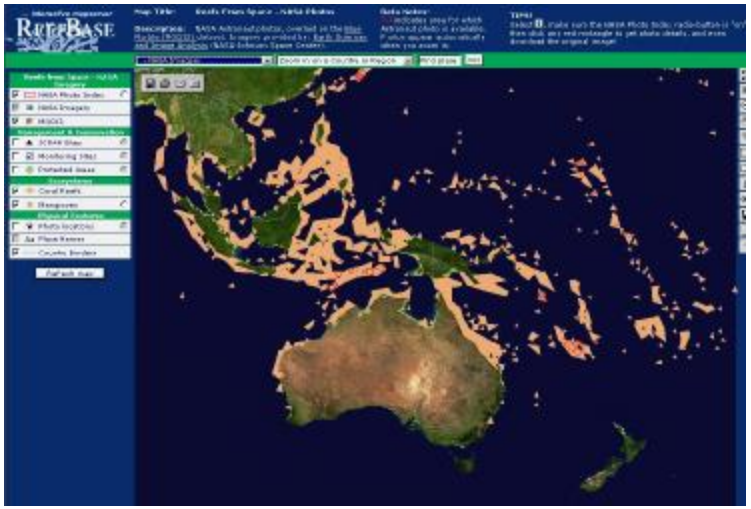
Innovative Testbed Processes An Approach To Improve and Accelerate Technology Industry Support to the Building Lifecycle and Urban Services

Mark E. Reichardt
President
Open Geospatial Consortium, Inc (OGC)
mreichardt@opengeospatial.org
+1 301 840-1361

Agenda

- **OGC Vision, Mission, and Goals**
- **Collaboration with other Standards Development Organizations**
- **Emphasis on Rapid Prototyping to Accelerate and Improve Quality of Standards**

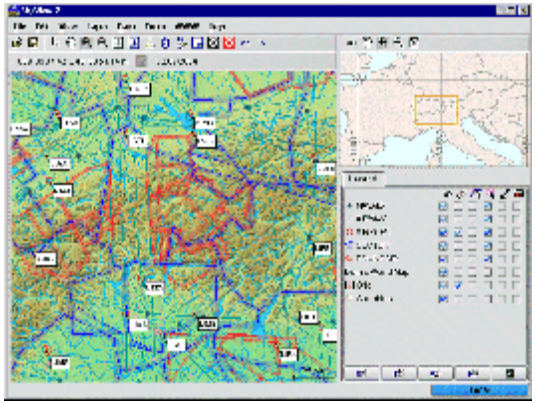


Global Reef Base
www.reefbase.org
http://reefgis.reefbase.org/mapper.asp

OGC®

The OGC Vision

- **To achieve the full societal, economic and scientific benefits of integrating electronic location resources into commercial and institutional processes worldwide.**



Aeronautical
SkyView2 uses multiple OGC Standards

China Ministry of Land and Resources

OGC®

The OGC Mission

To serve as a global forum for the collaboration of developers and users of geospatial content and services, and to advance the development of international standards for geospatial interoperability.

OGC CityGML Urban Model of Berlin

Source: www.3d-stadtmodell-berlin.de

OGC®

A Global Forum For Collaboration

OGC facilitates a common picture of reality for different organizations which have different views of that reality

OGC®

Example Members

- **Geospatial/AEC/CAD**: 1spatial, Analytical Graphics Inc., Autodesk, Bentley Systems, Blue Marble Geographics, Cadcorp, ESRI, e-spatial, Galdos, Intergraph, Ionic, Laser-Scan, MapInfo, NavisWorks, PCI Geomatics…
- **Infrastructure/Info. Services**: Oracle, Google, Microsoft, Shell Exploration…
- **Integrators / Engineering:** BAE Systems, Boeing, Design & Construction Strategies, EADS Astrium, Lockheed Martin, GeoDecisions, Raytheon, Northrop Grumman, Parsons Brinkerhoff, Mitre, Michael Baker, others…
- **Government:** Europe: JRC, EUSC, ESA, UK MOD; North America: DHS, EPA, Census, Geological Survey, Army Corps TEC, DISA, NGA, NASA, Natural Resources Canada, Oak Ridge National Labs; Australasia: Geosciences Australia; International: United Nations, NATO C3; and others at the national, provincial, state and local levels.
- **Academia/Research:** 100+ institutions worldwide
- **Sensors:** 3eTI, Smart Sensor Systems, IRIS Corp, Overwatch Systems…
- **Insurance: Allstate Planning & Research, FMGlobal**

OGC®

OGC Alliance Partnerships Are Critical To Success

- World Wide Web Consortium (W3C)
- Internet Engineering Task Force (IETF)
- Digital Geospatial Information Working Group (DGIWG)
- Global Spatial Data Infrastructure Association (GSDI)
- International Organization for Standards (ISO)
- OASIS
- Object Management Group (OMG)
- Open Mobile Alliance (OMA)
- Web3D
- Simulation Interoperability Standards Organization (SISO)
- International Alliance for Interoperability (IAI)
- IEEE GRSS
- IEEE Technical Committee 9 (Sensor Web)
- National Institute of Building Sciences (NIBS)
- Taxonomic Data Working Group (TDWG)
- Others

OGC®

OGC Status

- Solid framework of OGC standards available to the market
  - enable geospatial information and services to interoperate across systems and networks
  - Built out in hundreds of technology offerings around the world

- OGC members now addressing standards for
  - ***Sensors*** – integration of real time information from location based fixed and mobile sensors for enhanced decision making
  - ***Mass Market*** – standards for enhanced consumer use of location based information
  - ***AEC/BIM information*** – to satisfy a range of OGC member needs for detailed modeling, analysis and visualization related to safety, security, urban planning, logistics and transport, etc.
  - ***Digital Rights Management / Security*** – authentication, licensing, pricing

