Defence Research and Development Canada

Recherche et développement pour la défense Canada

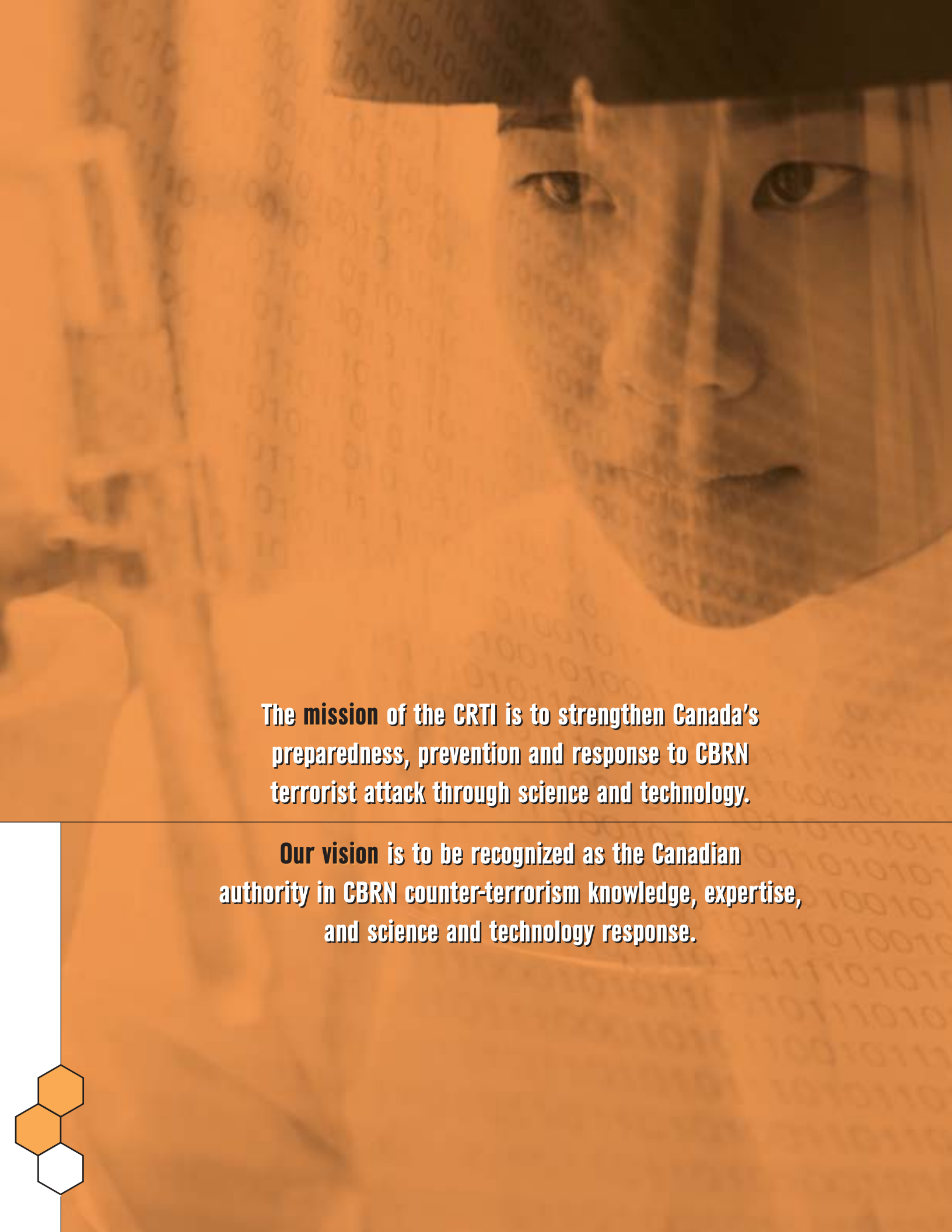
CRTI-IRTC

Science for a Secure Canada:

Building Communities

Annual Report 2002-2003

Canada



The mission of the CRTI is to strengthen Canada's preparedness, prevention and response to CBRN terrorist attack through science and technology.

Our vision is to be recognized as the Canadian authority in CBRN counter-terrorism knowledge, expertise, and science and technology response.

Science for a Secure Canada: Readiness for CBRN Terrorism

Well before the terrorist events of September 11, 2001 and the subsequent anthrax letter attacks in the United States, the Canadian government had been examining its state of emergency preparedness for such threats. Both the national security and science and technology (S&T) communities had been discussing the need for initiatives to address chemical, biological, radiological, and nuclear (CBRN) hazards preparedness and response. Shortly after the devastating attacks, the government began to plan for a national security budget. It turned to the federal science community for advice on how to proceed to make informed decisions on investments required to strengthen S&T capabilities and capacity.

Defence Research and Development (R&D) Canada was requested to engage the federal S&T community to assess the risk, the nation's science capability and capacity gaps, and to recommend an investment approach for CBRN S&T preparedness. As a result of this interdepartmental effort, the Public Security and Anti-Terrorism (PSAT) Budget of 2001 included funding for what was to become the CBRN Research and Technology Initiative (CRTI). It was the dedication and long hours devoted by the interdepartmental Interim Project Team that resulted in the launch of CRTI only five months later.

The CRTI reflects a new model for federal S&T. It represents a shift from traditional science policy because it uses new horizontal governance and management techniques. Three elements are fundamental to this new model. First, *understanding and assessing the risk* provides the scientific basis for identifying capabilities and gaps, and for prioritizing responses. Second, the creation of *Laboratory Clusters* provides the ability to leverage existing scientific expertise and facilities as well as to transfer scientific knowledge to a broader community. Third, building S&T capacity requires the *integration of effort from all national partners:* industry, academia, national security departments and agencies, and emergency response personnel.

CRTI has already become a model for innovation, relevance in S&T, leveraging expertise, S&T delivery, and horizontality in the federal government. This success is due to the commitment and excellence of the CRTI community. In this first year of operations, the groundwork has been laid for enhanced Canadian preparedness, prevention and response to CBRN terrorist attacks. My colleagues and I look forward to sharing with you the results of this initiative over the next five years.

John Leggat
Chairman CRTI Steering Committee,
Assistant Deputy Minister (Science and Technology),
Department of National Defence,
Chief Executive Officer,
Defence R&D Canada

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1. Introduction

In the fall of 2001, the federal science and technology (S&T) community worked together, with the national security, intelligence and First Responder communities, to propose a model for ensuring a coordinated approach to terrorist threats. Through their cooperation, a $170M five-year initiative to significantly enhance Canada's capacity to deal with potential chemical, biological, radiological and nuclear (CBRN) threats to public security was announced in Budget 2001 as part of the Canadian government's comprehensive $7.7B security package. The CBRN Research and Technology Initiative (CRTI) was launched on May 10, 2002 as a horizontal emergency preparedness program.[1]

Mandate and Key Activities

CRTI's mandate is to improve Canada's ability to respond to CBRN incidents through strengthening the coordination and collaboration of capacity, capabilities, research and technology plans and strategies by:

- Creating clusters of federal labs as elements of a federal laboratory response network that will build S&T capacity to address the highest risk terrorist attack scenarios;
- Funding research and technology to build S&T capability in critical areas, particularly those identified in the scenarios that address biological and radiological attack;
- Accelerating technology into the hands of the First Responders community and other operational authorities; and
- Providing funds to those areas where national S&T capacity is deficient owing to obsolete equipment, dated facilities and inadequate scientific teams.

To accomplish this mandate, CRTI manages six key activities. They are to:

1. *Create Laboratory Clusters* and build an S&T response network for CBRN events;
2. *Build S&T Capability* through funding research to build Canadian science capacity in targeted investment areas;
3. *Accelerate Technology to First Responders* by injecting funding into technology under development to get it into the hands of the First Responders as quickly as possible;
4. *Fund the National S&T Capacity* by building up deteriorated federal laboratory equipment and facilities;
5. *Build the Horizontal Capability* by leveraging federal government expertise with non-traditional partners to enhance the S&T capacity of Canada; and
6. *Build CBRN S&T Expertise and Knowledge* in national and international CBRN communities.

This annual report describes the CRTI's first fiscal year, 2002-2003. Progress in each of the six key activities is documented in the following chapters. Two critical success factors have emerged in the first year of operation; the CBRN risk assessment and community building have both been fundamental in the ability of CRTI to move forward.

[1] The governance of the CRTI is described in Annex A.

