



# **Sensors, Standards, and Situational Awareness - Advancing GeoInt Capabilities in Asia-Pacific**

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# Why OGC?



- The “place” for ad-hoc collaborative standards development and consensus based adoption and innovation for the Geospatial Community
- Excellent balance of global Government, Research, and Commercial member participants
- “Making Location Count:” all missions are tied to location
- No re-inventing wheels - harmonization is important – e.g. ISO, and many more

[www.opengeospatial.org](http://www.opengeospatial.org)

# Standards .....



**Support  
and  
enable  
policy**



# GeoInt Challenges – Asia Pacific (and elsewhere!)

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- Need to find, combine and publish actionable information from an increasingly vast array of data sources
- Sensors generate extremely large real and near real time data sets
- Data remains in hard to find and access silos
- Results in challenges to ensure the right information gets to right people at the right time
- Pressure to better respond to natural and human generated threats to national and regional security

*The use of standards to enable interoperability in the era of big data and a multitude of sensors and devices dramatically improves GeoInt capabilities.*

# Open Standards for GeoInt are Critical ...



*“Each day, we work to find ways to make GEOINT more accessible and relevant to time dominant operations, policy decisions, and ultimately, to **help partners save lives**. Our GEOINT Services initiative is the focal point for this mindset. This effort **spans all security domains** and, most importantly, it is open-ended. We are shattering the false boundary conditions that have always separated tasking, processing, exploitation and dissemination. GEOINT Services will allow us to find, get, use and contribute in a more fluid and open fashion. **Working closely with the Open Geospatial Consortium**, our partner for more than two decades, **we are using standardized and interoperable strategies to better move valuable data across mission systems faster, sharing it across broader community of users...**”*

Robert Cardillo

Director, National Geospatial-Intelligence Agency

Statement to the Senate Select Intelligence Committee,

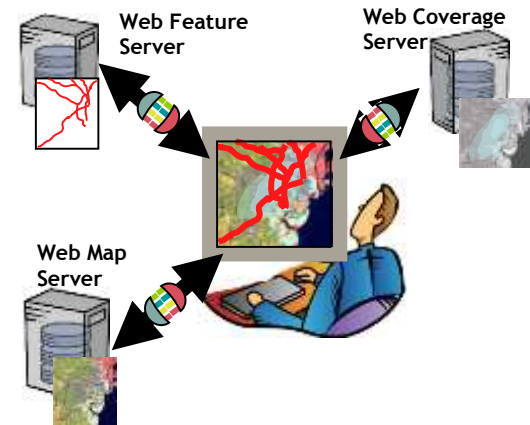
27 September 2016

# OGC's Geospatial Interoperability Standards Framework

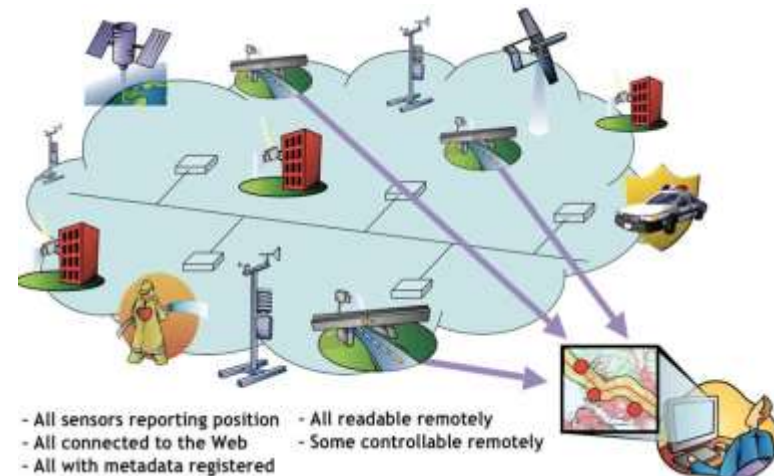


- **OGC Web Service Standards**
  - Integrate and share all types of geospatial and remote sensing data
- **OGC Sensor Web Enablement and SensorThings Standards**
  - Discover, task, access and process observations from *fixed & mobile sensors*
  - Access and integration of Internet of Things
- **Support data Transfer, Analysis and Processing**
  - Environmental modeling
  - Urban models
  - Geospatial Big Data / Analytics
  - Encodings
- **3D Visualization & Augmented Reality**
  - Outdoor location, routing
  - Indoor location
- **Social Media / Crowdsourcing**
  - Geo-enabled Social Media