OGC®

OGC®
Open Geospatial Consortium

OGC Work Relevant to AEC / BIM

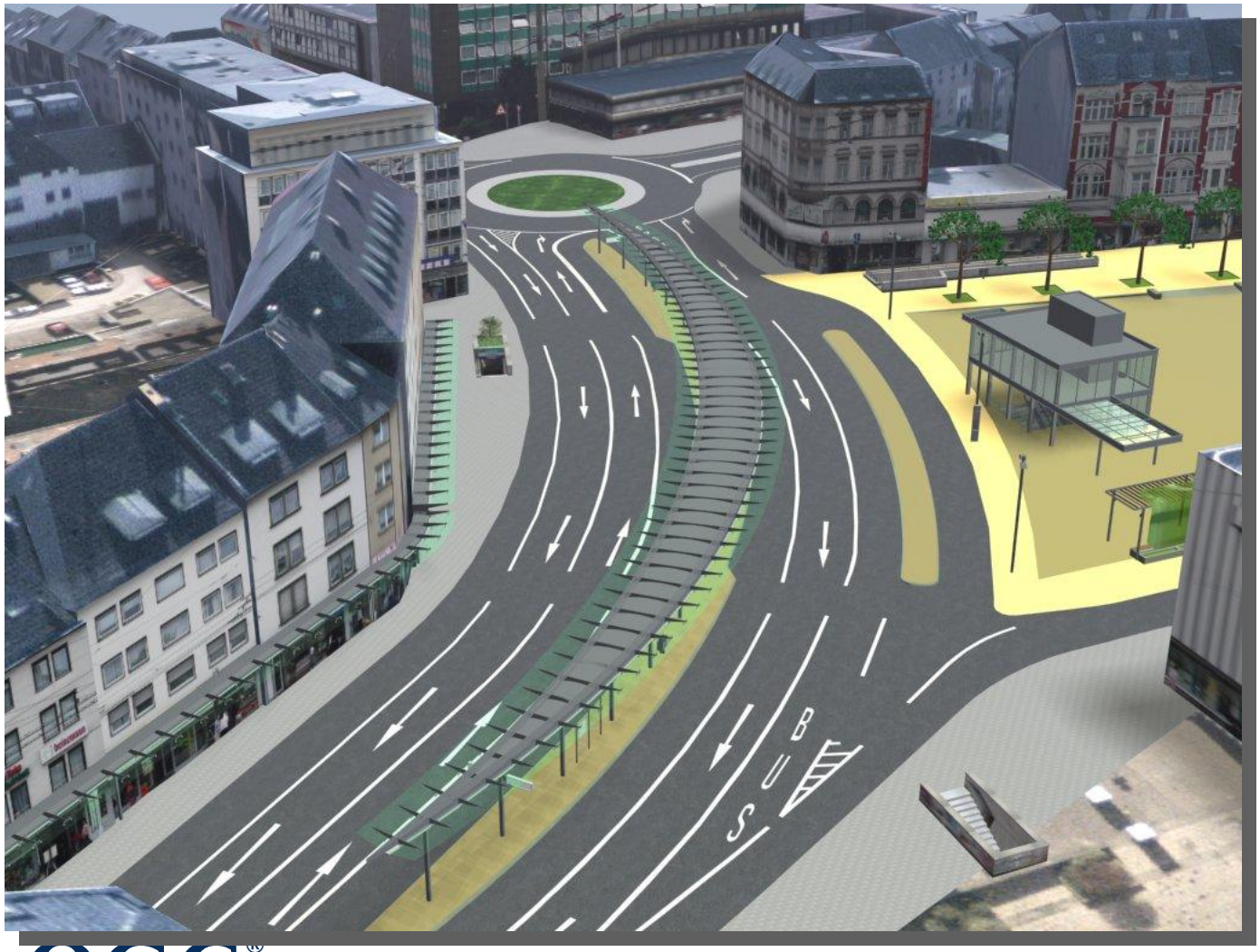
Summary of AEC focus in OGC

- ***3D Information Management WG*** – heavy focus on convergence of AEC and geospatial information and technologies
- Standards coordination agreements established with IAI International and the National Institute of Building Sciences
- OGC members develop CityGML to support creation, maintenance and visualization of 3D Urban Models
- OGC testbed features a “CAD/Geospatial/BIM” thread leveraging GSA space requirements to explore integration of AEC and geospatial as part of an EM/ER scenario.

OGC®

3D City Models (CityGML) – Multifunctional Use

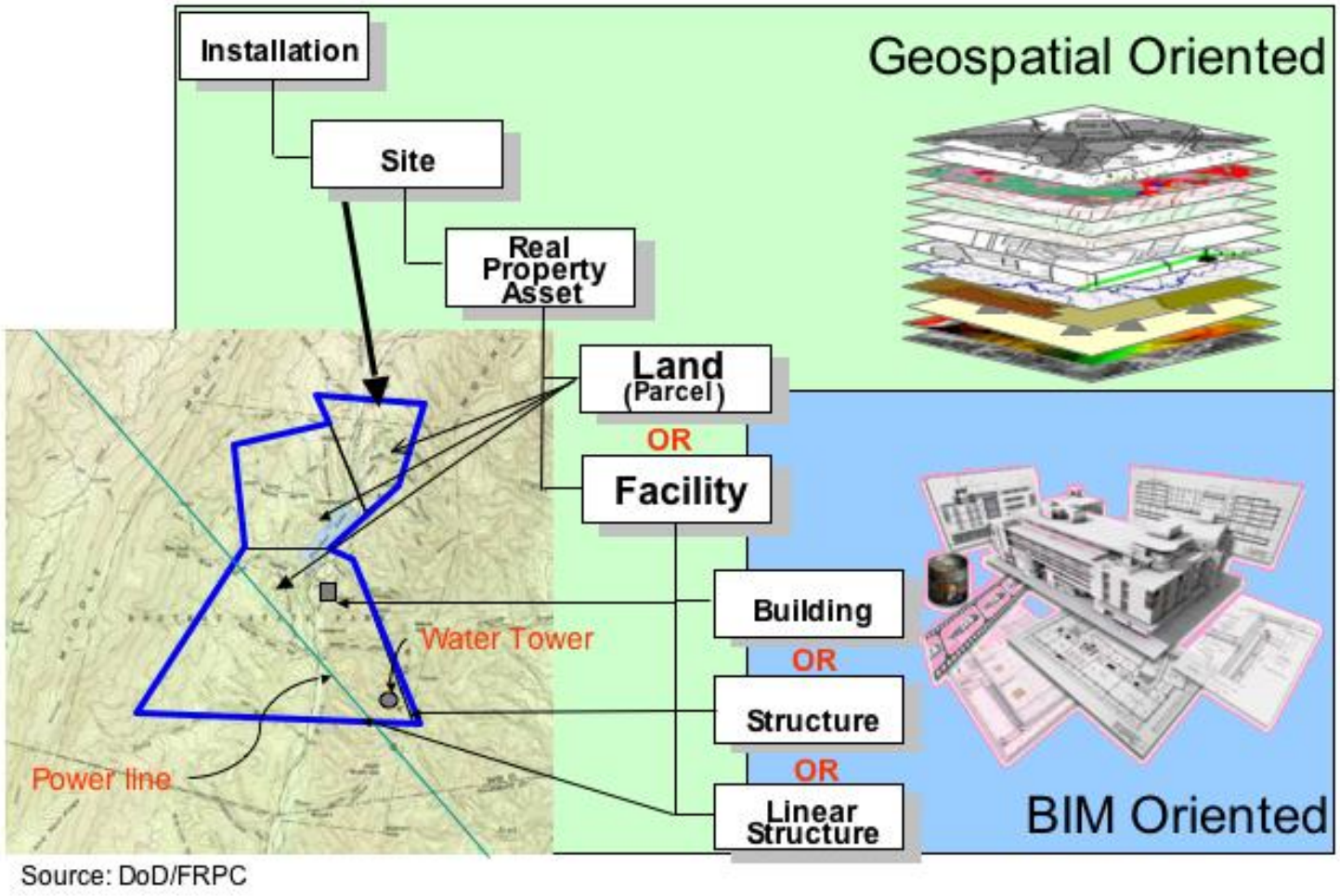
Source: T. H. Kolbe: Standardization of 3D City Models



- Urban Planning
- Urban Modeling
- Microclimate Analysis
- Emergency Management and Response
- Logistics Flow
- Critical Infrastructure Management / Protection
- Sustainable Communities
- Retail Services

OGC®

Seamless semantics and spatial information for AEC/Geospatial/BIM



OGC®

OGC's Approach for Advancing Interoperability

- ***Interoperability Program* (IP)** - a global, innovative, hands-on prototyping and testing program designed to accelerate interface development and validation, and bring interoperability to the market

Rapid Interface Development

Standards Setting

- ***Specification Development Program***
  –Consensus processes similar to other Industry consortia (World Wide Web Consortium, OMA, OMG, etc.).

