

Code Orange: Towards the Future of Strategic Leadership of Emergency Management Systems

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Towards the Future of Strategic Leadership of Emergency Management Systems***

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Abstract

Emergency management systems reflect require strategic leadership of an order not yet fully potentiated in Canada. When we ponder on past tragic events across Canada, what is the future role of strategic leaders in emergency management? A key informant study examines the perspectives of emergency, health care and IT leaders on the challenges of emergency management systems across Canada. The study underscores the eight unique strategic leadership challenges in this important specialization.

Introduction

Emergency management systems reflect require strategic leadership of an order not yet fully potentiated in Canada. Emergency management systems encompass management and care processes inherent in three critical events: emergencies, disasters and catastrophes. The literature is replete with references to a range of emergency management systems cases.¹⁻¹⁸ Emergencies are small-scale, common and largely predictable events that are managed with regional resources. Disasters are those that overwhelm regional resources and require multi-regional emergency responses and collaboration. Typically, mortality and morbidity exceed 10 and 100 persons respectively. Catastrophes are extreme disasters that paralyze, or destroy, critical community infrastructures and require multi-regional, national and international responses. The safety and well-being of individuals and the integrity of communities remain the core mission of emergency systems. The extant literature underscores the critical importance of emergency management leadership.¹⁹⁻³⁷ In particular, emergency management requires strategic leadership of five integrated components that are crucial in mitigating the loss of life, injuries and community disruptions. Figure 1 highlights each of the components, including emergency prevention; preparedness; response and care; recovery and rehabilitation; and auditing and learning along with their associated emergency management processes.

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Methods

The literature underscores the continuing relevance of key informant methodologies.³⁸⁻⁴³ To date, there have been no such studies on the perceptions of professionals on emergency management and leadership challenges in Canada. In this study, a questionnaire was designed, then was reviewed and approved by the Research Ethics Board of the University of Ottawa. A number of professional associations were approached to see whether they would agree to issue a general invitation to their membership to participate in this confidential study on emergency management leadership. The Canadian Association of Fire Chiefs, the Canadian Association of Social Workers, the Canadian College of Health Leaders and the Canadian Information Processing Society-Canada's IT professional association consented to participate. Other invited associations included the Canadian Association of Chiefs of Police, the Paramedic Chiefs of Canada and the Canadian Nurses Association, but did not respond within the given four-week limit.

Interested professional members was asked to contact the researcher within a six week time limit and were then sent a link to a confidential survey questionnaire in a secure database under the researcher's name with an online cloud-based company. As part of the confidential survey, key informants were asked to read and complete an explicit statement of consent and only then asked to complete the questionnaire or arrange to have a teleconference semi-structured interview, based on the questionnaire within a four-month window. The questionnaire was composed of 26 questions in six parts. Aside from their background, key informants were asked to describe one type of life-threatening encounter during the course of their work and comment on emergency management performance. They were also asked to list performance challenges; leadership qualities; and five future threats. They were also asked to comment on organizational plans for emergencies; future pertinent technological developments; and on partnerships with the IT sector. Seven key informants opted for a semi-structured interview by teleconference, during which the interviewer made detailed notes of the responses. The interviewer verbally summarized the key points to the interviewee thus affording the opportunity to correct or clarify any points. The results of the questionnaire and the interviews were then culled, analyzed and summarized into major themes.

Of the 103 questionnaires received within the four week month, 17 questionnaires had negligible responses and were dropped from the survey. The response rate was 83.5 percent with 86 key informants, representing 76 organizations across Canada, including two from the United States, as summarized in Table 1. Of 86 key informants, 89 percent were senior professionals with 10 years and over of experience and 11 percent had less than 10 years. Moreover, 32.6 percent were emergency and health professionals; 17.4 percent were governance professionals; 16.3 percent were fire and rescue officers; 12.8 percent were clinicians in emergency care; 11.6 percent were military force professionals and 9.3 percent were IT professionals.

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Results

The key informant study results were summarized and highlighted into three integrated constructs.

1. Emergency preparedness and performance

Table 2 summarizes five categories of threats on individuals and communities that constitute potentially significant emergencies; highlights the experiences of 46 respondents and identifies the perceived future threats. Forty-five per cent of respondents reported that updated business continuity, emergency preparedness and disaster recovery plans were in place in their organizations; 33 per cent had one or two of these in place; 21.0 per cent had none, or did not respond. Performance management is predicated on emergency efficiency (response, transport and discharge rates) and effectiveness (mortality, morbidity, recovery, professional burnout and patient/family satisfaction rates). Key informants reported that the emergency care response system performed as well or better than expected in efficiency terms, even if there was a 100% mortality rate, due to

the catastrophic nature of the event. Two key informants reported that despite excellent emergency response and care provided, professionals suffered from burnout and long-term post-traumatic stress disorder for which there was little recognition of, nor support for. This underscored the importance of emergency professionals who themselves are potential victims in the course of their work.