## OGC Web Services

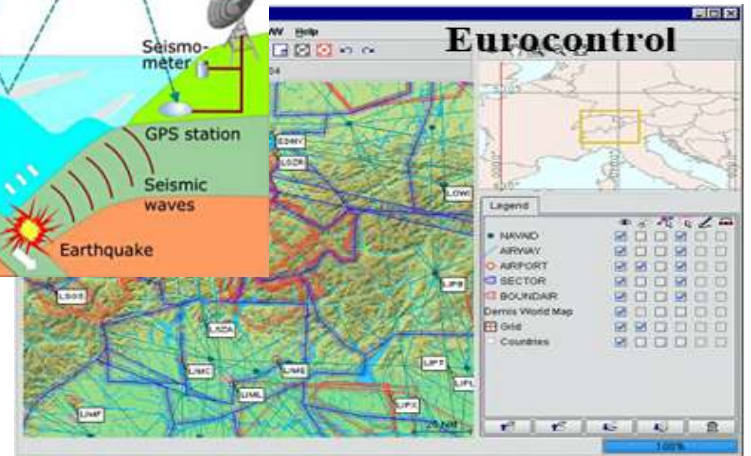
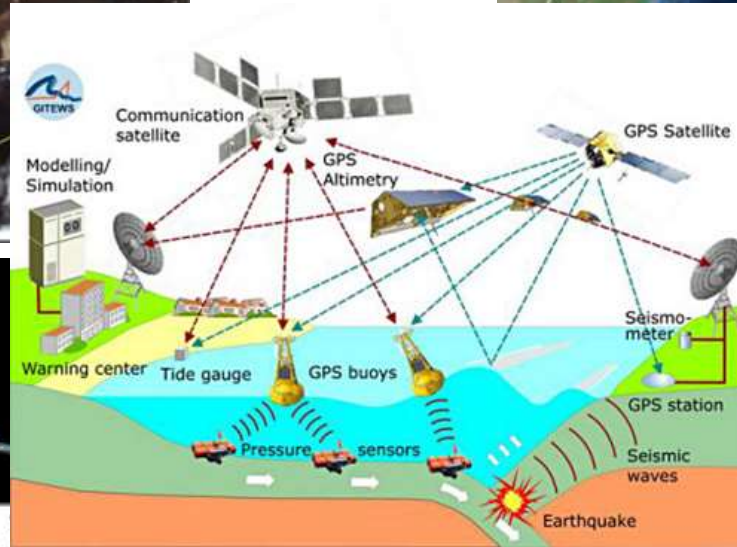
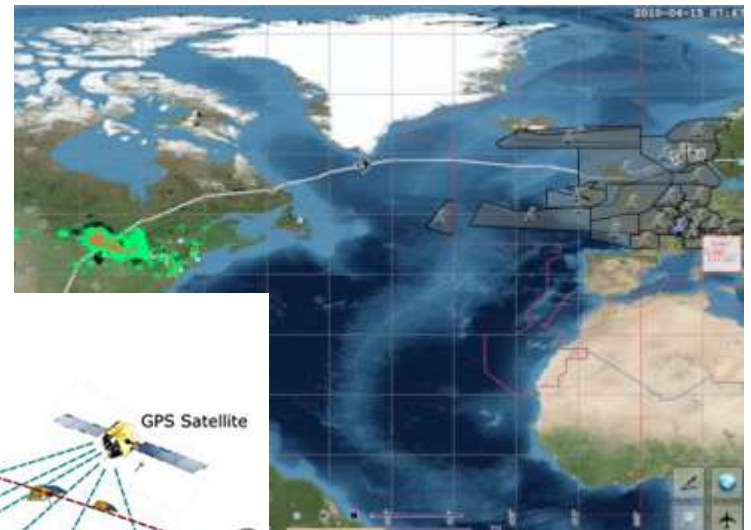