- ***Outreach and Community Adoption Program*** – education and training, encourage take up of OGC standards, business development, communications programs

Market Adoption

OGC®

The OGC Interoperability Program

- Is a ***"Technology Incubator"*** - A global, innovative, collaborative, hands-on engineering and testing program to draft and test and validate standards for consideration by OGC Technical Committee

- Delivers:
  - ***Engineering reports*** into the Standards Development Process
  - ***Product implementations*** that use candidate standards
  - ***Demonstrated capability*** achieved through comprehensive testing, validation and public demonstrations based on real work business cases.

- Sponsors and Participants work together.
  - Sponsors provide requirements, ***business cases*** and funding
  - Participants work with sponsors to define and/or refine OGC interface standards to solve a given interoperability problem

OGC®

OGC Interoperability Program

- A ***proven process to rapidly develop, test, validate and demonstrate new standards*** based on real world use cases identified by OGC members
- An effective way for members to ***quickly align industry to advance standards to meet priority needs***
- An ***efficient and competitive process***, often yielding a high level of industry participation and cooperation
- A ***repeatable process*** – over 30 initiatives have been successfully conducted using proven policies and procedures
- A mechanism to ***advance standards that address user community business cases***, requirements and priorities.

OGC®

Types of IP Initiatives

- **Testbeds** fast-paced, multi-vendor collaborative initiatives to define, design, develop, and test candidate standards. These draft standards are then reviewed, revised, and, potentially, approved in the OGC Specification Program.
- **Interoperability Experiments** are brief, low overhead, formally structured and approved initiatives performed by OGC members to achieve specific technical objectives that further the OGC Technical Baseline.
- **Pilot Projects** apply and test OGC standards in real world applications using standards-based commercial off-the-shelf (SCOTS) products that implement OGC Standards. Pilot projects are designed to help users understand how to best implement interoperable OGC and complimentary standards to best meet their needs.

OGC®

Roles in Interoperability Program Initiatives

- **Initiative Sponsors** (OGC and Alliance partner members) specify interoperability requirements. This process includes the development of an initiative's use cases, technology objectives, and schedule. Sponsors also contribute resources – funding, personnel, facilities
- **Initiative Participants**, mainly technology provider companies, formally propose solutions in response to a Request / Call For Participation and are evaluated to determine their ability to address one or more initiative requirements. If selected, these organizations will address initiative requirements for standards development, update their technologies to use these standards, and participate in tests and demonstrations.
- **OGC Interoperability Program Team,** OGC staff and consultants facilitate the overall process. OGC staff work with the Sponsors to: develop, publish and evaluate Requests for Technology (RFTs), Requests for Qualification (RFQs), and Calls for Participation (CFPs); manage initiatives; and provide liaison with other industry consortia and *de jure* standards organizations.

OGC®

OGC Interoperability Program Benefits

- Focus on rapid prototyping, testing and validation of emerging OGC and other standards.
- As a Sponsor:
  - Help prioritize and accelerate standards development of importance to your organization, partners and customers.
  - Help align industry to cooperatively advance standards to meet specific business needs
  - As a Participant:
    - Build early knowledge and experience with developing standards
    - Be among the first to make new standards available in the marketplace as part of your organization's technology solutions
    - Gain acknowledgement of and visibility with organizations Sponsoring initiative requirements
    - Develop and validate emerging standards in the context of sponsor business cases and scenarios

OGC®

Interoperability Program – Major Benefits To Sponsors

- ***Ability to Determine Market Interest*** -- OGC's Request process validates the willingness of industry to address specific interoperability issues requiring new standards
  - Request for Technology / Request for Quotation / Call for Participation
- Rapid prototype development yields ***workable interface standards in 4-6 months*** vice years for traditional standards processes
- ***Vendors test, validate and demonstrate interface integrity*** by implementing candidate standards in their products
  - (reduces the risk that a proposed standard will not perform as intended
- Accelerated process encourages ***rapid time to market*** for Standards-based solutions
  - Participating vendors are typically early adopters of new standards

OGC®

Benefits to Technology Developers (Participants)

- Opportunity to ***cooperatively develop open standards***
- ***Early insight*** into user requirements for interoperability, and ***early experience*** with and influence ***in developing standards*** in the context of user business cases
- ***Early delivery of open standards enabled products*** and services into the marketplace
- ***Reduce development costs, risks and lead time*** for developing interfaces (community-wide cost sharing)
- ***Broaden market reach*** by offering OGC standards based products that integrate into systems and enterprises quickly.

OGC®

OGC Interoperability Program Initiative Efficiency

- 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 or Dollar in sponsorship funding, the following initiatives have yielded:

– Web Mapping Testbed I	4 times
– Web Mapping Testbed II	3 times
– Geospatial Fusion Services Testbed	3 times
– OGC Web Services 1	2.7 times
– Military Pilot Project 1	2 times
– Open location Services	1.5 times
– OGC Web Services 3 Testbed	3 times
– OGC Web Services 4 Testbed	3.5 times

- Why? Vendors want early influence in standards development, early skill building, visibility, and opportunity for early market deployment of standards.