PLACE TABLE 2 HERE

2. Future IT developments and partnerships

The key informants concurred that technological innovations and deployments are crucial in emergency management. From advanced transportation technologies, such as drones and driverless vehicles, to autonomic computers, massive terabyte storage facilities, nanotechnology, robotics and ubiquitous sensor technologies- all will have the potential to save lives and decrease injuries in the future. This optimism was tempered with the realization that the deployment of innovations would be diffuse and inexorably slow in the light of sociopolitical and financial realities in Canada. The effectiveness of emergency management depends on reliable and secure telecommunications between critical systems that comply with interoperability standards. Key informants stressed that the lack of systems interoperability was one of the single greatest barriers to effective emergency systems and underscored that these were sociopolitical issues, not technological ones. Nor were key informants hopeful that partnerships with the private IT sector would bear fruit and be instrumental in the diffusion of key technologies. Respondents stressed that differences in mission, perceptions and values between the sectors militated against cogent and stable partnerships. However, they did think that cooperation and engagement of the private sector as key stakeholders was deemed important in three critical areas, including supply chain management networks, particularly in disaster recovery; coordinating in emergency preparedness efforts; and technological innovations and diffusion.

3. Emergency leadership and governance

Leaders should have a cogent knowledge and proven expertise in all emergency management phases, as well as a solid foundation of legal and sociopolitical contexts in which these phases take form. Cognitive skills, such as strategic and systems thinking in the face of complexity and pressing uncertainty, were also important. Key informants repeatedly stressed the need for strategic leadership in building collaborating networks of diverse professionals and community stakeholders through trust and respect relationships. Negotiation, conflict resolution and openness to innovation and change were also highlighted part of leadership skill sets engaging communities. Highly-developed interpersonal and communication skills were deemed important, as were emotional intelligence and professional competence. Leadership competencies underscored included analytical abilities and performance management. Key leadership attributes included accountability, discipline, empathy, professional ethics, personal integrity, and a high tolerance for stress and uncertainty. Repeatedly, the key informants underscored the importance of adaptability, courage, discipline, equanimity, initiative, and tenacity in the heat of battle. Situational and self-awareness of personal limitations and the ability to delegate authority were deemed important. Strategic leaders were deemed to have a responsibility within governance authorities to encourage cogent, proactive and visible approaches to emergency management on the part of all levels of governance. In particular, militating for legislation and regulations that would facilitate systems interoperability and effective inter-organizational collaboration was identified as an important leadership responsibility.

Critical Strategic Leadership Challenges

Table 3 highlights the key findings of the key informant study, which underscore eight critical strategic leadership challenges in the future of emergency management.

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1. Strategic leaders must think of the “unthinkable”. Emergencies often incubate silently and mask dangerous warning signals, latent problems and potential failures. Denial of red flags of smoldering crises continues to be one of the greatest challenges in emergency management and that remain political and psychological by nature. On an individual level, the consequences of denial are shock, disbelief, paralysis, panic and even disregard. On an organizational level, failure to pay attention to warning signals leads to systemic paralysis, reactive responses, chaos and undue delays that often prove disastrous for individuals, organizations and communities. Emergencies challenge set beliefs, expectations, perceptions and understanding of reality. Emergencies are rarely only visual assaults, they also engage auditory, tactile and olfactory senses that shock and paralyze the psyche. They often challenge the normalized view of ordered entities of reality and convolute it into the unthinkable. Prior experiences with emergencies and high level training remain important as they assist in overcoming the cognitive shock and information overload in actual emergencies. This allows leaders to maintain equanimity and decisiveness in the exercise of their responsibilities to save lives, reduce physical and psychological injuries and maintain organizational and communal integrity.

2. Strategic leaders must analyze threats and vulnerabilities faced regionally, nationally and internationally. This points the need for environmental perception and situational awareness of the risks, threats, vulnerabilities and potentially needed resources. Mitigating risks, strengthening the public health and safety legislation; land use planning; closing socioeconomic gaps; health promotion; emergency preparedness; strong medical care and recovery systems; community resilience and strengthening of critical emergency infrastructures-all mitigate risk. None of these happen without cogent leadership in emergency management. Moreover, leaders understand that threats always have the potential to compound and to escalate posing further risks.

