DEFENCE R&D DÉFENSE

Improving Coalitions through S&T Cooperation

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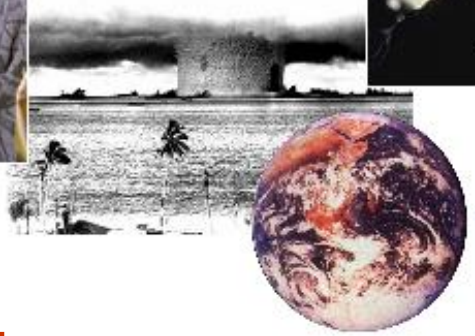
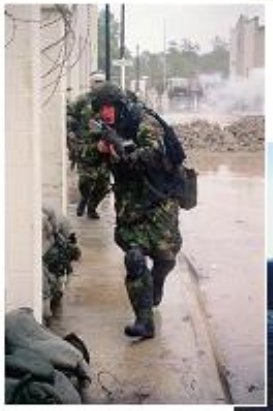
The New Defence and Security Context

Complex Conflict Spectrum

Asymmetric Threats



Global Economy

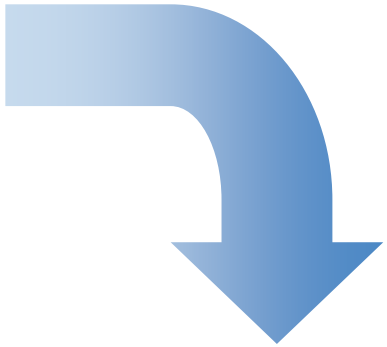


Common Defence and Security Agenda

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

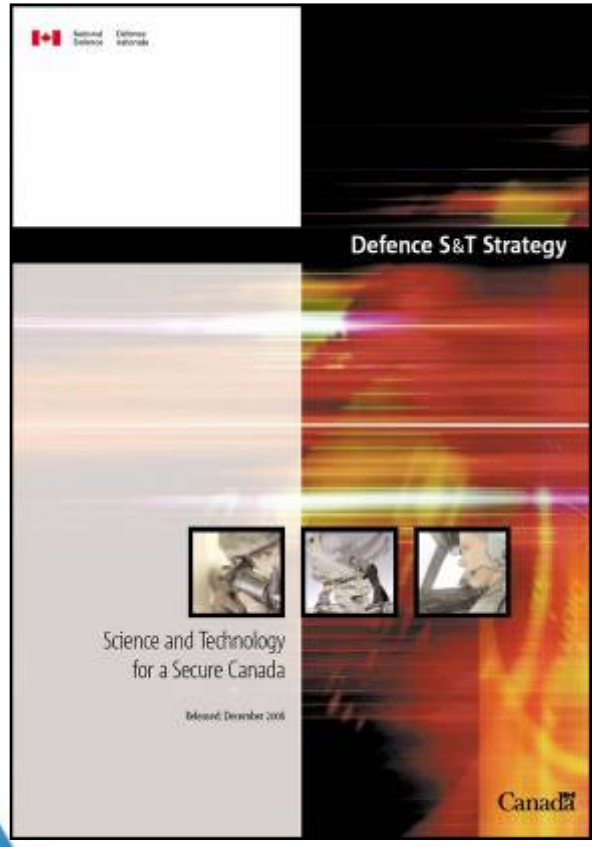


Defence and Security S&T Strategy: *Maximize the impact of S&T on Canadian defence and security capabilities* **and** *on the nation's innovation capacity*

