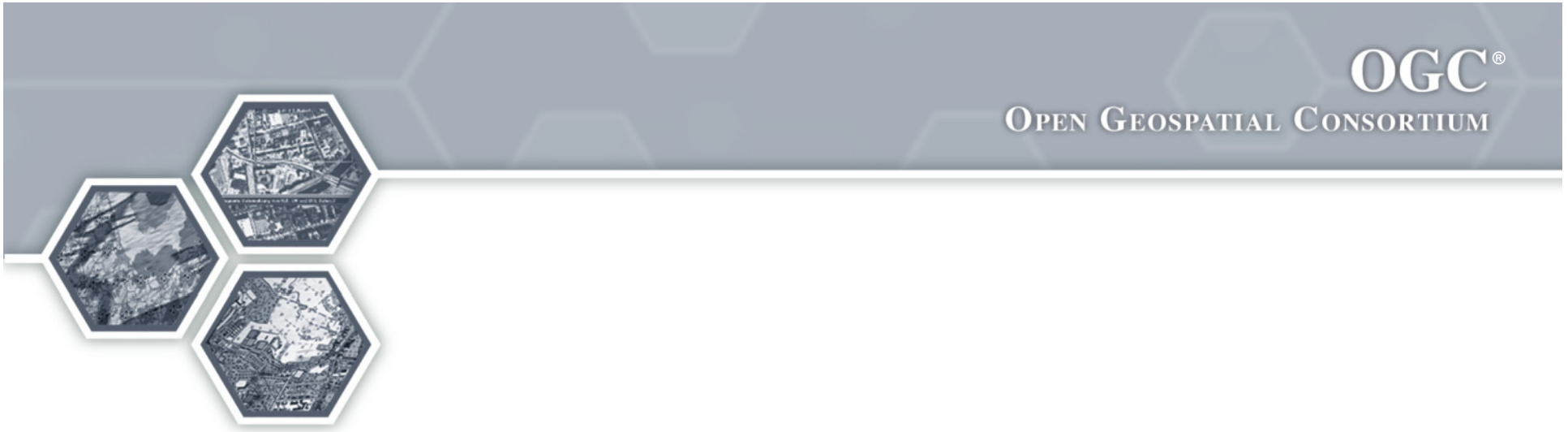

OGC 3D Portrayal Interoperability Experiment, OGC 3D Summit 2011

SIGGRAPH 2011

7–11 August 2011, Vancouver

Don Brutzman, Benjamin Hagedorn

The OGC: Making Location Count

What is the Open Geospatial Consortium?

- A non-profit, international voluntary consensus standards organization that is leading the development of standards for geospatial services that support interoperable solutions that "geo-enable" the Web, wireless and location-based services and mainstream IT.
- Facilitates a consensus process in which Members from currently 424 organizations collaborate to define and maintain OGC standards.
- 35 Adopted standards.

http://www.opengeospatial.org

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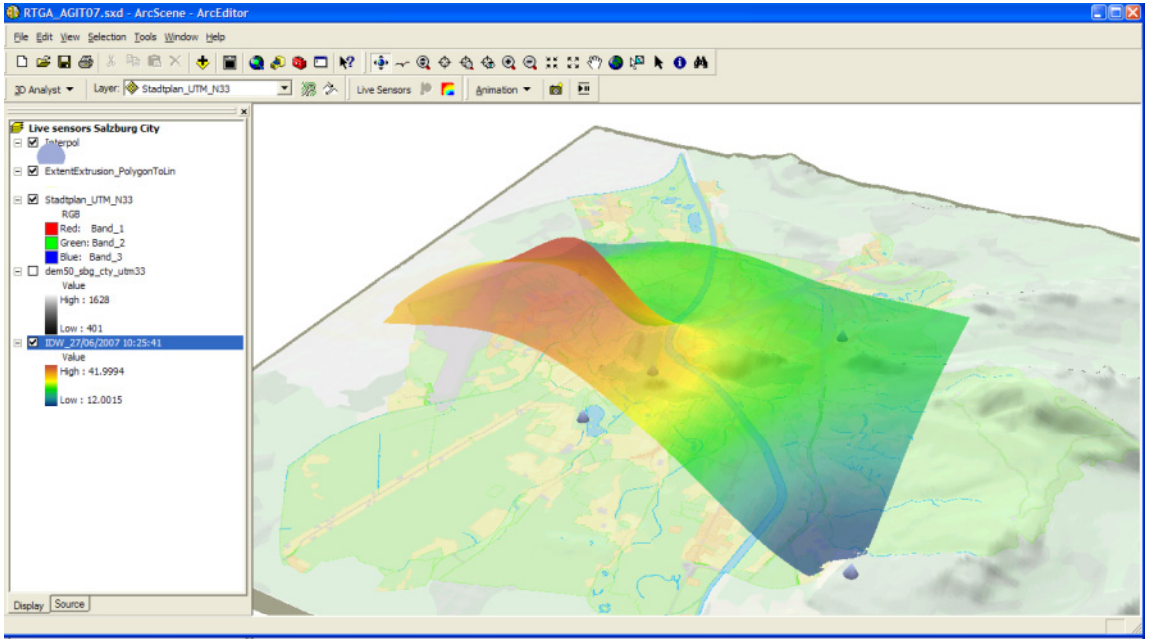
The OGC Vision

