of government with regard to counter-terrorism; second, depending upon the community, it would be very difficult for Emergency Managers to make a business case for finite municipal resources unless a clear risk could be established; third, notwithstanding the impact of terrorist events such as 9/11, federal/provincial funding mechanisms currently only provide 'seed' money toward capability development, including capabilities associated with CBRNE and Heavy Urban Search and Rescue (H/USAR). Notwithstanding, it is interesting to note that 47% of respondent communities indicated they had some capacity to manage CBRNE incidents. H/USAR remains limited with only 13% of respondent communities indicating they have some measure of this capability. Where this capability does exist, 67% indicated they have agreements in place for its use in support of regional emergencies. When asked which level of government should have responsibility for funding their H/USAR capabilities, 36% of respondents indicated all three levels of government should share the cost, 26% felt it was solely a federal responsibility, 20% believed the province should pay, and only 1% thought it should be the sole responsibility of the municipality.

5.2 Funding Mechanisms - General

In addition to the municipal tax base, two primary funding mechanisms exist in support of emergency management at non-federal levels: the first is the Disaster Financial Assistance Arrangements (DFAA); the second is the Public Safety – Joint Emergency Preparedness Program (JEPP). Relevant highlights from each funding program will be discussed below, including when applicable, any shortcomings or gaps that have been identified for the sustainability of emergency response capability across non-federal levels.

The awareness of emergency management funding programs across municipalities is high; 95% of Emergency Managers surveyed by the Standing Senate Committee on National Security and Defence (2008) confirmed their knowledge of provincially administered funding programs such as the DFAA, and 74% indicated they knew of the federally managed JEPP program. Details of these programs, including the application process, are posted on virtually all provincial and territorial EMO websites. Applications for funding through such programs has also been high: 72% of communities surveyed have sought funding from provincial sources, particularly for training, the purchase of emergency response equipment, and CBRNE-specific capabilities; 84% have sought funding support from the federal level through the JEPP program. However, the level of satisfaction with these programs is extremely low. For instance, survey results for funding programs at the provincial level show that only 20% of respondent communities were satisfied with the program, 35% were somewhat satisfied, and 33% were not satisfied. The responses for the JEPP program are similar, with 22% indicating their satisfaction with the program, 38% were somewhat satisfied, and 21% were not satisfied. A few of the many comments that speak to the reasons behind this dissatisfaction include:

- the disparity between emergency management responsibilities versus the available funding and resources to actually achieve the required levels of service;
- the one-time nature of JEPP capital funding that does not provide for operating, maintenance or life-cycle costs;
- no base-line funding for ongoing processes;
- the focus of funding on individual projects rather than approaches that encourage regional solutions;
- application and project timelines that are too stringent;
- federal and municipal budgetary processes and fiscal year-ends that are misaligned, e.g. municipalities work on a calendar year cycle which makes prosecuting and completing a project within the federal fiscal-year difficult,

particularly when spending can not begin until the project is approved and funding authorized;

- the lack of funding for preparedness projects such as public education, or to establish emergency stockpiles;

- the requirement for more flexible funding and project eligibility criteria, including a reduction on time restrictions between applications for such activities as plan writing and hazard, risk, and vulnerability analysis; and,

- the need for eligibility criteria to better reflect community needs.

5.3 Disaster Financial Assistance Arrangements

Emergency related Financial Assistance Programs have existed in Canada since April 1952; they were initially established to assist provinces and territories with the development of civil defence plans, and to reimburse the financial costs of associated services. While political and financial support for Emergency Measures and the Financial Assistance Program has seen considerable volatility over the years, it was nevertheless recognized that costs associated with disasters were unpredictable and that such costs could easily overwhelm a province's ability to cope. As such, in 1970, the federal government established a clearly defined administrative framework, known as the Disaster Financial Assistance Arrangements; the new program replaced the Financial Assistance Program as the means by which provinces and territories would defray the cost of disasters. Initially the program was also intended as a means of financing projects in support of national emergency response capabilities, but this function was eventually taken over by the JEPP program in 1980 (McConnell 2002). Payments made under the DFAA have tended to vary greatly; with more recent expenditures ranging from about $7.5 million in 1990-91 to over $144 million in 1996-97, with the total amount spent in 2007-08 being just over $76 million (McConnell 2002; Public Accounts of Canada, Transfer Payments, 2008).

Of note for non-federal levels of government and responder communities are the changes to funding eligibility found in the newly revised DFAA Guidelines which came into effect in January 2008. This program will now only fund costs associated with natural disasters; this represents a considerable narrowing of the scope of the program from the previous Guidelines which had not differentiated between natural or other emergencies. Similarly, limitations have also been placed on what will be deemed to be eligible expenses. Specifically, it is stated that:

> The DFAA are intended to address natural disasters resulting in extensive property damage or disruption of the delivery of essential goods and services. They *do not* apply to:
>
> - disasters whose effects are limited to a single economic production sector;

- chronic or pandemic health emergencies, including recurring or new public health threats;
- public order, civil disorder, criminal and terrorist acts, or international armed conflict;
- the fighting of forest, prairie, grass or wild fires, except where they pose a threat to built-up areas, and then primarily for pre-emptive actions, evacuation and damaged infrastructure restoration (Public Safety Canada DFAA Revised Guidelines 2008, Section 1.4).

While the emphasis of the DFAA under the revised Guidelines is on natural disasters, provisions do still exist for financial assistance to provinces when other emergencies are declared, but these must be deemed an emergency of concern to the Government of Canada in order to be eligible for federal funding. The final authority for determination that an emergency event is eligible for financial assistance rests with the Governor in Council and the Minister under the terms of the *Emergency Management Act* (Public Safety Canada DFAA Revised Guidelines 2008, Section 1.6). At the moment, there is no indication that this new approach will impact the JEPP program, which continues to apply an all-hazards emergency focus in its effort to develop the national emergency response and recovery capability. Nevertheless, it is worthwhile to ask what the changes to the DFAA funding eligibility may signal, and similarly what implications there may be for non-federal emergency management, particularly given that primary responsibility for disaster response and associated expenses constitutionally rest with the provinces.

Other revisions of note in the new DFAA Guidelines are the emphasis and importance given to pre-emptive action, as well as the value of actions or solutions that mitigate risks associated with recurring events (Public Safety Canada DFAA Revised Guidelines 2008 Sections 3.2.1. and 3.2.2, 3.3.1, 3.3.2, and 3.4). Where non-federal levels of government fail to identify and mitigate potential risks from natural hazards, and expenses are consequently incurred as a result, such costs may be ineligible for funding under the Disaster Financial Assistance Arrangements (Public Safety Canada DFAA Revised Guidelines 2008, Section 3.6).

Also of increasing importance for funding eligibility under the DFAA will be the ability of non-federal levels to differentiate between incremental costs, capabilities, and services, related to a disaster from those which are deemed normal operating expenses and incident management functions (Public Safety Canada DFAA Revised Guidelines 2008, Sections 4.1.1, 4.1.3). In addition, non-federal levels will be required to breakout the incremental costs associated with intra-governmental expenses incurred during an emergency when capabilities are 'shared' between departments and agencies (Public Safety Canada DFAA Revised Guidelines 2008, Sections 4.5.7). The recent survey conducted by the Standing Senate Committee on National Security and Defence (2008) found that out of 92 communities that responded, 79% confirmed that agreements between communities to provide mutual assistance in the event of a disaster was considered a necessity; 80% of the municipalities also indicated they already had such agreements in place. Being able

to identify and quantify incremental costs associated with such a network of capabilities and capacities will become increasingly important for defining eligible disaster funding.

Given the focus that the DFAA Revised Guidelines place upon natural hazards, the current CSS initiative to partner with Natural Resources Canada and Environment Canada is both timely and meaningful. The proposed project which seeks to develop natural hazard risk assessment methods, once operationalized, would offer a means to: quantify the relative risks (economic, physical, social) posed to Canada by those hazards; would evaluate how the identified risks can best be mitigated; and, would ensure results are used to inform policy and guide investments (by government, public and private sectors) in risk reduction (Lowe/Simonds 2008). The anticipated outputs would provide the necessary tools for more effective management of natural hazards at both the federal and non-federal levels, and would also provide the necessary information to substantiate federal emergency funding.

5.4 Joint Emergency Planning Program

First established in October 1980 as a new initiative, the objective of JEPP is to develop and/or enhance the national emergency response capability through jointly-funded federal provincial projects. Federal-provincial funding contributions are determined through a negotiation process that considers factors such as project alignment and contribution to national priorities, provincial requirements, other competing projects, and available funding. The proportion of federal funding allocated toward total project costs range from 50% to 75%. Annual funding allocations have varied from an average allocation in the 1980's and early 1990's of $6 to $6.5 million, to a low of $4.5 million in 1997-98; 2008 funding levels have once again rebounded, with contributions of over $7.8 million being distributed to provinces pursuant to the *Emergency Preparedness Act* (McConnell 2002; Public Accounts of Canada, Transfer Payments, 2008).

The program has undergone several changes over the years to address procedural, administrative, auditing and accountability concerns. For instance in 1994-95, block funding arrangements were introduced that were intended to earmark funds for the use of each province or territory based on a formula of $150,000 plus $0.10 per head of population (McConnell 2002). This new approach replaced the previous 'first-come first-serve' process that had prevailed up to that point. Currently, earmarked funds are held by the federal government for use against approved projects within the relevant provincial jurisdiction, and represent 75% of the JEPP budgetary portfolio. Proposals submitted by provinces and territories are first considered for funding against these earmarked funds up to the maximum allowable, after which proposals are considered against 'regular' funds that may be available in the annual JEPP budget portfolio; project approval processes for regular funds are merit-based and competed nationally. Within the budgetary limitations set by Cabinet in any given fiscal year, the annual maximum any one province or territory may receive is $4 million; the annual maximum funding ceiling for any one project is $3 million. JEPP monies have typically been "distributed among over 430 projects

annually with an average federal contribution of $10K per project" (Public Safety, JEPP Manual, n.p.).

The principle upon which JEPP funding rests is that it is only intended as 'seed' money to assist provinces and territories to get started on required projects, rather than as a vehicle for long-term or life-cycle requirements. Yet, despite the alleged 'proactive' nature of the program, JEPP funding, like that of the DFAA program, only provide monies to the provinces or territories in the form of reimbursement for eligible expenses already incurred against an approved project. Provinces are required to provide proof of paid invoices and confirmation that projects have been completed before eligible federal funding becomes payable; a process that, throughout the literature reviewed, has been criticized by non-federal levels as being slow and unresponsive. What the JEPP program, gives little recognition to, is the reality that non-federal levels do not necessarily have readily available or sustainable funding sources for development of emergency response capability. The challenges faced at the municipal level for funding in support of routine emergency preparedness, equipment, and personnel, is confirmed throughout the literature reviewed, such as municipal budgetary information, reports commissioned by the Federation of Canadian Municipalities (GCSI 2004; National Security Group 2006), the Canada West Report (Ploeg, 2004), and examinations of provincial-municipal expenditures undertaken by Enid Slack (2007) of the Institute on Municipal Finance and Governance.

A further complication for non-federal levels which seek JEPP assistance is that such funding is allocated annually by Parliament with no guarantee of what funding levels will be from year-to-year. The consequence is that JEPP projects, even if they are expected to be multi-year initiatives, may only seek approval for current fiscal year funding; multi-year projects are required to re-submit each year without assurance that the project once reviewed will continue to be funded. Such uncertain funding represents a significant gap for strategic planning and initiatives to develop national emergency response capabilities.

Non-federal levels also face funding challenges with regard to protection of critical infrastructure, of which 80% is privately owned. JEPP for instance, does not permit payments to businesses, nor can JEPP funds be used in such a manner that a business would profit and/or increase in value as a result of such expenditures. It is currently not clear how non-federal levels can or should address the question of protecting privately held critical infrastructure, or how to ensure businesses comply with national emergency planning objectives. But there are other challenges as well. For instance, while 84% of Emergency Managers who responded to the recent survey by the Standing Senate Committee on National Security and Defence (2008) indicated that local critical infrastructure had been identified, only 58% had a plan in place of how to protect it. In addition, significant confusion exists with regard to whether or not federal and provincial critical infrastructure may exist within a municipality's boundary, including who has responsibility for its protection.

There have been several evaluations provided of the JEPP program since its inception; these include the work of such authors as David McConnell (2002), the independent program evaluation of JEPP conducted in 2003[1] for Public Safety Canada, and the reports of the Standing Senate Committee on National Security and Defence in 2004 and 2008. While the general consensus of these various reports acknowledges that JEPP offers a unique and worthwhile program toward achieving national emergency preparedness and response objectives, there are nevertheless significant weaknesses that are identified. The main issues that have been raised include: questions about the relevance of JEPP; the lack of clarity about the program, its terms, conditions, application and approval processes; the appropriateness of the program criteria, priorities, and outcome expectations in relation to the parameters and levels of available funding; and, its role, responsibilities, accountabilities and general responsiveness to the communities it is intended to support.

The independent program evaluation conducted of JEPP in 2003, was to be followed by periodic evaluations every five years. The evaluation that was anticipated to take place in 2008 has not as yet been completed and/or released. Such evaluations are required to comply with Treasury Board policy on Program Evaluation (April 2001), and must specifically address questions pertaining to program relevance, success and cost-effectiveness. It is worth noting that the current JEPP program will only be in effect until March 31, 2009; an evaluation of the effectiveness of the program is required as part of the Treasury Board approval process for renewal of the program's terms and conditions. It is recommended that both the program evaluation process and the Treasury Board renewal process be monitored over the coming months for their findings and the implications for non-federal levels.

5.5 Business Planning Cycles and Preparedness Standards

As discussed above, the primary funding mechanisms available to non-federal levels of government in support of emergency management are: the municipal tax base; the DFAA; and, the jointly-funded federal provincial JEPP program. Several factors can influence the success of the business planning cycle associated with emergency planning, preparedness and response capabilities, including: whether the principles of emergency management are adhered to[2]; the efficacy of the processes used to identify, assess, and manage risk from all-hazards relevant to the community; and, application of standards and best practices in support of effective emergency management and business continuity planning.

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[1] Only excerpts of this report have been made available by Public Safety Canada; efforts to obtain a full copy of the report continue.

[2] The principles endorsed by the International Association of Emergency Managers, state that emergency management must be: comprehensive, progressive, risk-driven, integrated, collaborative, coordinated, flexible, and professional (2007, 4).

Until recently, the National Fire Protection Association's NFPA 1600 *Standard on Disaster/Emergency Management and Business Continuity Programs,* an American-focused publication, has been a primary reference for those with Emergency Management responsibilities. In August 2008, the Canadian Standards Association published the Canadian version of this document, the CSA Z1600-08 *Emergency Management and Business Continuity Programs*. Related documents such as the CSA 731-03 *Emergency Preparedness and Response*, CSA Z763 (R2006) *Introduction to Environmental Risk Assessment Studies*, and CSA Q850-97 (R2007) *Risk Management Guideline for Decision Makers*, will eventually be incorporated and/or closely aligned with the CSA Z1600-08. What is worthwhile to note is the high level of collaboration that has facilitated the development and application of such documents. Collaboration across and between Canadian stakeholders has included federal and provincial government agencies, emergency management organizations, first responder groups, and industry, with funding being provided by Public Safety Canada. Cross-border and international liaison has also taken place with such groups as the American Homeland Security Standards Panel, the NFPA 1600 Technical Committee, the ISO Advisory Group on Security, and the ISO TC 223 on Societal Security. Such Standards, which seek to harmonize public and private sector approaches to emergency management and business continuity programs and processes, represent the benchmark against which existing programs should ideally be assessed. The Standards have been specifically developed to support Public Safety Canada, provincial and municipal emergency management organizations, and other organizations in Canada already using the NFPA 1600 (Shanahan 2008).

The recent changes to the focus of DFAA funding, and the as yet unknown outcome of the Treasury Board review of JEPP funding mechanisms and processes will, without doubt, impact strategic emergency preparedness, business planning cycles, and resource management at non-federal levels. Clarity on what changes, if any, will be made to JEPP will be an important component toward establishing a feasible way ahead for business planning at non-federal levels of government, particularly if the misalignment between federal and municipal budgetary processes and fiscal year-end are not addressed.

Given that considerable progress has been made toward commonly accepted emergency management principles, standards and processes, including business continuity planning, the pivotal component for effective resource and capability management rests with the efficacy of risk assessment methodologies, tools and processes that are available to non-federal levels of government. As CSS Capability Based Planning, CNIMS, and all-hazard risk assessment models are refined, it is recommended that concurrent research be conducted to identify the specific practical linkages and opportunities these processes offer for resource and capability management that leverage available funding mechanisms.

6 Conclusions

The application of risk-based methods is now commonly used at the non-federal level for appropriating funding and aligning resources in support of emergency response. However, as is readily acknowledged by the Emergency Management community, disparity in the efficacy and rigor of methodologies, analysis, and tools have impeded the ability of municipalities to fully benefit from risk assessment as a capability and resource planning tool. Similarly, efforts toward collaborative public/private risk assessment, and/or partnerships in the area of critical infrastructure protection and emergency response, have had mixed success. The challenges primarily stem from confusion regarding roles, mandates, and authorities; fears about confidentiality of information; and, regulatory constraints associated with public funding frameworks and mechanisms.

Availability of adequate funding, including responsive and accountable financial processes, remains a significant impediment to the development of sustainable local, provincial and national level emergency response capabilities. While programs such as the DFAA and JEPP are recognized as worthwhile and are widely used, the level of satisfaction has been extremely low. In the case of JEPP, independent evaluations and user feedback have identified significant weaknesses and concerns about how effective such a program actually is toward achieving national emergency preparedness and response objectives.

What these global findings confirm is the need for and utility of, a reusable all-hazards framework for analyzing risk that is linked to capability and resource planning. CSS initiatives offer strategically important tools toward development of national emergency response capabilities, multi-level decision-making, and sustainable funding for non-federal levels of government. Specifically, the Capability Based Planning Pilot Project, CNIMS, and the Natural Resources/Environment Canada initiative will address current gaps in the ability of non-federal levels to meet their legislated responsibilities and chronic funding challenges by: providing connectivity between tools that analyze intentional and unintentional risks to Canadians from all-hazards, including CBRNE threats, natural, industrial, and accidental hazards; by identifying capability and capacity requirements across the risk spectrum; and, by providing a standardized means to differentiate between routine and incremental costs associated with incident management. Such tools will provide essential and tangible means by which non-federal levels of government can substantiate their funding requirements at the municipal level, as well as for DFAA and JEPP resources. In addition, the rigor that such tools offer will ensure that federal requirements under the Results-based Management and Accountability Framework, and the Risk-based Audit Framework, can be met.

7 Recommendations

The CSS/Natural Resources/Environment Canada partnership offers a comprehensive and potentially unifying risk assessment approach across non-federal levels of government that should continue to be pursued. In light of the findings in this report, the value of the proposed assessment models and tools to non-federal levels include:

- flexible and adaptable assessment tools that can meet user needs;
- standards-based;
- open source;
- scalable (i.e. operate at national, regional or local scales);
- modular (provide capacity to consider additional hazards);
- customizable (provide for user-defined hazard specifications);
- compatible with methodologies in use by other government departments/jurisdictions;
- well-documented operational guidelines;
- accountability mechanisms; and,
- offer senior decision-makers the information and means to link capability requirements, to resource planning and funding processes, in support of multi-level government strategic planning (Lowe/Simonds 2008).

Notwithstanding the promise that such initiatives represent, a word of caution is in order. A growing body of public management, performance measurement and accountability literature now indicates that the efficacy and success of public sector programs is critically impacted by whether such programs pay sufficient attention to influencing factors such as: the social and political context within which such programs are developed and effected; whether public managers are actively engaged; and whether consideration is given to how linkages can be forged between strategic planning processes, operational implementation, information-seeking, the assessment and management processes, and the challenges of public accountability. This is particularly important when such programs are multi-jurisdictional and multi-agency in nature; policies, programs and values may differ considerably, such that in practice it becomes difficult to align goals, or identify commonly acceptable assessment indicators or data across stakeholder decision-makers. It is recommended that CSS explore the insights this body of literature offers for the development and successful implementation of an all-hazard risk assessment model and tools.