3. Strategic leaders must forge effective emergency collaborative networks between diverse stakeholders. The survivability of individuals and viability of organizations and communities ultimately depend on it. Effective collaboration leads to information and resource sharing and systems interoperability that underpin effective emergency responses. The importance of identifying and engaging multiple stakeholders in emergency management through such networks remains paramount. Diverse stakeholders not only include the range of emergency professionals and care providers, but also advocacy and community groups, the military, non-governmental organizations and the private sector. Such

collaborative engagements are crucial in building understanding, trust and resilience. Effective collaboration requires cogent inter-organizational linkages between multiple political and jurisdictional authorities, be they regional, national or international.

4. Strategic leaders must engage individuals, organizations and communities in emergency preparedness as a social responsibility. This remains the vital core of planning and the praxis of the emergency management. Without effective business continuity, emergency response and recovery plans, individuals, organizations, and communities are far less able to respond, cope and fully recover. Emergency preparedness is not just the domain of the trained emergency professionals, but central to the integrity of organizations and communities. Resilience depends on engaging and creating social consciousness and motivation to help others. Emergency systems performance ultimately depends emergency preparedness and its integration as a social responsibility organizationally, regionally, nationally and internationally.

5. Strategic leaders must strive to create high reliability organizations in emergency management. Continuous learning and improvement and adaptability are the hallmarks of such organizations that mitigate the impact of, if not prevent, emergencies in environments efficiently and effectively. Creating and sustaining such organizations remains a challenge in the absence of effective and reliable telecommunications and advanced decision support systems. Systems interoperability is the basis for data and resource sharability between organizations. Inter-regional commonality in IT standards, policies, processes and procedures strengthens the effectiveness of critical emergency infrastructures. Germane to high-reliability organizations is the deployment of systems engineering techniques, such as benchmarking, Kaizen (continuous improvement), lean methodologies, root cause analysis, simulations and total quality management in the pursuit of greater efficiency and positive outcomes in emergency management.

6. Strategic leaders must have logistical plans that assure effective access to supply chain networks. Deploying critical personnel, resources and supplies in place efficiently, harmoniously and effectively is of paramount importance, particularly in disaster situations. Forging strong linkages with military infrastructures with chains of command together with well-developed and secure transportation networks are key to effective delivery of emergency relief and resources. Moreover, leaders have to assure that logistical plans include access to effective supply chain networks through governance, military, non-governmental and private sector organizations.

7. Strategic leaders must leverage innovative technologies to transform emergency management. The potential to transform emergency management through a panoply of technological innovations that are on the horizon is massive. Such technologies include advanced global communication and tracking systems, autonomic and intelligent systems, big-data storage systems, cloud-computing, driverless vehicles, drone technology, holographic applications, intelligent grid technologies, robotics, sensor nanotechnology, simulation learning systems, telemedicine, tele-surgery, and virtual incident command centers. Strategic leaders must pave the way transformative changes in emergency management in collaboration with diverse stakeholders, including those from the private sector. Leaders must be technologically savvy and able to effect positive deployments of innovations through systems and change management skills and strategies.

8. Strategic leaders must have foresight and vision informed by compassion. Foresight and a compelling vision that inspires and motivates others are hallmarks of strategic leaders. Leaders must have an intuitive understanding of the interrelatedness of environments and organizations. The ability to effectively communicate that vision and inspire others to collaborate and integrate emergency efforts is crucial. Empathy and compassion must inform that vision. Yet at the same time, leaders know and understand human and socio-political behaviour and limitations. Strategic leaders have the humility to know that the forces at work may at times be beyond human comprehension and control. Leaders and communities are neither omnipotent nor are deities. Yet even with that, foresight and vision must still see the day and inspire others in the continuous struggle of not only saving lives, but also increasing the quality of lives.

Conclusion

Emergencies never end at the door of emergency departments, but rather when victims, care providers and communities have fully recovered from and emotionally accepted the ordeals experienced. The magnitude and frequency of regional, national and global emergencies, disasters and catastrophes will undoubtedly increase in the face of growing populations exposed to increasing threats in vulnerable environments. Strategic leadership in emergency management will continue to have significant responsibilities in the future evolution of emergency critical infrastructures in Canada and internationally. In the face of systemic constraints on finances and resources and given limited political will and public support, effective and sustainable emergency systems will continue to require strong and cogent strategic leadership. In the quest to forge continuous collaboration and integration of emergency management efforts, such leadership will be crucial. Moreover, leadership will be the catalyst that will create integrated virtual organizations through the deployment of advanced technologies that will interoperate regionally, nationally and internationally. Transformational leadership that seeks to harmonize of emergency management policies and strategies with the regional, national and global communities will actualize this future for the common good.

