Open Standards for GeoSpatial and BIM Data, How are They Developed and What is Their Role in Building and Operating Built Environment

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BIM Ambassador
Geospatial and semantic 3D

- Geospatial community getting aware of 3D technology
  - Cadastre, terrain, design, Smart Cities
- New standards developed by OGC, CityGML, IndoorGML, InfraGML, KML (Google Earth format), 3D services in collaboration with web3D (webGL, X3D)
- New Urban Planning Domain Working Group in OGC
BIM for Infrastructures
Semantic data on the Web

Google Knowledge Graph

Facebook Open Graph

W3C Linking open-data community project

Web of Data
(open, standard, structured decentralized)
**Big data** is an evolving term that describes any voluminous amount of structured, semi-structured and unstructured data that has the potential to be mined for information.
Big Data: 3Vs
Volume, Variety, Velocity

Big Data: Expanding on 3 fronts at an increasing rate.
The Internet of Things (IoT) is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS) and the Internet.
Standardization organization types

• “Formal” standardization organizations
  • General national standards bodies, ANSI, DIN, SFS, SIS
    Members of ISO International Organization for Standardization and CEN
  • IEEE Institute of Electrical and Electronics Engineers
    IEEE standards affect a wide range of industries including: power and energy, biomedical and healthcare, Information Technology (IT), telecommunications, transportation, nanotechnology, information assurance, and many more. In 2013, IEEE had over 900 active standards, with over 500 standards under development.
  • IEC International Electrotechnical Commission
  • ITU, ETSI telecomm standards
Standardization organization types

• “Independent” standardization organizations owned by members with no formal position
  • W3C Word Wide Web Consortium, web standards, XML, HTML…
  • OGC Open Geospatial Consortium, GeoSpatial standards, GML…
  • IETF Internet Engineering Task Force, internet Standards, TCP/IP
  • buildingSMART information related standards for construction and built environment
Standardisation vs. Standards

OGC®  W3C®

bSI

ISO  CEN

National Standards
The Open Geospatial Consortium

Not-for-profit, international voluntary consensus standards organization; leading development of geospatial standards

- 480+ members and growing
- 38 standards
- Hundreds of product implementations
- Broad user community implementation worldwide
- Alliances and collaborative activities with ISO and many other SDO’s
OGC at a Glance

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What most people think about standards work!
Or How Many Others View Standards

1. How did the industry standards meeting go?
2. Did you convince 83 companies to adopt standards that benefit only us while dooming the entire industry in the long run?
3. Or are you a complete failure?
4. Can I hear those choices again?
Standards Development is not easy!

• Requires collaboration on a global basis

• Requires consensus by many organizations

• Requires give and take

• Requires certified, repeatable process
3D and CityGML

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CityGML

• Application independent Geospatial Information Model for virtual 3D city and landscape models
  • comprises different thematic areas (buildings, vegetation, water, terrain, traffic etc.)
  • data model (UML) according to ISO 191xx standard family
  • exchange format results from rule-based mapping of the UML diagrams to a GML3 application schema
  • ongoing standardisation process in OGC

• CityGML represents
  • 3D geometry, 3D topology, semantics and appearance
  • In 5 discrete scales (Levels of Detail, LOD)
Indoor location/navigation

Integrated indoor/outdoor navigation using OGC CityGML, WMS
InfraGML

- use case driven subset of LandXML functionality
- interoperability standard vs. negotiable template
- SDO support
- avoid possible legal issues
- enables OGC baseline consistency
- GML provides:
  - feature model
  - geometry support
  - coordinate reference systems
  - linear referencing
  - TIN support
  - compatibility with CityGML, TransXML
The ISO/TC 211
Geographic information/Geomatics
(2012-11)

• … building the foundation of the geospatial infrastructure, brick by brick ...
Introduction: buildingSMART today

A world wide Alliance driving the transformation of the built environment through creation & adoption of open, international standards.

Values
Open
Neutral
International
Non Profit

Goals
Create openBIM standards
Host open BIM forums
Certify software & people
Become a trusted resource
Promote active use

Standards Focus
Data
Processes
Dictionaries
BIM Standards

History
1995 Established
2000 IFC2 Release
2012 IFC4 Release
2013 First ISO Standards
ISO/TC 59 Buildings and civil engineering works

Scope:

Standardization in the field of buildings and civil engineering works
organization of information in the processes of design, manufacture and construction

general geometric requirements for buildings, building elements and components including modular coordination and its basic principles, general rules for joints, tolerances and fits;
general rules for other performance requirements, including functional and user requirements related to service life, sustainability, accessibility and usability;
general rules and guidelines for addressing the economic, environmental and social impacts and aspects related to sustainable development;
geometric and performance requirements for components that are not in the scope of separate ISO technical committees;
procurement processes, methods and procedures.
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 practice reusable in any Smart City

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Location Services for Smart Cities

- Citizen Services
  - Location-aware municipal services using open data and standards
- Energy and Utilities management
  - Smart Energy
  - Smart Water Management
- Disaster and Emergency Response
  - Common Operational Picture
- Urban Maps
  - 3D City Models
  - Indoor Venue Maps
  - Interoperability with BIM
- Sensor Webs
  - Situational awareness from fusion of sensor observations

Source: Thomas Kolbe, Berlin TU
Summary

• Integration of GeoSpatial and BIM should be implemented through “Multi-Kernel” approach

• Softwares implement the standards they need information from to the extent they need, not full implementations
Thank you