There is currently a lack of coherent, aggregate, and detailed information specific to municipal expenditures on all-hazard emergency services and response activities in relation to the available municipal tax base, and other funding sources. Similarly, there is a lack of clarity about what aspects of first responder capabilities are conducted as routine functions and what aspects constitute expenditures, incremental or otherwise, that should be captured against municipal all-hazard emergency response capabilities. For instance,

in 2005 police and fire services represented 17% of the total expenditures of local general government under Protection of Persons and Property (Slack, 2007); but, it is not readily apparent how much of that can be defined as expenditures, incremental or otherwise, in direct support of all-hazard emergency response. Such data will become increasingly important in order to establish and understand funding trends, baseline costing requirements, and to differentiate between routine and incremental expenditures; such data should ideally include expenditure information by hazard area.

The current JEPP program will only be in effect until March 31, 2009; an evaluation of the effectiveness of the program is required as part of the Treasury Board approval process for renewal of the program's terms and conditions. It is recommended that both the program evaluation process and the Treasury Board renewal process be monitored over the coming months for their findings and the implications for non-federal levels. How JEPP funding mechanisms and processes are shaped in future will determine the strategic and business planning cycle that non-federal levels should consider. Of particular importance will be what changes, if any, will be made to reconcile the misalignment between federal and municipal budgetary processes and fiscal year-end. It is also recommended that research be conducted to identify the specific practical linkages and opportunities such processes as Capability Based Planning, CNIMS, and all-hazard risk assessment models offer non-federal levels toward resource and capability management.

Annexes List of annexes[3]:

Annex A Research Institutes Short List

Annex B Research Institutes Long List

Annex C Academic Specialists by University

Annex D Specialist Consultants

[3] Annexes can be accessed in attached PDF's

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Top Choices for Engagement in Preliminary Research and Development of a Reuseable All-Hazard Risk Framework					
University of Western Ontario (uwo.ca)					
Institute for Catastrophic Loss Reduction and National Disaster Health Research Network Note: The Institute has established working partnerships with a select group of national and international organizations that share their vision, e.g.: Canadian Red Cross Society; Canadian Climate Impacts and Adaptation Research Network; Centre for Disaster Education and Research; Climate Change and Health Office; Disaster Prevention Research Institute, Kyoto; Emergency Management Ontario; Federation of Canadian Municipalities; Geological Survey of Canada; Health Canada; Institute for Business and Home Safety; Insurance Bureau of Canada; Meteorological Service of Canada; National Research Council Canada; Natural Hazard Centre, Colorado; Office of Critical Infrastructure Protection and Emergency Preparedness; Ontario Research and Development Challenge Fund; Research Alliance for Disaster Resilient Cities.	The Institute for Catastrophic Loss Reduction (ICLR) is a research Institute committed to the development of disaster prevention knowledge, and the broad dissemination of these research findings. Established by Canada's property and casualty insurers to reduce disaster losses, the Institute is internationally recognized for leadership in multi-disciplinary disaster prevention research. The objective is to conduct quality disaster research, including a program focusing on the social and health impacts of disasters, for better public policy and disaster management. ICLR has established four research priorities to improve knowledge about how to prevent natural hazards from becoming disasters and ways to reduce the social and economic impact of these events. Research priorities include: ▪Reducing wind and earthquake damage to housing, other buildings and infrastructure. ▪Understanding disaster risk management and prevention. ▪Enhancing government science related to natural disasters. ▪Improving community actions for disaster mitigation.	▪ A decision support tool for disaster risk management - Principal Investigators: Dr. Slobodan Simonovic, Dr. William Leiss, Dr. Donald Burn, Dr. Hanping Hong Today disaster risk reductions are attempted on the basis of a number of different conceptual approaches to 'risk'. The fallibility/unreliability of human judgment of natural disaster risk has been demonstrated in the past. Decision-makers are well aware of their own practice of attaching more weight to the perception of risk than to real risk impacts. In spite of the awareness of these weaknesses a very basic confusion continues to permeate both engineering and societal disaster risk decisions. Disaster risk management is considered in the proposed research as a decision problem. The proposed work is aimed at the development of a decision support tool for (a) qualitative framing of the disaster risk problem/s; (b) quantitative disaster risk assessment; and (c) integrated disaster risk and risk issue/s management. ▪ Role of Government in services for natural disaster reduction - Principal Investigators: Dr. Gordon McBean, Dr. J. Davies, Dr. A. Slivinski, Dr. P. Kopas This research project will investigate the past and present roles of government scientific agencies in activities that provide information and services contributing to the reduction in impacts of natural hazards in Canada. These activities include weather forecasting, earthquake and water monitoring and surveys and the science that supports their better understanding. The analysis will examine, from both the economic and policy points-of-view, the rationale for a government role and how it has changed. The study will also include a comparison of the Canadian situation with the roles in other countries (US, UK, Australia). In recent years, while the government sector has been reduced, there has been growth in the academic and private sectors and the study will consider the relative merits of the roles of these sectors. The information and analysis generated by this project will provide input into decision making by governments on appropriate roles and funding for agencies in the future, consistent with their roles in disaster reduction.	Dr. Paul Kovacs (Executive Director) Alan Davenport (Research Director)	Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@iclr.org London office 1491 Richmond Street London, Canada N6G 2M1 Tel: (519) 661-3234 Fax: (519) 661-4273	http://www.iclr.org/index.htm
University of Waterloo (uwaterloo.ca)					
Institute for Risk Research (IRR) and the Network for Environmental Risk Assessment and Management (NERAM)	NERAM integrates multi-disciplinary scientific knowledge and expertise across Canada to provide a comprehensive approach to environmental risk assessment and risk management that supports more effective and efficient environmental protection practices and decision-making. NERAM considers such issues as: deregulation; public sector downsizing; devolution of responsibility for environmental risk assessment and management from federal to lower levels of government and industry; the need for consistency/agreement on Risk Assessment methodologies; and, the need for more consistent and credible message in communicating about environmental risk The principal objectives are: • to develop risk-based methodologies, standards and tools based on scientific models of environmental risk assessment focusing on methodologies that are practical and evidence-based. • to establish an integrated scientific framework for theoretical and practical principles of integrated environmental risk assessment and management, based on actual risk management decisions. • to disseminate methods, research results and experiences with environmental risk assessment.		Dr. John Shortreed, Executive Director	Dr. Shortreed IRR and NERAM University of Waterloo Waterloo, Ontario N2L 3G1 Tel : (519) 888-4567, ext. 35527 Fax : (519) 725-4834 Email: shortree@uwaterloo.ca	irr-neram@uwaterloo.ca

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
IRR and NERAM (Research Nodes)					
Western Node			Dr. Cindy Jardine, Director Dr. Steve Hrudey, Associate Director	Dr. Cindy Jardine Dept. of Human Ecology 302 Human Ecology Bldg. University of Alberta Edmonton, AB T6G 2N1 Tel.: (780) 492-2626 Fax: (780) 492-4821 Email: cindy.jardine@ualberta.ca Webpage: www.re.ualberta.ca/People/Index Dr. Steve Hrudey Faculty of Medicine Professor of Environmental Health Public Health Sciences Faculty of Medicine and Dentistry University of Alberta, Edmonton, AB Tel.: (780) 492-6807 Fax: (780) 492-0364 Email: steve.hrudey@ualberta.ca Webpage: www.publichealth.ualberta.ca/steve_hrudey.cfm	
Middle Node			Dr. George Dixon, Director	Dr. George Dixon Department of Biology University of Waterloo Waterloo, ON N2L 3G1 Tel.: (519) 888-4567, ext. 32531 Fax: (519) 746-0614 Email: dgdixon@sciborg.uwaterloo.ca Webpage: www.biology.uwaterloo.ca/people/gdixon	
Ottawa Node			Dr. Dan Krewski, Director	Dr. Dan Krewski McLaughlin Centre for Population Health Risk Assessment Inst. of Population Health University of Ottawa 451 Smyth Road Ottawa, ON K1H 8M5 Tel: (613) 562-5800, ext. 8261 Fax: (613) 562-5465 Email: dkrewski@uottawa.ca Webpage: lrsp.carleton.ca:16080/directors/krewski	
Risk Communication Node			Dr. William Leiss, Director	Dr. William Leiss NSERC/SSHRC Research Chair University of Calgary 2500 University Drive NW Calgary, AB T2N 1N4 Tel: (403) 220-8579 Fax: (403) 282-0095 Email: wleiss@uottawa.ca	www.leiss.ca

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Simon Fraser University (sfu.ca)					
The Centre for Natural Hazard Research (CNHR)	The mandate of the CNHR is to conduct innovative research on geophysical processes that are a threat to the population and economic infrastructure of Canada. A key element of the Centre is the inclusion of public policy research on how to effectively transfer the results of scientific research to the people who need and can use it. By integrating physical science with social policy research, CNHR aims to lead the way in making Canada more resilient to natural disasters. Research projects are jointly sponsored by Simon Fraser University and agencies responsible for public safety, such as the BC Emergency Preparedness Program (PEP) and Public Safety and Emergency Preparedness Canada (OCIPEP).	**Earthquake and tsunamis:** Research aimed at determining the frequency, magnitude, and effects of earthquakes in the recent geologic past. Specific research topics include geological investigations of prehistoric earthquakes and tsunamis, geophysical modelling of surface deformation related to strain accumulation in the crust, assessment of the liquefaction potential of sediments in earthquake-prone areas, the response of rock slopes to seismic shaking, three-dimensional imaging of the near-surface and deeper crust to identify faults capable of strong earthquakes, and onshore mapping and interpretation of geological features indicative of recent crustal deformation. This information is expected to be relevant to emergency planners and officials in the BC Provincial Emergency Program, as it will allow them to model realistic scenarios in order to prepare for damage caused by earthquakes.	Dr. John Clague, Director Dr. Tucker Program Manager Reducing Risk from Natural Hazards (RRNH) Program - is tasked to develop and deliver a suite of products that will help reduce the impact of natural hazards on the Canadian population, economy and infrastructure by targeting investments towards the best opportunities for risk reduction and on enhancing our understanding of these hazards.	Dr. John Clague tel. +1 778 782 4924 fax. +1 778 782 4198 Email: jclague@sfu.ca Dr. Chris Tucker, Program Manager Reducing Risk from Natural Hazards (RRNH) Program - Emergency preparedness, Natural Resources Canada 601 Booth Street, 4th Floor, Room. 479 Ottawa, ON Canada K1A 0E8 Telephone: (613) 943-4245 Fax : (613) 992-0190 E-mail: cmtucker@nrcan-rncan.gc.ca http://ess.nrcan.gc.ca/index_e.php	http://www.sfu.ca/cnhr/mandate.htm
		Landslides: Research on causes, mechanisms, distribution, and age of landslides in western Canada to provide a better understanding of landslide hazard and risk. Collaborative research with University of Alberta, University of British Columbia, BC Forest Service, and the Geological Survey of Canada to create a broad-based, cooperative landslide program that includes field-based studies of landslides, mapping, laboratory investigations of soil properties, computer modelling of rock slope stability and movement, and studies of the impacts of groundwater on the stability of potentially unstable slopes. Researchers are involved in: (1) characterization of landslides in forested terrain in BC; (2) risk assessment in forestry-related landslides; (3) integrated numerical modelling and field instrumentation of major rockslides; (4) coupled groundwater-mechanical modelling of landslide failure mechanisms; (5) application of rock and soil engineering principles in landslide hazard assessment; (6) application of GIS in landslide investigations; (7) application of remote sensing techniques in landslide research; and (8) damage mechanisms, with particular emphasis on rock slope failures.			
		Snow avalanches: Avalanche researchers conduct theoretical studies of mechanisms of avalanche formation and movement. They also investigate antecedent weather conditions that favour avalanches. These data can be used to produce maps of high-use recreation areas in BC depicting avalanche hazards and risk. Such maps will be made available to the public and to groups responsible for public safety through a partnership with the Canadian Avalanche Association.			
		Volcanism: CNHR and the Geological Survey of Canada will collaborate on research on hazards posed by young volcanoes in western Canada, including Mount Baker, Mount Garibaldi, Mount Cayley, and Mount Meager. The hazards include ash fallout, pyroclastic flows, landslides, lahars (volcanic debris flows), outburst floods from lakes impounded by landslides on the flanks of volcanoes, and downstream aggradation of floodplains. The focus of this research will be documenting downstream effects of eruptions and landslides on volcanoes using stratigraphic and geophysical methods.			
		Floods: Examination of different types of floods to better understand their causes and to evaluate risk to existing economic infrastructure on floodplains. Flood types that will be studied include rainfall- and snowmelt-triggered floods, ice-jam floods, and outbursts from moraine-, glacier-, and landslide-dammed lakes. Research will focus on antecedent conditions associated with different types of floods, relations between flooding and high sediment supply to rivers, floodplain hazard mapping, and quantification of flood risk. Flood research will involve collaborations with hydrologists at the University of British Columbia, the National Hydrology Research Centre in Saskatoon, and the BC Government.			

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
		Climate change: The possibility of rapid climate change caused by human modification of the Earth's atmosphere is increasingly being recognized as a hazard. CNHR research in this area focuses on impacts of climate warming on physical processes and the landscape. Particular attention is given to destabilization of mountain slopes due to massive snow and ice loss, melt of permafrost, changes in the frequency of outburst floods from glacier- and moraine-dammed lakes, impacts of sea-level rise on shorelines, changes in vegetation, and changes in river hydrology and planform. The research will involve mapping, geomorphic, stratigraphic, sedimentological, and paleoecological studies, and comparison of aerial photographs spanning the last 70 years.			
		Land-use planning: Improved understanding of natural hazards aids land-use planners in making the best possible use of their resources for protective structures such as dykes, thus reducing the economic and social costs of natural disasters.			
		Critical infrastructure and hazardous waste: Many hazardous natural processes can damage critical infrastructure, including hazardous material storage facilities. Spillage of pesticides and petrochemicals could imperil Canada's food and water supplies, with significant health and economic impacts. Preventative measures and established clean-up plans, made possible with information and strategies provided by CNHR, will help mitigate these impacts.			
		Knowledge dissemination and emergency planning: Major natural disasters can have national, even global, effects. CNHR will archive natural hazard information and make it available in a useful form to governments to reduce the impact of future disasters. Research conducted by CNHR into the impact of natural disasters on people will lead to the creation of effective educational materials and emergency plans.			
		Public policy and communications: Because disaster risk reduction is a human-centred issue, it also has political, sociological, economic, and psychological dimensions. Two of the principal objectives of CNHR are to increase public awareness of natural hazards, and to influence public policy so as to reduce economic losses and injuries from natural disasters. Key to CNHR's program of reducing disaster losses is research leading to hazard identification and vulnerability analysis that is integrated into community planning and decision-making. Research on public policy helps shape land-use practices and resource management. Policy research is conducted on societal vulnerability and resilience to natural disasters, societal preparedness for natural disasters, risk perception, disaster management systems, disaster planning and training, disaster forecasting, reconciliation of natural hazard research with human well-being, psychological and social impacts of natural disasters, community response to natural disasters, sustainable development in areas of potential natural disasters, and integration of scientific information into the political decision-making process.			

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
École Polytechnique de Montréal (polymtl.ca)					
Research Group in Decision Analysis	Affiliated with the Department of Mathematical and Industrial Engineering, this research group functions in collaboration with École Polytechnique, HEC Montreal, Université du Québec à Montréal and Université McGill. The Group's main objective is to develop and to apply scientific methods and techniques (operations research, systems analysis, statistics, computer science and applied mathematics) for the resolution of complex problems related to decision making in organizations. The Group has been active in the fields of energy/environment, production management, industriel logistics, manufacturing systems and transportation. The Group also studies optimization problems in science: automatic classification, mathematical chemistry, economy.		Dr. Roland P. Malhamé, Director	Dr. Roland Malhamé Telephone: (514) 340-4711 ext. 4884 Fax: (514) 340-4078 Office: A-429.10.1 Email: roland.malhame@polymtl.ca Address: HEC Montreal 3000, chemin de la Côte Ste-Catherine Montréal, H3T 2A7	http://www.gerad.ca
Centre Risque and Performance	Affiliated with the Department of Mathematical and Industrial Engineering, the Centre Risque & Performance (CRP) is dedicated to the study of interdependencies between lifeline networks represented, among others, by the electrical, natural gas, waterworks system, telecommunications, transportation, civil security and governmental networks. Risk management will also be applied to technological project management and to the development of organizational contingency plans.		Dr. Robert Benoît, Director	Telephone: (514) 340-4711 ext. 4226 Fax: (514) 340-2989 Office: A-305.31 Email: benoit.robert@polymtl.ca	www.polymtl.ca/crp
Other Short-listed Research Institutes for Subsequent Consideration by Category of Expertise					
Public Policy and Governance					
Dalhousie University (dal.ca)					
RBC Centre for Risk Management	Recognizing that risk pervades business, from corporate boardrooms to manufacturing plants, and government services from storm warnings to transportation safety, national security to environmental protection, the stated goal of the Centre is to be a catalyst for interdisciplinary knowledge generation and transfer, and a focal point for stimulating growth in analysis, measurement and management of risk. The Centre builds on the academic strength and industry experience in management,engineering, mathematics, statistics, environmental studies, health science, physical science, and psychology in support of complex decision-making.		Ronald Pelot, Director Yonggan Zhao, Canada Research Chair (Tier II) in Risk Management	Ronald Pelot, Director 902 494 1769 (Phone) 902 494 1503 (Fax) Ronald.Pelot@dal.ca Yonggan Zhao Canada Research Chair (Tier II) in Risk Management 902 494 6972 (Phone) 902 494 1503 (Fax) Yonggan.Zhao@dal.ca	http://rbcriskmanagementcentre.dal.ca/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
School of Public Administration	Dr. Kevin Quigley, Assistant Professor at the School of Public Administration, specializes in public sector risk and crisis management, strategic management and critical infrastructure protection and is particularly interested in research methods that employ interdisciplinary and comparative approaches.	▪ Critical Infrastructure Protection Initiative - The goal of the initiative is to create opportunities for citizens, industry, NGOs and governments to engage with questions and ideas concerning the management of Canada's critical assets, exploring technical as well as historic, social, political, legal and economic opportunities and constraints. ▪ Critical Infrastructure Protection in Comparative Perspective: Continuity and Emergency Planning in the Health Sector ▪ Risk, Regulation, and Good Governance	Dr. Kevin Quigley, Assistant Professor	Dr. Kevin Quigley 902-494-3782 Kevin.Quigley@dal.ca	http://management.dal.ca/People%20and%20Groups/Faculty/Profile.php?id=71
McGill University (mcgill.ca)					
Centre for Strategy Studies in Organizations	The Centre supports research on strategy and organization. Its goal is to promote the execution and dissemination of the best possible research on issues central to organizations, especially the formation of strategic direction, the coordination of organizational activities, and the relationship between organizations and society. CSSO members employ diverse approaches to strategy and strategic change, including longitudinal/qualitative as well as advanced quantitative methods.		Dr. J. Jorgensen, Director	Dr. J. Jorgensen 1001 Sherbrooke Street West, Room 544 Montreal, Quebec H3A 1G5 Tel.: 514-398-4027 Fax: 514-398-3876 Email: jorgense@management.mcgill.ca	http://www.csso.mcgill.ca/
Simon Fraser University (sfu.ca)					
CMA Centre for Strategic Change and Performance Measurement	The Centre promotes research and knowledge on how organisations plan and execute strategic change and how best to measure the performance of organizations undergoing such change. The Centre pursues and sponsors multi-disciplinary research in three broad, yet highly interrelated themes: • strategic change and the execution of strategic change; • appropriate measurements for the evaluation of the performance of such changes; • and the evolution of organizations undergoing rapid change, including leadership and change management		Dr. Thomas Lawrence, Director	Dr. Thomas Lawrence CMA Centre for Strategic Change and Performance Measurement Segal Graduate School of Business Simon Fraser University Third Floor, 500 Granville Street Vancouver, BC, Canada V6C 1W6 Tel. 778-782-3708 Email: cma-centre@sfu.ca Fax. 778-782-4920	www.sfu.ca/~tblawren
University of Ottawa (uottawa.ca)					
Centre on Governance	The Centre focuses on the study of governance with regard to human interaction and its coordination, in and between organizations and communities. Affiliated with the Faculty of Social Sciences, the School of Political Science and the School of Management, the four main research axes at the current time include: ▪Governance and Democracy ▪Ethics and Governance ▪Global and North American Governance ▪Knowledge, Complexity and Governance		Dr. Caroline Andrew, Director	Dr. Caroline Andrew Phone: 613-562-5800 ext. 1702 E-mail: candrew@uOttawa.ca	http://www.socialsciences.uottawa.ca/pol/eng/profDetails.asp?id=90 http://www.socialsciences.uottawa.ca/governance/eng/
Public Administration	Critical analysis of Canadian Public Sector political and administrative reforms, management frameworks and their implementation, innovation, and structure of legislation.		Dr. Christian Rouillard, Canada Research Chair on Governance and Public Management (Tier II) - Social Sciences and Humanities	Dr. Christian Rouillard Office: 613-562-5800 (2659) Fax: 613-562-5350 E-mail: christian.rouillard@uottawa.ca	http://www.socialsciences.uottawa.ca/pol/eng/profDetails.asp?id=126

