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# Integrating Space into CF Operations

**Director Space Requirements**  
**Col Andre Dupuis**

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Défense  
nationale

Chief of Force Development / Chef du Développement des Forces

Canada



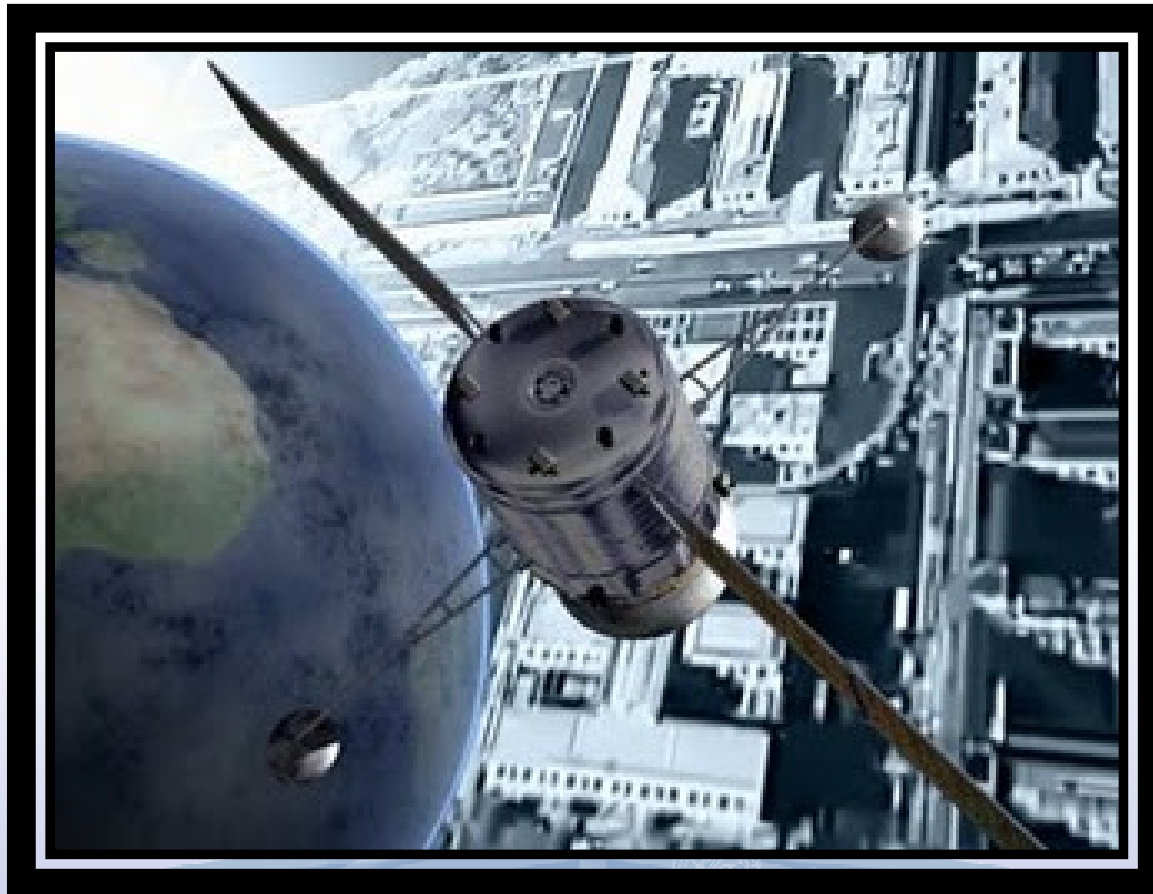
# The Drivers

- **DND/CF Space Programme leveraging Relationships & Expertise**
  - Close collaboration Cross DND and CAF
  - Other Government Departments, Industry Partners & Allies
- **CFDS-derived requirements**
  - Excellence at home
  - Strong, Reliable Defence Partner
  - Projecting Leadership Abroad
- **Space requirements support Six Core Mission Areas**
  - National Defence Space Policy
  - National Defence Space Strategy