OGC®

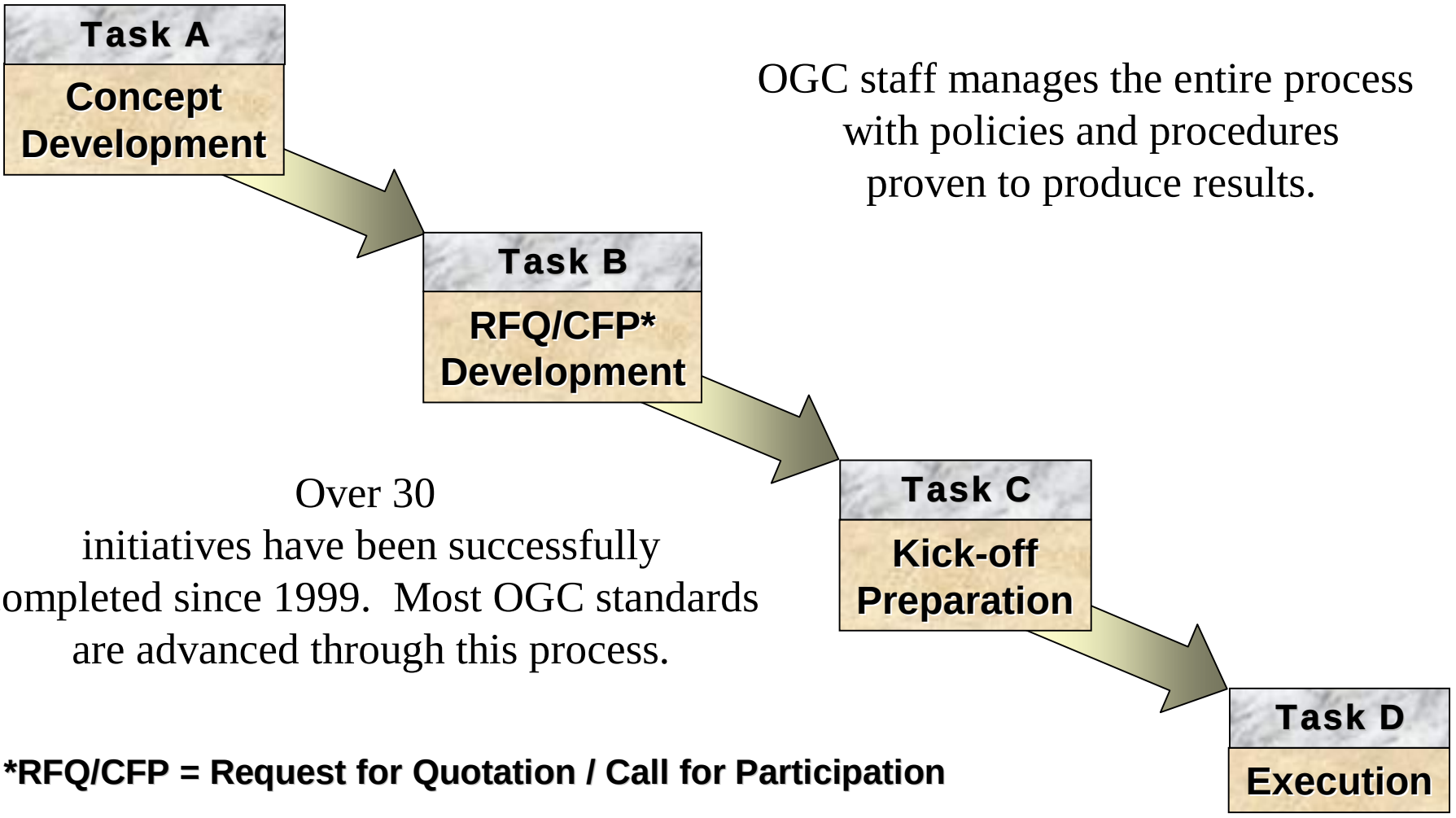
Additional Benefits

- Testbeds and pilots help to ***reduce the risk associated with an emerging standard*** by creating reference implementations that use draft standards, and by validating these technologies with real world business cases / scenarios

- Testbed results and demonstrations are useful:
  - in ***assessing organizational Return on Investment (ROI)*** related to efficiency and effectiveness gains associated with the standard
  - as an educational and marketing tool ***to reinforce the value of new standards*** with organizational leadership

OGC®

OGC Testbed Approach



OGC staff manages the entire process with policies and procedures proven to produce results.

Over 30 initiatives have been successfully completed since 1999. Most OGC standards are advanced through this process.

***RFQ/CFP = Request for Quotation / Call for Participation**

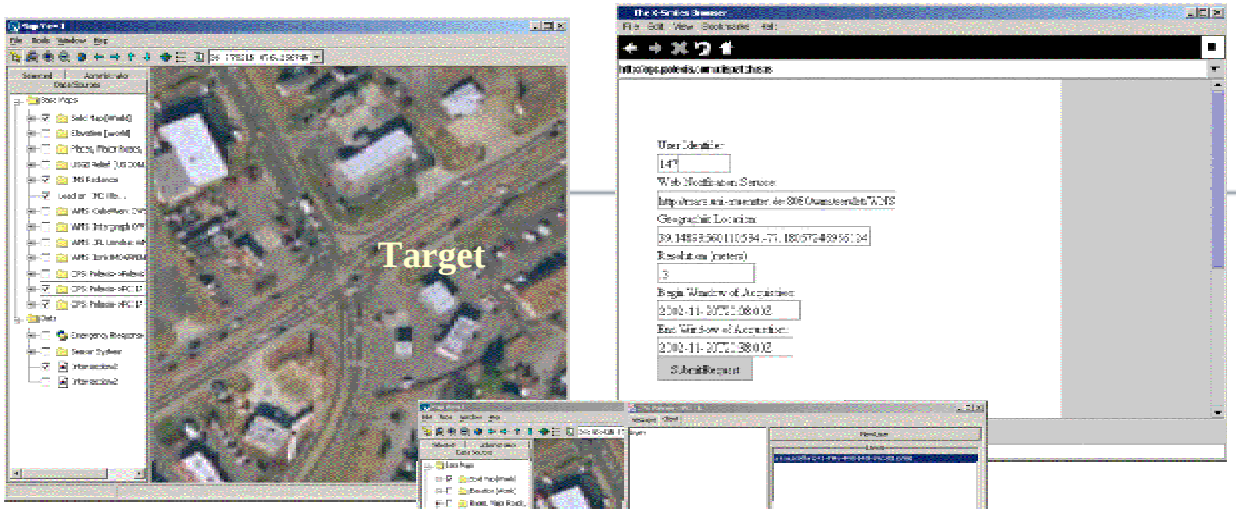
OGC®

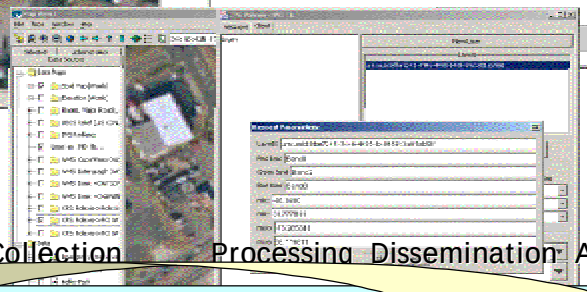
OGC Web Services Testbed (2001-2002)
Rapid Interface Development

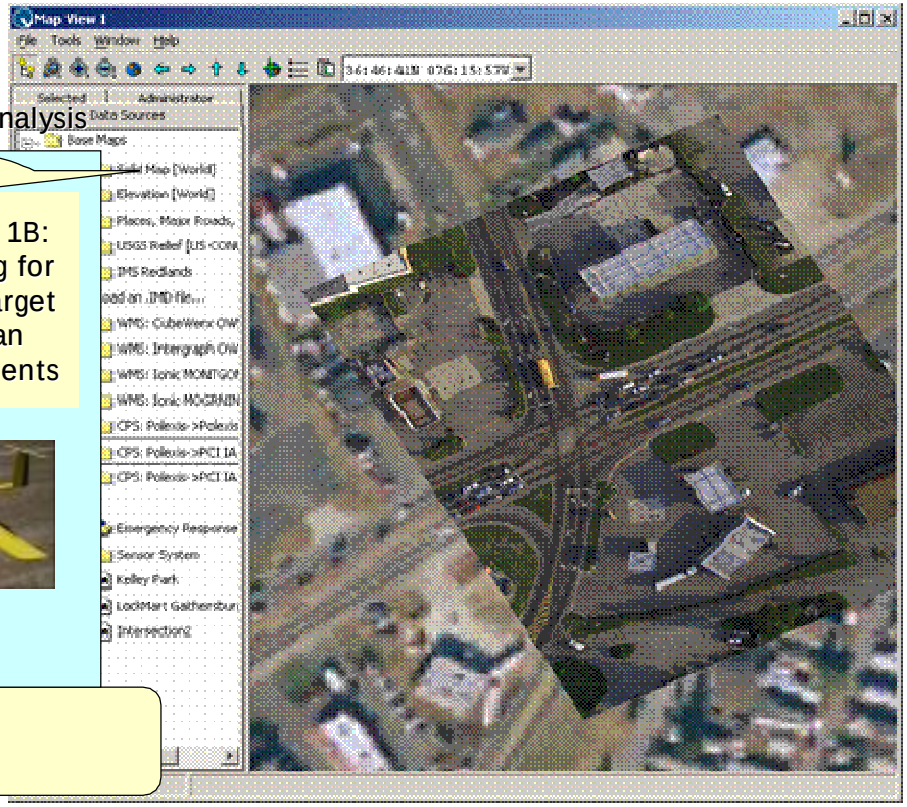
- **New York City**
- **17 Participating organizations (NYC, vendors, Universities, and Federal Agencies)**
- **Integration with real time sensor webs.**
- **Situational Awareness – local data, Satellite and airborne imagery, orthophotos and planimetric data.**
- **Multiple applications accessing and applying information from over a dozen data repositories in different locations.**
- **Exercising multiple OGC interface standards**

