Partnerships and Progress: OGC Disasters Interoperability Initiative

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National Geospatial Advisory Committee

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Making location count.

The OGC Mission

To advance the development and use of international standards and supporting services that promote geospatial interoperability.

Global forum for the collaboration of geospatial data / solution providers and users.

- Achieve technical agreement on interoperability challenges
- Develop, prototype, demonstrate innovative new solutions
- Networking, partnership development, corporate identity
- Insight into emerging technologies and markets
- Discover solutions being advanced by others
- Share effort / resources in solving interoperability challenges

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Emergency & Disaster Management

Has been a central organizing focus for OGC since its inception in 1994

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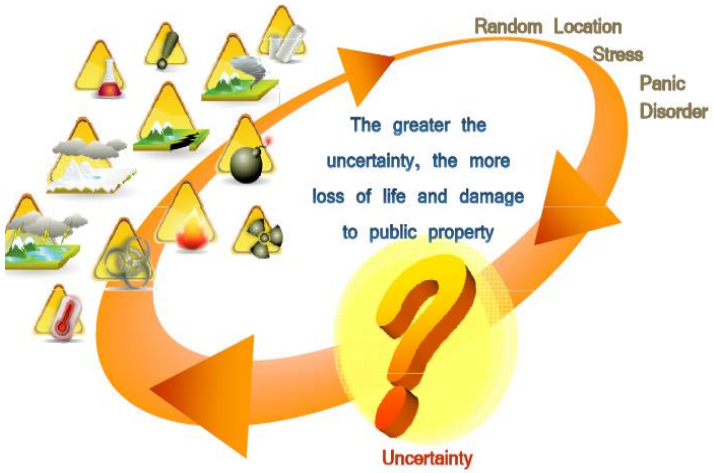
Emergency and Disaster Management Domain Working Group

- Standing OGC forum for uniting communities of users including government agencies, industry, research organizations, non-governmental organizations and others.
- Promote dialog, collaboration and innovation concerning interoperability and standards alignment within the EDM community.



