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ASSISTANT DEPUTY MINISTER (SCIENCE AND TECHNOLOGY)

Chief of Staff



Future S&T Context and Trends for Defence and Security: Informing Canada's New Defence Policy

Historical Analysis for Defence and Security Symposium

May 24, 2017

Canada 



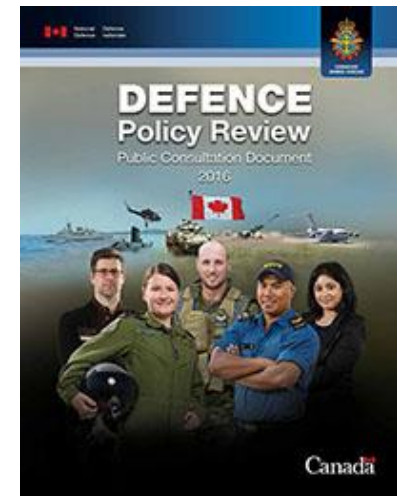
Outline

- Background
- Methodology and timelines
- Results
- Key findings
- Future of warfare and Defence Policy Review (DPR)



Background

- Canada's Defence Policy Review
 - April – August 2016
 - Public consultations
 - Experts roundtables
 - Allied and partner consultations
 - Internal reviews and input
- DM request for a paper on the future of warfare to inform DPR





Methodology and timelines

- Objective
- Agency wide consultations
- Literature review
- Lead organization – ADM (S&T) Advisory Cell
- Timelines
 - April 4-8, 2016, call for submissions
 - April 13-15, assessment of themes
 - May 2, request for expanded papers
 - May 12-24, synthesis and first draft
 - June 24, delivery of final report



ADM (S&T) Advisory Cell Mission

- Support ADM (S&T) to:
 - Ensure S&T advice aligns with GoC/DND priorities and leverages S&T work
 - Ensure DND investment and policies are informed by S&T evidence
 - Brief level 0 DND executive on emerging S&T issues that could impact defence and security



Future of Warfare: Main themes

- Characteristics of the future operating environment
- Trends in personnel, military organizational structure and doctrine
- High-impact technologies and technology trends
- Technological threats and opportunities



Characteristics of the future operating environments

- War-fighter congestion
- Open source warfare
- Psychological warfare
- Cyber warfare

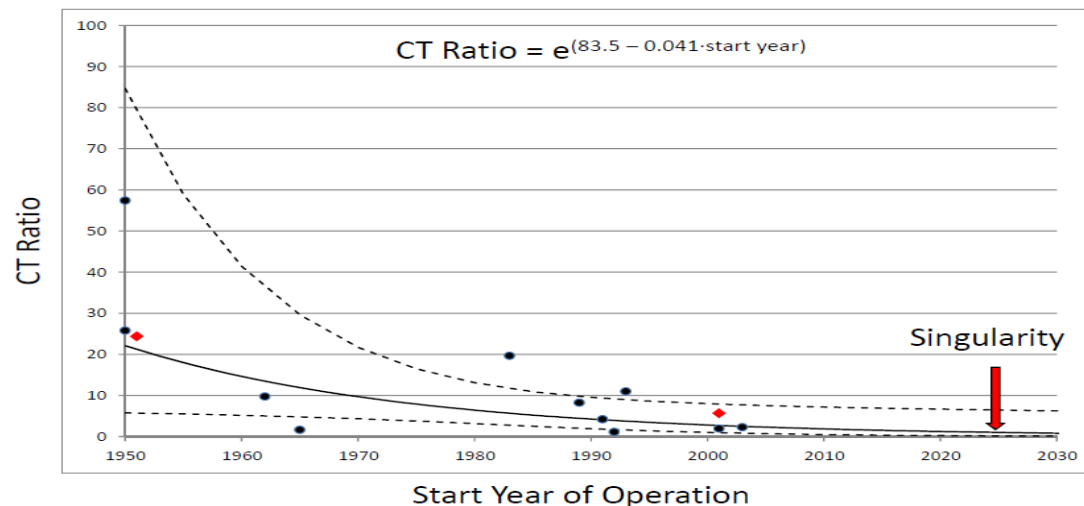




Trends in personnel, military organizational structure and doctrine

- Decline of combat casualties
- Revolution in military organizational structures
- Flexible and adaptive decision aids
- Evolution of strategic concepts – deterrence and assurance

