

Fall 2010

LOCATION LOCATION LOCATION

GIS

22°17'2.18"N
114° 9'18.28"E

88 Floors

International
Finance Centre
22°17'6.43"N
114° 9'33.79"E

Temperature: 25 C
Humidity: 74
Air Pollution Index: 32

26th Floor
22°16'44.02"N
114° 9'0.05"E

Hong Kong Population: 7,055,071
Water: 2.63 Million Cubic Meters Per Day
Energy: 805 Terajoules Per Day

Lights Off

Lights On

90 m²
Apartment
24th Floor

22°16'46.49"N
114° 9'41.27"E
72 Floors
135,000 m²
45 Elevators

Carpet 48,600 m²
Renewable Energy:
107,219 Megajoule
Energy Use:
8,101,080 Megajoule

BIM BIM BIM

Laying the Foundation for BIM Interoperability

By Louis Hecht, Jr.

DELIVERING ON THE PROMISE OF BIM REQUIRES A foundation—a comprehensive framework of open information and communication technology (ICT) standards—that will support improved information exchange within the architectural, engineering and construction (AEC) domain and between the AEC domain and neighboring domains such as emergency management, real estate, energy, finance and law.

The principles involved in building a comprehensive framework of ICT standards to serve a diverse set of needs are well understood and there is a growing body of “lessons learned” and good practices that can be applied.

STEPPING AWAY FROM AEC BABEL

BIM vendors have successfully promoted the value of their BIM suites to the point that AEC industry participants and the owner and operator community are increasingly requesting BIM in contracts. Different vendors’ BIM products, however, usually don’t work well together. There is also non-interoperability between BIM products and software used by people outside the AEC world, such as the owners and operators of buildings. And the problem isn’t only non-interoperability among data formats and application software, but also non-interoperability among the underlying operating systems, programming platforms and user interface environments.

Fortunately, web services and the principles of service-oriented architectures are now solidly established and these address non-interoperability among different operating systems, programming platforms and user interface environments.

Significantly, web services and open standards provide the foundation for cloud computing and AEC players and owners and operators of buildings and facilities will not want to forego the substantial benefits that cloud computing offers. More and more of these stakeholders are expected to participate in BIM standards activities that are now headed firmly in the direction of supporting service-oriented architectures based on open interface and encoding standards.

ON SERVICES

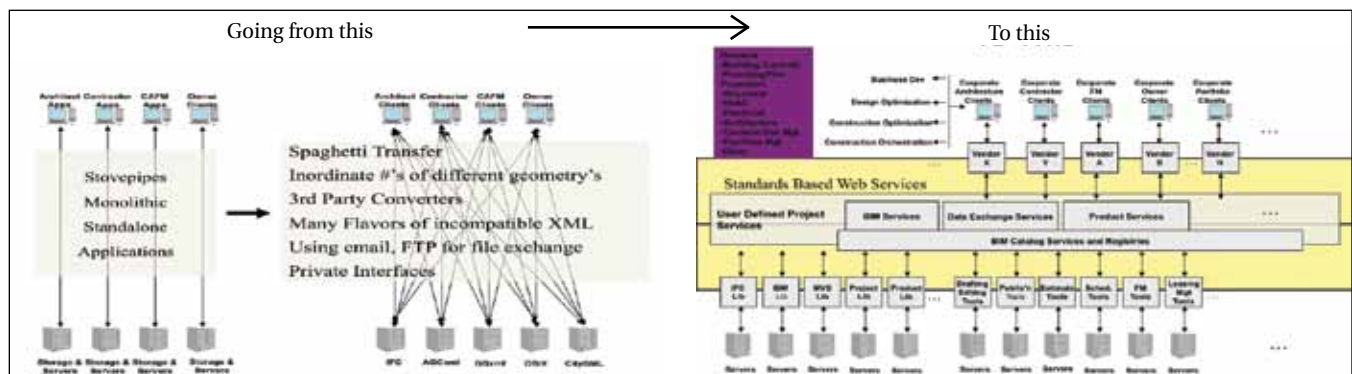
The buildingSMART alliance™ develops the *United States National BIM Standard™* (NBIMS). Over the past 12 years, the global AEC community, led by buildingSMART International, has established Industry Foundation Class standards (IFCs) for representing building elements and their properties. IFCs are an object-oriented data representation standard and file format for defining architectural and constructional CAD graphic data as 3D real-world objects. They have captured much of the semantic content necessary for the comprehensive standards framework we seek. But IFCs alone are not sufficient.

A key breakthrough has been the acceptance within the buildingSMART alliance™ and, increasingly, also within buildingSMART International, of the services imperative. They recognize the necessity to move from IFC file formats, with a focus on batch file conversion, toward IFC-compliant data accessed through service interfaces. Imagine you are planning a road trip: would you rather download a file containing a national road map, or would you rather access a web service like Google Maps, MapQuest or Bing Maps that shows you routes, calculates mileage and also gives you links to restaurants, hotels and a cornucopia of site information available through a search engine? This is the power of web services and it is the future of BIM.