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

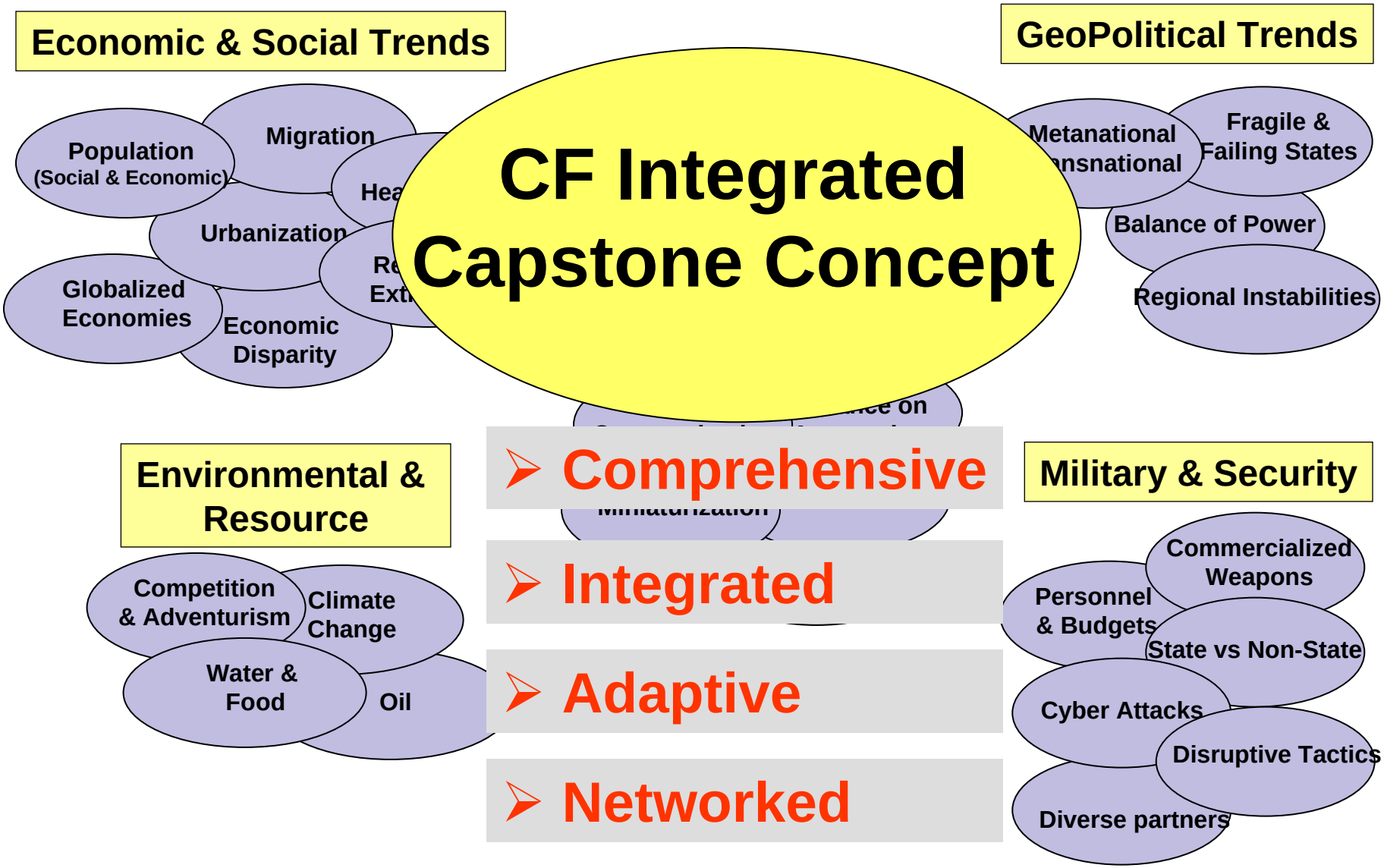


- **Deliver "full-service" S&T that supports all Departmental decision processes.**
- **Implement an institution-wide governance construct - *the Defence S&T Enterprise.***
- **Evolve the role/focus for the internal S&T capability – *excel at S&T Integration.***
- **Establish purpose-built internal and 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



