

Integrated Project Delivery Through Building Information Modeling

Integrated Project Delivery through Building Information Modeling (BIM)

1/17/2008

1/20

Topic: *BIM - Current Trends and Issues*

Presenter: *Allan Partridge*

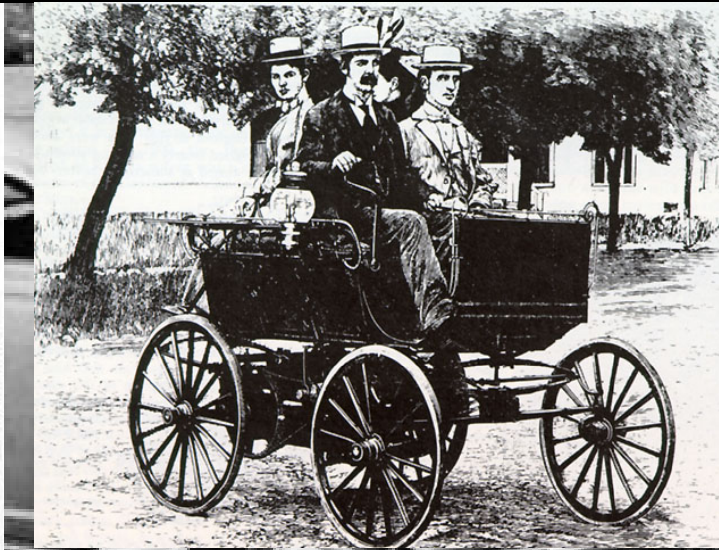


Synopsis

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2. Practice Impacts - 1
3. Engineering Impacts
4. Integrated Project Delivery
5. Roundtable Discussion
6. BIM & The Architectural Team
7. BIM & The AEC Team
8. Practice Impacts – 2
9. BIM - Integrated Practice – Putting It All Together



Technology Impact



Technology Impact



*Integrated Project Delivery through
Building Information Modeling (BIM)*

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Technology Impact

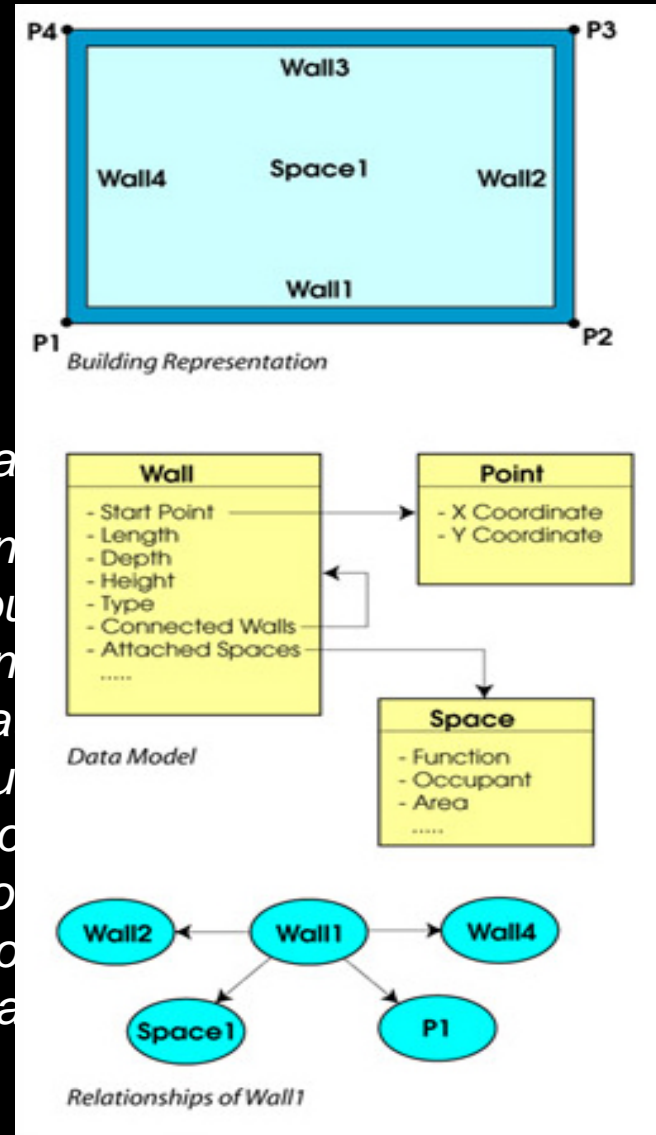
MAD – 4,000+ Years

CAD – 40+ Years



BIM – 7+ Years

*“Building Information Modeling
.....is the creation of a
consistent, computer-based
building project information
digital representation of the
representations used in
making, production of
documents, performance
estimating and construction
eventually, for manufacturing
facility.” (Autodesk)*