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Secure/Open Source Intel					
Carleton University (carleton.ca)					
Canadian Centre of Intelligence and Security Studies (CCISS)	The Canadian Centre of Intelligence and Security Studies (CCISS) is an Organized Research Unit under the aegis of the Norman Paterson School of International Affairs (NPSIA) focusing specifically on Intelligence and National Security studies. Research initiatives have addressed topics such as ethics and intelligence; Canadian intelligence history; international intelligence relations; peacekeeping intelligence, intelligence and counter- terrorism, financial intelligence; critical energy infrastructure protection; and intelligence oversight and review. In collaboration with the Integrated Threat Assessment Centre (ITAC) the Centre is engaged in preparation of open-source assessment studies on Trends in Terrorism, addressing topics of priority concern to Canada's S&I and law enforcement communities.		Dr. Jez Littlewood, Director	Dr. Jez Littlewood Telephone: 613-520-2600 ext 6659 Email: Jeremy_Littlewood@carleton.ca	http://www.carleton.ca/cciss/
Public Economics					
McMaster University (mcmaster.ca)					
Experimental Economics Laboratory	This laboratory is dedicated to computer-mediated interactive experiments in economics and related disciplines. The lab is available to researchers outside of McMaster University who wish to study market institutions and collective decision-making and use laboratory methods in their research. Dr. Mestelman, Co-director, is a professor of Economics whose research interests include Quantitative Studies in Economics and Population, Public Sector Economics (Provision of Public Goods, Social Choice), Applied Microeconomics (regulation, environmental economics, industrial organization), and Experimental Economics. Dr. Andrew Muller, Co-director, is a professor of Economics, Natural Resource and Environmental Economics, and Industrial Organization. Research interests lie in using laboratory experiments in economics to investigate aspects of environmental regulation and voluntary contributions to public goods. He also is interested in the economic valuation of environmental services using conjoint analysis of stated preferences, a form of contingent valuation.		Dr. Stuart Mestelman, Co-director Dr. Andrew Muller, Co-director	Department of Economics McMaster University Hamilton Ontario CANADA L8S 4M4 Dr. Mestelman Office: KTH 403 Office Phone: (905) 525-9140 ext. 23113 Fax: (905) 521-8232 Email: mestelma@mcmaster.ca http://socserv2.socsci.mcmaster.ca/~econ/faculty/mestelma/index.html Dr. Andrew Muller Kenneth Taylor Hall, Room 437 E-mail: mullera@mcmaster.ca Voice: (905) 525-9140, ext. 23831 Fax: (905) 521-8232 http://socserv2.socsci.mcmaster.ca/~econ/faculty/mullera/index.html	http://socserv2.socsci.mcmaster.ca/~econ/mceel/index.html

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Psychosocial					
University of Ottawa (uottawa.ca)					
GAP-Santé, Institute of Population Health	Relevant research streams of the "Group for the Analysis of Psychosocial Health" (GAP-Santé) include: ▪Social Environment and Stress ▪Investigation of Organisational Stress and Health ▪Risk Representation ▪Community Well-being	▪Social Analysis of Risk: Security, Environment and Population Health ▪Psychosocial Risk Manager (PRiMer): Computer-based Pre-Event Training ▪Psychosocial Risk Assessment and Management (RAM) Tools to Enhance Response to CBRN Attacks and Threats in Canada ▪Public Perceptions and Acceptable Levels of Health Risk Among Canadians ▪Caring About Healthcare Workers as First Responders: Enhancing Capacity for Gender-Based Support Mechanisms in Emergency Preparedness Planning ▪Risk and Stress: Anticipation and Perception in Psychosocial Management of Terrorist Threats ▪R. Samuel McLaughlin Research Chair on Psychosocial Aspects of Risk and Health	Dr. Louise Lemyre, Director and McLaughlin Research Chair on Psychosocial Aspects of Risk and Health	Dr. Louise Lemyre Phone: 613-562-5800 ext.2321 E-mail: louise.lemyre@uottawa.ca http://www.socialsciences.uottawa.ca/psy/eng/profDetails.asp?id=218	http://www.gapsante.uottawa.ca/English/index.php
Disaster Communications					
Simon Fraser University (sfu.ca)					
The Centre for Policy Research on Science and Technology and the associated Telematics Research Laboratory	CPROST engages in research on the relationship between public policy and technology. It brings together practitioners and scholars to study the interaction of advances in science and technology, their implementation in the marketplace, and their impacts on community and individual interests.	▪Disaster Mitigation and Emergency Preparedness (Dr. Peter Anderson) - The convergence of computers and communications, and the accelerating growth of global information networking is beginning to have profound impact on the organization of disaster mitigation, planning and response at all levels of society. During the past decade, Peter Anderson through CPROST and its associated Telematics Research Laboratory (TRL) have been participating in these developments through applied disaster communication research in Canada and abroad in collaboration with civil emergency organizations at all levels of government and with the United Nations and international disaster relief organizations. Note: The Telematics Research Laboratory (TRL) is currently engaged in a number of projects utilizing wireless telecommunications aimed at developing robust systems that are scalable, connectable to and interoperable with terrestrial and space-based systems to enable rapid deployment during and after disasters.	Dr. Adam Holbrook, Associate Director	Dr. Richard Smith (Director) smith@sfu.ca www.cmns.sfu.ca/people/faculty/smith_r.html Dr. Adam Holbrook 778-782-5192 jholbroo@sfu.ca www.sfu.ca/cprost/docs/adamholbrook-cv.pdf Peter S. Anderson, M.A. peter_anderson@sfu.ca www.cmns.sfu.ca/people/faculty/anderson_p	http://www.sfu.ca/cprost/
Practical Applications					
York University (yorku.ca)					
Disaster and Emergency Management Program (Master's Level Program)	The Program focuses on five conceptual areas: • Public Safety and Security • Environmental Issues and Disaster Management • Business Continuity Management • Technology and Disaster Management • Risk and Social Vulnerability		Dr. David Etkin Director, EM Graduate Program	Dr. David Etkin Office: 258C Atk Phone: (416) 736-2100 ext. 44016 Email: etkin@yorku.ca http://www.yorku.ca/akevents/academic/SAS/faculty/SASfacultyProfile.asp?id=559	http://www.yorku.ca/web/futurestudents/graduate/programs/Disaster_and_Emergency_Management/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Acadia University (acadiau.ca)					
Department of Mathematics and Statistics	Dr. Hugh Chipman, Canada Research Chair in Mathematical Modelling specializes in developing mathematical models of large and complex datasets that can be used to better understand scientific phenomena. The research will lead to the application of mathematical models to drug discovery, genetics, environmental science, marketing, security, and manufacturing.		Dr. Hugh Chipman Canada Research Chair (Tier II) in Mathematical Modelling (Natural Sciences and Engineering)	Dr. Hugh Chipman 902-585-1525 hugh.chipman@acadiau.ca	http://ace.acadiau.ca/math/chipmanh/homepage.htm
Carleton University (carleton.ca)					
The Centre for Security and Defence Studies (CSDS)	Promotes teaching, research and public outreach initiatives in the area of security and defence studies, including conflict management and resolution.		Dr. David Mendeloff, Director	Dr. David Mendeloff The Norman Paterson School of International Affairs tel: (613) 520-6655 (General Number) fax: (613) 520-2889 E-mail: csds@carleton.ca, or david_mendeloff@carleton.ca	http://www.carleton.ca/csds/
Canadian Centre of Intelligence and Security Studies (CCISS)	The Canadian Centre of Intelligence and Security Studies (CCISS) is an Organized Research Unit under the aegis of the Norman Paterson School of International Affairs (NPSIA) focusing specifically on Intelligence and National Security studies. Research initiatives have addressed topics such as ethics and intelligence; Canadian intelligence history; international intelligence relations; peacekeeping intelligence, intelligence and counter- terrorism, financial intelligence; critical energy infrastructure protection; and intelligence oversight and review. In collaboration with the Integrated Threat Assessment Centre (ITAC) the Centre is engaged in preparation of open-source assessment studies on Trends in Terrorism, addressing topics of priority concern to Canada's S&I and law enforcement communities.		Dr. Jez Littlewood, Director	Dr. Jez Littlewood Telephone: 613-520-2600 ext 6659 Email: Jeremy_Littlewood@carleton.ca	http://www.carleton.ca/cciss/
Department of Civil and Environmental Engineering	Research Focus: Quantitative uncertainty analysis and risk assessment of natural and engineering systems against unforeseen hazards. The research has broad implications for risk assessment projects in structural, marine, aerospace, and petroleum industries, as well as for risk modeling in finance, economics, and national defense-related initiatives.	Development and improvement of techniques used for uncertainty analysis with the goal to improve the risk and reliability prediction of natural and physical systems due to natural and man-made hazards.	Dr. Abhijit Sarkar, Canada Research Chair in Analysis and Management of Risk	Dr. Abhijit Sarkar Department: (613) 520-5784 Office: (613) 520-2600 ext. 6320 Home: (613) 521-6832 Cell: (613) 262-0213 E-mail: absarkar@connect.carleton.ca	www.abhijit.sarkar.name/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Centennial College					
Emergency Management Certificate Program	Centennial College has emerged as a recognized leader in applied emergency preparedness research and education. The program combines theory and practice in the following areas: Analyze hazards and assess risks; develop and practice plans for emergency response and recovery; design an emergency operations centre layout and build an understanding of mitigation and prevention strategies.	Major areas of accomplishment: • High fidelity disaster simulations. Centennial has moved to the forefront in staging high fidelity disaster simulation action studies, bringing together first responders from across the Greater Toronto Area to evaluate emergency response plans, develop a higher level of teamwork across various organizations and evaluate new communication and information management technologies in crisis environments. • Inter-professional education research. We are the first college to be awarded research funding from Health Canada to develop and evaluate courses designed to increase inter-professional collaboration in emergency response situations. • Innovative simulation tools. Within our applied research area, Centennial is developing sophisticated interactive tabletop simulation software tools to support disaster response training near to the classroom, helping to meet the critical but hard to achieve need for hands-on practice. • Strategic partnerships. Centennial is active in the development of partnerships, bringing together senior emergency management experts with the goal of improving all aspects of coordinated emergency response planning.	Charleen Lapalme Program Administrator	Charleen Lapalme Program Administrator Department of Inter-Professional Health Education School of Community and Health Studies Centennial College Box 631 Station A Toronto, Ontario M1K 5E9 416-289-5000 x8072	healthstudiesce@centennialcollege.ca
Dalhousie University (dal.ca)					
RBC Centre for Risk Management	Recognizing that risk pervades business, from corporate boardrooms to manufacturing plants, and government services from storm warnings to transportation safety, national security to environmental protection, the stated goal of the Centre is to be a catalyst for interdisciplinary knowledge generation and transfer, and a focal point for stimulating growth in analysis, measurement and management of risk. The Centre builds on the academic strength and industry experience in management,engineering, mathematics, statistics, environmental studies, health science, physical science, and psychology in support of complex decision-making.		Ronald Pelot, Director Yonggan Zhao, Canada Research Chair (Tier II) in Risk Management	Ronald Pelot, Director 902 494 1769 (Phone) 902 494 1503 (Fax) Ronald.Pelot@dal.ca Personal Web Site: http://myweb.dal.ca/rpelot/index.php Yonggan Zhao Canada Research Chair (Tier II) in Risk Management 902 494 6972 (Phone) 902 494 1503 (Fax) Yonggan.Zhao@dal.ca	http://rbcriskmanagementcentre.dal.ca/
School of Public Administration	Dr. Kevin Quigley, Assistant Professor at the School of Public Administration, specializes in public sector risk and crisis management, strategic management and critical infrastructure protection and is particularly interested in research methods that employ interdisciplinary and comparative approaches.	▪ Critical Infrastructure Protection Initiative - The goal of the initiative is to create opportunities for citizens, industry, NGOs and governments to engage with questions and ideas concerning the management of Canada's critical assets, exploring technical as well as historic, social, political, legal and economic opportunities and constraints. ▪ Critical Infrastructure Protection in Comparative Perspective: Continuity and Emergency Planning in the Health Sector ▪ Risk, Regulation, and Good Governance	Dr. Kevin Quigley, Assistant Professor	Dr. Kevin Quigley 902-494-3782 Kevin.Quigley@dal.ca	http://management.dal.ca/People%20and%20Groups/Faculty/Profile.php?id=71
Centre for Foreign Policy Studies	Dr. Dan Middlemiss, Director of the Centre, specializes in Civil-Military Relations, Interoperability and Canadian Defence Policy James King, a Research Fellow at the Centre, specializes in Interdepartmental Cooperation		Dr. Dan Middlemiss Director	Dr. Middlemiss Telephone: 902-494-6637 Email: dan.middlemiss@dal.ca James King Telephone: 902-494-3769 Email: jking@cfcon.com	

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
École Polytechnique de Montréal (polymtl.ca)					
Research Group in Decision Analysis	Affiliated with the Department of Mathematical and Industrial Engineering, this research group functions in collaboration with École Polytechnique, HEC Montreal, Université du Québec à Montréal and Université McGill. The Group's main objective is to develop and to apply scientific methods and techniques (operations research, systems analysis, statistics, computer science and applied mathematics) for the resolution of complex problems related to decision making in organizations. The Group has been active in the fields of energy/environment, production management, industriel logistics, manufacturing systems and transportation. The Group also studies optimization problems in science: automatic classification, mathematical chemistry, economy.		Dr. Roland P. Malhamé, Director	Dr. Roland Malhamé Telephone: (514) 340-4711 ext. 4884 Fax: (514) 340-4078 Office: A-429.10.1 Email: roland.malhame@polymtl.ca Address: HEC Montreal 3000, chemin de la Côte Ste-Catherine Montréal, H3T 2A7	http://www.gerad.ca
Centre Risque and Performance	Affiliated with the Department of Mathematical and Industrial Engineering, the Centre Risque & Performance (CRP) is dedicated to the study of interdependencies between lifeline networks represented, among others, by the electrical, natural gas, waterworks system, telecommunications, transportation, civil security and governmental networks. Risk management will also be applied to technological project management and to the development of organizational contingency plans.		Dr. Robert Benoît, Director	Telephone: (514) 340-4711 ext. 4226 Fax: (514) 340-2989 Office: A-305.31 Email: benoit.robert@polymtl.ca	www.polymtl.ca/crp
McGill University (mcgill.ca)					
Centre for Strategy Studies in Organizations	The Centre supports research on strategy and organization. Its goal is to promote the execution and dissemination of the best possible research on issues central to organizations, especially the formation of strategic direction, the coordination of organizational activities, and the relationship between organizations and society. CSSO members employ diverse approaches to strategy and strategic change, including longitudinal/qualitative as well as advanced quantitative methods.		Dr. J. Jorgensen, Director	Dr. J. Jorgensen 1001 Sherbrooke Street West, Room 544 Montreal, Quebec H3A 1G5 Tel.: 514-398-4027 Fax: 514-398-3876 Email: jorgense@management.mcgill.ca	http://www.csso.mcgill.ca/
NSERC Industrial Research Chair on Extreme Weather Events at McGill University - Affiliated with the Institute for Catastrophic Loss Reduction	To study the nature of extreme weather events, in order to better forecast their occurrence. Longer lead times would reduce the material loss and human suffering associated with such events. The frequency and intensity of extreme weather events as a result of global climate change will also be examined.		Dr. Ron Stewart	Dr. Ron Stewart Department of Atmospheric and Oceanic Sciences Tel.: 514-398-1380	http://www.mcgill.ca/meteo/staff/stewart/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
McMaster University (mcmaster.ca)					
Experimental Economics Laboratory	This laboratory is dedicated to computer-mediated interactive experiments in economics and related disciplines. The lab is available to researchers outside of McMaster University who wish to study market institutions and collective decision-making and use laboratory methods in their research. Dr. Mestelman, Co-director, is a professor of Economics whose research interests include Quantitative Studies in Economics and Population, Public Sector Economics (Provision of Public Goods, Social Choice), Applied Microeconomics (regulation, environmental economics, industrial organization), and Experimental Economics. Dr. Andrew Muller, Co-director, is a professor of Economics, Natural Resource and Environmental Economics, and Industrial Organization. Research interests lie in using laboratory experiments in economics to investigate aspects of environmental regulation and voluntary contributions to public goods. He also is interested in the economic valuation of environmental services using conjoint analysis of stated preferences, a form of contingent valuation.		Dr. Stuart Mestelman, Co-director Dr. Andrew Muller, Co-director	Department of Economics McMaster University Hamilton Ontario CANADA L8S 4M4 Dr. Mestelman Office: KTH 403 Office Phone: (905) 525-9140 ext. 23113 Fax: (905) 521-8232 Email: mestelma@mcmaster.ca http://socserv2.socsci.mcmaster.ca/~econ/faculty/mestelma/index.html Dr. Andrew Muller Kenneth Taylor Hall, Room 437 E-mail: mullera@mcmaster.ca Voice: (905) 525-9140, ext. 23831 Fax: (905) 521-8232 http://socserv2.socsci.mcmaster.ca/~econ/faculty/mullera/index.html	http://socserv2.socsci.mcmaster.ca/~econ/mceel/index.html
Department of Economics	As the Canada Research Chair in Public Econoimics, Dr. Abigail Payne is interested in the analysis of the effects of government funding and government policy on individuals and organizations. In particular, she focuses on issues pertaining to the effects of government policy and/or funding on donations and fundraising efforts of nonprofit organizations, and the political economy of research funding at universities and the effects of research funding on research activity. Her work also examines policy interventions in public economics, particularly in education, university research funding and social welfare policy as it relates to non-profit organizations.		Dr. Abigail Payne, Canada Research Chair (Tier II) in Public Economics (Social Sciences and Humanities)	Dr. Abigail Payne Kenneth Taylor Hall, Rm 415 McMaster University 1280 Main Street West Hamilton, Ontario Canada L8S 4M4 905-525-9140 ext. 23814 905-521-8232 (fax) paynea@mcmaster.ca	http://socserv.socsci.mcmaster.ca/payne/
Political Science Department	Dr. William Coleman, is the Canada Research Chair in Global Governance and Public Policy and Director of the Institute on Globalization and the Human Condition. Using a multi-disciplinary approach, Dr. Coleman considers globalization and its perceived effects on policy making in four interrelated areas: autonomy, democracy, changing policy processes, and North American integration.		Dr. William Coleman, Canada Research Chair (Tier I) in Global Governance and Public Policy (Social Sciences and Humanities)	Dr. Coleman 905-529-7070 Ext. 23886 colemanw@mcmaster.ca	http://globalization.mcmaster.ca/
Royal Military College of Canada (rmc.ca)					
Environmental Sciences Group	Risk management, the development of remedial technologies and applied research, environmental assessment, remediation projects at contaminated sites, and research in bioremediation in harsh climates, contaminant uptake in the food chain, impacts from mining, and phytoremediation of metal-contaminated soil.		Dr. Kenneth J. Reimer	Dr. Kenneth J. Reimer Tel: (613) 541-6000, ext. 6161 Email: reimer-k@rmc.ca	www.rmc.ca/academic/gradrech/esg/index_e.html

