Improving Coalitions through S&T Cooperation

Dr. Robert S. Walker

Assistant Deputy Minister (Science & Technology)
& Chief Executive Officer, Defence R&D Canada
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
The New Defence and Security Context

Complex Conflict Spectrum  
Asymmetric Threats

Global Economy

Common Defence and Security Agenda  
Globalization of Science and Technology
Defence and Security S&T - Setting the Government’s policy context

- **Canada First Defence Strategy**
- Extension of CF’s Afghanistan mission through 2011
- National Security Statement
- Northern Strategy
- **Advantage Canada** – Federal Government’s Economic Strategy

**Defence and Security S&T Strategy:** Maximize the impact of S&T on Canadian defence and security capabilities and on the nation’s innovation capacity
Canada First Defence Strategy
May 2008

- Defines the government’s Level of Ambition for the Canadian Forces
- Recognizes the need to balance the defence investment across people, equipment, infrastructure and readiness
- Links defence expenditures and socio-economic expectations
- Provides a stable, long-term fiscal framework
Defence S&T Strategy - Direction

- Deliver “full-service” S&T that supports all Departmental decision processes.
- Implement an institution-wide governance construct - the Defence S&T Enterprise.
- Evolve the role/focus for the internal S&T capability – excel at S&T Integration.
- Establish purpose-built internal and external partnerships - leverage effort and increase exploitation of results.
Science & Technology...

• Informs emerging Canadian Forces concepts and doctrine
• Helps build Canadian Forces capabilities to realize the Canada First Defence Strategy
• Helps the CF acquire war-winning technologies – disruptive and enabling
• Helps solve Canadian Defence and Security hard problems
S&T informs Canadian Forces Emerging Concepts and Doctrine

Economic & Social Trends
- Population (Social & Economic)
- Migration
- Urbanization
- Economic Disparity
- Globalized Economies
- Health
- Water & Food
- Oil
- Climate Change
- Competition & Adventurism

GeoPolitical Trends
- Balance of Power
- Regional Instabilities
- Fragile & Failing States
- Metanational & Transnational
- Global Communication

Military & Security
- Commercialized Weapons
- State vs Non-State
- Cyber Attacks
- Disruptive Tactics
- Diverse partners

Environmental & Resource
- Water & Food
- Oil
- Climate Change
- Competition & Adventurism

CF Integrated Capstone Concept
- Comprehensive
- Integrated
- Adaptive
- Networked
S&T helps build
Canadian Forces CFDS Capabilities

1. Trusted situational awareness, intent prediction and decision making for achieving operational superiority
2. Robust operational command and control
3. Seamless interoperability with other government departments, other Canadian partners and allied forces in a complex environment
4. Agile, tailored force to deploy and operate in complex environments
5. Full-spectrum protection including from weapons of mass destruction
6. Sustainability, affordability, supportability of operations, assets and people
7. Creation of asymmetric advantage by defeating terrorist groups and tactics
8. Defence policy and force development informed and enabled by S&T developments.
Potentially disruptive technologies that could provide decisive advantage for the CF

For example ...

• Quantum capabilities
• Autonomous intelligent systems and platforms
• Wide-band mobile wireless networking
• New sensing (hyper-spectral, terahertz)
• Micro-satellites
• Virtual reality and neuro-interfaces
• Non-conventional weapons
• Micro/nano-engineered smart materials
• Novel power sources
• Bio-based solutions (biometrics, bio-signatures, broad spectrum therapies)
S&T helps solve Defence and Security Hard Problems

**Defence**
- Defeat the “IED System”
- Enhance soldier survivability
- Build an integrated CF C2 system
- Grow the Force (recruit, train, retain, and duty of care)
- Close the gaps in the CF Strategic Capability Roadmap
- Position Defence to exploit emerging or disruptive technologies
- Reduce the costs of defence systems through-life capability management

**Defence & Security**
- Provide a rigorous foundation for defence and security emerging concepts and doctrine (comprehensive, integrated, adaptive, networked)
- Improve northern and maritime situational awareness and response
- Build a reusable national Major Events Security capability
- Defeat the CBRNE terrorist threat
- Enhance the nation’s cyber-security

**Global**
- Enable the “Green” Canadian Forces
- Find alternative power and energy solutions for the CF
Areas of S&T Expertise

Human Domain
- Human Systems Integration
- Behavioural Effects

Information Domain
- Command and Control
- Complex Systems
- System Autonomy
- Intelligence, Surveillance and Reconnaissance

Physical Domain
- Personnel Protection
- Weapon Systems
- Protection of Assets
- Mobile Systems

Defence R&D Canada • R & D pour la défense Canada
Roles and Impact of International S&T Cooperation
External Partnerships: Allied Defence and Security S&T Collaboration

Leveraged value to Canada
$100M (FY08/09)

- CAN-NLD-SWE MOU
- CBR Defense Material MOU
- North American Technology and Industrial Base Organization
- Bilateral MOUs on Defence S&T
Defence and Security S&T Cooperation contributes to ...

... burden sharing in knowledge and technology development by ...

• Understanding and responding to threats
• Exploring emerging S&T for disruptive effect
• Helping shape new military concepts and doctrine
• Providing options for future military capabilities
• Exercising and training on new military capabilities
• Supporting current military operations
• Strengthening domestic security capabilities
Exploring emerging S&T for disruptive effect

- Harvesting energy from human movement – meeting soldier power requirements
- Femtosecond laser – manipulating materials for protection, sensors, energetic materials
- Environmentally sensitive surface treatments with enhanced durability
Providing Options for New Military Capabilities

Missiles Integration and Launch

Combat Fluid Resuscitation

Soldier Information Requirements

Traumatic Brain Injury Diagnostics
Supporting current military operations: Counter – IED

Prevent

Detect

Respond

Mitigate

Bomber Geographic profiling

Intelligence Collation and Link Analysis

Detection of Hostile RF Signals

Hyper Spectral Imaging

LAV Impact Seating System

Medic Battlefield Trauma Training

PPE Enhancements
## Expectations for S&T Cooperation: a Canadian Perspective

### Knowledge Development
- Contributes to each nation’s MoD decision processes
- Informs the national S&T program: future environment; emerging concepts, systems and doctrine; disruptive S&T
- Enables an efficient and effective national S&T program: people and personal networks; lexicons and standards; shared awareness; peer review.

### Technology Development
- Shares the burden in technology and system development
- Contributes to reduction of risk in national acquisition programs
- Contributes to reduction of through-life cost of military systems
Enhancing International S&T Cooperation - Some Thoughts
Strategic Challenges in S&T Cooperation

• Differing expectations on national S&T Programs

• Differing scales of investment in Defence S&T by each country

• Differences among the nations’ acquisition business models – from COTS/MOTS to custom defence equipment development

• Potentially competing economic development objectives
Some Principles to Shape the Way Ahead

- **Trust matters** – Favor coalitions of trusted partners, from warfighters to scientists

- **Knowledge matters** – Balance the S&T cooperation spectrum from knowledge co-development to technology co-development

- **Speed matters** – Synchronize S&T cooperation to the operational need for solutions

- **People are crucial**: smart, informed scientists and engineers enable stronger coalitions (engage the best and the brightest)