- Achieve the full societal, economic and scientific benefits of integrating location resources into commercial and institutional processes worldwide



2010 - Live Geography – Interoperable Sensor Webs Enabling Portability in Monitoring Applications - Interpolation of Temperature Values for the Detection of Urban Heat Islands

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OGC Mission

- To serve as a global forum for the ***development, promotion and harmonization of open and freely available geospatial standards …***

Urban Model of Berlin based on OGC CityGML
Source: www.3d-stadtmodell-berlin.de

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OGC Domain Working Groups (Aug-8-11)

Name	Lead **
3DIM DWG (3DIM DWG)	Scott Simmons, CACI International Inc.
Architecture DWG (Arch DWG)	Doug Nebert, US Geological Survey (USGS)
Aviation DWG (Aviation DWG)	Navin Vembar, FAA System Operations Airspace and AIM Office
Catalog DWG (Cat DWG)	Doug Nebert, US Geological Survey (USGS)
Coordinate Reference System DWG (CRS DWG)	Victor Minor, Blue Marble Geographics
Coverages DWG (Cover DWG)	Peter Baumann, FORWISS (Bavarian Research Centre for Knowledge-Based Systems)
Data Preservation DWG (PreservDWG)	Steve Morris, North Carolina State University
Data Quality DWG (DQ DWG)	Matt Beare, 1Spatial Group Ltd.
Decision Support DWG (DS DWG)	Stan Tillman, Intergraph Corporation
Defense and Intelligence DWG (D and I DWG)	Lucio Colaiacomo, European Union Satellite Centre
Earth Systems Science DWG (ESS WG)	Phillip Dibner, Ecosystem Research
Emergency & Disaster Management DWG (EDM DWG)	Lewis Leinenweber, Evolution Technologies, Inc.
Geo Rights Management (GeoRM) DWG (GeoRM DWG)	Roland Wagner, BHT-Berlin (Beuth Hochschule für Technik Berlin)
Geography Markup Language (GML) DWG (GML DWG)	Ron Lake, Galdos Systems Inc.
Geometry DWG (GeometryDWG)	John Herring, Oracle USA
Geosemantics DWG (Semantics)	Joshua Lieberman, Deloitte Financial Advisory Services, LLP
Hydrology DWG (Hydrology DWG)	David Lemon, CSIRO
Location Services DWG (LS DWG)	Marwa Mabrouk, Esri
Mass Market DWG (MassMarket DWG)	Ed Parsons, Google
Metadata DWG (Metadata DWG)	David Danko, Esri
Meteorology & Oceanography DWG (Met Ocean DWG)	Chris Little, UK Met Office
Oblique Imagery DWG (ObliqueImageryD)	Shayne Urbanowski, Lockheed Martin
Security DWG (SecurityDWG)	Andreas Matheus, University of the Bundeswehr - ITIS
Sensor Web Enablement DWG (SensorWeb DWG)	Mike Botts, Botts Innovative Research
University DWG (Univ DWG)	Chris Higgins, Open Grid Forum
Web Feature Service DWG (WFS DWG)	Martin Daly, cadcorp (Computer Aided Development Corp.) Ltd.
Workflow DWG (Workflow DWG)	Stan Tillman, Intergraph Corporation
** - There may be Co-Chairs or Vice-Chairs that are not listed in this table	

An interest or focus in 3D content modeling, sharing, and integration/fusion

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3D Information Management (3DIM) DWG

- **Background:** “A great deal of technical innovation has been accomplished in the areas of CAD, AEC, geospatial, 3D visualization, and urban simulation. A variety of products, information and services abound in each of these environments. A framework of data interoperability should exist across the lifecycle of building and infrastructure investment: planning, design, construction, operation, and decommissioning. This work is of interest to the geospatial community in that there is a growing need for technologies and information to effectively interoperate between these domains to support a range of vital services and decision support needs. The working group was formed in 2005 to identify and act on opportunities to improve interoperability of geospatial data and services across these domains.”

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3DIM DWG - Overview

- 3DIM History
  - Formed in 2005 as the CAD/GIS Working Group
  - Changed name to 3D Information Management Domain Working Group in 2007 to better reflect the diversity of work in the group
  - Initiated CityGML Standards Working Group in 2007
  - Initiated Oblique Imagery Domain Working Group in 2009
  - 3D Portrayal Interoperability Experiment started in May 2011
  - IndoorGML Standardization in preparation
- Activities
  - Devise/Initiate architecture for open interoperable 3D services
  - Advance Discussion Papers and Best Practices
  - Participate in Testbeds
  - Build on industry partnerships

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3DIM DWG - Relationships

- buildingSMART alliance (MoU)
  - Development of IFC, the major, open standard for Building Information Modeling (BIM)
  - AECOO-1 Testbed: Discussion Paper released
  - BIM-GIS Information Exchange Project
- Special Interest Group 3D (MoU)
  - German organization responsible for initial CityGML format
  - MoU signed
- W3 Point of Interest Working Group
  - Mission is to develop a technical spec for the representation of "Points of Interest" information on the Web
- **Web 3D Consortium (MoU)**
  - **X3D: ISO Graphics Standard for 3D on the Web**

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OGC-Web3D Consortium MoU

Memorandum of Understanding since December 2006:

Mark Reichardt, President of the OGC explained, “[…] This agreement will enable OGC and Web3D to work more cooperatively on the development and promotion of standards for improved application of web-based, location enabled 3D visualization, modeling and simulation".