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Ryerson Polytechnic University (ryerson.ca)					
Centre for Studies in Food Security	The Centre for Studies in Food Security (CSFS) has been working to promote food security through research, dissemination, education, community action and professional practice. The Centre takes an interdisciplinary and systemic approach to the social justice, environmental sustainability, health and socio-cultural aspects of food security. The Centre shares information and facilitates dialogue among civil society organizations, universities and governments and is engaged with food security initiatives at local, regional and global levels.	The Centre works with the following five components of Food Security: Availability - sufficient food for all people at all times Accessibility - physical and economic access to food for all at all times Adequacy - access to food that is nutritious and safe, and produced in environmentally sustainable ways Acceptability - access to culturally acceptable food, which is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights Agency - the policies and processes that enable the achievement of food security	Dr. Cecilia Rocha, Director	Dr. Cecilia Rocha 416-979-5000 x6009 crocha@ryerson.ca	http://www.ryerson.ca/foodsecurity/
Network-Centric Applied Research Team (N-CART)	N-CART is a multidisciplinary research organization based in the department of computer science at Ryerson University. Their focus is on the extension of personal space and a sense of presence into, and across, different media. Research interests include: • Autonomy and Autonomous Agents • Teleoperation and Telepresence • Computer Mediated Interaction • Internet Appliances and Soft Computing • Intelligent Image and Video Processing • Urban Search and Rescue (Canine and Rescue Robots) This organization actively seeks collaboration with educational, corporate and industrial organizations. N-CART works with systems that are inherently unreliable, involve insufficient computing and network resources, are difficult to control and are designed for the real world.	▪CAT at HUSAR Exercise A DEMO of the cooperative effort between N-CART and the Provincial Emergency Response Team (PERT) of the Ontario Provincial Police during a recent Heavy Urban Search And Rescue (HUSAR) exercise. ▪Canine Augmentation Technology (CAT) for USAR The intent of the CAT project has been to provide useful technological component augmentation to canine teams in support of USAR where direct interaction is precluded. ▪Robots At Disaster City USAR Robots in Action (Disaster City, Texas, April 06):The purpose of the response robot evaluation exercises (RREE) was to introduce emerging robotic capabilities to emergency responders while providing valuable feedback to robot developers	Dr. Alex Ferworn, Director	Dr. Alex Ferworn Network-Centric Applied Research Team (N-CART) Department of Computer Science, Ryerson University 350 Victoria St. Toronto, Ontario, Canada M5B 2K3 (416) 979-5000 x 6968 aferworn@scs.ryerson.ca	www.ncart.scs.ryerson.ca
Simon Fraser University (sfu.ca)					
The Centre for Policy Research on Science and Technology and the associated Telematics Research Laboratory	CPROST engages in research on the relationship between public policy and technology. It brings together practitioners and scholars to study the interaction of advances in science and technology, their implementation in the marketplace, and their impacts on community and individual interests.	▪Disaster Mitigation and Emergency Preparedness (Dr. Peter Anderson) - The convergence of computers and communications, and the accelerating growth of global information networking is beginning to have profound impact on the organization of disaster mitigation, planning and response at all levels of society. During the past decade, Peter Anderson through CPROST and its associated Telematics Research Laboratory (TRL) have been participating in these developments through applied disaster communication research in Canada and abroad in collaboration with civil emergency organizations at all levels of government and with the United Nations and international disaster relief organizations. Note: The Telematics Research Laboratory (TRL) is currently engaged in a number of projects utilizing wireless telecommunications aimed at developing robust systems that are scalable, connectable to and interoperable with terrestrial and space-based systems to enable rapid deployment during and after disasters.	Dr. Adam Holbrook, Associate Director	Dr. Richard Smith (Director) smith@sfu.ca www.cmns.sfu.ca/people/faculty/smith_r.html Dr. Adam Holbrook 778-782-5192 jholbroo@sfu.ca www.sfu.ca/cprost/docs/adamholbrook-cv.pdf Peter S. Anderson, M.A. peter_anderson@sfu.ca www.cmns.sfu.ca/people/faculty/anderson_p	http://www.sfu.ca/cprost/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
The Centre for Natural Hazard Research (CNHR)	The mandate of the CNHR is to conduct innovative research on geophysical processes that are a threat to the population and economic infrastructure of Canada. A key element of the Centre is the inclusion of public policy research on how to effectively transfer the results of scientific research to the people who need and can use it. By integrating physical science with social policy research, CNHR aims to lead the way in making Canada more resilient to natural disasters. Research projects are jointly sponsored by Simon Fraser University and agencies responsible for public safety, such as the BC Emergency Preparedness Program (PEP) and Public Safety and Emergency Preparedness Canada (OCIPEP).	**Earthquake and tsunamis:** Research aimed at determining the frequency, magnitude, and effects of earthquakes in the recent geologic past. Specific research topics include geological investigations of prehistoric earthquakes and tsunamis, geophysical modelling of surface deformation related to strain accumulation in the crust, assessment of the liquefaction potential of sediments in earthquake-prone areas, the response of rock slopes to seismic shaking, three-dimensional imaging of the near-surface and deeper crust to identify faults capable of strong earthquakes, and onshore mapping and interpretation of geological features indicative of recent crustal deformation. This information is expected to be relevant to emergency planners and officials in the BC Provincial Emergency Program, as it will allow them to model realistic scenarios in order to prepare for damage caused by earthquakes.	Dr. John Clague, Director Dr. Tucker Program Manager Reducing Risk from Natural Hazards (RRNH) Program - is tasked to develop and deliver a suite of products that will help reduce the impact of natural hazards on the Canadian population, economy and infrastructure by targeting investments towards the best opportunities for risk reduction and on enhancing our understanding of these hazards.	Dr. John Clague tel. +1 778 782 4924 fax. +1 778 782 4198 Email: jclague@sfu.ca Dr. Chris Tucker, Program Manager Reducing Risk from Natural Hazards (RRNH) Program - Emergency preparedness, Natural Resources Canada 601 Booth Street, 4th Floor, Room. 479 Ottawa, ON Canada K1A 0E8 Telephone: (613) 943-4245 Fax : (613) 992-0190 E-mail: cmtucker@nrcan-rncan.gc.ca http://ess.nrcan.gc.ca/index_e.php	http://www.sfu.ca/cnhr/mandate.htm
		Landslides: Research on causes, mechanisms, distribution, and age of landslides in western Canada to provide a better understanding of landslide hazard and risk. Collaborative research with University of Alberta, University of British Columbia, BC Forest Service, and the Geological Survey of Canada to create a broad-based, cooperative landslide program that includes field-based studies of landslides, mapping, laboratory investigations of soil properties, computer modelling of rock slope stability and movement, and studies of the impacts of groundwater on the stability of potentially unstable slopes. Researchers are involved in: (1) characterization of landslides in forested terrain in BC; (2) risk assessment in forestry-related landslides; (3) integrated numerical modelling and field instrumentation of major rockslides; (4) coupled groundwater-mechanical modelling of landslide failure mechanisms; (5) application of rock and soil engineering principles in landslide hazard assessment; (6) application of GIS in landslide investigations; (7) application of remote sensing techniques in landslide research; and (8) damage mechanisms, with particular emphasis on rock slope failures.			
		Snow avalanches: Avalanche researchers conduct theoretical studies of mechanisms of avalanche formation and movement. They also investigate antecedent weather conditions that favour avalanches. These data can be used to produce maps of high-use recreation areas in BC depicting avalanche hazards and risk. Such maps will be made available to the public and to groups responsible for public safety through a partnership with the Canadian Avalanche Association.			
		Volcanism: CNHR and the Geological Survey of Canada will collaborate on research on hazards posed by young volcanoes in western Canada, including Mount Baker, Mount Garibaldi, Mount Cayley, and Mount Meager. The hazards include ash fallout, pyroclastic flows, landslides, lahars (volcanic debris flows), outburst floods from lakes impounded by landslides on the flanks of volcanoes, and downstream aggradation of floodplains. The focus of this research will be documenting downstream effects of eruptions and landslides on volcanoes using stratigraphic and geophysical methods.			
		Floods: Examination of different types of floods to better understand their causes and to evaluate risk to existing economic infrastructure on floodplains. Flood types that will be studied include rainfall- and snowmelt-triggered floods, ice-jam floods, and outbursts from moraine-, glacier-, and landslide-dammed lakes. Research will focus on antecedent conditions associated with different types of floods, relations between flooding and high sediment supply to rivers, floodplain hazard mapping, and quantification of flood risk. Flood research will involve collaborations with hydrologists at the University of British Columbia, the National Hydrology Research Centre in Saskatoon, and the BC Government.			

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
		Climate change: The possibility of rapid climate change caused by human modification of the Earth's atmosphere is increasingly being recognized as a hazard. CNHR research in this area focuses on impacts of climate warming on physical processes and the landscape. Particular attention is given to destabilization of mountain slopes due to massive snow and ice loss, melt of permafrost, changes in the frequency of outburst floods from glacier- and moraine-dammed lakes, impacts of sea-level rise on shorelines, changes in vegetation, and changes in river hydrology and planform. The research will involve mapping, geomorphic, stratigraphic, sedimentological, and paleoecological studies, and comparison of aerial photographs spanning the last 70 years.			
		Land-use planning: Improved understanding of natural hazards aids land-use planners in making the best possible use of their resources for protective structures such as dykes, thus reducing the economic and social costs of natural disasters.			
		Critical infrastructure and hazardous waste: Many hazardous natural processes can damage critical infrastructure, including hazardous material storage facilities. Spillage of pesticides and petrochemicals could imperil Canada's food and water supplies, with significant health and economic impacts. Preventative measures and established clean-up plans, made possible with information and strategies provided by CNHR, will help mitigate these impacts.			
		Knowledge dissemination and emergency planning: Major natural disasters can have national, even global, effects. CNHR will archive natural hazard information and make it available in a useful form to governments to reduce the impact of future disasters. Research conducted by CNHR into the impact of natural disasters on people will lead to the creation of effective educational materials and emergency plans.			
		Public policy and communications: Because disaster risk reduction is a human-centred issue, it also has political, sociological, economic, and psychological dimensions. Two of the principal objectives of CNHR are to increase public awareness of natural hazards, and to influence public policy so as to reduce economic losses and injuries from natural disasters. Key to CNHR's program of reducing disaster losses is research leading to hazard identification and vulnerability analysis that is integrated into community planning and decision-making. Research on public policy helps shape land-use practices and resource management. Policy research is conducted on societal vulnerability and resilience to natural disasters, societal preparedness for natural disasters, risk perception, disaster management systems, disaster planning and training, disaster forecasting, reconciliation of natural hazard research with human well-being, psychological and social impacts of natural disasters, community response to natural disasters, sustainable development in areas of potential natural disasters, and integration of scientific information into the political decision-making process.			
CMA Centre for Strategic Change and Performance Measurement	The Centre promotes research and knowledge on how organisations plan and execute strategic change and how best to measure the performance of organizations undergoing such change. The Centre pursues and sponsors multi-disciplinary research in three broad, yet highly interrelated themes: • strategic change and the execution of strategic change; • appropriate measurements for the evaluation of the performance of such changes; • and the evolution of organizations undergoing rapid change, including leadership and change management		Dr. Thomas Lawrence, Director	Dr. Thomas Lawrence CMA Centre for Strategic Change and Performance Measurement Segal Graduate School of Business Simon Fraser University Third Floor, 500 Granville Street Vancouver, BC, Canada V6C 1W6 Tel. 778-782-3708 Email: cma-centre@sfu.ca Fax. 778-782-4920	www.sfu.ca/~tblawren

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Institute of Governance Studies	IGS pursues multidisciplinary research into problems on contemporary governance with a special focus on British Columbia. Specific objectives include: ▪focus on issues and problems of governance - in Canada, at the municipal, regional/metropolitan, provincial and federal levels, in comparative domestic and Aboriginal systems and in the emerging global order. ▪provide a facility in which data for the study of contemporary governance and related public policy can be collected, catalogued and made readily accessible through data management and exchange. Note: Some work has also been done in the area of Terrorism/anti-terrorism and rights research		Dr. Patrick J. Smith - Director	Dr. Patrick J. Smith Institute of Governance Studies Academic Quadrangle 6051 Simon Fraser University, Burnaby, British Columbia, Canada, V5A 1S6 Tel: (604) 291-4994 Fax: (604) 291-4786 Email: psmith@sfu.ca General E-mail: igs@sfu.ca	www.sfu.ca/igs
University of Manitoba (umanitoba.ca)					
Disaster Research Institute	The mission of the Disaster Research Institute is to build a knowledge resource on disaster management which responds to the demands created by disasters. The DRI conducts interdisciplinary research in disaster- • monitoring • prediction • prevention • mitigation • relief • recovery • management	▪Vulnerability and preparedness among indigenous people ▪Risk perception and communication ▪Disasters and bio-diversity: complements and constraints ▪Disaster management systems ▪Disaster planning and training assessment ▪Impacts of social crises and conflict ▪Globalization, planning and mitigation ▪Prediction and planning: a role for GIS ▪Short and long-term psychosocial impacts ▪Community Response to flooding in Manitoba's Red River Valley Research has focused on Human Caused Disasters as well as Natural Disasters: Human Caused Disasters • Afghanistan • Mozambique • Iraq • Rwanda • Sudan • Somalia Natural Disasters • Bangladesh • Canada • Brazil • St. Vincent	Dr. Robert Tait, Professor of Psychology and Director of Disaster Research Institute	Dr. Robert Tait rwtait@ms.umanitoba.ca DRI General Tel: 204-474-8391	http://www.umanitoba.ca/institutes/disaster_research/index.html
University of Ottawa (uottawa.ca)					
Centre on Governance	The Centre focuses on the study of governance with regard to human interaction and its coordination, in and between organizations and communities. Affiliated with the Faculty of Social Sciences, the School of Political Science and the School of Management, the four main research axes at the current time include: ▪Governance and Democracy ▪Ethics and Governance ▪Global and North American Governance ▪Knowledge, Complexity and Governance		Dr. Caroline Andrew, Director	Dr. Caroline Andrew Phone: 613-562-5800 ext. 1702 E-mail: candrew@uOttawa.ca	http://www.socialsciences.uottawa.ca/governance/eng/

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Public Administration	Critical analysis of Canadian Public Sector political and administrative reforms, management frameworks and their implementation, innovation, and structure of legislation.		Dr. Christian Rouillard, Canada Research Chair on Governance and Public Management (Tier II) - Social Sciences and Humanities	Dr. Christian Rouillard Office: 613-562-5800 (2659) Fax: 613-562-5350 E-mail: christian.rouillard@uottawa.ca	http://www.socialsciences.uottawa.ca/pol/eng/profDetails.asp?id=126
GAP-Santé, Institute of Population Health	Relevant research streams of the "Group for the Analysis of Psychosocial Health" (GAP-Santé) include: ▪Social Environment and Stress ▪Investigation of Organisational Stress and Health ▪Risk Representation ▪Community Well-being	▪Social Analysis of Risk: Security, Environment and Population Health ▪Psychosocial Risk Manager (PRiMer): Computer-based Pre-Event Training ▪Psychosocial Risk Assessment and Management (RAM) Tools to Enhance Response to CBRN Attacks and Threats in Canada ▪Public Perceptions and Acceptable Levels of Health Risk Among Canadians ▪Caring About Healthcare Workers as First Responders: Enhancing Capacity for Gender-Based Support Mechanisms in Emergency Preparedness Planning ▪Risk and Stress: Anticipation and Perception in Psychosocial Management of Terrorist Threats ▪R. Samuel McLaughlin Research Chair on Psychosocial Aspects of Risk and Health	Dr. Louise Lemyre, Director and McLaughlin Research Chair on Psychosocial Aspects of Risk and Health	Dr. Louise Lemyre Phone: 613-562-5800 ext.2321 E-mail: louise.lemyre@uottawa.ca http://www.socialsciences.uottawa.ca/psy/eng/profDetails.asp?id=218	http://www.gapsante.uottawa.ca/English/index.php
University of Toronto (utoronto.ca)					
University of Waterloo (uwaterloo.ca)					
Institute for Risk Research (IRR) and the Network for Environmental Risk Assessment and Management (NERAM)	NERAM integrates multi-disciplinary scientific knowledge and expertise across Canada to provide a comprehensive approach to environmental risk assessment and risk management that supports more effective and efficient environmental protection practices and decision-making. NERAM considers such issues as: deregulation; public sector downsizing; devolution of responsibility for environmental risk assessment and management from federal to lower levels of government and industry; the need for consistency/agreement on Risk Assessment methodologies; and, the need for more consistent and credible message in communicating about environmental risk The principal objectives are: • to develop risk-based methodologies, standards and tools based on scientific models of environmental risk assessment focusing on methodologies that are practical and evidence-based. • to establish an integrated scientific framework for theoretical and practical principles of integrated environmental risk assessment and management, based on actual risk management decisions. • to disseminate methods, research results and experiences with environmental risk assessment.		Dr. John Shortreed, Executive Director	Dr. Shortreed IRR and NERAM University of Waterloo Waterloo, Ontario N2L 3G1 Tel : (519) 888-4567, ext. 35527 Fax : (519) 725-4834 Email: shortree@uwaterloo.ca	irr-neram@uwaterloo.ca

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
IRR and NERAM (Research Nodes)					
Western Node			Dr. Cindy Jardine, Director Dr. Steve Hrudey, Associate Director	Dr. Cindy Jardine Dept. of Human Ecology 302 Human Ecology Bldg. University of Alberta Edmonton, AB T6G 2N1 Tel.: (780) 492-2626 Fax: (780) 492-4821 Email: cindy.jardine@ualberta.ca Webpage: www.re.ualberta.ca/People/Index Dr. Steve Hrudey Faculty of Medicine Professor of Environmental Health Public Health Sciences Faculty of Medicine and Dentistry University of Alberta, Edmonton, AB Tel.: (780) 492-6807 Fax: (780) 492-0364 Email: steve.hrudey@ualberta.ca Webpage: www.publichealth.ualberta.ca/steve_hrudey.cfm	
Middle Node			Dr. George Dixon, Director	Dr. George Dixon Department of Biology University of Waterloo Waterloo, ON N2L 3G1 Tel.: (519) 888-4567, ext. 32531 Fax: (519) 746-0614 Email: dgdixon@sciborg.uwaterloo.ca Webpage: www.biology.uwaterloo.ca/people/gdixon	
Ottawa Node			Dr. Dan Krewski, Director	Dr. Dan Krewski McLaughlin Centre for Population Health Risk Assessment Inst. of Population Health University of Ottawa 451 Smyth Road Ottawa, ON K1H 8M5 Tel: (613) 562-5800, ext. 8261 Fax: (613) 562-5465 Email: dkrewski@uottawa.ca Webpage: lrsp.carleton.ca:16080/directors/krewski	
Risk Communication Node			Dr. William Leiss, Director	Dr. William Leiss NSERC/SSHRC Research Chair University of Calgary 2500 University Drive NW Calgary, AB T2N 1N4 Tel: (403) 220-8579 Fax: (403) 282-0095 Email: wleiss@uottawa.ca	www.leiss.ca