Encoding data in the eXtensible Markup Language (XML) produces IFC files that are bigger than traditional ASCII-encoded IFC files, yet the service approach (which makes use of XML), provides users with much greater convenience. This is because users will seldom download a file. Rather, they will submit a query and “get an answer.” That is, they get just the information they need, rather than a big batch of data from which they will extract an answer.

The AECOO community has begun to embrace key open XML encoding standards such as:

- aecXML (uses IFC’s to create non-graphic BIM data);



BIM interoperability has already advanced from total vendor lock-in to batch conversion of files, including IFCs and various XML encodings. Image courtesy of the Open Geospatial Consortium (2007).

In the not-too-distant future, BIM interoperability will be accomplished through service interfaces, not file transfers and conversions. Image courtesy of the Open Geospatial Consortium (2007).

- AGCxml (for electronic interchange of AEC transactional data); and
- OGC® CityGML (for storage and exchange of virtual 3D city models).

SEPARATION OF CONCERNS

Different smart people in any enterprise have different concerns (or views) and related expertise. In the BIM world, the views are those of architects, owners, lenders, insurers, builders, realtors and regulators. Various view modeling systems guide the structuring, classifying and organizing of information system architectures to capture the “separation of concerns.”

The Reference Model for Open Distributed Processing (RM-ODP) (ISO 10746) is one widely used view modeling system. In the OGC, the geospatial technology industry developed an abstract specification based on the RM-ODP, which has been a reliable guide for the development of standards for that industry. Similarly, the U.S. National Institute of Standards and Technology (NIST) is using RM-ODP to lead a national effort to develop a standards framework for the modernization of the U.S. Smart Grid. In both domains, “separation of concerns” is a key to creating “service oriented architectures” that provide the basis for “systems of systems” that take advantage of “computing across the network.”

The BIM standards effort needs to do much more with view modeling but progress in this direction is evident in



“Levels of Detail” (LoD) in CityGML, an application schema for Geography Markup Language 3 (GML3), the extendible international standard for spatial data exchange issued by the OGC and ISO TC211. Image courtesy of Dr. Steidler, CyberCity Modeler.

Information Delivery Manuals (IDMs) and Model View Definitions (MVDs).

SDO COLLABORATION

Internet and web standards development organizations (SDOs) increasingly collaborate on problems to take advantage of one another’s expertise and to avoid duplication of effort and avoid creation of new obstacles to interoperability. Similarly, the buildingSMART alliance™ and buildingSMART International, two organizations linked by charter, have cooperated more closely over time, aligning both their names and activities.

Their joint programs—aimed at a single international BIM standards framework—also make it easier for other international standards groups to relate to what might otherwise be seen as a strictly U.S. activity. For example, there is an obvious need for standards to integrate indoor and outdoor locations and to integrate the technologies of design (AEC, CAD and BIM) with the technologies of observation and measurement (surveying, GIS, remote sensing, LIDAR, navigation, location services). Improving interoperability in this area was the main reason for the buildingSMART alliance™ and buildingSMART International to sign a formal memoranda of understanding with OGC, the international geospatial standards organization, in 2006.

THE PATH FORWARD

The buildingSmart alliance™ is bringing AEC stakeholders into the fold and promoting an international effort to modernize the IFCs. It is anticipated that service interfaces for BIM will result from these efforts, driven partly by the growing momentum of the AEC Integrated Project Delivery (IPD) process. Attention to “separation of concerns” will help guide this process and the buildingSMART alliance™ will provide “rapid prototyping” and testing of standards in industry testbeds, pilots and interoperability experiments.

If the AEC industry participates actively in this process, BIM will get the foundation it needs and the promise of BIM will become a reality. ■

Louis Hecht, Jr. is the Executive Director, Business Development, Open Geospatial Consortium (OGC). He can be reached at lhecht@opengeospatial.org.



PERIPHERAL SYSTEMS, INC.

The Complete Information Management Company

Women-owned Small Business Enterprise (WBE)
Providing Information Management Consulting & Services since 1978

Memberships:

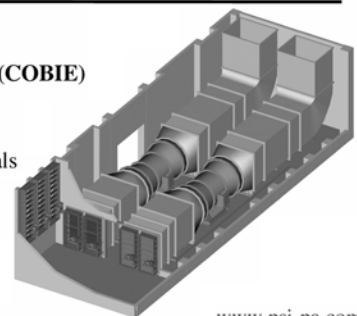
- BuildingSMART Alliance™
- Ntl Institute of Building Sciences
- Whole Building Design Guide

Supporting:

- NBIMS

Contact: Glenn Hunt
Manager, Sales & Marketing
Phone: (610) 987-3421
Fax: (610) 987-9871

- Construction Operations Building Information Exchange (COBIE)
... recognized as a 1st provider of COBIE support services.
- Technical Documentation:
 - Operation & Maintenance / Support Information Manuals
 - Interactive Electronic Technical Manuals
 - Training Plans & Procedures
 - Integrated Logistics Support
- 3D Models, Renderings, Animations & Exploded Views
- Software Program & Database Design / Data Entry



www.psi-pa.com