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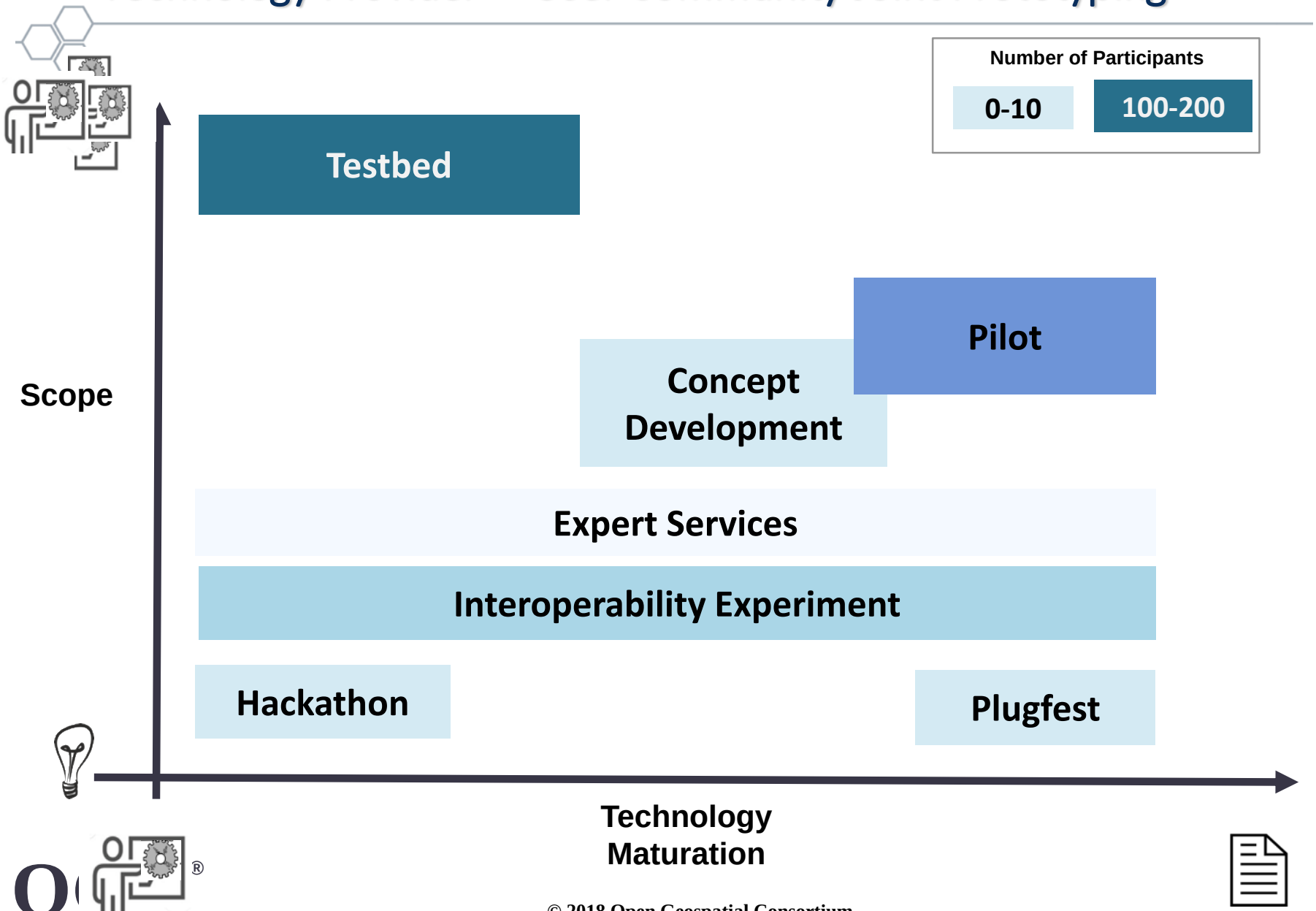
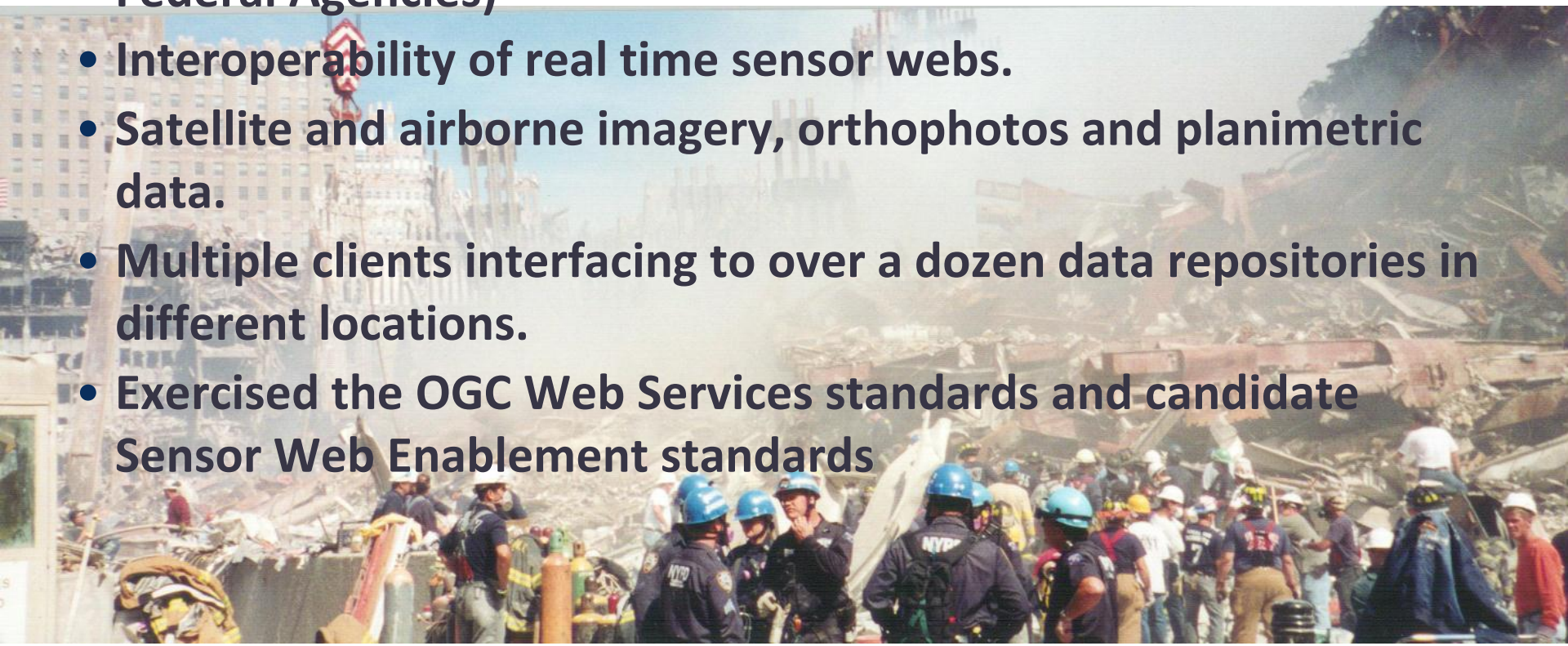
OGC Innovation Program

