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eVisolutions

An Introduction to Building Information Modeling

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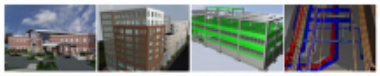

Professional Education for the Security Industry

ISC SOLUTIONS

AIA Provider Statement

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  This program is registered with ***AIA/CES*** for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

- Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Building Information Modeling (BIM) is revolutionizing design processes through the construction industry, and security is no exception. Just as Computer Aided Design (CAD) represented a sea change in how drawings are produced and shared, BIM, with its 3-D modeling capabilities, will deliver an equivalent or greater impact to the industry. This course presents a basic grounding in the technology and its benefits, potential applications in security, and likely implementation issues.

Learning Objectives

At the end of this program, participants will be able to:

- Understand BIM Basics & the Benefits
- Describe how BIM can be used as a communication and collaboration tool, and its contributions to Scheduling, Estimating, and Facility Management .
- Manufacturers BIM Objects
- Explain the process of implementing BIM and how BIM-based designs for Structural, Mechanical, Electrical, Plumbing, Communications, Security, Fire Protection fit into the overall Construction Document fabric

- BIM is a huge buzzword in AEC Industry. It shows up in magazines; there are multiple conferences a year about it; software developers headline their products as BIM tools.
  - What is it?
  - How is it different?
  - Why should you care about BIM?

NATIONAL BIM CONFERENCE

Autodesk BIM Conference 2011

BIMFORUM

BIM STORM

What is BIM?…BIM Defined..

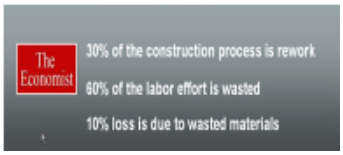
- An Elegant Definition
  - BIM: An Intelligent Simulation of Design Intent
- A More to the Point Definition
  - Moving From 2D Drawings to 3D Models That Carry Intelligence/Data
- A Technical Definition (National BIM Standard Definition of BIM – buildingSMART)

  A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward.

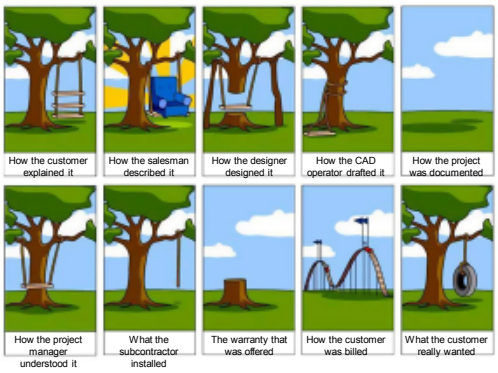
The National BIM Standard *is part of the global buildingSMART Information Delivery Manual Initiative.*

Wikipedia: **Building information modeling** (BIM) is the process of generating and managing building data during its life cycle

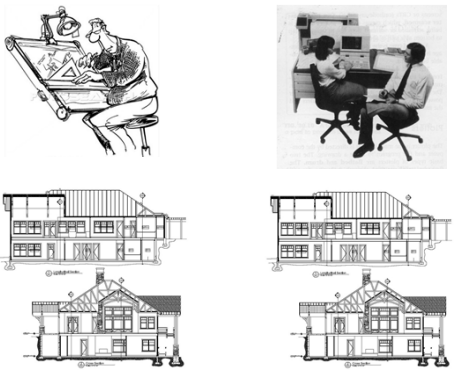
The Problem..



- In North America construction is the only industry that has seen a consistent decline in productivity over the past 40 yrs
  (US Dept. of Commerce, Bureau of Labor Statistics)



The past...



Learning from Others

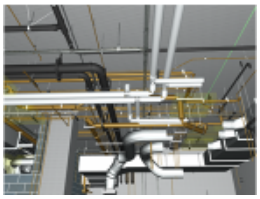
- We design and build a project and then turn it over to client to manage and in any other industry our finished product would be called a Prototype
- We can now build the Project Twice through a BIM/VDC process
  - Once Virtually and Once in the Field
- The Benefits of BIM/VDC are tremendous for the project team just due to the enhanced information that can now be reviewed well before construction even begins.

From manufacturing to AEC

Now...

Building Simulation

Build the Project TWICE



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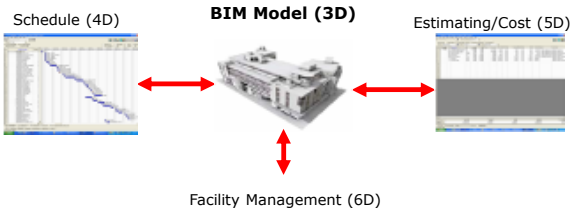
What BIM is and Why is it Different?

