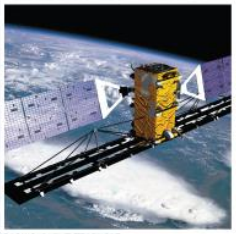


All Domain Situational Awareness (ADSA) S&T Program

101 Briefing
(Updated in June 2019)

ADSA Drivers

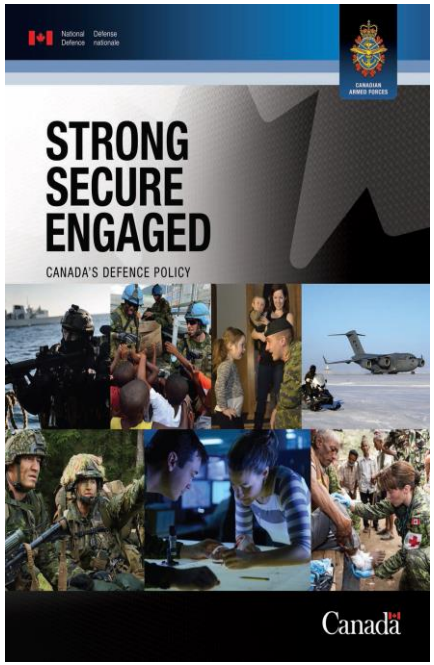
There are four drivers for an enhanced Research and Development (R&D) program in continental surveillance:

- **Technology**
  - **Broader range of threat weapons: long range, precision, stealth, hypersonic speed, drones.**
- **Environment**
  - **Unique and changing geophysical ocean conditions, particularly in the North.**
- **Theatre**
  - **Greater accessibility to and economic activity in the North.**
- **Geopolitics**
  - **Strategic messaging.**

Departmental Strategic Guidance

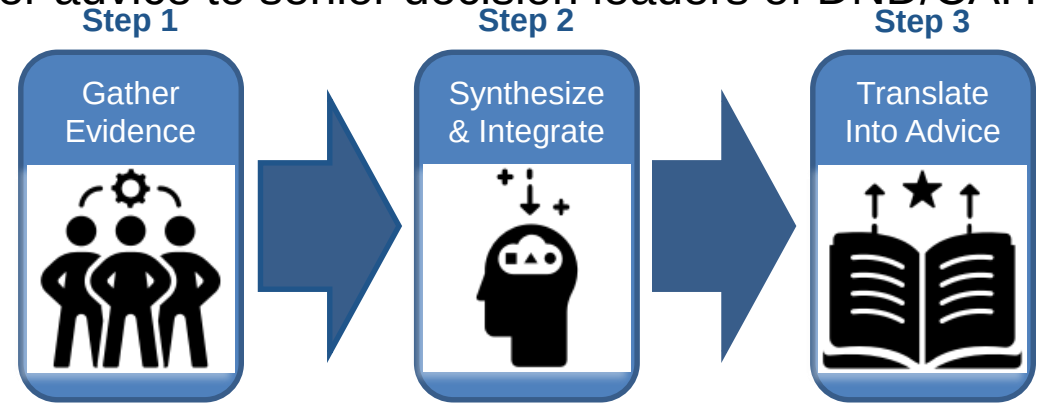
- $133 million was allocated in 2015 by the Department of National Defence (DND) for a five-year S&T program to inform decisions on surveillance capabilities.

- Canada's Defence Policy *Strong, Secure, Engaged* (SSE) includes guidance on S&T surveillance programs:
  - Prioritize Arctic joint intelligence, surveillance and reconnaissance as a defence research and development priority to produce innovative solutions to surveillance challenges in the North. (Initiative 69);
  - Collaborate with the United States on the development of new technologies to improve Arctic surveillance and control, including the renewal of the North Warning System. (Initiative 109);
  - Modernize NORAD to meet existing challenges and evolving threats to North America, taking into account the full range of threats. (Initiative 111)



ADSA Program

- Analyze requirements with DND/CAF and North American Aerospace Defense (NORAD) Command stakeholders;
- Work with partners to address emerging threats in an evolving geopolitical environment;
- Access innovation and capacity within Industry and Academia to deliver on DND/CAF requirements;
- Conduct research and development projects to reduce the risk of unproven technologies;
- Deliver advice to senior decision leaders of DND/CAF.



ADSA Program – Four lines of operation

1. Awareness of traffic in Canada's airspace;
2. Awareness of maritime traffic in Canadian approaches and Arctic shore regions;
3. Awareness of sub-surface activity on approaches to Canada or in the North; and
4. Analysis of sensor mixes and information integration for domain awareness to detect threats beyond the threshold of current systems.