Technology Provider – User Community Joint Prototyping

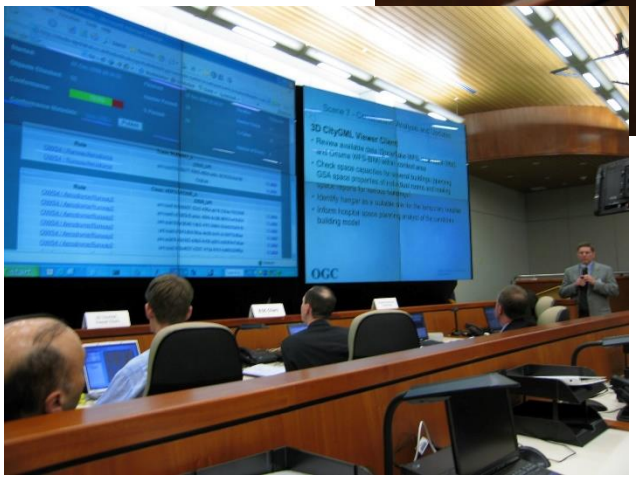


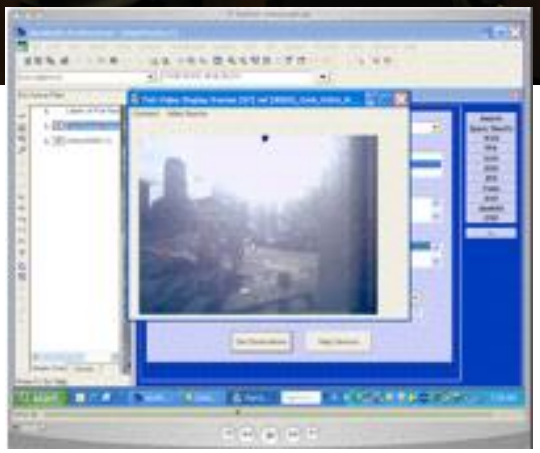
OGC Web Services Testbed (2001-2002)
Rapid Interface Development

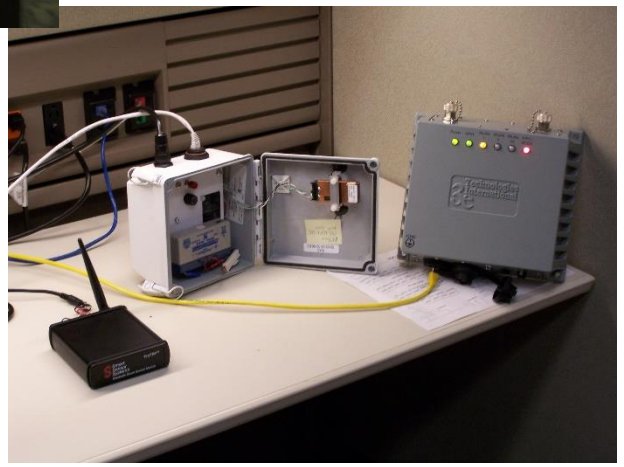
- **New York City**
- **17 Participating organizations (NYC, vendors, Universities, and Federal Agencies)**
- **Interoperability of real time sensor webs.**
- **Satellite and airborne imagery, orthophotos and planimetric data.**
- **Multiple clients interfacing to over a dozen data repositories in different locations.**
- **Exercised the OGC Web Services standards and candidate Sensor Web Enablement standards**



OGC Web Services Testbed 4 (2006)
Port Authority NY / NJ







Deepwater Horizon – Gulf of Mexico, April 2010

BP Deepwater Horizon Oil Sill, Incident Specific Preparedness Review (ISPR), Final Report January 2011

Oil Spill Response
Common Operating Picture

International Association of Oil & Gas Producers

IPIECA

- IOGP and IPIECA (International Petroleum Industry Environmental Conservation Association) chose OGC to lead an open process to develop a recommended practice based on open standards
- Produce a **Recommended Practice** for support of Oil Spill response using of GIS technology
  - Geo-information in a “Common Operating Picture” for management of the response
  - Published as OGC 15-037
    https://portal.opengeospatial.org/files/?artifact_id=63334
- Accomplished via OGC Innovation Program initiative