2. Critical Success Factors

Assessing and Planning for Risk

Foundational to managing the CRTI program has been the assessment of the CBRN risk to Canada to plan for preparedness and response. Extensive consultations with stakeholders led to the production of a Consolidated Risk Assessment of CBRN terrorism utilizing numerous characteristic scenarios that cover three hazard areas (chemical, biological and radiological/nuclear) and these target classes:[2]

- People (in urban areas and enclosed spaces);
- Critical Infrastructure;
- Food/consumer products and water; and
- Agro-Systems (animals and plants).

Scenarios were utilized to identify potential terrorist uses so that decision-makers at all levels could forecast the threats and understand the vulnerabilities posed by CBRN terrorism. Representative high-risk scenarios were selected in each of the following areas:

- Biological in an urban setting;
- Chemical in an urban setting;
- Chemical in food/water supply;
- Biological in food/water supply;
- Biological in agro-systems (animals) and the environment;
- Biological in agro-systems (plants) and the environment; and
- Reactor accidents in agro-systems and the environment.

For each scenario, the relative technical feasibility was evaluated, considering the aspects of availability of material, equipment, technical expertise and knowledge, leading to a rating scale of high, medium, low, or very low. The impact was then evaluated, considering the potential number of dead or injured, damage to equipment, buildings or the environment, and economic loss, from which resulted a rating scale of catastrophic, critical, moderate, or low. The risk was assigned based on the matrix in Table 1.

An intelligence judgment was then assigned according to the categories of likely, emerging, possible, or unlikely, with the risks being brought forward. A preparedness prioritization level was obtained as shown in the matrix in Table 2.

This assessment of risk combined with the intelligence judgment produced a framework that was used to identify those areas where scientific knowledge could be applied to address a potential CBRN terrorist event and resulted in nine Investment Priorities for the CRTI (Figure 1). It also ascertained the collective level of preparedness and readiness needed to improve Canada's scientific and technical response capacity to enhance public safety. It was particularly unique in that it was the result of a cooperative, perhaps unprecedented, effort between the science, intelligence and First Responder communities.

[2] Risk is interpreted as the product of the probability of the occurrence of a terrorist attack multiplied by the magnitude of the consequences.

Table 1: Risk Matrix

Impact	Relative Technical Feasibility			
	High	**Medium**	**Low**	**Very Low**
Catastrophic	Extreme	Extreme	High	Moderate
Critical	Extreme	High	High	Low
Moderate	High	Moderate	Moderate	Low
Low	Moderate	Low	Low	Low

Table 2: Preparedness Matrix

Risk	Intelligence Judgment			
	Likely	**Emerging**	**Possible**	**Unlikely**
Extreme	Immediate	Immediate	High	Emerging Concern
High	Immediate	High	High	Discretionary
Moderate	High	Emerging Concern	Emerging Concern	Discretionary
Low	Emerging Concern	Discretionary	Discretionary	Discretionary

Figure 1: Investment Priorities

1. Lab Cluster Management and Operations
2. Collective Command, Control, Communications, Coordination and Information (C^4I) Capabilities for CBRN Planning and Response
3. S&T for Equipping and Training First Responders
4. Prevention, Surveillance and Alert Capabilities
5. Immediate Reaction and Near-Term Consequence Management Capabilities
6. Longer-Term Consequence Management Issues
7. Criminal Investigation Capabilities
8. S&T Dimensions of Risk Assessment
9. Public Confidence and Psycho-Social Factors

Building Communities

The greatest challenge for CRTI should also prove to be its greatest strength. Getting disparate organizations and experts who are not traditional partners to talk and plan together is not easy. However, when they do, they create a bond that is strong and durable. CRTI spent its first year pulling together individuals and organizations from across the science and security sectors into new partnerships and a new national CBRN community.

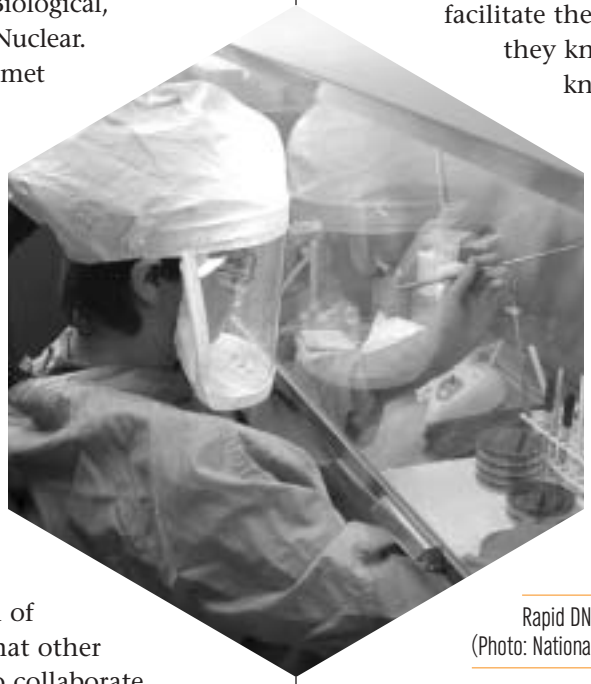
From January to May 2002 the Interim Project Team, consisting of science and security policy representatives from across the federal government, set this cross-organizational methodology in place. Comprised from a diversity of departments and skill-sets, the Team consulted broadly with stakeholders including First Responders.

The second set of communities to develop was in the Laboratory Clusters: Biological, Chemical and Radiological/Nuclear. These self-selecting Clusters met through a series of workshops to determine what combination of federal government labs would best meet the challenges arising from the Consolidated Risk Assessment. Like the Interim Project Team, the members had rarely, if ever, had an opportunity to meet with many of the other Cluster members.

Within weeks of the launch of CRTI, it became apparent that other communities would have to collaborate. Pan-cluster activities were needed to talk about knowledge management of CBRN S&T, geospatial information systems (GIS), emergency response plans (ERP) and the psychosocial aspects of CBRN terrorism. As Cluster members met in workshops to discuss these issues, others from the GIS, Emergency Management, First Responder and social science communities were invited to share their experience and expertise. These encounters have served only to confirm the need for broad dialogue amongst all players in CBRN counter-terrorism.

With the first call for proposals for project funding on June 16, 2002, partnerships began to form as industry, academia and federal labs collaborated on projects. As required by the process, which calls for federal partners on each project and 1/3 of the resources to be provided by the project partners, new connections and relationships were beginning to be fused.[3]

Continuing community building will facilitate the experts to "know what they know" and put that knowledge to use in CBRN preparedness and response. Throughout this report, evidence of the success of community building and the resulting impact on outcomes will be found in all sections relating to each of the six key CRTI activities.



Rapid DNA-Based Diagnostic Assays
(Photo: National Microbiology Laboratory)

[3] Annex B lists the breadth of partnerships in CRTI projects in the first round.

3. Building Laboratory Clusters

Three Clusters – Biological, Chemical and Radiological/Nuclear – were formed as elements of a federal laboratory response network that will build S&T capacity to address the highest risk terrorist attack scenarios. The labs were chosen from across federal government departments based on their expertise within the CBRN field.[4] They were tasked to ensure their preparedness through the development, maintenance and evolution of Cluster Implementation Plans. This involves developing roles and procedures for response during a CBRN event, identifying capability gaps and selecting equipment and infrastructure acquisition projects. There is also a primary requirement to ensure appropriate working relationships and communications between Cluster members, pan-cluster and with other stakeholders, particularly First Responders.

Outputs

Each of the three Clusters developed their Implementation Plans in the first year of operation. The Plans cover the operations and key objectives of the Clusters, focusing on sharing expertise and filling capability gaps. The Clusters developed criteria for selection of Acquisition Technology projects on the basis of a gap analysis performed within each Cluster. The funding of projects was coordinated according to these analyses.

Supporting Operational Readiness

An initial assessment by the expert members of the Biological Cluster identified the key priority areas for improvement to be surveillance, diagnostic and surge capacity, decontamination and disposal, and treatment and prevention. The Biological Cluster also committed to an intensive examination of gaps and mechanisms to fill those gaps by striking four working groups to work on viral, bacterial, animal, and food and water concerns.

The Radiological/Nuclear Cluster has integrated its approach with the Federal Nuclear Emergency Plan (FNEP). Linkages to the FNEP Technical Advisory Group (TAG) and Operational Support Group (OSG) were defined.