Among the many benefits that will derive from this collaboration will be improved standards-based, location enabled 3D web services to support urban planning; architecture, engineering and construction; climate prediction, homeland security, emergency management, defense and intelligence, and other capabilities.

Alan Hudson, President of Web 3D, noted that "The OGC and the Web3D Consortium envision the synthesis of 2D maps with content-rich 3D immersive worlds. To that end, we believe the incorporation of interactive, internet based 3D graphics is the next logical step that will benefit users with a richer, more meaningful geospatial experience.“

http://www.opengeospatial.org/pressroom/pressreleases/650

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OGC-Web3D Consortium MoU

- Develop and coordinate the production of appropriate joint outreach and marketing materials
- Develop and publicly publish exemplar hybrid content, which demonstrates the practical feasibility and effective value of using Web3D and OGC standards in concert
- Keep OGC and Web3D working groups informed about on-going technical progress and standards development strategies, in order to maximize interoperability and comparability between technology sets

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OGC 3D Standards

- OGC Geography Markup Language
  - XML-based language for encoding geographic information to be stored and transported over the Internet
  - Defines both the 2D and 3D geometry and properties of objects that comprise geographic information.
- CityGML
  - Application independent Geospatial Information Model for virtual 3D city models and 3D landscape models
  - Comprises different thematic areas(buildings, vegetation, water, terrain, traffic etc.)
- KML Encoding Standard
  - XML for geographic visualization on 2D and 3D Earth browsers
  - Features for display: placemarks, images, polygons, 3D models, text, etc.

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3D Portrayal Services

Missing Link

- Proprietary 3D portrayal solutions available for Perspective Street Views, Virtual Globes (commercial and open source)
- However, extensibility and interoperability are limited and projects (e.g. 3D City Models) depend on the business model of existing platforms
- By opening the 3D portrayal interfaces it becomes possible to exchange servers and clients in a flexible way
- 3D visualization systems have different requirements than full desktop GIS
- **➔ We need a "Map Server for 3D"**

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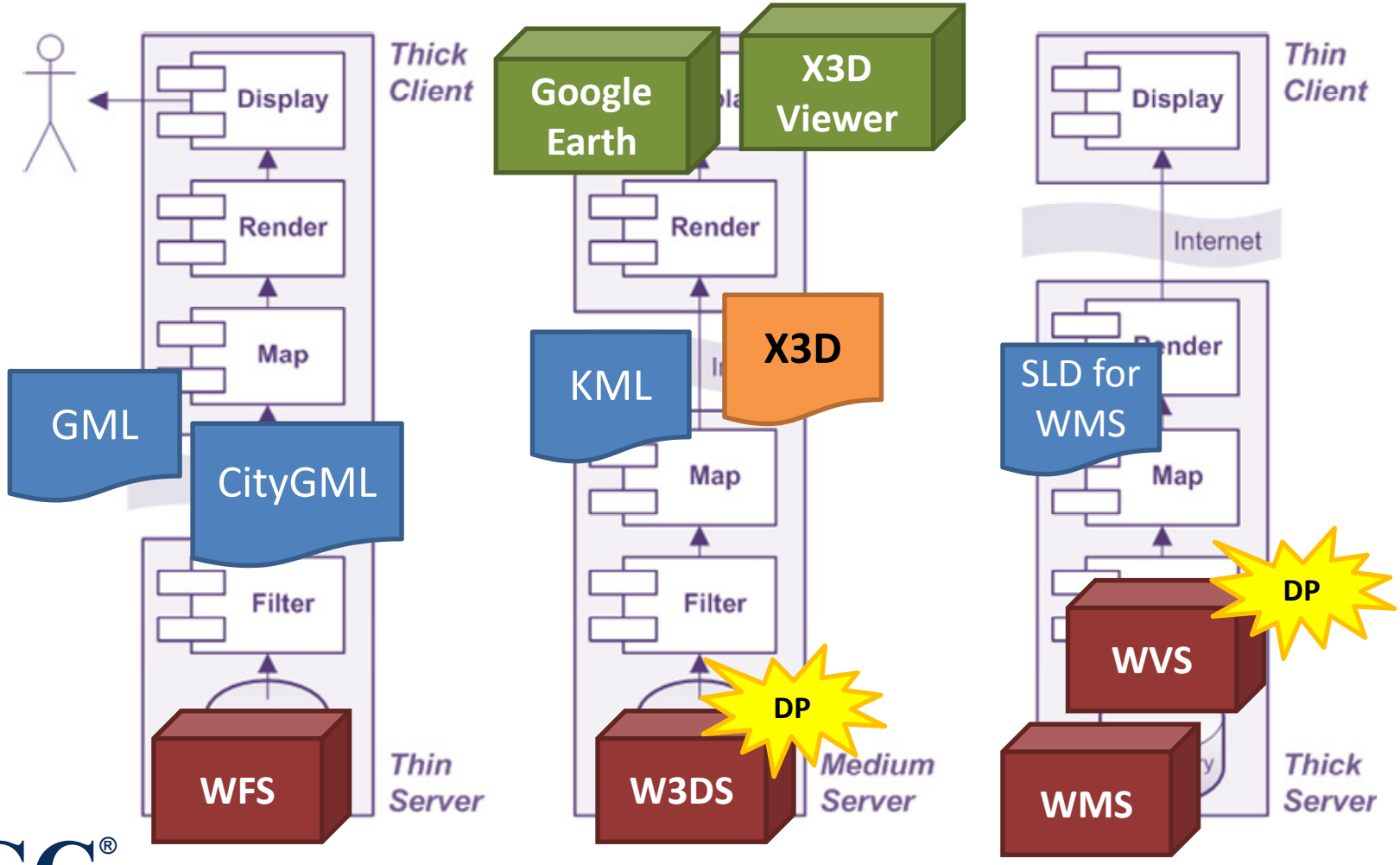
3D Portrayal Services

