"The value of and business case for open standards"

15 February 2012

FGDC Coordination Group

National Capital Planning Commission

Washington, DC

Mark E. Reichardt, President and CEO

mreichardt@opengeospatial.org

+1 301 840-1361

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Agenda

- A bit about the OGC
- In General – The Value of Open Standards
- OGC Value / Return On Investment
  - Industry Perspectives
  - User Community Perspectives
  - OGC Participation
- Summary
- Discussion

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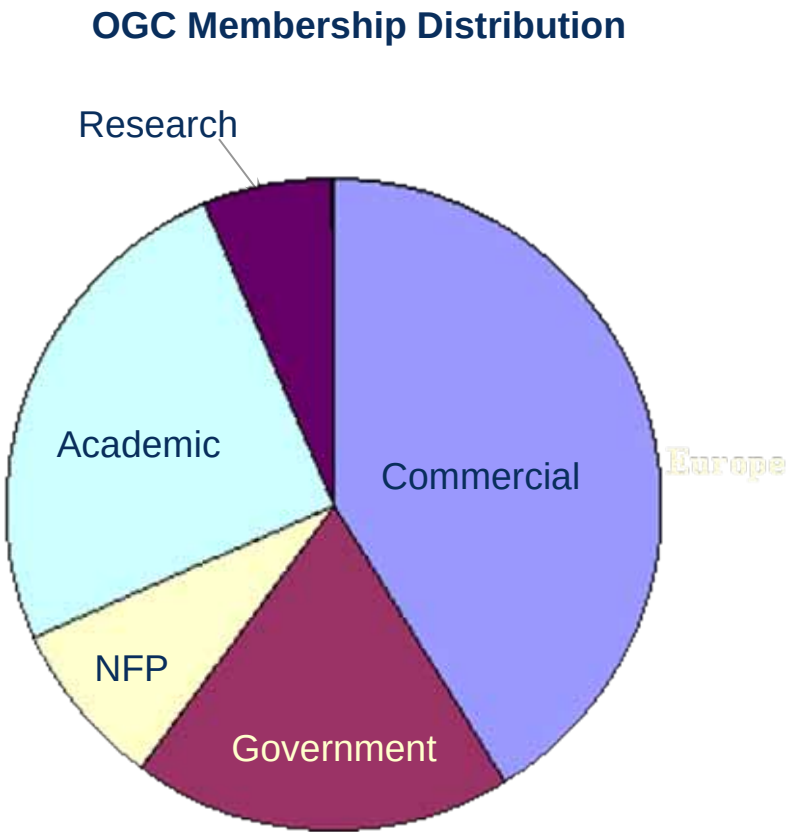
OGC Snapshot

- A Voluntary Consensus Standards Organization, founded in 1994.
- 445 members
- 38 adopted standards
- Hundreds of product implementations
- Broad user community implementation worldwide
- Alliance partnerships with 30+ standards & professional orgs



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Example OGC Industry Organizations

NORTHROP GRUMMAN
ORACLE
Google
ROLTA
ESRI
EADS astrium
latlon raumbezogene informationssysteme
LOCKHEED MARTIN
BENTLEY
PIXIA CORP
BAE SYSTEMS
SAIC From Science to Solutions
INTERGRAPH
GE Energy
erdas The Earth to Business Company
DIGITALGLOBE
BOEING
Microsoft
Autodesk
Pitney Bowes Business Insight
Trimble
galdos systems inc
agi
LIZARDTECH a celartem Company
Infotech Creating Business Impact
Cadcorp
carmenta geospatial innovations
PCI Geomatics
COMPUSULT
ITT
IBM
GeoEye
OGC

And many, many more…

Example Government Organizations

- DOD Australia
- Geoscience Australia
- NSW Dept of Environment and Climate Change (Australia)
- Eurocontrol
- European Environment Agency
- European Satellite Centre
- European Space Agency
- EU Joint Research Centre
- UK MOD
- UK MET
- METEO France
- Korea Land & Housing
- BRGM (France)
- Ordnance Survey (UK)
- State Land Agencies (Germany)
- GIS Center for Security (Abu Dhabi, UAE)
- US DHS
- US EPA
- US FAA
- US NASA
- USGS / FGDC
- US NGA
- US Census
- US NOAA
- US Joint Program Executive Office
- City/County San Francisco, California
- City of Phoenix, Arizona
- Oakridge National Lab
- Natural Resources Canada
- North Carolina Dept of Environment & Natural Resources
- Dept. Science & Technology (India)

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Value of Open Standards

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Fundamental Goal -- Interoperability

- You know when you don't have it:
  - Custom Integration
  - High lifecycle costs
  - Difficult to rapidly mobilize new capabilities
  - Duplication of effort
  - Missed opportunities for improved decision making

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Open Standards
Benefits for Technology Developers and Users

- Enhance Return on Investment
- Reduce risk
- Improve choice in the marketplace
- Avoid proprietary “lock in”
- Reduce costs
- Extend the life of current systems
- Rapidly mobilize new services
- Increase market and revenue
- Compete in international markets

OGC © 2012, Open Geospatial Consortium

Benefits of Open Standards

- Prevents a single, self-interested party from controlling a standard
- Facilitates competition by lowering the cost of entry
- Stimulates innovation beyond the standard by companies that seek to differentiate themselves.
- Prevents vendor lock-in
- Reduces life cycle costs

Source: ***Open Standards, Open Source, and Open Innovation: Harnessing the Benefits of Openness***, April 2006. Committee For Economic Development. www.ced.org

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Return on Investment

Multiple studies confirm the value and advantage of open standards based solutions:

- NASA Geospatial Interoperability: Return on Investment Study: www.egy.org/files/ROI_Study.pdf
- Value of Standards, A Delphi Study: http://www.pesc.org/library/docs/about_us/whitepapers/ValueofStandards-DelphiStudy.pdf
- Economic Benefits of Standardization, DIN German Institute for Standardization: http://www.sis.se/upload/632248898159687500.pdf

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For every $100 million spent on projects based on proprietary platforms, **the same value could have been achieved with $75 million** if the projects had been based on open standards.

NASA study, 2005

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Benefits of OGC Standards

Some Community Examples

-Save Money

-Save Time

-Share Broadly

-Mobilize Quickly

- Meet Mission Needs

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A few Industry Statements

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Why Adopt Open Standards? Google

Google Mapping Spec Now An Industry Standard
by admin in July 23rd, 2010

"standardization will make KML more palatable"

"Governments like to say they can publish to OGC KML instead of Google KML"

"What OGC brings to the table is…everyone has confidence we won't take advantage of the format or change it in a way that will harm anyone,"

"The goal is to prevent market fragmentation"

Source: Michael Weiss-Malik, Google KML product manager

http://www.jonmojuddho.org/index.php/2010/07/23/google-mapping-spec-now-an-industry-standard/

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Industry on Open Standards

www.intergraph.com/assets/plugins/sgicollaterals/downloads/CenFedGovt_Brochure.pdf

"Our Web-based geospatial technology solutions and tools are used globally for data distribution and Web services that follow OGC and ISO standards, minimizing disconnects among groups and maximizing communication"

Esri Supported Open Geospatial Consortium, Inc., and ISO/TC 211 Standards

Esri's approach to interoperability encompasses the International Organization for Standardization Technical Committee 211 (ISO/TC 211) and Open Geospatial Consortium, Inc.® (OGC®), specifications and standards.

Additionally, Esri® software engineering is guided by specifications from the IT and web services communities such as the World Wide Web Consortium and Organization for the Advancement of Structured Information Standards as well as standards from the

www.esri.com/library/whitepapers/pdfs/supported-ogc-iso-standards.pdf

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Industry - Why Adopt Open Standards?

- Galdos
  - "To provide solutions that are effective, scalable, and future-proof, GeoWeb services must be built on a platform of stable and internationally recognized standards."

www.galdosinc.com/services/standards

- PCI Geomatics
  - Standards based geospatial interoperability benefits everyone – it keeps delivery costs down, and enables a widespread array of analysis.
  - The OGC initiatives bring to fruition the full societal, economical and scientific advantages of incorporating sophisticated, but easy to use geospatial technology into government, public and private markets.

http://www.opengeospatial.org/ogc/quotes/pcigeomatics

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One Data Provider’s
(and OGC Member's)
Point of view

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Supporting the Warfighter

EnhancedView Web Hosting Service

For Afghan Ops:

DG Leverages OGC Compliant Standards

To deliver mission critical information

Within 24 hours of reception

Using Web Based Services

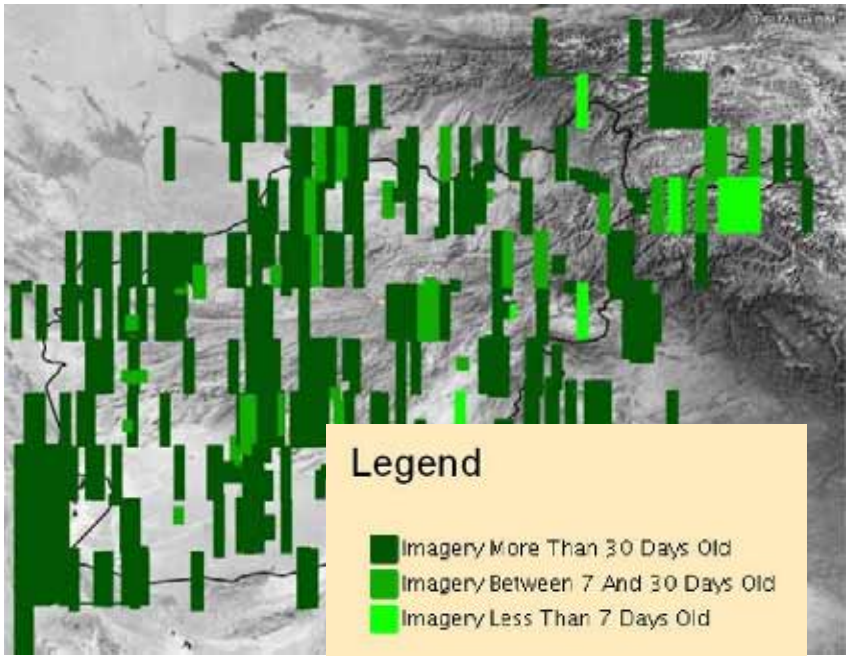
Slide Source: DigitalGlobe

OGC

EnhancedView Web Hosting Service **Current Layer**

- Terrain Matched High Resolution Satellite Imagery Strips
- Leveraging Web Mapping (WMS) Web Coverage (WCS) and Web Tiling Services (WTS)
- Metadata available online via Web Feature Services (WFS)