HIGH LEVEL DELIVERABLES INCLUDE ANALYSIS OF:

- current and future threats
- the performance and viability of surveillance technologies and techniques and methodologies

HIGH LEVEL DELIVERABLES INCLUDE:

- the contribution of current, near term and future sensors and information
- potential sensor mixes

ADSA – Projects

ADSA S&T PROJECTS CURRENTLY RECEIVING FUNDING TO PROVIDE ADVICE/SOLUTIONS:

- **Polar Over the Horizon Radar (OTHR)**
  - Long range radar in the Arctic
- **Compress the Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) cycle**
  - Facilitates the decision making cycle
- **Canadian Arctic Underwater Sentinel Experimentation (CAUSE)**
  - Improves underwater surveillance
- **Threat, Requirement and Gap (TRG) Analysis**
  - Provides understanding of the security challenges in Canada, particularly in the Arctic

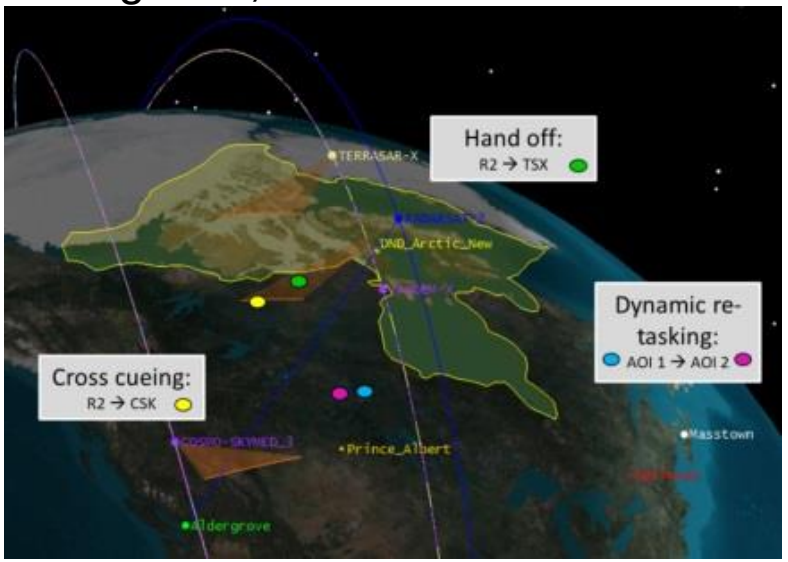
OTHR Project Overview

- **Objectives:**
  - To assess the possibility of OTHR as an option for surveillance of the North in addition to the current North Warning System (NWS) and NORAD capability.
  - To develop technology and signal processing techniques to characterize and address the challenges encountered from Aurora Borealis.

- **Deliverables:**
  - Tools and advice for improved effectiveness and greater situational awareness through integrated intelligence, surveillance and reconnaissance (ISR) capabilities, including networked sensors with a shared operational picture.

TCPED Project Overview

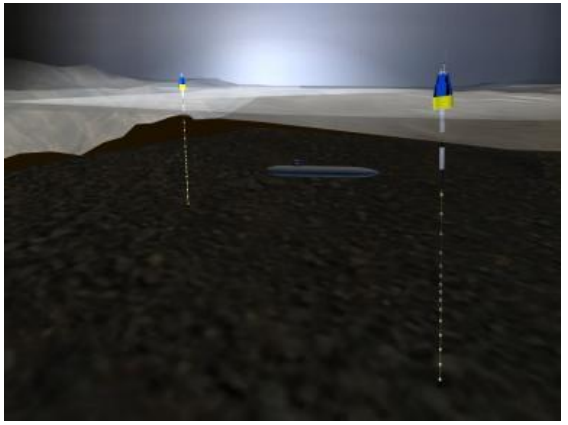
- **Objectives:**
  - To compress the TCPED intelligence cycle for RADARSAT Constellation Mission (RCM) follow-on missions to:
    - Increase the usefulness for maritime domain awareness, Arctic surveillance and other geospatial intelligence;
    - Allow cueing of other satellites;
    - Increase use of data by Allies;
    - Strengthen Canada's specialized role in space-based radar;
    - Conduct wide area maritime surveillance and detection.