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Sendai / Fukushima Japan

Sendai Airport – By Roberto Devido

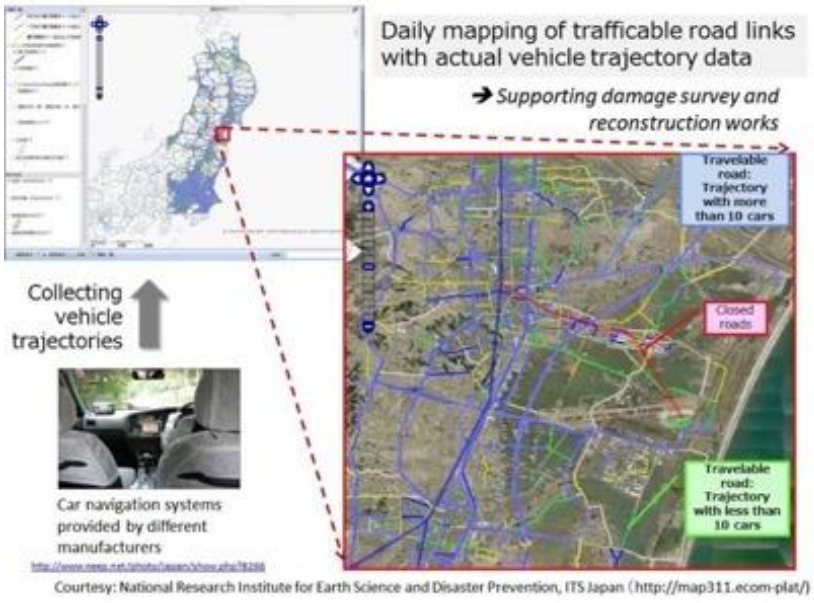
Haramachi, Minami-soma, Fukushima, Japan – By Jun Teramoto

25日撮影

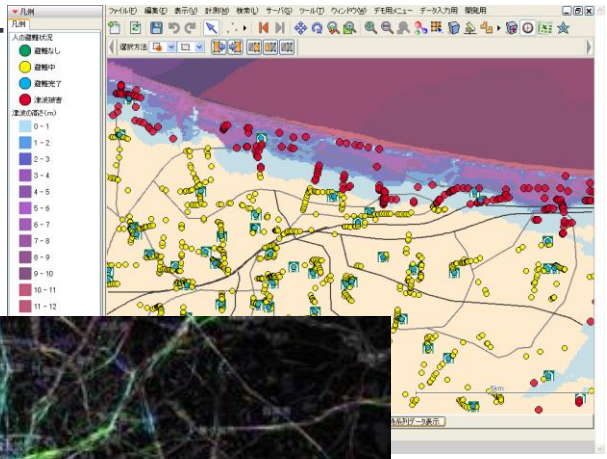
国土地理院
Geospatial Information Authority of Japan

OGC Moving Features Encoding Standard

- "Moving features" data describes such things as vehicles, pedestrians, airplanes and ships.
  - This is Big Data – high volume, high velocity
- CSV and XML encodings of ISO 19141



Courtesy: National Research Institute for Earth Science and Disaster Prevention, ITS Japan (http://map311.ecom-plat/)

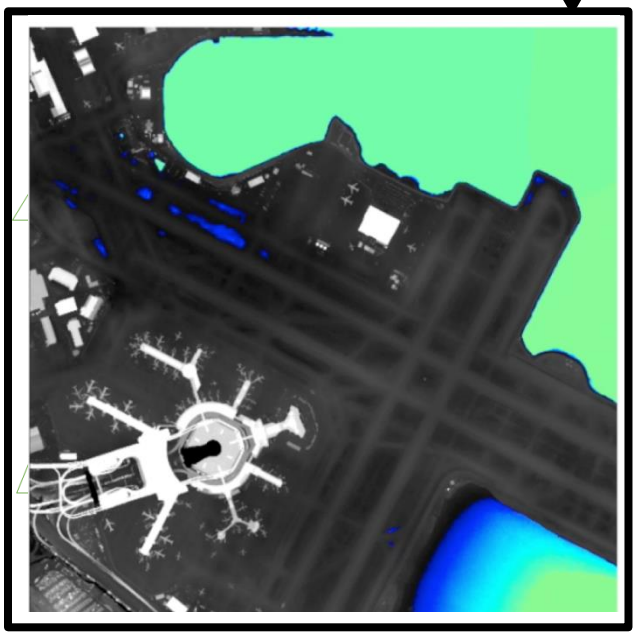


Geospatial prediction, analysis and anticipation

Extreme Coastal Weather Event – OGC Testbed 11

Predictive Models with Simple Interfaces

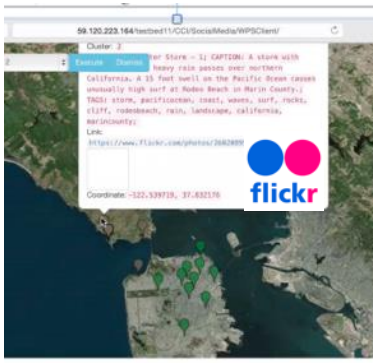
OGC Web Processing Service (WPS)