Technology Impact

BIM

“Building Information Modeling

*.....is the creation and use of **coordinated, consistent, computable information** about a building project in design that yields reliable digital representations of the building—representations used for design decision-making, production of high-quality construction documents, performance predictions, cost-estimating and construction planning, and, eventually, for managing and operating the facility.”* (Autodesk)



Technology Impact

BIM

.....is not just about having a model, or even Objects, is that everything in the model “knows” what it is and has both data and behavior.

.....it is not just being able to stick information to a 3D model, it's that the design, building, information and Project can be managed intelligently.



Technology Impact

BIM

What's in the BIM is what's in (or going into) the Real Building

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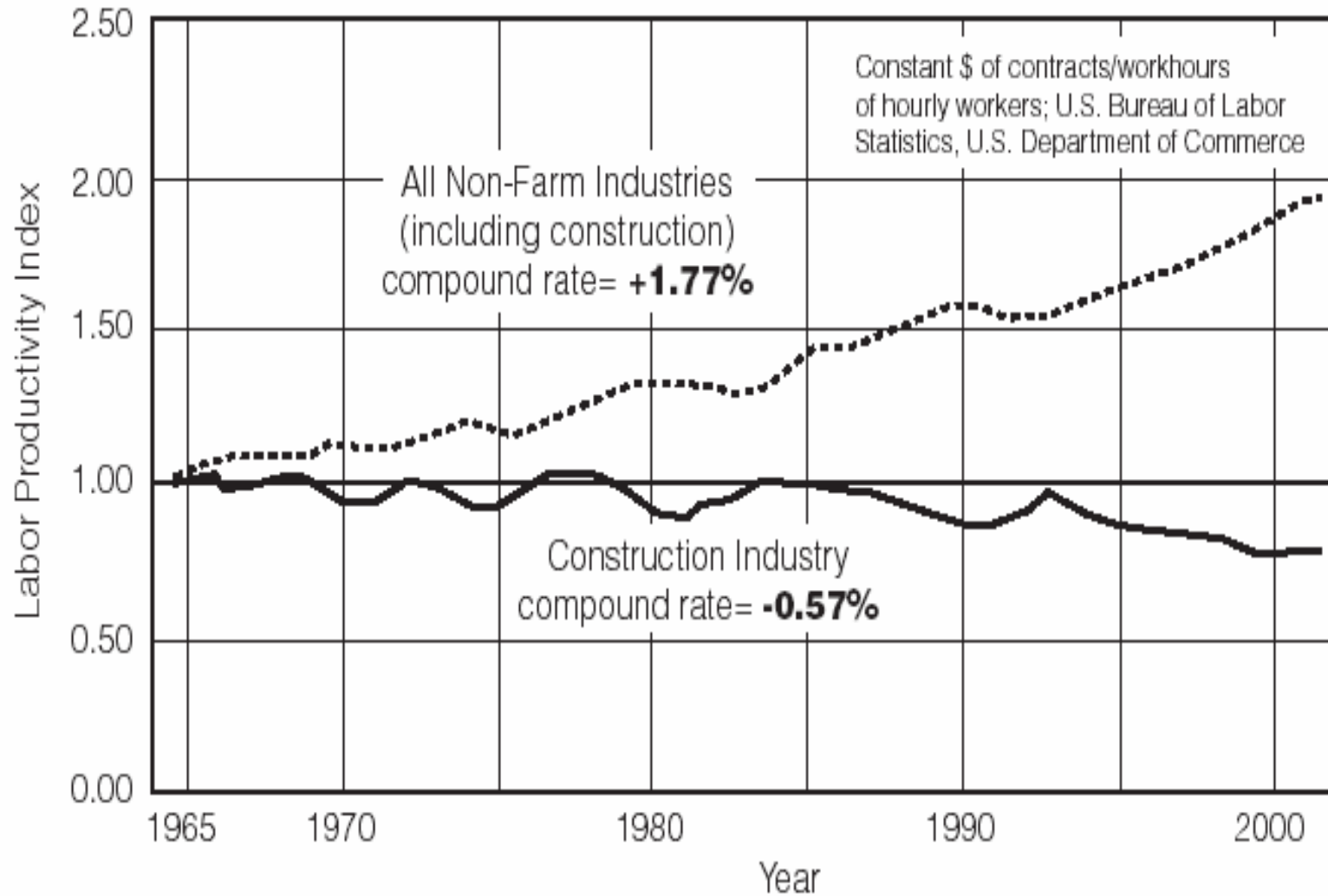
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Economic Impact: Productivity Decline



