Welcome to the Winter Edition of *CSSP Connect.*

The public safety and security landscape continues to evolve at a rate that requires us to constantly adapt and re-align priorities to ensure that we have the best tools and knowledge to respond to existing and emerging challenges. The collaboration efforts featured in our *CSSP Connect* newsletter are great examples of how we continue to adapt to change by supporting projects from a broad range of public safety and security domains. Your efforts demonstrate the value in bringing together the best minds from government, industry and academia, and play a significant role in keeping the lives and livelihoods of Canadians safe.

In this issue, you will find a feature exploring how behavioural changes across all levels of society can contribute to enhanced resiliency. You will also learn about the important role Canada's Platform for Disaster Risk Reduction (DRR) plays in connecting people, businesses and organizations in the public safety and security domains. You will read about how the CSSP supported the development of an innovative approach to assess the seriousness of burn wounds, as well as how one of the CSSP's precursor programs enabled Natural Resources Canada to develop and procure airborne gamma ray spectroscopy (AGRS) systems used in a major international nuclear explosion exercise. We also have a story from our partners in the Yukon Government on the integration of an all-hazards risk assessment (AHRA) process into an information system.

This issue also highlights recent DRDC CSS activities such as the 2014 DRDC CSS Awards and Recognitions Ceremony and DRDC CSS's first ever Twitter chat in partnership with the U.S. Department of Homeland Security Science and Technology Directorate.

Mark A. Williamson, Ph.D
Acting Director General,
DRDC Centre for Security Science

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Foray into the Twittersphere:
Centre for Security Science co-hosts the first DRDC Twitter Chat

On 30 January 2015, DRDC CSS and the United States (U.S.) Department of Homeland Security Science and Technology Directorate (DHS S&T) hosted a live Twitter chat to highlight the impact of the third Canada-U.S. Enhanced Resiliency Experiment (CAUSE III), held in November 2014.

@DRDC_RDDC

During the one hour chat session, interested partners were able to engage in an interactive discussion on Twitter with subject matter experts from both sides of the border. The event was a great success; providing a wonderful opportunity to demonstrate DRDC's engagement with partners and promote the impact of the CAUSE series. Based on post-event social media analytical data, there were a total of 673 Tweets generated from 118 different accounts. Those Tweets reached approximately 387,300 Twitter users worldwide and generated 2.4 million impressions. Not bad for DRDC CSS's very first Twitter chat!

The Canadian Safety and Security Program is led by Defence Research and Development Canada's Centre for Security Science, in partnership with Public Safety Canada

Canada

Keeping Pace with Change

By Dr. Mark Williamson

Since 9/11, the safety and security landscape in Canada and globally can best be described as volatile, uncertain, complex and ambiguous. In such a dynamic terrain, the challenge for safety and security practitioners (operators/responders, decision makers, policy makers, regulators, infrastructure owners, businesses, non-governmental organizations (NGOs), volunteers, communities, citizens) and elected officials is to plan, operate and deliver a program that satisfies Canadians' values and expectations for safe and secure lives and livelihoods. This is heightened by the horizontal nature of all safety and security issues within a largely vertical cultural and governance construct.

The overall societal goal of healthy, safe and secure communities is expressed increasingly within the overall notion of "resiliency". Therefore, making investments in knowledge, science and technology (S&T) within the safety and security domain can hugely impact on resiliency. Within the context of the Canadian Safety and Security Program (CSSP), this has been proven many times by your efforts. Fundamentally, however, the resiliency challenge requires a more effective, institutionalized inter-connectedness across all levels of governments and practitioners, which unfortunately, can sometimes be at odds with institutional, authority/accountability frameworks and culture. Thus, enhancing resiliency demands that we work to effect a degree of behavioural change across all levels of society.

To be effective, investments made in safety and security knowledge and S&T must be commensurate with the identified societal behavioural changes necessary. Optimizing this connection is necessary to transition investment products smoothly from the idea, knowledge and solution generators to the knowledge, technology and decision-maker receivers.

> **"... enhancing resiliency demands that we work to effect a degree of behavioural change across all levels of society."**

Increasingly, S&T programs in government focus on output productivity within an articulated suite of intermediate and longer-term goals and outcomes. There is little, if any, direct focus or strategy relating to what can be described as the behavioural or influential aspects of the "transition" issues described above. Within the compartmentalized and vertical nature of governments, this is perhaps not surprising, as these elements are often owned by entities having very little to do with S&T.

To partially address this issue, in 2012, the CSSP articulated the specific need to work the "transition" domain in a more systematic and strategic way by focussing both on the technology as well as on the behavioural challenges delivered within an identified framework.