Slide Source: DigitalGlobe



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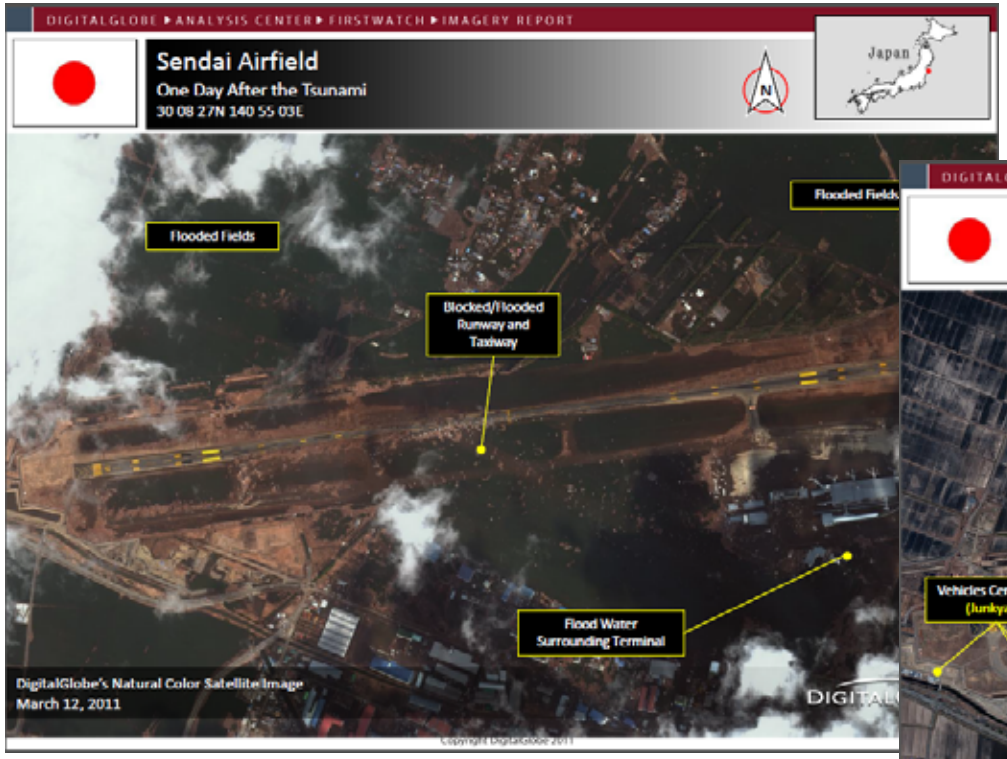
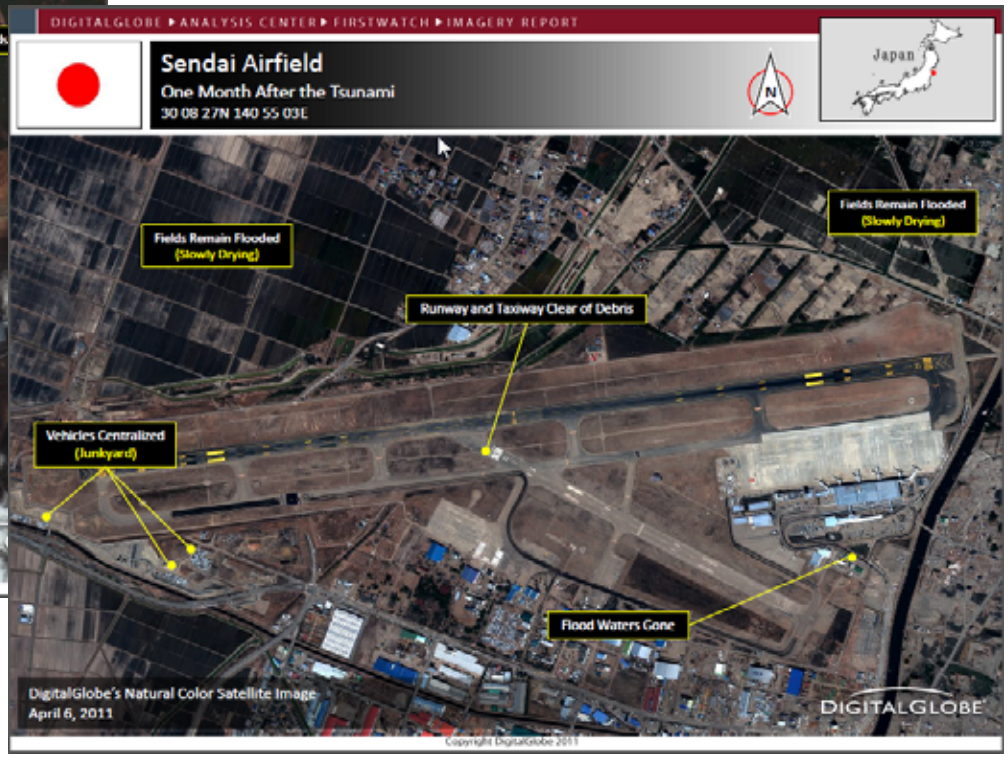
Crisis Event Services

- Worldwide monitoring and coverage
- Historical context exploiting pre-event imagery
- Color, Pan and NIR* imagery
- Over 3 million sqkm available Online

Leveraging OGC For Crisis Response





Slide Source: DigitalGlobe

OGC

DigitalGlobe on Standards and OGC

"Standards-based interoperability is key for improved timeliness for delivering relevant imagery to our users. With OGC services our users access geospatial content that integrates with hundreds of off-the-shelf tools and software. "It just works." In addition to using COTS, DG customers can and have developed custom applications to readily view and use imagery that contributes to their decision-making. These well defined standards enable quick integration into existing and custom workflows and allow mashups with many types of other OGC-delivered geospatial content.

We deliver FirstLook imagery to the UN entirely via OGC-based services (e.g. WMS, WMTS, WFS, KML)

In addition to providing imagery to end users, we also work with partners and other vendors to extend valuable geospatial content into their products using OGC services…"

John Lucier, Senior Manager, DigitalGlobe

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One Vendor's (and OGC Member's) Point of View

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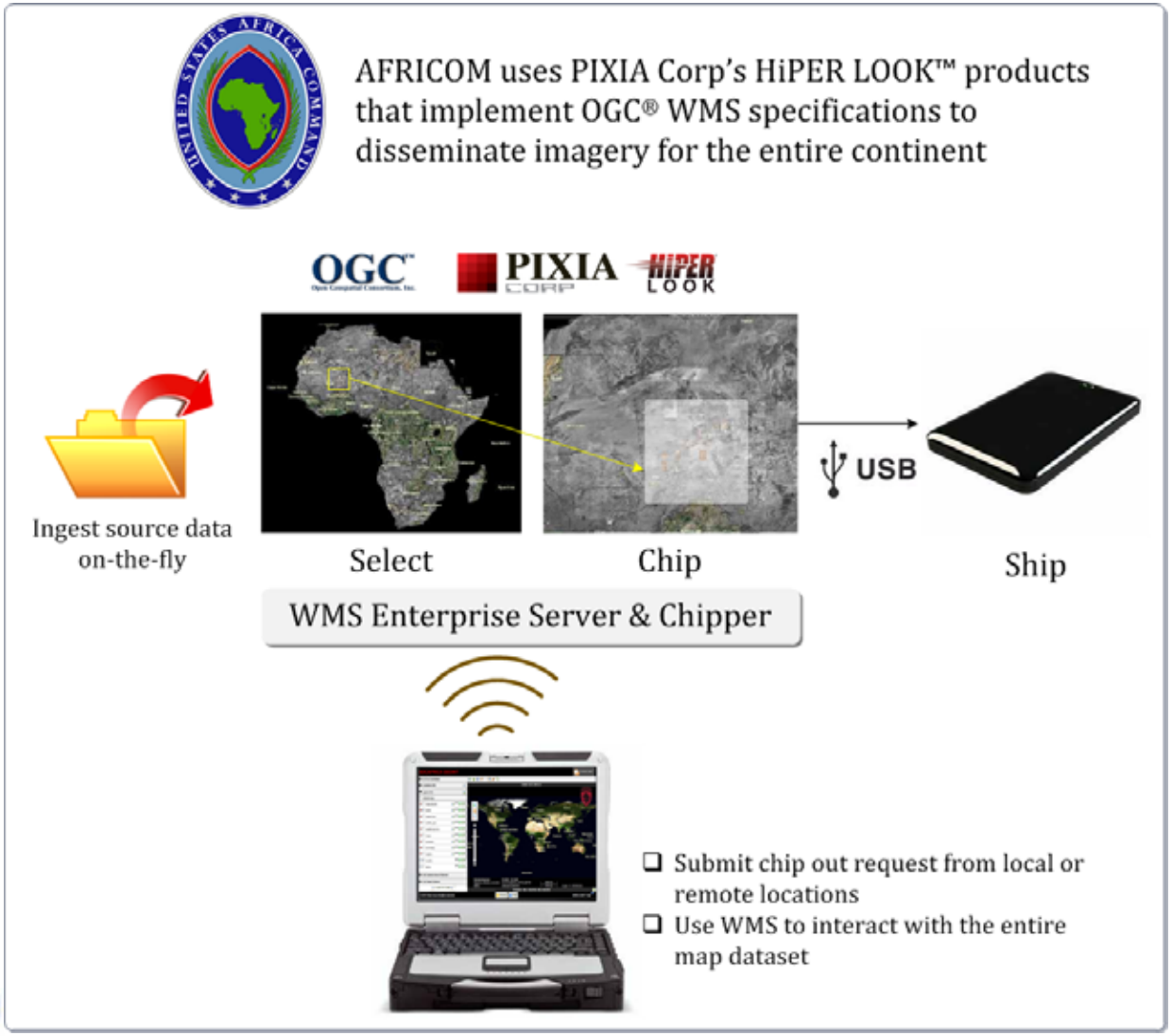
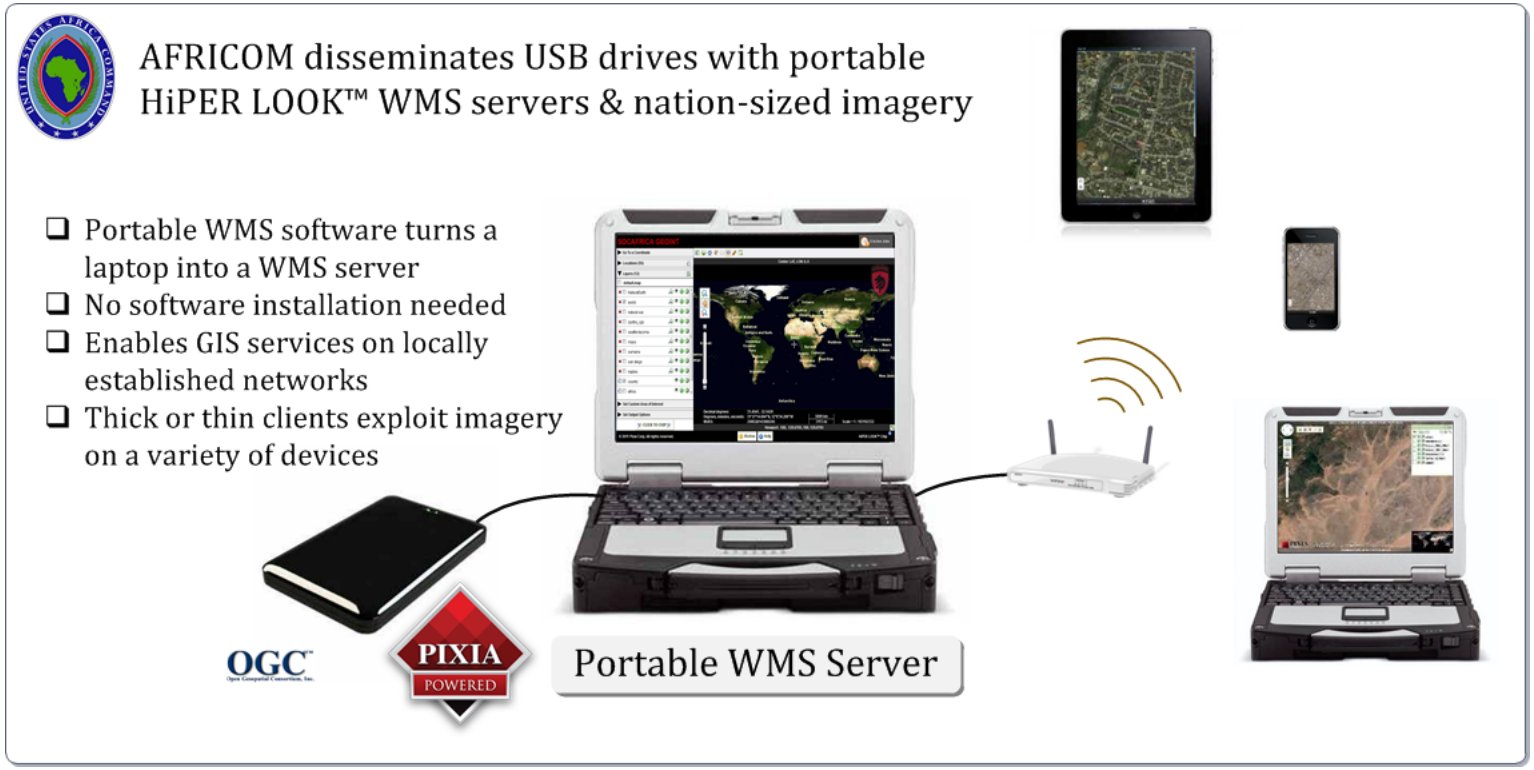
Use case: AFRICOM ingest & chip services



Slide Source: Pixia

Use case: AFRICOM geospatial imagery distribution



Slide Source: Pixia

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Pixia on Standards and OGC

"By implementing OGC WMS 1.1.1 and later OGC WMS 1.3.0, in one single swoop, PIXIA Corp enabled their enterprise HiPER LOOK™ web services to support all major GIS exploitation products."