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

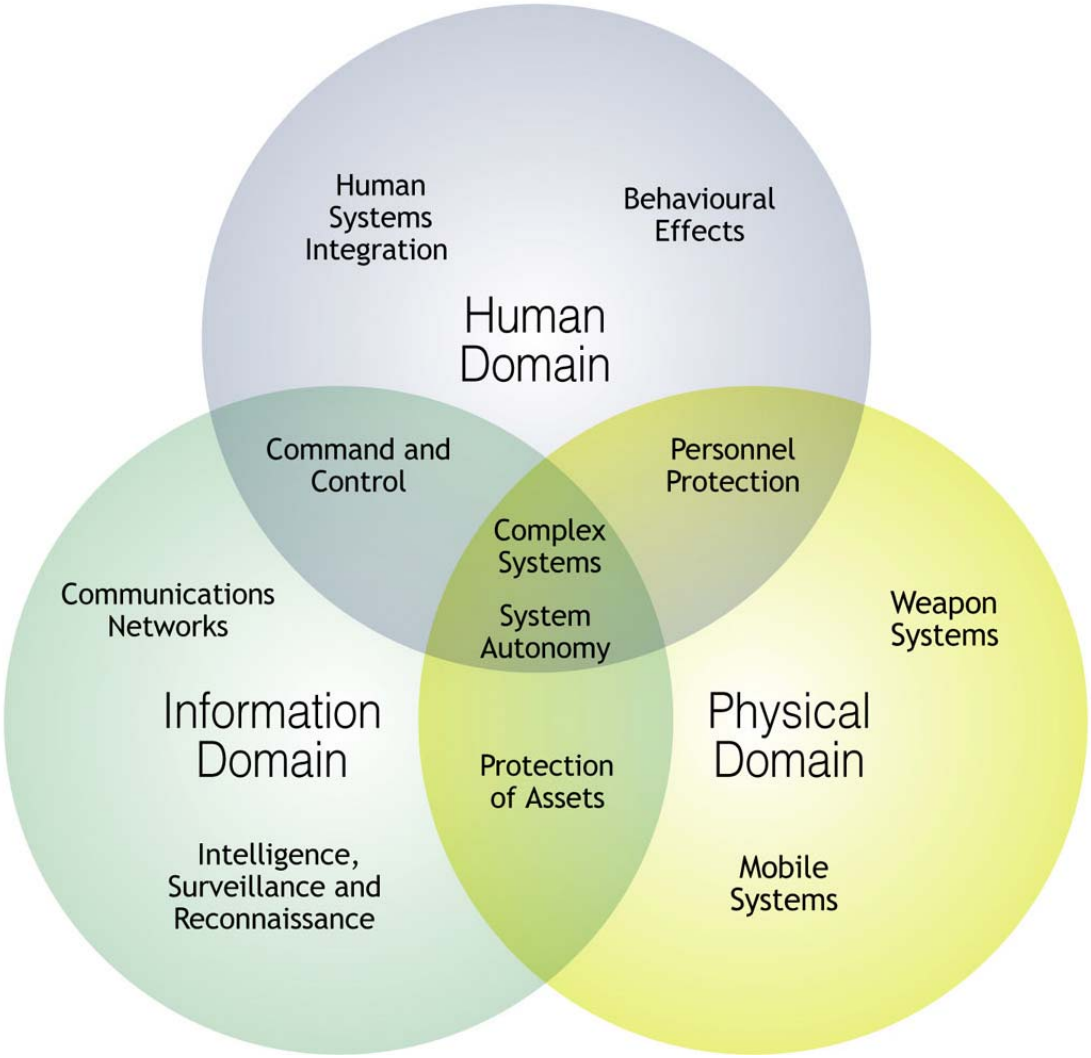
Defence & Security

- 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



Roles and Impact of International S&T Cooperation

External Partnerships: Allied Defence and Security S&T Collaboration

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

THE TECHNICAL COOPERATION PROGRAM
TTCP

CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL
COOPERATIVE PROGRAM

CBR Defense Material MOU

NATO
OTAN

North American Technology and Industrial Base Organization

PUBLIC SECURITY TECHNICAL PROGRAM
PSTP

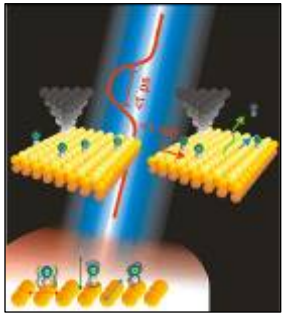
CAN-NLD-SWE MOU

Bilateral MOUs on Defence S&T

Defence and Security S&T Cooperation contributes to …

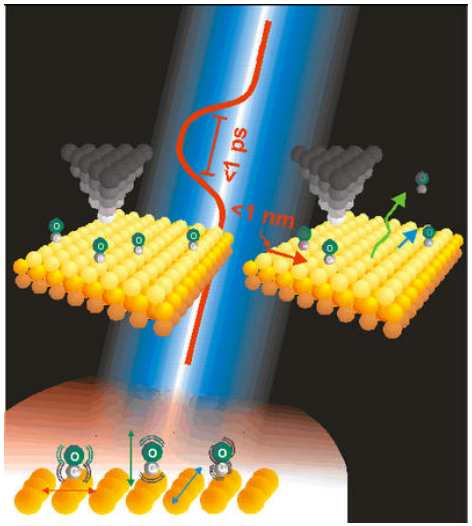
… burden sharing in knowledge and technology development by …