Within this context, DRDC CSS needed to transform its relationships with the range of CSSP stakeholders and clients who generate and consume knowledge and technology. DRDC CSS recognized that it had to deliberately identify, plan and influence the interlinked behavioural changes and that it was as important as its core S&T investment planning.

Programmatically, two challenges exist:

» **To deliver on identified knowledge gaps and technology priorities; and**

» **To create the permissive, interconnected horizontal environment necessary to transition such technologies and knowledge.**

In many ways, transformation of this nature was a characteristic of the precursor programs that underpin the CSSP. From the initial inception of the chemical, biological, radiological, nuclear or explosive (CBRNE) Research and Technology Initiative (CRTI) in 2002, followed by the creation of the Public Security Technical Program (PSTP) in 2005, the former programs were innovative in this way. The 2006 stand-up of DRDC CSS through arrangement with Public Safety Canada was the initial response to the developing landscape. The 2012 harmonization of the pre-existing programs to become the CSSP followed. This essentially codified the requirement for continuous program adaptation, agility and focus on valued outcomes. The transformation is ongoing and continues to be adaptive to the constantly changing environment.

Canada

Canada's Role in the Comprehensive Nuclear-Test-Ban Treaty Organization's Largest-Ever Inspection Exercise

By John Buckle and Dr. Henry Seywerd

Over 2,000 nuclear test explosions occurred worldwide between 1945 and 1996. During that time, concerns over the danger of nuclear war, nuclear proliferation and exposure of populations and the environment to radioactive fallout motivated the creation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) maintains a worldwide monitoring network to detect nuclear explosions, and supplements this with the capability to perform an on-site inspection of a country suspected of having conducted a nuclear test. Under the CTBT, any signatory country can request an onsite inspection in another signatory country to verify whether a nuclear explosion has taken place.

In November 2014, a large contingent of international inspectors was sent to Jordan's Dead Sea region as part of a field exercise, "Integrated Field Exercise 2014", to simulate such a process. Their mission: Detect a nuclear explosion. The exercise was the largest one ever conducted by the CTBTO. More than 200 technical experts from over 40 countries used more than 120 tonnes of equipment to conduct a mock on-site inspection of 1,000 square kilometers, looking for evidence of a nuclear explosion. The inspectors had up to 55 days to collect evidence to prove if

a nuclear explosion had taken place. The evidence was then provided to the executive council for their final inspection report.

Canada — through funding from the Department of Foreign Affairs, Trade and Development (DFATD) and with participation of scientists from Natural Resources Canada (NRCan) — donated an airborne radiation measuring system that was used by CTBTO inspectors to assist in the verification of whether a nuclear explosion had taken place. The Canadian system was flown in a Jordanian Air Force Super Puma for six sorties, and the data was used in conjunction with other techniques such as visual observations, seismic networks, multi-spectral imaging and radionuclide sampling to provide evidence for the on-site inspection's final report.

Prior to the Canadian contribution to the CTBTO, funding through the former CBRNE Research and Technology Initiative (CRTI) and the current Canadian Safety and Security Program (CSSP) enabled NRCan to further develop and procure airborne gamma ray spectroscopy (AGRS) systems such as the one used by CTBTO inspectors during the exercise. These systems are also used to support the Federal Nuclear Emergency Plan and the national CBRNE team within Canada. ❯

CTBTO inspectors conducting an AGRS survey during Integrated Field Exercise 2014.

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CTBTO inspector preparing AGRS equipment in a Jordanian Air Force Super Puma prior to a morning sortie.

NRCan has been on the leading edge of the development of AGRS systems since the 1960s. The systems were designed for earth science applications — in particular, mineral exploration of uranium — but are also used in environmental monitoring, in consequence management applications following a nuclear accident, and to support security. In fact, an earlier version of this system was successfully used to find and map debris from the downed Russian nuclear powered satellite Cosmos 954 in the Northwest Territories in 1978, and in mapping low levels of Xenon-133 along the west coast of Canada as a result of the 2011 Fukushima nuclear disaster. CRTI funding to NRCan has further sustained exercises such as Exercise AS IS, Maritime Response, EXIT 08 and deployments of the system during the Vancouver 2010 Olympics, the G8/G20 meetings and the 2008 Francophonie Summit.

The Canadian system, built by Radiation Solutions Inc., was designed to be flown in a helicopter or a fixed winged aircraft and to be used to remotely detect gamma radiation. The key advantage of this technique is that large ground areas can be surveyed quickly and from a safe distance. NRCan designed the system and tested it with CTBTO staff in the spring of 2013. The system was delivered to Vienna (CTBTO headquarters), and NRCan provided in-flight and classroom training to the CTBT inspectors in Sicily, Italy (in September 2013) and in Hungary and Vienna (in the spring of 2014) as a lead up to Integrated Field Exercise 2014.