Rahul Thakkar

Vice President, Technology

PIXIA Corp

OGC

Partial List of Implementers WMS 1.1.1, WMS 1.3

ABB
ABS Informatica S. L.
airGmap Aerospace Tech. Ltd
Autodesk, Inc.
Azavea
BELSIS Ltd.
Bentley Systems Inc.
BILGI GIS
Cadcorp
CARIS
Carmenta AB
CCI Co. Ltd.
CCI co. Ltd.
Chunghwa Telecom Co., Ltd.
CmWorld
Computer Vision Labs Pvt. Ltd.
con terra-Applied Info. Tech. Ltd.
CPA Systems GmbH
CubeWerx, Inc.
DACorp
Demis bv
Envitia
ERDAS Inc.
ESRI
G-Inno Systems Inc.
Galdos Systems Inc
GDSK
GE Smallworld
Generic Logic, Inc.
Geomatys
GEOMEX SOFT Co., Ltd.
Geotwo Co., Ltd
gvSIG association
HermeSys
IBL Software Engineering
interactive instruments GmbH
Intergraph
islran
Itacasoft
JEOBROWSER
KSIC (Korea Geosp. Info. & Com. Co.)
lat/lon GmbH
LBS Plus co. Ltd.
Liquid Technologies
Luciad NV
M.O.S.S. Computer Grafik Systeme GmbH
ManifoldNet Ltd
Maps@
MilSOFT ICT
NETCAD
Newgrove
NTT DATA CORPORATION
Omniscale GmbH & Co. KG
PiriReis Bilisim Teknolojileri LTD.
Pitney Bowes Business Insight
Pixia Corporation
Politerm LLC
Powel AS
Rolta India Ltd.
RSI SOFTECH India Pvt. Ltd.
Samsung SDS
Scanpoint Geomatics Ltd.
Skyline Software Systems, Inc.
Social Change Online Pty Ltd
SRP Gmbh
STAR-APIC
SuperGeo Technologies Inc.
SuperMap GIS Techonologies Inc.
SuperMap Software Co., Ltd
TatukGIS
University of Alabama
University of Reading
WaveGIS Technology Co.Ltd

OGC

One Mining Industry Organization's Policy (Not an OGC member)

…MineRP's openness goes further, through active participation in industry groups such as the Mining, Metals and Mineral Forum of the Open Group, and technological alignment with the Open Geospatial Consortium, which is setting global standards for interfaces or encodings of spatial information. "At our most recent international mine planning," says Strydom, "we even invited two of our major competitors to share the platform with us—something we are not aware of happening anywhere else in the world. In the long run, though, collaboration to support standardisation—rather than developing purely proprietary products—is in the interests of the mining industry as a whole."

Achieving Business Excellence, 1/30/2012

http://www.bus-ex.com/article/minerp

OGC

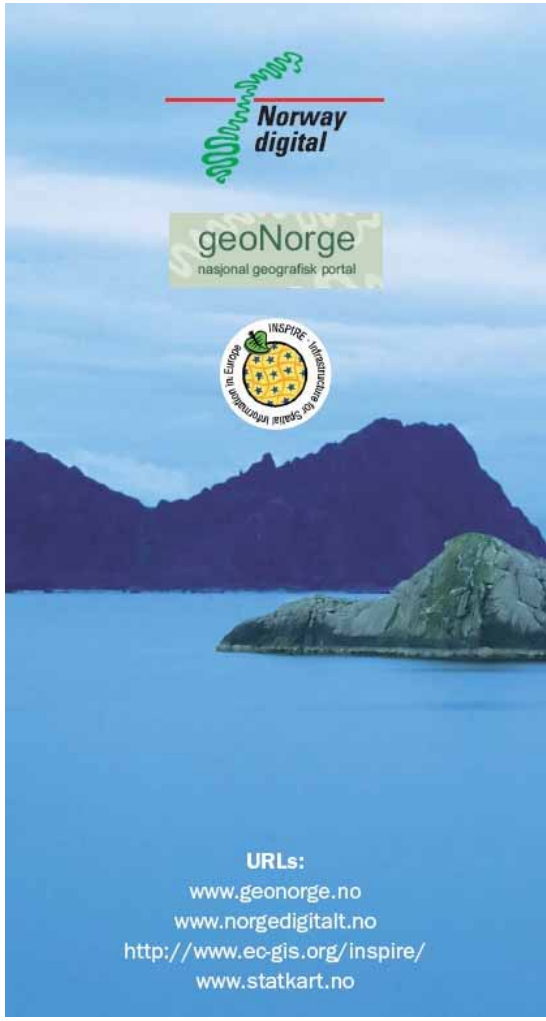
Norway

Norway Digital

- Norway Digital is the Norwegian government's initiative to build the national geographical infrastructure.

- Norway Digital is already a working co-operation and infrastructure with reference data and thematic data available, more than 100 operational web map services, geoportal and other services.

  www.statkart.no/Norge_digitalt/Engelsk/About_Norway_Digital/



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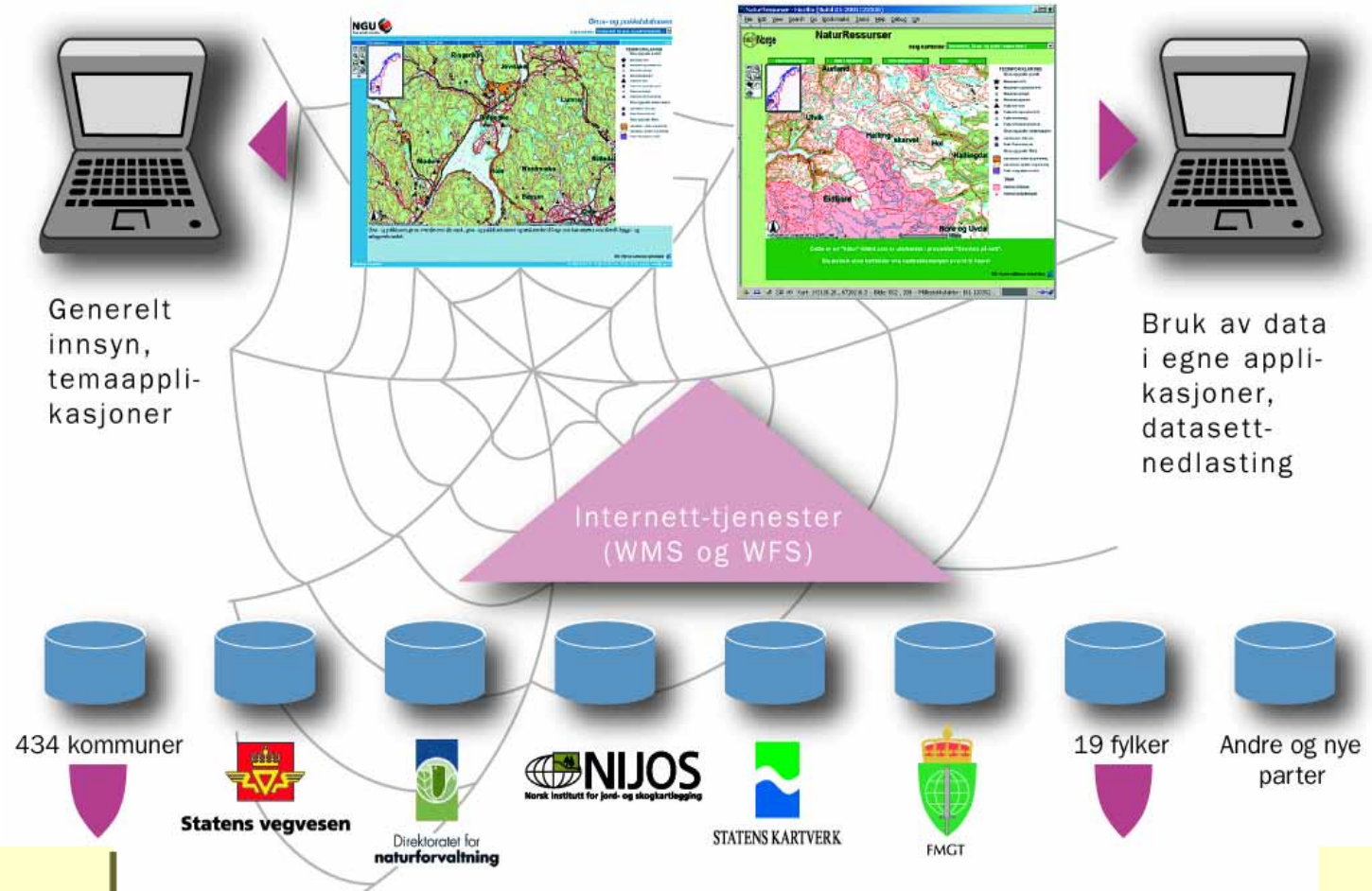
OGC Standards Use – Norway Digital



400 municipalities

19 counties

Norway Digital

Source http://www.statkart.no/Norge_digitalt/Engelsk/About_Norway_Digital/

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Digital Norway – Land Use

Municipal Areas

Flood Risk Areas

- Fisheries
- Waste Water Outflow
- Water Supply

- Demography
- Biodiversity
- Agriculture and Forestry

Land Use

OGC

United Kingdom

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Ordnance Survey

Ordnance Survey was the first national mapping agency to adopt GML when we began using it over ten years ago in the development and launch of our flagship product OS MasterMap Topography Layer.

'Initially we thought GML was all about data delivery, however in recent years the use of OGC standards such as GML in conjunction with developments in web services has also enabled us to modularise our backend systems in order to create a world-leading enterprise data maintenance system.

