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Space S&T Program

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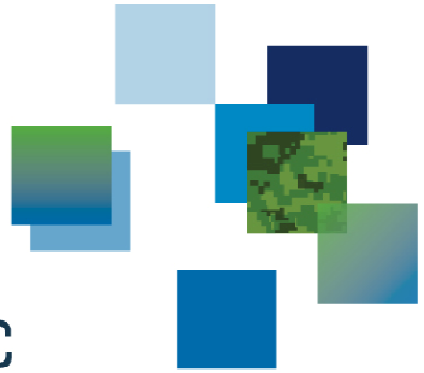

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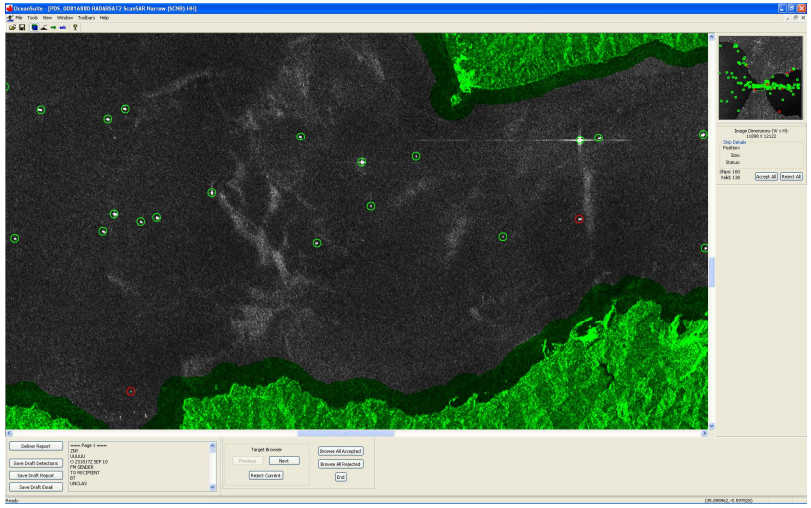
Outline

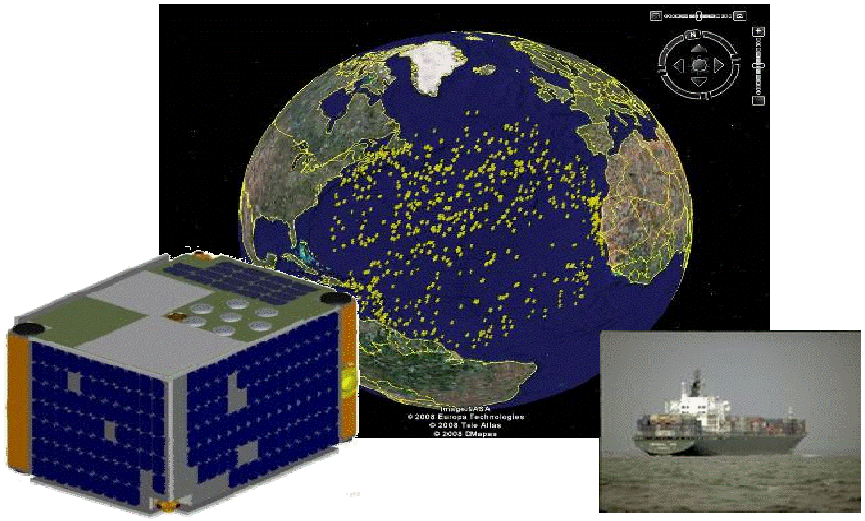
- Successful and Ongoing Collaboration
- Program Formulation
  - Outcomes
- Engagement Strategy
  - Opportunities for Engagement

Successful and Ongoing Collaboration

- OceanSuite for Operational Ship Detection – Exploitation of Space-Based SAR



- M3MSat – Exploitation of Space-Based AIS



Joint Force Development (JFD) Portfolio Overview

- **Command and Control / Communication Information Systems (C2/CIS)**
- **Cyber Operations**
- **Intelligence**
- **Intelligence, Surveillance and Reconnaissance (ISR)**
- **Space Operations**

Key Clients:

- Chief Force Development (CFD)
- Chief Defence Intelligence (CDI)
- Assistant Deputy Minister (Information Management) (ADM(IM))