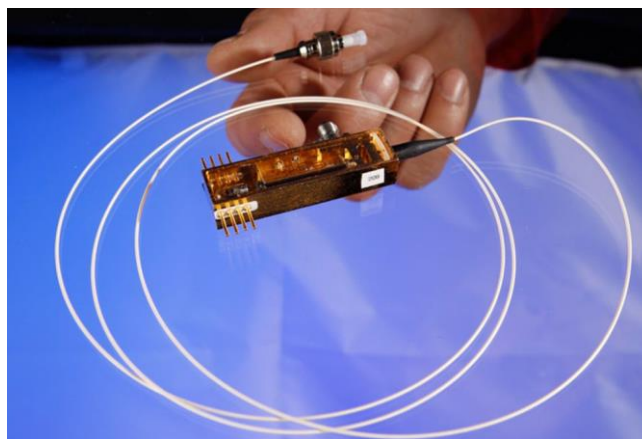
Combat Troops
(CT) Ratio





High-impact technologies and technology trends

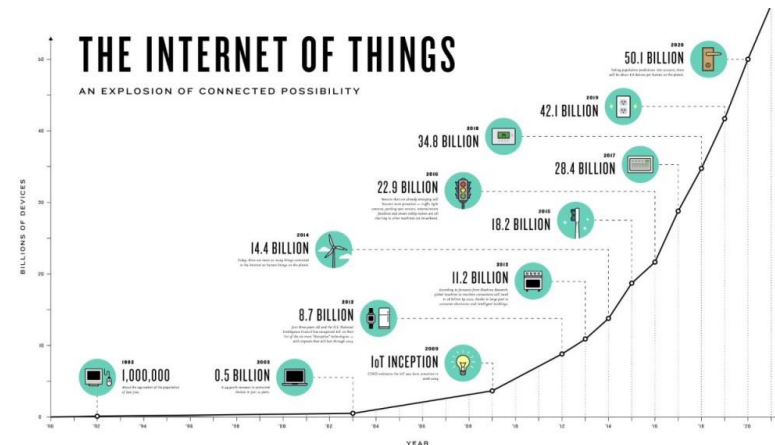
- Autonomy
- Comprehensive sensing
- Low-observability (stealth)
- Hypersonics
- Quantum





Technological threats and opportunities

- Electromagnetic congestion
- Big data/Internet of things
- Synthetic biology and genome editing
- Personalized screening and enhanced physical performance concepts





Key findings

- Adoption of open-source and less-expensive technologies may be critical for agility and relevance in future warfare.
- New threats and domains such as cyber and space require a new approach to the use of military force.
- Deterrence and assurance are more effective strategies for managing state competition and threats from non-state actors than arms races.
- Future operations in the cyber domain would be heavily dependent on S&T, including engineering, behavioral and social sciences.



Key findings

- Future force planning may be increasingly reliant on technology to protect and replace human combatants, while modular, multi-purpose, and rapidly responding smaller units may be preferred for deployment.
- Autonomy, alongside comprehensive sensing, quantum technology and hypersonics, are expected to revolutionize support systems and some warfighting functions, signal processing, encryption, and countermeasure capabilities.
- Novel approaches to extract knowledge from data will be crucial for successful operations in the future.
- Future adversaries may increasingly focus on the exploitation of soldiers' moral values.



Future of warfare exercise and the Defence Policy Review

- Discussion paper
- Deep-dive analysis: cyber, autonomy and deterrence for ADM(Pol) and DPR
- Verification of findings
 - Analysis of external experts submissions to the DPR
- DPR not yet released
 - Draft versions show heavy emphasis on S&T and new concepts as enablers