

INTRODUCTION TO THE OPEN GEOSPATIAL CONSORTIUM (OGC) ...PLUS IDEAS FOR COLLABORATION

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We live in EXCITING times!

Massive Amounts of Location Data



3D Building Models - City of Helsinki - https://kartta.hel.fi/3d/#/



Helsinki

We live in Challenging times!

Massive Amounts of Environmental Issues

Sea levels are rising. Sea level change compared with a 20th-century average, inches Lower Higher 1880 1900 1920 1940 1960 1980 2000

The extent of our arctic sea ice is shrinking.

Arctic sea-ice extent compared with a 1979-2008 average, millions of square miles

Larger extent 📰 💴 Smaller extent



The Greenland ice sheet is melting. Percent of ice sheet surface area that is

melting compared with a 1979-2008 average

Less melt 🗾 📕 More melt

CC®



Figure 2. FY2018 Dollar Disaster Relief Appropriations, FY1964-FY2018



The last twenty years have seen a dramatic rise of 151% in direct economic losses from climate-related disasters, according to a new report released by the UN Office for Disaster Risk Reduction (UNISDR).

We Have to do Better!





Why OGC Standards ?



 \mathbf{OGC}°

Image by Gerd Altmann from Pixabay

Many "Eyes / Sensors/Data Sources"



Without Standards ...



 \mathbf{OGC}°



*Please be careful when you put revision clouds on your drawings, some of the contractors do not understand. *

...Data Silos and poor/no Interoperability





You Must Plan for It!

"<u>Open Data , open standards and</u> <u>technologies</u> that implement standards are all <u>critical to the goals of GEO</u> to "unleash the power of EO" for the greater benefit of society. A clear understanding about the relationship of these three elements. and how to implement on both the policy and technical level is critical to sharing information across boundaries and creating transparency. As a Participating Organization in GEO, OGC has been the driving force for open standards in building GEOSS"

Barbara Ryan, Geo Secretariat Director, May, 2014



OGC®



Using location, we connect people, communities, technology and decision making for the good of society

What is the Open Geospatial Consortium(OGC) ?

The world's most comprehensive community of experts making location data and information more Findable, Accessible, Interoperable and Reusable (F.A.I.R.)



True Open Standards, Collaboratively Developed



OGC Member Meeting, Banff, Alberta, Canada, September 2019

Member Driven

The Value of OGC Membership

Connecting Communities Global Leadership Expert and Trusted Knowledge Innovation, Technology and Standards Technology Monitoring

500+ Members - Well Balanced From all Sectors



Value by Sector

| Commercial | Government | Academia and Research |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Client and Partner</i> <i>Relationships</i> - Interacting with existing and potential new clients and partners provides invaluable intelligence to ensure market requirements are met. | Innovation and Market Growth Sponsoring Innovation initiatives provides an efficient method to test new capabilities while investing in new approaches, and technologies, supporting Market Growth | Research Partners - OGC's international membership provides ideal opportunities to find new partners to support research |
| Innovation Advantage - Early access to new standards and technology tested in an innovation initiative and sponsored by clients may result in being early to market with a new offering | <i>Trusted Advice</i> - interaction with the open, transparent and collaborative OGC process results in neutral, trusted, advice from international experts, which helps inform investment decisions for new and existing capabilities | <i>Innovation Funding</i> - For members who successfully respond to a call for innovation initiative, offset funding may be available. |
| Brand Exposure - for start- ups and small and medium enterprises, OGC is a cost effective way to find potential new clients. For established or larger companies, participation affirms a leadership role. | International Partnerships - OGC's global reach provides an ideal environment for Government to Government collaborative discussions | International Collaboration - Networking the world's leading Universities and Research organizations fosters a barrier free environment for knowledge transfer and partnership development |
| <i>Funding</i> - For members who successfully respond to a call for participation in an innovation initiative, offset funding may be available. | <i>Certification</i> - By requiring vendors to supply certified products, gain confidence that a product will work with other certified vendor products. | <i>Citations</i> Academic contributors to Standards and the Innovation process have the option for work completed and voted on by the OGC community (i.e. peer reviewed), to provide citations in follow on academic work. |

