BIM Basics & Benefits

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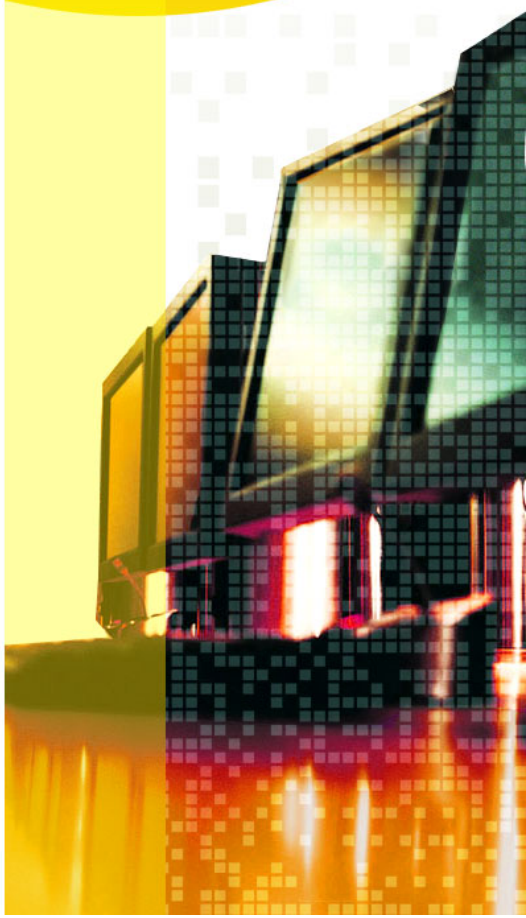
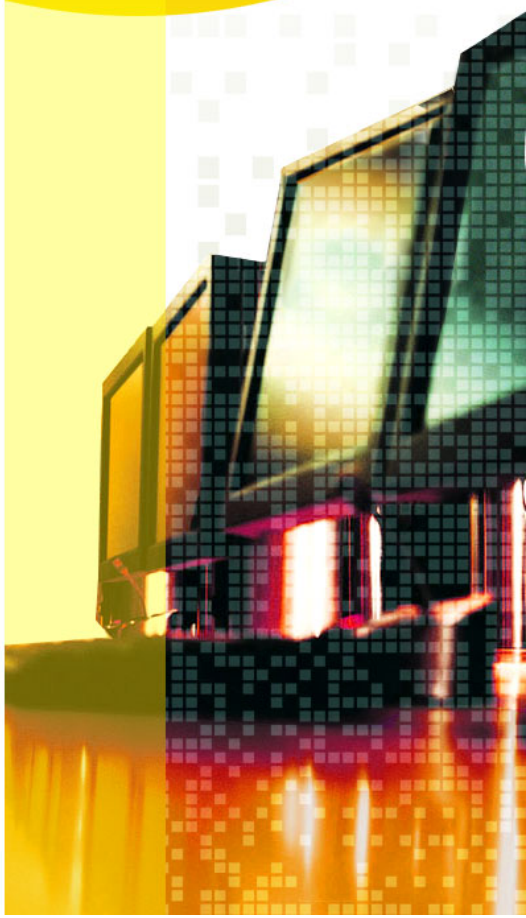
What is BIM?

- National BIM standard definition of BIM Building Smart Alliance (BSA)
  - A Building Information Model (BIM) is a *digital representation of physical and functional characteristics of a facility...and a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition*.



What is BIM?

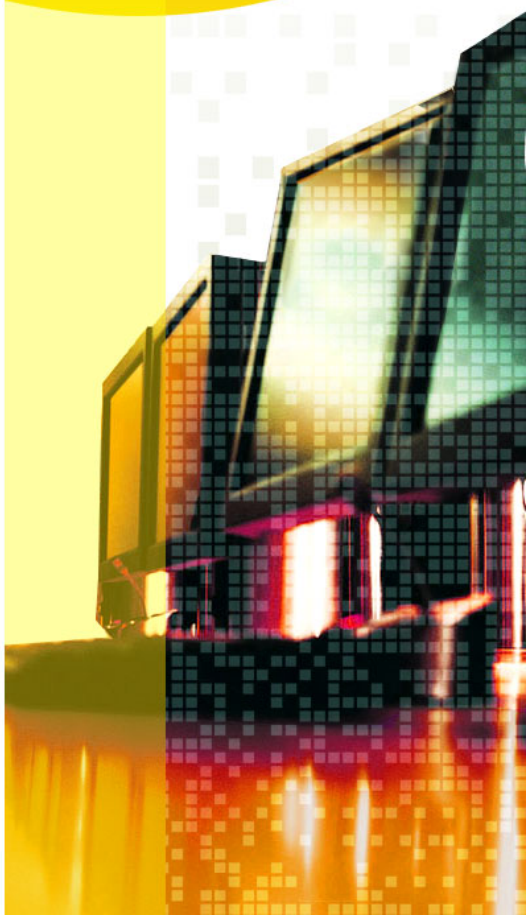
- AIA California Council
  - A basic premise of BIM is a collaboration by different stakeholders at different phases of the lifecycle of a facility to insert, extract, update or modify information in the BIM process



What is BIM?

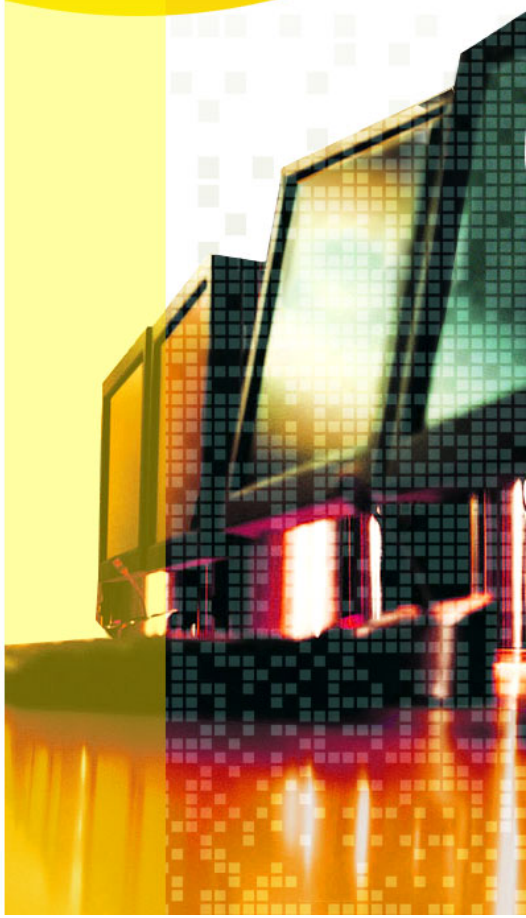
- ***Key Words:***

…shared…knowledge…
…information…decisions
…inception onward…
…collaboration



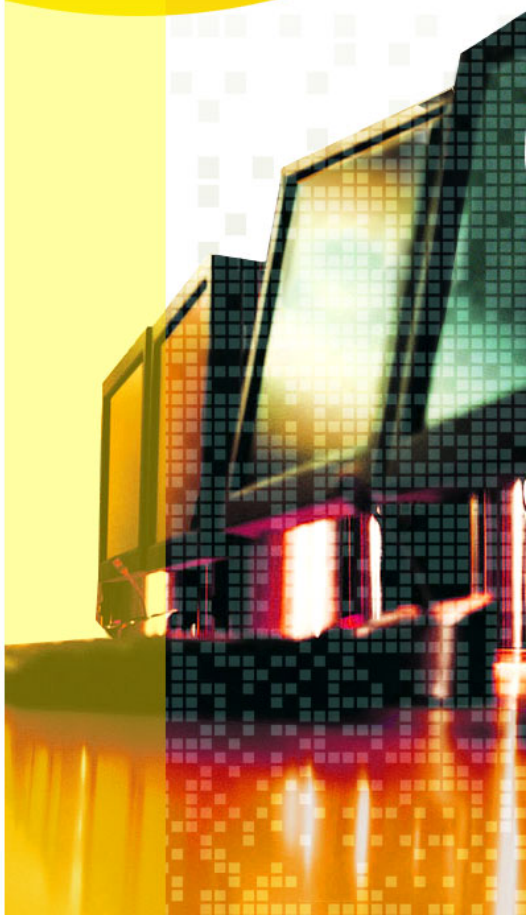
What is BIM?

- AGC of America
  - Building Information Modeling is the development and use of a computer software model to simulate the construction and operation of a facility. The resulting model, a Building Information Model, is a data rich, object oriented, intelligent and parametric digital representation of the facility, from which views and data appropriate to various users' needs can be extracted and analyzed to generate information that can be used to make decisions and improve the process of delivering the facility.



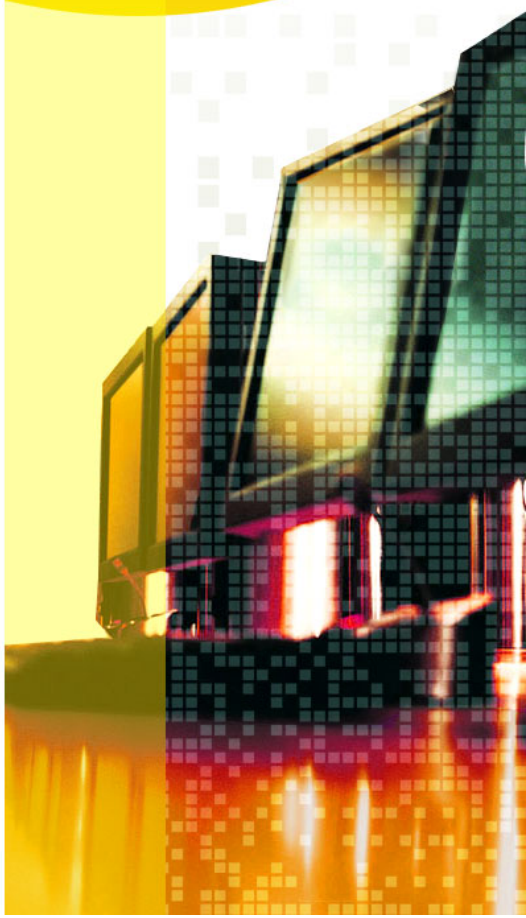
What is BIM?