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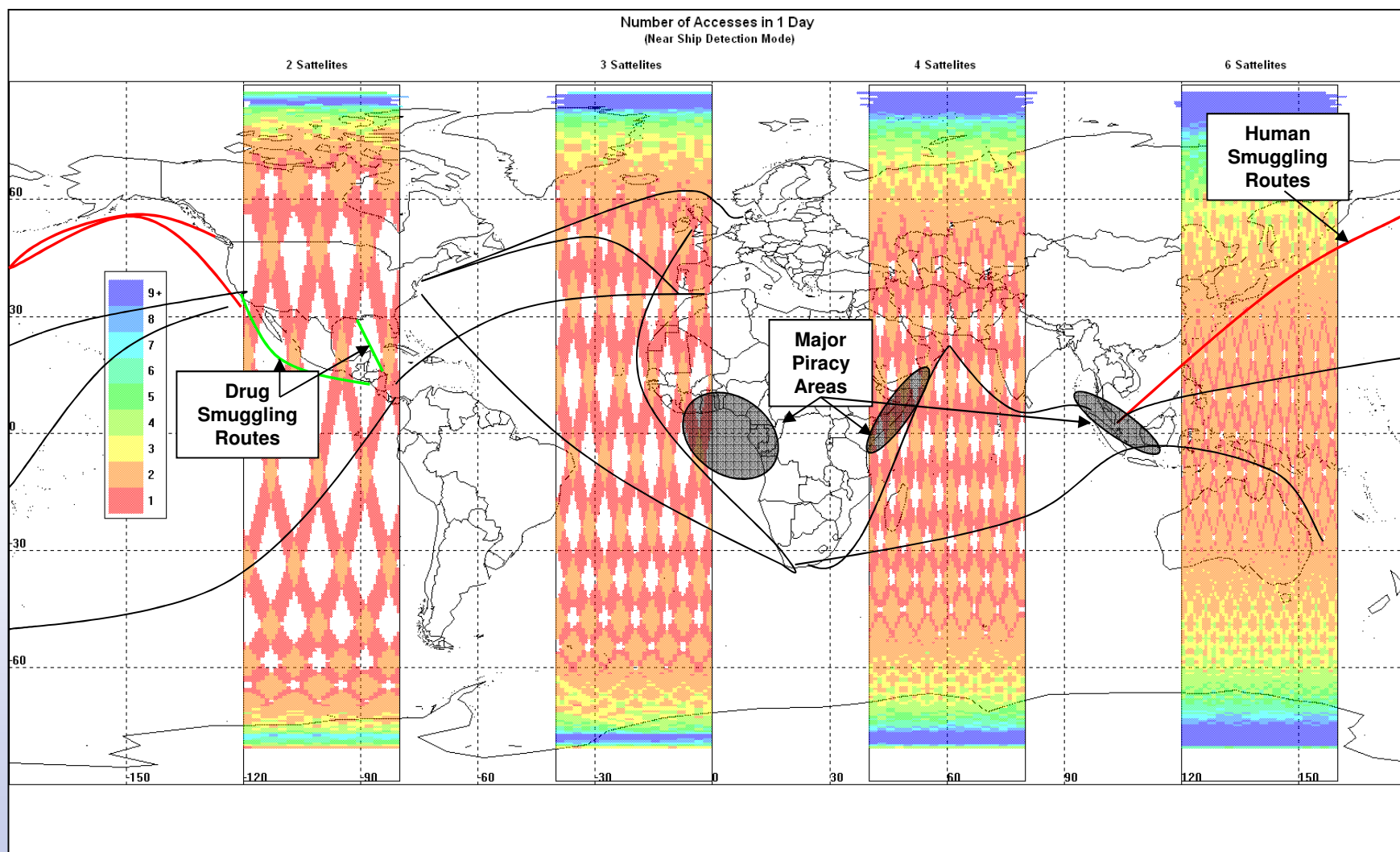
# ISR





