Complexity, Convergence, Divergence and the Geospatial Knowledge Economy: The Role of Standards

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Geospatial Information & Technologies underpin governance, business, consumer and citizen decisions

- Health
- Logistics & Transport
- Education & Research
- Sustainable Development
- Energy & Utilities
- Emergency and Disaster Mgt / Response
- Consumer Services
- Smart Cities
- Geosciences
- E-Government

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Standards: Enable Interoperability to Share and Transform Geoinformation into Knowledge

• Defined as the ability of diverse data sources, systems and organizations to work together (inter-operate).

  • Ease information sharing
  • Promote information reuse
  • Reduce duplication of effort
  • Flexibility to add new capabilities
  • Vendor neutral

• Saves time, reduces cost, increases market choice, protects assets and lives
Standards-based Solutions Promote Improved Decision Making

Meteorology, Hydrology, Ocean Monitoring

Aviation Flight Information / Safety

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Deepwater Horizon – Gulf of Mexico, April 2010
Oil Industry Response to Deepwater Horizon

• Oil and Gas Producers (OGP) 3-year Joint Industry Project (JIP) funded by oil industry members.

• Oil Spill Response JIP comprised of several Work Programs (WPs)
  – WP1 - In-Water Surveillance
  – WP2 - Surface Surveillance
  – WP3 - Modelling & Prediction
  – WP4 - Metocean Databases
  – WP5 - GIS/Mapping and Common Operating Picture

• Managed by IPIECA for OGP based on its long-standing experience with Oil Spill Response

http://oilspillresponseproject.org/
• Produce a **Recommended Practice** for GIS/Mapping
  – Support of Oil Spill response using GIS technology
  – Geo-information in a “Common Operating Picture” for management of the response

• OGP and IPIECA chose OGC to lead an open process to develop a recommended practice based on open standards

• The OGC Interoperability Program
  – An essential part of OGC’s fast, effective, inclusive user-driven process to develop, evolve, test, demonstrate and promote OGC Standards.
Supporting COP and Decision Making for a Range of Scenarios

**On Land Release**
- Rupture during excavation work by local construction company at site close to a village.

**Coastal Terminal Release**
- Storage tank rupture due to structural failure.

**Tanker in Transit**
- Tanker suffers shell plate damage to one of its cargo tanks releasing oil before entry to port.

**Offshore Platform**
- Accidental discharge of crude oil during daylight hours.

**Offshore Pipeline**
- Rupture during dredging activity work by local company.

**Deep Water Well Blowout**
- Blowout through the riser, drill pipe/tubing, choke/kill lines at the rig.

(Figure source: IPIECA)
COP - leveraging geospatial information

(Figure Source: Shell)
“Dashboard” for COP users

- Query and selection of resources
- Map display including multiple layers and symbols
- Video display from cameras directly viewing incident
- Graphical display: histograms and other charts

(Graphics Source: Esri)
COP Service-Oriented Architecture

- COP
  - Composed of multiple map layers
- User Computers
- Context Document
- Client Applications
- User Management
- Public Web Sources
- Web Servers: WMS, WFS, etc.
- Geospatial Information from External Sources
- COP Service-Oriented Architecture
- User Management Access Privileges
- Web Servers: WMS, WFS, etc.
- COP
- Response Center
- Remote Archive
- Data Base
  - Base Map and Reference Info
  - Drill & Incident Specific Info
- Disconnected COP Users
- Real-Time Feeds, Observations and Alerts
- Base Map and Reference Info
- Drill & Incident Specific Info
- Web Servers: WMS, WFS, etc.
- Geospatial Information from External Sources
- Web Servers: WMS, WFS, etc.
Inputs to the Response Center

- Background and Reference Layer Sources
- Meteorological Data Sources
- Observations of the Spill from Surveillance Systems
- Observations of the Spill from Field Workers
- Modeling and Prediction of the Spill
- Tracking of Resources for Spill Response
- Social media monitoring about the spill
OGP/IPIECA

Oil Spill Response
Common Operating Picture
Architecture

Draft Recommended Practice
Oil and Gas Standards Leadership Council (SLC)

- Improved interoperability through coordination

SLC Vision
- To unite leaders of upstream oil and gas industry standards organizations in a collaborative environment promoting the adoption of open and freely-available standards

http://www.oilandgasstandards.org/
Standards Leadership / Coordination
Oil & Gas standards organizations unite

Source: SLC
The SLC works to address the full scope of concerns

- Different organizations
- Different challenges
- Different perspectives

Business Processes
  - Procurement
  - Contracts

Operations Control
  - Communications
  - Handover

Asset Management
  - Wells
  - Facilities
  - Pipelines

Data Management
  - Data in Motion
  - Data at Rest

Life Cycle Optimization
  - Planning
  - Operations
  - Divestment

SLC Introduction

LATIN AMERICA GEOSPATIAL FORUM
Other factors Impacting Energy and Utility Sector

- Water Resources
- Climate Change
- Extreme Weather

Source: U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER
Some OGC Standards to Facilitate Geodata Integration / Decision Support