✓ Reshaped JFD S&T programs to address client-based outcomes

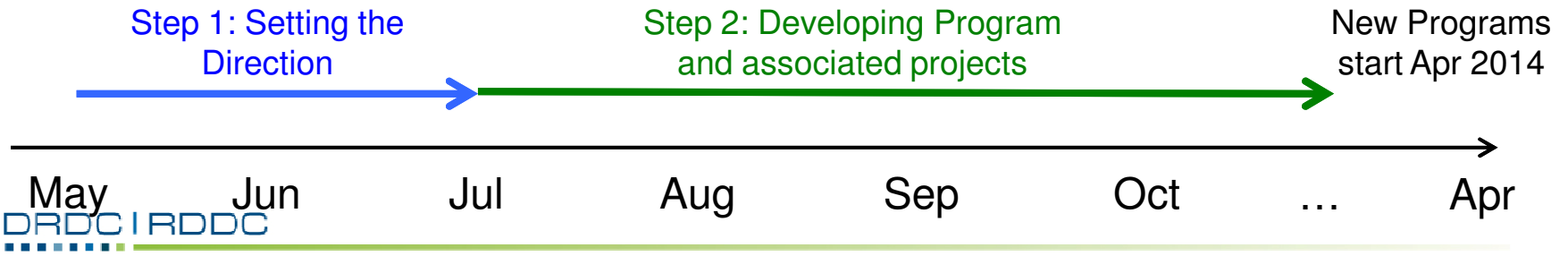
✓ Many projects are in definition phase

✓ Projects will be conducted in collaboration with OGDs, industry, academia and allies

✓ Sourcing strategy requires an understanding of industry interests, strategic goals, capabilities and capacities

Program Formulation

- Tiered development of projects
  - Program (i.e. ISR)
  - Project (i.e. Space Situational Awareness and Emerging Technologies)
- Aim for larger teams to go deep into an area and deliver measurable outputs
- Projects are approved for FY2014/15 through to FY2019/20 (five years) and will be re-evaluated and updated yearly as required



ISR S&T Client-Based Intermediate Outcomes

The CAF have accurate, timely, and persistent situational awareness of Canada's territory and its air and maritime approaches as well as other international areas of interest

- Continue to operationally exploit space-based Synthetic Aperture Radar (SAR) and Electro-Optic/Infrared (EO/IR)
- Maintain and improve Maritime Domain Awareness (MDA) *
- Maintain and improve Arctic intelligence *

* Using space-based sensors when appropriate

Space Operations S&T Client-Based Intermediate Outcome

The CAF have assured access to space and is guaranteed its unhampered exploitation for the delivery and sustainment of space effects

- Capability to compile and maintain a Space Common Operating Picture (COP)
- Capability to detect and characterize space objects for SSA, identify threats and assess risks
- Capability to discriminate between intentional (hostile) and unintentional (natural) effects in space
- Capability to perform orbital analysis and conjunction threat assessment for the space track catalogue
- Capability to implement next generation space surveillance

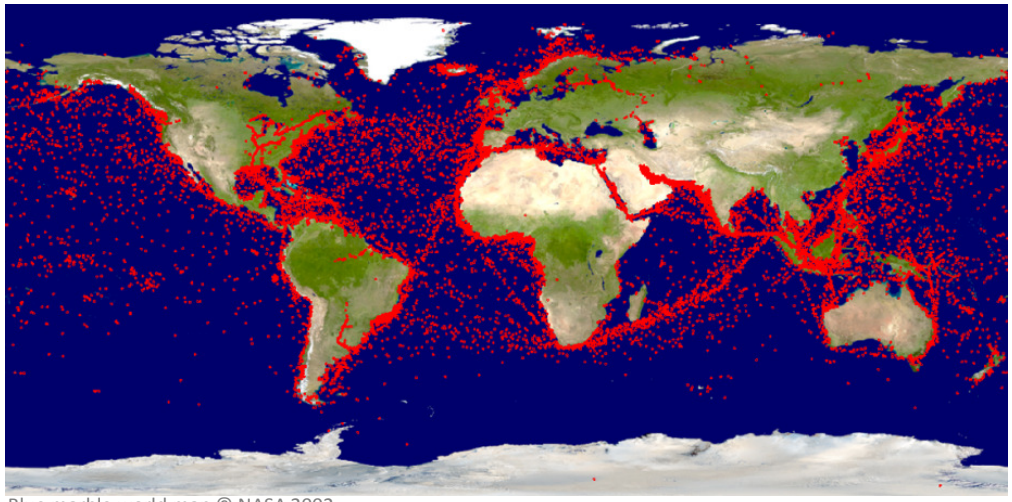
Engagement Strategy

Category	Partner	Engagement
Other Government Departments (for example)	Canadian Space Agency	➢ Renew the CSA-DRDC Advisory Committee on R&D (ACORD) to ensure continued engagement of key partner in delivery of space effects. Coordinate governance structures and policies to enable CSA to better respond to DRDC/DND needs ➢ Ensure lessons learned from current joint CSA/DND projects are incorporated into future developments and processes
	NRCan	➢ Participate in an intergovernmental committee to coordinate space infrastructure and requirements
Non-Governmental Agencies	Academia	➢ Identify work in projects that could benefit from expertise from academia, e.g. UTIAS, etc. have established capabilities to develop payloads and small cubesats and nanosats. Set up strategic partnerships with key universities through funding a research centre of excellence. Discuss strategies with academia to access the academic innovation community.
	Industry	➢ Participate in defence industry association events to publicize DND strategic requirements and messages, and to develop an enterprise policy and strategy to engage industry.