Assess situation on ground Check predictions

WFS Transaction

Social Media Analysis WPS



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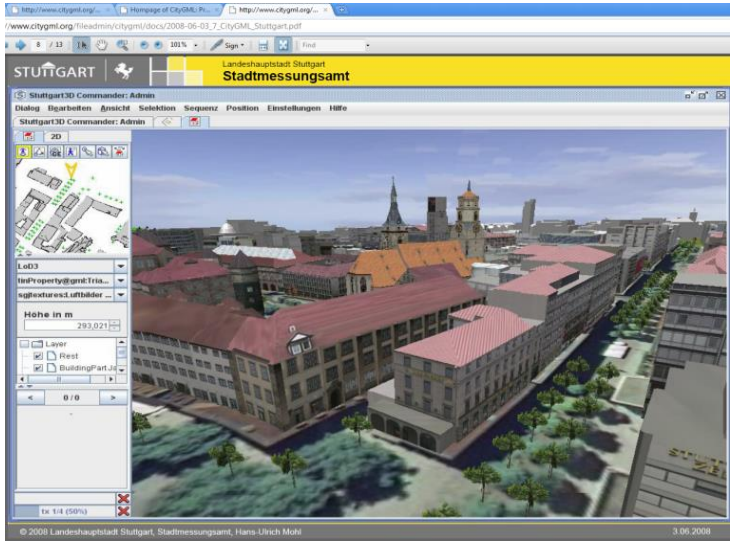
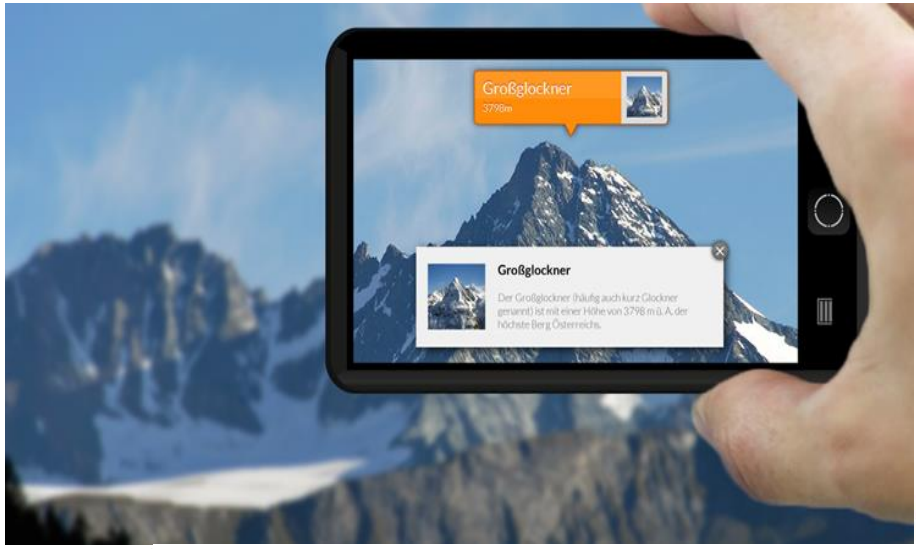
OGC's Geospatial Interoperability Standards Framework

- **OGC Web Service Standards**
  - Publish, discover, access, process, 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 Analysis and Processing**
  - Environmental modeling
  - Urban models
  - Geospatial Big Data / Analytics
- **3D Visualization & Augmented Reality**
  - **Outdoor location, routing**
  - **Indoor location**
- **Social Media / Crowdsourcing**
  - Geo-enabled Social Media



Source: Thomas Kolbe, Berlin TU



OGC Augmented Reality Markup Language 2.0

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Recurring Themes in Disaster Management

- **Lack of policy operationalization**
  - Example: readiness to accept, qualify, ingest and use relevant geospatial information from a range of government, commercial providers and citizens via social media / VGI.