Economic Impact: Growing Client & Contractor Dissatisfaction

Client :

Declining Document Quality **70%**

A/E's should be held more accountable for quality of documentation **98%**

(FMI CMAA OWNERS SURVEY 5 2004)

Contractors:

Poor technical documents by A/E's **60%**

Slow response to questions **51%**

(FMI CONTRACTOR SURVEY 2005)





Economic Impact: Non-Interoperability

“The cost of inadequate interoperability in the U.S. capital facilities industry to be \$15.8 billion per year. The intended audiences are owners and operators of capital facilities; design, construction, operation and maintenance, and other providers of professional services in the capital facilities industry”

(Paper published in 2004 from The National Institute of Standards and Technology (NIST))

“The cost of interoperability is driving up costs for the (construction) industry. On an average, about 3.1% of project costs are related to software non-interoperability”

(Interoperability in the Construction Market November 2007, McGraw-Hill Smart report)

From studies by nationally prominent bodies, one may establish design error and omission rates in the range of 2% to 3% of construction cost as a threshold level of acceptability.

(National Society of Professional Engineers - Engineering Times, Feb 99, p23)



Economic Impact: Non-Interoperability

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(Interoperability in the Construction Market November 2007, McGraw-Hill Smart report)

Canadian Construction Gross Output	\$ 164 Billion (2006)
Cost Internally of Non-Interoperability	\$ 5 Billion
Reduction by at least 80%	\$ 4 Billion

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(National Society of Professional Engineers - Engineering Times, Feb 99, p23)

Canadian Construction Gross Output	\$ 164 Billion (2006)
Design/Omissions Cost (10%±)	\$ 16 Billion
Reduction by at least 80%	\$ 13 Billion

BIM – Understanding the Terms

INTEROPERABILITY

The **International Alliance for Interoperability (IAI)** is a global standards-setting organization representing widely diverse constituencies—from architects and engineers, to research scientists, to commercial building owners and contractors, to government officials and academia, to facility managers, and to software companies and building product manufacturers. Alliance members are committed to promoting effective means of exchanging information among all software platforms and applications serving the AEC+FM community by adopting a single Building Information Model (BIM).

This mission is accomplished by defining, promoting and publishing specifications for **Industry Foundation Classes (IFC)** as BIM and as a basis for AEC project information sharing through the project life cycle, globally, across disciplines and technical applications.



BIM – Understanding the Terms

The IAI IFCs (Industry Foundation Classes)

The classes defined by the IAI are termed Industry Foundation Classes (IFCs) for the following reasons:

- IFCs are defined by the AEC/FM **Industry**.
- They provide a **Foundation** for the shared project model
- They specify **Classes** of things in an agreed-upon manner that enables the development of a common language for construction.

The IAI IFC is the only construction information standard recognized by the International Standards Organization (ISO). Software must be certified by the IAI as compliant with the latest IAI IFC standard 2X3



BIM – Understanding the Terms

The IAI IFCs (Industry Foundation Classes)