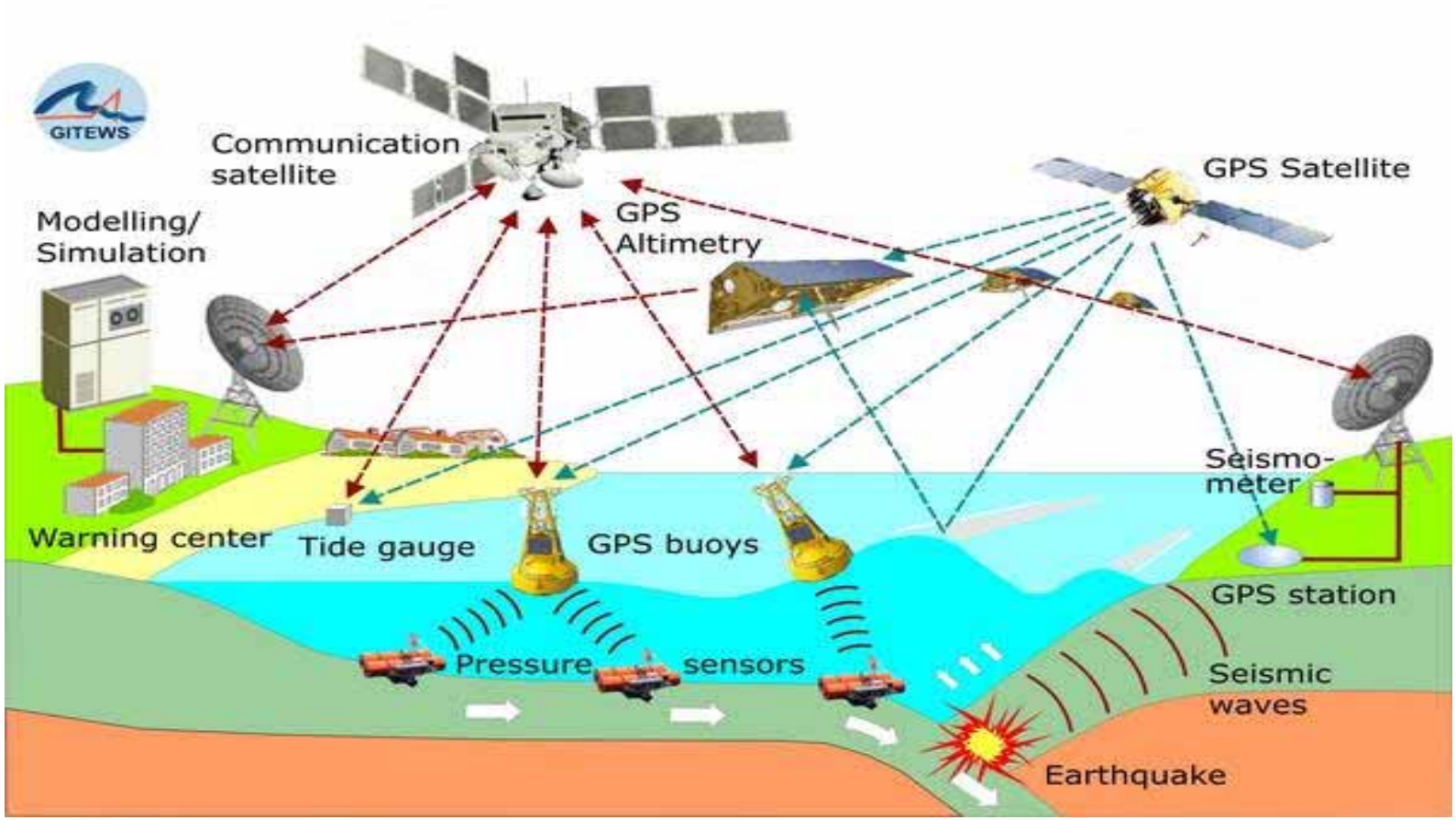
'Ordnance Survey has been an early adopter of web mapping services (WMS) through a number of projects and customer pilots. In 2009, we went live with a commercial service called 'OS OnDemand' which delivers 10 Ordnance Survey products, including OS MasterMap Topography Layer, through WMS.

Dr Vanessa Lawrence CB,
Director General and CEO,
Ordnance Survey Great Britain

Ordnance Survey®

Indonesia

Disaster Management
German Indonesian Tsunami Early Warning System



Source: www.gitews.org

OGC

Disaster Management

German Indonesian Tsunami Early Warning System

www.gitews.de/fileadmin/documents/content/press/fact8000_01.pdf

FACTSHEET System Integration

GITEWS

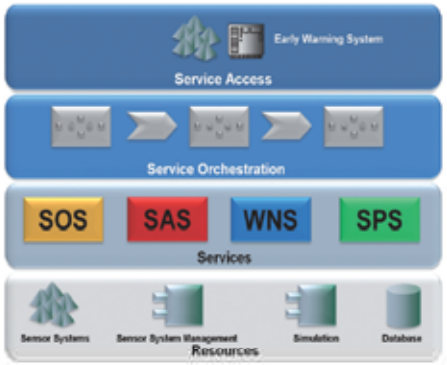
German Indonesian Tsunami Early Warning System

System Integration

The German Indonesian Tsunami Early Warning System GITEWS is a complex system consisting of several sensor types like seismometers, sea level sensors, and GPS land stations, each sensor with its own system behavior and proprietary data structure. To operate a warning chain, beginning from sensor measurements scaling up to warning products, all system components have to interact in a correct way, syntactically and semantically.

Warning systems will evolve over time: New sensor types might be added, old sensors will be replaced and sensor integration as well as decision software will be improved. To keep GITEWS operating under these circumstances its software architecture must be tailored for evolution.

Given these requirements a flexible GITEWS infrastructure is a prereq-



Designing service interfaces great emphasis was laid on conformity to the OpenGIS specification *Sensor Web Enablement (SWE) by Open Geospatial Consortium (OGC[1])*.

The benefits of using a flexible SOA architecture together with Sensor Web Enablement (SWE) as the interface standard leads to an open integration platform: Integrating, accessing, and controlling different types of sensors in a standardized and uniform way.

Source: http://www.gitews.de/fileadmin/documents/content/press/fact8000_01.pdf

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This is not all bad news…

JakartaGlobe
Your City. Your World.

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Indonesian Fishermen Destroyed Tsunami-Warning Buoys: Germany

October 14, 2011

Related articles

Indian Ocean Tsunami Warning System Tested 12:53pm Oct 12, 2011

Indian Ocean Tsunami Alert System to Be Tested on Oct. 12 6:51pm Oct 6, 2011

Indonesia to Helm Tsunami Service 10:03am Sep 27, 2011

5 Million Indonesians at Risk From Tsunamis, UN Says 10:40am Aug 11, 2011

Indonesian Fishermen Find Old Sunken Ship

Berlin. Most of the 16 tsunami-warning machines set up off the coast of Indonesia after the tsunami of 2004 have been damaged beyond repair, German scientists said on Friday.

They blamed fishermen who had tied boats to the floating buoys and other non-natural causes for the failures.

After the 2004 tragedy killed tens of thousands of people, Germany paid for most of the cost of instruments to detect giant waves caused by earthquakes in a major tectonic fault near Indonesia's

OGC

Australia

Geospatial Interoperability
Shared Land Information Platform (SLIP)

Landgate, Western Australia Land Agency

- Infrastructure Services Planning
- Mining
- Emergency Management
- Community Housing
- Commercial Diversity
- Permitting

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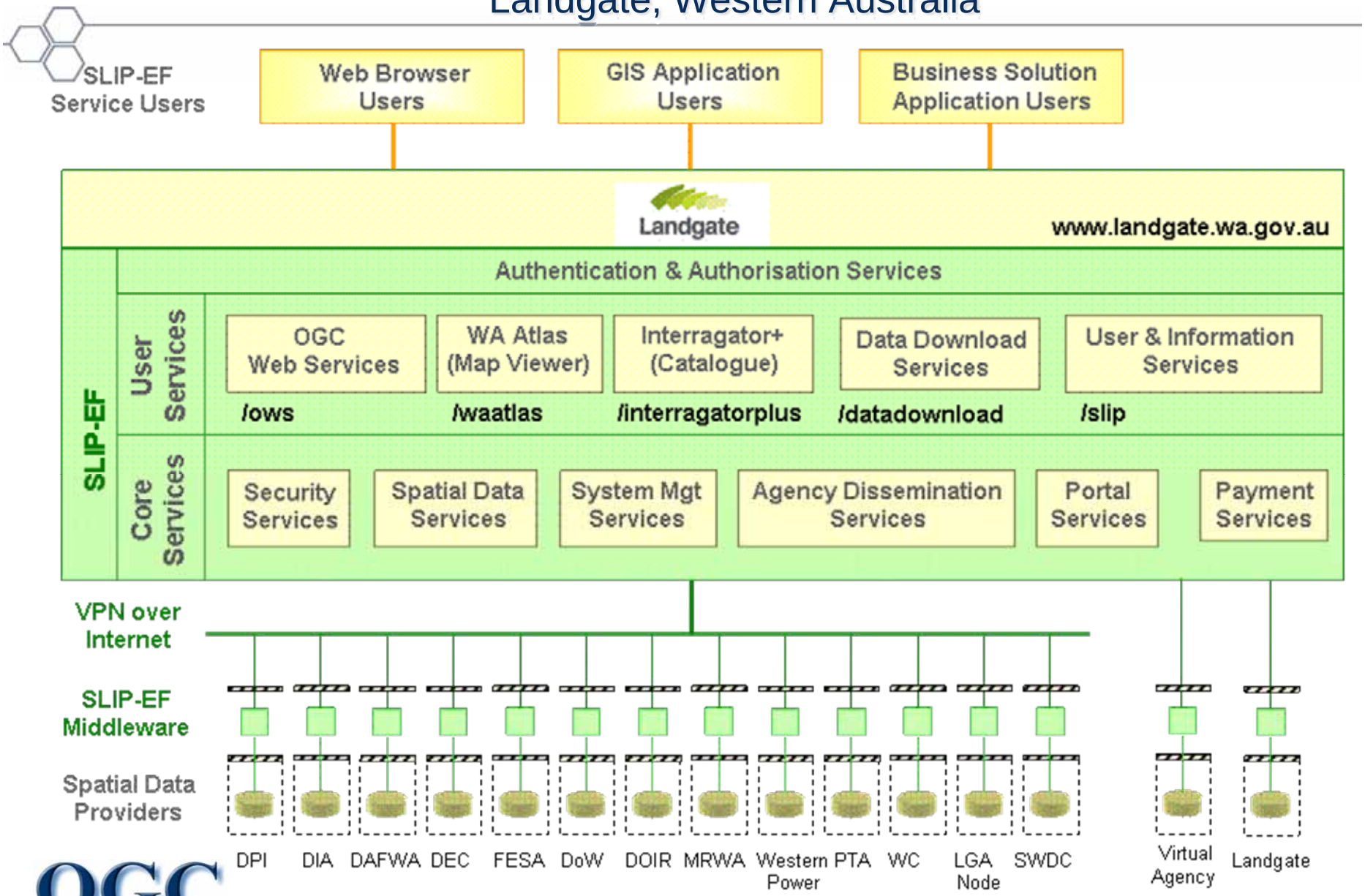
Shared Land Information Platform (SLIP) Enabler