• Web Processing Service (WPS)
  – Enables the insertion of simple to complex geospatial processing anywhere in a web services environment.
  – Eases processing and analysis challenges in support of complex issues

• Weather Information Exchange Model (WXXM)
  – Based on OGC GML
  – Adopted by the aviation community, and under evaluation for use in Smart Grid

• WaterML 2.0
  – Recently approved international standard
  – Enables broad integration of disparate water observations locally to regionally and worldwide

• PipelineML (in-work)
  – Standard interexchange for pipeline data
  – In cooperation with PODS and other SLC members

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Pipeline Industry Overview

**North American Pipelines**
- 2500 Operating Companies
- 1 Million Total Miles
- 150,000 Crude
- 145,000 Highly Volatile Liquids (HVL)
- 650,000 Natural Gas

**Diverse Geographic Footprint**
- Buried, Above Ground and Undersea
- Crossing Rivers, Highways, Utilities
- Populous and Remote Areas
- Tropical to Arctic Climates
- Low Pressure and High Pressure
SERVICES FOR SMART CITIES
Smart Cities are rich in “where” information

As of 2008:

• More than half of the world population lives in cities
• Mobile access to the Internet exceeded fixed access
• Devices connected to Internet exceeds people

*Townsend, Smart Cities, 2013*
Unifying Themes

• Smart Cities are high-density generators of innovation and information
• Location information is a major enabler of Smart Cities
• Open standards are needed for interoperability
• Spatial Architecture for Smart Cities valuable
Location Services for Smart Cities

- **Citizen Services**
  - Location-aware municipal services

- **Energy and Utilities management**
  - Smart Energy
  - Smart Water Management
  - Wireless telecommunications placement

- **Public Safety and Law Enforcement**
  - Common Operational Picture

- **Retail / Commercial Applications**
  - 3D City Models
  - Indoor Venue Maps
  - Interoperability with BIM

- **Sensor Webs**
  - Enhanced situational awareness from access and integration of sensors
OGC CityGML: An urban information integration platform

Determination of solar potential

Urban Planning, City Services Source; Thomas Kolbe, Berlin TU

Training City Services staff

OGC®
Addressing the Indoor Frontier

• The simple reason LBS has not quite yet lived up to the promise: people spend nearly 90% of time indoors
  – Joep van Beurden, CEO CSR Plc

• Indoor location brings a new dawn in mapmaking
  – Christof Hellmis, Vice President-Map Platform, Nokia

• Over 15,000 indoor venue maps throughout the world developed by Micello

• Indoor infighting means technology companies are duplicating their efforts at great expense - The Economist
Integrated Outdoor / Indoor Information

OGC IndoorGML

Based on Dual Location Devices for each environment
IndoorGML – supports a range of applications

- Cellular Space Model
- Indoor Network
- Multi-Layered Space Model

IFC
KML
CityGML
2D Indoor Floor Plan

Cruise Ship
Hospital
Indoor LBS

Services for handicapped persons

Application

Emergency Control

Indoor mCommerce

Indoor Robot
OGC Advancing a Spatial Architecture for Smart Cities

- Integration of Geo-information, Sensor Webs, Built Environment using open standards
- Interoperability of independent software implementations in an open framework
- Market opportunities through innovations in open standards
- Vendor-neutral best practices reusable in any Smart City

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OGC’s Next Testbed: Focus on Urban Resilience for Smart Cities

- Monitoring and response to impacts on Infrastructure – IoT Sensors
- Real-time video monitoring from Geocoded CCTVs
- Social media for public safety information collection, analysis, response
- Security on the networks (sensors and infrastructure)
- Use of OGC Mobile standards:
  - Open GeoSMS
  - GeoPackage
  - Publish and subscribe

Details coming soon at: http://www.opengeospatial.org/projects/initiatives/testbed11
Location Powers

A new summit series by OGC tackling the global issues and innovations in sharing and accessing location information

Join us for our first summit on

Smart Cities

Tuesday 2\textsuperscript{nd} December 2014
Tokyo, Japan

Registrations of interest for presenting, panellist or attendance please contact
dmckenzie@opengeospatial.org
In Closing

- Success in advancing the Knowledge Economy relies on an underpinning of location information
- Efficient access, processing, integration and application of location information for decision making is made possible through open standards
- Sharing within and across disciplines will be key
- Open standards such as those of the OGC and ISO
  - Are broadly implemented around the world and are helping improve access to and use of location information.
  - Helping to ease the complexity of knowledge formation
For More Information…

• LAGF Workshop:

The Role of Standards in Geospatial Information Management for Latin America

Wednesday, 24 September 2014
1700-1830
Dona Socorro