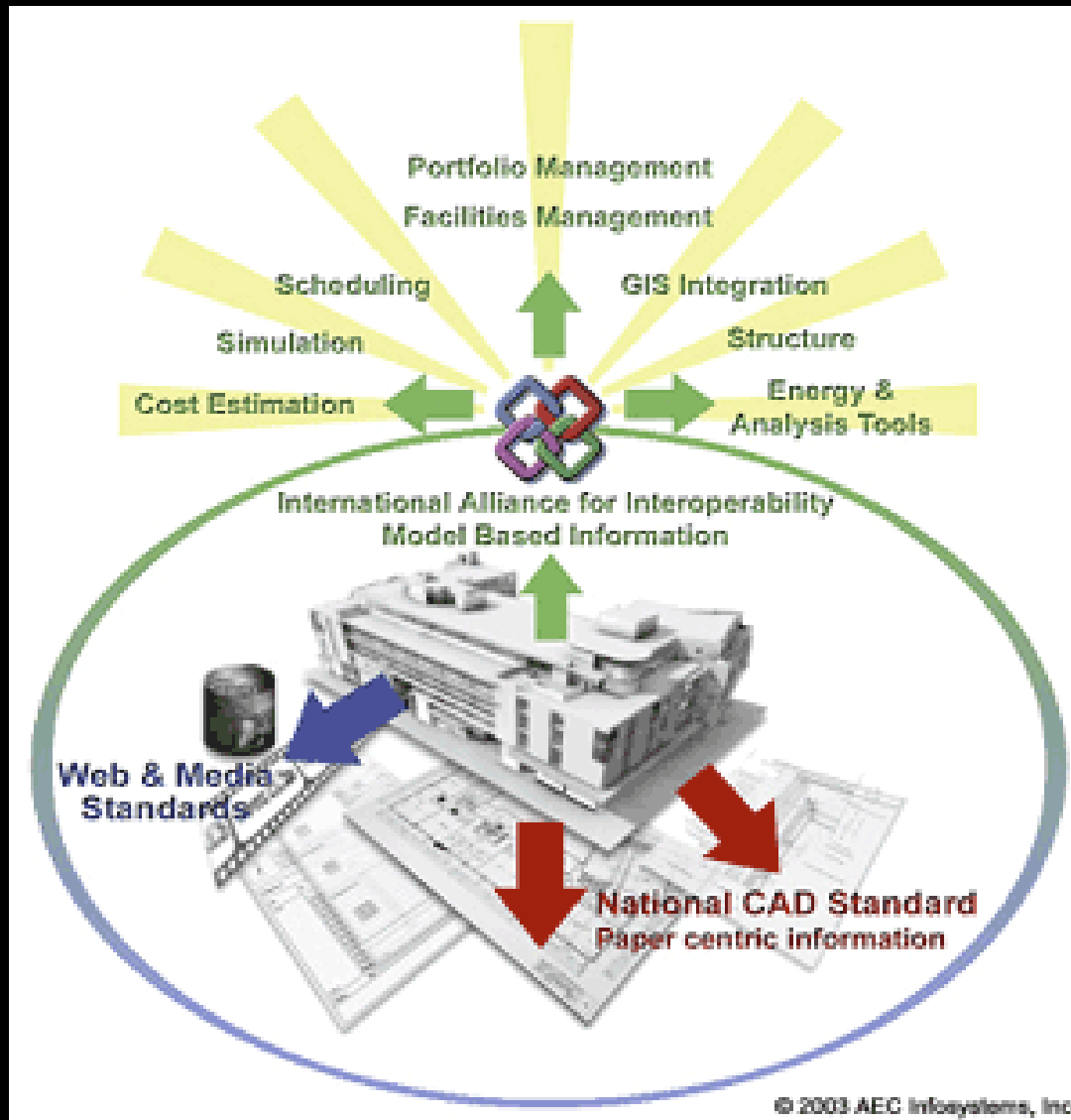
IAI IFC's

- Specify how "things" occur in a constructed facility (including real things such as doors, walls, windows, etc as well as abstract concepts such as space, organization, information exchange, and process)
- Should be represented electronically.
- These specifications represent a data structure supporting an electronic project model useful in sharing data across applications.
- Each specification is called a "class." The word "class" describes a range of things with common characteristics. For instance, every door has the characteristics of opening to allow entry to a space; every window has the characteristic of transparency so that it can be seen through.

"Door" and "window" are names of classes.