- **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**

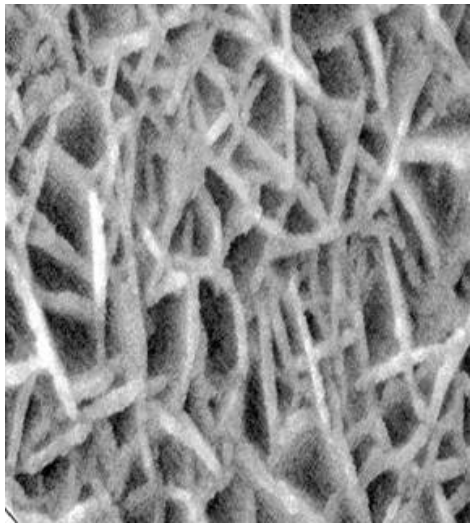



Exploring emerging S&T for disruptive effect

Biomechanical Energy Harvester



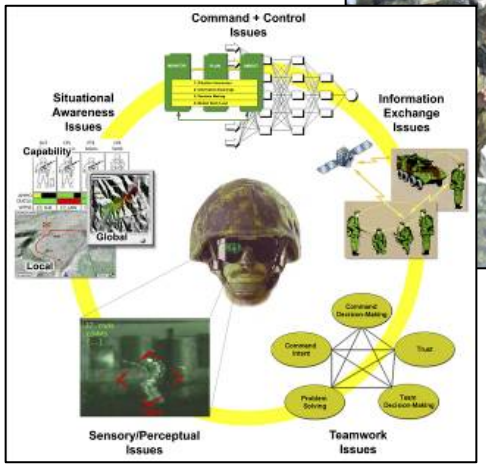
Femtosecond laser



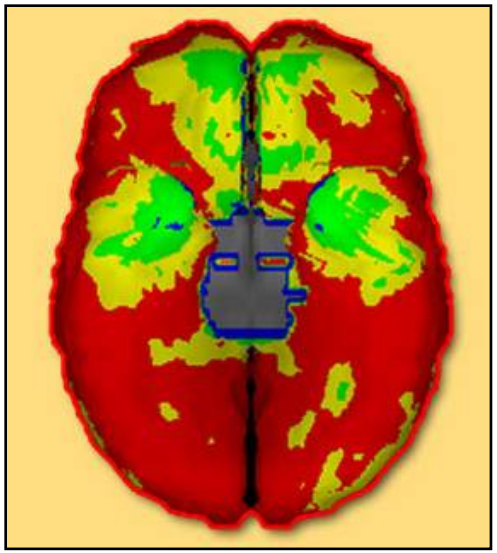
Surface Treatments

- 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

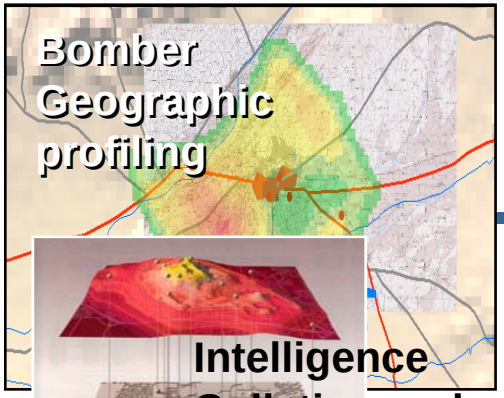


Soldier Information Requirements



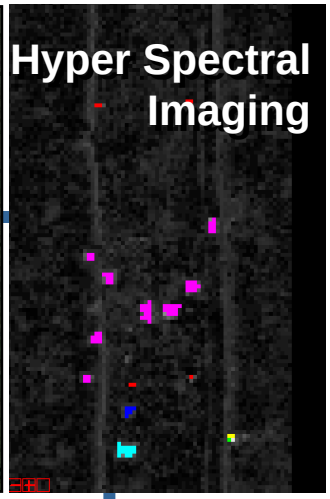
Traumatic Brain Injury Diagnostics

Supporting current military operations: Counter – IED



Prevent

Detect



Respond

Mitigate

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)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