Connecting the Community – Sample Members



leidos

LUCIAD

Rockwell Collins

Building trust every

S LIZARDTECH

CubeWerx

Full List : http://www.opengeospatial.org/ogc/members

Example Government Members

Asia

- DOD Australia
- Geoscience Australia
- Dept. Science and Technology (India)
- Land Information New Zealand
- Europe
 - Eurocontrol
 - European Satellite Centre
 - European Space Agency
 - EU Joint Research Centre
 - Frontex
 - UK MOD
 - UK MET Office
 - METEO France
 - Ordnance Survey
 - German Aerospace Centre

Harmonisation – Example Partners



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Making location count

OGC's Approach for Advancing Innovation





OGC Tech Trends Mindmap



Publicly Available at: https://github.com/opengeospatial/OGC-Technology-Trends



Trend Characterizations – 2019Q2

- Digital Twin: Static and Dynamic
- Web of Data (Linked Data, Property Graphs)
- Machine Learning
- High Definition maps for Autonomous Vehicles
- Data Science and Analytics
- Immersive Geo: AR, VR, MR
- Quantum Computing and Sensing
- Smallsats and ground stations



Connecting the Community

- Hydrology
- Meteorology
- Oceanography
- Aviation
- Energy and Utilities
- Emergency & Disaster
- Defense &
 Intelligence
- Earth Systems Science
- Security
- Data Quality
- Big Data



- 3D Information Mgt
- Smart Cities and the Built Environment
- Public Safety & Law Enforcement
- Geosemantics
- Health
- Agriculture
- Urban Planning
- Land
 Administration
- Mobile Location
 Services
- Point Cloud

Impact – Built Environment



CESIUM ion 3DCityDB . © 2018 Chair of Geoinformatics, TU Munich Data attribution

3D Building Model Standards – UN HQ New York Open City Model, 125 Million buildings in 3D Using OGC Standards

https://github.com/opencitymodel/opencitymodel

At various Levels of Detail



https://www.gim-international.com/content/article/redefining-the-level-of-detailfor-3d-models



Smart, Safe, Resilient Communities



Open standards platform to integrate 2D and 3D+ location information, including indoor and sensor data to create the *Information Infrastructure*.

Spatial Information Themes

- Smart Cities are high-density generators of innovation and information
- Location information is a major enabler of Smart City technology benefits.

UNIVERSITY OF

- Benefits of smart technology must be judged by benefits to residents
- Reuse and repurpose is vital to urban resilience
- Open standards are needed for interoperability, efficiency, application innovation and cost effectiveness.



(Graphic from Steve Liang, University of Calgary)

Community Planning / Operations Interoperability Across spatial domains

- Geospatial,
- Civil Engineering &
- BIM

These domains are coming together – an opportunity to expand to other communities exists!



OGC CityGML for Urban Applications



Source: http://www1.nyc.gov/site/doitt/initiatives/3d-building.page



Source: Singapore Land Authority, and Geospatial Media

CityGML models for 3D visualization and analysis based on semantics

- Urban Planning / Operations
- Emergency Mgt / Response
- Transportation / Routing / Logistics
- Indoor navigation
- Retail Site analysis
- Sustainable / Green Communities
- City Services Management
- Noise abatement
- Telecommunications placement
- Many other uses...

Interoperability Services for Smart Cities

Geospatial Data - OGC Web Service Standards

 Integrate and share all types of geospatial and remote sensing data about a city

Sensor feeds - Sensor Web Enablement Standards

 Discover, Task, Access and Process Observations from all types of sensors

Leverage Social Media / Crowdsourcing

- Geo-enabled Social Media
- SensorThings for Internet of Things

Support Analysis and Processing

- Model city processes
- 3D Visualization and Augmented Reality
- Open Data and Mobile Applications



OGC Smart Cities Spatial Information Framework

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https://portal.opengeospatial.org/files/?artifact_id=61188

The Next Frontier

Indoor Location and Navigation

- OGC IndoorGML standard is a major step in addressing indoor navigation
- Additional focus on 3D streaming, Augmented Reality
- Underground Infrastructure is a major focus now
 - Understanding and addressing Smart City challenges is not complete without a detailed understanding of infrastructure below ground.
 - Establishing standards-based Underground Infrastructure Information (UGII) will complement CityGML and IndoorGML
 - Huge cost efficiencies will be achievable