OGC®

OWS-2 (2003)
Focus on tasking, accessing and applying data from sensors to address emergencies







Tasking Collection Processing Dissemination Analysis

Scenario 1: Searching for mobile target in Urban Environments

Scenario 2: La Plata Tornado

Scenario 3: Wilson Bridge Incident

Scenario 1B: Searching for mobile target in Urban Environments

Emergency Operations Center

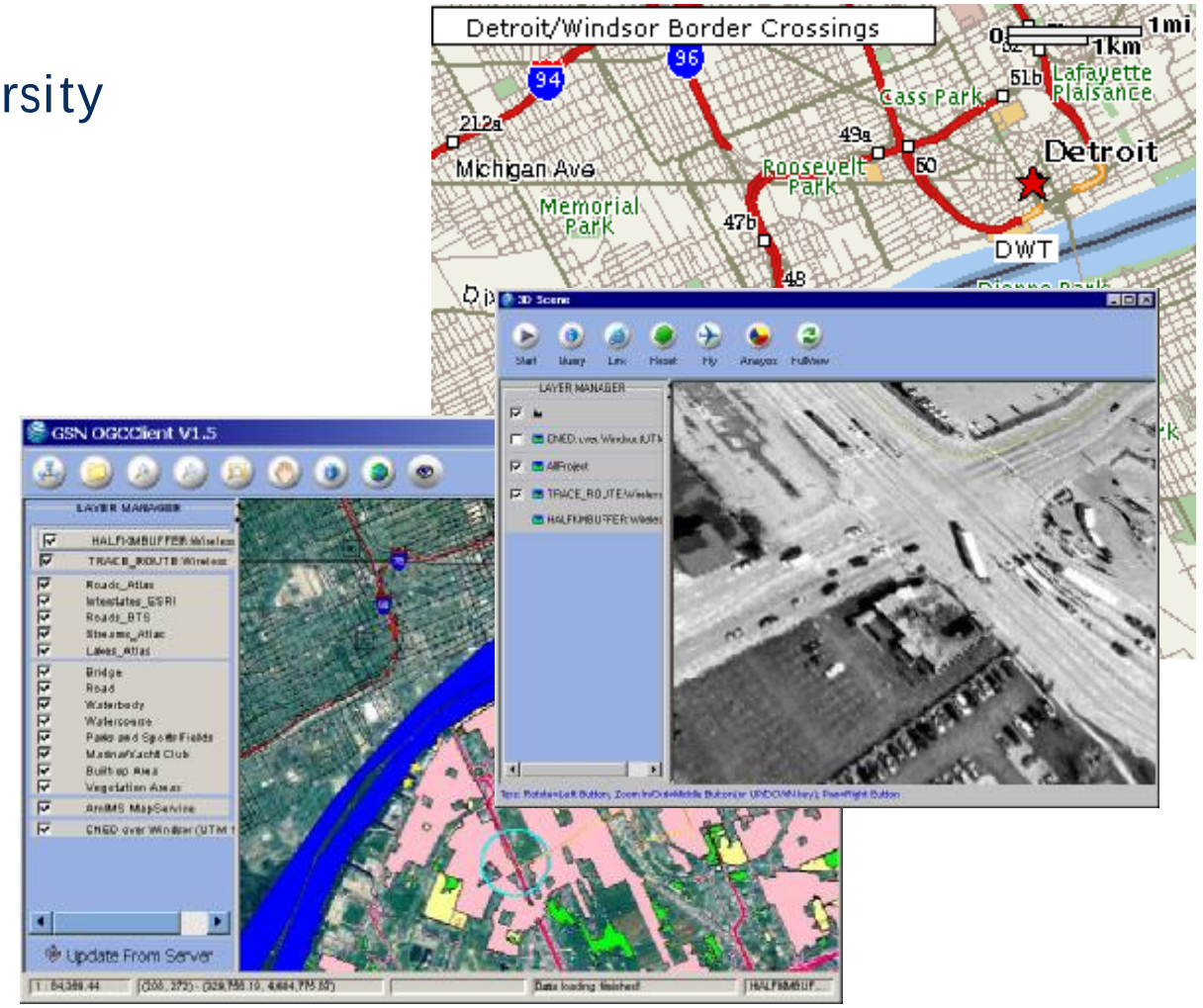
Detection, Planning, Response, Recovery

OGC®

Critical Infrastructure Protection Initiative (2003)

Sponsors:

- Wayne State University
- City of Windsor
- Wayne County
- City of Detroit
- Michigan GIS
- Ontario MNR
- General Dynamics
- US DOD
- Geoconnections
- OCIPEP
- USGS
- FGDC