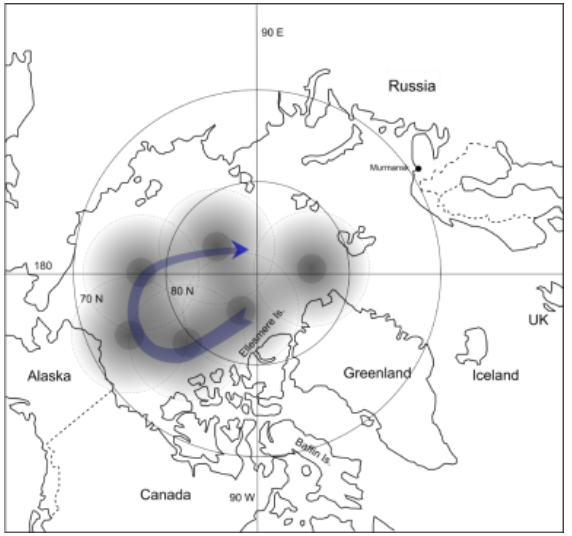


- **Delivered through Defence Innovation Research Program (DIRP) calls to Industry/Academia (50% funded by bidder).**

CAUSE Project Overview

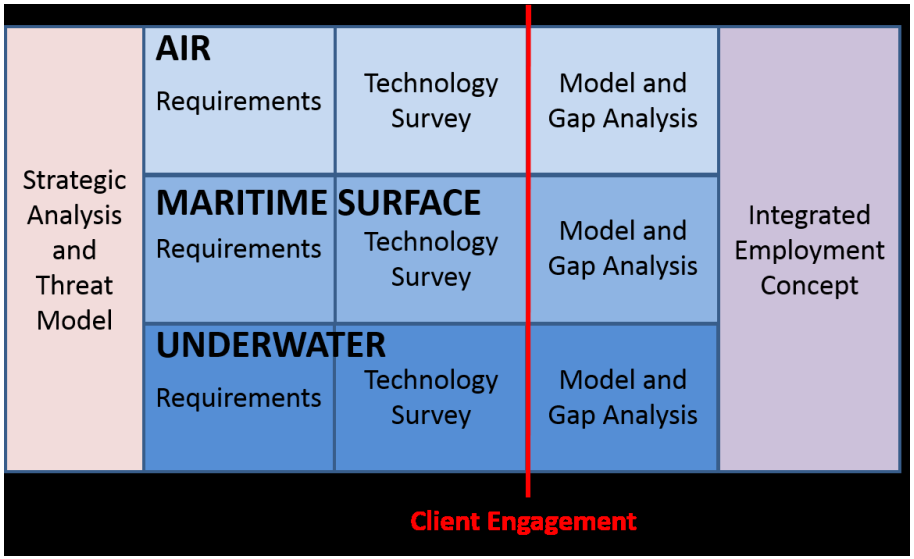
- **Objectives:**
  - Investigate and demonstrate sensor systems for wide-area underwater and under-ice surveillance in the Arctic (includes the Arctic Basin and Canadian Archipelago).
  - Study various technologies for long range underwater surveillance, such as types of arrays, acoustic sound sources for surveillance and underwater communications, and the viability of a long range unmanned underwater vehicle.
- **Deliverables:**
  - Technology demonstrations and advice on underwater/under-ice surveillance technologies and methodologies.





TRG Analysis Project Overview

- **Objectives:**
  - Assess all domain threats in the Canadian Arctic and relevant approaches;
  - Analyze surveillance requirements in support of the CAF and NORAD;
  - Compare selected technology options against these requirements; and
  - Analyze Arctic/ISR capability gaps in support of the DND and CAF.



Progress Update

- The ADSA S&T Program is progressing well.
  - All of the major contracts with industry and academia are in place to deliver innovation addressing surveillance challenges in the North.

- Preliminary results are being received and a team is prepared to synthesize and integrate the information in order to formulate advice.

- Working with the US, ADSA is also contributing to the first-ever bi-national study of innovative technological solutions for airspace surveillance.

- These S&T contributions will inform dialogue within DND and Government on future acquisition projects for broader North American Defence capabilities including, but not limited to, the renewal of the North Warning System capability.

Conclusion

- New threats and strategic changes stress the need for advice on enhanced surveillance and detection capabilities.
- Surveillance solutions explored support the Government of Canada's ability to exercise sovereignty in the North, and provide a greater whole-of-government awareness of safety and security issues, transportation and commercial activity in Canada's Arctic.
- The ADSA S&T Program creates opportunities for S&T providers and will build innovation and capacity within Industry and Academia.
- Outcomes from the program will also inform future acquisition projects including, but not limited to, the renewal of the North Warning System capability.
- Finding enhanced surveillance solutions is essential in providing enduring protection of Canada and North America.