Training Cluster Members

Scientists in the Chemical Cluster were trained in sample handling and analysis of chemical warfare agents using mass-spectrometry, thereby transferring this specialized knowledge to laboratories across the country. In the event of a chemical terrorist attack, samples could be identified in local labs thereby reducing response and therapy time.

Expanding S&T Knowledge

- Members of the Radiological/Nuclear Cluster exchanged information on laboratory capabilities and technologies.
- Biological Cluster sought best practices from the US Centers for Disease Control and Prevention (CDC).
- Chemical Cluster hosted the CDC Chief of Emergency Response to discuss methodology and to exchange lists of priority chemicals.
- Chemical Cluster examined the requirements of the Chemical Weapons Convention (CWC) regarding permits, transportation, retaining, and disposal of materials.

Exercises

Radiological/Nuclear Cluster had two tabletop exercises to examine the use of FNEP response structures in terrorist events.

[4] For a brief synopsis of each Cluster's objectives and the participating laboratories, see Annex C.

Providing S&T advice and expertise

The Severe Acute Respiratory Syndrome (SARS) incident brought out evidence of one outcome of the creation of the CRTI and the Biological Laboratory Cluster: more rapid analyses, and therefore more rapid prevention and mitigation measures, were possible because the cluster members involved in the incident were aware of the additional capacity and capabilities outside of their organization that they were able to call upon to assist during the incident.

Immediate Outcomes

Accomplishments directly related to the Clusters' first year objectives include:

- Identification of links to First Responders and the operational community,
- Clarification of the roles and responsibilities of the Cluster and its members,
- Identification of expertise and capacity within laboratories of the federal science based departments,
- Setting criteria for and selection of Acquisition Technology projects to be supported in order to address gaps and enhance Canada's preparedness,
- Participation in CRTI pan-cluster workshops, and
- Closing preparedness gaps through support of Acquisition Technology.

Surveillance of Bio-Warfare Agents and Identification of Engineered Virulence Genes (Photo: National Microbiology Laboratory)

4. Building S&T Capability and Accelerating Technology for First Responders

The CRTI comprises a collection of projects selected via an annual competitive process. The management of these projects represents two major activities in the CRTI program: *Building S&T Capability* and *Accelerating Technology for First Responders*. The selection process employs a quality and relevance review by experts coordinated by the CRTI Secretariat. Selection criteria differ depending on the category of project, although they favour partnering and leveraging in all project categories. Each project has a federal lead, which assigns a Project Manager who is responsive to the Director of the CRTI Secretariat. Projects require two federal partners in Research and Technology Development Projects and one federal partner in Technology Acceleration projects. Other levels of government, academia or industry can participate.

Each CRTI project consists of activities that are designed to achieve agreed objectives within a specified timeframe using assigned resources. The CRTI Steering Committee provides guidance as to the extent of financial investment by CRTI in each project category. This guidance is not intended to be precise, but rather to help manage expectations among stakeholders and to help ensure that

CRTI investments are appropriately balanced across project categories. Projects are selected annually from the following categories:

Research and Technology Development: is intended to close the gaps in knowledge and capabilities of the S&T and operational communities so as to enable effective response to future CBRN threats. These projects require the involvement of at least two federal partners, are completed typically within three to four years of funding approval with funding in the $3 million to $10 million total resources range, encourage partnering and leveraging, and can include technology demonstration. CRTI's share of a project's cost does not exceed $10 million except under exceptional circumstances as approved by the CRTI Steering Committee.

Technology Acceleration: is intended to accelerate the commercialization and transition to use by First Responders and other operational authorities of technologies that address key capacity gaps. These projects are typically completed within six months to two years of funding approval, valued between $1 million and $10 million of total resources, involve technology that is "in the pipeline", and include at least one industrial partner.[5]

Outputs

In the first year of operation, CRTI managed two "Calls for Proposals" for both categories and announced one set of successful projects on 16 September 2002. The first call yielded 416 proposals with a final 24 selected for funding totaling $46M.

Minimum acceptable levels of performance in key criteria for relevance, innovation, and management were established to ensure that only the most suitable proposals are accepted. The accountability requirements specific to PSAT funding required, in some cases, federal departments receiving funding from CRTI to develop new or different processes for identifying and tracking funding specific to CRTI funded projects.

The single, most challenging aspect in initiating the work on CRTI funded projects was the issuance of contracts to industry and university project partners through the Public Works Government Services Canada (PWGSC) process. CRTI has been working with PWGSC to resolve the issues and speed up the process during the second round of projects. Intellectual property issues also proved to be challenging in some cases, requiring lengthy discussions with legal and business office personnel.

The individual Research and Technology Development and Technology Acceleration projects in the CRTI Portfolio are described in Part II of this Report.

Immediate Outcomes

The selection of projects in all categories occurs in accordance with the CRTI's nine investment priorities. Table 3 illustrates the balance of the Portfolio by investment priority and hazard. The concentration of projects reflects both the most immediate concerns for CBRN preparedness and response, as well as the current strengths of the Canadian CBRN community.

Each project team was required to submit a completed Project Charter indicating the scope budget, schedule, and other project management details before funding could be released to the lead federal department. By 31 March 2003, 13 Project Charters had been submitted and the process of project implementation had begun.

[5] See Annex D for a description of the Project Selection Process.

Teams from CRTI and the Health Canada Radiation Protection Bureau celebrate the first signed CRTI Charter (0080TA) January 2003.

Table 3: Projects by Investment Priority (Some projects address more than one hazard.)

Investment priority	Bio	Chem.	RN
Cluster Management and Operations			
C^4I for CBRN Planning and Response	1	1	2
S&T for Training and Equipping 1st Responders	5	3	4
Prevention, Surveillance, and Alert	1		2
Immediate and Near Term Consequence Management	5	3	4
Longer Term Consequence Management			1
Criminal Investigation Capabilities			
S&T Dimensions of Risk Assessment	1		
Public Confidence and Psycho-Social Factors			

5. Acquiring National S&T Capacity

CRTI's fourth activity is to provide funding to enhance the national S&T capacity. This is accomplished through a third category of project investment referred to as Acquisition Technology.

Acquisition Technology projects are intended to establish or enhance the infrastructure and equipment of the Laboratory Clusters that support the CBRN response. These acquisitions should typically be made in the year in which they are funded and be "off-the-shelf" purchase of existing technology. The CRTI priority is afforded to the most critical gaps in capacity and are consistent with Lab Cluster roles and responsibilities.

Outputs

In the first year, Laboratory Cluster Acquisition Technology projects were twice consolidated and reviewed to ensure that they addressed key Cluster Objectives identified in the individual Cluster Implementation Plans as well as overall CRTI objectives and investment priorities. Projects that covered more than one Cluster or addressed broader response dimensions were also identified.[6]

Immediate Outcomes

Several outcomes for developing unique S&T capabilities and improving Canadian laboratory CBRN preparedness and response have been achieved through the Acquisition Technology project category. For example, the addition of a charcoal filter on the biological safety cabinet in Health Canada's Office of Laboratory Security allows for the triaging of suspicious packages in a safe lab setting. Unopened suspicious packages can be opened in the safe environment of the biological safety cabinet to rule-out chemical,

[6] The individual Acquisition Technology projects selected in the first round are listed in Annex E of this Report.

radiological and biological threats, a feature that was unavailable in the National Capital Region previous to this investment.

Canada's capability to detect the radionuclides that would be distributed following an explosion of a radiological dispersal device was significantly improved. The detectors used by Health Canada's Radiation Protection Bureau were upgraded so that they could measure plutonium and some other radionuclides that were previously undetectable.

Fluorescent microscopes were purchased for Defence R&D Canada Level 2 and Level 3 laboratories. These microscopes allow the labs the capability to use Direct Fluorescent Antibody (DFA) assays for confirmatory identification of bacteria in place of the currently used diagnostic assays. These better defined DFA assays provide more efficient and additional capability in forensic identification, which did not previously exist in these labs. For example, a DFA for Brucella will replace a number of biochemical tests currently recommended for Brucella.

The replacement of an ultracentrifuge and the purchase of a new centrifuge and related equipment have aided in virus preparation leading to better and safer vaccines, with work being focused on alphaviruses and poxviruses.