Landgate, Western Australia



OGC

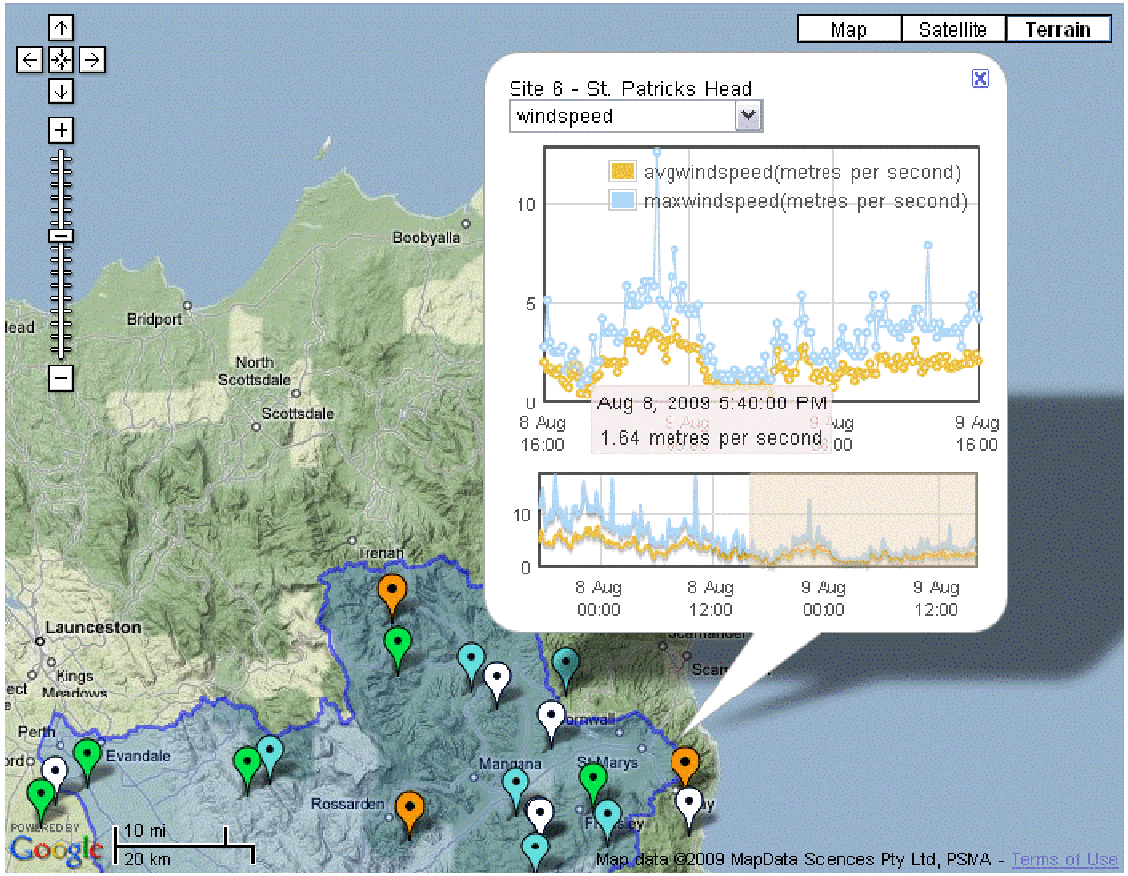
“ When you are delivering spatial web services on behalf of 20 government agencies to more than a 1000 organisations running their own spatial systems, you need standards.

Using the internationally recognised OGC and ISO standards for both the architecture and web services has been essential to our success.”

Kylie Armstrong
Manager, Business Programs
Landgate, Western Australia

Applications – Monitoring Water Quality, Flood, Pollution & Drought Conditions

South Esk River Catchment – Tasmania



OGC Web Services, OGC Sensor Web Enablement, W3C OWL Standards

- Sensor Web Enablement Standards used to monitor, model and forecast flood, drought and environmental events
- Government agencies can rapidly integrate data across separate sensor networks
- Working to incorporate 3rd party (e.g. agricultural) sensor feeds to improve prediction and decision making

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Open Standards and Research

"By using open standards we are able to:

- Avoid reinventing the wheel by using existing reference implementations
- Collaborate with a growing body of like-minded researchers across the world
- Maximise opportunities to achieve research impact
- Ensure we conform with current best practices
- Learn from other people's experiences with implementation
- Maximise opportunities for re-use/repurposing of infrastructure and software
- Build highly scalable solutions
- Make a difference where it counts!"

Andrew Terhorst, CSIRO Australia, Hydrologic Sensor Web

OGC

United States

Sensor Web Enablement Standards Application Ocean Observation

INTEGRATED OCEAN OBSERVING SYSTEM

NOAA IOOS

Core DIF Standards

These are some of the basic standards and specifications adopted by the NOAA IOOS Data Integration Framework.

- OGC Sensor Observation Service (SOS) specification NOAA IOOS uses this service type to provide access to in-situ oceanographic data in an XML encoding defined by the GML application schema referenced above.
- OGC Web Coverage Service (WCS) specification NOAA IOOS uses this service type to provide access to gridded remotely sensed data in binary formats such as NetCDF and GeoTIFF.
- OPeNDAP information This service type is used by NOAA IOOS to provide access to gridded remotely sensed data in binary formats such as NetCDF and GeoTIFF.
- OGC Web Map Service (WMS) specification This service type will be used to provide georeferenced images of data.

http://www.ioos.gov/dif/

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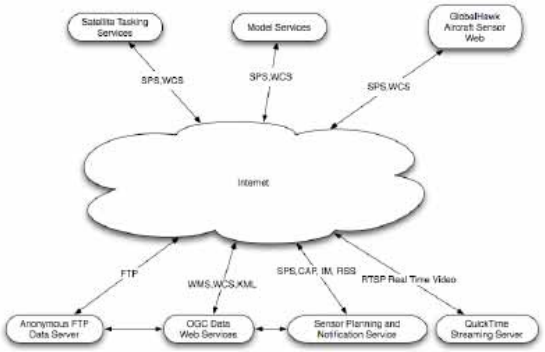
Wildfire Management

- Rapid mobilization of UAV assets – Global Hawk

- OTH, Commercial Ku
- C&C and Data
- Multiple web services:
  - WMS, WCS, SPS, WNS
    - Beta WCPS
  - RTSP, RSS
- On board Sensor Web



Source: Don Sullivan, NASA

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Role of OGC Standards

"As an architect for communication and data systems for NASA Uninhabited Aerial Systems, my job commonly requires near-real-time information be delivered to unit commanders making decisions affecting human welfare and potentially large economic commitments. Systems like the ones we build, sensor webs, must employ accurate, efficient and secure machine-to-machine communication and data sharing.

Without the specifications and standards we jointly develop in the Open Geospatial Consortium, the inter-agency and international sensor webs required for my mission would just not be possible."

Don Sullivan, NASA Ames Research Center

OGC

Chinese Taipei

Disaster Prediction and Warning

- Typhoons and earthquakes trigger landslides and flooding on a frequent basis
- OGC services used with an array of spatial data and sensors to provide situational awareness for forecasting, detecting, alerting and response to debris flow situations.
- Rapidly deployed network of debris flow sensors, and distributed services performing sensor data analysis and processing

Source: Feng Chia University, GIS Research Center

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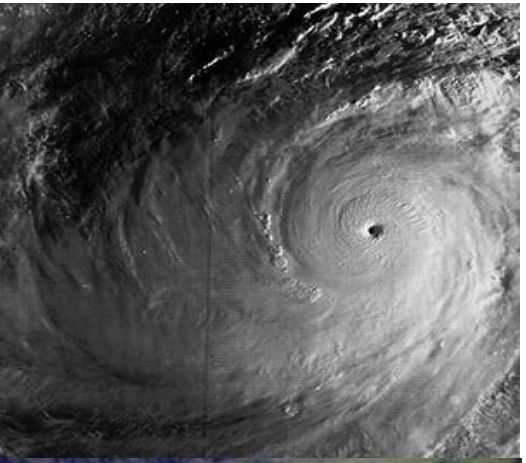
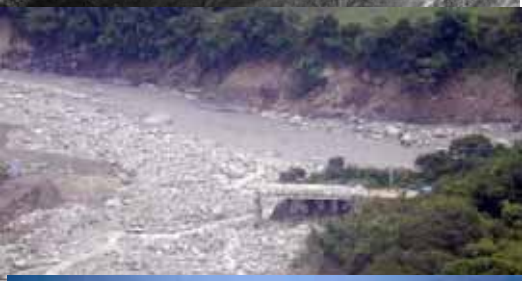
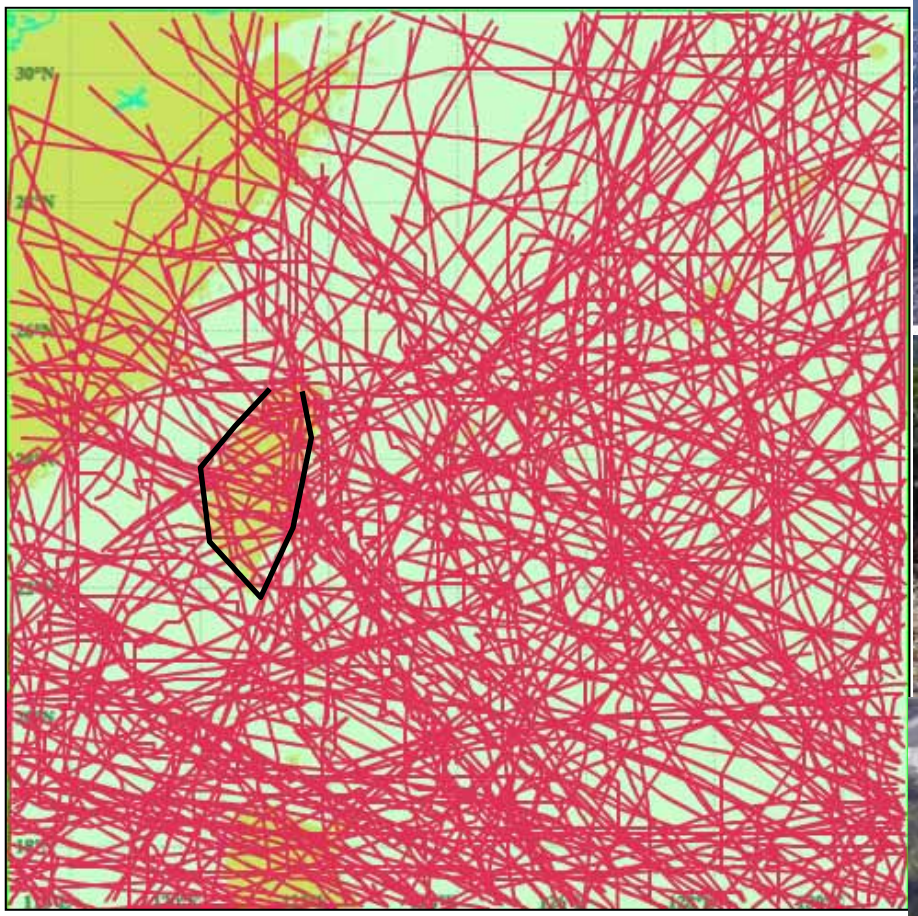
Typhoons – A Busy Region