Looking forward, the Canadian AGRS system will remain with the CTBTO in Vienna, and NRCan intends to continue to support the CTBT by training inspectors, enhancing detection techniques, helping to develop operating procedures and maintaining the system. NRCan's expertise, which has been supported by the CSSP, will play a vital role in CTBTO on-site inspection in the future and contribute to the deterrence of further nuclear weapons testing.

John Buckle is a scientist with Natural Resources Canada. He is responsible for operations of the Nuclear Emergency Response Project of the Canadian Hazards Information Service. Dr. Henry Seywerd is a radiation physicist with Natural Resources Canada and project leader of the Nuclear Emergency Response Project of the Canadian Hazards Information Service.

Rethinking Roles in Disaster Risk Reduction - the 5th Annual National Roundtable of Canada's Platform

Canada's Platform for Disaster Risk Reduction (DRR) connects people, businesses and organizations with great ideas and important networks at its Annual Roundtable.

On October 21, 2014, over 150 DRR partners descended on downtown Toronto. The full-day event, hosted by Public Safety Canada, drew international speakers and attendees from all levels of government, the private sector, academia, non-governmental organizations, professional associations, Aboriginal groups and the general public.

The goal of the Annual Roundtable is to enable inclusive, horizontal and participatory dialogue with DRR stakeholders across Canada. It is an important consultative mechanism used to inform the development of key domestic DRR-related policy issues. As well, the Roundtable links participants to the international community and the global efforts of the United Nations (UN) International Strategy for Disaster Reduction, in addition to other emergency management activities. Throughout the program, participants were encouraged to share information, express opinions and inspire action.

To encourage dialogue, the Roundtable featured a talk-show-style panel on how to better balance cost-sharing for disaster response and recovery across levels of governments and with the insurance industry. Facilitated by a renowned Canadian journalist, the conversation on this complex and controversial issue was informed, relevant and captivating. The consensus was that money spent preventing disasters and mitigating their impact is a wise investment. The talk-show was then followed by a session on "Extreme of Extremes", which referenced examples of intense world disasters along with a Canadian context.

Other sessions were hosted by the Platform's working groups. They examined issues such as new techniques for analyzing disaster risk across Canada and also explored the additional risks faced by Aboriginal communities. Defence Research and Development Canada's Centre for Security Science (DRDC CSS) is actively engaged with these working groups in ➤

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a number of ways: Dr. Mark Williamson, Acting Director General, serves as the Co-chair of the Science and Technology Working Group; a number of DRDC CSS portfolio managers engage relevant working groups as part of their Community of Practice engagements; and the Canadian Safety and Security Program (CSSP) has funded a host of research initiatives across the various working groups. *"The Platform offers DRDC CSS an excellent opportunity to gain a greater understanding of the public safety and security landscape, which informs the CSSP priorities"*, said Dr. Williamson.

The Roundtable also opened the floor to industry to discuss their role in building Canada's community resilience. Vice-presidents from IBM and Walmart spoke about the business value of investing in disaster mitigation and enabling employees to contribute to resilience efforts. The CEO of the Global Disaster Innovation Group challenged participants to think in an innovative way, even in disaster response.

The final session of the day looked to the future direction of DRR, both domestically and at the international level. A consultative session sought feedback from participants on the evolution of emergency management towards a focus on community resilience and how Canada is contributing to the UN's goals on DRR.

Canada's Platform for DRR strives to enable an open dialogue among stakeholders and looks forward to receiving feedback from its membership on previous Roundtable events as well as on future topics that would provide a meaningful forum for the membership. Planning for next year's Roundtable is already under way. Please contact Canada's Platform Secretariat to share your ideas or to find out how to be connected to DRR work in Canada.

For more information on Canada's Platform for DRR, consult the Public Safety Canada website: www.publicsafety.gc.ca.

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Moving an All Hazard Risk Assessment Forward for the Provinces and Territories

By Kevin Janes and Richard Gorczyca

The National Enterprise Risk Management Initiative in the Public Sector (Initiative) commenced in late 2013. It has primarily focused on embedding an all hazards risk assessment (AHRA) process into an information system. The Initiative was made possible through funding provided by the Canadian Safety and Security Program (CSSP) and is led by the Government of Yukon. The governments of British Columbia, Saskatchewan, Manitoba, Nova Scotia, Northwest Territories and Nunavut are participating as members.