- Separation of rendering concerns; examples of services and formats:



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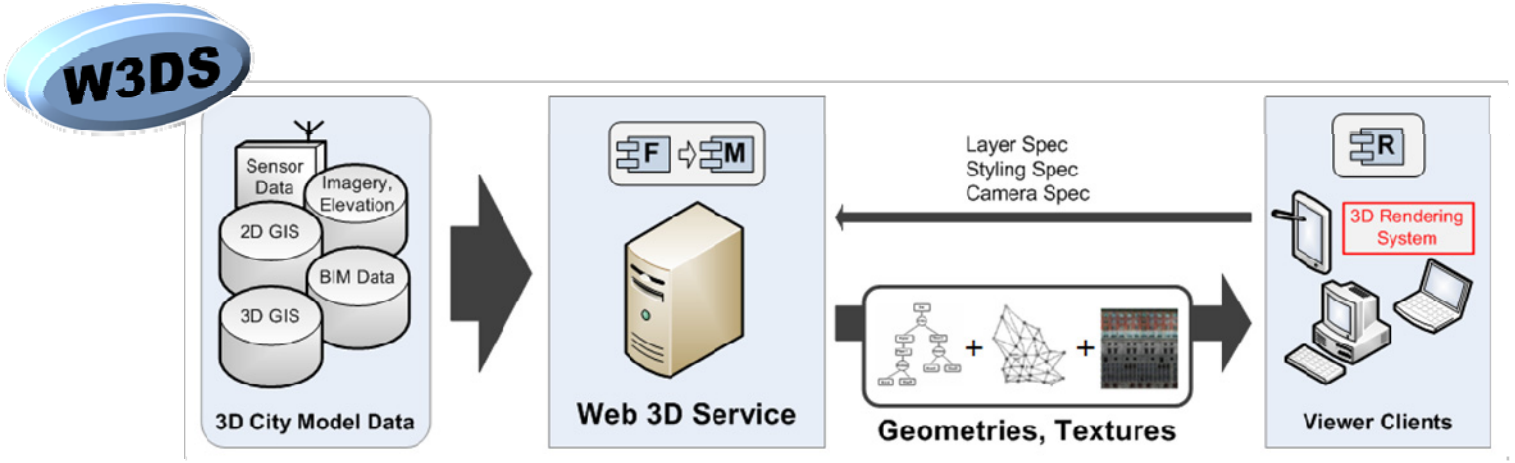
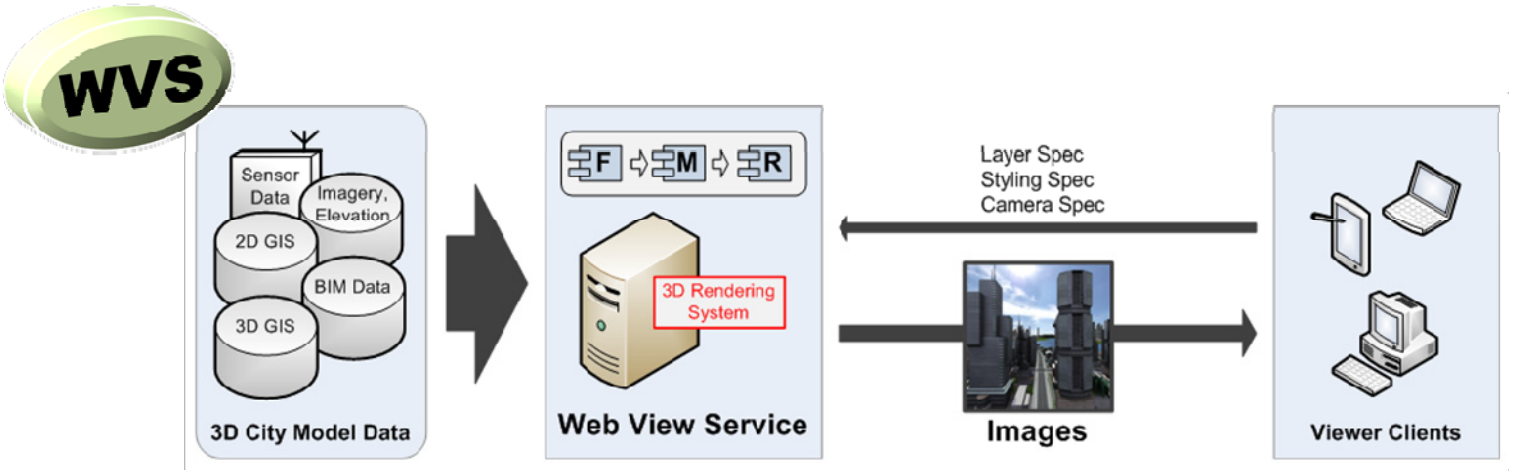
OGC Candidate 3D Standards