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# Major Shipping Routes



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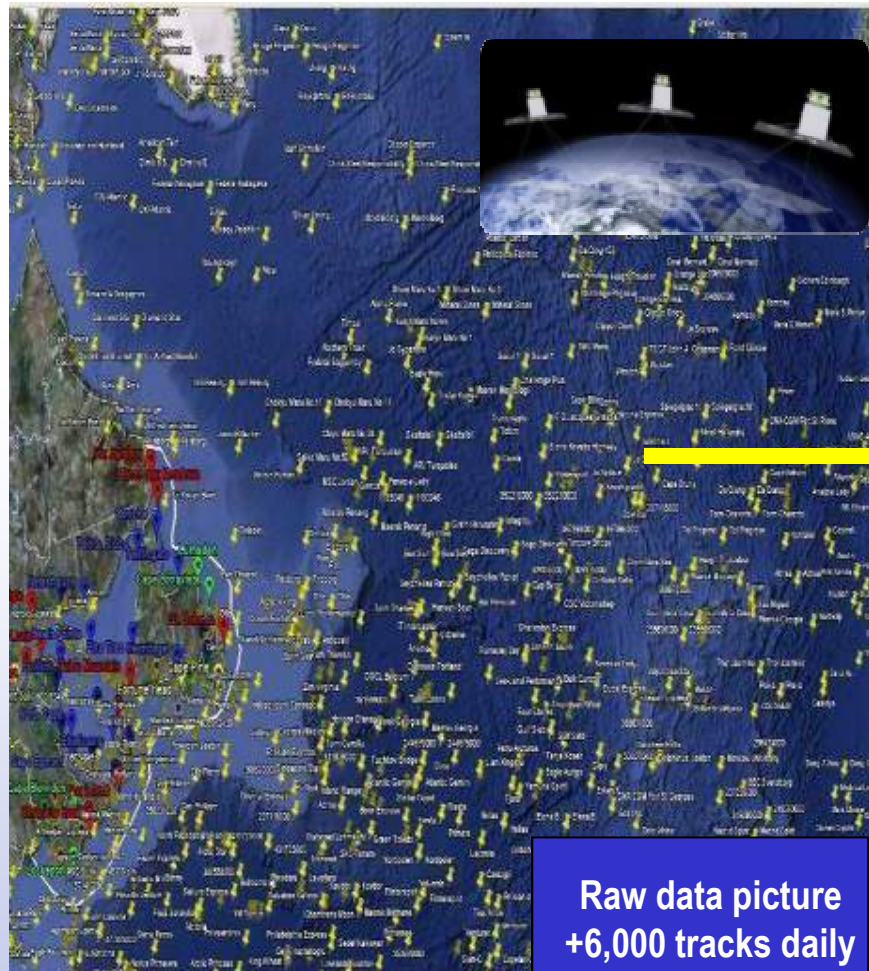
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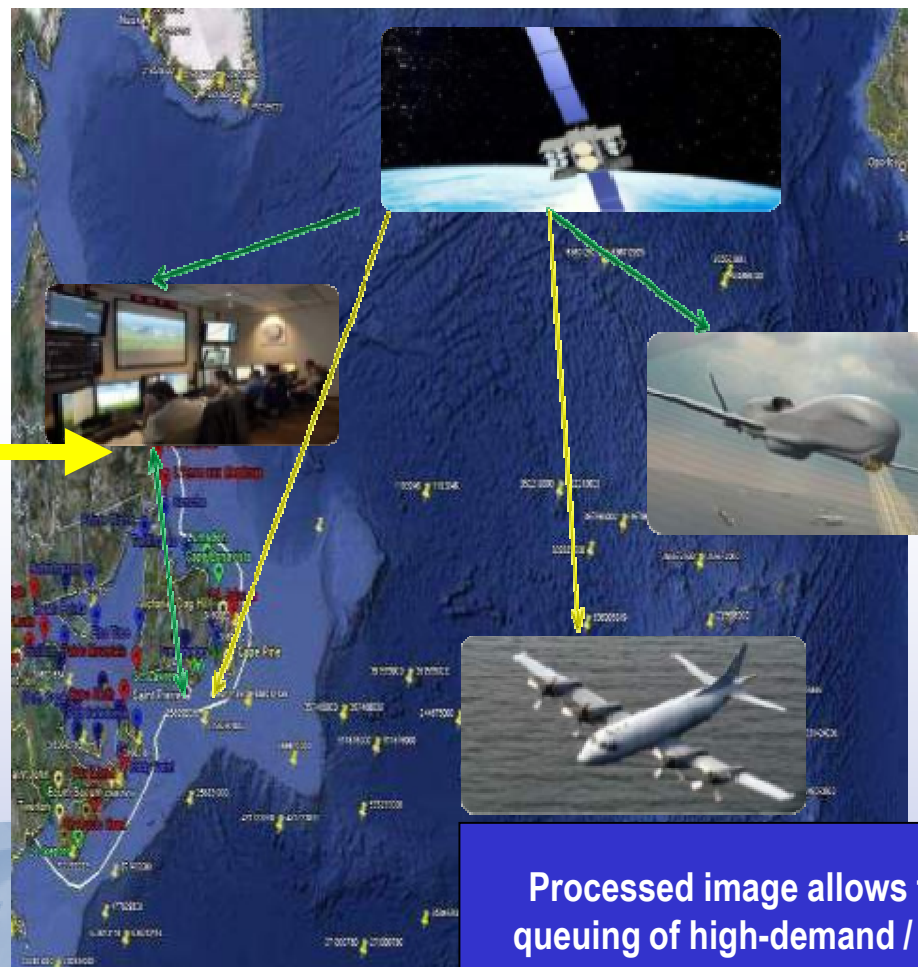