Academic Research Institute	Research Objectives	Current Research Projects	Primary Point (s) of Contact	Contact Info	Website
Institute for Quantitative Finance and Insurance (IQFI)	IQFI Mission: to promote excellence in the science and practice of risk management through teaching, research and outreach activities. Specialize in financial risk management, actuarial science, computer science, econometrics, finance and statistics.		Dr. Peter Forsyth, Scientific Director	Dr. Peter Forsyth Math & Computer Building 6026A University of Waterloo 200 University Avenue West Waterloo, Ontario, Canada N2L 3G1 519 888 4567 ext. 7160 paforsyt@uwaterloo.ca Dr. Ken Seng Tan Associate Scientific Director kstan@math.uwaterloo.ca	http://www.iqfi.uwaterloo.ca/
University of Western Ontario (uwo.ca)					
Institute for Catastrophic Loss Reduction and National Disaster Health Research Network Note: The Institute has established working partnerships with a select group of national and international organizations that share their vision, e.g.: Canadian Red Cross Society; Canadian Climate Impacts and Adaptation Research Network; Centre for Disaster Education and Research; Climate Change and Health Office; Disaster Prevention Research Institute, Kyoto; Emergency Management Ontario; Federation of Canadian Municipalities; Geological Survey of Canada; Health Canada; Institute for Business and Home Safety; Insurance Bureau of Canada; Meteorological Service of Canada; National Research Council Canada; Natural Hazard Centre, Colorado; Office of Critical Infrastructure Protection and Emergency Preparedness; Ontario Research and Development Challenge Fund; Research Alliance for Disaster Resilient Cities.	The Institute for Catastrophic Loss Reduction (ICLR) is a research Institute committed to the development of disaster prevention knowledge, and the broad dissemination of these research findings. Established by Canada's property and casualty insurers to reduce disaster losses, the Institute is internationally recognized for leadership in multi-disciplinary disaster prevention research. The objective is to conduct quality disaster research, including a program focusing on the social and health impacts of disasters, for better public policy and disaster management. ICLR has established four research priorities to improve knowledge about how to prevent natural hazards from becoming disasters and ways to reduce the social and economic impact of these events. Research priorities include: ▪Reducing wind and earthquake damage to housing, other buildings and infrastructure. ▪Understanding disaster risk management and prevention. ▪Enhancing government science related to natural disasters. ▪Improving community actions for disaster mitigation.	▪ A decision support tool for disaster risk management - Principal Investigators: Dr. Slobodan Simonovic, Dr. William Leiss, Dr. Donald Burn, Dr. Hanping Hong Today disaster risk reductions are attempted on the basis of a number of different conceptual approaches to 'risk'. The fallibility/unreliability of human judgment of natural disaster risk has been demonstrated in the past. Decision-makers are well aware of their own practice of attaching more weight to the perception of risk than to real risk impacts. In spite of the awareness of these weaknesses a very basic confusion continues to permeate both engineering and societal disaster risk decisions. Disaster risk management is considered in the proposed research as a decision problem. The proposed work is aimed at the development of a decision support tool for (a) qualitative framing of the disaster risk problem/s; (b) quantitative disaster risk assessment; and (c) integrated disaster risk and risk issue/s management. ▪ Role of Government in services for natural disaster reduction - Principal Investigators: Dr. Gordon McBean, Dr. J. Davies, Dr. A. Slivinski, Dr. P. Kopas This research project will investigate the past and present roles of government scientific agencies in activities that provide information and services contributing to the reduction in impacts of natural hazards in Canada. These activities include weather forecasting, earthquake and water monitoring and surveys and the science that supports their better understanding. The analysis will examine, from both the economic and policy points-of-view, the rationale for a government role and how it has changed. The study will also include a comparison of the Canadian situation with the roles in other countries (US, UK, Australia). In recent years, while the government sector has been reduced, there has been growth in the academic and private sectors and the study will consider the relative merits of the roles of these sectors. The information and analysis generated by this project will provide input into decision making by governments on appropriate roles and funding for agencies in the future, consistent with their roles in disaster reduction.	Dr. Paul Kovacs (Executive Director) Alan Davenport (Research Director)	Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@iclr.org London office 1491 Richmond Street London, Canada N6G 2M1 Tel: (519) 661-3234 Fax: (519) 661-4273	http://www.iclr.org/index.htm
York University (yorku.ca)					
Disaster and Emergency Management Program (Master's Level Program)	The Program focuses on five conceptual areas: • Public Safety and Security • Environmental Issues and Disaster Management • Business Continuity Management • Technology and Disaster Management • Risk and Social Vulnerability		Dr. David Etkin Director, EM Graduate Program	Dr. David Etkin Office: 258C Atk Phone: (416) 736-2100 ext. 44016 Email: etkin@yorku.ca Website: http://www.yorku.ca/web/futurestudents/graduate/programs/Disaster_and_Emergency_Management/	http://www.yorku.ca/akevents/academic/SAS/faculty/SASfacultyProfile.asp?id=559

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Acadia University (acadiau.ca)																	
Department of Mathematics and Statistics - Dr. Hugh Chipman Canada Research Chair (Tier II) in Mathematical Modelling (Natural Sciences and Engineering)														✓	Expertise: Development of mathematical models of large and complex datasets that can be used to better understand scientific phenomena including data applicable to security	Dr. Hugh Chipman 902-585-1525 hugh.chipman@acadiau.ca	http://ace.acadiau.ca/math/chipmanh/homepage.htm
Athabaska University (athabasku.ca)																	
Atlantic Baptist University (abu.nb.ca)																	
Bishop's University (ubishops.ca)																	
Brandon University (brandonu.ca)																	
Brock University (brocku.ca)																	
Cape Breton University (capebretonu.ca)																	
Carleton University (carleton.ca)																	
Canadian Centre of Intelligence and Security Studies (CCISS) - Dr. Jez Littlewood, Director						✓									Expertise: WMD proliferation and counter-proliferation, terrorism and counter-terrorism, international security, and intelligence issues.	Dr. Jez Littlewood Telephone: 613-520-2600 ext 6659 Email: Jeremy_Littlewood@carleton.ca http://www.carleton.ca/npsia/npsia_faculty/littlewood.htm	http://www.carleton.ca/cciss/
Ethics & Policy Issues Centre - Dr. Marc Saner										✓		✓			Expertise: values, ethics, and policy	Dr. Marc Saner Tel: (613) 520-3942 Email: saner@magma.ca	www.carleton.ca/cove/cv/Saner
Canada Research Chair in Analysis and Management of Risk - Dr. A Sarkar														✓	Expertise: Quantitative uncertainty analysis and risk assessment of natural and engineering systems against unforeseen hazards.	Dr. A Sarkar Department: (613) 520-5784 Office: (613) 520-2600 ext. 6320 Home: (613) 521-6832 Cell: (613) 262-0213 E-mail: absarkar@connect.carleton.ca Web site: www.abhijit.sarkar.name/	http://www.carleton.ca/cu/research/chairs/canada_chairs/sarkar.html
Department of Economics - Dr. Stanley L. Winer, Canada Research Chair											✓					Dr. Stanley L. Winer Telephone: 613 520 2600 x 2630 E-mail: stan_winer@carleton.ca	http://www.carleton.ca/~winers/
Concordia University (concordia.ca)																	
Dalhousie University (dal.ca)																	
Chemical Engineering - Dr. Paul Amyotte			✓												Expertise: Dust explosion prevention and mitigation, hybrid mixture explosions, process safety management, inherent safety, human factors, quantitative risk assessment.	Dr. Paul Amyotte Tel: (902) 494-3976 Email: paul.amyotte@dal.ca	chemicalengineering.dal.ca/Amyotte.php
Centre for Foreign Policy Studies - James King, Research Fellow										✓					Expertise: Interdepartmental Cooperation	James King Telephone: 902-494-3769 Email: jking@cfcon.com	
RBC Centre for Risk Management - Dr. Ronald Pelot, Director							✓				✓			✓	Expertise: Industrial Engineering, Engineering Economics, Operations Research applied to risk and resource analysis,developed a multi-period cost/risk capital budgeting model for contaminated site remediation, Decision Analysis, and Simulation	Dr. Ronald Pelot (902) 494-6113 Ronald.Pelot@dal.ca	http://myweb.dal.ca/rpelot/index.php
Public Administration - Dr. Kevin Quigley									✓	✓					Expertise: Public sector risk and crisis management, strategic management and critical infrastructure protection	Dr. Kevin Quigley 902-494-3782 Kevin.Quigley@dal.ca	http://management.dal.ca/People%20and%20Groups/Faculty/Profile.php?id=71
RBC Centre for Risk Management - Yonggan Zhao Canada Research Chair (Tier II) in Risk Management											✓			✓	Expertise: dynamic risk management, practical investment modeling, developing innovative simulation and optimization algorithms involving model design and model calibration to identify appropriate dynamics of asset returns under uncertainty	Yonggan Zhao 902 494 6972 (Phone) 902 494 1503 (Fax) Yonggan.Zhao@dal.ca	http://profiles.management.dal.ca/profiles/Profile.php?server=http://management.dal.ca/People%20and%20Groups/Faculty/&id=77
École Polytechnique de Montréal (polymtl.ca)																	
Research Group in Decision Analysis - Dr. Roland P. Malhamé, Director														✓	Expertise: Electrical Engineering	Dr. Roland P. Malhamé, Director Telephone: (514) 340-4711 ext. 4884 Fax: (514) 340-4078 Office: A-429.10.1 Email: roland.malhame@polymtl.ca	http://www.gerad.ca

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Research Group in Decision Analysis - Dr. Charles Audet														✓	Expertise: Mathematical Industrial Engineering, algorithmic development, convergence analysis and applications	Dr. Charles Audet Telephone: (514) 340-4711 ext. 4510 Fax: (514) 514-340-4086 Office: A-520.37 Email: charles.audet@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Pierre Baptiste								✓						✓	Expertise: Mathematical Industrial Engineering, transportation, and decision analysis Also a member of the Centre for Research on Transportation (C.R.T.), associated with the NSERC Industrial Research Chair in Logistics Management which contributes to the development of knowledge and expertise on the engineering and management of enterprise networks, ranging from the design of the different networks imbedded within the socio-technical systems under study, to the engineering of advanced planning and operating processes, taking into account the managerial, economical, environmental and safety issues pertaining to these systems.	Dr. Pierre Baptiste Telephone: (514) 340-4711 ext. 4919 Fax: (514) 340-4173 Office: A-305.20.1 Email: pierre.baptiste@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. El-Kebir Boukas														✓	Expertise: Mechanical Engineering, decision analysis	Dr. El-Kebir Boukas Telephone: (514) 340-4711 ext. 4007 Fax: (514) 340-5867 Office: B-450.17 Email: el-kebir.boukas@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Guy Desaulniers														✓	Expertise: Mathematical Industrial Engineering, decision analysis	Dr. Guy Desaulniers Telephone: (514) 340-4711 ext. 6671 Fax: (514) 340-5665 Office: AA-4525 Email: guy.desaulniers@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Michel Gamache														✓	Expertise: Mathematical Industrial Engineering,Operations research, Scheduling, Dispatching	Dr. Michel Gamache Telephone: (514) 340-4711 ext. 5920 Fax: (514) 514-340-4086 Office: A-305.29 Email: michel.gamache@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Alain Hertz														✓	Expertise: Mathematical Industrial Engineering, decision analysis	Dr. Alain Hertz Telephone: (514) 340-4711 ext. 6037 Fax: (514) 340-5665 Office: AA-4487 Email: Alain.Hertz@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Andre Langevin								✓						✓	Expertise: Mathematical Industrial Engineering, Operations research and management science, Logistics Also a member of the Centre for Research on Transportation (C.R.T.), associated with the NSERC Industrial Research Chair in Logistics Management which contributes to the development of knowledge and expertise on the engineering and management of enterprise networks, ranging from the design of the different networks imbedded within the socio-technical systems under study, to the engineering of advanced planning and operating processes, taking into account the managerial, economical, environmental and safety issues pertaining to these systems.	Dr. Andre Langevin Telephone: (514) 340-4711 ext. 4511 Fax: (514) 340-4463 Office: A-520.31 Email: andre.langevin@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Dominique Orban															Expertise: Mathematical Industrial Engineering, decision analysis	Dr. Dominique Orban Telephone: (514) (514) 340-4711 #5967 Fax: (514) 340-4463 Office: A-520.27 Email: dominique.orban@polymtl.ca	http://www.gerad.ca

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Research Group in Decision Analysis - Dr. Michel Perrier														✓	Expertise: Chemical Engineering, decision analysis Also a member of The NSERC Environmental Design Chair - I3P, which considers relationships and issues associated with high-tech and heavy industry - especially natural resource industries such as pulp and paper. Specific focus of this group includes Supply Chain Management in the Pulp and Paper Industry, Process Optimization Techniques combined with process integration tools applied to the Pulp & Paper Industry, Business Modeling, Real-Time Optimization, Pulp and Paper Mill Sludge Biodrying, Data Driven Modeling, Thermal Pinch Analysis under Constraints, Pinch-Based Programs for Energy Optimization and Waste Heat Upgrading, White Water Networks Controllability Analysis, Validated Dynamic Simulation of a Fine Paper Mill, Data Reconciliation.	Dr. Michel Perrier Telephone: (514) 340-4711 ext. 4130 Fax: (514)340-4159 Office: AA-6497 Email: michel.perrier@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Diane Riopel								✓						✓	Expertise: Mathematical Industrial Engineering, Operations research and management science, Logistics, Manufacturing, Operations management Also a member of the Centre for Research on Transportation (C.R.T.), associated with the NSERC Industrial Research Chair in Logistics Management which contributes to the development of knowledge and expertise on the engineering and management of enterprise networks, ranging from the design of the different networks imbedded within the socio-technical systems under study, to the engineering of advanced planning and operating processes, taking into account the managerial, economical, environmental and safety issues pertaining to these systems.	Dr. Diane Riopel Telephone: (514) 340-4711 ext. 4982 Fax: (514) 340-4173 Office: A-306.13 Email: diane.riopel@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Brunilde Sanso								✓						✓	Expertise: Electrical Engineering, Telecommunication and Computer Networks, Traffic Engineering, Performance and QoS, Network reliability and survivability, Design, Routing, Service Differentiation, Call Admission Control, Optimization, Cross-Layering. Also a member of Broadlab - Laboratory of Broadband Networks. The objective of the research carried out at the Broadlab is to develop methods of assessment, measure and performance prediction as well as reliability and design of broadband wireless and wireline networks.	Dr. Brunilde Sanso Telephone: (514) 340-4711 ext. 4949 Fax: (514) 340-4078 Office: M-6107 Email: brunilde.sanso@polymtl.ca Extra info.: Téléphone GERAD (514) 3406053 xt 6949/ FAX 3405665	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Gilles Savard								✓						✓	Expertise: Mathematical and Industrial Engineering, Research & Innovation Also a member of the Centre for Research on Transportation (C.R.T.), associated with the NSERC Industrial Research Chair in Logistics Management which contributes to the development of knowledge and expertise on the engineering and management of enterprise networks, ranging from the design of the different networks imbedded within the socio-technical systems under study, to the engineering of advanced planning and operating processes, taking into account the managerial, economical, environmental and safety issues pertaining to these systems.	Dr. Gilles Savard Telephone: (514) 340-4711 ext. 4990 Fax: (514) 514-340-4086 Office: B-208 Email: gilles.savard@polymtl.ca	http://www.gerad.ca

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Research Group in Decision Analysis - Dr. Francois Soumis								✓						✓	Expertise: Mathematical and Industrial Engineering and decision analysis Also the Canada Research Chair in Large Transportation Network Optimization. Focus: to develop optimization software to manage personnel and vehicles in large transportation systems (aircraft, trains and buses)	Dr. Francois Soumis Telephone: (514) 340-4711 ext. 6044 Fax: (514) 514-340-4086 Office: A-520.15 Email: francois.soumis@polymtl.ca	http://www.gerad.ca
Research Group in Decision Analysis - Dr. Andre Turgeon							✓		✓					✓	Expertise: Mathematical and Industrial Engineering and decision making Also NSERC/Hydro-Quebec Industrial Chair on River Basin Management to promote the development of new stochastic optimization methods for reservoir management. This research field is considered important for Canada and Quebec, and notably for Hydro-Quebec since revenues depend on the way the reservoirs are managed. Managing the reservoirs properly also means minimizing the risk of flooding, respecting the environment, supplying water to the municipalities and industries, etc. The research program includes the five following projects: •Modeling of the reservoir inflows and of the forecasting errors •Secure management of the river basin installations •Multi-criteria optimization of the reservoir operation •Optimal operation of a large number of interconnected reservoirs •Optimal operation of a system that includes hydroelectric installations and wind mills.	Dr. Andre Turgeon Telephone: (514) 340-4711 ext. 6034 Fax: (514) 340-5665 Office: AA-5457 Email: andre.turgeon@polymtl.ca	http://www.gerad.ca
Centre Risque and Performance - Dr. Robert Benoit, Director							✓		✓					✓	Expertise: Mathematical and Industrial Engineering, risk management and interdependencies between infrastructures, flood risks, cascading effects within lifeline networks, environmental risk management and emergency measures	Dr. Robert Benoit Telephone: (514) 340-4711 ext. 4226 Fax: (514) 340-2989 Office: A-305.31 Email: benoit.robert@polymtl.ca	www.polymtl.ca/crp
Centre Risque and Performance - Dr. Mario Bourgault									✓	✓				✓	Expertise: Mathematical and Industrial Engineering Also Canada Research Chair on Technology Management which is focused on describing and understanding emerging practices in the management of technology projects where a collaborative approach is being used and experts are working in a variety of different locations. The research examines governance, technology infrastructure, competencies, and processes for introducing technology into organizations. Research objective: to measure the impact of the above components on the success of projects.	Dr. Mario Bourgault Telephone: (514) 340-4711 ext. 5956 Fax: (514) 340-4173 Office: A-306.8 Email: mario.bourgault@polymtl.ca	www.polymtl.ca/crp

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Centre Risque and Performance - Dr. Nathalie De Marcellis-Warin								✓						✓	Expertise: Mathematical and Industrial Engineering, transportation data and risk assessment involving hazardous materials and road logistics operations, integrated organizational risk Also a member of the Centre for Research on Transportation (C.R.T.), associated with the NSERC Industrial Research Chair in Logistics Management which contributes to the development of knowledge and expertise on the engineering and management of enterprise networks, ranging from the design of the different networks imbedded within the socio-technical systems under study, to the engineering of advanced planning and operating processes, taking into account the managerial, economical, environmental and safety issues pertaining to these systems.	Dr. Nathalie De Marcellis-Warin Telephone: (514) 340-4711 ext. 4127 Fax: (514) 340-4173 Office: A-305.24 Email: nathalie.demarcellis-warin@polymtl.ca	www.polymtl.ca/crp
Centre Risque and Performance - Dr. Claude Marche							✓		✓					✓	Expertise: Civil, Geological and Mining Engineering relating to flooding Also a member in support of the NSERC Industrial Chair in drinking water which examines biological treatment, disinfection by-products, quality in distribution systems (regrowth and corrosion), and treatment processes for small communities. The research provides industry with operational and design criteria for treatment processes in order to meet future water quality requirements. The NSERC Chair is Dr. Michele Prevost. Telephone: (514) 340-4711 #4778 Fax: (514)340-5918 Email: michele.prevost@polymtl.ca Web Site: http://www.polymtl.ca/chaireeau/index.php	Dr. Claude Marche Telephone: (514) 340-4711 ext. 4801 Fax: (514) 340-2989 Office: B-431.4.5 Email: claude.marche@polymtl.ca	www.polymtl.ca/crp
Centre Risque and Performance - Dr. Jean Rousselle							✓		✓					✓	Expertise: Civil, Geological and Mining Engineering relating to flooding	Dr. Jean Rousselle Telephone: (514) 340-4711 ext. 4802 Fax: (514) 340-2989 Office: B-651 Email: jean.rousselle@polymtl.ca	www.polymtl.ca/crp
Lakehead University (lakeheadu.ca)																	
Laurentian University (laurentian.ca)																	
Laval University (ulaval.ca)																	
Memorial University (mun.ca)																	
McGill University (mcgill.ca)																	
Occupational Health Epidemiology, Biostatistics and Occupational Health - Dr. Tom Kosatsky							✓								Expertise: Environmental epidemiology, assessment of exposure to environmental toxins, assessment of dose response relationships, use of health data in risk assessment.	Dr. Tom Kosatsky Tel: (514) 398-8209 Email: tkosatsk@santepub-mtl.qc.ca	
Centre for Strategy Studies in Organizations - Dr. J. Jorgensen, Director										✓	✓				Expertise: Management Policy, Competitive Strategy, Organizational Policy, Public Sector Management, International Business Organizational responses to globalization in selected industries, strategic collaboration, and public sector divestment and restructuring in industrialized and developing countries.	Dr. J. Jorgensen Tel.: 514-398-4027 Fax: 514-398-3876 Email: jorgense@management.mcgill.ca http://people.mcgill.ca/jan.jorgensen/	http://www.csso.mcgill.ca/