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References

1. Ainuddin S, Routray JK. Institutional framework, key stakeholders and community preparedness for earthquake induced disaster management in Balochistan. *Disaster Prev Manage* 2012; 21 (1): 22-36. doi:10.1108/09653561211202683.
2. Albright EA. Policy change and learning in response to extreme flood events in Hungary: An advocacy coalition approach. *Policy Stud. J* 2011; 39(3): 485-511. doi: 10.1111/j.1541-0072.2011.00418.x.
3. Anantharaman V. Impact of health care system interventions on emergency department utilization and overcrowding in Singapore. *Int J Emerg Med* 2008; 1(1):11-20. doi: 10.1007/s12245-008-0004-8.
4. Banerjee A. The impact of process re-engineering on patient throughput in emergency departments in the United Kingdom. *Int J Emerg Med* 2008; 1(3):189-92. doi:10.1007/s12245-008-0055-x.
5. Cheng SS. Crisis communication failure: A case study of typhoon Morakot. *Asian Social Science* 2013; 9(3): 18-32.
6. Chitakornkijsil P. Disaster and risk management in a global world. *IJOI* 2010;3(2): 97-113.
7. Eshghi, K, Larson RC. Disasters: Lessons from the past 105 years. *Disaster Prev Manage* 2008; 17(1), 62-82. doi: 10.1108/09653560810855883.
8. Guskova AK. Medical consequences of the Chernobyl accident: Aftermath and unsolved problems. *Atomic Energy* 2012; 113(2): 135-42. doi:10.1007/s10512-012-9607-5.
9. Ha KM. Moving toward balanced R&D in Korean emergency management. *IMPP* 2013;15(2): 194-204.
10. Ibrahim MS. An overview on the technological disasters. *Disaster Prev Manage* 2007; 16(3): 380-90. doi: 10.1108/09653560710758332.
11. Kumar S. Managing risks in a relief supply chain in the wake of an adverse event. *OR Insight* 2011; 24(2): 131-57. doi: 10.1057/ori.2011.4.
12. Momani, NM. Integrated framework for earthquake consequences management. *Disaster Prev Manage* 2011; 20(3): 314-33. doi: 10.1108/09653561111141745.
13. Oloruntoba R, Gray R. Customer service in emergency relief chains. *JPDLM* 2009; 39 (6): 486-505. doi: 10.1108/09600030910985839.
14. Seyedin SH, Jamali, HR. Health information and communication systems for emergency management in a developing country Iran. *J Med Syst* 2011; 35 (4): 591-607. doi:10.1007/s10916-009-9396-0.
15. Simpson NC, Hancock PG. Fifty years of operational research and emergency response. *J.Oper.Res.Soc.* 2009; 60 (05): S126-139. doi:10.1057/jors.2009.3.
16. Unlu A, Kapucu N, Sahin B. Disaster and crisis management in Turkey: A need for a unified crisis management system. *Disaster Prev Manage* 2010; 19(2), 155-74. doi: 10.1108/09653561011037977.
17. Van De Walle B, Turoff M. Decision support for emergency situations. *ISeB* 2008; 6(3), 295-316. doi:10.1007/s10257-008-0087-z.
18. Xu K, Li W. An ethical stakeholder approach to crisis communication: A case study of Foxconn's 2010 employee suicide crisis. *J. Bus. Ethics* 2013; 117(2): 371-86. doi:10.1007/s10551-012-1522-0.
19. Aradau C, Van Munster R. Governing terrorism through risk: Taking precautions, (un)knowing the future. *Eur. J. Int. Rel* 2007; 13(1): 89-115,148.
20. Baker DP, Day R, Salas E. Teamwork as an essential component of high-reliability organizations. *Health Services Research* 2006; 41(4 Part 2): 1576-98.
21. Basher R. Disaster impacts: Implications and policy responses. *Social Research* 2008; 75(3): 937-54, 1033.
22. Caro DHJ. Towards systemic sustainable performance of TBI care systems: Emergency leadership frontiers. *Int J Emerg Med* 2010; 3 (4): 357-65. doi: 10.1007/s12245-010-0252-2.
23. Crawford L, Langston C, Bajracharya B. Participatory project management for improved disaster resilience. *IJDRBE* 2013; 4(3):317-33.
24. Curry C. A perspective on developing emergency medicine as a specialty. *Int J Emerg Med* 2008.1:163-67. doi:10.1007/s12245-008-0056-9.
25. Decker WW, Stead LG. Application of lean thinking in health care: a role in emergency departments globally. *Int J Emerg Med* 2008; 1.3:161-62. doi: 10.1007/s12245-008-0057-8.
26. Hayes PAJ, Omodei, MM. Managing emergencies: Key competencies for incident management teams. *Aust N Z J Organisational Psychology* 2011; 4(April 1):1-10. doi:10.1375/ajop.4.1.1.