- **Difficult to identify / access "fit for purpose" information in the context of a disaster event**
  - Inability with existing search / metadata approaches to quickly discover and understand which information sources, analysis products are most useful

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Recurring Themes in Disaster Management

- **Lack of sufficient / timely coordination in the disaster workflow to derive actionable knowledge**
  - Example: rapid processing (fuse, process, synthesize) multiple data sources / real-time sensor feeds for direct use by the decision maker / responder
- **Need for a persistent methodology to address the full lifecycle of a disaster**
  - Example:
    - Recovery timeline months / years
    - Cross-border organization and management of disaster related EO, geospatial information, analytics, workflows, and tools necessary for collaboration.

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Disaster Concept Development Study

http://www.opengeospatial.org/projects/initiatives/disasterscds

- **Objectives**
  - Engage stakeholders (Executive, Operational and Technical) to gather and share information on the current state for using geospatial data and services during natural disasters
  - Understand what data, applications, tools and services are available and what is needed
  - Determine and how discoverable, accessible and useable are the existing services
  - Understand interoperability challenges and integration opportunities
  - Communicate activities occurring at OGC and other key organizations
  - Identify gaps in data, applications, tools and services
- **Leverage follow on Pilot initiatives to address findings**

Figure 1: Disasters Geospatial Concept of Operations: Department of Homeland Security, USA

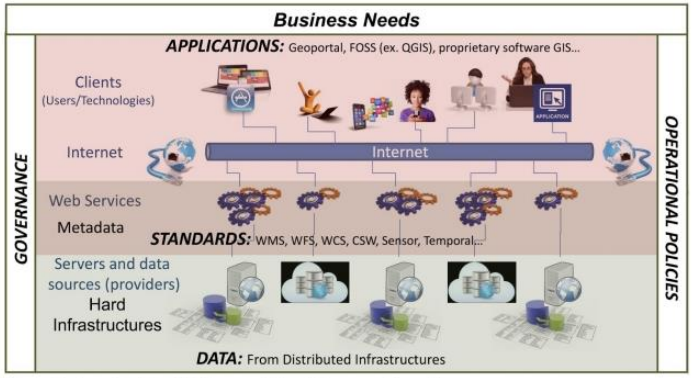

Figure 2. Aspects of an SDI (Source: Natural Resources Canada)

Request for Information
https://portal.opengeospatial.org/files/?artifact_id=77838

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OGC Disasters Initiative

Engaging the Community

- **Phase one: OGC Disasters Interoperability Concept Development Study (CDS)**
  - Encourage sustained community-wide dialog to stimulate dialog on successes, issues and opportunities
    - Interviews with Stakeholders
    - Globally issued Request for Information
    - Stakeholder Workshops
    - Findings & Recommendations
    - Persistent forum
  - Assess current state of SDI components for the use of disasters.
  - Document data exchange technologies, develop an inventory of available geospatial services across different types of disasters, define the core components of a SDI architecture
  - Define use-cases and scenarios for future disaster pilot(s)

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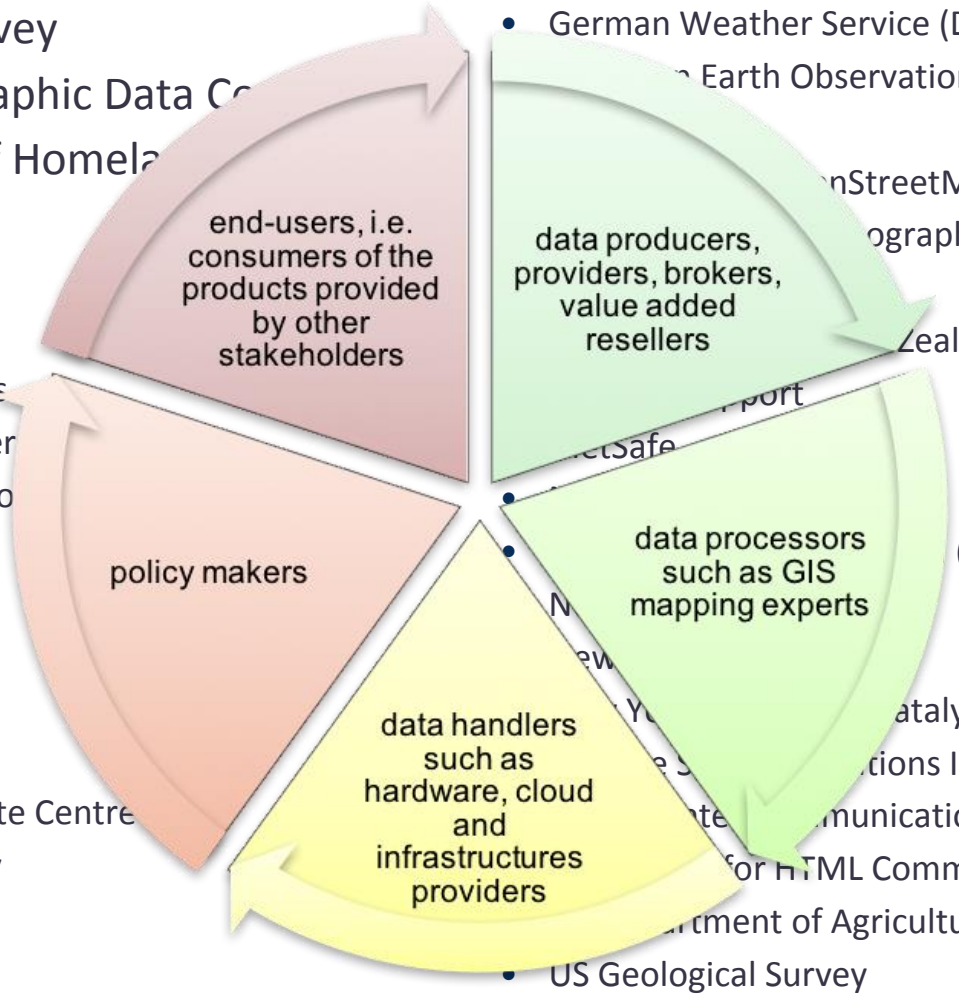
Disasters CDS Stakeholders