- A BIM is a lifecycle information collection point for a facility
- A BIM allows for the creation of facility information relationships
- A BIM is focused on saving resources (dollars, time and materials) during each phase of the facility life cycle
- The more mature the model the more usable it is – but any collected data is better than how we do business today



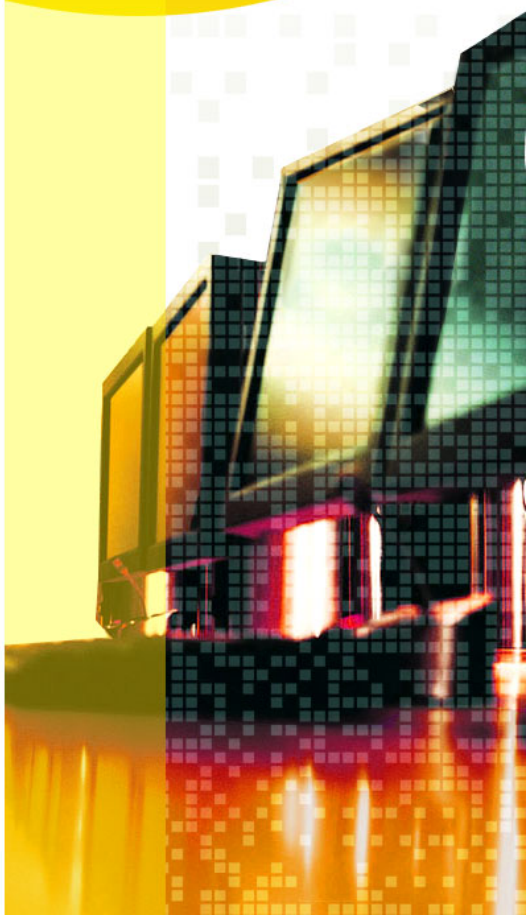
What is BIM?

- Basic BIM
  - Check for Collisions
  - Resolve conflicts
  - Visual aid/ Model
- Full BIM
  - Yet to be realized
  - Involves 4-D (time) & 5-D (cost) &…X-D



IS IT BIM???

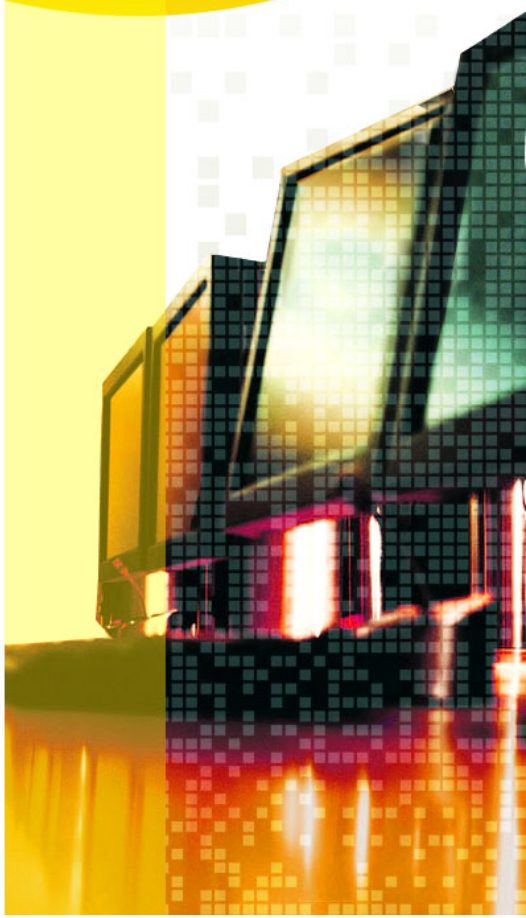
- Is drawing in 3-D BIM?
  - NO
- Is downloading from CAD to FAB BIM?
  - NO
- Is linking schedule (time) to a model BIM?
  - YES
- Is having product information in the model BIM?
  - YES



WHAT IS BIM?

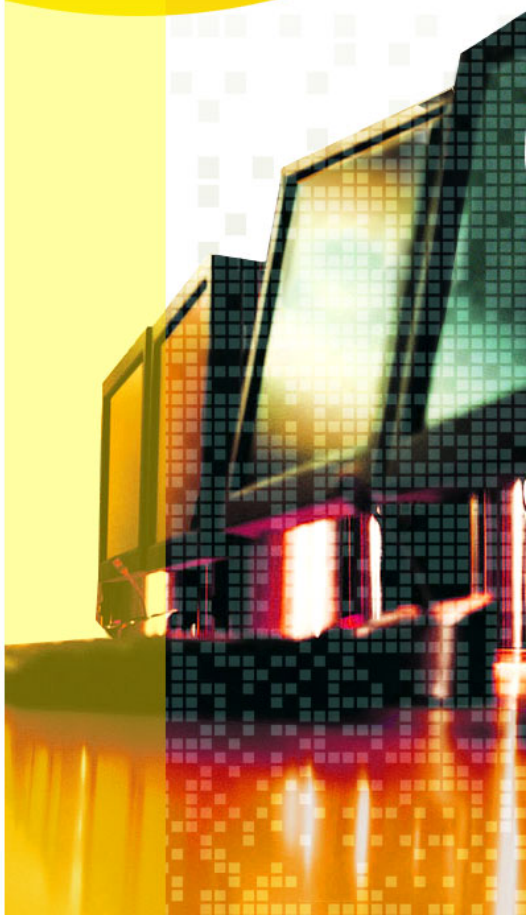
- Simply put BIM is a digital representation of the physical and functional characteristics of a building that is shared/used by all stakeholders to eliminate waste and increase efficiency.

- BIM is not about the B or M it is about the I...INFORMATION

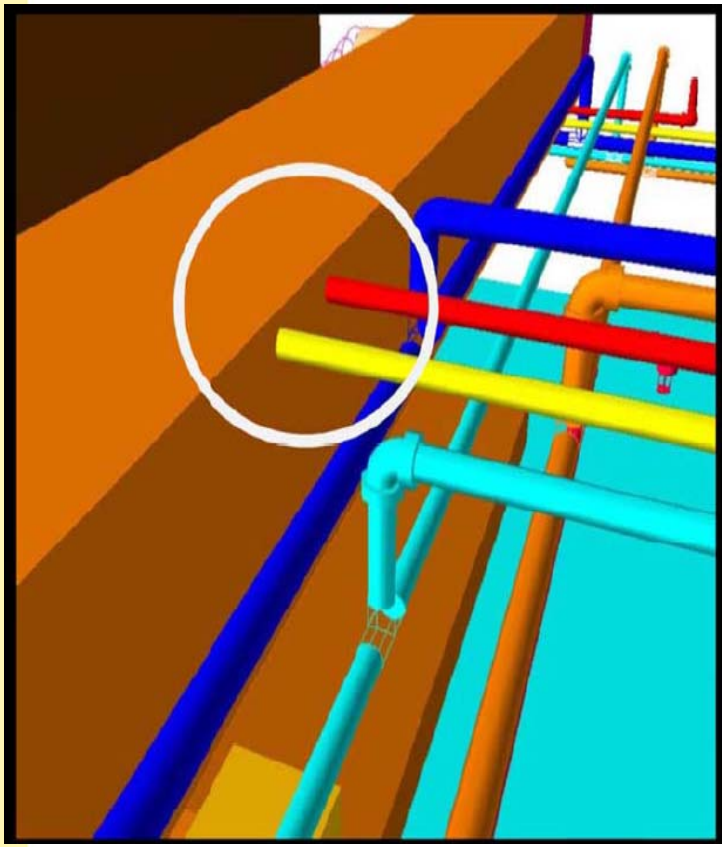


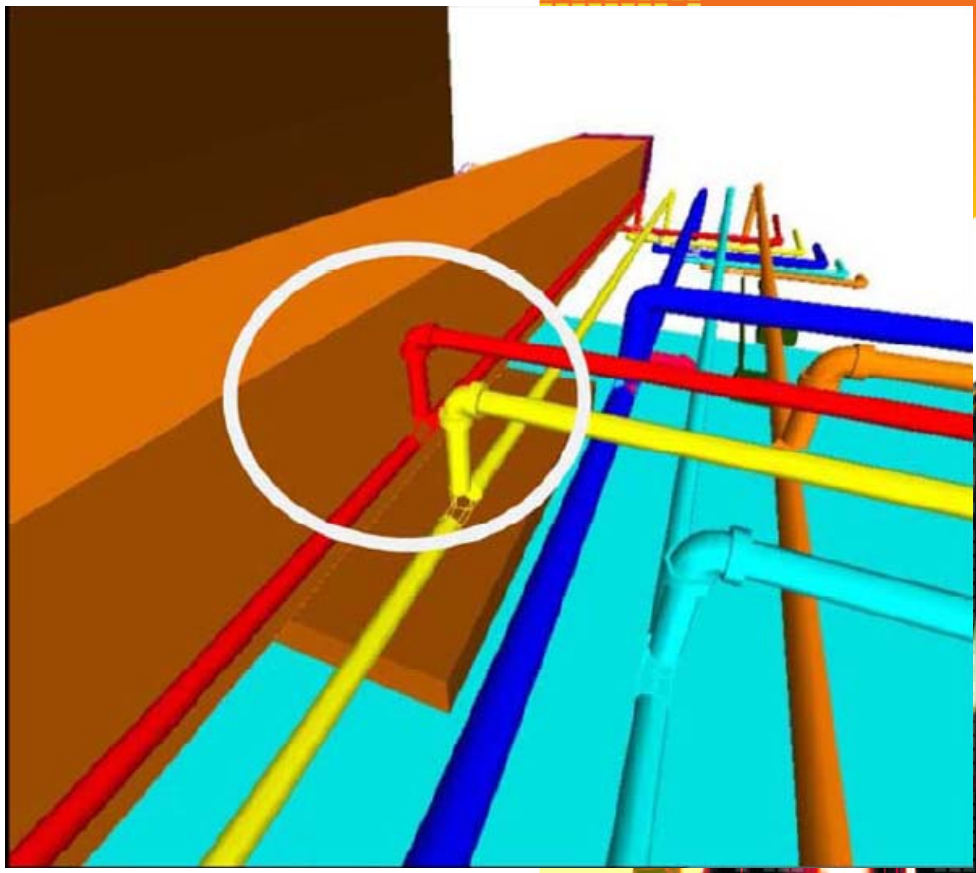
Key Concepts of BIM

- It is a database – not just 3D drawings
- It is about sharing information through a model with all disciplines
- Refers to a model but it is really a process
- Ultimate communication tool – VISUAL
- Connects formerly disconnected info sources
- Collaboration to the N^{th} degree
- Enabler for LEAN construction