- For most of history design and construction of building has relied on drawings for representing the work to be done.
- BIM involves representing a design as objects
- Modern BIM design tools go further.



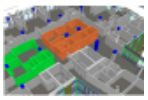
What is a BIM? - Lifecycle Information View

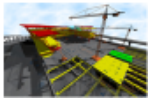
Big Trends

- Building life cycle: DBO
- More integrated supply chain
- Dramatic technological change

BIM BENIFITS

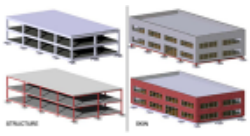
- PRECONSTRUCTION BENEFITS TO OWNER
  - Concept, feasibility, design benefits
  - Increased building performance and quality
  - Near instant material takeoffs





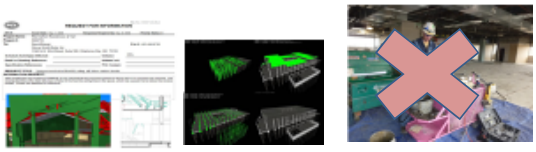
BIM BENIFITS

- DESIGN BENEFITS
  - Earlier and more accurate visualization of a Design
  - Automatic corrections when changes are made to a design
  - Generate accurate and consistent 2D drawings at any stage of the design
  - Earlier collaboration of multiple design disciplines
  - Check against design intent
  - Extract Cost Estimates during design
  - Improve energy efficiency and sustainability



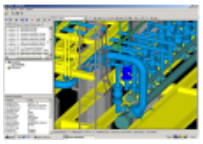
BIM BENIFITS

- CONSTRUCTION AND FABRICATION BENEFITS
  - Synchronize design and construction planning
  - Discover design errors and omission before construction
  - React quickly to design or site problems
  - Use design model for fabrication components
  - Synchronize procurement



BIM BENIFITS

- POST CONSTRUCTION BENEFITS
  - Better manage and operate facilities
  - Integrate with Facility operation and management systems



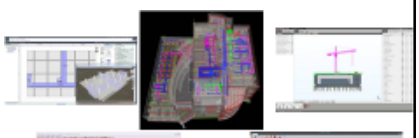
BIM SOLUTIONS

Software
- Dprofiler
- Onuma
- Autodesk Revit
- Tekla
- Bentley
- ArchiCAD
- CAD Duct
- CAD Pipe
- QuickPen
- AutoSPRINK

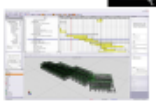
BIM Extraction
- Vico Software
- Autodesk QTO
- EcoDomus

BIM Coordination
- Autodesk NavisWorks
- Tekla BIMsight
- Solibri

3D

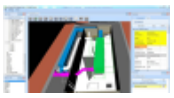


4D



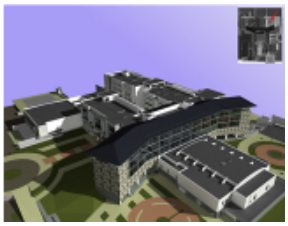
5D

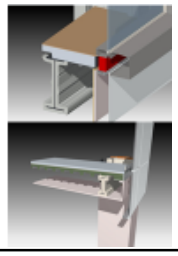
xD



BIM PROJECT EXAMPLES – LAUSD Central High School

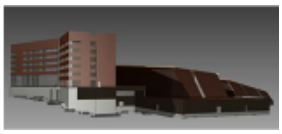
- Goal - coordination
- 3d details of areas of concern
- Navisworks was uses the collaborative platform





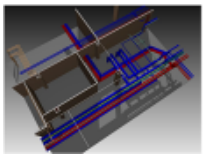
BIM PROJECT EXAMPLES - Turtle Creek Casino

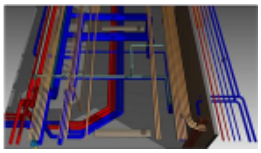
- Goal - coordination
- responsible for all piping, plumbing, electrical modeling
- Navisworks was uses the collaborative platform



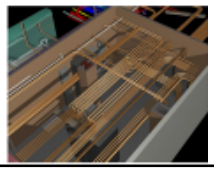
BIM PROJECT EXAMPLES - Turtle Creek Casino