6. Partnerships

The ability of the CRTI model to encourage partnerships for leveraging capacity and capability has been aptly demonstrated in the first year of operation, so much so that *Building the Horizontal Capability* has arisen as a separate and significant activity in the CRTI program. As Canada does not exist in isolation within the CBRN counter-terrorism context, CRTI must also collaborate with international partners, particularly the US, to attain a complementary S&T program and response.

Outputs

On a national level, a Memorandum of Understanding (MOU) was signed in September 2002 by 13 CRTI participant departments and agencies to allow the participants to facilitate the implementation and conduct of CRTI projects. The agreement provided the mechanisms to transfer funds, manage contracting and intellectual property and other requirements.

Internationally, the CRTI began discussions with new and non-traditional partners. They met with counterparts from the Chemical/Biological National Security Program at the US Department of Energy, US Army Edgewood Research Development and Evaluation Center, Centers for Disease Control, Technical Support Working Group, and the US Defense Threat Reduction Agency. In the UK, CRTI met with officials from defence and civil authorities.

The Radiological/Nuclear Cluster signed an agreement to partner with the Scandinavian radiation protection community to deploy a common nuclear emergency management software system that integrates and presents data in a timely fashion. This would provide critical data needed by decision makers to manage an event.

These linkages have opened the doors for collaboration on program planning and technology coordination to reduce duplication and to ensure interoperability. Participation from international colleagues in the Proposal Selection Committee as subject experts, as contributors of expertise, as members on project teams and in future risk assessments has been committed.

CBRN Blast Protective Helmet: Med-Eng Systems

The CRTI Secretariat was also requested to speak to a number of committees and organizations. They included the Minister of Health's Advisory Committee (Low Committee) on CBRN, the New Brunswick Federal Council (of federal science based departments and agencies) in Fredericton, the Montreal Security Industry Symposium, the Canadian Defence Industries Workshop and Exhibition and many smaller venues.

Immediate Outcomes

As a result of new international networks CRTI was asked to review and comment on the US Federal Bureau of Investigation document on *Quality Assurance Guidelines for Laboratories Performing Microbial Forensic Work** for which the Biological Laboratory Cluster members provided a more comprehensive Canadian review.

7. Building Communities

Building CBRN S&T Expertise and Knowledge is the sixth CRTI activity.

Outputs

After the launch of the CRTI, the Laboratory Clusters recognized the benefits of holding a series of pan-cluster activities to exchange information on topics germane to the work of all three. Workshops were held in the fall of 2002 on:

- Knowledge Management (KM), 30 September;
- Geospatial Information Systems (GIS), 30 October; and
- Emergency Response Plans, 18 November.

The need for workshops targeted to specific requirements led to three more. A Project Management Workshop was held 25 September after the announcement of the first round of projects to assist teams with the new processes involved in CRTI. This was followed by a two day introductory Project Implementation Workshop for first round project managers on 12 and 13 November, 2002. A "Knowledge Archaeology" workshop was held on 24 February 2003 to capture the lessons learned from the Interim Project Team. On 18 March 2003, CRTI joined with the Social Sciences and Humanities Research Council (SSHRC) for a workshop on Public Confidence and Psychosocial Factors as they pertain to CBRN counter-terrorism.

Each workshop yielded opportunities for cross-disciplinary exchange and action plans for the CRTI community. Specifically from the Knowledge Management Workshop, a CRTI KM Strategy and Framework with a prioritized action plan was developed. In all cases, participants

* Forensic Science Communications: 5(4), October 2003.

were able to make new connections with non-traditional partners and in some cases new communities were formed.

Immediate Outcomes

The workshops have shown some immediate outcomes and the promise of outcomes in the next year. Building relationships and sharing knowledge with First Responders and emergency planners, for example, is an area targeted by the CRTI pan-cluster participants. Developing tools, methods and approaches for information exchange and knowledge sharing for CBRN response is another requirement identified from within the community.

The creation of the three Laboratory Clusters has ultimately provided rapid access to a multi-faceted resource that did not previously exist: a centralized source for scientific and technical knowledge and expertise and for surge capacity when local or regional resources are over loaded.

CRTI-SSHRC Workshop on Psychosocial Factors Research Themes Arising for Future Work

1. Prevention and management of panic
2. Ensuring that broad institutions of society, e.g. banks, government, health, grocery stores, are maintained
3. Mobilization and community response
4. Appropriate warning mechanisms and approaches (policy)
5. Minimizing the number of people who think they are affected but really aren't: "worried - well".
6. Psycho-social and biological predictors of health and CBRN
7. Models for predicting psychosocial impacts of CBRN and terrorism
8. Role of the media
9. Role and credibility of officials
10. Social discrimination following CBRN attack
11. Answering all research questions in the context of a diverse, multicultural society
12. Literature reviews and best practices or other practices
13. CBRN hoaxes and copycat crimes
14. Fear-coping and stress

GIS Community

GIS Experts from across the federal government met to determine needs for the CBRN response. The group identified four primary requirements: an inventory of GIS resources and capabilities; usability and interoperability; the clear definition of the GIS role in CBRN operations; and a Community of Practice to work together on these issues.

National Emergency Response Plans

Forty federal government national security and scientific staff met to share the breadth of emergency response plans that could be activated in the event of a CBRN terrorist event. As a result, the role of the Laboratory Clusters in national emergency response plans will be pursued, Laboratory Clusters built exercises and simulations into their action plans, and best practices in CBRN forensics will be shared.

Lessons Learned from the Interim Project Team

A number of critical success factors contributed to the ability of the Interim Project Team to succeed in the timely creation of the CRTI. These included having an articulate visionary, a comprehensive vision, a highly credible team with strong leadership, mechanisms for obtaining and maintaining key stakeholder buy in and an action plan for an operational implementation.

8. Outlook

The potential use of CBRN weapons by terrorists poses a number of new risks and challenges for which the First Response community needs to be adequately prepared. They include, among others, the areas of detection and identification, medical treatments, personnel protective clothing, equipment and decontamination. The CRTI is responding to these challenges by introducing new ways to deliver R&D and focusing on the response capacity needed for future public security.

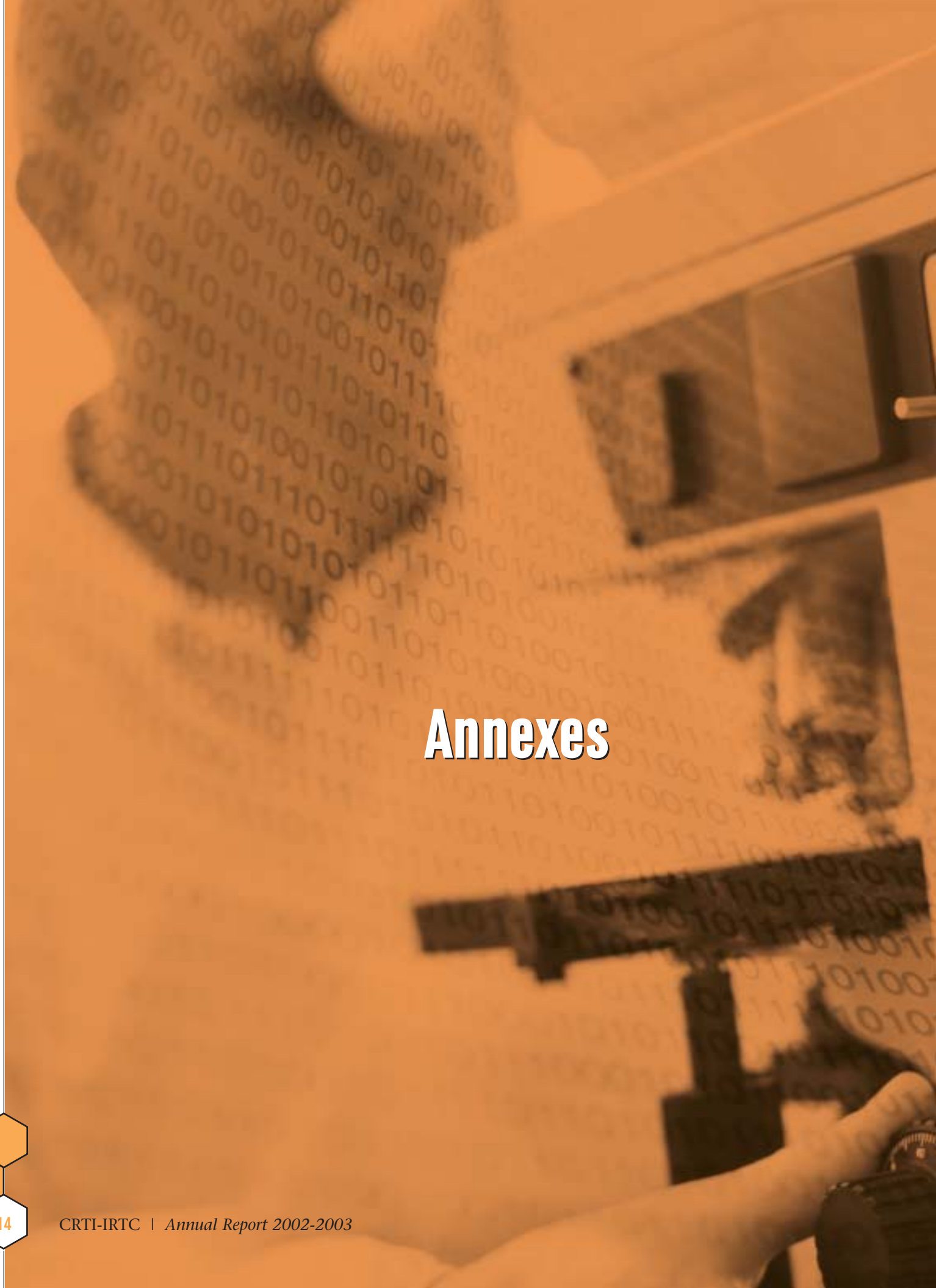
In the next year, the introduction of a *Technology Demonstration* project category will enable S&T partners to demonstrate first hand the utility and impact of technologies to First Responders in an operational setting. Technology Demonstration projects will afford a "leave behind" opportunity where specific knowledge, technology or capacity could be transferred quickly to specific end user communities. CRTI will also engage end user communities such as firefighter and paramedic associations in a concentrated and coordinated approach. The S&T brought to bear, resulting from the direct participation and interface with the end user community, is intended to improve the integration and interoperability of the collective response capacity.