- **Web 3D Service and Web View Service**





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OGC Candidate Standard: Web 3D Service

- **Web-based, Graphics-Based Provision of and Access to Virtual 3D Worlds**
  - Geodata is delivered as scenes that are comprised of display elements, optimized for efficient real time rendering at high frame rates.
  - It can be used for web applications and datasets that are too big for being stored in single files.
  - Streaming allows effective fly-throughs
  - All features supported by web 3D standards (VRML, X3D, COLLADA, KML) can be exploited

www.w3ds.org

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OGC Candidate Standard: Web View Service

- **Web-based, Image-Based Provision of and Access to Virtual 3D Worlds**
  - Server-side model management and 3D rendering
  - Generation of images of views on the 3D model and transfer to viewer clients
  - Provides visual, thematic, and geometric information as images
  - Reduces data complexity and rendering complexity for clients
  - WVS is a 3D equivalent of 2D map services

www.webviewservice.org

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3D Portrayal Interoperability Experiment

- **Main focus on Web 3D Service and Web View Service**
- 3DPIE tests server-side issues and client-server interaction to test the interoperability along the visualization pipeline:
  - Advance and harmonize developments of Web 3D Service (W3DS) and Web View Service (WVS) candidate standards.
  - Test the applicability of W3DS-based and WVS-based 3D portrayal approaches for different client platforms, including thick clients, web-based clients, and mobile clients.
  - Test the compatibility of 3D portrayal based on W3DS and WVS with standards-based data formats, including, e.g., CityGML.
  - Lower the barriers for the implementation, integration, and usage of 3D portrayal capabilities.

http://www.opengeospatial.org/projects/initiatives/3dpie

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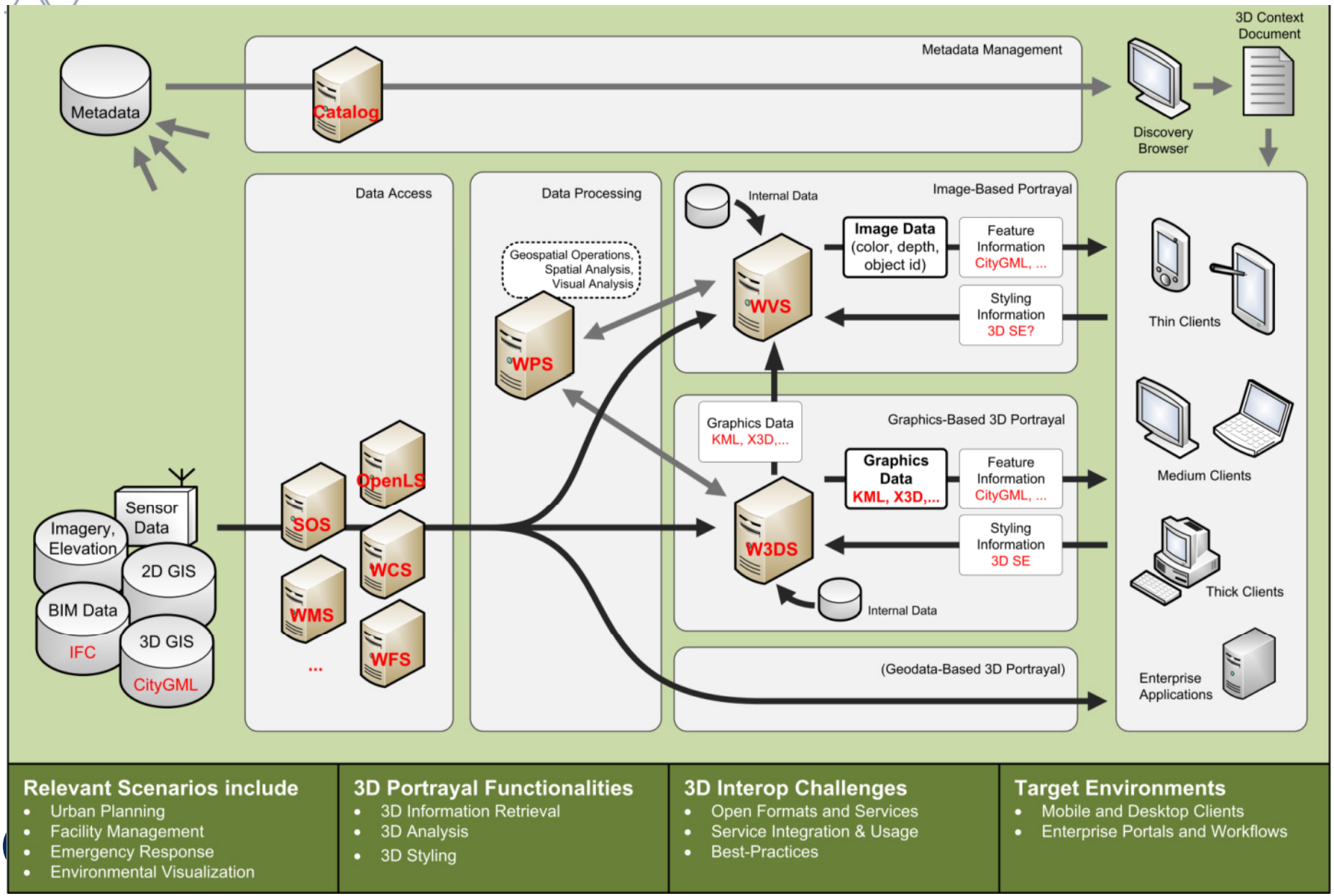
3DPIE – Context