## OGC Sensor Web Enablement





# For Land, Sea, and Air

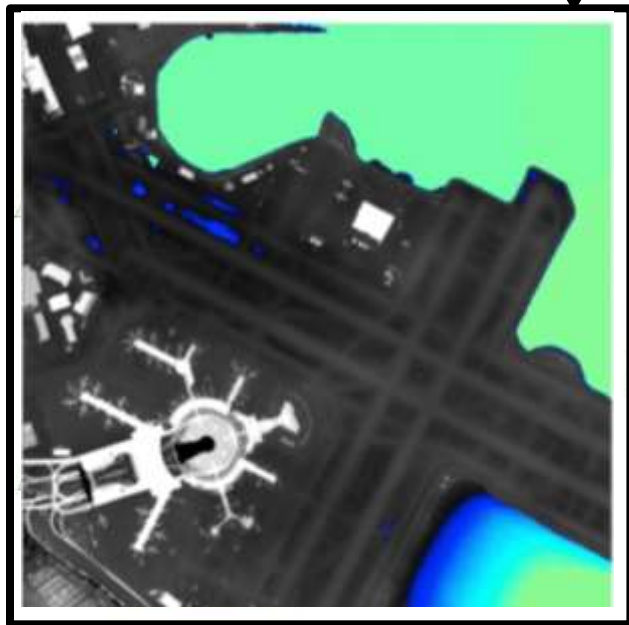


# Especially for Improving Urban Resilience



Predictive Models with Simple Interfaces

OGC Web Processing Service (WPS)



Assess situation on ground  
Check predictions



WFS

Transaction

Social Media Analysis WPS





# INTERNET OF THINGS TECHNOLOGY DEMONSTRATION

## Partners

*IJIS Institute*

*Open Geospatial Consortium*

*Tumbling Walls*




## Performers

 *52° North Initiative for Geospatial  
Open Source Software GmbH*

 *Botts Innovative Research*

 *Compusult Limited*

 *Envitia Limited*

 *Exemplar City / GeoHuntsville*

 *Noblis*

 *Northrop Grumman*

 *SensorUp*

 *University of Melbourne  
Centre for Disaster Management  
and Public Safety*

# Example: Public Security

## (Truck Accident & Chlorine Gas Cylinders Leak)



### INCIDENT RESPONSE CYCLE

**00:00-00:05**  
**NOTIFICATION**



**02:00-12:00**  
**RECOVER**



**00:05-00:20**  
**BUILD AWARENESS**



**00:40-02:00**  
**MITIGATE EVENT**



**00:20-00:40**  
**RESPOND**

# IoT for First Responders - Now

Sensor 'Things' - vendor proprietary device



Proprietary Interface & Format 1



Proprietary Interface & Format 2



Proprietary Interface & Format 3



Proprietary Interface & Format 4



Proprietary Interface & Format 5...