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# Maritime Domain Awareness (RADARSAT with AIS)



Raw data picture  
+6,000 tracks daily



Processed image allows for  
queuing of high-demand / low  
density assets





# Satellite-Based Search & Rescue

## Reducing Response Times to Save Lives

- Founding member of International COSPAS-SARSAT Treaty
- Credited with saving > 32,000 lives & \$10M/yr in SAR costs

### LEOSAR

- 2 SAR repeaters on US satellites in LEO
- Cost: \$25M – Implementation Phase



### MEOSAR

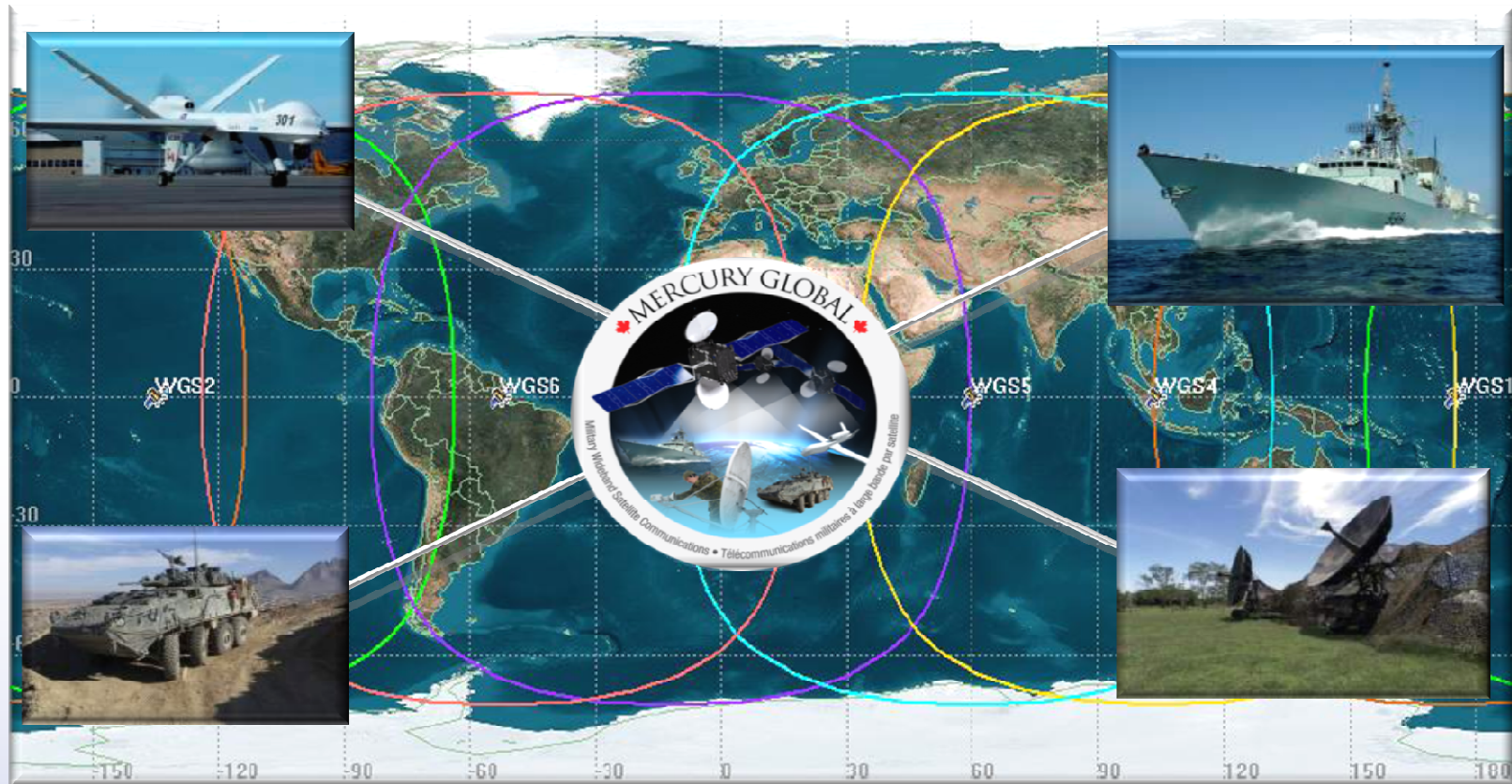
- 24 SAR repeaters on US GPS satellites in MEO
- Tight timelines to meet US GPS design milestones & launch (2016)
- Cost: TBD – In Options Analysis Phase