3DPIE – Questions to Answer

- Can the draft service candidates of WVS and W3DS adequately support the web-based management, portrayal, and exploration of environmental and urban 3D geodata?
- Can the W3DS and WVS specifications be further harmonized to provide a more common interface to 3D portrayal capabilities and to support their potential integration and combination?
- What are best practices for the application of the various 3D portrayal approaches, including graphics-based 3D portrayal (e.g., through W3DS) and image-based 3D portrayal (e.g., through WVS)?
- What are best practices for the application of the various 3D geodata formats and 3D graphics data formats including CityGML, X3D, KML, COLLADA, and others?
- How to exploit W3DS and WVS from various client platforms, including thin-clients, web-based clients, and mobile clients?

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3DPIE – Role of X3D

- Test and demonstration of X3D‘s role and capabilities within an interoperable 3D portrayal pipeline to deliver massive real-world geospatial data to various clients
- Test and demonstration of X3D as a major output format of the Web 3D Service and as a means for the interoperable integration of 3D content
- Test and demonstration of the plugability of systems that deliver or consume X3D
- Test, demonstration and discussion of recent X3D developments in the context of 3D portrayal services
- Identification of challenges for future X3D developments and future OGC/Web3D collaborations

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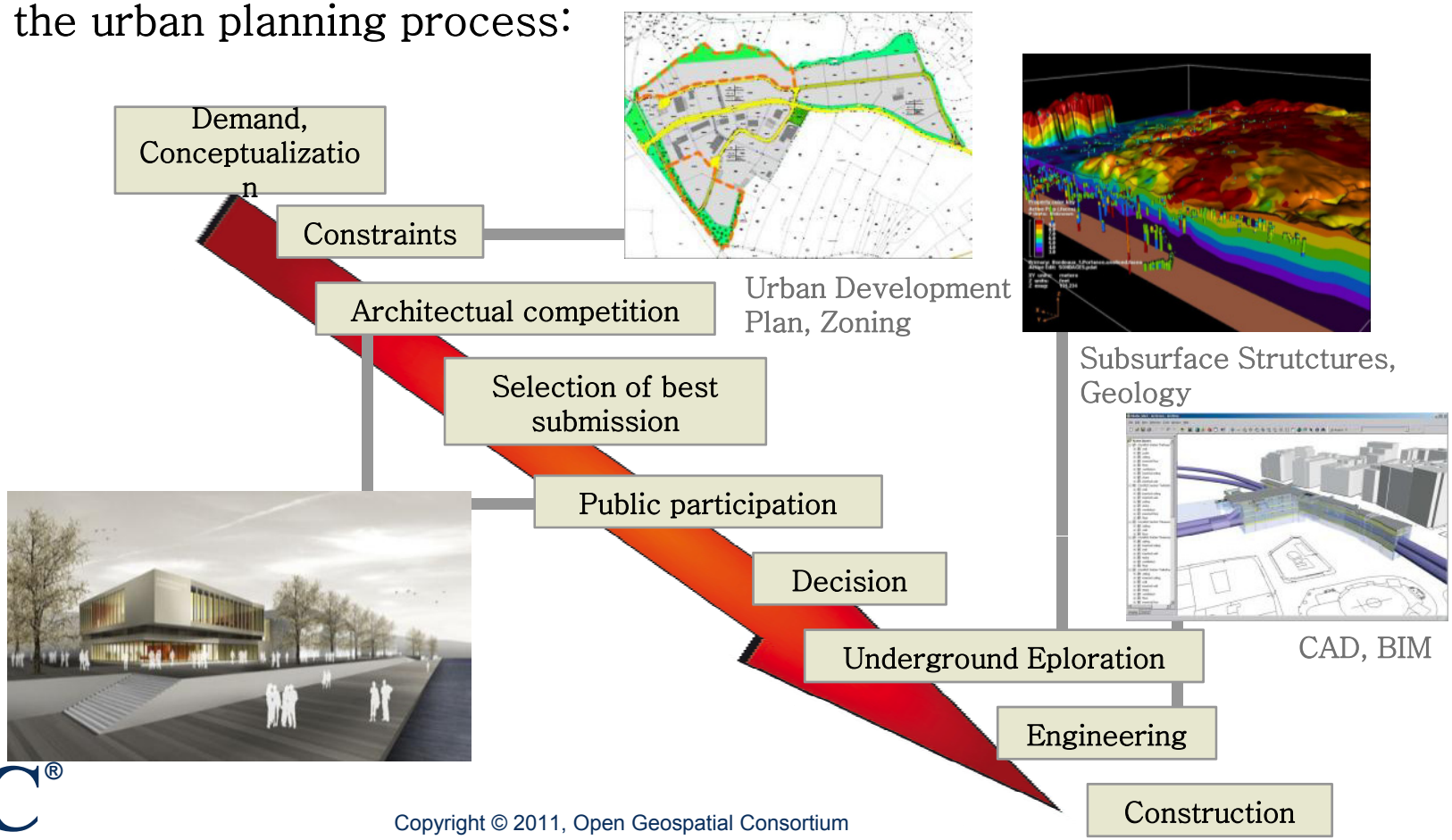
3DPIE – Use Case