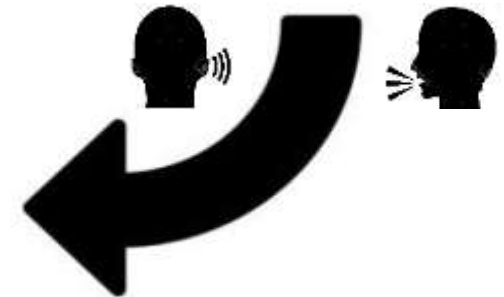
Operation Center



On-Scene Coord



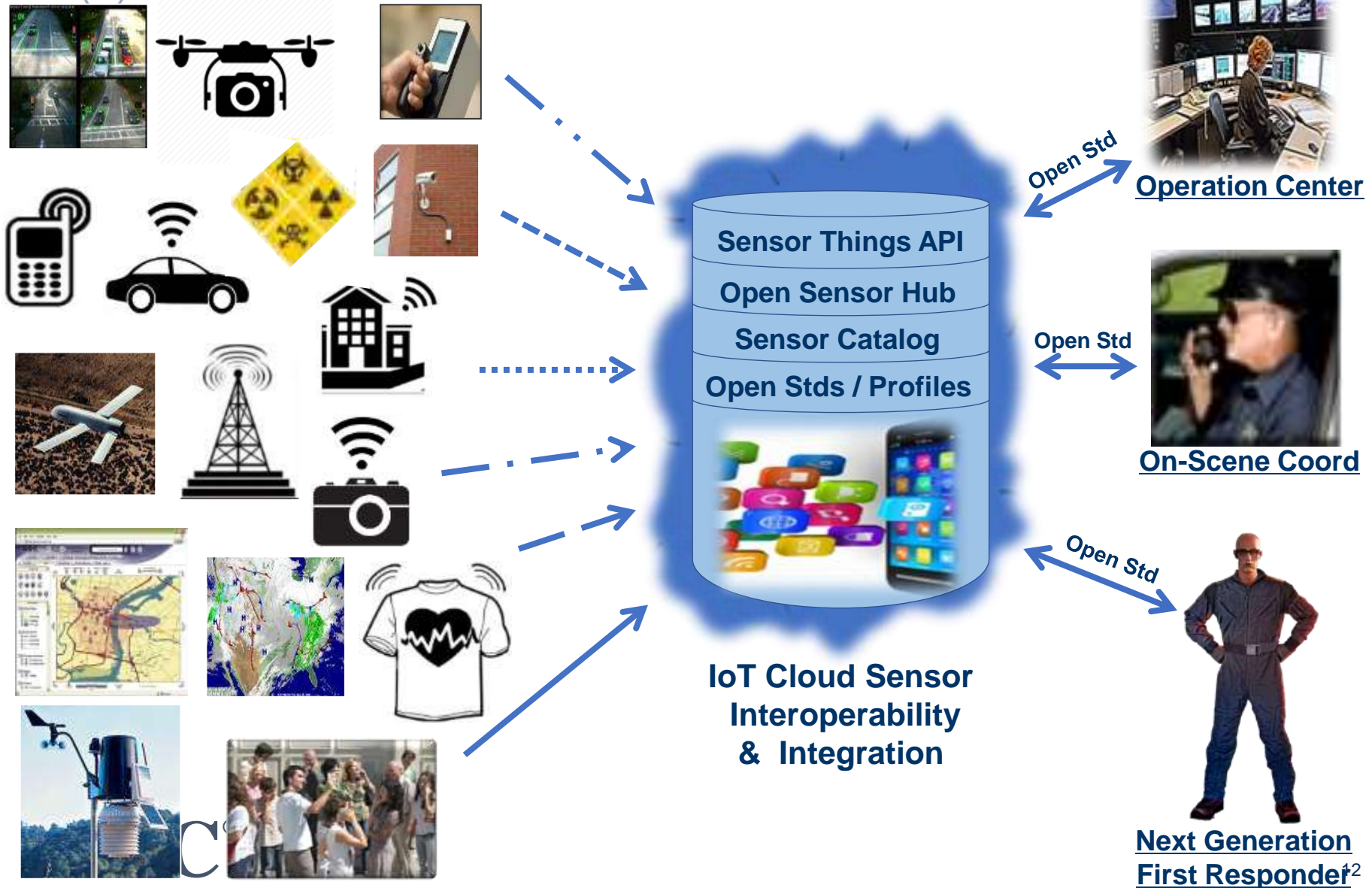
First Responder





# Enabling IoT for First Responders: Near Future

Sensor 'Things' - vendor proprietary device



Operation Center



On-Scene Coord



Next Generation First Responder<sup>2</sup>

# IMIS Pilot results are now DHS Guidance



# Homeland Security

Science and Technology

Next Generation First Responder

Interface

Next Generation First Responder (NGFR)

QUICK START GUIDE

PART 1: INTRODUCTION

Guide for Assisting Industry Support of First Responder

“I was impressed with the ‘state of the practical’ where these various industry **sensors can be integrated today using open standards (i.e., SensorThings API) that remove the stovepipe limitations** of one-off technologies.”