Source: Feng Chia University, GIS Research Center

Disaster Prediction and Warning

Pre-typhoon

2008/11

Post-Morakot

2009/8

Source: Feng Chia University, GIS Research Center

OGC

Monitoring Stations

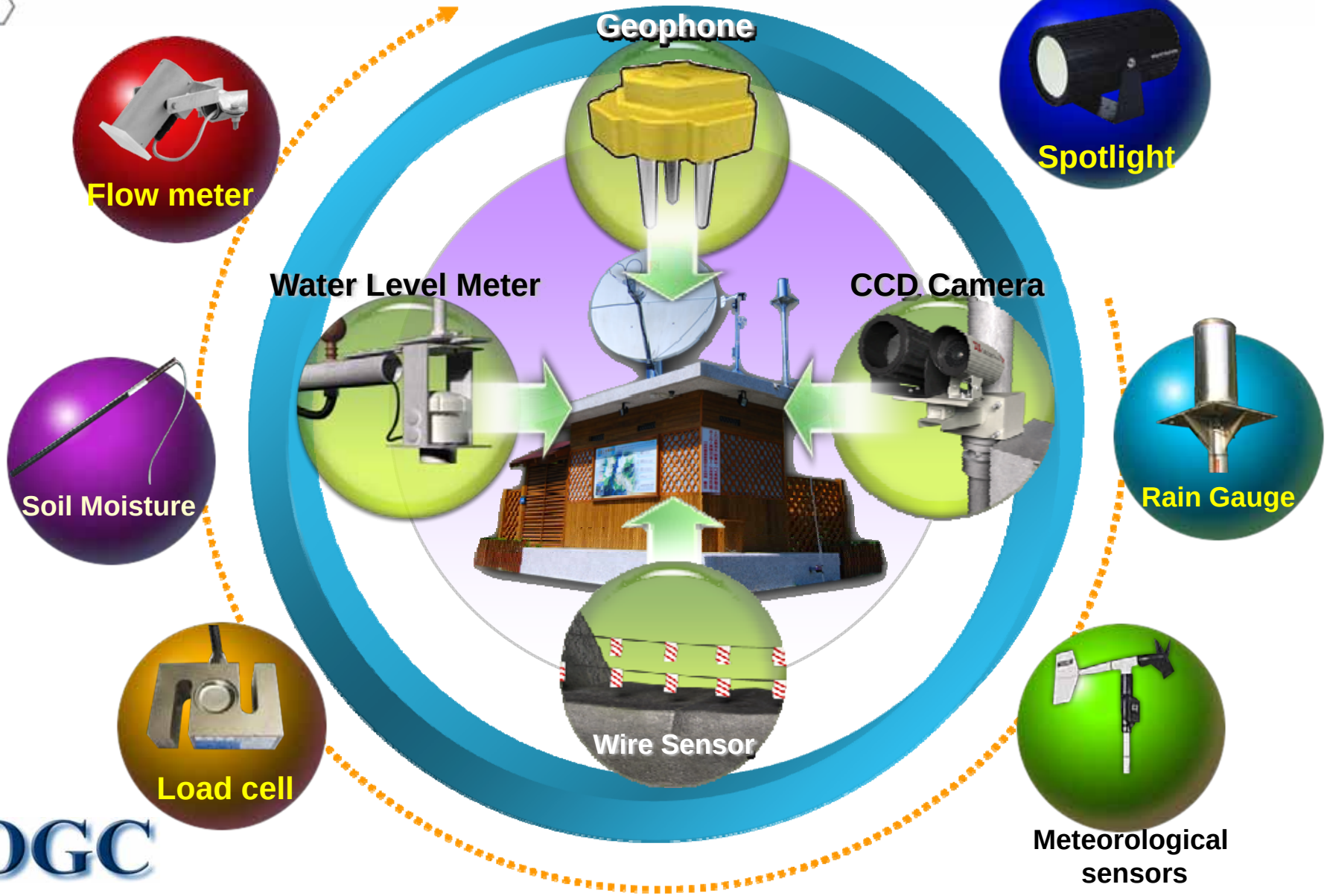
01.白布帆站 (Baibufan Station)
02.九份二山站 (Jiufen-Ershan Station)
03.神木站 (Shenmu Station)
04.上安站 (Shang-an Station)
05.郡坑站 (Jyunkeng Station)
06.豐丘站 (Fongciou Station)
07.大粗坑站 (Dacukeng Station)
08.鳳義坑站 (Fongyikeng Station)
09.射馬干站 (Shemangan Station)
10.華山站 (Huashan Station)
11.大興站 (Dasing Station)
12.豐山站 (Fongshan Station)
13.松鶴站 (Songhe Station)
14.坪頂站 (PingDing Station)
15.蘇樂站 (Suru Station)
16.玉峰站 (Yufong Station)
17下田埔站 (Shiatainpu Station)
18.羌黃坑站 (Cianghuangkeng Station)
19.集來站 (Jilai Station)
20.來義站 (Laiyi Station)
21.大鳥站 (Daniao Station)

Debris Flow Monitoring Station×21
Landslide Monitoring Station×1
Sediment Concentration Monitoring Station×3
Mobile Debris Flow Monitoring Station ×3
Grid Debris Flow Monitoring Station ×14

OGC

Source: Feng Chia University, GIS Research Center

Sensors in Debris Flow Monitoring Station



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OGC Value

"The success of our programs to monitor, detect, warn and respond to emergencies and natural disasters in Taiwan depends heavily on OGC standards.

We use OGC Web Service and Sensor Web Enablement standards to rapidly mobilize monitoring , forecasting and warning networks, and to implement a diversity of sensor assets as part of these systems. This saves time, money and lives."

Tien-Yin Chou, Director of the GIS Research Center
Feng Chia University, Taiwan

OGC

Mountain View CA, USA
December 2009

OGC Value: On the Development Side of the Equation

Taichung, Chinese Taipei
June 2011

Bonn, Germany, March 2011

United Nations, New York USA,
January 2005

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Drivers for Engaging In OGC Programs
Technology Users

- ***Technology Risk Reduction*** - encourage the commercial market to develop and validate new open interfaces consistent with user needs. Broad implementation of open standards by the marketplace would be difficult, if not impossible, to achieve via conventional contracting practices. OGC's programs encourage the market to do the integration for you.
- ***Improve choice and competition in the marketplace*** – Procure your choice of standards-based products that can be plugged into an enterprise -- no single application meets the needs of all users
- ***Reduce technology life cycle costs*** by increasing usage of standards based COTS, organizations can more readily reduce custom solutions and associated maintenance costs
- ***Rapidly Insert New Technology*** – By working with industry and academia to implement OGC standards in their offerings, organizations can maximize their ability to rapidly transfer new solutions into use.

OGC

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Drivers for Engaging In OGC Programs
Technology Developers

- Opportunity to cooperatively develop open standards
- Early insight into user requirements for interoperability
- Early experience with and influence in developing standards
- Reduce development costs / risks and lead time for developing interfaces (community wide cost sharing)
- Bring new OGC based products and services into the marketplace earlier
- Broaden market reach via products that implement OGC standards

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Drivers for Engaging In OGC Programs
Integrators

- The OGC interoperability Program process essentially offers a path for integrator firms to gain increased economies on system integration and enterprise systems development:
  - Improve customer choice of the mix of geospatial applications and services that can be plugged into an OGC ready architecture
  - Offer customers flexibility in integrating improved applications and services in the future
  - Adopt geospatial standards consistent with the user's defined policy on open standards and architectures

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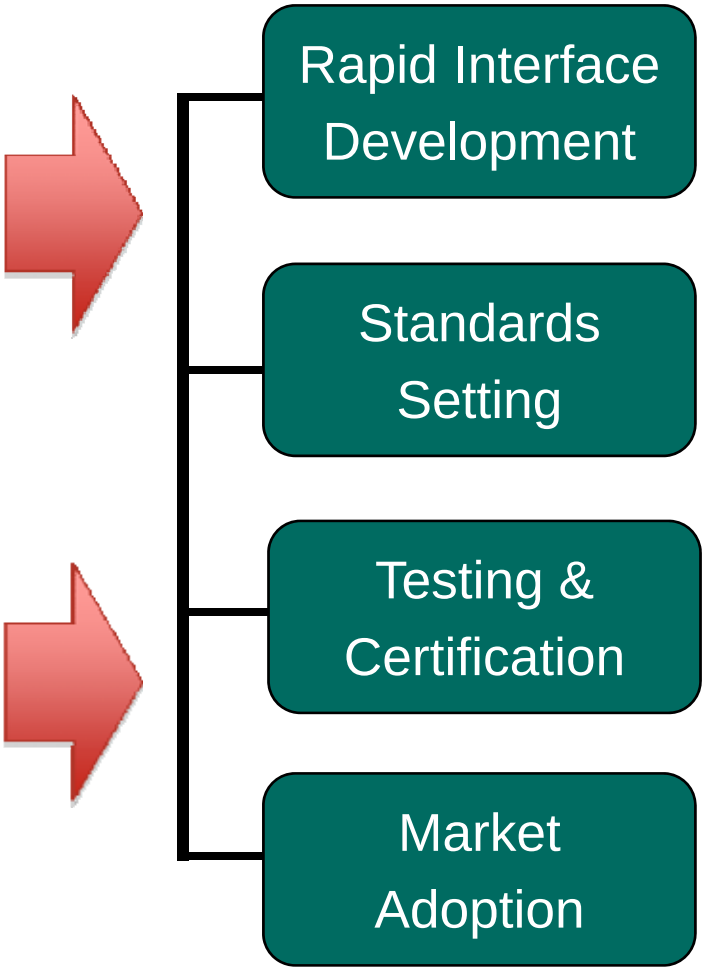
OGC's Approach for Advancing Interoperability

- ***Interoperability Program* (IP)** - a global, innovative, hands-on rapid prototyping and testing program designed to unite users and industry in accelerating interface development and validation, and the delivery of interoperability to the market
- ***Specification Development Program*** – Consensus standards process similar to other Industry consortia (World Wide Web Consortium, OMA etc.).
- ***Compliance Testing and Certification Program -*** allows organizations that implement an OGC standard to test their implementations with the mandatory elements of that standard
- ***Marketing and Communications Program*** – education and training, encourage take up of OGC specifications, business development, communications programs



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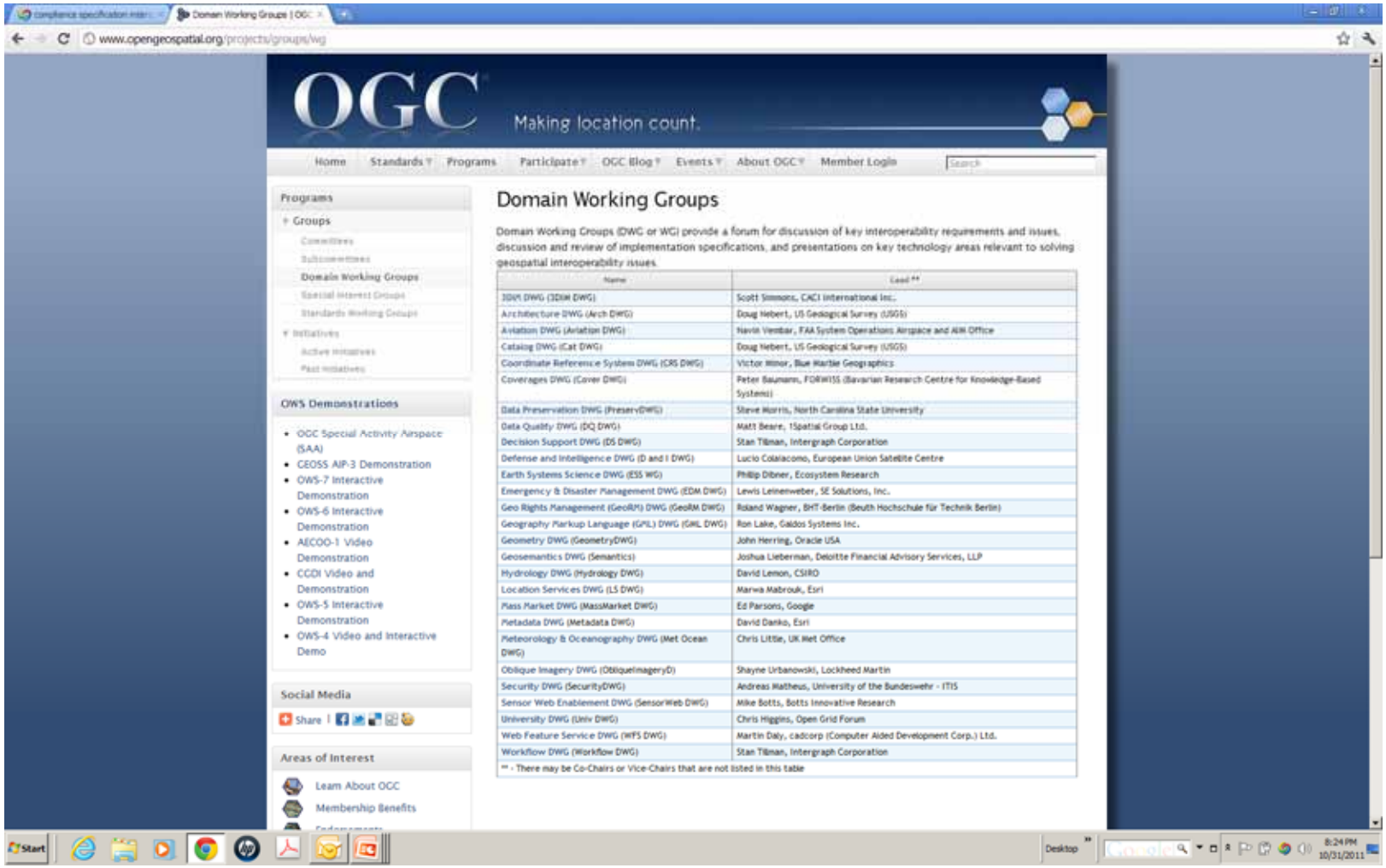
Domain Working Groups