Basic BIM





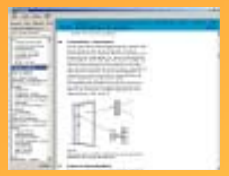
Conflict resolution

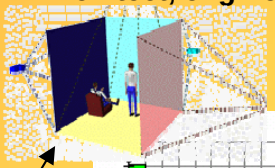
Life-Cycle (Full BIM)

Laws and regulations
-Building regulations
-Building specifications

CAD software
-Drawings, calculations
-Architect, engineer,…

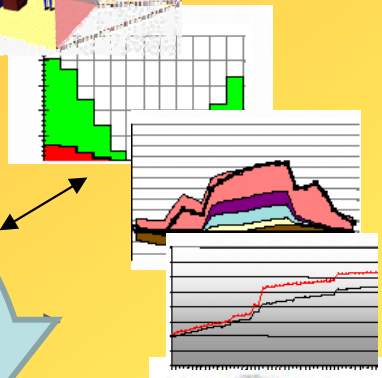
Knowledge databases
-Best practise knowledge
-Own practice





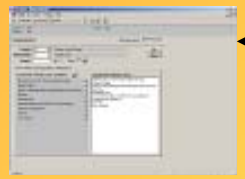
VRML
-Visualisation, 3D models

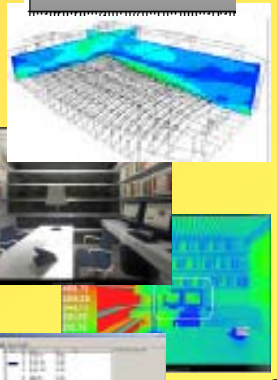
Briefing
-Functional req.
-Estimates
-Conditions
-Requirements



Simulations
-Comfort
-Ventilation, heating
-Life cycle cost
-Light, sound
-Insulation
-Fire, usage
-Environment
-Life time predictions

Demolition, refurbishment
-Rebuild
-Demolition
-Restoration

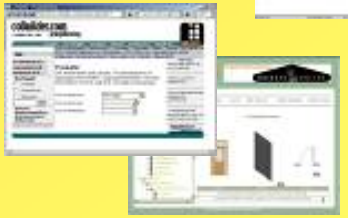




Facility management
-Letting, sale, operations
-Maintenance
-Guaranties

Specifications
-Specification sheets
-Classification standards
-Estimates, accounting

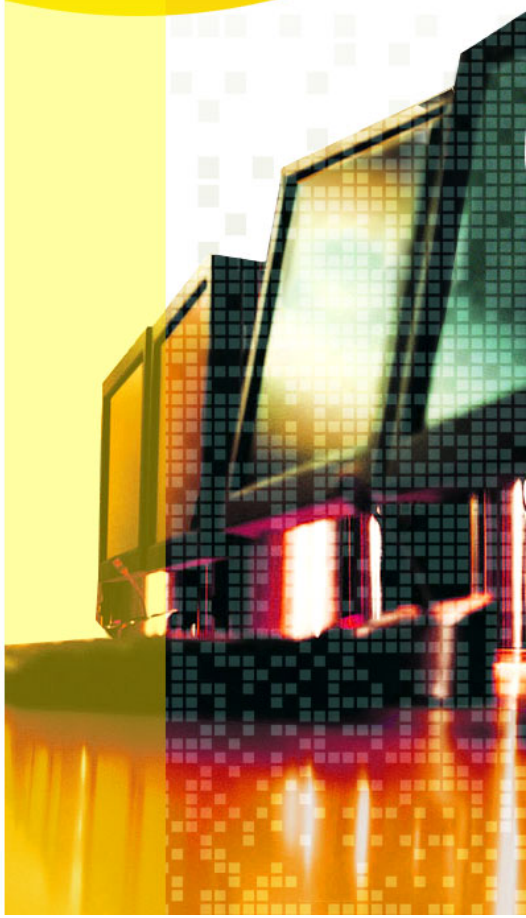
Construction management
-Scheduling
-Logistics, 4D



Procurement
-Product databases
-Price databases

Myths

- BIM is only for large projects
- BIM is only for large contractors
- BIM will take work away from me or my firm



Basics of BIM - Hardware

Minimum Acceptable

Processor:
Intel® Core™ 2 Duo P8400 (2.26GHz, 3M L2 Cache, 1066MHz FSB)

Operating System:
Windows 7 with Business Downgrade to XP Professional

LCDs:
15.4" Wide WXGA (1280x800) Display

Graphics:
NVIDIA Quadro FX 770M, 512MB

Memory:
2.0GB (3.0GB Recommended), DDR2-800 SDRAM, 2 DIMMS

Approximate Cost:
Desktop: $1,200 - $1,500
Laptop: $1,500 - $2,000

High End

Processor:
Intel® Core™ 2 Quad QX9300 (2.53GHz, 12M L2 Cache, 1066MHz FSB)

Operating System:
Windows 7 – 64-BIT SP1, With Media

LCDs:
17" UltraSharp™ Wide Screen WUXGA (1920x1200)
RGB LED LCD Display

Graphics:
NVIDIA Quadro FX 3700M, 1.0GB

Memory:
16.0GB, DDR3-1066MHz SDRAM, 4 DIMMS

Approximate Cost:
Desktop: $1,500 - $2,500
Laptop: $2,000 - $3,000

Basics of BIM - Software

What to Look For in A Software Solution

- Simplicity
- Functionality
- Interoperability
- Collaborativeness
- Vendor Longevity
- Support / Training
- Environment

$4,000 - $7,000 (Single License)

Base AutoCAD Packages:

AutoCAD MEP
Revit MEP Suite

$10,000 - $12,000 (Single License)

3RD Party Autodesk Add On Software Packages:

Bentley
CAD Duct
InteliCAD
NavisWorks
PractiCAD
Quickpen
Shop Data

What are the barriers?

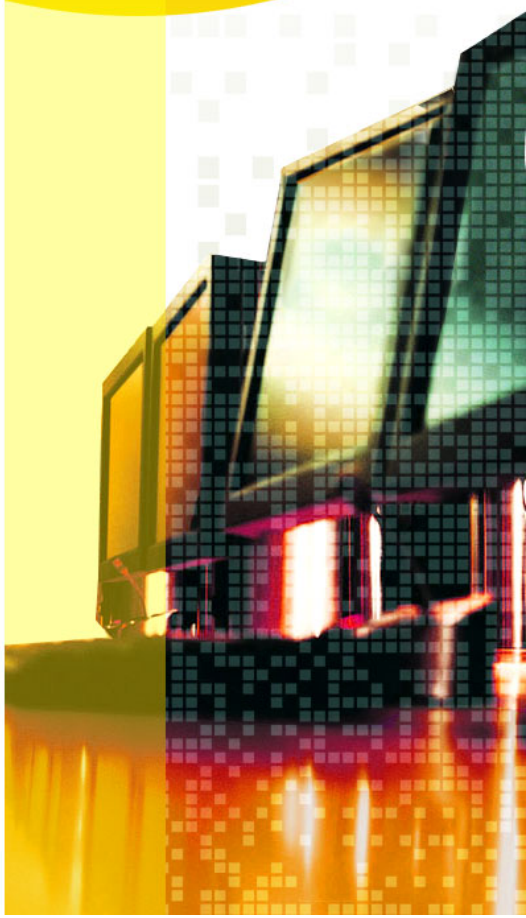
My costs will skyrocket if I get into BIM - FALSE

- There is a learning curve
- Payback is less than 6 months

Technology changes so fast it intimidates us - TRUE

* 1992 First Commercial text message sent

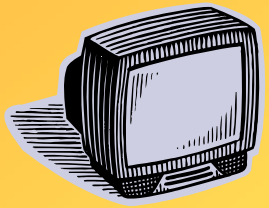
- Today the total number of text messages sent and received every day exceeds the population of the planet



What are the barriers?

* In 2006 2.7 Billion Google Searches every month
    - Today there are 31 Billion every month
    - What did we do B.G.?
* Number of years it took to reach 50 Million Homes

Radio
38 years



TV
13 years

Internet
4 years

IPOD
3 years

Facebook
2 years

Face Reality

"Companies not reacting quick enough to the changing demands of both technology and our economy will fail."