There is a continuing need to develop redundancy and resilience in laboratories' capacity, to cope with the surge in demand from terrorist events, particularly if multiple incidents occur at the same time in different parts of Canada or internationally. The Laboratory Clusters will undertake new training and participate in emergency response exercises to test and evaluate the capabilities and capacity of federal science departments. Laboratory techniques, operating procedures and protocols will be correlated to ensure that they fit internationally recognized standards. In doing so, the goal will be to exploit more effectively the CRTI products, and effectively transition the results generated by CRTI into the systems, operations and architectures of end user organizations. Stronger links between the Laboratory Clusters, operational communities and First Responders will be established. Canadian First Responders will benefit through close association with and utilization of the capabilities of the CRTI Laboratory Clusters.

The CRTI will continue to review and update the Consolidated Risk Assessment in concert with the national security and intelligence communities to reflect rapidly evolving geo-political factors as well increased understanding of CBRN terrorism. As part of the *Building CBRN S&T Expertise and Knowledge* activity, the CRTI Secretariat will sponsor symposia, workshops and studies to share new CBRN S&T knowledge, gain feedback from First Responders and assess emerging CBRN technology trends, threats and hazards. A key objective for the CRTI, in the next year, will be to focus on critical technology response gaps and operational needs in areas of high priority to the end user.

Allies will continue to be engaged to exchange information, participate in joint projects and to work together on standards and investigative tools for collective response. Collaboration with new partners and the resulting leveraging of resources will consolidate a wealth of expertise on critical issues in CBRN preparedness and response. The expertise from multiple stakeholders and partners will allow the CRTI to provide more effective technology solutions to address the vulnerabilities and risks posed by CBRN terrorism.[7]

[7] See Annex F for the CRTI Funding Model and Reports.



Annexes

Annexes

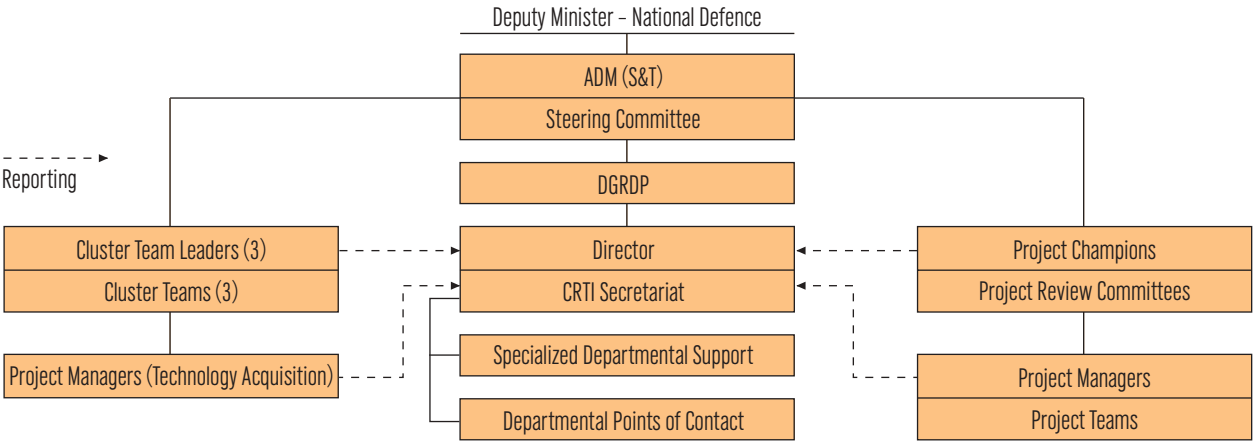
A. Governance

The CRTI is an interdepartmental collaboration initiative, with all participants having been involved in identifying the needs to improve Canada's ability to respond to CBRN threats and to select those proposals that best lend themselves to meet those needs. The participating departments and agencies are:

- Department of National Defence/Defence R&D Canada*
- Department of National Defence/Office of Critical Infrastructure Protection and Emergency Preparedness*
- Health Canada*
- Environment Canada*
- Agriculture and Agri-Food Canada*
- Canadian Food Inspection Agency*
- Department of Fisheries and Oceans*
- National Research Council*
- Natural Resources Canada*
- Royal Canadian Mounted Police*
- Solicitor General of Canada*
- Canadian Security Intelligence Service*
- Atomic Energy of Canada Limited
- Canada Customs and Revenue Agency
- Canadian Nuclear Safety Commission*
- Privy Council Office, and
- Treasury Board Secretariat.

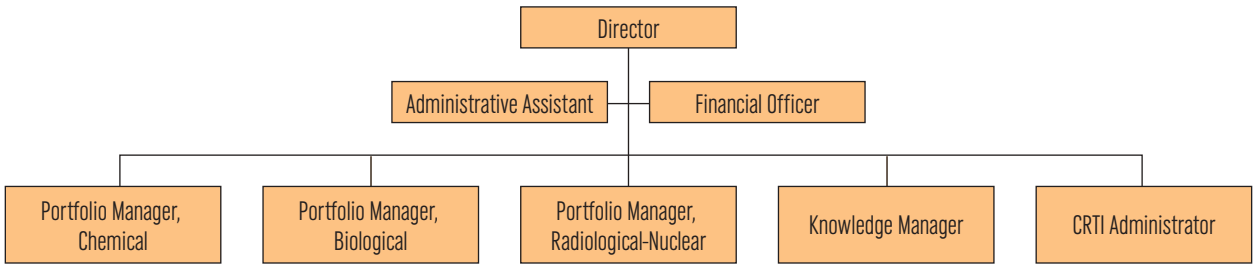
CRTI is coordinated by an interdepartmental Steering Committee that is chaired by the Assistant Deputy Minister (ADM) for Science and Technology, Department of National Defence. Representation from the participating departments is at the ADM level. A Secretariat of eight people, located in Defence R&D Canada, manages the Initiative on behalf of the Steering Committee. The governance structure is displayed in Figure 1 and the Secretariat Structure in Figure 2.

Figure 1: CRTI Governance



* Signatories to the Memorandum of Understanding to participate in the research and technology projects.