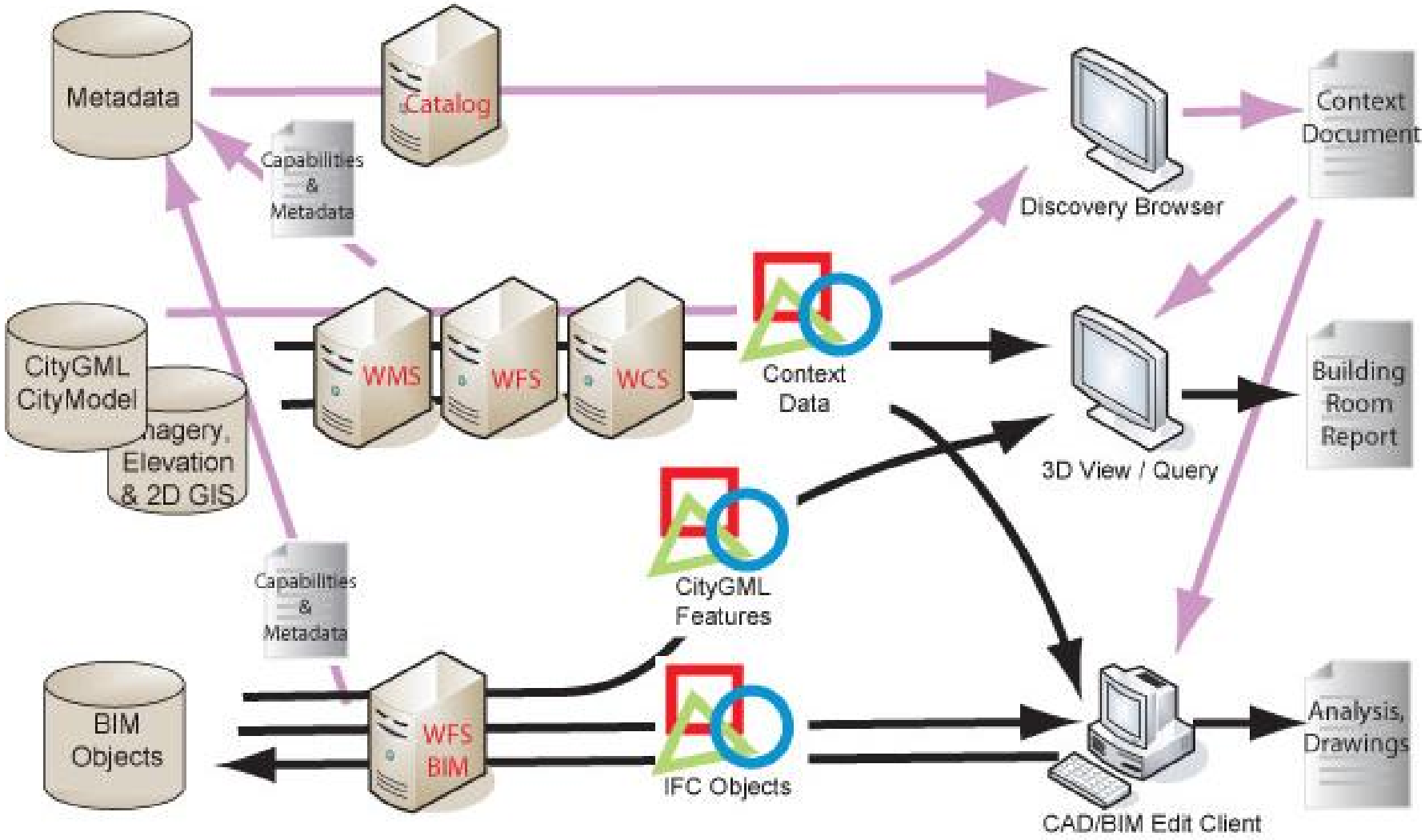
OGC®

Open Standards for Urban Operations
(part of recent OGC Web Services Phase 4 Testbed - 2006)

Identify and deploy a temporary hospital in response to an emergency event.

OGC®

OWS-4-CGB Architecture Overview (This may look complex, but…)



OGC®

www.opengeospatial.org/pub/www/ows4/index.html

OGC®

OGC®
Open Geospatial Consortium

AECOO Testbed Planning 2007-2008

Purpose

- A joint initiative to unite the AECOO community to address and succeed at solving a limited set of interoperability problems
- Work to engage relevant standards organizations in a collaborative environment – leveraging their standards, best practices and processes
- Establish a forum for encouraging the alignment of the international technology provider industry to participate in standards development, testing and validation
- Work to create a sustainable, cooperative model for accelerating the pace of interoperability achievement
- Illustrate value of BIM in addressing ROI in the building lifecycle

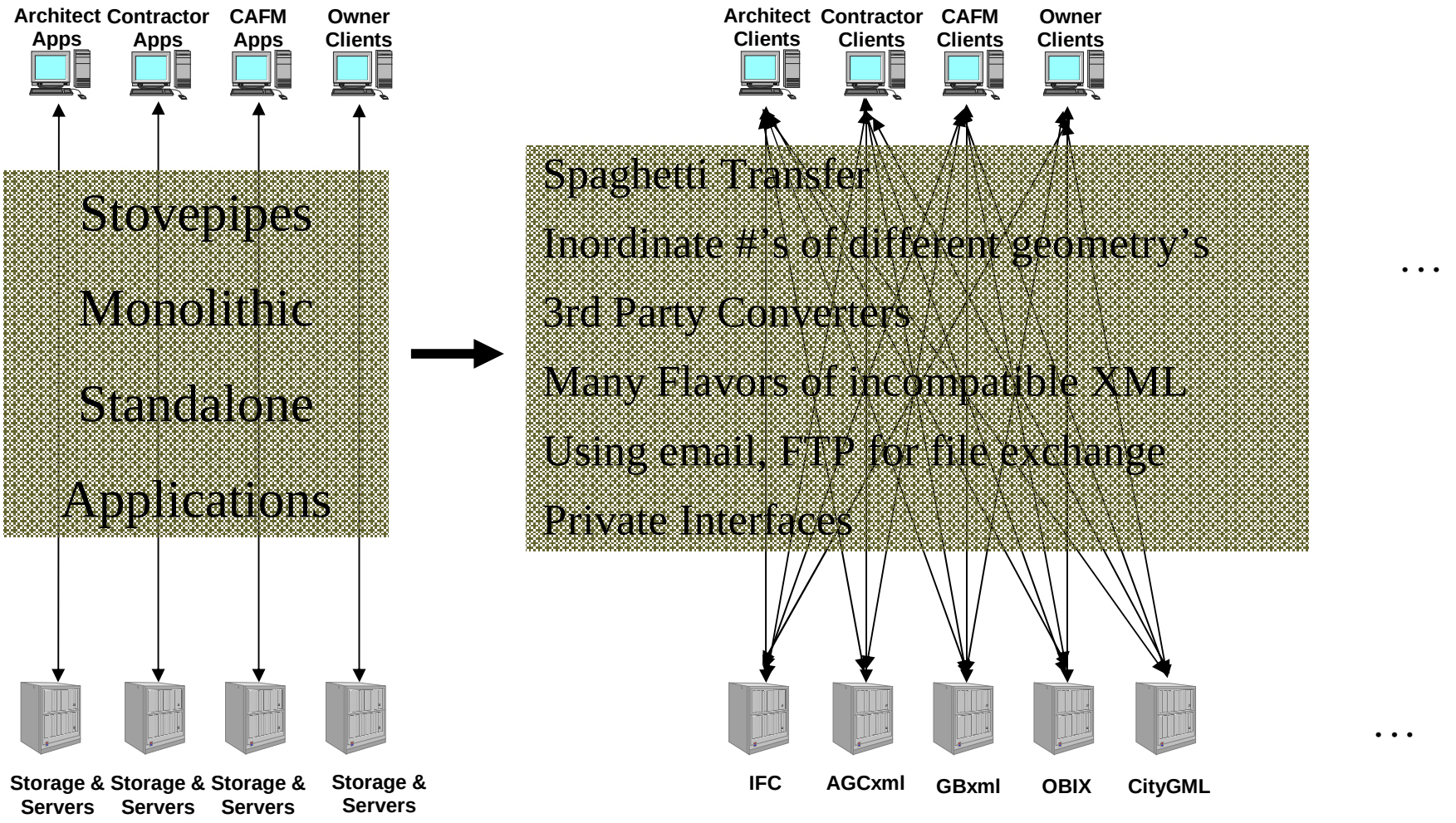
OGC®

AECOO Testbed Status

- Sponsorship (requirements and financial support) confirmed from:
  - Associations and SDO's
    - LFRT - AIA - BuildingSmart Alliance
    - IAI International
  - Individual Firms
    - HOK - Burt Hill
    - Webcor - GSA
- Other Sponsors actively being sought to complete necessary funding to proceed
- Leverage OGC testbed process, policies and procedures