27. Henstra D. Evaluating local government emergency management programs: What framework should public managers adopt? *Publ. Admin. Rev* 2010; 70(2): 236-46.
28. Ilhan AM. The humanitarian relief chain. *South East European Journal of Economics and Business* 2011; 6 (2): 45-54.
29. Jaques T. Embedding issue management as a strategic element of crisis prevention. *Disaster Prev Manage* 2010; 19(4): 469-82. doi: 10.1108/09653561011070385.
30. Kapucu N, Arslan T, Demiroz F. Collaborative emergency management and national emergency management network. *Disaster Prev Manage* 2010; 19(4): 452-68. doi:10.1108/09653561011070376.
31. McEntire D. Understanding and reducing vulnerability: From the approach of liabilities and capabilities. *Disaster Prev Manage* 2011; 20(3): 294-313. doi:10.1108/09653561111141736.
32. McGuire M, Silvia C. The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: Evidence from local emergency management. *Publ. Admin. Rev* 2010; 70(2): 279-88.
33. Ncube LB, Wasburn MH. Strategic collaboration for ethical leadership: A mentoring framework for emergency management and organizational decision making. *JLOS* 2006; 13(1): 77-92.
34. Schrijvers, G. The integration of chronic care and emergency medicine. *Int. J. Integrated Care* 2008; 8(2):1-2.
35. Shughart WF,II. Disaster relief as bad public policy. *Indep. Rev* 2011; 15(4): 519-39.
36. Van de Vactor JD. Cognizant healthcare logistics management: Ensuring resilience during crisis. *IJDRBE* 2011; 2(3): 245-55. doi:10.1108/17595901111167114.
37. Wiist WH, Barker K, Arya N, Rohde J, Donohoe M, White S. et al. The role of public health in the prevention of war: Rationale and competencies. *Am J Public Health* 2014; 104(6): e34-47.
38. Cooper T. Exploring strategic risk in communities: Evidence from a Canadian province. *Journal of Enterprising Communities: People and Places in the Global Community* 2012;6 (4): 350-68. doi:10.1108/17506201211272788.
39. DeJong TM, Overholser JC. Assessment of Depression and Suicidal Actions: Agreement between Suicide Attempters and Informant Reports. *Suicide & Life - Threatening Behavior* 2009; 39 (1): 38-46.
40. Di Ruggiero E, Cohen JE, Cole, DC. The Politics of Agenda Setting at the Global Level: Key Informant Interviews regarding the International Labour Organization Decent Work Agenda. *Global Health* 2014. 10 (1): 56. doi: 10.1186/1744-8603-10-56.
41. Gamboa-Maldonado T, Marshak HH, Sinclair R, Montgomery S, Dyjack D. Building capacity for community disaster preparedness: A call for collaboration between public environmental health and emergency preparedness and response programs *Journal of Environmental Health* 2012; 75(2), 24-9.
42. Morison S, McMullan C. Preparing for the future: Challenges and opportunities for management and leadership skills. *Br Dent J* 2013; 214 (1): E2. doi:10.1038/sj.bdj.2012.1177.
43. Shoaf K, Estorio de Castro CO, Miranda ES. Hospital preparedness in advance of the 2014 FIFA world cup in Brazil. *Prehosp Disaster Med* 2014; 29 (4): 409-12. doi:10.1017/S1049023X1400065X.