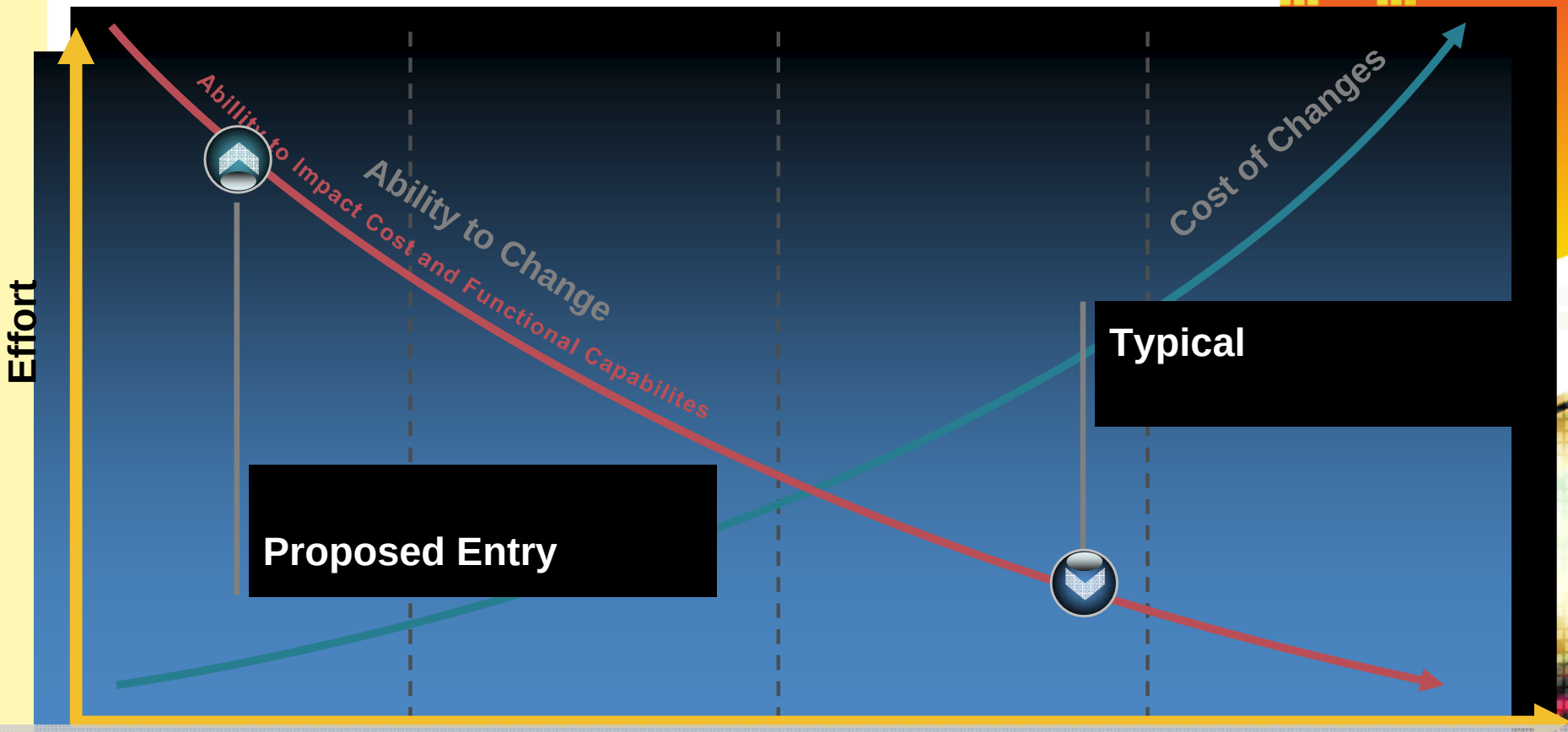
Tom Schleifer, Ph.D.
HVAC Forum – SMACNA Convention 2006

Do you want to invest in?

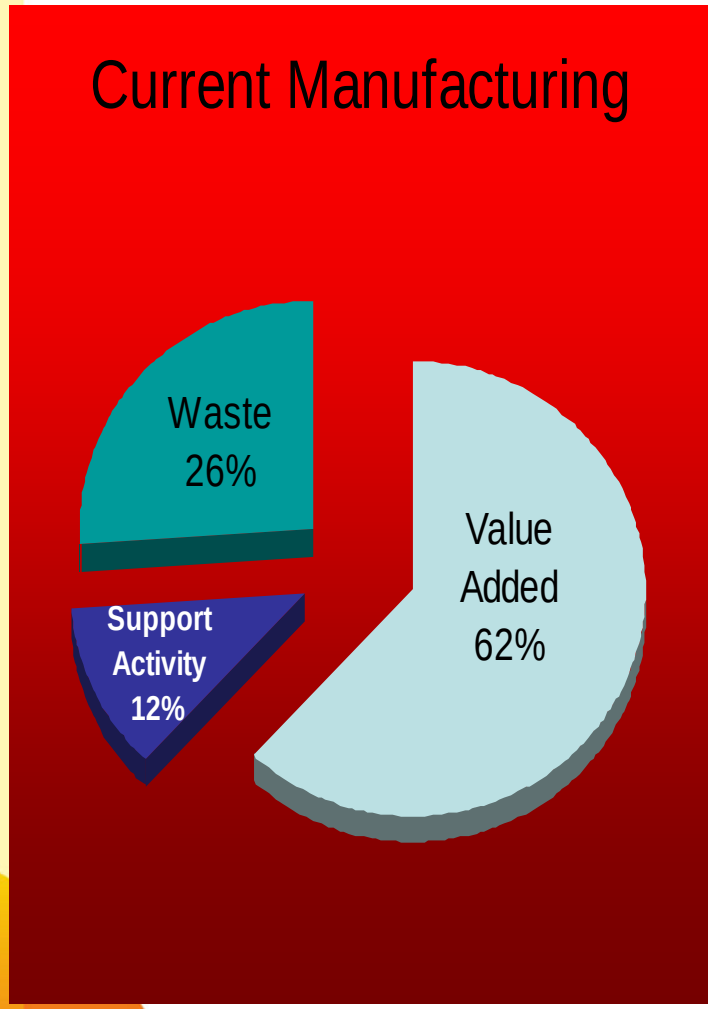
- Pay Phone Business
- Fax Machine Business
- Typewriter Business
- U.S. Postal Service

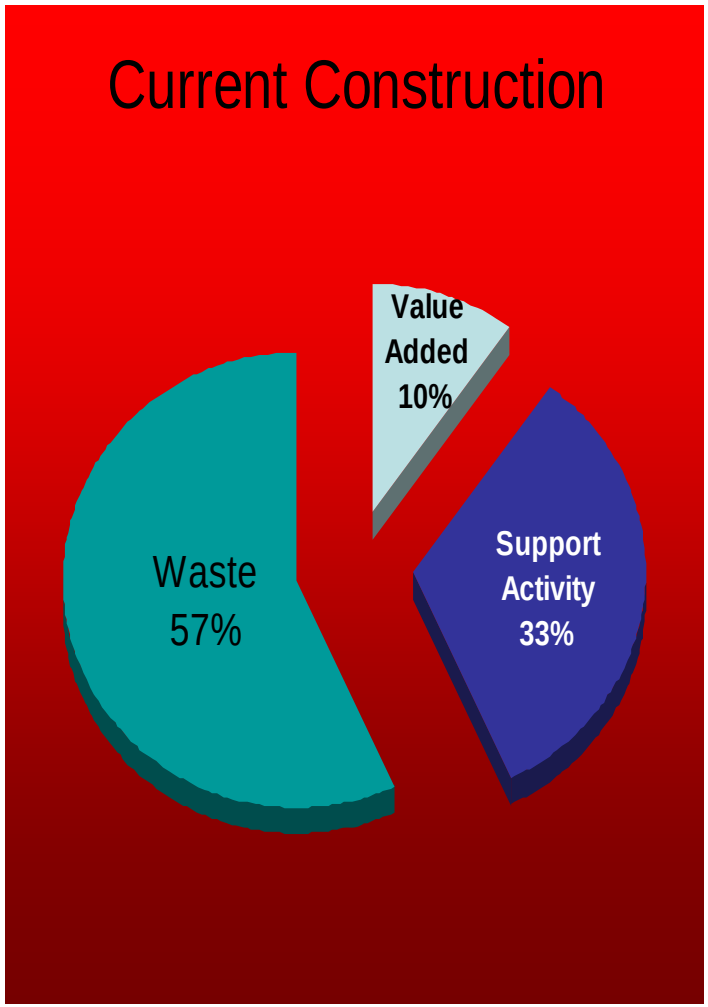
Our customers are demanding we implement BIM.

What are the Benefits?



What are the Benefits?

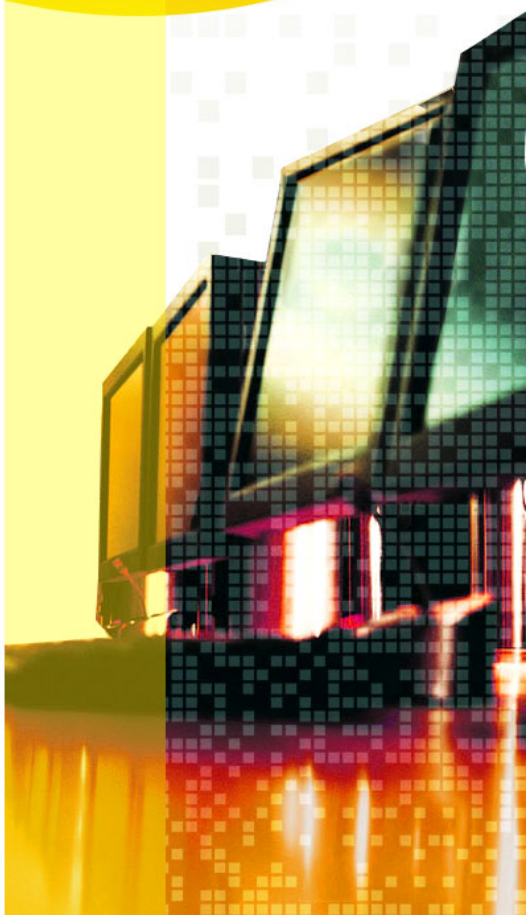




Information from the Construction Industry Institute

What are the Benefits?