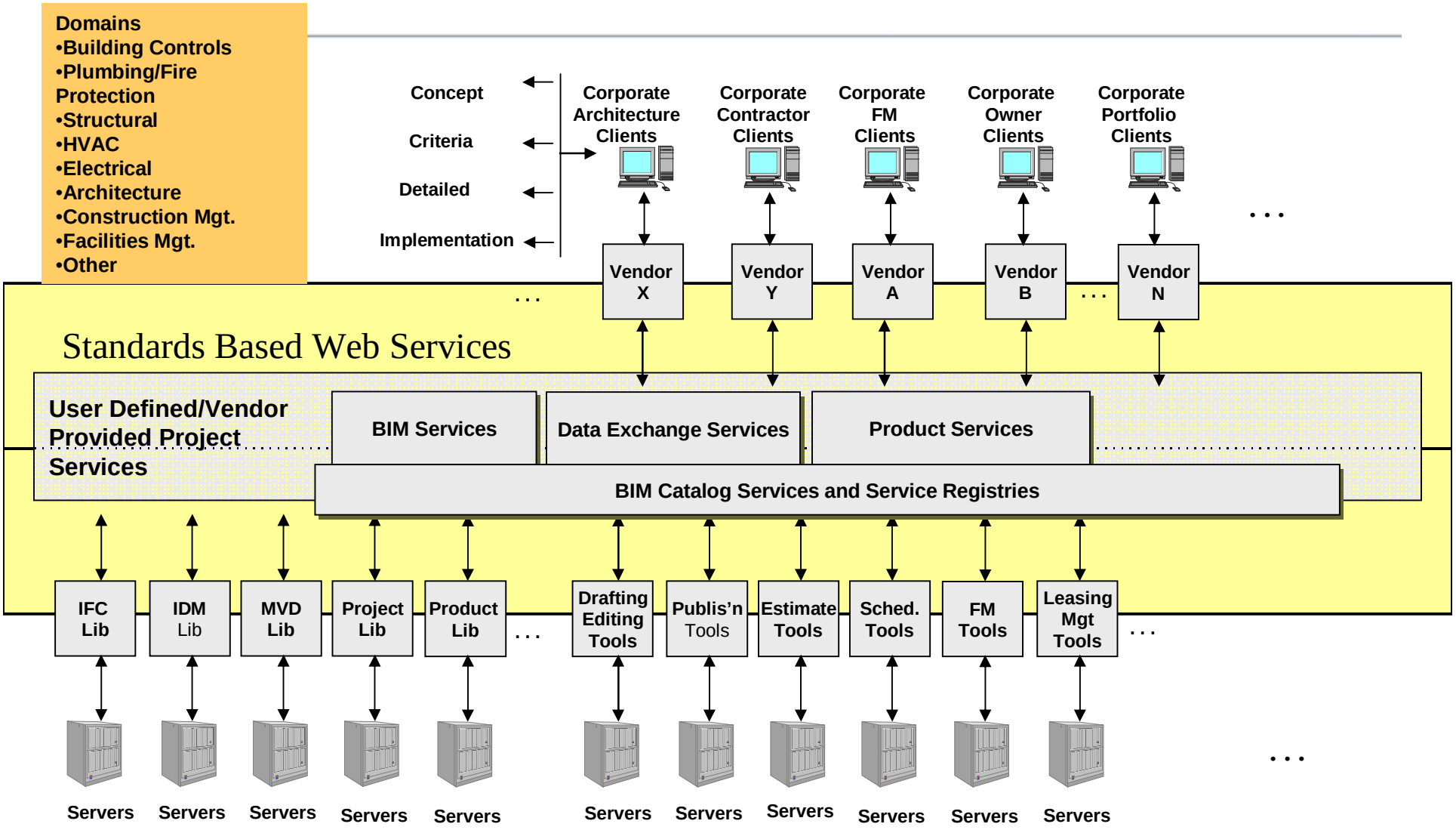
OGC®

Going From This



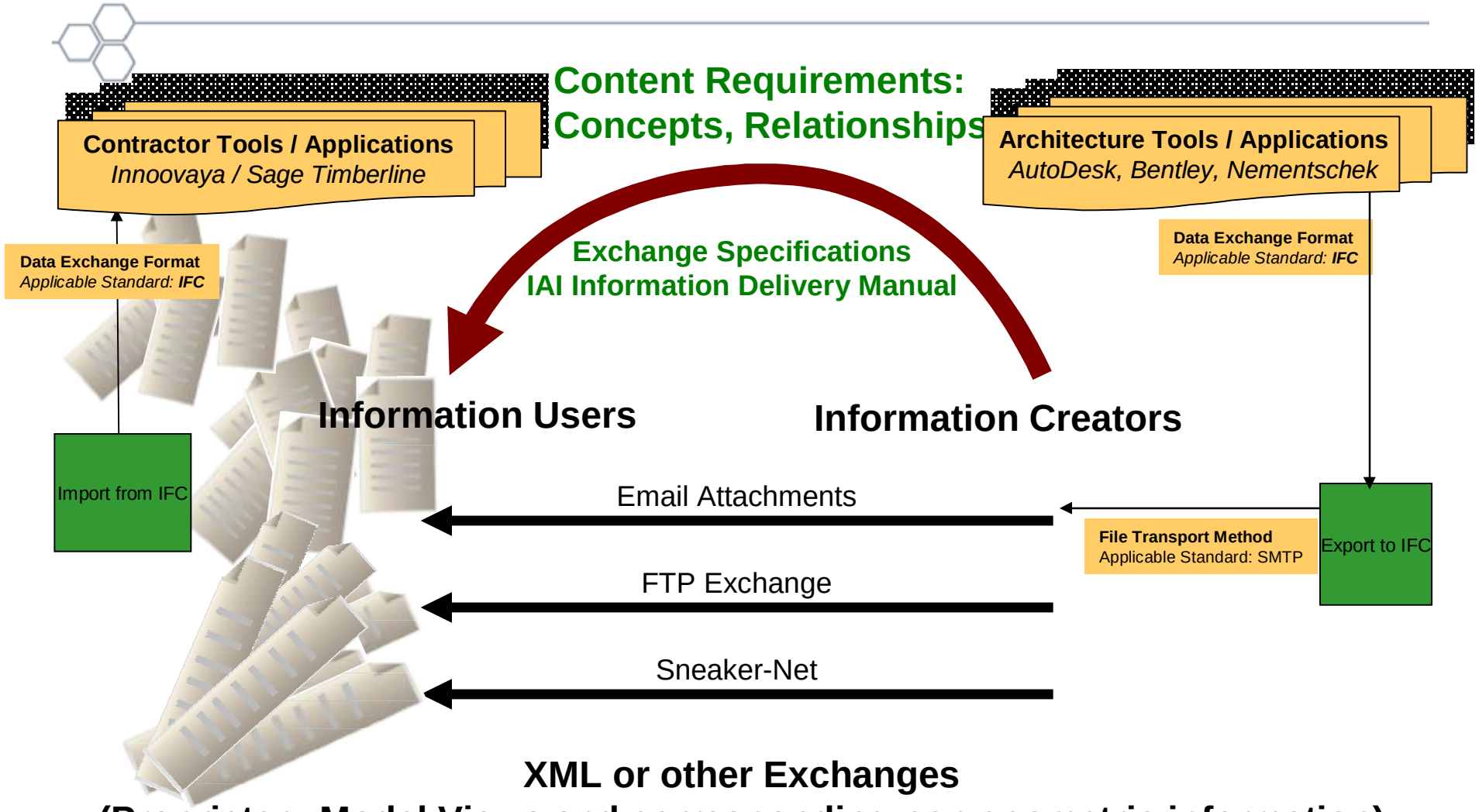
OGC®

To This



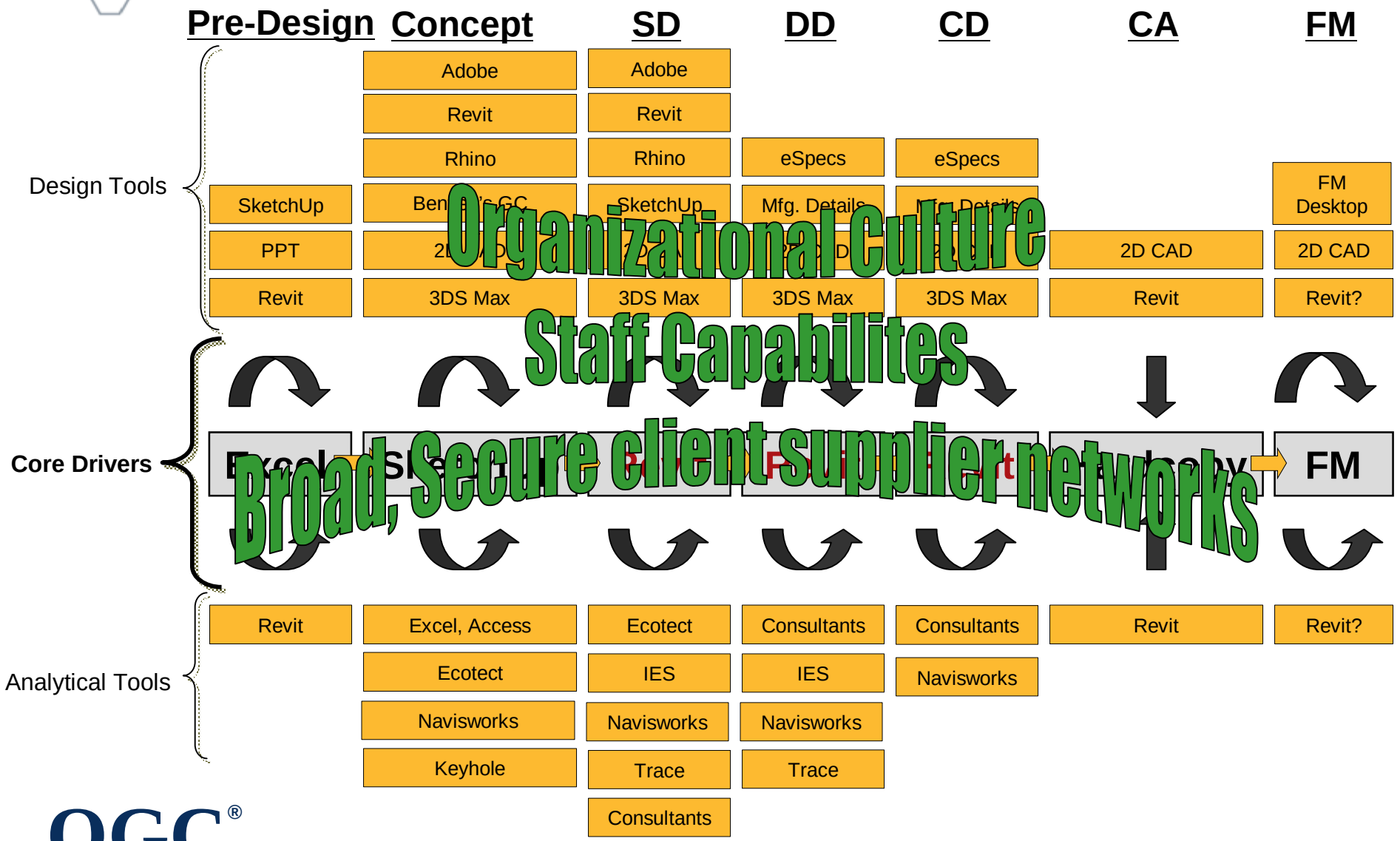
OGC®

Information Exchange



OGC®

2007 BIM and Integrated Practice
A Tough Environment for Interoperability



OGC®

Information Exchange Objectives for AEC Industry at Large

- Standards based Workflows that capture exchanges
  - Collaborative tools that includes trades
  - Specified Data Exchange - Transparency, accessibility and usability of electronic information for seamless exchange using access controls and data security provisions
  - Standards for BIM query, display and model views
  - Data re-usability and machine interpretability
  - Model repository/model management
- Standard terminology for software messaging
- Standard terminology for content messaging
  - Quality assurance methods and procedures
- Clients for information viewing, notification and working together
- Reference test cases that enable software vendors and end users to know whether specific products can interoperate effectively

OGC®

Cross Building Life Cycle Agreements
The Wild West of XML

- **IFC** - data representation standard and file format for defining architectural and constructional CAD graphic data as 3D real-world objects
- AGC - **AGCxml** is an exchange language dealing with transactional data normally exchanged in construction and business-to-business documents.
- AEC - **aecXML** is a data representation standard designed for all the non-graphic data involved in the construction industries
- **AEX** - The Automating Equipment Information Exchange (AEX) project is developing, demonstrating and deploying XML specifications to automate information exchange for the design, procurement, delivery, operation and maintenance of engineered equipment.
- **BACnet** (ASHRAE) - defines an XML data model and Web service interface for integrating facility data from disparate data sources with business management applications. Conforms to Simple Object Access Protocol (SOAP) 1.1 over Hypertext Transfer Protocol