Figure 1: Strategic Leadership: Emergency Phases and Processes

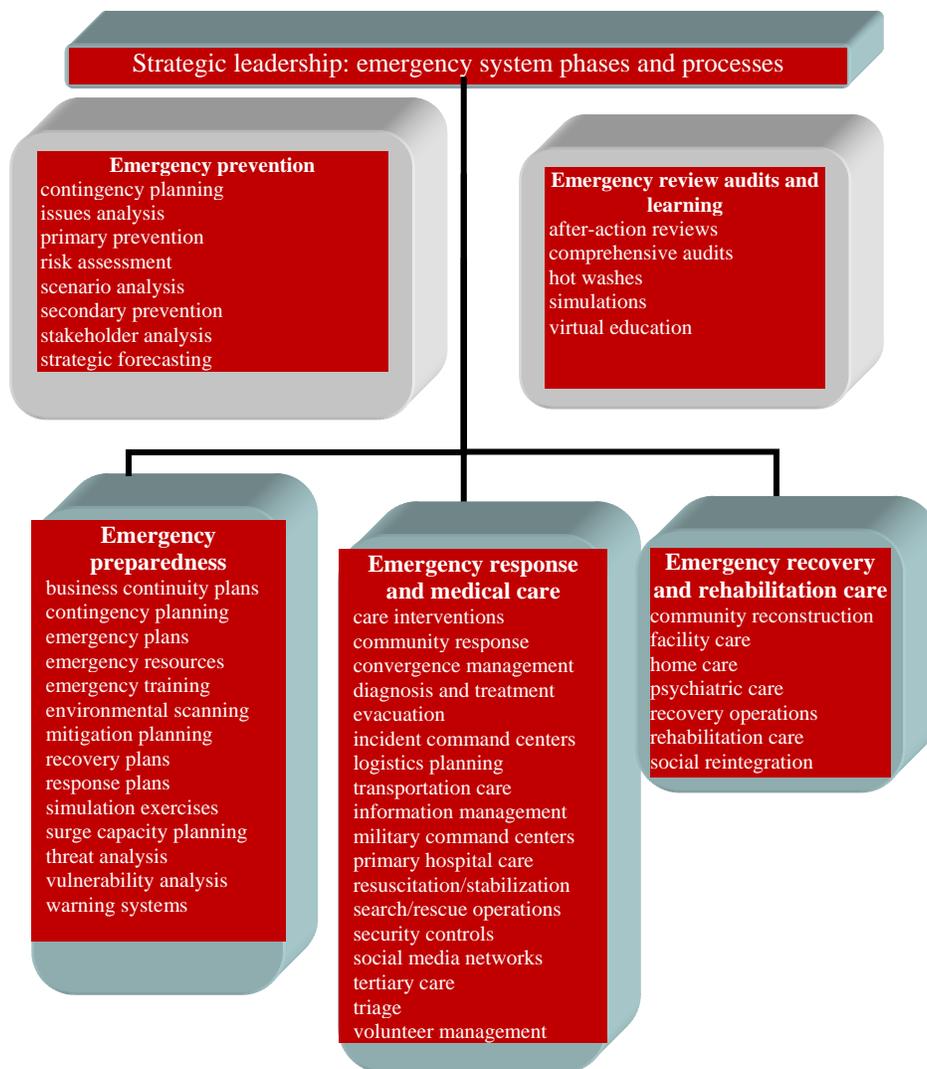


Table 1: Summary of key informants

*Aboriginal Affairs and Northern Development Canada
 Alberta Health Services, Edmonton, Alberta
 Alberta Investment Management Company, Edmonton, Alberta
 Ambulance New Brunswick, Moncton, New Brunswick
 AMITA Corporation, Ottawa, Ontario
 *Arnprior and District Memorial Hospital, Arnprior, Ontario
 BC Cancer Agency, Vancouver, British Columbia
 Bell Canada, Ottawa, Ontario
 Brant County Fire Department, Paris, Ontario
 Businesstech Consulting, London, Ontario
 Calgary Fire Department, Calgary Alberta
 Canadian Association of Fire Chiefs, Ottawa, Ontario
 Canadian Blood Services, Ottawa, Ontario
 Canadian Coast Guard, Gatineau, Quebec
 Canadian College of Health Leaders, Ottawa, Ontario
 Canadian Forces Health Services Centre, Cold Lake, Alberta
 Canadian Forces Health Services Group, Ottawa, Ontario
 Canadian Forces Military Police, Ottawa, Ontario
 Central Ambulance Communications Centre, London, Ontario
 Central West Local Health Integration Network (LHIN), Brampton, Ontario
 Centre for Emergency Preparedness and Response, Ottawa, Ontario
 CGI, Ottawa, Ontario
 Children's Hospital of Eastern Ontario, Ottawa, Ontario
 City of Calgary
 City of Ottawa
 Collingwood Fire Department, Collingwood, Ontario
 Corner Brook Fire Department, Corner Brook, Newfoundland and Labrador
 Department of Fisheries and Oceans, Ottawa, Ontario
 Emergency Health Services, London, Ontario
 Emergency Management and Public Safety Institute (formerly Canadian Centre for
 Emergency Preparedness), Toronto, Ontario
 Emergency Management Ontario, Toronto, Ontario
 e-Privacy Management Systems Inc., Lakefield, Ontario
 Florida Department of Management Services, Tallahassee, Florida
 *Foresight Canada
 Fort Erie Fire Services, Fort Erie, Ontario
 Fraser Health Authority, Surrey, British Columbia
 Grey Bruce Health Services, Owen Sound, Ontario
 Heart and Stroke Foundation of Canada, Ottawa, Ontario
 Highlander Counselling and Mediation, Edmonton, Alberta
 Humber Institute of Advanced Learning and Technology, Toronto, Ontario
 *IBM (Oracle), Ottawa, Ontario
 IBM, Oakville, Ontario
 Industry Canada, Ottawa, Ontario
 *International Association of Emergency Managers
 J. Garrow & Associates, Ottawa, Ontario
 KPMG, Toronto, Ontario
 Lakeview Manor, Durham Ontario
 Lansdowne Children's Centre, Brantford, Ontario
 London Health Sciences Centre, London, Ontario
 McGill Health Network, Montreal, Quebec
 Ministry of Community Safety and Correctional Services, Toronto, Ontario
 *Office of the Chief Coroner, Ministry of Community Safety and Correctional Services,
 Toronto, Ontario
 National Defence and the Canadian Armed Forces, Ottawa, Ontario
 National Office of Health Emergency Response, Public Health Agency of Canada, Ottawa,
 Ontario
 North York General Hospital, Toronto, Ontario
 Nova Scotia Department of Community Services, Halifax, Nova Scotia