# Global SATCOM Requirement



Satellite communications enables world wide execution of the  
Canada First Defence Strategy.  
Without Communications - there is no command and control

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# Polar Comms and Weather





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# Global Navigation Satellite Systems



**PNT INFORMATION DOMINANCE  
(Use While Deny)**



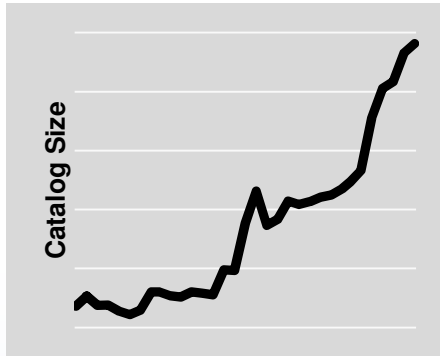


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# Space is a Congested, Contested and Competitive Environment

## A Complex Space Environment

↑ *# of Objects*



↑ *Use of Space*



↓ *Object Size*



Countries worldwide are utilizing satellites as small as 2.5 lb.

↑ *Debris*



## Evolving Threat Capabilities

**RF Jamming**  
**Laser Blinding/Damage**  
**High Power Microwave**  
**Direct Ascent ASAT**  
**Co-Orbital ASAT**  
**Physical Attack**  
**Cyber Attack**  
**Nuclear Detonation**