- „Urban Planning“ as a major Use Case

Examples of using 3D portrayal
within the urban planning process:



3DPIE – Participants

- Participants (including 3 Web 3D Cons. members)
  - Bitmanagement
  - CACI
  - Fraunhofer IGD
  - GIScience at the University Heidelberg
  - Hasso-Plattner-Institut at the University Potsdam
  - IGG at Technical University Berlin
  - Institute Geographic Nationale (IGN)
  - LSIS at Aix-Marseille University
  - MOVES Institute at the Naval Post Graduate School
  - Virginia Tech
- Additionally, many OGC Members are observing the 3DPIE

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3DPIE – Workplan

- Work Item 1: Data Integration
  - Ex. #1A: Import raw data into W3DS
  - Ex. #1B: Import raw data into WVS
- Work Item 2: Service Integration
  - Ex. #2A: Integration of W3DS data in WVS client
  - Ex. #2B: Integration of WVS images in W3DS client
  - Ex. #3A: Seamless integration of multiple W3DS in a client
  - Ex. #3B: Overlay images from multiple WVS in a client
- Work Item 3: Service Delivery
  - Ex. #4A: Web-based portrayal through W3DS
  - Ex. #4B: Web-based portrayal through WVS
  - Ex. #5A: Mobile 3D graphics from W3DS
  - Ex. #5B: Mobile perspective images from WVS

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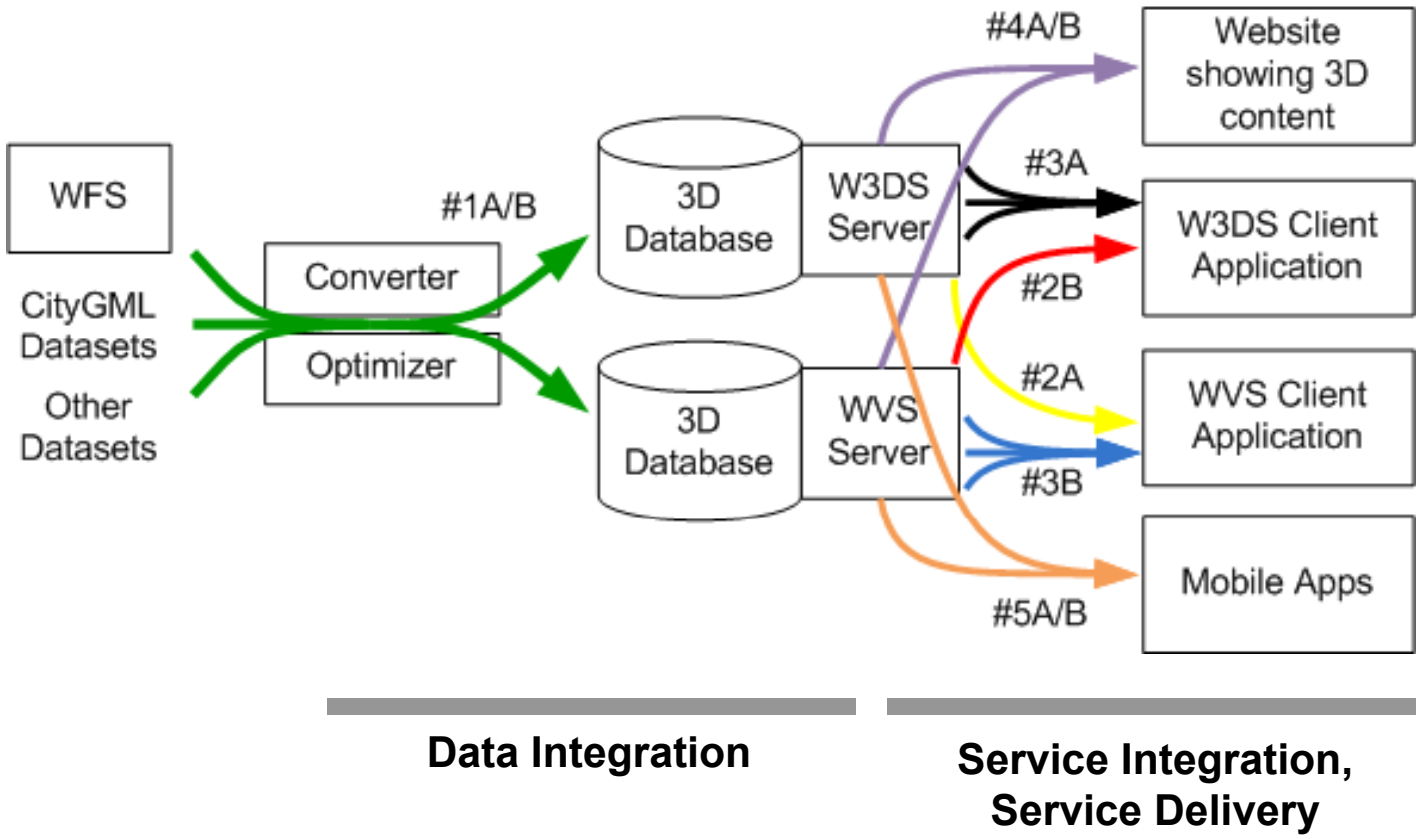
3DPIE – Architecture