- Interesting Information:
  - World Construction Industry 2008 = $4.8T (ENR-Estimate)
  - U.S. Construction Industry 2008 = $1.3T (ENR-Estimate)
  - Difference in waste between construction and manufacturing (57%-26% = 31%)
  - 31% of $1.3T is about $400 Billion
  - Even just a 10% improvement would save $40 Billion

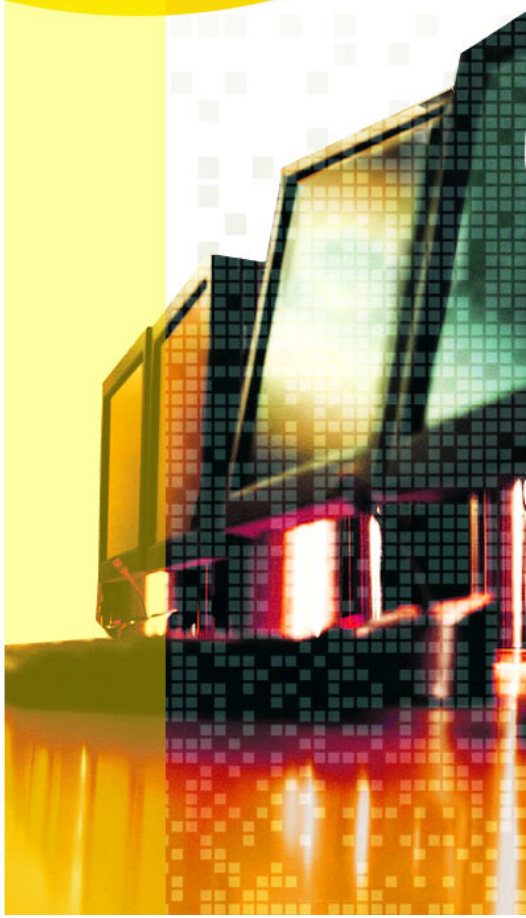


What are the Benefits?

- The Design team (Architects and Engineers)
  - Better overall finished product
  - Reduced RFI's
  - Happier customer (Owner)
  - Visual model
    - Better/more info for decision making
    - Evaluate multiple scenarios quickly
  - Remodel or retrofit

What are the Benefits?

- Inspectors
  - Automated inspections (Smart Codes)
  - Virtual inspections (before and during construction) easier in 3-D
  - Check “soft” collisions
  - Confirm installation and application with manufacturer’s instructions



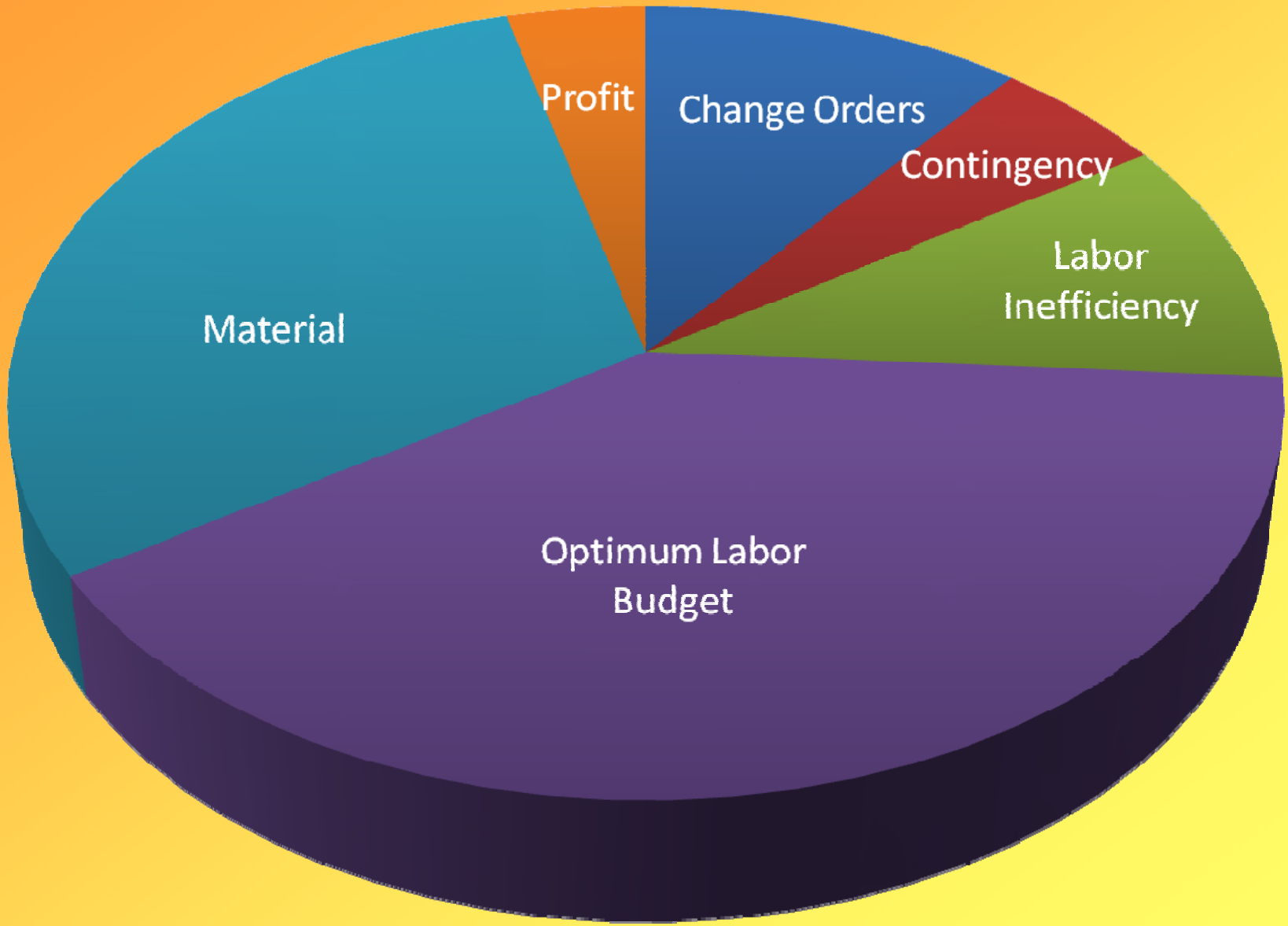
What are the Benefits?

- The Build team
  (Contractors, manufacturers, and suppliers)
  - Easier take-off – Shop drawings
  - Verify compliance with spec’s
  - Pre-fab reliability
  - Fewer RFI’s
  - Sequence
  - Coordination
  - Remodel or retrofit

What are the Benefits?

- Owners and Facility Mangers
  - Digital Model of the entire building
  - Better information for decisions
  - Access to building history
  - Repairs and maintenance are easier
  - Able to pass information from “generation to generation”
  - Virtual training vs O.M.