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OGC Interoperability Program

Active OGC Initiatives

Name	Lead **
3D Portrayal IE (3DPIE)	Raj R. Singh, Open Geospatial Consortium, Inc.
Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks (EO2HEAVEN)	Martin Klopfer, Open Geospatial Consortium (Europe) Limited
GEOSS Architecture Implementation Pilot (GEOSS/OGC)	George Percivall, Open Geospatial Consortium, Inc.
HDWG Forecasting IE (ForecastIE)	David Arctur, Open Geospatial Consortium, Inc.
HDWG Surface Water IE (SW IE)	David Arctur, Open Geospatial Consortium, Inc.
Mobile Internet (Mobile CD)	George Percivall, Open Geospatial Consortium, Inc.
OGC Water Information Services Concept Development (OGC Water IS CD)	Luis Bermudez, Open Geospatial Consortium, Inc.
OGC Web Services, Phase 8 (OWS-8)	David Arctur, Open Geospatial Consortium, Inc.
OGC Web Services, Phase 9 (OWS-9)	Nadine Alameh, Open Geospatial Consortium, Inc.
OWS Shibboleth IE (Shibboleth IE)	Luis Bermudez, Open Geospatial Consortium, Inc.
SAA Pilot (SAA Pilot)	Nadine Alameh, Open Geospatial Consortium, Inc.

Past Initiatives: http://www.opengeospatial.org/projects/initiatives/past

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OGC Web Mapping Testbed I

- Sponsors:
  - NIMA (NGA)
  - US Army Corps of Engineers TEC
  - Federal Geographic Data Committee (FGDC)
  - USDA, Natural Resources Conservation Service
  - National Aeronautic and Space Administration (NASA)
  - Australian World Wide Web Consortium

- Total Sponsor Investment $1.1M

- Specifications Produced: Web Map Service 1.0

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OGC Web Mapping Testbed I Participants

- Autodesk (US)
- BBN Technologies
- Blue Angel Technologies
- Cadcorp (UK)
- Compusult (Canada)
- Cubewerx (Canada)
- ESRI (US)
- Galdos Systems (Canada)
- Geodan IT (Netherlands)
- Geomatics Canada
- Hitachi (Japan)
- ILOG (France)
- Intergraph (US)
- Ionic Software SA (Belgium)
- Laser Scan (UK)
- Litton/TASC (US)
- Lockheed-Martin (US)
- MapInfo (US)
- Microsoft (US)
- MIT (US)
- Mitsubishi (Japan)
- NTT Data (Japan)
- ObjectFX (US)
- Oracle Corp (US)
- Ordnance Survey (UK)
- PCI Geomatics (Canada)
- Penn State University (US)
- SICAD Geomatics (Germany
- Social Change Online (Australia)
- Sun Microsystems (US)
- Universal Systems (Canada)

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Market Adoption of WMS 1.0
Based on OGC Registered Products List

- Market Adoption of WMS 1.0: 77 registered products in September 2004, 151 products registered in October 2009:
  - 52 North
  - CARIS
  - Christ. Michel. Rsh.
  - Cubewerx
  - Envitia
  - FAO
  - GEF-RIS AG
  - Geometry Party Ltd
  - Innogistic Softw.
  - Iter.dk
  - Liquid Technologies
  - Manifold Net Ltd
  - MIT
  - NAC Geogr. Prod.
  - Northrop Grumman
  - PCI Geomatics
  - PTFS
  - Social Change Online
  - STAR Informatic SA
  - T-Systems Group
  - UMN MapServer
  - WhereGroup GmbH

-AED SICAD
- Carmenta AB
-Compusult
-Demis BV
-ERDAS
-Faulnalia
-Generic Logic, Inc.
-GMU
-Intergraph
-Laser-Scan
-MOSS Computer Grafik
-Maps@
- Moxie Media
-NetGIS Gdbr
-OmniScale
- Pixxures
-Refractions Research
- SRI International
-STAR APIC
-TatukGIS
-University of Alabama

-Cadcorp
-CCGIS
-con-terra
-DM Solutions
-ESRI
-GE Smallworld\
-GEOMania
-HDM
-Intl. Interfaces
- lat/lon
- Mancke Software
-Miramon
-MRF Geosystems
-Newgrove
-PB Mapinfo
- Polexis
-Skyline Software
-SRP GmbH
-SWBB GmbH
-The Carbon Project
-US FGDC

As of
1 November 2011

234
Implementations
registered
WMS 1.0

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OGC Interoperability Program Return on Investment

- Participants in OGC testbeds and pilot initiatives contribute more in in-kind contributions (labor, software, infrastructure etc.) than is provided in Sponsor funding.

- For every one Euro, Dollar… in sponsorship funding, the following initiatives have yielded additional in-kind resources:
  - Web Mapping Testbed I (1999) — 4 times
  - OGC Web Services 3 Testbed — 3 times
  - OGC Web Services 4 Testbed — 3.5 times
  - OGC Web Services 5 Testbed — 3.3 times
  - OGC Web Services 6 Testbed — 3.1 times
  - OGC Web Services 7 Testbed — 2.5 times
  - OGC SAA Pilot — 1.9 times
  - OGC Web Services 8 Testbed — 2.8 times

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Innovation

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SMS

- SMS is supported by most mobile devices
- SMS is fixed-rate and everyone is used to it already
- SMS is push-and-trigger style communication

However, SMS lacks an open standards based approach for location information exchange across platforms.

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OGC Open GeoSMS

Defines a short messaging service (SMS) encoding to exchange lightweight location information between different mobile devices or applications.

Open GeoSMS encoding for location is **compatible with other OGC standards**, such as those for sensor webs and earth imaging.

It is also **compatible with other standards** such as the OASIS Common Alerting Protocol (CAP) standard and the IETF RFC Presence Information Data Format Location Object (PIDF-LO).

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Cross-platform Open GeoSMS

http://maps.google.com/maps?q=38.9985,-77.030275&GeoSMS
I am here for OGC TC Meeting.

Users don’t need to care about target platform or map/navigation service

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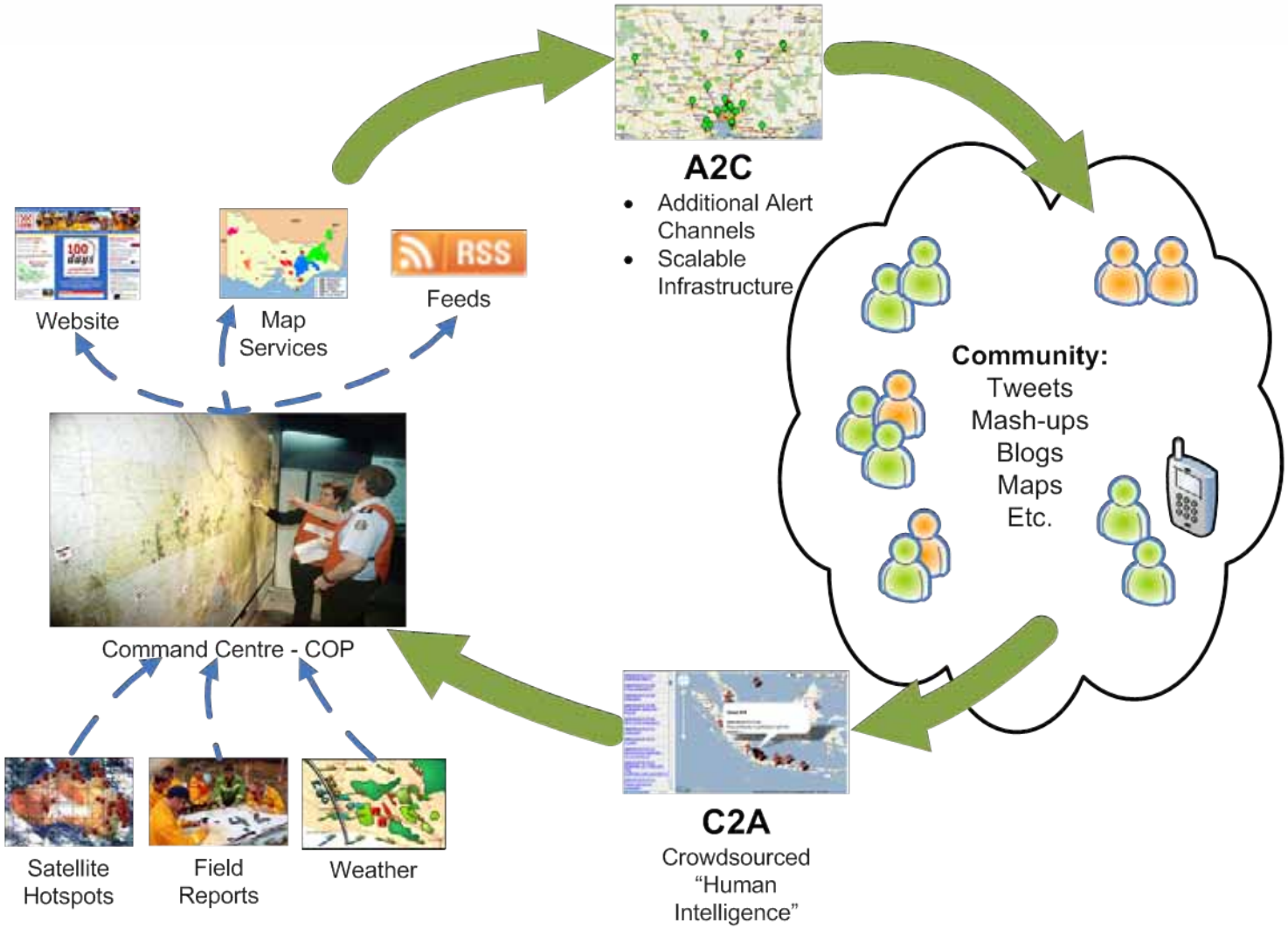
Bridging the Ecosystems