Source: Alattas, Zlatanova, Van Oosterom, Chatzinikolaou, Lemmen and Li, <u>http://www.mdpi.com/2220-9964/6/12/384/pdf</u>, CC 4.0



<u>"Nobody Knows What Lies Beneath</u> <u>New York City" Greg Milner</u> <u>Bloomberg Businessweek, 8.10.17</u>

Indoor Mapping and Navigation Pilot

- Sponsored by the Public Safety Communications Research Division of NIST,
- Advance solutions to complex geospatial challenges related to indoor mapping and navigation for first responders.
- Use standardized, open GIS frameworks, data models, and data exchange formats (e.g. CityGML, IndoorGML, Web Processing Service, Web Feature Service, etc.)
- Address the real-time, event-driven aspects of indoor mapping and navigation for first responders.





Smart City Interoperable Reference Architecture (SCIRA)

- "Integrate commercial proprietary IoT sensors for public safety applications at the community level"
- Concept Development Study (2018)
 - Smart City Architecture Landscape Assessment
 - Stakeholder Requirements Validation
 - Smart City Architecture Design and Development
 - Smart City Architecture Hackathon
 - Smart City Deployment Guidance
- Pilot (Nov 2018 to April 2019)
 - Architecture Comparative Analysis & Pilot
 - Sponsored by US Dep't of Homeland Security



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

Underground Information (UGI) Initiatives

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

- OGC UGI Concept Study completed 2017
 - Sponsors Fund for NY City, Ordance Survey UK, Singapore Land Authority
 http://docs.opengeospatial.org/per/17-048.html
- UGI Data Model under development
 - Necessary foundation for the Pilot
- OGC Pilot Implementation planned
- Develop, Test and Demonstrate a common standards based approaches
 - Provide basis for city procurements
 - Call for Sponsors announced



Source: Singapore Land Authority

Virtual Singapore



https://www.smartnation.sg/what-is-smart-nation/initiatives/Urban-Living/virtual-singapore

High Density, Vertical (extra Challenges – where does one propery start stop, where is the "ground" floor)



Figure 1. The project in a nutshell: from native BIM (Building Information Model) to the integration of CityGML models in Virtual Singapore.

Rudi Stouffs *, ‡, Helga Tauscher ‡ and Filip Biljecki ‡ Department of Architecture, School of Design and Environment, National University of Singapore, Singapore 117566, Proceedings of the 36th eCAADe conference; Lodz, Poland, September 2018. ‡ All authors contributed equally to this work. Received: 31 May 2018; Accepted: 20 August 2018; Published: 27 August 2018 , https://www.mdpi.com/2220-9964/7/9/355/pdf



OGC and CRN – Possible Collaboration



Challenge Characterization

Residential Real Estate – Largest Asset Class in USA Limited findable, accessible , Interoperable and Reusable source of appraisal and other information

Possible Collaboration

Use of OGC Standards for; 3D Building Models Indoor Mapping/Measurement Standards in use globally

Use of existing OGC Registry for;

Building Footprint and location Linked to appraisal and other data Registry in use globally (e.g. Oil and Gas) OGC's Next TC Meeting: 2-6 March, Hong Kong #OGC20HK

OGC at a Glance

OGC at a Glance

25+ Years of Hard , Not- For-Profit Work 520+ International Members Well Balanced by Sector 110+ Member Meetings 12+ Regional and Country Forums 120+ Innovation Initiatives 60+ Alliance and Liaison Partners 65 + Adopted Standards 45+ Application Domain Working Groups 50+ Standards Working Groups 300+ Certified Product Implementations 990,000 + Operational Services based on OGC Web Service Standards

OGC - Making Location Count

Thanks! Questions ?

OGC – Making Location Count - Together

Information on;

Membership http://www.opengeospatial.org/ogc/join Innovation Program http://www.opengeospatial.org/ogc/programs/ip Standards Program http://www.opengeospatial.org/standards Compliance Program http://www.opengeospatial.org/compliance

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