- Piping and Plumbing



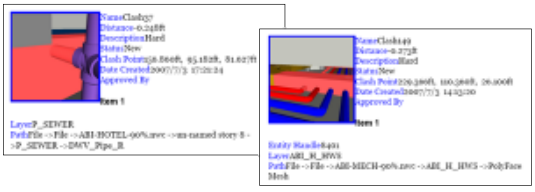


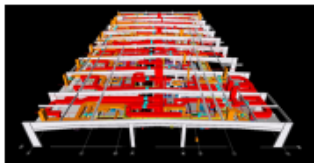
- Electrical



BIM PROJECT EXAMPLES - Turtle Creek Casino

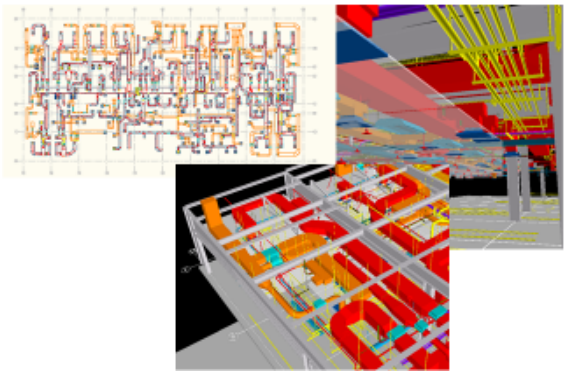
- Navisworks reports and clashes were discussed at coordination meetings



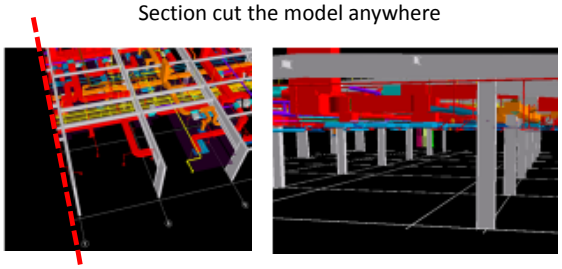


- Modeled all structural, and complex systems for coordination

CEDARS-SINAI



Section cut the model anywhere



- Section cut in any direction, top, bottom, left, right
- Easier to view and discuss isolated area

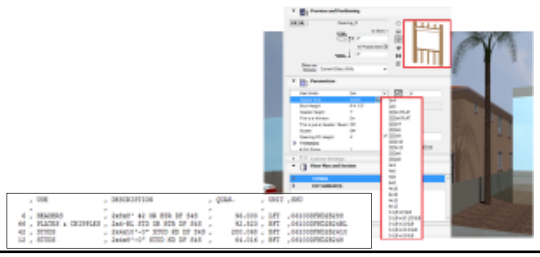
Clash Detection

- Clashes run trade versus trade

- Results highlighted, plumbing – HVAC clash

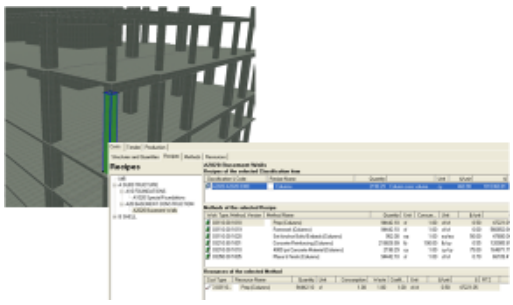
BIM Project Examples – Residential Home Builder

- owner, interest in BIM
- Goal - savings in production & estimating
- Solution - developed smart objects to aid in CD production and estimating

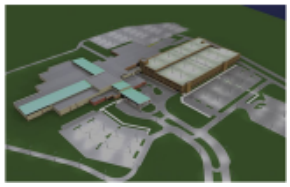


BIM PROJECT EXAMPLES - Four Seasons

- owner, interest in preconstruction costs
- Goal - savings in production & estimating



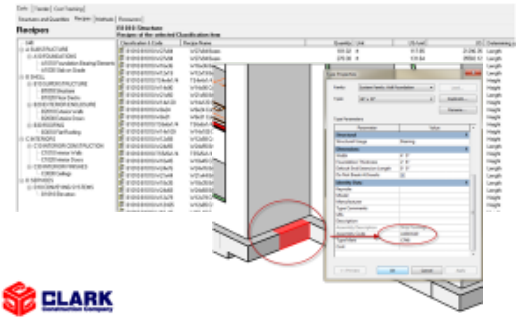
BIM PROJECT EXAMPLES - Firekeepers Casino