Figure 2: Secretariat



B. Project Partners

The first round of projects indicates a diversity of partners:

Federal Departments, Agencies and Crown Corporations

- Health Canada
- Defence R&D Canada
- Canadian Food Inspection Agency
- Royal Canadian Mounted Police
- National Research Council
- Department of Fisheries and Oceans
- Environment Canada
- Atomic Energy of Canada Limited
- Natural Resources Canada
- Office of Critical Infrastructure Protection and Emergency Preparedness

Canadian Industry

- MEMS Precision Technologies
- Bubble Technologies Inc.
- General Dynamics Canada
- IatroQuest Corp.
- AMITA Corp.
- McFadden Technologies
- Infectio Diagnostics Inc.
- Cangene Corp.
- Biophage Pharma
- Medarex
- MDS Sciex
- Med-Eng Systems

Canadian Universities

- University of British Columbia
- Trent University
- University of Saskatchewan
- Memorial University
- Royal Military College
- McMaster University
- Université Laval
- University of Toronto
- University of Alberta
- University of Ottawa
- Carleton University
- University of Manitoba

C. Clusters Objectives and Membership

Cluster Roles

To achieve the goal of harnessing and better utilizing existing CBRN R&D capabilities and fostering new R&D initiatives, Laboratory Clusters were formed. Laboratory Clusters are groups of federal and other government laboratories comprised of scientific and technical experts and supporting equipment and facilities, whose S&T capabilities and capacity are prepared and able to contribute synergistically, effectively and efficiently to preparedness for, prevention of and response to terrorist attacks in Canada that have employed CBRN hazards.

Initially it was decided to establish three Lab Clusters to address the Chemical, the Biological and the Radiological/Nuclear threats respectively. The following roles were established for the Cluster Teams:

- Manage the Cluster;
- Support operational readiness, including training;
- Provide S&T advice and services in support of operations;
- Develop and maintain standards, perform evaluation and certification;
- Develop and manage pertinent S&T knowledge needed in operations; and
- Conduct R&D to grow and maintain the Cluster's S&T capabilities.

Cluster membership is broadly dispersed amongst participating departments and agencies with the following categories of membership:

- **Member** - Labs that have a mandate or play an active role in the specific area of interest of the Cluster.
- **Affiliate** - Labs that have the lead on Cluster related R&D projects or provide a specific expertise that is of interest to the Cluster
- **Partner** – Selected non-federal government labs (provincial, international, etc.) that work in the specific area of interest of the Cluster.

Biological Laboratory Cluster

On inception in May of 2001, the Biological Laboratory Cluster developed its initial Implementation/Business Plan. This plan names the members of the Cluster, provides a set of processes and procedures by which to govern the operation of the Cluster, specifies the priority roles and the key objectives that the Cluster would address in the first two years of operation, identifies how the Cluster will work in times of crisis with the operational government departments and lists specific gaps that the Cluster would attempt to narrow or close through projects.

An initial assessment of the expert members of the Cluster identified the key priority areas in which Canada needed improvement to be: surveillance, diagnostic and surge capacity, decontamination and disposal and treatment and prevention. This initial assessment was used in developing criteria for selection of the 13 Acquisition Technology projects for Canadian biological labs funded by CRTI in 2002/03.

The Cluster committed to concentrating its efforts on intensive examination of gaps and mechanisms to fill those gaps over the autumn of 2002. As a result of that commitment four working groups were struck to do an analysis of the status of Canada's preparedness regarding viral, bacterial, animal, and food and water concerns. The activities of the working groups could not be

concluded within the 2002/03 fiscal year due to the fact that the federal employees involved in the four working groups were also integral in protecting Canada during the period in which Severe Acute Respiratory Syndrome (SARS) surfaced.

As part of the two year Implementation/Business Plan 12 key objectives were specifically identified, five of which were to be completed in the first year. Those objectives were to:

- Identify links to First Responders and the operational community;
- Clarify the roles and responsibilities of the Cluster and its members;
- Make decisions on first phase Acquisition Technology projects;
- Review existing operational emergency plans and develop draft plan for integration of Cluster work into the plans; and
- Prioritize acquisition needs and close ten high priority gaps through Acquisition Technology projects.

Biological Laboratory Cluster Membership

The Biological Laboratory Cluster consists of 18 core members from eight federal science based departments and agencies representing approximately 75 federal laboratories. The Cluster also includes affiliate members and partners.

Lab Cluster Co-Chairs:

Dr. Frank Plummer, Health Canada – National Microbiology Laboratory

Dr. Jean Hollebone, Canadian Food Inspection Agency

Core Cluster Members:

- Canada Customs and Revenue Agency - Lab and Scientific Services Directorate
- Canadian Food Inspection Agency - Animal Lab Network

CBRN Response Training at DRDC Suffield
(Photo Credit: Randy Lynde)

First responder performing selected activities in the exposure chamber at Royal Military College.
(Photo Credit: CFB Kingston)

- Canadian Food Inspection Agency - Plant Lab Network
- Canadian Food Inspection Agency - Food Microbiology Lab Network
- Defence R&D Canada - Suffield
- Defence R&D Canada - Counter Terrorism Technology Centre
- Environment Canada
- Agriculture and Agri-Food Canada
- Natural Resources Canada - Canadian Forest Service
- Health Canada - Centre for Infectious Disease Prevention and Control
- Health Canada - Centre for Surveillance Coordination
- Health Canada - Food Directorate
- Health Canada - Food Directorate - Bureau of Microbial Hazards
- Health Canada - National Microbiology Lab
- Health Canada - Canadian Science Centre for Human and Animal Health
- Health Canada - Office of Lab Security
- National Research Council - Institute of Biotechnology Research
- National Research Council - Institute of Biological Sciences

Affiliate Members:

- Department of National Defence – Directorate for Strategic Intelligence
- Department of Fisheries and Oceans
- Health Canada – Laboratory for Foodborne Zoonoses
- National Research Council – Biotechnology Research Institute
- National Research Council – Integrated Manufacturing Technology Institute
- National Research Council – Institute for Research in Construction
- Royal Canadian Mounted Police
- Canadian Security Intelligence Service
- Office of Critical Infrastructure Protection and Emergency Preparedness

Partners:

- Canadian Food Inspection System International Working Group
- Canadian Public Health Laboratory Network
- North American Plant Protection Organization
- Networks for Centres of Excellence – Canadian Network for Vaccines and Immunotherapeutics
- Networks for Centres of Excellence – Canadian Bacterial Disease Network
- United States Department of Agriculture – Animal Research Service
- United States Department of Agriculture – Animal and Plant Health Inspection Service

Chemical Laboratory Cluster

When the Chemical Lab Cluster met for the first time, they established the following as their Cluster objectives in the near term (6 months – 2 years).

- Improve integration of data/information management systems for operational needs;
- Improve analytical approaches to the detection of hoaxes;
- Identify lead laboratories for all chemicals on the priority substances list;
- Address gaps in the lead lab capabilities for chemicals on the list;
- Develop improved capabilities for field detection of chemicals on the list; and
- Improve mobile analytical capabilities to provide direct support to responders.

The Chemical Lab Cluster set out to meet several objectives in their Cluster Implementation Plan. These objectives were as follows:

- Establish links to First Responders and the operational community;
- Clarify the roles and responsibilities of the Cluster and its members;
- Approve a plan for integrating labs into operational emergency plans;
- Complete two scenario-based exercises incorporating existing emergency plans;
- Develop common procedures for S&T response to events;
- Improve the integration of data and information management systems for operational needs;
- Provide initial R&D products to the operational community for evaluation;
- Close a number of high priority gaps through Acquisition Technology projects;
- Develop analytical approach for the rapid detection of hoaxes;
- Develop a protocol for the identification and quantification of true unknown substances;
- Develop a long term R&D plan;
- Develop exposure markers;
- Develop a list of target chemicals and deal with the following:
  - Assess capabilities of the Cluster members vis-à-vis the target list;
  - Identify labs of primary interest;
  - Evaluate, improve, and develop new kits for field detection of chemicals on the list;
- Assess and improve standard protocols for sample handling, transport and testing of potentially highly hazardous materials; and
- Assess and improve mobile analytical capability to provide direct real-time support to First Responders and the operational community.