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Centre for Strategy Studies in Organizations - Dr. Steve Maguire										✓		✓			Expertise: Organizational Strategy, Managing Organizational Politics, the emergence and institutionalization of new societal concepts and practices, dynamics of interorganizational fields (e.g. business-NGO collaborations, trust-building and identity), formal models of complex systems, Complexity and Management	Dr. Steve Maguire Ph.: 514-398-2115 Fax: 514-398-3876 steve.maguire@mcgill.ca	http://people.mcgill.ca/steve.maguire/
Centre for Strategy Studies in Organizations - Dr. Henry Mintzberg										✓		✓		✓	Expertise: General management and organization (including the process of strategy formation, the design of organizations and the impact of design on organizations)	Dr. Henry Mintzberg Ph.: 514-398-4017 Fax: 514-398-3876 henry.mintzberg@mcgill.ca	http://people.mcgill.ca/henry.mintzberg/
Department of Atmospheric and Oceanic Sciences - Dr. Ron Stewart, NSERC Industrial Research Chair on Extreme Weather Events							✓							✓	Expertise:Extreme weather events and forecasting their occurrence, the frequency and intensity of extreme weather events as a result of global climate change	Dr. Ron Stewart Tel.: 514-398-1380	http://www.mcgill.ca/meteo/staff/stewart/
McMaster University (mcmaster.ca)																	
Political Science Department and the Institute on Globalization and the Human Condition - Dr. William Coleman										✓		✓			Expertise: Canada Research Chair (Tier I) in Global Governance and Public Policy (Social Sciences and Humanities) and Director of the Institute on Globalization and the Human Condition. Researc focuses on globalization and its perceived effects on policy making in four interrelated areas: autonomy, democracy, changing policy processes, and North American integration.	Dr. William Coleman 905-529-7070 Ext. 23886 colemanw@mcmaster.ca	http://globalization.mcmaster.ca/
Institute of Environment and Health - Dr. John Eyles							✓								Expertise: evidence-based decision-making, environment-health connections	Dr. John Eyles Tel: (905) 525-9140, ext. 23152 Email: eyles@mcmail.mcmaster.ca	www.science.mcmaster.ca/geo/faculty/eyles
Experimental Economics Laboratory and Department of Economics - Dr. Mestelman											✓			✓	Expertise: Quantitative Studies in Economics and Population, Public Sector Economics (Provision of Public Goods, Social Choice), Applied Microeconomics (regulation, environmental economics, industrial organization), and Experimental Economics.	Dr. Mestelman Office: KTH 403 Office Phone: (905) 525-9140 ext. 23113 Fax: (905) 521-8232 Email: mestelma@mcmaster.ca	http://socserv2.socsci.mcmaster.ca/~econ/faculty/mestelma/index.html
Chemistry - Dr. Brian McCarry		✓			✓		✓								Expertise: environmental toxicology, polymer membranes, radionuclides in nuclear medicine	Dr. Brian McCarry Tel: (905) 525-9140, ext. 24504 Email: mccarry@mcmaill.cis.mcmaster.ca	www.chemistry.mcmaster.ca/mccarry
Experimental Economics Laboratory and Department of Economics - Dr. Andrew Muller							✓				✓			✓	Expertise: Economics, Natural Resource and Environmental Economics, and Industrial Organization, and laboratory experiments in economics to investigate aspects of environmental regulation and voluntary contributions to public goods. Other research areas include the economic valuation of environmental services using conjoint analysis of stated preferences, a form of contingent valuation.	Dr. Andrew Muller Kenneth Taylor Hall, Room 437 E-mail: mullera@mcmaster.ca Voice: (905) 525-9140, ext. 23831 Fax: (905) 521-8232	http://socserv2.socsci.mcmaster.ca/~econ/faculty/mullera/index.html
Department of Economics Dr. Abigail Payne											✓				Expertise: Canada Research Chair in Public Economics, Tier II, Social Sciences and Humanities. Research focuses on the analysis of the effects of government funding and government policy on individuals and organizations. One area of research includes examination of how government funding of charitable and non-profit organizations affect their operation and their fundraising success in attracting private donations?	Dr. Abigail Payne 905-525-9140, ext. 23814 paynea@mcmaster.ca	http://socserv.socsci.mcmaster.ca/payne/
Mount Allison University (mta.ca)																	
Mount Saint Vincent University (msvu.ca)																	

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Nipissing University (nipissingu.ca)																	
Queen's University (queensu.ca)																	
Psychology - Dr. Gerald J.S. Wilde, Emeritus Professor								✓				✓			Expertise: Theories and data regarding accident causation and prevention (in transportation and occupational settings).	Dr. Gerald J.S. Wilde Tel: (613) 533-2889 Email: wildeg@post.queensu.ca	psyc.queensu.ca/faculty/wilde
Instructional Development - Dr. Christopher Knapper, Professor Emeritus								✓				✓		✓	Expertise: Driving behaviour and traffic safety; attitude and opinion measurement, perception of risk.	Dr. Christopher Knapper Tel: (613) 533-6428, x36428 Email: knapper@queensu.ca	
Royal Military College of Canada (rmc.ca)																	
Environmental Sciences Group - Dr. Kenneth J. Reimer							✓							✓	Expertise:risk management, the development of remedial technologies and applied research, environmental assessment, remediation projects at contaminated sites, and research in bioremediation in harsh climates, contaminant uptake in the food chain, impacts from mining, and phytoremediation of metal-contaminated soil.	Kenneth J. Reimer Tel: (613) 541-6000, ext. 6161 Email: reimer-k@rmc.ca	http://www.rmc.ca/academic/gradrech/esg/index_e.html
Ryerson Polytechnic University (ryerson.ca)																	
School of Occupational and Public Health - Dr. John F. Hicks							✓								Expertise:Environmental health risk assessment; air dispersion, exposure assessment.	Dr. John F. Hicks Tel: (416) 821-0592 Email: jhicks@ryerson.ca	
School of Occupational & Public Health - Dr. Ronald Pushchak							✓							✓	Expertise: Public facility siting and risk assessment; environmental impact assessment and risk impacts.	Dr. Ronald Pushchak Tel: (416) 979-5000 x7049 Email: pushchak@ryerson.ca	www.ryerson.ca/pushchak
School of Occupational and Public Health - Dr. Kathryn Woodcock														✓	Expertise: accident theory and investigation/modelling/data, ergonomics/human factors engineering, hazard perception and safety inspection performance, amusement rides, health/safety and deaf people.	Dr. Kathryn Woodcock Email: kwoodcoc@ryerson.ca	www.ryerson.ca/~woodcock
Saint Mary's University (smu.ca)																	
Faculty of Commerce, Finance & Management Science - Dr. Muhong Wang								✓						✓	Expertise: Statistical modelling of transportation accidents.	Dr. Muhong Wang Tel: (902) 420-5723 Email: wangm@shark.stmarys.ca	www.stmarys.ca
Simon Fraser University (sfu.ca)																	
Biological Sciences - Dr. Tony Williams	✓						✓								Expertise: avian ecophysiologist	Dr. Tony Williams Tel: (604) 291-4982 Email: tdwillia@sfu.ca	www.sfu.ca/biology/faculty/williams.
The Centre for Policy Research on Science and Technology and the associated Telematics Research Laboratory - Peter Anderson, M.A.										✓			✓		Expertise: The role of communication in the social, economic and cultural development of rural and urban areas. Advanced communication networks. Regulation and policy governing telecommunications, broadcasting and information systems. Emergency and disaster communication.	Peter Anderson, M.A. peter_anderson@sfu.ca	www.cmns.sfu.ca/people/faculty/anderson_p
The Centre for Policy Research on Science and Technology - Dr. J. Adam Holbrook, P.Eng , Associate Director										✓					Expertise: Analysis of science, technology and innovation (STI) policy and program activities in both the public sector and the private sector, including policy and program evaluation.	Dr. J. Adam Holbrook jholbroo@sfu.ca	www.sfu.ca/cprost/docs/adamholbrook-cv.pdf

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CMA Centre for Strategic Change and Performance Measurement - Dr. Thomas Lawrence, Director										✓		✓			Expertise: Organizational Change, Continuous Change, Organizational Resistance, Multi-Sector Collaboration, Territoriality in Institutions, Organizational Collective Identity, Distinguishing trust and power in interorganizational relations	Dr. Thomas Lawrence CMA Centre for Strategic Change and Performance Measurement Segal Graduate School of Business Simon Fraser University Third Floor, 500 Granville Street Vancouver, BC, Canada V6C 1W6 Tel. 778-782-3708 Email: cma-centre@sfu.ca Fax. 778-782-4920	www.sfu.ca/~tblawren
The Centre for Policy Research on Science and Technology - Dr. Richard Smith, Director CPROST and Associate Director of the School of Communication												✓	✓		Epertise: Social inclusion (and exclusion) and the role of new media in social change. He has an ongoing interest in technology for education, privacy and surveillance in public spaces, online communities, and the wireless information society	Dr. Richard Smith smith@sfu.ca	www.cmns.sfu.ca/people/faculty/smith_r.html
Institute of Governance Studies - Dr. Patrick J. Smith - Director										✓					Expertise: Public policy and administration, constitutional reform, local government/politics, metropolitan governance, party organizations and electoral reform.	Dr. Patrick J. Smith Tel: (604) 291-4994 Fax: (604) 291-4786 Email: psmith@sfu.ca General E-mail: igs@sfu.ca	www.sfu.ca/igs
The Centre for Natural Hazard Research (CNHR) - Dr. Chris Tucker, Program Manager Reducing Risk from Natural Hazards (RRNH) Program - Emergency preparedness, at NRCan.							✓		✓	✓	✓				Expertise: Development and delivery of a suite of products that will help reduce the impact of natural hazards on the Canadian population, economy and infrastructure by targeting investments towards the best opportunities for risk reduction and on enhancing our understanding of these hazards	Dr. Chris Tucker Reducing Risk from Natural Hazards Program Manager, ESS/ESSPOB/ESGFP Natural Resources Canada 601 Booth Street, 4th Floor, Room. 479 Ottawa, ON Canada K1A 0E8 Telephone: (613) 943-4245 Fax : (613) 992-0190 E-mail: cmtucker@nrcan-rncan.gc.ca	http://ess.nrcan.gc.ca/index_e.php
St Francis Xavier University (stfx.ca)																	
Thompson Rivers University (tru.ca)																	
Trent University (trentu.ca)																	
Environmental and Resource Studies - Dr. Stephen Hill							✓			✓	✓				Expertise: climate change policy and management; energy science, technology & policy; environmental risk management and policy; application of environmental management tools such as impact assessment, environmental accounting, life-cycle assessment, economic instruments, environmental indicators, and environmental auditing; relationship between science and environmental policy	Dr. Stephen Hill Tel: (705) 748-1011 ext 7368 Email: stephenhill@trentu.ca	people.trentu.ca/stephenhill
Trinity Western University (twu.ca)																	
Université de Moncton (umoncton.ca)																	
Université du Québec a Montréal (uqam.ca)																	
Université du Québec à Trois-Rivière (uqtr.ca)																	
Université de Sherbrooke (usherbrooke.ca)																	
University College of the Fraser Valley (ucfv.ca)																	
University of Alberta (ualberta.ca)																	
Civil & Environmental Engineering - Dr. David M. Cruden, Emeritus Professor							✓							✓	Expertise: Development of a worldwide inventory of landslides; detailed studies of slope movements at sites in the Canadian Cordillera, the Interior Plains and in the French Alps; laboratory studies on the friction of the surfaces of brittle natural materials; fundamental studies of rock fabric.	Dr. David M. Cruden Tel: (780) 492-5923 Email: dave.cruden@ualberta.ca	www.engineering.ualberta.ca/geotechnical/cruden
Analytical Chemistry - Dr. Walter E. Harris, Professor Emeritus		✓					✓							✓	Expertise: Analytical chemistry, hazardous waste destruction facility siting regulatory limit setting, risks of PCB's and dioxins, risk assessment.	Dr. Walter E. Harris Email: walter.harris@ualberta.ca	www.chem.ualberta.ca

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Environmental Health Sciences, School of Public Health - Dr. Steve E. Hrudey							✓						✓		Expertise: Environmental/human health risk assessment; risk communication; risk management.	Dr. Steve E. Hrudey Tel: (780) 492-6807 Email: steve.hrudey@ualberta.ca	www.phs.ualberta.ca/hrudey_research.cfm; www.eab.gov.ab.ca/members.htm
Rural Economy - Dr. Cindy Jardine							✓						✓		Expertise: environmental health risk communication, risk perception and risk assessment	Dr. Cindy Jardine Tel.: (780) 492-2626 Email: cindy.jardine@ualberta.ca	www.re.ualberta.ca/People/Index
Environmental Engineering - Dr. Warren B. Kindzierski							✓							✓	Expertise: Exposure assessment modeling; personal exposure measurements to air pollutants; human health risk assessment.	Dr. Warren B. Kindzierski Tel: (780) 492-0247 Email: warren.kindzierski@ualberta.ca	www.enveng.ualberta.ca
Public Health Sciences - Dr. Chris Le		✓					✓								Expertise: analytical chemistry, environmental chemistry, biomarkers	Dr. Chris Le Tel: (403) 492-6416 Email: xcle@ualberta.ca	www.ualberta.ca/~xcle/home.html
Industrial Safety & Loss Management - Dr. Doug McCutcheon												✓		✓	Expertise: Industrial safety; loss management; human factors; process safety.	Dr. Doug McCutcheon Tel: (780) 492-6931 Email: doug.mccutcheon@ualberta.ca	www.engineering.ualberta.ca/McCutcheon
Engineering Management - Dr. John D. Whittaker, Professor Emeritus									✓						Expertise: Risk analysis of pipelines and sour gas facilities.	Dr. John D. Whittaker Tel: (403) 492-4443 Email: john.whittaker@ualberta.ca	www.ualberta.ca
Mechanical Engineering - Dr. David J. Wilson														✓	Expertise: Hazard assessment of toxic gas releases; exhaust gas dispersal in industrial ventilation; lab simulation in wind tunnels & water channels.	Dr. David J. Wilson Tel: (403) 492-5467 Email: david.wilson@ualberta.ca	www.ualberta.ca
Industrial Safety & Loss Management - Dr. Laird Wilson												✓		✓	Expertise: Industrial safety; loss management; human factors; process safety.	Dr. Laird Wilson Tel: (780) 492-0008 Email: laird.wilson@ualberta.ca	www.ualberta.ca
University of British Columbia (ubc.ca)																	
BC Centre for Disease Control, Health Care & Epidemiology/Environmental Health - Dr. Ray Copes							✓						✓	✓	Expertise: Risk assessment, management and communication, impacts on human health of environmental pollutants	Dr. Ray Copes Tel: (604) 660-1409 Email: ray.copes@bccdc.ca	
Assoc. Director, Eco Risk Research Unit - Dr. Robin S. Gregory							✓							✓	Expertise: Decision making; environmental/ecological; risk management.	Dr. Robin S. Gregory Tel: (250) 539-5701 Email: rgregory@uniog.ubc.ca	
Institute of Resources and Environment, School of Community and Regional Planning - Dr. Tim McDaniels							✓			✓				✓	Expertise: Value elicitation; decision analysis; risk management; risk perception; environmental risk; evnrionmental regulation; public policy analysis.	Dr. Tim McDaniels Tel: (604) 822-9288 Email: timmcd@unixg.ubc.ca	www.bridge.ubc.ca/directory/faculty
Centre for Applied Ethics - Dr. Michael McDonald										✓		✓			Expertise: Applied ethics; philosophy of law; rights - in the risk context.	Dr. Michael McDonald Tel: (604) 228-3967 Email: mcdonald@ethics.ubc.ca	www.ethics.ubc.ca/people/mcdonald

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University of Calgary (ucalgary.ca)																	
Faculty of Communication and Culture, Communication Studies - Dr. Edna F. Einsiedel													✓		Expertise: Risk communication, risk perception, media studies.	Dr. Edna F. Einsiedel Tel: (403) 220-3924 Email: einsiede@ucalgary.ca	www.ucalgary.ca/~einsiede
Finance and Management Science - Dr. Erhan Erkut								✓						✓	Expertise: Decision-making, transportation, uncertainty.	Dr. Erhan Erkut Tel: (403) 492-3068 Email: erhan.erkut@ualberta.ca	www.bus.ualberta.ca/eerkut
NSERC/SSHRC Research Chair - Dr. William Leiss Note: See also under University of Ottawa							✓						✓		Expertise: risk communication, risk management	Dr. William Leiss Tel: (403) 220-8579 Fax: (403) 282-0095 Email: wleiss@uottawa.ca	www.leiss.ca
Civil Engineering - Dr. Marc A. Maes														✓	Expertise: Reliability-based design, civil engineering risk analysis, stochastic modeling, uncertainty analysis, lifetime problems, stochastic optimization.	Dr. Marc A. Maes Tel: (403) 220-7400 Email: mamaes@ucalgary.ca	www.acs.ucalgary.ca/~mamaes
University of Guelph (uoguelph.ca)																	
Environmental Biology - Dr. Hung Lee	✓						✓								Expertise: Biomass conversion, bioenergy research; biodegradation, biotransformation and bioremediation of pollutants; environmental toxicology; biotechnological applications of biosurfactants; monitoring and detection of microorganisms in the environment.	Dr. Hung Lee Tel: (519) 824-4120, x53828 Email: hlee@uoguelph.ca	www.uoguelph.ca/~hlee
Canada Research Chair in Water Supply Security - Dr. Edward A. McBean							✓							✓	Expertise: Hazardous waste management; environmental monitoring networks; risk management planning, fate as a transport characterization, statistical interpretation of environmental data.	Dr. Edward A. McBean Tel: (519) 824-4120 x53923 Email: emcbean@craworld.com	www.chairs.gc.ca/web
Food Science - Dr. Doug Powell							✓								Expertise: food safety	Dr. Doug Powell Tel: (519) 824-4120 Email: dpowell@uoguelph.ca or dpowell@ksu.edu	www.plant.uoguelph.ca/faculty/dpowell
Centre for Toxicology - Dr. Keith R. Solomon							✓								Expertise: Environmental toxicology, pesticide toxicology, exposure of humans to pesticides.	Dr. Keith R. Solomon Tel: (519) 824-4120 x58792 Email: ksolomon@uoguelph.ca	www.envbio.uoguelph.ca/f_solomon
Environmental Biology - Dr. Jack Trevors	✓						✓								Expertise: Environmental microbiology/biotechnology.	Dr. Jack Trevors Tel: (519) 824-4120 x3367 Email: jtrevors@uoguelph.ca	www.envbio.uoguelph.ca/f_trevors
University of Lethbridge (uleth.ca)																	
University of Manitoba (umanitoba.ca)																	
Disaster Research Institute - Dr. Robert Tait, Director and Professor of Psychology										✓		✓			Expertise: Policy and program analysis, organization research and institutional management evaluation	Dr. Robert Tait rwtait@ms.umanitoba.ca DRI General Tel: 204-474-8391	http://www.umanitoba.ca/institutes/disaster_research/index.html
Université de Montréal (umontreal.ca)																	
University of New Brunswick (unb.ca)																	
University of Northern BC (unbc.ca)																	
University of Ontario Institute of Technology																	
Faculty of School of Business and Information Technology - Dr. William (Bill) Goodman														✓	Expertise: statistical consulting and risk analysis,"Key Factors Analysis," severity distributions, decision theory and logic modeling	Dr. William (Bill) Goodman Tel: (905) 721-3111 ext 2639 Email: bill.goodman@uoit.ca	www.businessandit.uoit.ca

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University of Ottawa (uottawa.ca)																	
Centre on Governance - Dr. Caroline Andrew, Director Note: Affiliated with the Faculty of Social Sciences, the School of Political Science, the School of Management and is a Professor with the Insitute of Population Health Program							✓			✓					Expertise: Governance and coordination in and between organizations and communities; governance and democracy; ethics and governance; global and North American governance; knowledge, complexity and governance; urban development; municipal politics; urban politics - planning and the process of public participation	Dr. Caroline Andrew Phone: 613-562-5800 ext. 1702 E-mail: candrew@uOttawa.ca	http://www.socialsciences.uottawa.ca/pol/eng/profDetails.asp?id=90
Institute of Population Health - Dr. Kevin P. Brand							✓							✓	Expertise: human health risk assessment, regulatory toxicology, uncertainty analysis, burden of disease assessment, and risk management	Dr. Kevin P. Brand Tel: (613) 562-5257 Email: kbrand@uottawa.ca	www.research.uottawa.ca/researcher_kbrand.html
Epidemiology and Community Medicine; McLaughlin Centre for Population Health Risk Assessment, Institute of Population Health - Dr. Dan Krewski							✓							✓	Expertise: risk assessment and risk management; biostatistics; epidemiology	Dr. Dan Krewski Tel: 613) 562-5800, ext. 8261; Tel: (613) 562-5381 Email: dkrewski@uottawa.ca	irsp.carleton.ca:16080/directors/krewski
McLaughlin Center for Population Health Risk Assements, Institute of Population Health - Dr. William Leiss Note: See also under University of Calgary							✓						✓		Expertise: Risk communication, risk management re: pesticides, environmental controversies. Recipient of the Order of Canada 2004	Dr. William Leiss Email: wleiss@uottawa.ca	www.leiss.ca
GAP-Santé, Institute of Population Health - Dr. Louise Lemyre, Director and McLaughlin Research Chair on Psychosocial Aspects of Risk and Health							✓					✓		✓	Expertise: Psychosocial factors in stress and health (prevention, population health)	Dr. Louise Lemyre Phone: 613-562-5800 ext.2321 E-mail: louise.lemyre@uottawa.ca	http://www.socialsciences.uottawa.ca/psy/eng/profDetails.asp?id=218
Faculty of Social Sciences, School of Political Studies, Public Administration - Dr. Christian Rouillard, Canada Research Chair on Governance and Public Management (Tier II) - Social Sciences and Humanities										✓					Expertise: Critical analysis of Canadian Public Sector political and administrative reforms, management frameworks and their implementation, innovation, and structure of legislation.	Dr. Christian Rouillard Office: 613-562-5800 (2659) Fax: 613-562-5350 E-mail: christian.rouillard@uottawa.ca	http://www.socialsciences.uottawa.ca/pol/eng/profDetails.asp?id=126
Faculty of Engineering Department of Civil Engineering - Dr. Murat Saatcioglu, University Research Chair in Earthquake Engineering							✓		✓						Expertise: Development of new and innovative seismic retrofit technologies for reinforced concrete structures, such as buildings and bridges; verification through testing of large-scale specimen in the Structures Laboratory of the University of Ottawa (one of the few pseudo-dynamic testing facilities in the world that provides a unique opportunity for verification, since it allows the simulation of earthquakes in slow motion)	Dr. Murat Saatcioglu Contact Info Office: 613-562-5800 (6129) Office (alt): 613-562-5915 Fax: 613-562-5174 E-mail: murat@eng.uottawa.ca	http://by.genie.uottawa.ca/profs/murat/murat.htm