Dr. Reginald Brothers  
DHS Under Secretary for Science and Technology



Guide for Assisting Industry Support of First Responder  
On-Body Next-Generation Architecture (OBNA)

Version 0.3



DHS Science and Technology Directorate |  
MOBILIZING INNOVATION FOR A SECURE WORLD

OGC®



# Sample Emerging: Marine / Maritime

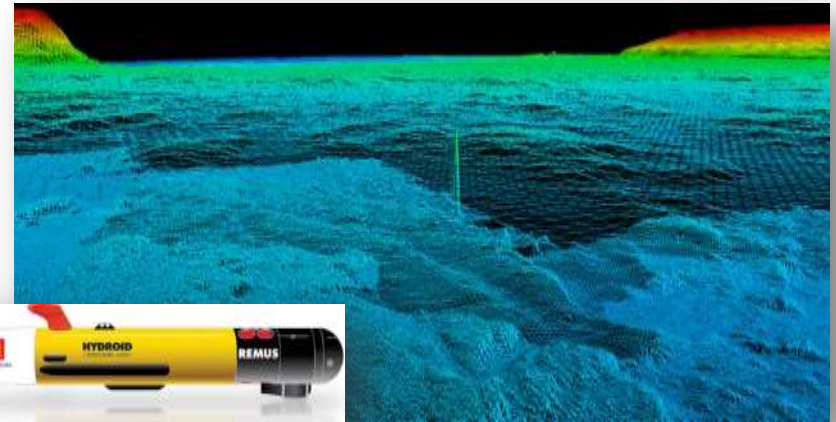


**Bathymetric data and Marine SDIs and Land Water data integration**

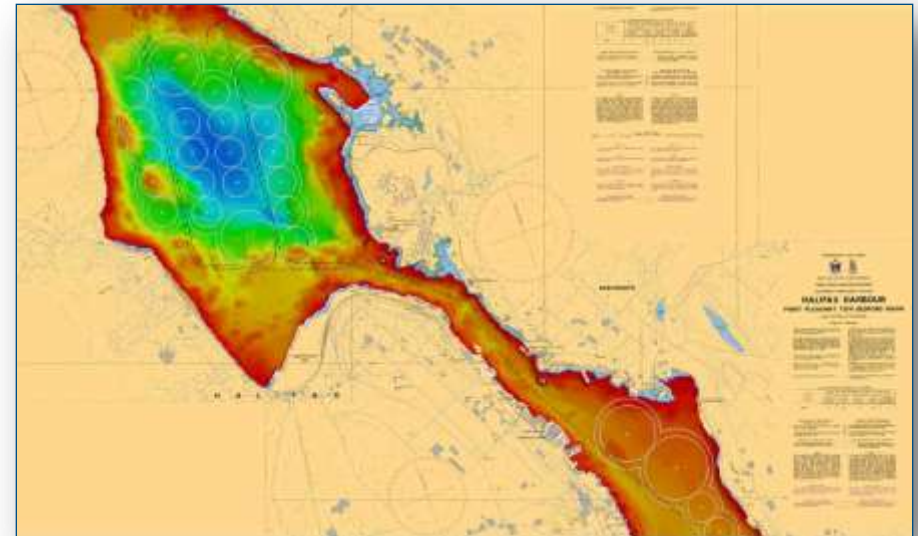


**Maritime monitoring - AIS**

**OGC<sup>®</sup>**



**Explosion of RoVs/Autonomous**

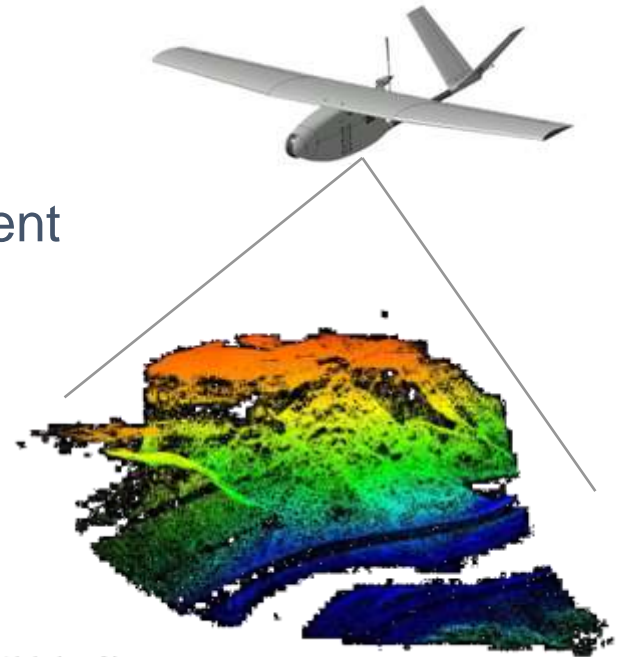


**Navigation/**

# Sample Emerging: Unmanned Systems



- OGC Working Group
- Initially conceived to focus on Unmanned Aerial Systems (UAS), but scope has been broadened to all types of platforms
  - Focus: autonomous or remotely piloted platforms which acquire data
- Initial UAS use cases include:
  - Exchange of flight plans