Typical Subcontractor Bid



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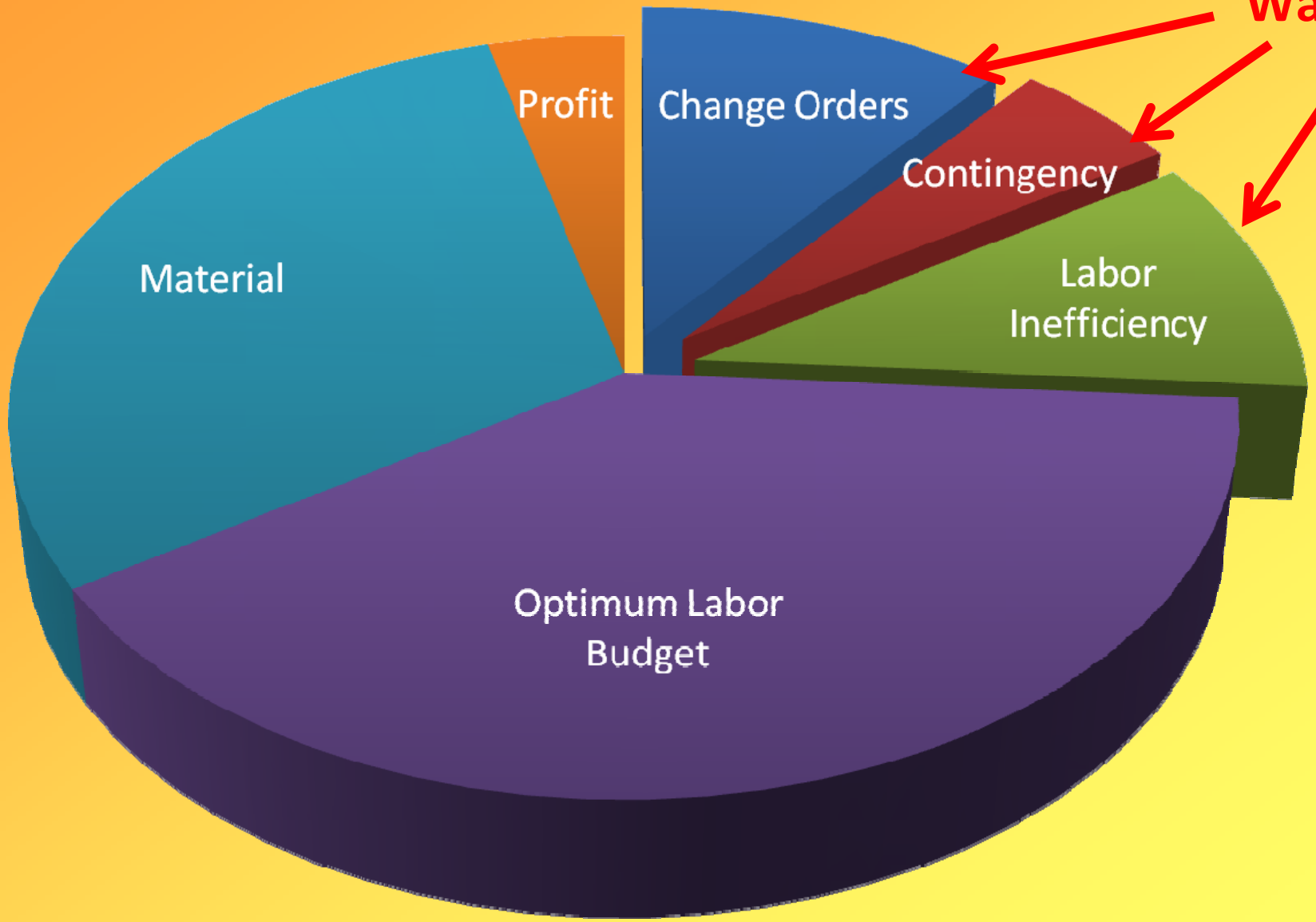
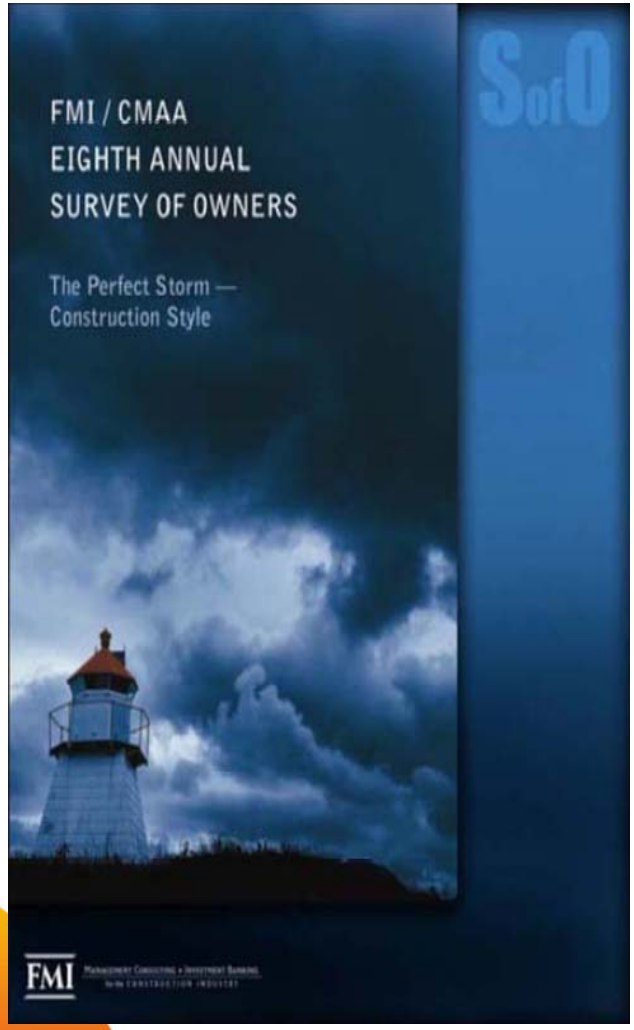


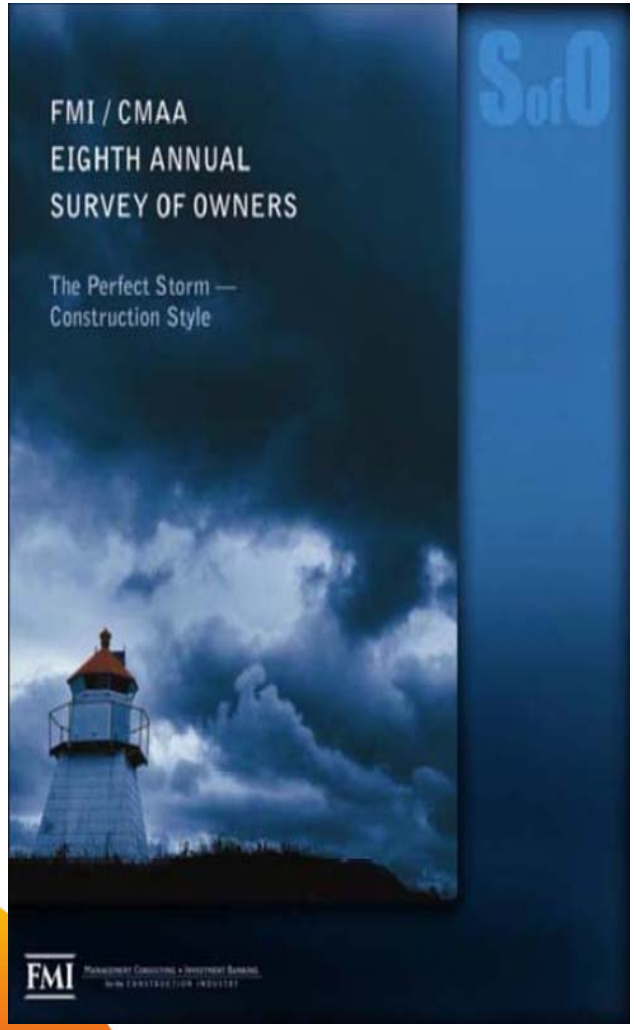
Owners say…



"We pursued BIM because of efficiency. BIM has the potential to provide us with a far more efficient operation, not only as part of design and construction but also in operations and maintenance. Accuracy is another main reason. BIM appears to offer greater accuracy than what our current practices produce."

Charles Hardy, AIA, CCM
Deputy Director
U.S. General Services Administration (GSA)
Office of Property Development

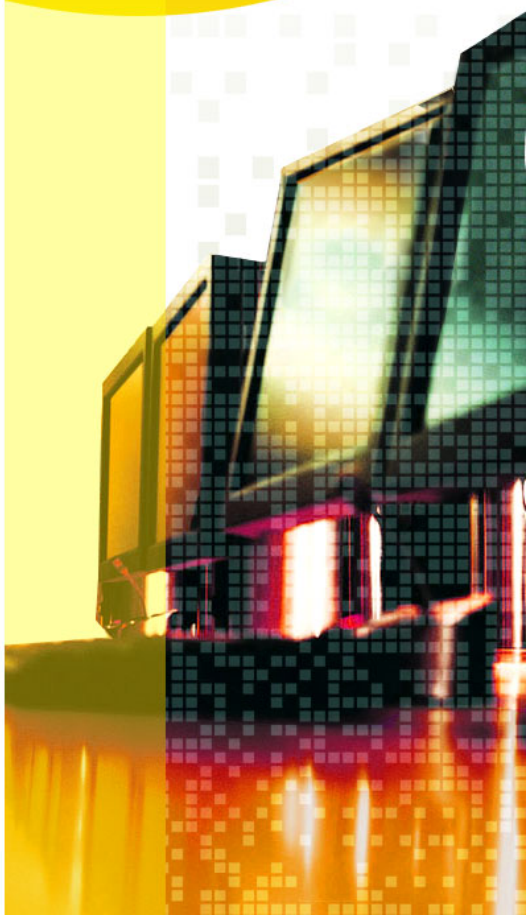
Owners say…



"With BIM we have successfully increased labor productivity, thereby lowering its net cost, changed or reduced the amount of materials used and wasted on a job site to lower their net cost, and modeled construction costs are more accurate to the point that some of the more expensive site options available became financially viable."

"Our team is so committed to the use of this tool that long time suppliers who are not or could not get onboard and demonstrate their readiness to use BIM were replaced in favor of new allies"

John Moebes, AIA
Director of Construction
Crate and Barrel



Everyone needs to be up to speed

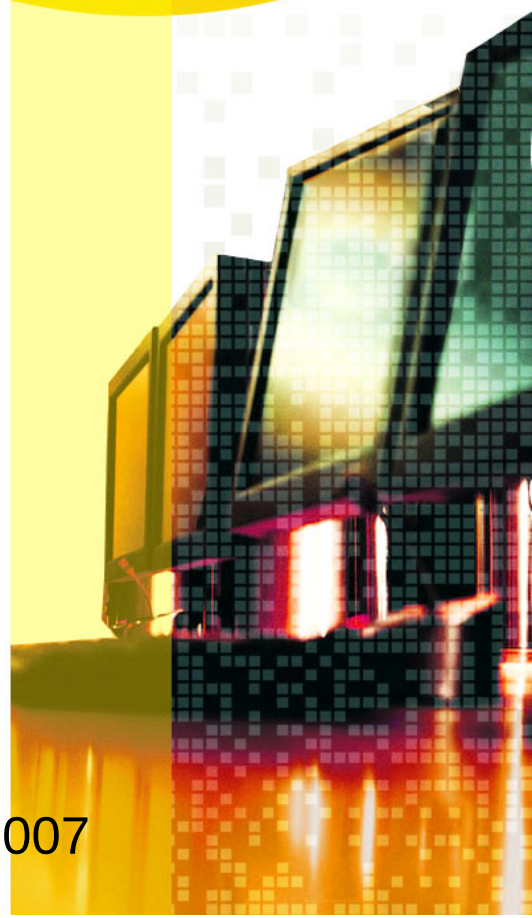
Concerns

Concerns

- Learning curve
- Who owns what?
- Legal issues
- Standards
- Cost ROI?