BIM – Understanding the Terms

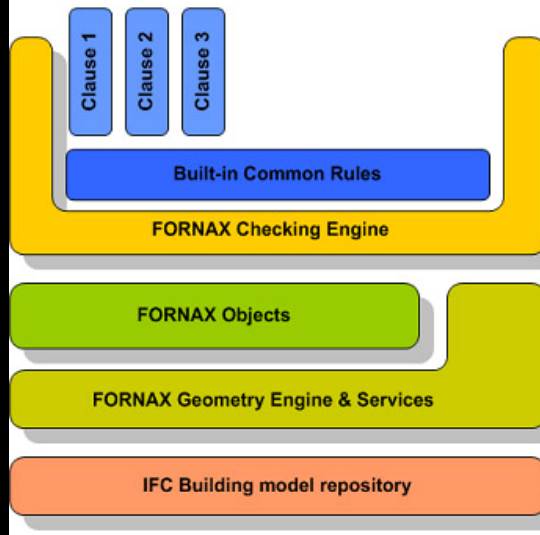
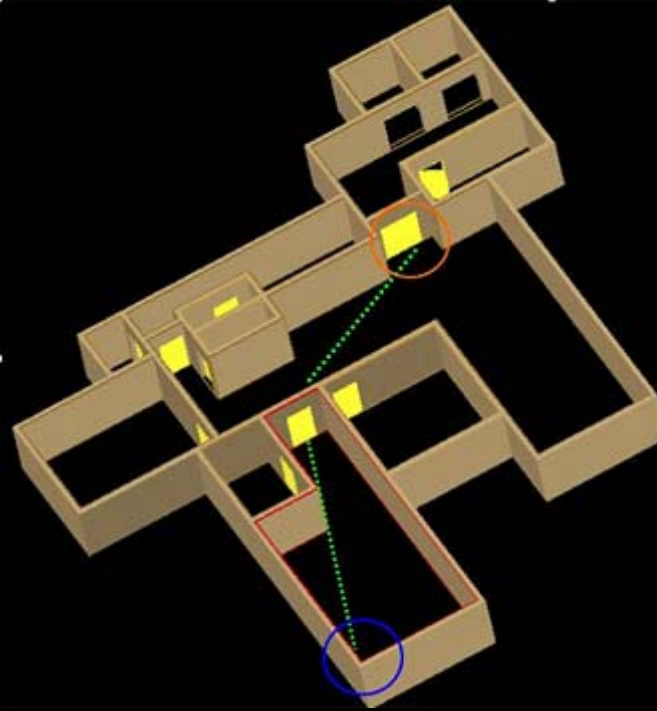
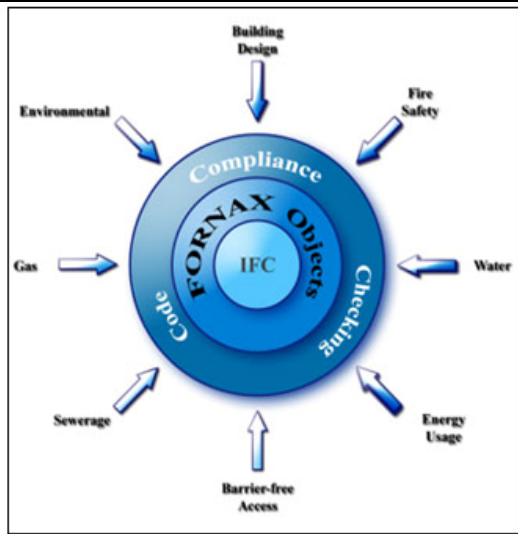