Chemical Cluster Membership

Lab Cluster Chair:

Dr. John Carey, Environment Canada - National Water Research Laboratory

Mr. Alain Cassista, Royal Canadian Mounted Police (co-lead)

Core Cluster Members:

- Defence R&D Canada – Suffield
- Environment Canada – Environmental Emergencies Section
- Environment Canada – Canadian Meteorological Centre
- Health Canada - Bureau of Chemical Safety Laboratories
- Health Canada - Bureau of Environmental Health Sciences
- Agriculture and Agri-Food Canada
- Canadian Food Inspection Agency – Laboratories Directorate
- Department of Fisheries and Oceans
- National Research Council – Institute for Chemical Processes and Environmental Protection
- Natural Resources Canada – Earth Sciences Sector – Geomatics Canada
- Natural Resources Canada – Earth Sciences Sector - Geological Survey of Canada
- Natural Resources Canada - CANMET Energy Technology Centre
- Canada Customs and Revenue Agency – Laboratory Scientific Services Directorate
- Royal Canadian Mounted Police
- Royal Military College

Affiliate Members:

- Transport Canada
- National Research Council – Industrial Materials Institute
- National Research Council – Institute for Microstructural Sciences
- National Research Council – Integrated Manufacturing Technologies Institute
- National Research Council – Institute for Research in Construction

Radiological/Nuclear Laboratory Cluster

When the Radiological/Nuclear Lab Cluster first met, in May and June 2002, they conducted a survey to determine which of the Cluster roles assigned were currently being performed and which were planned to be address under existing plans. A consequence of this activity was the development of a Cluster Implementation/ Business Plan with the following objectives during the first two years of operation:

- Develop a functional plan to establish links between the Cluster, First Responders and the operational community;
- Clarify the roles and responsibilities of the Cluster and its members;
- Approve a plan for integrating labs into operational emergency plans;
- Improve the integration and sharing of data within the Cluster by developing, adopting and implementing standard protocols;
- Provide initial R&D products to the operations community for evaluation;
- Participate in emergency planning exercises that exercise the capabilities of the Cluster laboratories;
- Close high priority gaps in the areas of human and environmental measurement through Acquisition Technology projects;
- Improve Canada's Radiological/Nuclear surveillance capabilities; and

- Establish a capability, when an incident occurs, to notify and activate labs in the Cluster on a 24/7 basis.

Detailed tasking was as follows:

- Ensure Cluster preparedness through the development, maintenance and evolution of the Cluster Implementation Plan;
- Develop the roles and procedures by which the Lab Cluster interfaces with operational mandates during a CBRN event;
- Ensure appropriate working relationships between all stakeholders in the Cluster, with particular emphasis on engaging First Responders;
- Manage cross-cluster interactions;
- Provide and support CBRN standardized specific training that complement other efforts;
- Provide access to specialized training facilities for Cluster members and First Responders;
- Develop, conduct and participate in exercises;
- Provide operational analysis in support of operational communities' capability investments (training, equipment, procedures, and organization);
- Provide S&T advice on equipment development and acquisition especially for First Responders;
- Provide tools and advice that support surveillance, monitoring, and trend analysis for early detection of CBRN events;
- Provide S&T dimension to communications and advice to the public;
- Support comprehensive CBRN risk assessment, by providing S&T expertise into the intelligence community's assessment;
- Provide rapid detection, identification, quantification, and isolation of agents and hazards;
- Provide advice on protection, treatment, containment, decontamination, transport, disposal and remediation of contaminants and contaminated materials;
- Provide forecasting, monitoring and advice on dispersion, fate and effects of the agents and hazards;
- Support exposure and health monitoring;
- Provide expert support for forensic examination of crime scene samples, advice and testimony including the investigation of incidents;
- Provide certification services and evaluation or validation of field and laboratory equipment;
- Develop and provide standard operating procedures and protocols;
- Develop and provide standards and limits for occupational health and safety, response, remediation and follow-up health monitoring;
- Maintain registry of training, equipment availability, comparability, interoperability, and testing to standards;
- Provide CBRN S&T knowledge management including linkages and co-ordination: contact lists, reference libraries, information directories, digital maps, standard operating procedures and protocols, standards;
- Develop and provide information that supports the early identification and communication of potential and emerging threats in different targets;
- Provide technical assessment of the efficacy of emerging threats, ensure collaboration amongst S&T, civilian and military intelligence communities and identify appropriate mitigation measures;

- Develop and implement an appropriate information and knowledge management architecture to enable effective day-to-day working relationships among Cluster members, between Clusters, and with operational communities;
- Conduct R&D to close knowledge gaps in the Cluster's ability to provide the roles described above; and
- Conduct R&D to address operational gaps in the nation's ability to prevent and respond to CBRN attacks.

Radiological/Nuclear Cluster Membership

The Radiological/Nuclear Laboratory Cluster consists of 13 core members from 11 federal science based departments and agencies. The Cluster also includes seven affiliate members and four partners.

Lab Cluster Chair:

Dr. Jack Cornett, Health Canada – Radiation Protection Bureau

Core Cluster Members:

- Health Canada – Radiation Protection Bureau
- Defence R&D Canada – Ottawa
- Environment Canada – Canadian Meteorology Centre
- National Research Council – Ionizing Radiation Standards Group – Institute for National Measurement Standards
- Natural Resources Canada – Radiation Geophysics Section – National Gamma Ray Spectrometry Program
- Natural Resources Canada – Emergency Mapping Service
- Natural Resources Canada – Earth Sciences Sector – Geomatics Canada Mapping Services Branch
- Atomic Energy of Canada Limited – Chalk River Laboratory
- Department of Fisheries and Oceans – Atlantic Environmental Radioactivity Laboratory
- Canada Customs and Revenue Agency – Laboratory and Scientific Services Directorate
- Canadian Food Inspection Agency
- Canadian Nuclear Safety Commission – Directorate of Nuclear Substance Regulation
- Agriculture and Agri-Food Canada – Land Resources Unit

Affiliate Members:

- Royal Canadian Mounted Police – Explosive Disposal Unit, Forensic Identification Services, and Forensic Laboratory Services
- Canadian Security and Intelligence Service
- Department of National Defence – J2 Directorate for Strategic Intelligence
- National Research Council – Integrated Manufacturing Technology Institute
- National Research Council – Fuel Cell Program
- National Research Council – Institute for Research in Construction

Partners:

- Emergency Protection Laboratory – Ontario
- Radiation Protection Bureau – British Columbia
- US Department of Energy
- Federal, Provincial and Territorial Radiation Protection Committee (FRTRPC)

D. Proposal Selection Process

The CRTI Framework, found at Figure 3, demonstrates the dynamic aspect of CRTI planning. Investment priorities are determined through analysis of the risk compared with capability and capacity, and the technology requirements and response gaps of First Responders and the Laboratory Clusters. For *Acquisition Technology* projects, the Laboratory Clusters identify requirements through consensus and make submissions to a Project Review Committee, chaired by the Director of CRTI and made up of the Laboratory Cluster Leaders, before going to the Steering Committee.

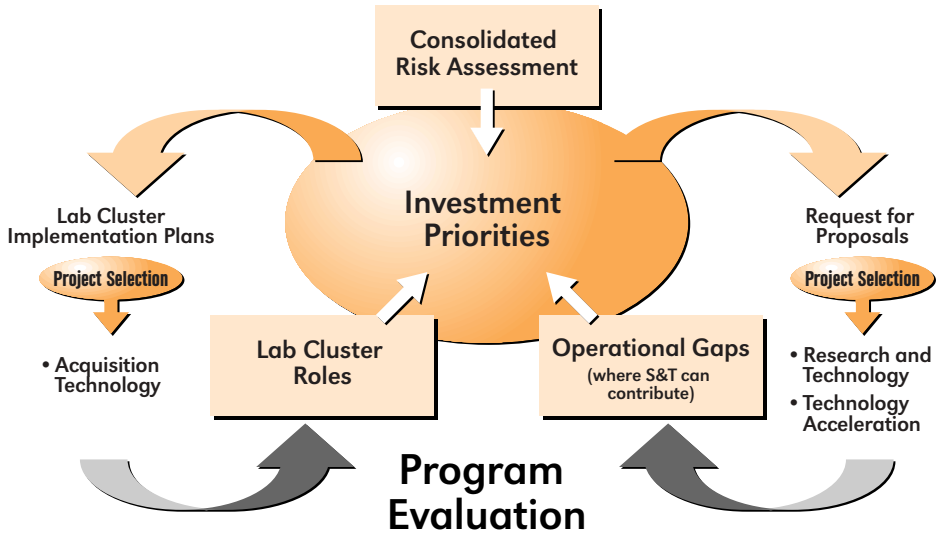
A Proposal Selection Committee made up of experts in the fields of CBRN science and technology, public security and counter-terrorism evaluates projects in the *Research and Technology Development* and *Technology Acceleration* categories. They are supported by a number of external reviewers who provide the necessary expertise, judgment and knowledge needed to critically assess the proposals against identified selection criteria.