CLARK

BIM PROJECT EXAMPLES – Firekeepers Casino

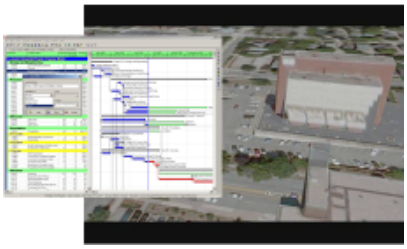
- Model information tied to a database



CLARK

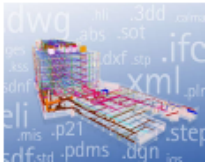
BIM PROJECT EXAMPLES – Ann Arbor City Hall Expansion

- Used Revit + Google Earth, showing model at different stages in construction (4D)
- Image taken from Google Earth (sketchup models)



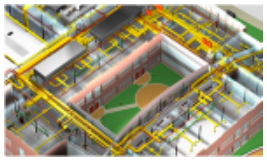
The Common Misunderstandings

- **THERE IS NO SUCH THING AS A MASTER MODEL!!!** What this means is you will never have one model that encompasses all of the detail each of the individual project team members have in their stand alone models used from design to fabrication. Each Project will have a FEDERATED Model
- Each team member should use those applications that work best for their scope of work.
- You Don't need to all be in the *same software* to *collaborate*. Technology now allows for work to be done on the same model by various team members all over the globe.



BIM INTEROPERABLITY

- Collaboration between the disciplines that come to play in the design, production, construction and management of buildings.
  - The most important (but not the only) technology vehicle for collaboration is IFC-based information exchange



IFC

buildingSMART International Home of openBIM http://www.buildingsmart.com/

BIM INTEROPERABLITY

SOLIBRI
Model Checking

Autodesk Revit · AutoCAD · Quickfor
MEP


Architecture

An IFC OPEN Solution

Trelligence · dRofus
Planning

Energy

VINTOCON · VICO SOFTWARE
FM, Construction

NEMETSCHEK Allplan · NEMETSCHEK Scia · TEKLA Structures · FEM-Design · Autodesk Revit · ETABS · SAP2000 · SDS/2
Structural

BIM INTEROPERABLITY

- IFC (Industry Foundation Classes)
  - http://www.buildingsmart.com/bim
- COBie (Construction Operations Building Information Exchange)
  - http://www.wbdg.org/resources/cobie.php
- NBIMS (National BIM Standard)
  - http://www.buildingsmartalliance.org/index.php/nbims/
- Green Building XML (gbXML)
  - http://www.gbxml.org

BIM MANUFACTURERS OBJECTS

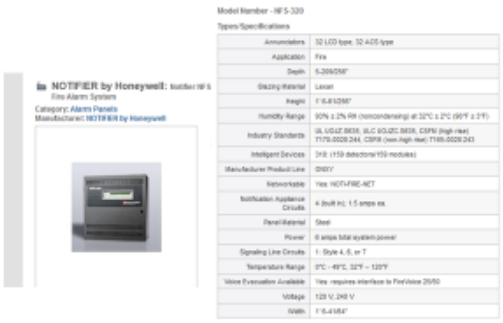
- Adoption of BIM is driving the migration of A/E/C to 3D CAD platforms where advanced visualization, simulation, and analysis software tools have pushed the product selection process earlier than ever before.
- Now, manufacturers have begun to create high-quality, digital product models that contain an array of useful product information and performance characteristics, and are fully compatible with the BIM process. Giving manufacturers an opportunity to influence the product selection process and increase the odds that design professionals will specify your products into *designs—a potentially tremendous competitive advantage.*

BIM MANFACTURERES WEBSITES

Websites with modeling objects being leveraged today:

- http://seek.autodesk.com/
- http://smartbim.com/SmartBIMObjectFinder/ObjectFinder.aspx#area=2

BIM MANFACTURERES EXAMPLE



BIM MANFACTURERES EXAMPLE

Life Cycle Benefit

Because of the Silos the Cost of Interoperability Annually = $0.23/SF

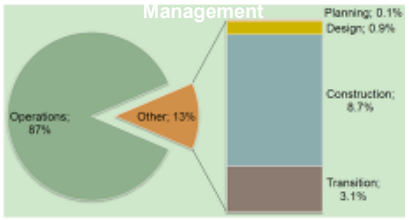
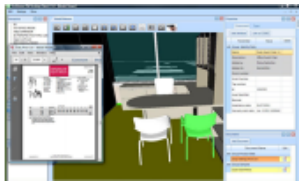