**Access to Space-based Capabilities must  
be protected**



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# CF Space Operations



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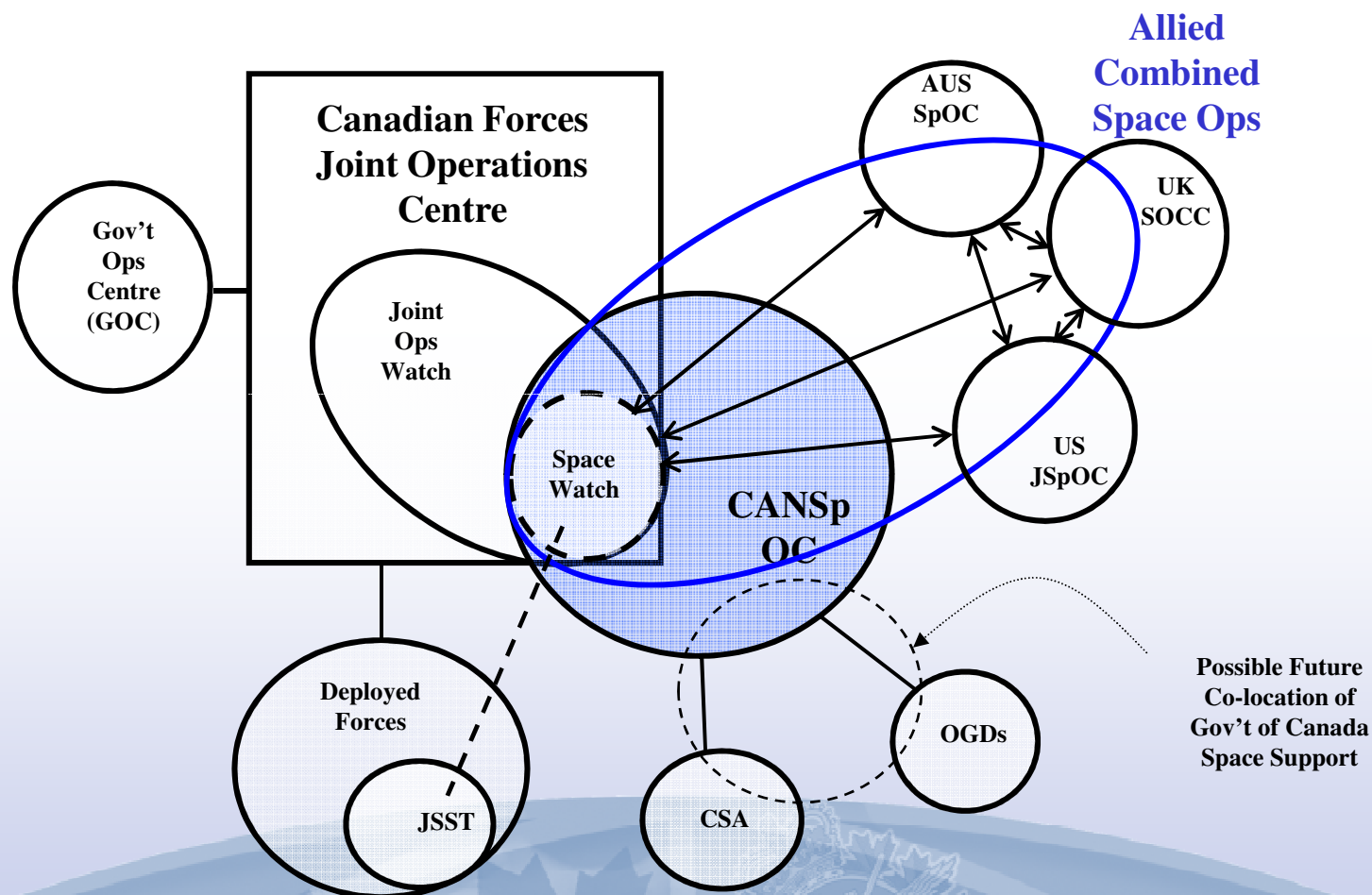
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# Force Employment Concept



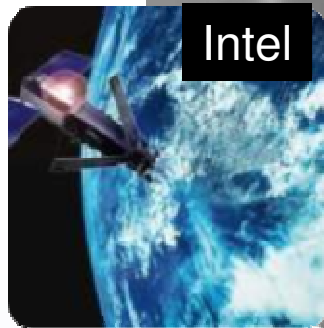


## Conclusions

- **Delivering critical Space enablers to CF operations**
- **Implementing unprecedented Space partnerships**
  - Coalition Space Ops w/ US and others
  - Government of Canada Space Ops
- **Incremental personnel resources coming**
- **CJOC / CFD / DG Space way ahead required for full integration of Space into CF operations**



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- Space affects all phases of military operations, Air, Land, Sea
- CF must be proactive to maintain access to critical space-based capabilities
- Unprecedented opportunities exist to leverage space partnerships for support to CF Operations



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