 Office of Emergency Management, Plano, Texas
 Ontario College of Family Physicians, Toronto, Ontario
 Ontario Ministry of Health and Long Term Care, Toronto, Ontario
 Pacific Region, Canadian Coast Guard, Victoria, British Columbia
 Princess Margaret Hospital, Toronto, Ontario
 Public Health Agency of Canada, Ottawa, Ontario
 *Public Safety Canada, Ottawa, Ontario
 Quinte Health Care, Belleville, Ontario
 R. Scott Rowand & Associates Inc., Toronto, Ontario

Regina Fire and Protective Services, Regina, Saskatchewan
Richmond Fire and Rescue, Richmond, British Columbia
Royal Canadian Air Force, Kingston, Ontario
Sarnia Fire and Rescue Services, Sarnia, Ontario
Southeast Local Health Integration Network (LHIN), Belleville, Ontario
St. Michael's Hospital, Toronto, Ontario
Sudbury Regional Hospital, Sudbury, Ontario
Surrey Fire Service, Surrey, British Columbia
Thunder Bay Fire and Rescue, Thunder Bay, Ontario
Trillium Health Centre, Mississauga, Ontario
Vancouver Coastal Health, Vancouver, British Columbia
Vancouver Health Services Authority, Vancouver, British Columbia
Vancouver Island Health Authority, Victoria, British Columbia
Verras Canada Ltd., Toronto, Ontario
VHA Home Health Care, Toronto, Ontario
Waterloo-Wellington Local Health Integration Network (LHIN), Kitchener, Ontario

** Semi-structured interviews of key informants at their request.*

Table 2: Summary of key informant actual emergency experiences and perceptions of threats

Threat Categories	Examples	Key Informant Emergency Experiences	Key Informant Perceived Threats (%)
Biological	<ul style="list-style-type: none"> Biological agents and attacks Cardiovascular emergencies Epidemics and pandemics Food and/or water contamination Food and/or water shortages Immunity to antibiotics Infectious diseases Pandemic Psychiatric disorders Sports injuries and falls Suicidal ideation and behaviors 	<ul style="list-style-type: none"> ➤ Cardiovascular emergencies. ➤ Suicidal crisis intervention. ➤ H1N1 epidemic. ➤ Public venue suicide. ➤ SARS outbreak. ➤ Sudden deaths on public venues. 	26%
Meteorological	<ul style="list-style-type: none"> Blizzards Heat emergencies Hurricanes Ice storms Tornados Wind storms 	<ul style="list-style-type: none"> ➤ Hurricane Katrina restoration. ➤ Tornados touchdown points in rural Ontario. 	15%
Sociogenic	<ul style="list-style-type: none"> Border emergencies and shutdowns Collapse of public health and safety systems Criminal violence Cyberattacks Explosive devices Homicides Gang and tribal conflicts International conflicts Infrastructural damage, disruption and failure Mass violence Terrorist violence Social unrest and anarchy 	<ul style="list-style-type: none"> ➤ 911 command center operation in Manitoba. ➤ G8 and G10 emergency operations. ➤ Crisis intervention of a person with suicide ideation. ➤ Family homicidal incident. ➤ Suicide bomber in hospital emergency unit ➤ Olympics 2010 emergency preparation. ➤ War injuries and casualties in Afghanistan. ➤ Public venue suicide. 	18%