Sponsors & Organizations Responding to Disasters RFI

- US Geological Survey
- US Federal Geographic Data Co
- US Department of Homela

- AmericaView
- Ardent
- Canadian Armed Forces
- CIESIN, Columbia Univer
- Croatian Crisis Mgt Asso
- CubeWerx
- DigitalGlobe
- Ecere
- Envitia
- Esri
- European Union Satellite Centre
- Fund For New York City
- GeoScience Australia
- GeoThings



- German Weather Service (DWD)
- Earth Observations (GEO)
- nStreetMap Team (HOT)
- ography
- Zealand
- port
- etSafe
- (8 different depts)
- atalysts
- tions Inc.
- munications Inc.
- for HTML Community Group
- rtment of Agriculture, Ops Center
- US Geological Survey
- Xentity Corporation

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Disasters CDS Stakeholders (2)
Workshop Participants

- All Hazards Consortium
- Amazon Web Services
- California Governor's Office
- California State University, Monterey
- City of Virginia Beach, VA
- College of Charleston SC
- Figure Eight
- First Responder Network Authority
- Gates Foundation
- Howard County, Maryland OEM
- Merrick & Company
- NAPSG Foundation
- National Insurance Crime Bureau
- National Geospatial-Intelligence Agency (NGA)
- Northern California Regional Intelligence Center
- Office of Science & Technology Policy (OSTP)
- Planet, Inc.
- United National Office of Space Affairs
- US Department of Commerce
  - Economic Development Administration
- US Department of Energy (DOE)
- US Department of Health and Human Services (HHS)
  - Center for Disease Control
- US Department of Homeland Security (DHS)
  - FEMA
- US Department of Interior (DOI)
  - US Geological Survey
  - Federal Geographic Data Committee
- US General Services Administration (GSA)
- US National Aeronautics and Space Administration (NASA)
  - Ames Research Center
- US National Oceanic and Atmospheric Admin. (NOAA)
  - National Weather Service
- World Bank

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Disasters CDS Stakeholders (3)

Additional Organizations Represented in Attendance

- Booz Allen
- Dewberry
- Direct Sensing & Analytics Association
- Dorchester County, MD
- ESIP Federation
- Future Earth
- G&H International Services
- George Mason University
- GSPH LLC / Sustaine'
- Keys Net LLC
- Lewis Burke Associates
- Marion County, FL Information Technology
- Maryland Environmental Service
- Michael Baker International
- Noblis
- One Concern
- Radiant Solutions
- Sat-Drones
- University of Maryland
- US Army Corps of Engineers
- Science & Technology Policy Institute
- Thermopylae sciences + technology
- US Department of Agriculture
  - US Forest Service
  - Agriculture Research Center
  - Foreign Agricultural Service
- US Department of Interior (DOI)
  - Bureau of Land Management
- US Department of Transportation (DOT)
  - Federal Aviation Administration
  - Maritime Administration
- US Environmental Protection Agency (EPA)
- World Resources Institute / Partnership for Resilience..