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Faculty of Social Sciences, School of Political Studies, Public Administration PhD Program - Krista Simonds, M.A.										✓		✓	✓		Expertise: Specializing in public and private sector all-hazard emergency preparedness and governance challenges; public policy, administration and management; Strategic Planning; Capability Based Planning; the Operational Planning Process; Program Development and Management; Organizational Change; and Business Resilience. PhD studies will focus on the critical question of how to ensure alignment and focus of all-hazard emergency planning activities and the application of related resources, toward common goals within an integrated governance structure that provides sustainable and effective Public security policy and management. Attention will be given to the examination of issues relevant to collaboration, coordination and consistency across multi-levels of public, private and community sectors, both vertically and horizontally; and, consider the means and methods by which to promote coherent application of response mechanisms, resources and tools consistent with the collective goals of a jointly-owned public security framework.	Krista Simonds, M.A. (PhD Candidate University of Ottawa Commencing Fall 2008) Tel: 613-745-1237 Cell: 613-882-1237 Email: cg-kc-simonds@rogers.com	
University of PEI (upei.ca)																	
University of Regina (uregina.ca)																	
University of Saskatchewan (usask.ca)																	
Department of Sociology, Sociology of Biotechnology Program - Dr. Michael Mehta	✓				✓		✓						✓		Expertise: Risk perception and communication; biotechnology, nuclear safety, blood safety, endocrine modulators, nanotechnology.	Dr. Michael Mehta Tel: (306) 966-6917 Email: michael.mehta@usask.ca	www.policynut.com
University of Toronto (utoronto.ca)																	
Faculty of Management - Dr. James Dooley										✓		✓			Expertise: Effects of the concern for health and the environment on corporate strategy & the management of operations. Operations management strategy, national and international with a focus on S.E. Asia.	Dr. James Dooley Tel: (416) 978-4914	
Institute for Environmental Studies - Dr. Lino Grima											✓	✓	✓		Expertise: Economic and social aspects of risk management, particularly risk communication.	Dr. Lino Grima Tel: (416) 461-5390 Email: lino.grima@utoronto.ca	myprofile.cos.com/grima
Rotman School of Management - Dr. William C. Strange, Real Estate and Urban Economics											✓				Expertise: Business economics and real estate in particular - urban economics, public economics, and investment focused on industry clusters, the importance of cities to business, and innovation.	Dr. William C. Strange Tel: 416-978-5703 (SwitchBoard)	http://www.rotman.utoronto.ca/~wstrange
Rotman School of Management - Dr. Glen R. Whyte, CCMF Chair in Integrative Thinking and Professor of Organizational Behaviour and Human Resource Management										✓	✓	✓		✓	Expertise: Managerial negotiations, administration theory, and advanced topics in negotiation and decision making, risk management and decision making under uncertainty, individual and group decision making, and risk management.	Dr. Glen R. Whyte Tel: 416-978-5703 (SwitchBoard)	http://www.rotman.utoronto.ca/facbios/viewFac.asp?facultyID=whyte
University of Victoria (uvic.ca)																	
Centre for Studies in Religion and Society - Dr. Conrad G. Brunk, Director										✓		✓			Expertise: Philosophy and ethics of technological risk at the national level, e.g. nuclear risks, nuclear deterrents, plant and animal health risks, biotechnology.	Dr. Conrad G. Brunk, Director Tel: (250) 721-8325 Email: csrs@uvic.ca	web.uvic.ca/csrs/about/Brunk

University	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment and Health	Transport and Logistics	Critical Infrastructure	Public Policy and Governance	Public Economics	Psycho-Social	Risk Communications	Decision-Analysis and Modelling	Risk Assessment	Contact Info	Website
Dr. Jamie Cassels Vice-President Academic and Provost Professor of Law							✓			✓					Expertise: Industrial safety, law, policy & regulation	Dr. Jamie Cassels Vice-President Academic and Provost Professor of Law Tel: (250) 721-7010 Email: jcassels@uvic.ca	web.uvic.ca/vpac/general/cassels
University of Waterloo (uwaterloo.ca)																	
Geography Department - Dr. Jean Andrey								✓		✓					Expertise: Transportation policy and risk management issues, mainly in Canada; implications of climate change for transportation planning; winter storms and winter road maintenance; telecommuting; and the geography of road safety - both generally and more specifically for older drivers.	Dr. Jean Andrey Tel: (519) 888-4567 x33629 Email: jandrey@uwaterloo.ca Webpage:	www.fes.uwaterloo.ca/geography/Faculty/andrey.html
Department of Economics - Dr. Richard W. Bodell											✓				Expertise: Natural resources - renewable, non-renewable, permits vs control policies; Cost/benefit - public policy, non-marketed (goods and services), consistency of approach.	Dr. Richard W. Bodell Tel: (519) 888-4567 x32047 Email: rwbodell@uwaterloo.ca	economics.uwaterloo.ca/fac-Bodell.html
Accounting Group - Dr. Phelim P. Boyle											✓				Expertise: Financial risk management; insurance, risk sharing.	Dr. Phelim P. Boyle Tel: (519) 888-4567 x36513 Email: pboyle@uwaterloo.ca	http://accounting.uwaterloo.ca/people/boyle
Mechanical Engineering - Dr. Gordon M. Bragg, Professor Emeritus & Adjunct							✓							✓	Expertise: Risk analysis related to asbestos, quantitative exposure assessment, exposure physics, industrial ventilation and hygiene, indoor air quality, environmental impact assessment.	Dr. Gordon M. Bragg Tel: (519) 888-4567 ext. 33336 Email: gmbragg@uwaterloo.ca	www.mme.uwaterloo.ca/people/info
Statistics & Actuarial Science - Dr. K. Stephen Brown														✓	Expertise: Biostatistics, statistical consulting, generalized linear models.	Dr. K. Stephen Brown Tel: (519) 888-4567 x35500 Email: ksbrown@uwaterloo.ca	www.stats.uwaterloo.ca/Faculty/Brown.KS
Department of Civil Engineering - Dr. Donald H. Burn, P. Eng							✓							✓	Expertise: Regional flood frequency analysis; Analysis of drought characteristics; Impacts of climate change on hydrologic variables and water resource systems	Dr. Donald H. Burn, P. Eng Tel: (519) 888-4567 ext.33338 Fax: (519) 888-4349 Office: E2-3327 Email: dhburn@civmail.uwaterloo.ca	http://www.civil.uwaterloo.ca/dhburn
Chemical Engineering - Dr. John Byerley, Professor Emeritus		✓													Expertise: Inorganic toxicity hazards.	Dr. John Byerley Professor Emeritus, Chemical Engineering Tel: (519) 888-4567 x33409 Email: jjbyerle@retirees.uwaterloo.ca	chentserver.uwaterloo.ca/faculty_emeriti/byerley
Statistics & Actuarial Science - Dr. Winston H. Cherry							✓							✓	Expertise: Statistical studies to diseases, statistics education.	Dr. Winston H. Cherry Tel: (519) 888-4567 x35507 Email: wcherry@uwaterloo.ca	www.stats.uwaterloo.ca/Faculty/Cherry
Statistics & Actuarial Science - Dr. Richard Cook							✓							✓	Expertise: Development and application of statistical methods for public health; analysis of life history data, longitudinal data, sequential methods, multivariate analysis, clinical trial design, and the assessment of diagnostic tests.	Dr. Richard Cook Tel: (519) 888-4567, x35549 Email: rjcook@uwaterloo.ca Webpage:	www.stats.uwaterloo.ca/Faculty/Cook
Biology Department - Dr. D. George Dixon	✓														Expertise: Effects of toxic chemicals, including metals and oilsands process water, on aquatic organisms, principally fish; biotic modifying factors of toxicity; development of methods for environmental effects monitoring. Physiologically based pharmacokinetic modelling of contaminant levels in fish.	Dr. D. George Dixon Tel: (519) 888-4567 x32531 Email: dgdixon@uwaterloo.ca	www.biology.uwaterloo.ca/people/gdixon
School of Accountancy - Dr. Leonard Eckel (retired)							✓			✓			✓		Expertise: Environmental/ecological, policy & regulation, risk management/communication.	Dr. Leonard Eckel Tel: (519) 888-4567 x37238 Email: leckel@uwaterloo.ca	accounting.uwaterloo.ca/alumni/fellowships/LeonardEckel

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Civil Engineering, Dist. Professor Emeritus - Dr. Grahame J. Farquhar							✓	✓							Expertise: Contaminant transport in soil and groundwater; design of acid rain abatement strategies; waste management and disposal; landfill gas and leachate control; industrial and hazardous wastewater treatment.	Dr. Grahame J. Farquhar Tel: (519) 888-4567 x33989 Email: fark@uwaterloo.ca	www.civil.uwaterloo.ca/our_people
Management Sciences - Dr. David Fuller											✓			✓	Expertise: Models of energy markets and emissions.	Dr. David Fuller Tel: (519) 888-4567 x32683 Email: dfuller@uwaterloo.ca	www.mansci.uwaterloo.ca/about/faculty/dfuller
Philosophy - Dr. Larry Haworth, Professor Emeritus										✓		✓			Expertise: Personal autonomy as a philosophical, psychological & political idea; risk assessment methodology with reference to the role of extra-scientific elements (values, world-views); special application to genetic engineering.	Dr. Larry Haworth Email: haworth@uwaterloo.ca	http://philosophy.uwaterloo.ca/people/haworth.html
Systems Design Engineering - Dr. Keith W. Hipel														✓	Expertise: Development and application of systems design methodologies such as conflict resolution and time series analysis.	Dr. Keith W. Hipel Tel: (519) 888-4567 x32830 Email: kwhipel@uwaterloo.ca	Website: www.systems.uwaterloo.ca/Faculty/Hipel Conflict Analysis Group Website: www.systems.uwaterloo.ca/Research/CAG
Statistics & Actuarial Science - Dr. Jerry F. Lawless	✓													✓	Expertise: Statistical methods and theories; reliability; biostatistics relations to risk analysis.	Dr. Jerry F. Lawless Tel: (519) 888-4567 x35533 Email: jlawless@uwaterloo.ca	www.stats.uwaterloo.ca/Faculty/Lawless
Civil Engineering - Dr. William C. Lennox							✓							✓	Expertise: Probabilistic models in hydrology; groundwater contaminant transport; risk, surface water quality.	Dr. William C. Lennox Tel: (519) 888-4567 x36959 Email: wclennox@uwaterloo.ca	
School of Planning - Dr. Larry R.G. Martin										✓	✓	✓			Expertise: Emergency planning and its relationship to municipal and regional planning; socio-economic impact analysis; remote sensing as means of monitoring land use changes.	Dr. Larry R.G. Martin Tel: (519) 888-4567 x32792 Email: lrgmartl@uwaterloo.ca	
Health Studies and Gerontology - Dr. Stephen McColl							✓								Expertise: Environmental health, occupational health, health risk assessment, toxicology.	Dr. Stephen McColl Tel: (519) 888-4567 x32720 Email: mccoll@healthy.uwaterloo.ca	www.ahs.uwaterloo.ca/hsg/research/McColl.html
Philosophy - Dr. Jan F. Narveson										✓					Expertise: Public policy.	Dr. Jan F. Narveson Tel: (519) 888-4567 x32780 Email: jnarveso@watarts.uwaterloo.ca	arts.uwaterloo.ca/~jnarveso/
Institute for Risk Research (IRR) and the Network for Environmental Risk Assessment and Management (NERAM) - Dr. Jatin Nathwani					✓					✓		✓		✓	Expertise: Risk management in the public interest; criteria development and focus on the man/technology environment interface; societal balancing of benefits and risks; energy policy issues - risk assessments, evaluation of alternative strategies, options; nuclear safety issues - fission & fusion. Energy Chair. Dr. Jatin Nathwani has been awarded a $3 million provincial research chair to integrate new technologies that can enhance energy efficiencies and promote renewable resources within a reliable power system.	Dr. Jatin Nathwani Email: Jatin.Nathwani@rogers.com or nathwani@uwaterloo.ca	http://geri.uwaterloo.ca/jatin.html
Civil Engineering - Dr. Mashesh Pandey										✓	✓	✓			Expertise: socio-economic indicators	Dr. Mashesh Pandey Tel: (519) 888-4567, ext. 35858 Email: mdpandey@sunburn.uwaterloo.ca	www.civil.uwaterloo.ca/mdpandey

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Biology - Dr. Michael Power	✓						✓							✓	Expertise: Ecological risk assessment/risk management, development of risk decision-making frameworks, environmental modelling, cumulative stressors analysis, risk inthe aquatic environment, population-level risks.	Dr. Michael Power Tel: (519) 888-4567 x32595 Email: m3power@sciborg.uwaterloo.ca	www.biology.uwaterloo.ca/power
Chemical Engineering - Dr. Park M. Reilly, Professor Emeritus		✓													Expertise: Chemical risks.	Dr. Park M. Reilly Tel: (519) 888-4567 x32701 Email: pmreilly@cape.uwaterloo.ca	uwaterloo.ca/faculty_emeriti/reilly
Civil Engineering - Dr. Frank Saccomanno								✓							Expertise: Transport of hazardous materials; transport risk analysis.	Dr. Frank Saccomanno Tel: (519) 888-4567 x32631 Email: saccoman@uwaterloo.ca	www.civil.uwaterloo.ca/saccomanno
Civil Engineering; Institute for Risk Research - Dr. John Shortreed							✓	✓							Expertise: risk management and risk assessment of hazardous industries, dangerous goods transport risks	Dr. John Shortreed Tel: (519) 888-4567, ext. 35527 Email: shortree@uwaterloo.ca	www.civil.uwaterloo.ca/our_people
Mechanical Engineering - Dr. Peter Slawson														✓	Expertise: Physical and mathematical models of gas dispersion; gaseous contaminants.	Dr. Peter Slawson Tel: (519) 888-4567 x32425 Email: prslawso@uwaterloo.ca	www.mme.uwaterloo.ca/research/brochure/slawson
School of Planning - Dr. Roger Suffling							✓								Expertise: Risk management considerations in environmental impact assessment, forest fire and boreal ecology, global climate change and right-of-way management.	Dr. Roger Suffling Tel: (519) 888-4567 x33184 Email: rcsuffli@fes.uwaterloo.ca	http://www.fes.uwaterloo.ca/planning/faculty/suffling.html
Statistics & Actuarial Science - Dr. Mary Thompson														✓	Expertise: Probability and statistics.	Dr. Mary Thompson Tel: (519) 888-4567 x35543 Email: methomps@uwaterloo.ca	www.stats.uwaterloo.ca
Mechanical and Mechatronics Engineering, Fire Research Group - Dr. Elizabeth Weckman															Expertise: Combustion diagnostics, fire research, pool fires, structural fires, fire fighter training.	Dr. Elizabeth Weckman Tel: (519) 888-4567, x33345 Email: ejweckman@uwaterloo.ca	www.me.uwaterloo.ca/~eweckman
Systems Design Engineering - Dr. Douglas T. Wright										✓				✓	Expertise: Public interest.	Dr. Douglas T. Wright Tel: (519) 888-4567 x84933 Email: dtwright@uwaterloo.ca	www.adm.uwaterloo.ca/infopres/wright
Civil Engineering - Dr. Samuel Yagar								✓							Expertise: Risk analysis and evaluation in traffic management and operations; freeway corridor analysis.	Dr. Samuel Yagar Tel: (519) 888-4567 x33929 Email: syagar@uwaterloo.ca	www.civil.uwaterloo.ca/our_people
University of Western Ontario (uwo.ca)																	
The Institute for Catastrophic Loss Reduction - Dr. A. G. Davenport, Research Director							✓							✓	Expertise: Pioneered the application of boundary layer wind tunnels to the design of wind sensitive structures, the description of urban wind climates and other problems involving the action of wind. He also has contributed to the fields of meteorology, environmental loads, structural dynamics and earthquake loading. He developed the world's first statistically based seismic zoning map, for Canada.	Dr. A. G. Davenport Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@icdr.org	http://www.icdr.org/davenport.htm
Civil & Environmental Engineering - Dr. Hanping Hong														✓	Expertise: Risk analysis, reliability method, designate calibration.	Dr. Hanping Hong Tel: (519) 679-2111 ext 88315 Email: hongh@uwo.ca	

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Institute for Catastrophic Loss Reduction and National Disaster Health Research Network - Dr. Paul Kovacs, Executive Director							✓			✓	✓				Expertise: Executive Director, Institute for Catastrophic Loss Reduction President, Property and Casualty Insurance Compensation Corporation Adjunct Research Professor, Economics, The University of Western Ontario	Dr. Paul Kovacs Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@icdr.org	http://www.icdr.org/Kovacs.htm
The Institute for Catastrophic Loss Reduction and Departments of Geography & Political Science - Dr. Gordon McBean							✓			✓		✓		✓	Expertise: Atmospheric and climate sciences, ranging in scope from the natural sciences of the phenomena to the policies of governments and responses of people to them; evaluates the performance of weather and environmental prediction systems, the changing climate and weather systems in the Arctic and investigates the role of changing government policies on the ability of national laboratories and organizations to support Canadian activities. Also does research in the changing occurrence of extreme weather events with climate change, their influence on public systems and strategies for adaptation.	Dr. Gordon McBean Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@icdr.org	http://www.icdr.org/mcbean.htm
Institute for Catastrophic Loss Reduction and National Disaster Health Research Network - Dr. Slobodan Simonovic							✓							✓	Expertise: Systems modeling; Risk and reliability; Water resources and environmental systems analysis; Computer-based decision support systems development; Water resources education and training; Flood control; Hydropower energy; Operational hydrology. Research focuses on application of systems approach to, and development of the decision support tools for, management of complex water and environmental systems. Most of his work is related to the integration of risk, reliability, uncertainty, simulation and optimization in hydrology and water resources management including water resources decision support. He has undertaken applied research projects that integrate the mathematical modeling, data-base management, geographic information systems and intelligent interface development into decision support tools for water resources decision makers. The main focus of his current research is related to flood prevention and management. Most of his research is being conducted through the Facility for Intelligent Decision Support (FIDS) at the University of Western Ontario.	Dr. Slobodan Simonovic Toronto office 20 Richmond Street East, Suite 210 Toronto, Canada M5C 2R9 Tel: (416) 364-8677 Fax: (416) 364-5889 info@icdr.org	http://www.iclr.org/simonovic.htm
University of Windsor (uwindsor.ca)																	
Civil & Environmental Engineering - Dr. Rajesh Seth							✓	✓						✓	Expertise: wastewater treatment, multimedia mass balance modelling, contaminant fate and transport, metal and organic pollutants, environment and health	Dr. Rajesh Seth Tel: (519) 253-3000 ext. 2553 Email: rseth@uwindsor.ca	
University of Winnipeg (uwinnipeg.ca)																	
Wilfrid Laurier University (wlu.ca)																	
Laurier Centre for Military Strategic & Disarmament Studies - Dr. D. Marc Kilgour, Professor of Mathematics							✓							✓	Expertise: Conflict analysis; game theory, Decision Theory, Operations Research and Mathematical Modelling, environmental management.	Dr. D. Marc Kilgour, Research Director Tel: (519) 884-0710, x4208 Email: mkilgour@wlu.ca; mkilgour@wlu.ca1	www.wlu.ca/~wwwmath/faculty/kilgour