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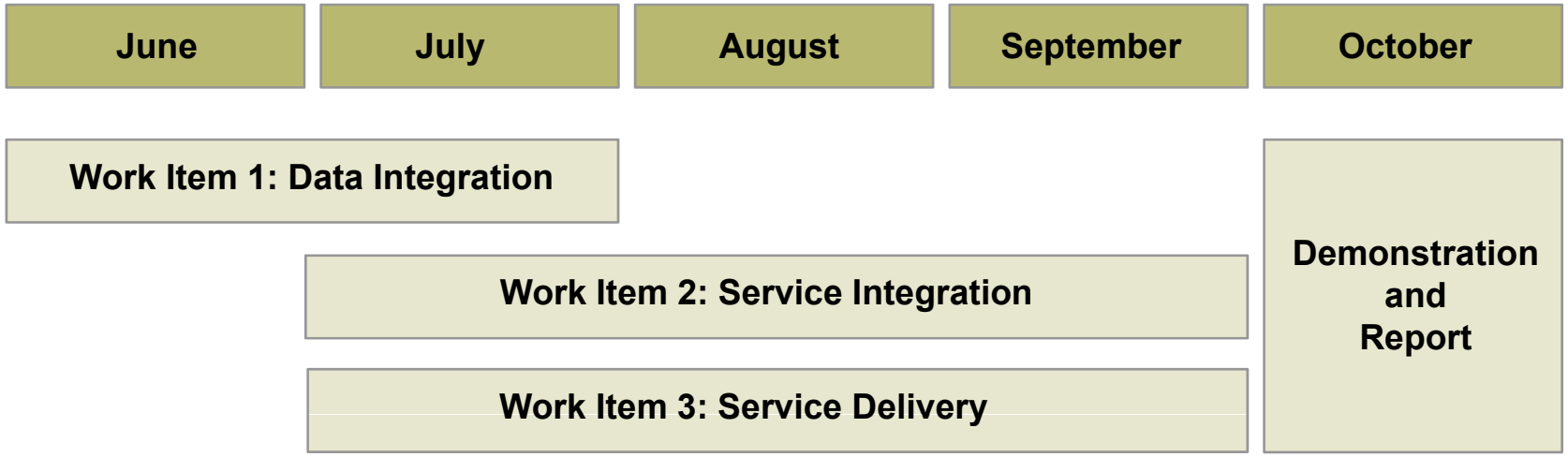
3DPIE – Schedule

- 3DPIE Schedule
  - Kickoff on 26 May 2011
  - Intended duration: 5 months



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Upcoming: 2nd OGC 3D Summit, 2011

- **Full-day Summit on Tuesday, September 20, 2011** in Boulder, Colorado in conjunction with the OGC Technical Committee Meeting
  - Focus is on the current impact and future opportunities for open standards to better enable 3D geospatial practices
  - Interactive discussions, lightning talks, and inspiring presentations
  - Hosted evening social will provide additional networking opportunity
- **Open Call for Presentations (Abstracts due: Aug 12):**
  - Lightning Talks: Technical innovation, best practices, case studies
  - Video Presentations: Up to 5 minutes showcasing latest innovations
- **You are welcome to join! Check it out:**

  http://www.opengeospatial.org/event/11093dim

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OGC 3DIM co-Vice-Chair
3D Portrayal IE Initiative Manager

OGC: http://www.opengeospatial.org

3DIM: http://www.opengeospatial.org/projects/groups/3dimwg

3DPIE: http://www.opengeospatial.org/projects/initiatives/3dpie

3D Summit: http://www.opengeospatial.org/event/11093dim

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