Concerns

- Too few firms are using BIM
- Cost associated with implementing tools
- Training time associated with BIM tools
- Cost of the software
- Lack of interoperability
- Unresolved issues concerning ownership and maintenance of the Model



McGraw-Hill Construction Research Analytics, 2007

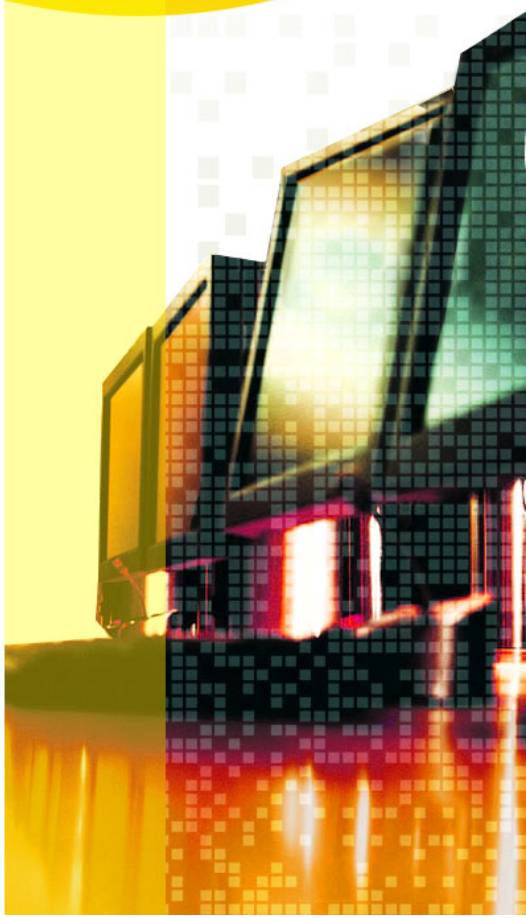
Concerns

- Lack of objective documentation showing the benefits
- Instability of electronic hardware
- Current legal contracts do not address BIM issues/Proprietary information
- Unclear roles for the participants

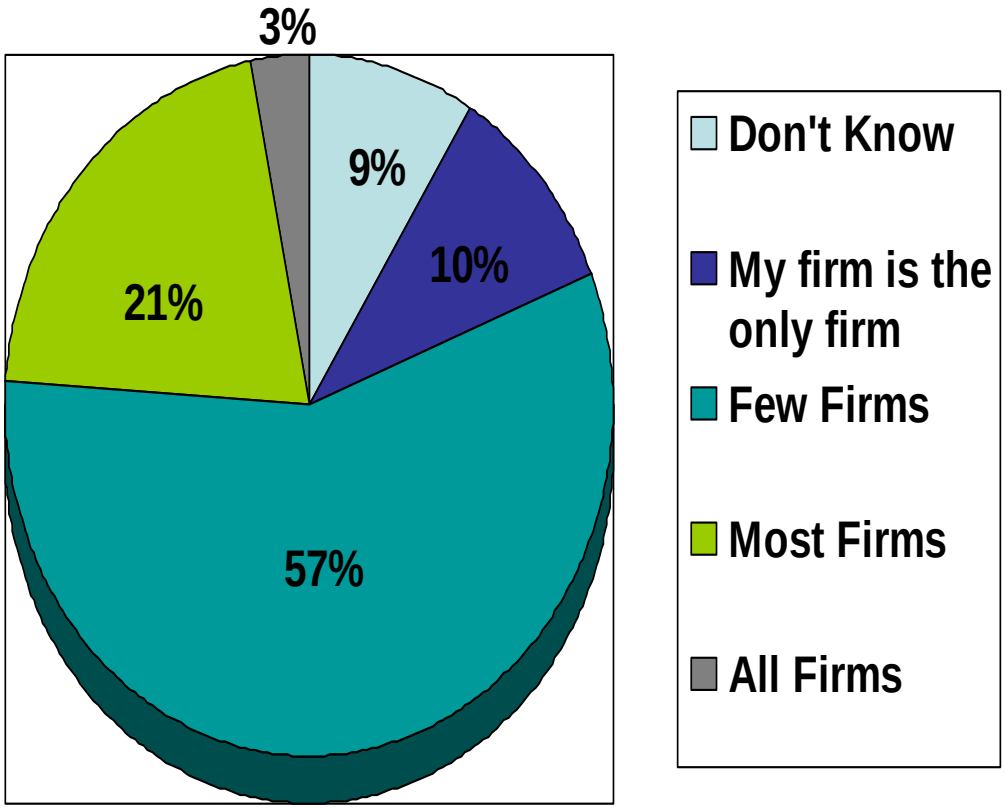
McGraw-Hill Construction Research Analytics, 2007

Other Roadblocks?

- Interoperability
- Shift in the traditional approach to construction
- Industry Support
- Too much information at the wrong time.



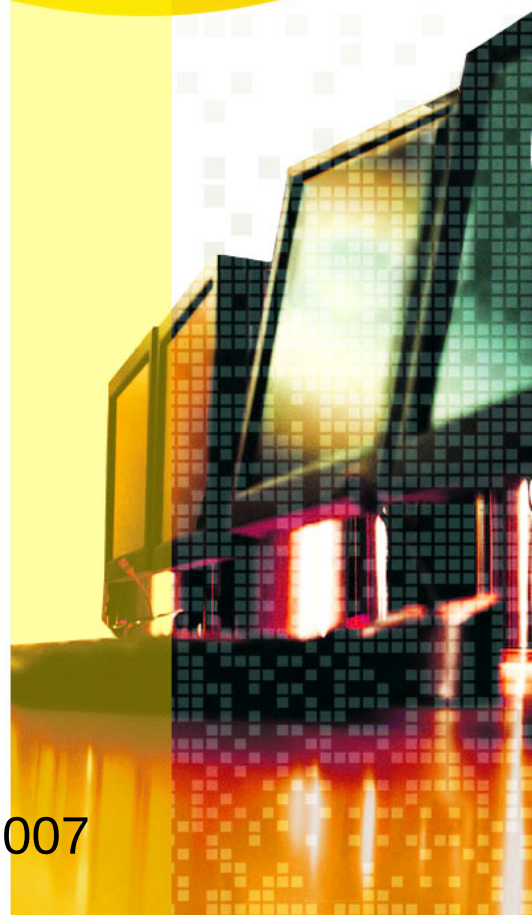
Firms Using BIM Software



McGraw-Hill Construction Research Analytics, 2007

Firms Using BIM software

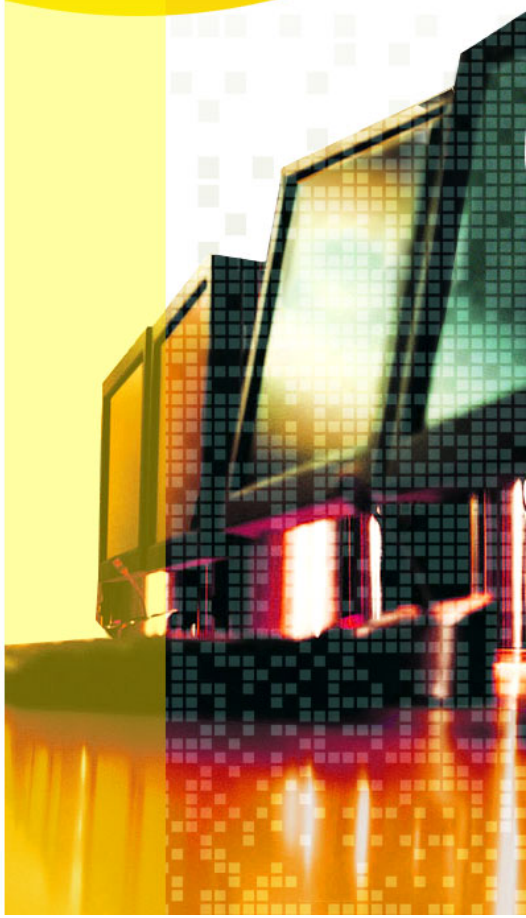
- Don’t Know
  - Architects 20%
- My firm is the only firm
  - Engineers 13%
- Few Firms
  - Owners 68%
- Most Firms
  - Contractors 27%



McGraw-Hill Construction Research Analytics, 2007

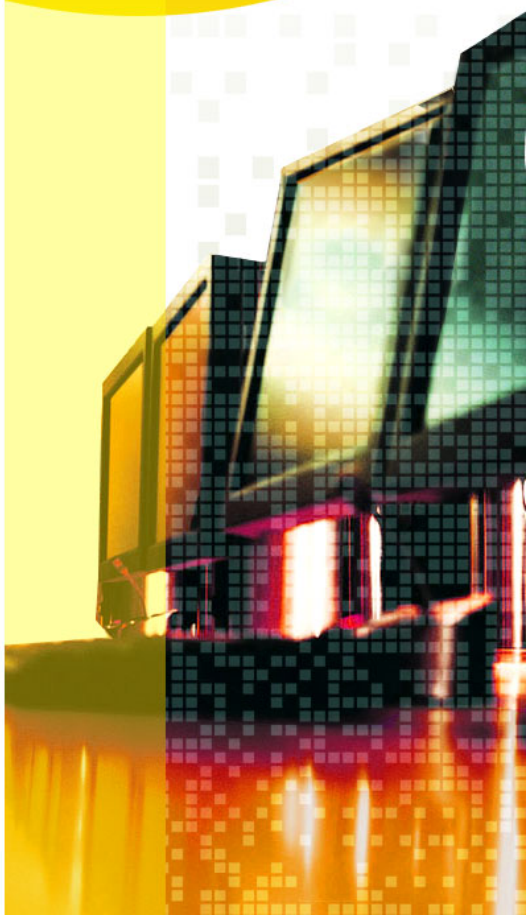
SMACNA and BIM

- Partner with NIBS / BSA to remove some roadblocks
  - Interoperability
    - Standards what can and can't (or won't) change
    - Standardized naming platform
  - File size manageability
  - Metadata, lockdown and security issues