How do you bring an AHRA process to the provinces and territories? This question has occupied the minds of the project team, which includes staff members from the Government of Yukon, the Government of Nova Scotia and the systems development contractor Make IT Solutions. The project team looked for a common thread through the majority of the provinces and territories. That thread was a common interest in Enterprise Risk Management — that is, a focus on organizational risk. The project team noted that the AHRA process, through its use of impact categories and a questionnaire format, had overcome a number of issues associated with traditional risk assessment approaches. Aligning an Enterprise Risk Assessment (ERA) with the AHRA was the key selling point: it would allow governments to use a similar approach for both organizational and disaster risks.

The project team also recognized that many existing risk management systems simply act as a repository of risks, and may not support the facilitation of the risk analysis itself. Throughout the initiative, a great deal of thought was given to integrating each step of the ERA and AHRA into the system: setting the context, risk identification, risk analysis, risk evaluation and risk treatment. Furthermore, the project team was able to enhance the facilitation methods of the existing AHRA by designing the information system to integrate and complement these facilitation methods. The system includes a mobile scoring application for polling risk assessment participants. By integrating the system into the facilitation in this way, the facilitator is able to review live scoring results to stoke lively debate where needed.

The project team also explored unique and innovative ways to enhance the quality and usability of training materials (which many systems are lacking). The developed risk assessment process and its supporting system would be incomplete without strong training materials in place for the risk analysts who are asked to use it. A commitment was made to develop a series of professional system and facilitation training screencasts and other support materials.

Conducting an AHRA can be a daunting task for even experienced risk analysts. However, through the use of a common approach with ERAs, risk analysts in the provinces and territories should find the AHRA more accessible due to resulting cross-training opportunities. Through this initiative, each of the participating provinces and territories will have received training on the developed risk management process and system, a production-ready risk management information system, and access to training materials.

Kevin Janes is a Business Analyst for the Government of Yukon and Richard Gorczyca is the Acting Director of Risk Management for the Government of Yukon.

Canada

Burn Wound Assessment to Optimize Patient Outcome

By Dr. Michael G. Sowa

Burn injuries don't discriminate. From a toddler taking their first uncertain steps in the kitchen to the firefighter charging into a burning building or the soldier operating in theatre, all are at risk. Serious burn injuries can be life threatening — and are at the very least life altering.

Burn wounds are among the most challenging and expensive injuries to treat and manage. In a mass casualty event, the logistical requirements needed for burn wound management could overwhelm our national capacity. Beyond that, accurate and early assessment of the injury improve the recovery of the patient. The key question is: Will the wound heal with appropriate wound care, or is surgery necessary? The prognosis for these injuries is critically dependent on the supply of blood to the wound. For example, the depth of the burn is related to the healing capacity of the wound. However, assessing these injuries is very difficult. Until now, there have been no objective methods to aid in determining wound depth or healing potential. Generally, a wait-and-see approach is adopted, but waiting increases the risk of infection and the chance of a thicker scar. It can also prolong the pain of the healing wound.

Clinicians, scientists, engineers and entrepreneurs from the Hospital for Sick Children in Toronto, the National Research Council of Canada (NRC) and Kent Imaging[1] teamed up to develop a technology in response to these realities through support from the former CBRNE Research and Technology Initiative (CRTI) and the Canadian Safety and Security Program. This project will dramatically improve the management of burn injuries by enabling prompt and appropriate treatment. The technology uses state-of-the-art lasers and imaging technologies that can distinguish superficial and deeper burns by producing an image in a non-contact fashion. This allows the clinician to determine if the wound is being supplied with blood and receiving enough oxygen, which allows the clinician to decide whether or not the injury requires surgery.

To address some of the current gaps in casualty management, the technology was developed to be expedited to provide on-site incident management support, and optimize emergency centre operations, emergency triage, pre-hospital treatment as well as mass care. Beyond that, it can be used to assess chronic wounds, peripheral circulation (blood flow that reaches the upper and lower extremities of the body and the surface of the skin), surgical reconstruction and tissue transplantation.

A prototype has been built by Kent Imaging. It meets the Canadian Standards Association's requirements for medical devices, and Health Canada has approved its use for investigational testing at the Hospital for Sick Children. Dr. Joel Fish, Medical Director of the Burn Program at Sick Kids, will lead the first clinical evaluation of this technology in the spring of 2015. *"Experienced burn care providers cannot distinguish burn depth by just mere observation which results in either delayed treatment or sometimes over treatment"*, said Dr. Fish. *"We have received the new*

[1] A Calgary-based wound imaging company

prototype and will be using this immediately hoping to have a 'proof of concept' complete in the next six months while at the same time commencing a scientific study on burn depth measurement." The prototype, named KC-103, is based on oximetry imaging. That is to say, it measures the amount of oxygen in blood. It has recently received Food and Drug Administration (FDA) 510K market clearance and is undergoing extensive clinical trials.