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York University (yorku.ca)																	
Schulich School of Business - Dr. John Buzacott Professor Emeritus, Management Science Specialization								✓							Expertise: Manufacturing systems; production management; manufacturing strategy; supply chain management, operations research.	Dr. John Buzacott Tel: (416) 736-5074 Email: jbuzacot@schulich.yorku.ca	www.schulich.yorku.ca/ssb-extra/faculty
Disaster and Emergency Management Program (Master's Level) - Dr. David Etkin, Director, EM Graduate Program							✓			✓					Expertise: National assessment of natural hazards	Dr. David Etkin Office: 258C Atk Phone: (416) 736-2100 ext. 44016 Email: etkin@yorku.ca	http://www.yorku.ca/akevents/academic/SAS/faculty/SASfacultyProfile.asp?id=559

ACADEMIC AND RESEARCH INSTITUTES DATABASE

Specialist Consultant	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment, Health and Safety	Transport and Logistics	Critical Infrastructure	Policy Governance and Mgmt	Economics and Financial	Psycho-Social	Risk Communications	Decision-Analysis, Modelling, Process Mgmt	Risk Assessment	Contact Info	Website
Alp & Associates Inc.						✓	✓			✓				✓	Expertise: Integrated risk assessment and management for organizations with exposures to hazardous material, process, and security risks; quantitative risk analysis using frequency and consequence models; enterprise risk management for companies and government departments with responsibilities for public, occupational and environmental safety.	Ertugrul Alp Principal Tel: (905) 508-2595 Email: ertugrulalp@rogers.com	www.ertugrulalp.com
Peter Bein Transportation Systems Consultant								✓	✓					✓	Expertise: Decision analysis of civil engineering systems under uncertainty and risk; modelling and assessment of natural and man-made hazards to civil engineering works, and risks arising in transportation of people and goods.	Peter Bein Transportation Systems Consultant Tel: (604) 228-9437 Email: piotr.bein@umag.net	
Bercha Group							✓		✓					✓	Expertise: Development and application of methods of risk analysis to oil and gas facilities, transportation systems, and arctic offshore operations; use of probabilistic methods in engineering design; risk based land use guidelines.	Frank G. Bercha President Tel: (403) 270-2221 Email: bgroup@berchagroup.com	www.berchagroup.com/index.htm
GlobalTox International Consultants Inc.		✓					✓						✓	✓	Expertise: Human exposure modelling, quantitative risk assessment/characterization, risk perception, communication; all with regard to environmental or occupational exposures to toxic chemicals.	Ronald Brecher Principal Tel: (519) 766-1000 x 223 Email: rbrecher@globaltox.ca	www.globaltox.ca/staff_rb.php
Itasca Consulting Canada Inc.							✓								Expertise: Mining, geomechanics, mining accidents, mine decommissioning, risk assessment.	Richard Brummer President Tel: (705) 522-2697	www.itasca.ca/canada
Decision Partners, LLC							✓		✓	✓		✓	✓	✓	Expertise: Strategic risk communications processes, methods and tools applied to issues related to health, environment, electricity, new technology, and siting projects; multi-stakeholder, multi-channel stakeholder engagement processes; public judgment; strategic planning; training; innovation management; mental models research.	Gordon Butte President Tel: (941) 355-4441 Email: gbutte@decisionpartners.com	www.decisionpartners.com
Center for Risk Communication												✓	✓		Expertise: Community involvement; risk communication; risk perception.	Vincent Covello Tel: (212) 222-7841	www.centerforriskcommunication.com
Curry Hydrocarbons Inc.							✓							✓	Expertise: Process hazard analysis, process and equipment reliability analysis, failure investigation, emergency response planning, safety engineering, HAZOP, worst case scenario, compliance audits.	Frank H. Curry President Tel: (416) 298-9563 Email: fhcurry@rogers.com	www.curryhydrocarbons.ca
Industrial Accident Prevention Association							✓							✓	Expertise: Occupational health and safety program auditing, consulting, training; occupational risk analysis education; promotion of general hazard/risk models; risk education.	Renzo Dalla Via Regional Team Leader Tel: (416) 798-0220 Email: rdallavia@iapa.on.ca	www.iapa.on.ca

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AMEC Earth & Environmental							✓							✓	Expertise: Consulting engineering, heavy civil, mine waste management, open pit design, risk assessments, earthquake engineering, liquefaction evaluations, foundation engineering and general engineering geology.	Michael P. Davies Vice-President Tel: (604) 473-5304 Email: michael.davies@amec.com	www.amec.com
Risk Wise Inc.							✓			✓			✓	✓	Expertise: Integrated operational risk management consulting (e.g. health, safety, environment business continuity, liabilities, etc.), risk management training, risk communication.	Diana Del Bel Belluz Tel: (416) 686-7362 Email: diana.belluz@riskwise.ca	
BMT Fleet Technology Limited									✓						Expertise: Structural reliability analysis and optimal design; pipeline & ship structures research; structural and mechanical integrity assessment and metallurgical principals; LSD code calibration.	Aaron Dinovitzer President Tel: (613) 592-2830 x203 Email: adinovitzer@fleetech.com	www.fleetech.com
Canadian Water and Wastewater Association		✓					✓			✓				✓	Expertise: Impact of chemicals in the environment on public safety and health. Public health risk assessment and management incorporating risk identification, analysis, option formulation and selection. Vulnerability assessments, emergency response planning and training. Policy and legislative anlaysis.	T. Duncan Ellison Executive Director Tel: (613) 747-0524 Email: tdellison@cwwa.ca	www.cwwa.ca
Frontline Corporate Communications Inc. and DeGroote School of Business at McMaster												✓	✓		Expertise: Risk communication training; Media training; Development and implementation of community relations plans (CRP).	Terry Flynn President Tel: (888) 848-9898 x201 Email: flynn@onthefrontlines.com	www.fcc.onthefrontlines.com/main
Intus Road Safety Engineering Inc.							✓	✓						✓	Expertise: Risk analysis and evaluation in highway safety, road design, traffic management and operations/maintenance.	Gerry Forbes President & Chief Engineer Tel: (905) 332-9470 Email: gerry@intus.ca	www.intus.ca
SENES Consultants Ltd.							✓							✓	Expertise: Safety audit, dispersion modeling, vulnerability analysis and off-site/on-site emergency planning.	Murali Ganapathy Principal Tel: (905) 764-9380 x350 Email: mganapathy@senes.ca	www.senes.on.ca
Safety Services (Gow) Inc.							✓							✓	Expertise: Safety management system; emergency response planning; environmental assessments.	John Gow Tel: (403) 686-6180	
Hickling Corp.							✓	✓		✓					Expertise: Transportation policy and management; transportation safety policy.	John Gratwick Associate Tel: (902) 423-1606 Email: johngrat@hfx.eastlink.ca	
AECL	✓				✓		✓								Expertise: Relative risks associated with ionizing radiation; radiation protection strategies; biological dosimetry R&D; molecular, biochemical and geographical epidemiology.	Clive L. Greenstock Research Officer, Safety, Environmental & Radiological Protection Tel: (613) 584-3311, x6053 Email: greenstockc@aecl.ca	

Specialist Consultant	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment, Health and Safety	Transport and Logistics	Critical Infrastructure	Policy Governance and Mgmt	Economics and Financial	Psycho-Social	Risk Communications	Decision-Analysis, Modelling, Process Mgmt	Risk Assessment	Contact Info	Website
Golder Associates							✓		✓		✓				Expertise: Risk management and analysis of environmental, health, safety and financial issues in a range of business sectors including oil and gas, mining, transportation and utilities.	Brian J. Griffin Tel: (403) 299-4615 Email: bgriffin@golder.com	www.golder.com
Toxicology and Risk Assessment RWDI Air Inc.							✓							✓	Expertise: Consulting experience in human health risk assessment, toxicology, environmental impact assessment and risk-based decision-making.	Ron Haley Senior Specialist, Tel: (519)823-1311 x2276 Email: ron.haley@RWDI.com	
Stanley R. Hatcher					✓							✓			Expertise: Nuclear, organizational social, cultural factors in risk, risk perception.	Stanley R. Hatcher Tel: (416) 873-1369 Email: Shatcher@idirect.com	
Allan Jones & Associates, Inc.		✓					✓			✓			✓		Expertise: Environmental policy development; risk communication; responsible care development and its application beyond the chemical manufacturing industry.	Allan Jones Executive Director Tel: (905) 335-5463 Email: allan.jones@attcanada.net	
GeoInfo Solutions Ltd.							✓							✓	Expertise: Marine traffic risk analysis, navigation and related software application development	Brad Judson President Tel: (250) 656-3056 Email: brad.judson@geoinfosolutions.com	www.geoinfosolutions.com
GE Oil & Gas							✓		✓					✓	Expertise: Pipeline Safety, Risk and reliability analysis, environmental modeling.	Shahani Kariyawasam Chief Engineer, Integrity Services Tel: (403) 806-0267 Email: shahani.kariyawasam@ge.com	
Robert F. Keith							✓			✓				✓	Expertise: Public policy/decision making; northern development decision-making; environmental assessment; resource development; regional planning; Arctic contaminants.	Robert F. Keith Tel: (519) 846-2704 Email: rkeith@sympatico.ca	
Bririsk Consulting Ltd.							✓							✓	Expertise: Industrial risk management and process safety.	Brian D. Kelly Tel: (403) 375-0709 Email: kellybd@telus.net	
Hemmera Envirochem		✓					✓							✓	Expertise: Evaluation of contaminated sites and subsequent evaluation of potential human health risks and ecological risks; definition of design and operational protocols for minimization of risk associated with use of antisapstain and wood preservation chemicals (process safety).	Dennis Konasewich Vice President, Technical Services Email: dkonasewich@hemmera.com	www.hemmera.com
Brenda Lee							✓				✓	✓		✓	Expertise: Philosophical assumptions in risk assessment; cost-benefit methods of decision-making; environmental impact and social impact assessment and risk assessment.	Brenda Lee Tel: (514) 343-3870	

Specialist Consultant	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment, Health and Safety	Transport and Logistics	Critical Infrastructure	Policy Governance and Mgmt	Economics and Financial	Psycho-Social	Risk Communications	Decision-Analysis, Modelling, Process Mgmt	Risk Assessment	Contact Info	Website
SNC-Lavalin Environment Inc.								✓						✓	Expertise: Transportation of dangerous goods; quantitative risk assessment; emergency planning.	Renaud Lemoine Project Manager, Environment Tel: (450) 651-6710 Email: lemor@snc-lavalin.com	www.SNC-Lavalin.com
AcuTech Consulting, Inc.		✓					✓							✓	Expertise: Safety and risk analysis and assessment of industrial facilities. Hazard analysis for petroleum & chemical industry; loss prevention, fault tree analysis, HAZOP.	David Moore President & CEO Tel: (415) 923-9226 Email: dmoore@acutech-consulting.com	acutech-consulting.com
CanTox Health Sciences International							✓								Expertise: Toxicology; environmental risk assessment.	Ian Munro Executive Vice President Tel: (905) 542-2900 Email: imunro@cantox.com	www.cantox.com
Douglas H. Napier		✓	✓				✓								Expertise: Hazard analysis and risk assessment; investigation of major industrial hazards; combustion and combustion-related phenomena; plant design in the chemical and process industries.	Douglas H. Napier Industrial Hazard & Risk Consultant Tel: (416) 620-4224	
Walters Forensic Engineering														✓	Expertise: Accident reconstruction, computer modeling/simulation - 3D scientific animation.	Saad Nassar Tel: (800) 387-1950 Email: snassar@waltersforensic.com	www.waltersforensic.com
C-FER Technologies							✓							✓	Expertise: Safety, risk analysis, environmental modelling.	Maher Nessim Chief Engineering and Director, Pipelines and Structures Tel: (780) 450 9898 x207 Email: m.nessim@cfertech.com	
Dow Chemical Canada Inc.		✓					✓						✓		Expertise: Chemical hazard evaluation, management control systems; hazard communication; landfill sites.	Brenda Prine Reactive Chemical Specialist Tel: (519) 339-4563	www.dow.com
Acuratek Inc.			✓					✓		✓				✓	Expertise: Transportation risk assessment, business continuity management, consequence modeling for fire, explosion and oil spill on water.	James D. Reid Tel: (514) 383-9816 Email: james.reid@acuratek.ca	www.acuratek.ca
International Program on Chemical Safety, World Health Organization							✓			✓					Expertise: Health, occupational safety & health, policy & regulation.	Ann Robinson Consultant, International Program on Chemical Safety World Health Organization Tel: (416) 762-6488	
Institute for Research in Construction, National Research Council Canada							✓							✓	Expertise: Water quality modelling, environmental risk engineering, risk-based decisionmaking, reliability engineering and system safety, and environmental system modelling	Rehan Sadiq Research Officer, Buried Utilities, Urban Infrastructure Tel: (613)954-5984 Email: rehan.sadiq@nrc-cnrc.gc.ca	

Specialist Consultant	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment, Health and Safety	Transport and Logistics	Critical Infrastructure	Policy Governance and Mgmt	Economics and Financial	Psycho-Social	Risk Communications	Decision-Analysis, Modelling, Process Mgmt	Risk Assessment	Contact Info	Website
Sustainable Visions, Inc.								✓							Expertise: Transportation risk; risk management.	Richard Schwing Tel: (248) 851-9519 Email: sustainablevisions@earthlink.net	
Decision Research Inc.												✓			Expertise: Risk perception.	Paul Slovic Research Associate Tel: (541) 485-2400 Email: pslovic@darkwing.uoregon.edu	www.decisionresearch.org/people/slovic
Montreal Department of Public Health CINBIOSE (Centre for studies in Health and Environment)	✓	✓					✓								Expertise: Indoor, outdoor and personal exposure assessment, Biological monitoring of exposure and effects in populations exposed to toxic chemicals, Risk Assessment	Dr. Audrey Smargiassi Adjunct Professor Tel: (514) 528-2400 ext. 3226 Email: asmargia@santepub-mtl.qc.ca	
Institute for Research in Construction National Research Council of Canada							✓		✓						Expertise: Risk analysis and risk assessment in the infrastructure application, and earthquake risk assessment.	Solomon Tesfamariam Tel: (619) 993-2448 Email: solomon.tesfamariam@nrc-cnrc.gc.ca	
Thorne Butte: Decision Partners Inc.							✓			✓		✓	✓		Expertise: Strategic risk communications processes, methods and tools applied to issues related to health, environment, electricity, new technology, and siting projects; multi-stakeholder, multi-channel stakeholder engagement processes; public judgment; strategic planning; training; innovation management; mental models research.	Sarah Thorne President Tel: (519) 337-9000 Email: sthorne@decisionpartners.com	www.decisionpartners.com
Egmond Associates Ltd.										✓		✓			Expertise: Public interest.	John Van Egmond President Tel: (800) 267-4797 Email: jvegmond@aztec-net.com	www.egmondassociates.com
W & W Radiological & Environmental Consultant Services					✓										Expertise: Ionizing radiation risk.	Murray L. Walsh Tel: (416) 730-8490 Email: murraywalsh@rogers.com	
Rideau Strategy Consultants Ltd.											✓				Expertise: All aspects of risk analysis, as an important part of cost-benefit analysis.	Kenneth Watson Partner Tel: (613) 745-8433 Email: ken.watson@sympatico.ca	www.rideaugroup.com
Black and White Communications Inc.													✓		Expertise: Risk communication.	Kathryn White President Tel: (613) 224-8228 Email: blackandwhite@magma.ca	
Mestor Associates										✓		✓			Expertise: Risk perception and risk management policy.	Anne Whyte Tel: (613) 445-1305 Email: mestor@sympatico.ca	

Specialist Consultant	Bio	Chem	Expl	Fore	RadNuc	Security Intel	Environment, Health and Safety	Transport and Logistics	Critical Infrastructure	Policy Governance and Mgmt	Economics and Financial	Psycho-Social	Risk Communications	Decision-Analysis, Modelling, Process Mgmt	Risk Assessment	Contact Info	Website
AECL Research		✓			✓		✓							✓	Expertise: Technical safety and reliability analysis techniques for nuclear chemical, process industries (FTA, FMEA, HAZOPS, ETA, HR consequence analyses); process plant management systems reviews.	David J. Winfield Safety and Reliability Analysis Tel: (613) 584-3311 Email: winfieldd@aecl.ca	www.aecl.ca
Ontario Power Generation											✓				Expertise: Financial risk control; enterprise-wide risk management; emergency response; loss management.	Christopher M. Young Plant Manager Tel: (416) 592-3202 Email: chris.young@opg.com	www.opg.com
Environmental Sciences Group Royal Military College of Canada							✓								Expertise:risk management, the development of remedial technologies and applied research, environmental assessment, remediation projects at contaminated sites, and research in bioremediation in harsh climates, contaminant uptake in the food chain, impacts from mining, and phytoremediation of metal-contaminated soil.	Kenneth J. Reimer Tel: (613) 541-6000, ext. 6161 Email: reimer-k@rmc.ca	www.rmc.ca/academic/gradrech/esg/index_e.html
Sunoco Inc. Sarnia Refinery							✓								Expertise: environmental and occupational health issues relating to risk to human health	Vince Gagner Environment, Health & Safety Tel: (519) 3873-3606 Email: VGagner@Suncor.com	

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List of symbols/abbreviations/acronyms/initialisms

CBRNE	Chemical, Biological, Radiological, Nuclear and Explosives
CNIMS	Canadian National Incident Management System
CSA	Canadian Standards Association
CSS	Centre for Security Science
DFAA	Disaster Financial Assistance Arrangements
DRDC	Defence Research and Development Canada
EMO	Emergency Management Organization
H/USAR	Heavy Urban Search and Rescue
ISO	International Standards Organization
ISO TC	International Standards Organization Technical Committee
JEPP	Joint Emergency Preparedness Program
NFPA	National Fire Protection Association

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13. ABSTRACT

Defence Research and Development Canada (DRDC), Centre for Security Science (CSS) is engaged in several initiatives toward the development of an all-hazards risk assessment model and tools that will contribute to Canadian preparedness for response to terrorism and other hazards. This Contract Report represents the findings of work conducted in support of the Capability Based Planning Pilot Project lead by the CSS Forensics Portfolio Manager. Specifically, the report identifies potential partnership opportunities with academic research institutes that share a common interest and expertise in analyzing risk to Canadians from all-hazards, including Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) threats; facilitates collaborative initiatives that support validation of risk assessment tools – specifically the connectivity between tools that assess intentional (CBRNE threats) and unintentional (natural hazards) threats; and, provides insights relating to sustainability of emergency response across non-federal levels of government.

Le Centre des sciences pour la sécurité (CSS) de Recherche et développement pour la défense Canada (RDDC) a entrepris de nombreux projets visant l'élaboration d'outils et d'un modèle d'évaluation de tous les risques, qui contribueront à améliorer la préparation du Canada à une intervention en cas d'acte terroriste ou d'autre situation de menace. Le présent rapport de contrat fait état des conclusions du travail effectué à l'appui du Projet pilote sur planification axée sur les capacités, qui est dirigé par le gestionnaire du portefeuille judiciaire du CSS. Plus particulièrement, le rapport détermine les possibilités de partenariat avec des établissements universitaires et de recherche qui, comme nous, ont de l'intérêt et de l'expertise dans l'analyse des risques auxquels sont exposés les Canadiens et Canadiennes, y compris les menaces d'incidents liés aux dispositifs chimiques, biologiques, radiologiques, nucléaires et explosifs (CBRNE). De plus, il traite des initiatives réalisées, en partenariat à l'appui de la validation des outils d'évaluation des risques – notamment la connectivité entre les outils d'évaluation des menaces intentionnelles (CBRNE) et des menaces non intentionnelles (catastrophes naturelles) ainsi que de la viabilité des interventions d'urgence aux échelons non fédéraux.

14. KEYWORDS, DESCRIPTORS or IDENTIFIERS

Capability Based Planning: Sustainable Non-Federal Emergency Management: All-Hazards Risk Assessment