IFCs

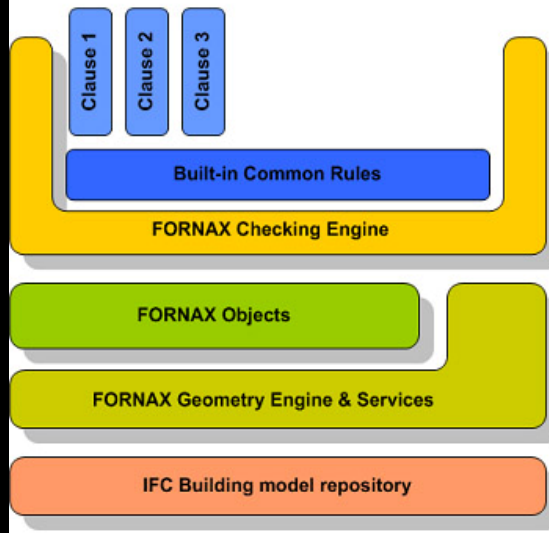
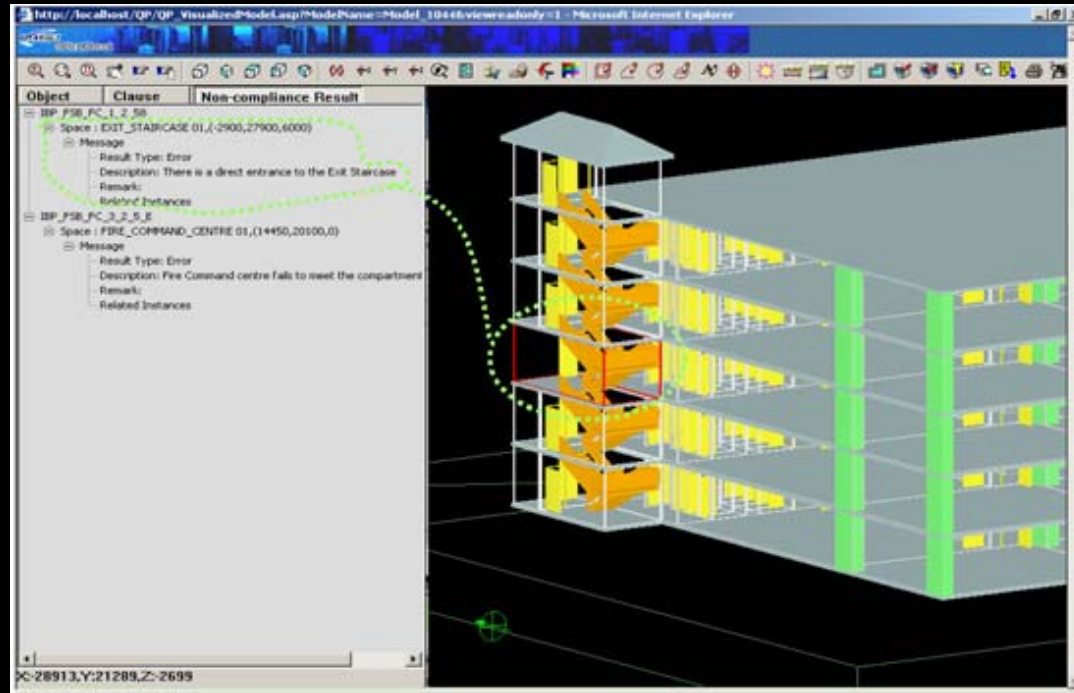
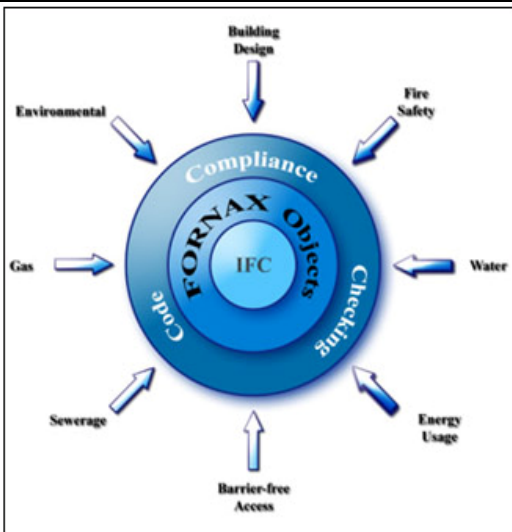
Describes the building model, its components, and the relationships between them in a single computable model that can be shared by diverse applications.



BIM – Understanding the Terms



BIM – Understanding the Terms



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BIM – Current Vendors

The IAI IFC is the only construction information standard recognized by the International Standards Organization (ISO). Software must be certified by the IAI as compliant with the latest IAI IFC standard (2X3)

Software vendors must be committed to supporting open, standards-based data exchange mechanisms in its products, and the IFC 2x3 certification joins other mechanisms including DXF, DWF, XML, ODBC, gbXML, and LandXML.

- Autodesk - Revit & ADT (PC based)
- Bentley - Bentley Architecture (Microstation)
- Dassault Systems (Catia)(PC based)
- Gehry Technologies - Digital Project - Designer (PC Based)
- Graphisoft - ArchiCADD (PC Based)
- Nemetschek VectorWorks 2008 (Mac Based)



Questions