Source: www.bushfireconnect.org

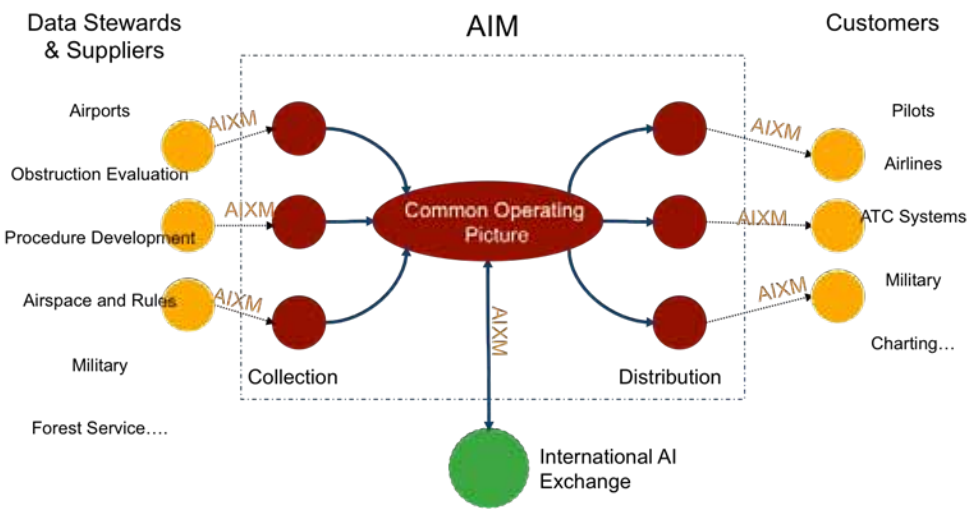
OGC

Aeronautical Information Management (AIM)

(OGC Web Services Phase 6 & 7 Testbeds)

- Develop and test standards-based service-oriented architecture to support the provision of aeronautical information directly to flight decks and Electronic Flight Bags (EFB)

- Support vision for Aeronautical Information Management
  - Interconnected systems with many actors and many users
  - Need for real-time information used in flight planning, navigation, rerouting, etc
  - Right information at the right time at the right place to the right user
  - End-to-end management of information



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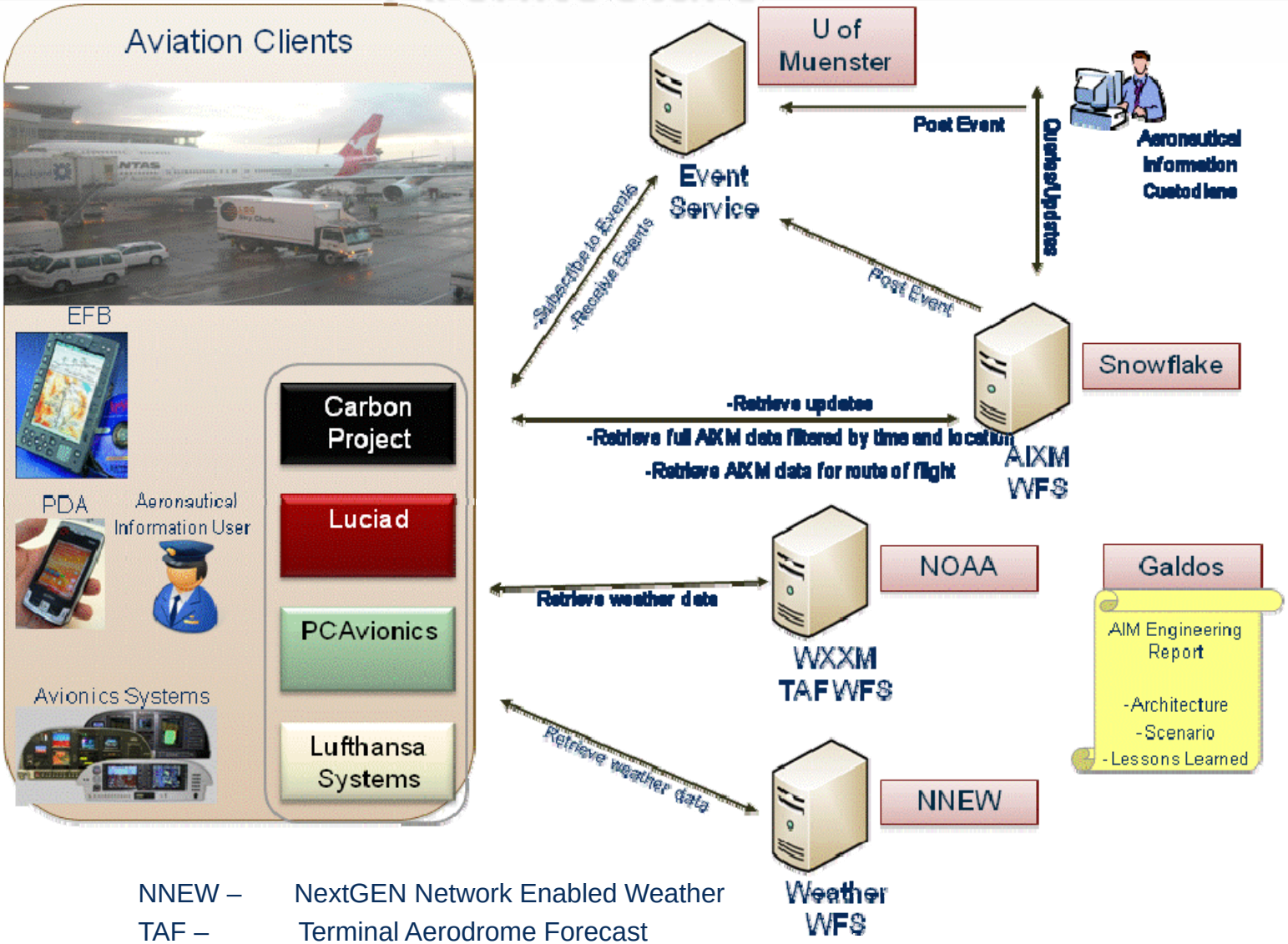
OWS-6 Aeronautical Information Management Architecture



NNEW – NextGEN Network Enabled Weather
TAF – Terminal Aerodrome Forecast
WXXM – Weather Info. Exchange Model
WFS – OGC Web Feature Service

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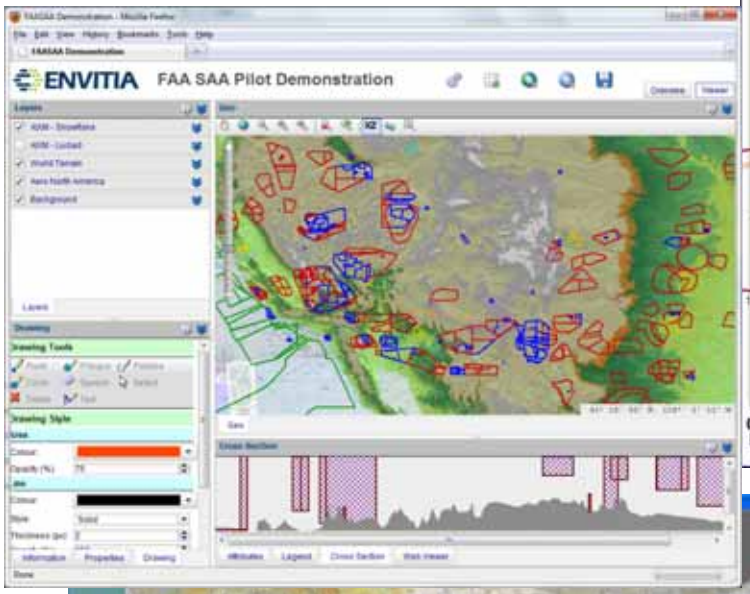
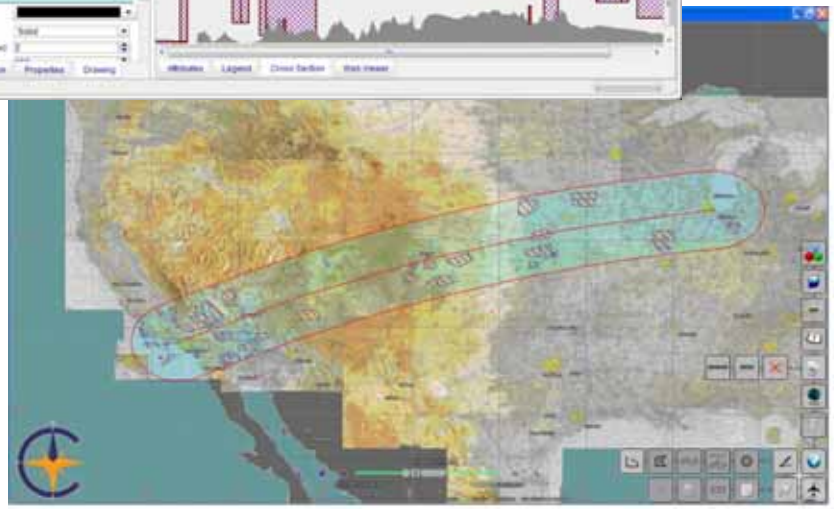
FAA Special Access Airspace (SAA) Pilot





SAA Pilot Demo page

http://www.opengeospatial.org/pub/www/saa/index.html

OGC Aviation Domain Working Group

http://www.opengeospatial.org/projects/groups/aviationdwg

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On OGC Interoperability Program and Aviation Information Management

"The FAA SAA Dissemination pilot proves that OGC Web Services can be used in concert with domain-specific information exchange standards to satisfy the operational needs of a wide variety of users. The use of the standards means that all of the stakeholders' costs decrease while the benefits of the communication are realized quickly.“

Navin Vembar

Aeronautical Information Management (AIM) Acquisition Lead

US Federal Aviation Administration

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More OGC Areas of Focus

Uncertainty
Data-Quality Sensor-Fusion
Decision-Fusion Cloud-Computing
Data-Preservation Mass-Market-Standards
Semantic-Mediation Embedded-Mobile-Sensors
Cross-Community-Interoperability Internet-of-Things
Compliance-Testing Water-Resources-Best-Practices
Earth-Observation-Best-Practices Aviation-Information-Management
Geosynchronization Modeling-and-Simulation
Augmented-Reality Geo-Rights-Management
Oblique-Imagery 3D-Portrayal Compliance-Certification
3D-Urban-Models Mobile-Internet
Indoor-Location
Linked-Data

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republic, monarchy, regime,
totalitarian country/state, etc. →
po'lice ,station n. [C] the
police in a town or city
po·lice·wom·an
policewomen
officer
pol·i·cy
a way of doing th
agreed and chosen by
organization: our foreign/econ
etc. policy | the company's policy
leave | government officials who
policy | a leading autho
written agreeme
one pole
fishing
nd south-
the North
erent from
asses were
one of two
its power is
nts at which
order to use
ong arguments
dea, opinion, or

Policy and Guidance Worldwide

- National level policy and legislation
- European INSPIRE Directive
- Global Earth Observation System of Systems (GEOSS)
- European Space Agency
- Defense and Intelligence
- Sub-national level - Delhi, Abu Dhabi, Western Australia

Summary

- Many examples of value exist from both the user and the information and technology provider communities
- ROI/Value is being extended through formation of policies and guidance in favor of OGC and complementary standards
- Standards innovation continues. Continue to voice your requirements in the OGC process!

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Standards are like parachutes...
...they work best when they're open.