Technological	<ul style="list-style-type: none"> Airline accidents Bleves, conflagrations and firestorms Chemical and gas explosions Electrical grid failures Environmental accidents Facility and plant fires Hazards materials (HAZMAT) accidents Home and farm accidents Industrial and workplace accidents Infrastructure collapse Loss of energy, power and water resources Marine accidents and disasters Motor vehicle accidents (MVA) Nuclear accidents Oil and toxic spills Pedestrian accidents Rail accidents Space accidents Recreational/sports accidents Structural accidents Transportation accidents 	<ul style="list-style-type: none"> ➤ Abandoned plant fire and toxic fumes plume ➤ Bicycle/MVA collision ➤ Bus accident with pediatric emergencies. ➤ Bus/semi-tractor trailer collision ➤ CBRNe team response to ammonia leak ➤ Chemical explosion and conflagration. ➤ Chemical recycling plant explosion and conflagration. ➤ Collapse of a safety rail at public event in Ontario. ➤ Commercial building fire. ➤ Ferry boat sinking in British Columbia. ➤ Hospital fires. ➤ Motorcycle collisions. ➤ Multi-automobile collisions. ➤ Oil refinery explosion and conflagration ➤ Pedestrian/automobile collision. ➤ Pediatric MVA ➤ Rail transport with hazardous chemicals/MVA collision. ➤ Recreational burn accident. ➤ Residential complex fire. ➤ Residential house fires. ➤ Rural All-Terrain Vehicle (ATV) accident. ➤ Small aircraft crash Ontario. ➤ Swiss Air 111 tragedy. ➤ Train/pediatric accident. ➤ Transport truck tumbles off a bridge into a dry river bed. 	29%
Topological	<ul style="list-style-type: none"> Droughts and water shortages Earthquakes Catastrophic floods Forest and grassland fires Landslides and sinkholes Sinkholes Space weather (solar flares) Tsunamis 	<ul style="list-style-type: none"> ➤ Catastrophic flooding in Manitoba. ➤ Earthquake disaster Haiti. ➤ Forest wildfires of British Columbia. ➤ Hurricane Katrina. ➤ Tornado in rural Ontario. 	12%

Table 3: Salient highlights of key informant study on emergency leadership

Threats and vulnerability analysis

- Compounding and escalation of threats and vulnerabilities
- Continuous monitoring and situational awareness of environmental dangers
- Perceptual understanding regional, national and international threats and vulnerabilities
- Risk mitigation strategies

Systemic integration of emergency management systems

- Attention to professional burnout and post-traumatic stress disorder
- Community and social recovery
- Ecology of emergencies
- Emergency command centers
- Emergency medicine
- Emergency preparedness engagement
- Interoperability of telecommunication systems
- Physical, mental and social rehabilitation processes
- Primary and secondary prevention strategies

Collaborative network communities

- Cogent and stable collaboration through mutual trust and sharability
- Community group support
- Critical role of military command
- Engagement of regional, national and international governance organizations
- Stakeholder identification and analysis

Equanimity, composure and control in the face of horrors and tragic events

- Ambiguity with great uncertainty in the face of fluid situations
- Courage and humility
- Decisiveness under conditions of informational and sensory overload and stress
- Objectivity while maintaining compassion
- Personal integrity
- Prior emergency and clinical experiences
- Understanding human and socio-political limitations

Performance management

- Ability to identify <mudas> (wastages) through gemba walks (walking through the frontlines)
- Lean engineering applications to leverage efficiency
- Metrics to assess performance outcomes
- Metrics to monitor operational and response efficiencies
- Outcome-orientation that focuses on saving lives and reducing morbidities

Vision of future technological innovations

- Autonomic support to complement human perception and understanding
- “Big data” support of unstructured to create meaningful cognitive pictures
- Bringing the hospital to the field
- Change management strategies
- Drones monitoring of emergency scenes
- Robotic deployments
- Ubiquitous embedded sensor and tracking technologies

Coopting and engagement of private sector leaders

- Ability to bridge the different paradigms
- Collaboration in business continuity, emergency preparedness and recovery planning
- Innovation and implementation of information, communication and transportation technologies
- Private sector recognition and actualization of social responsibilities

Adaptive learning

- Promulgating a culture of continuous learning
- Performance analysis of emergency management components