Based on the clinical trials and innovations stemming from our current project, Kent Imaging will design a robust, field-portable version that can be widely deployed in clinical and field settings.

Dr. Michael G. Sowa is a Principal Research Officer and Group Leader for the Medical Devices Portfolio at the National Research Council of Canada.

The KC-103 from Kent Imaging is FDA approved for wound assessment and is undergoing clinical trials.

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DRDC CSS Awards and Recognition 2015

Every year, DRDC CSS recognizes its employees for their outstanding contributions and performance.

Last December 2014, **Sofi Blazeski**, **Ahmad Khorchid**, and **Carolane Parent** received an Award of Excellence for their dedication and innovative accomplishments in the implementation of the 2014-2015 CSSP Call for Proposals. **Violet Ma** received the same award for her professionalism as a creative problem solver demonstrating excellence in providing support to Human Resources at DRDC CSS.

Three DRDC CSS employees were also recognized for outstanding achievement in the following areas:

» **Paul Chouinard** for exceptional dedication to advancing critical infrastructure (inter) dependency analysis, superior knowledge of probability and network theory and the ability to reverse engineer complex software;

» **Greg Walker** for his leadership through exemplary use of effective communication and a flexible, proactive approach to problem solving to ensure efficient and effective client relations; and

» **Sonia del Castello** for her professionalism and commitment to providing excellent communications services and fostering a collaborative workplace environment.

In addition to the official awards, three employees were celebrated for the DRDC CSS special awards:

» **Brian Greene** for the development of portfolio narratives in support of the annual planning process for the CSSP;

» **Chantal Couture** for her contribution to the multi-national Resilience Policy Working Group;

» **Karen McLeod** for development of support tools for the CSSP and transforming program delivery into a smooth running process; and

» **Meaghan Dagenais** for her work on the Program Management Database.

Front row from left to right: *Sofi Blazeski, Chantal Couture and Karen McLeod.*

Back row from left to right: *Paul Chouinard, Ahmad Khorchid, Sonia del Castello, Carolane Parent, Violet Ma and Greg Walker.*

DRDC Published Reports

The following is a sample of selected DRDC CSS project reports published over the last several months. For a complete list, please contact us at css-info@drdc-rddc.gc.ca.

DRDC-RDDC-2014-C104
A Compton Gamma Imager for Criminal and National Security Investigation

DRDC-RDDC-2014-C298
A Roadmap for Investigation and Validation of Dry Fogging as a Decontamination Technology

DRDC-RDDC-2014-C52
A Software Framework for Spam Campaign Detection and Analysis

DRDC-RDDC-2014-C141
A Tool for Rating the Resilience of Critical Infrastructures in Extreme Fires

DRDC-RDDC-2014-C166
Accelerated Evidence Search Report

DRDC-RDDC-2014-C35
All Hazards Risk Assessment Transition Project: Report on Capability Assessment Management System (CAMS) Automation

DRDC CSS LR 2013-048
Analysis of the Operational Value of the National Energy Infrastructure Test Center (NEITC)

DRDC-RDDC-2014-C108
Cyber Intelligence Analysis Platform: Final Report

DRDC-RDDC-2015-C007
Data Centric Approach for SCADA Technology Assessment Study

DRDC-RDDC-2014-C172
Development of Canadian Diagnostic Capability for Rift Valley Fever Virus (RVFV)

DRDC-RDDC-2014-R113
eSecurity Portfolio Overview, Analysis of Value Added, and Way Ahead

DRDC-RDDC-2014-C303
Implementation of Individual System Qualification (ISQ) in a CBRN Respiratory Protection Program, Part A Guidance

DRDC-RDDC-2014-C126
Mitigating Dissemination of Bioterrorism Agents in Canadian Food Distribution Systems

DRDC-RDDC-2014-C158
Paramedic Physical Demands Analysis

DRDC-RDDC-2014-C66
Resilience of Critical Infrastructure to Extreme Fires - Gaps and Challenges

DRDC-RDDC-2014-R36
Risk Scan: A Review of Risk Assessment Capability and Maturity within the Canadian Safety and Security Program

DRDC-RDDC-2014-R16
Social Media in Emergency Management: Developing a Canadian SMEM capability

Please note that reports are published in the language of the author. If you wish to receive a copy of any of these reports, please send an email to css-info@drdc-rddc.gc.ca.

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