- **COBIE** - xml encoding through which information created during design and construction can be transferred directly to facility operators, maintainers, and managers.
- **cfiXML** - use of XML in the capital facilities industry. including industrial, commercial and institutional facilities, buildings and infrastructure. focuses on technical descriptions of facility items (such as pumps, heat exchangers and other equipment items) that participate in larger business processes such as Request for Quote, Quote, Purchase Order, etc.,
- **GML/CityGML** - geographic mark up language and foundation for OGC Web Services for communication between geographic objects and enterprise applications and a common information model for the representation of 3D urban objects
- **GBxml** - transfer of building information between standalone CAD, engineering analysis and modeling software
- **OBIX** - standard web services protocol for communication between building mechanical and electrical systems and enterprise applications

OGC®

Initial AECOO Testbed Requirements Scope (Per sponsor meeting 25 October 2007)

- **Early Design**
  - **BIM Design Software does not talk to Energy Model Software**
  - **BIM Design Software does not talk to Cost Estimating Software**
- **Construction Phase**
  - **Construction Management Software does not talk to other Construction Management Software**

OGC®

AECOO Testbed Schedule - Tentative

- November 2007 to Feb 2008
  - Concept Development - Request for Quotation/Call for Participation
- March 2008 to May 2008
  - Period for response to and evaluation of Request for Quotation/Call for Participation
  - Negotiations with Participants
- May 2008 - Test Bed Execution Kick-off

OGC®

Questions?

www.opengeospatial.org

Mark E. Reichardt
President
mreichardt@myogc.org
+1 301 840-1361

Louis Hecht
Global Business Dev.
lhecht@myogc.org
+1 301 365-5907

Carl Reed
CTO
creed@myogc.org
+1 970 402-0284

George Percivall
Chief Architect
percivall@myogc.org
+1 301 560-6439

Raj Singh
rsingh@myogc.org
+1 617 642-9372

OGC®