Chart from the Healthcare BIM Consortium Kick-off Meeting Presentation July 29, 2010 –

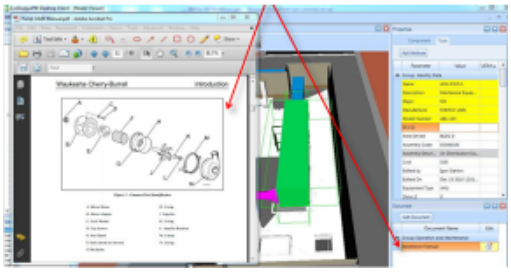
Real Life BIM / FM Business Cases

- Maintenance Work Order Management
- Emergency Service Request / Disaster Recovery
- Energy Systems Analysis / "Greening of Facilities"
- Visual Work Orders
- Leasing Preconstruction and Analysis
- Visual Inventorying / Asset reconciliation
- Facility Condition Assessment
- Life Safety Assets Inspections



Maintenance Work Orders

- Maintenance Work Order Management: equipment's corresponding documents are attached and can be accessed immediately



Facility Data That Could Be Included in BIM

- Planning scenarios and site information
- Architectural program
- Floor plans
- Space functions
- Classified areas, vaults etc.
- Area calculations
- Volume calculations
- Engineering calculations
- Specifications
- Contract documents
- Legal description
- Change orders
- Supporting documentation for litigation
- Shop drawings
- Procurement documents
- Progress photographs
- Alarm diagrams
- Warranty data
- Invoices
- Purchase requests
- Cost Estimates
- Organizational occupants
- Personnel lists
- Seating plans
- Handicap designation
- Network diagrams
- Hazardous materials
- Operating manuals
- Maintenance records
- Inspection records
- Electronic 3D model
- Simulations
- Continuation of operations plans
- Disaster Recovery Plans
- Contingency plans
- Furniture inventory

BIM APPLICATION DEMO - ArchiCAD

BIM APPLICATION DEMO - Navisworks

How Do We Begin Using BIM in Our Company?

- Form a dedicated group to take responsibility
- Outsource and observe the process
- Evaluate software, most have free trails
- Start small, pick a project
- Make a simple plan, stick to it
- Leadership commitment

Need to Have a Plan

It's All about PLANNING:

to get exactly what you need when you need it "No More No Less"

- Establish Who is to Model What and When
- Outline the LOD throughout the process
- Create the Execution Plan and then Manage It

BIM Guides

Getting Started: Reading

GSA BIM Guide
http://www.gsa.gov/portal/category/21062

NBIMS – National BIM Standard
http://www.buildingsmartalliance.org/index.php/nbims

Digital Building Lab @ Georgia Tech
http://bim.arch.gatech.edu/

AECbytes
http://www.aecbytes.com/index.html

Getting Started: Software

Autodesk
http://usa.autodesk.com/building-information-modeling/

Graphisoft
http://www.graphisoft.com/products/archicad/

Bentley
http://www.bentley.com/en-US/Solutions/Buildings/About+BIM.htm

Tekla BIM Sight
http://www.teklabimsight.com/

Some Final Important thoughts on BIM

"In 10 years, we will be living in a BIM world. It's our new reality."
Cosima Crawford
Chief Engineer
New York City Transit Authority

- BIM is not just a 3D package it is an Overall Process
- BIM gives power back to designers.
- BIM means a complete set of information, not just a single drawing.
- The more mature the model the more usable it is – but any collected data is better than how we do business today
- Some BIM models are not currently interchangeable between BIM software packages.
- BIM addresses the complete life-cycle of a project.
- Higher Quality Designs -Enhanced Coordination & Interference Checking
- Better Estimates - Accurate Quantity take-offs
- Consistency in product - Integration of standards models and materials
- Cost Savings
  - Lower RFI's
  - Fewer Amendments
  - Reduced Construction Change Orders
  - = **Better Buildings**

BIM Accomplishes

- Reduction in field changes, tightened subcontractor bids, and improved information flow throughout the design and construction process.
- Clarity in design communications based on BIM visualization platforms. Three dimensional presentations of information allow everyone to see the project components and how they work together. This quickly and clearly conveys ideas and intent.
- Higher quality design that is not delayed during construction because of rework.
- ***= Better Built Buildings***

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This concludes
Introduction to BIM
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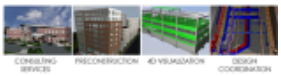

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