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Disasters Concept Development Study
Key Conclusions

- From the RFI responses and workshops, four high level, overarching requirements of any Disasters SDI rose to the surface.
    1. Provide stakeholders with appropriate access to the spatial data they need. These data can be static as well as dynamic data that arise before, during and after the disaster.
    2. Allow different stakeholders at different locations to access the SDI.
    3. Allow for data exchange, especially dynamic data, in an appropriate, efficient and secure way.
    4. Increase the use relevant open standards / best practices to achieve the points above

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Disasters Concept Development Study
Key Conclusions (continued)

- Underserviced stakeholders
  - First Responders
  - General Public
- Architecture implementation should be a loose confederation of portals and platforms discoverable by open specifications and standards.
- Architecture should allow easy integration of new and emerging technologies.
- Emphasis on new data source integration such as UAS and Crowd-sourced data.
  - What other new data and standards can be used?
  - What new tools exist or are forthcoming to integrate these new data sources?

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Disasters Concept Development Study Key Conclusions (continued)

- Better integration of near real-time observations from both satellites and in-situ sensors, along with auto-registration of sensors is required.
- Need to exercise a Disasters SDI in all phases the 'life cycle' of disaster management: 1) mitigation; 2) preparedness; 3) response; and 4) recovery.
- Tailoring of key geospatial information for different disaster types (hurricanes, earthquakes, floods, etc.) will provide focus and reduce info overload.
- Core / base data should be prepared and available in advance. i.e. Pre-loaded on mobile devices for first responder / field use

OGC Disasters Initiative

Engaging the Community Via Pilots

Phase 2: OGC Disasters Interoperability Pilot initiatives designed to:

- Illustrate the benefits of a common, interoperable Disasters SDI to support improved support to disaster lifecycle
- Highlight the SDI architecture concept, technology and its application to support disaster stakeholders.
- Leverage Concept Development Study findings to advance new capabilities, new levels of access to relevant geospatial information
- Explore approaches that allow more efficient use of disasters SDI data, processing resources.
- Analyze consistent and long term retainability practices for disasters related material.

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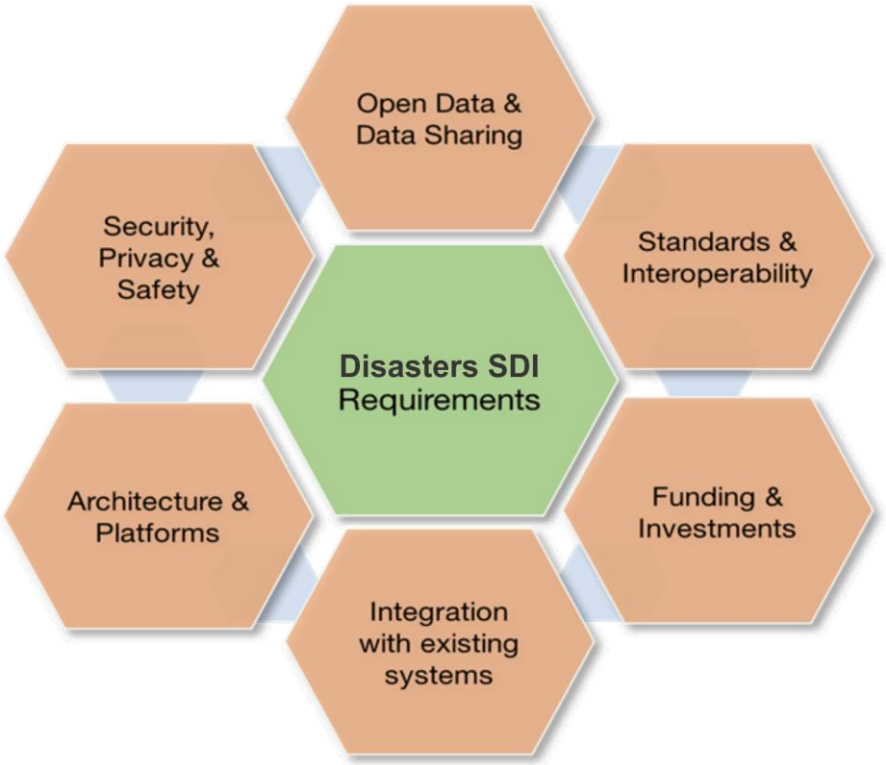
Next Steps

- Finalize CDS Report and Findings by late September 2018
- Sustain and grow dialog with the disasters stakeholder community
  - Expand OGC Alliance Partner network
  - Work toward multi-organizational joint community steering process
- Begin planning for Pilots to address key CDS / community findings



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