After two-page Proposal Synopses are screened and assessed, successful applicants are invited to submit a more detailed Full Proposal. The Full Proposals are evaluated using a structured language ladder. The Proposal Selection Committee makes recommendations for the balance of the portfolio and final selection to the Steering Committee. In all cases, the Steering Committee makes the final decisions.

The Proposal Selection Committee is comprised of a cross-section of subject matter experts supported by external reviewers. The Committee members are subject to a conflict of interest and non-disclosure agreement. The Committee for 2002-2003 included:

- Dr. Cam Boulet, Director CRTI Secretariat (Chair);
- Dr. Jean Hollebone, Acting Science Director, Canadian Food Inspection Agency and Co-Leader, Biological Cluster;

Figure 3: Framework



- Dr. Frank Plummer, Director, National Microbiology Laboratory, Health Canada and Co-Leader, Biological Cluster;
- Dr. John Carey, Director General, National Water Research Laboratory, Environment Canada and Leader, Chemical Cluster
- Dr. Jack Cornett, Director, Radiation Protection Bureau, Health Canada and Leader, Radiological/Nuclear Cluster;
- Mr. Tim Patraboy, Scientist, Solicitor General;
- Mr. Ian Blackie, Chief, Counter-Terrorism Policy, Solicitor General;
- Dr. John Arnold, Chief Scientist, Canadian Police Research Centre, National Research Council;
- Dr. Heather Durham, Professor, Montreal Neurological Institute, McGill University;
- Dr. Bill Davidson, Vice-President, Science and Technology, MDS SCIEX;
- Dr. Wendy Johnson, Vice-President, Research and Development, Cangene; and
- Dr. Chris Tucker, Director, Research and Development, Office of Critical Infrastructure Protection and Emergency Preparedness.

E. Acquisition Technology in 2002-2003

The Acquisition Technology fund provides funds to those areas where the national S&T capacity is deficient owing to obsolete equipment, dated facilities and inadequate scientific teams. Projects are selected through gap analysis and Cluster consensus.

BIO001AP
*Health Canada**
Inactivation / Decontamination of Human and Animal Bio-terrorism Agents and Analysis of Suspicious Materials with Mixed Hazards

BIO002AP
Health Canada
Charcoal filter on Containment Level Three (CL3) Biological Safety Cabinet

BIO003AP
Health Canada
National Real-Time Network for Identification of Bio-Terrorism Agents

BIO004AP
Health Canada
Upgrade of Contamination Areas (CL3 and CL4) to Test for Bio-Terrorism Agents

BIO005AP
Defence R&D Canada
Chemical / Biological Forensic Reference Lab

BIO006AP
Health Canada
Laboratory Response Network, Participation in US and Canadian Initiatives

* Lead Federal Department

BIO007AP
Defence R&D Canada
Gamma Cell for Irradiation of Biological Agents

BIO008AP
Health Canada
Data Standards for Shared Information

BIO009AP
Defence R&D Canada
Direct Fluorescent Antibody Assays for Viruses and Bacteria

BIO009AP
Defence R&D Canada
Virus Culture and Purification

BIO011AP
Canadian Food Inspection Agency
Acquisition of a Crisis Information Management System

BIO012AP
Canadian Food Inspection Agency
Emergency Management Response System (EMRS) and the Canadian Animal Disease Emergency Response System

BIO013AP
Canadian Food Inspection Agency
State-Transition Model Software for Animal Health and Zoonosis Threat Assessment

CHEM001AP
Environment Canada
Field Response - Re-equipping Vehicle Portable Analytical Systems

CHEM002AP
Environment Canada
Field Response - Person Portable Analytical Equipment

CHEM003AP
Royal Military College
Relocation of Chemical Vapour Protection Test Facility

CHEM004AP
Health Canada
Chemical Containment Lab Assessment

CHEM005AP / CHEM006AP / CHEM007AP
RCMP
Raman for Rapid Characterization of Unspecified Materials Recovered from Terrorist Incidents

CHEM008AP
RCMP
Facility for Gravimetric Analysis of Airborne Particulate Matter

CHEM009AP
Defence R&D Canada
Analysis of Chemical Warfare Agents in Samples Collected in Support of Counter-Terrorism

CHEM010AP
Canadian Food Inspection Agency
Microscope for Fourier Transform Infrared (FTIR)

CHEM011AP
Canadian Food Inspection Agency
Toxic Element Contamination - Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) for Toxic Element Analysis

CHEM012AP
Canadian Food Inspection Agency
Enhanced Capability for Identification of Chemical Residues in Foods, Feeds and Fertilizers

RN001AP
Health Canada
Fixed Point Surveillance System for Canada

RN002AP
Natural Resources Canada
Aerial Surveillance

RN004AP
Defence R&D Canada
Whole Body Monitoring for Radiological Contamination

RN005AP
Health Canada
Nuclear Cluster Emergency Alerting / Notification

RN006AP
Health Canada
Networking Laboratory Results

PAN0001AP
Environment Canada
On-Site Acquisition of Meteorological Data

F. Financial Report

CRTI Funding Model

Table 1: CRTI Program Funding

$ Millions	5-year
CRTI Secretariat	9.5
Technology Acquisition	27.5
Technology Acceleration	38.0
Research and Technology Development	95.0
Totals	**170.0**

Table 2: CRTI Funding Model (Framework)

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
CRTI Secretariat	0.1	1.8	1.9	1.9	1.9	1.9	9.5
Technology Acquisition	0.0	11.1	6.1	4.1	3.1	3.1	27.5
Technology Acceleration	0.0	10.0	10.0	7.0	6.0	5.0	38.0
R&T Development	0.0	7.0	17.0	22.0	24.0	25.0	95.0
Total	**0.1**	**29.9**	**35.0**	**35.0**	**35.0**	**35.0**	**170.0**

CRTI Financial Overview for 2002/2003 Portfolio

This financial overview is based on first project portfolio in Acquisition Technology, Technology Acceleration, and Research and Technology Development. Tables 3-6 show cash flow (committed and available funds) for each project category and for the Secretariat. Shown are the funds based on the charters and initial allocations.

Table 3: Acquisition Technology Projects

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
Framework Model	0.0	11.1	6.1	4.1	3.1	3.1	27.5
Committed projects	-	11.3	9.6	0.3	-	-	21.2
Biological	-	3.1	4.0	-	-	-	7.1
Chemical	-	4.1	1.9	-	-	-	6.0
Radiological/nuclear	-	4.1	3.7	0.3	-	-	8.1
Free	-	-	-	0.1	3.1	3.1	6.3
Total	-	**11.3**	**9.6**	**0.4**	**3.1**	**3.1**	**27.5**

Table 4: Technology Acceleration Projects

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
Framework Model	0.0	10.0	10.0	7.0	6.0	5.0	38.0
Committed projects	-	1.2	8.5	5.3	1.5	-	16.5
Free	-	8.8	1.5	1.7	4.5	5.0	21.5
Total	-	**10.0**	**10.0**	**7.0**	**6.0**	**5.0**	**38.0**

Table 5: Research and Technology Development Projects

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
Framework Model	0.0	7.0	17.0	22.0	24.0	25.0	95.0
Committed projects	-	2.0	11.7	7.8	5.2	2.0	28.7
Free	-	5.0	5.3	14.2	18.8	23.0	66.3
Total	-	**7.0**	**17.0**	**22.0**	**24.0**	**25.0**	**95.0**

Table 6: Secretariat Budget

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
Framework Model	0.1	1.8	1.9	1.9	1.9	1.9	9.5
Committed/Spent	-	1.1	-	-	-	-	1.1
Free	0.1	0.7	1.9	1.9	1.9	1.9	8.4
Revised Budget	-	**1.1**	**1.9**	**2.3**	**2.3**	**1.9**	**9.5**

Revised Budgetary Forecast

Table 7: Revised Budgetary Forecast

$ Millions	01/02	02/03	03/04	04/05	05/06	06/07	Total
Framework Model	-	30.0	35.0	35.0	35.0	35.0	170.0
Spent/Committed	-	15.6	29.8	13.4	6.7	2.0	67.5
Free	-	14.4	5.2	21.6	28.3	33.0	102.5
Revised Budgetary Forecast	-	**15.5**	**35.0**	**44.5**	**40.0**	**35.0**	**170.0**