  - Lightweight protocols for sensor management

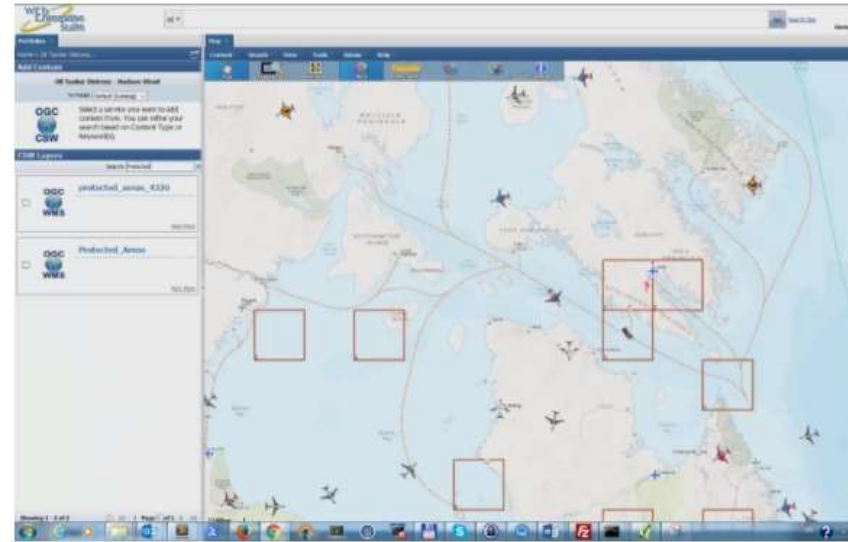


# Thought Provokers – Asia Pacific Countries



- Need for Overarching National Framework ?
- Pressing National/ Regional Scenarios ?
- Fit for Purpose and future needs ?
- Use Cases and Gap Analysis ?
- Connect to national/regional/international SDI?
- Multisource Integration (could include private sector data) ?
- Tension between “need to know” versus “need to share”

One Idea : Concept development study/innovation pilot based on national or regional scenarios/use cases to help scope the way forward?



Arctic Search and Rescue scenario OGC Arctic SDP, 2017

[http://www.opengeospatial.org/pub/ArcticSDP/r2/er.html#\\_search\\_rescue\\_in\\_the\\_hudson\\_strait](http://www.opengeospatial.org/pub/ArcticSDP/r2/er.html#_search_rescue_in_the_hudson_strait)

# Thank you !

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