Opportunities for Engagement

SPACE-BASED MARITIME DOMAIN AWARENESS (MDA)

Tools and techniques to exploit RADARSAT Constellation Mission (RCM) capabilities for MDA as well as exploiting RCM as elements in a system-of-systems.



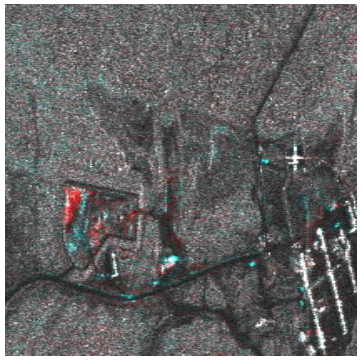
Blue marble world map © NASA 2002

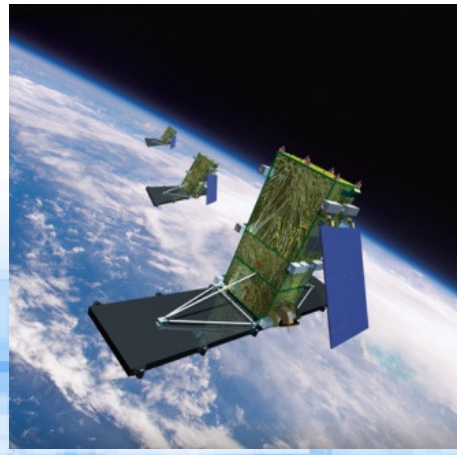
- Detection, discrimination, and identification of ships and ship intent
- Detection of human activity and anomalies, and enhanced ocean intelligence products
  - Leveraging existing contracts
  - DIR, CSSP and RFP in early 2015

Opportunities for Engagement

SPACE-BASED RADAR EXPLOITATION

Exploitation of RADARSAT-2 and RCM and other future space-based radar systems for surveillance, including the Arctic, and intelligence preparation of the battlefield in support of deployed forces



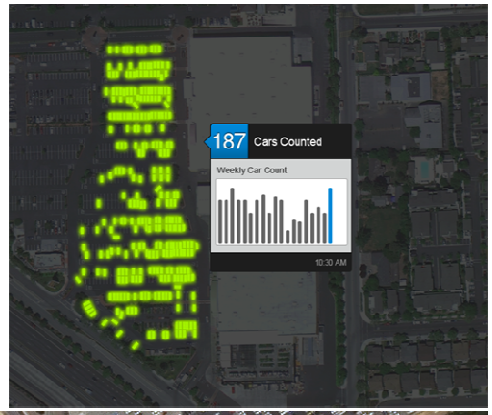


- Terrain elevation and bathymetric data within littoral regions
- Change detection for monitoring of remote northern facilities using space-based sensors
- High Arctic air defence

Opportunities for Engagement

SPACE-BASED EO/IR EXPLOITATION

Exploitation of persistent imaging as well as emerging sensors such as OPIR and HSI for surveillance as elements within a system of systems.



- Wide Area Motion Imagery
- Exploitation of hyperspectral nanosat technology to detect greenhouse gases
- Modelling and simulation of HSI sensor technologies

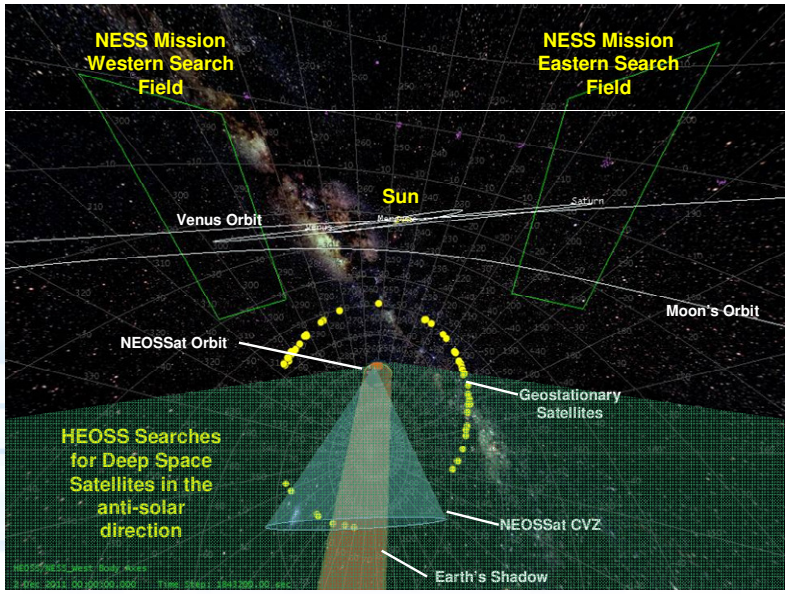
Opportunities for Engagement

SPACE SITUATIONAL AWARENESS AND EMERGING SPACE TECHNOLOGIES

Development of a Space Common Operating Picture (COP)

- **Concepts for a technology demonstrator**

- Orbital analysis and conjunction threat assessment for the space track catalogue
- Detection and characterization of space objects for space situational awareness
- Concepts for next generation surveillance of space capability



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