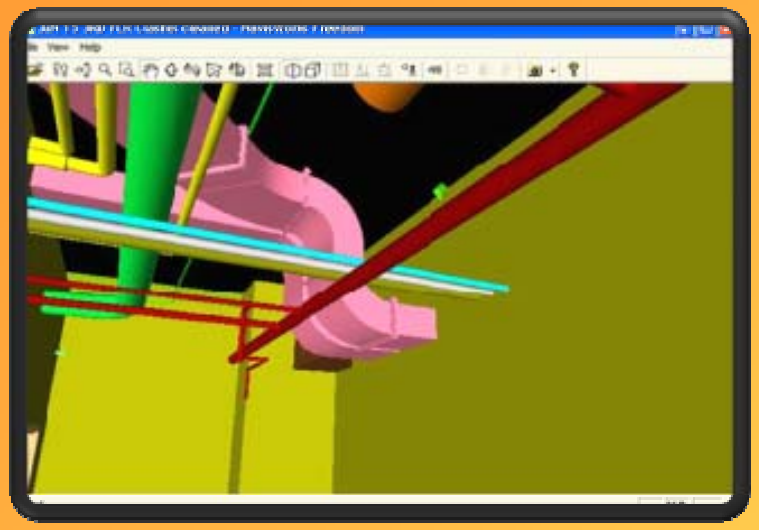


SMACNA and BIM

- Provide resources:
  - Website dedicated to BIM (Members Only)
    - BIM and Legal Contracts
    - White Paper for AIA and Consensus Docs
  - Links to MEP resources for BIM
  - Educational Resources
    - Webinars
    - Half day course on BIM and IPD
  - McGraw Hill SMART report sponsor
    - ROI
  - List serve / forum



Small Scale BIM Advantages



Download Duct Direct to Fabrication Equipment

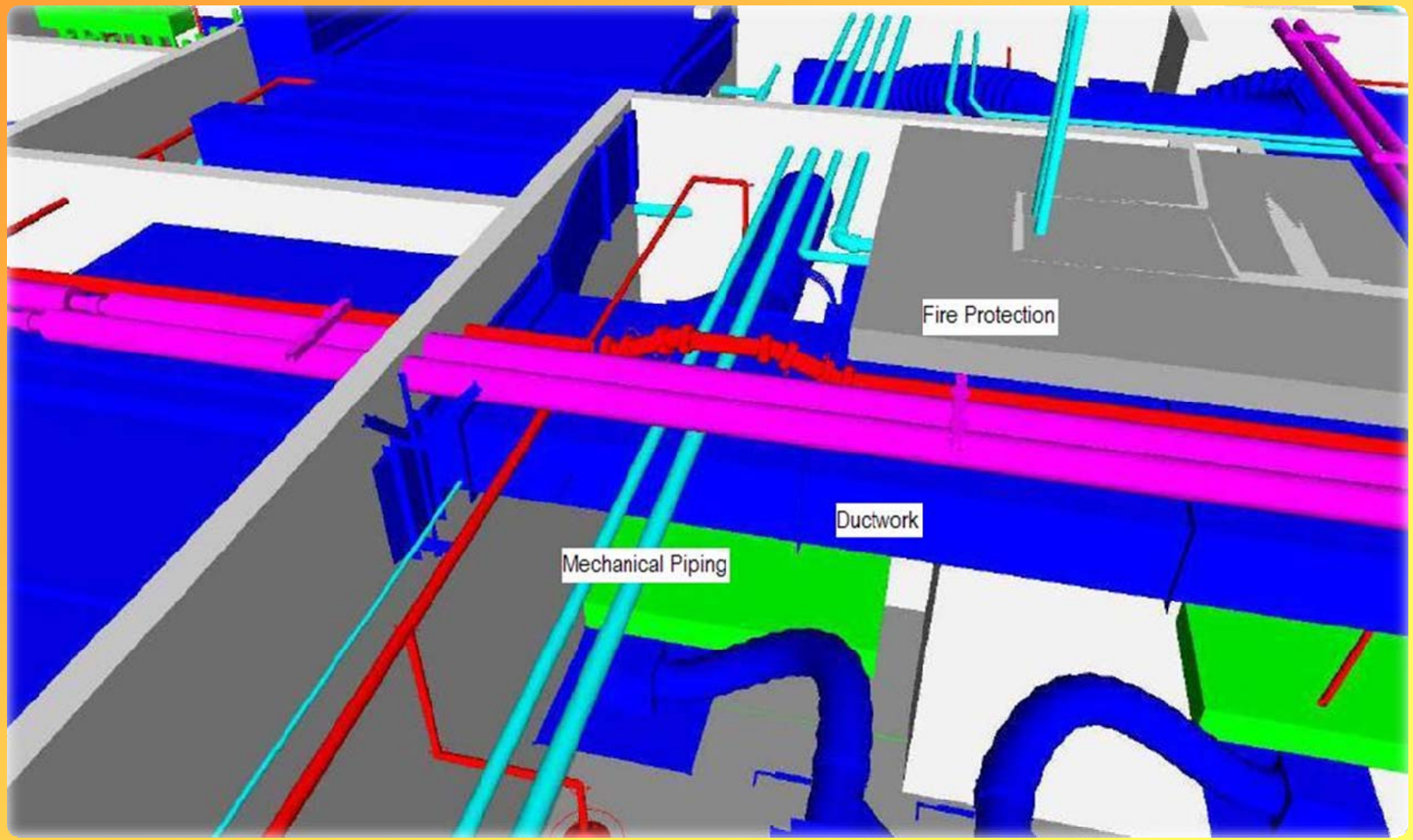
* Automated download – No “punch in”
* Eliminates human error in “punch in”

BIM allows us to utilize JIT – Just In Time Practices

* Less Duct Storage on Site – Less Clutter, Safer Site
* Eliminates Waste of Material Handling
* Eliminates Lost Pieces which require rework

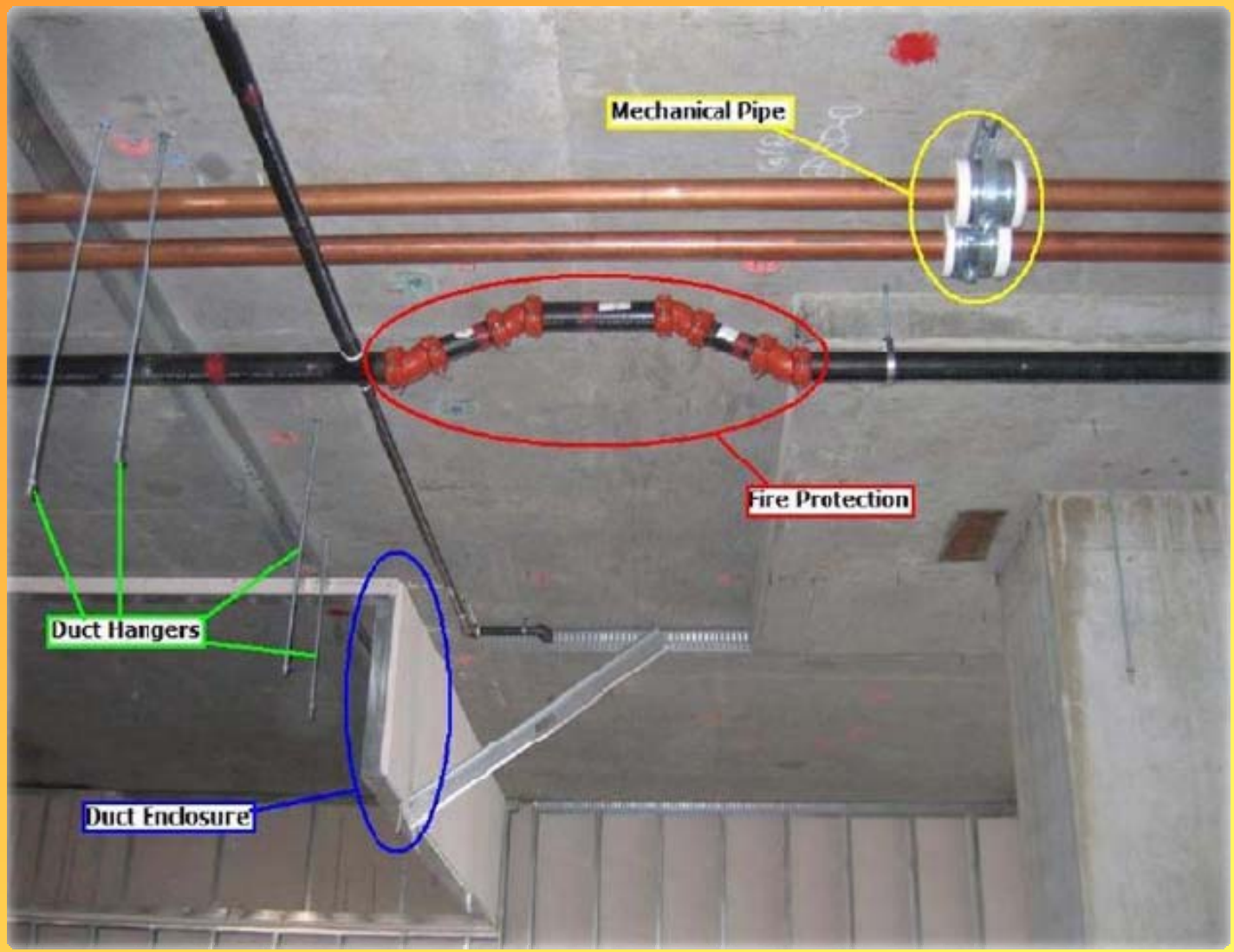
Small Scale BIM Advantages

Enabler for Lean Construction



Small Scale BIM Advantages

Enabler for Lean Construction



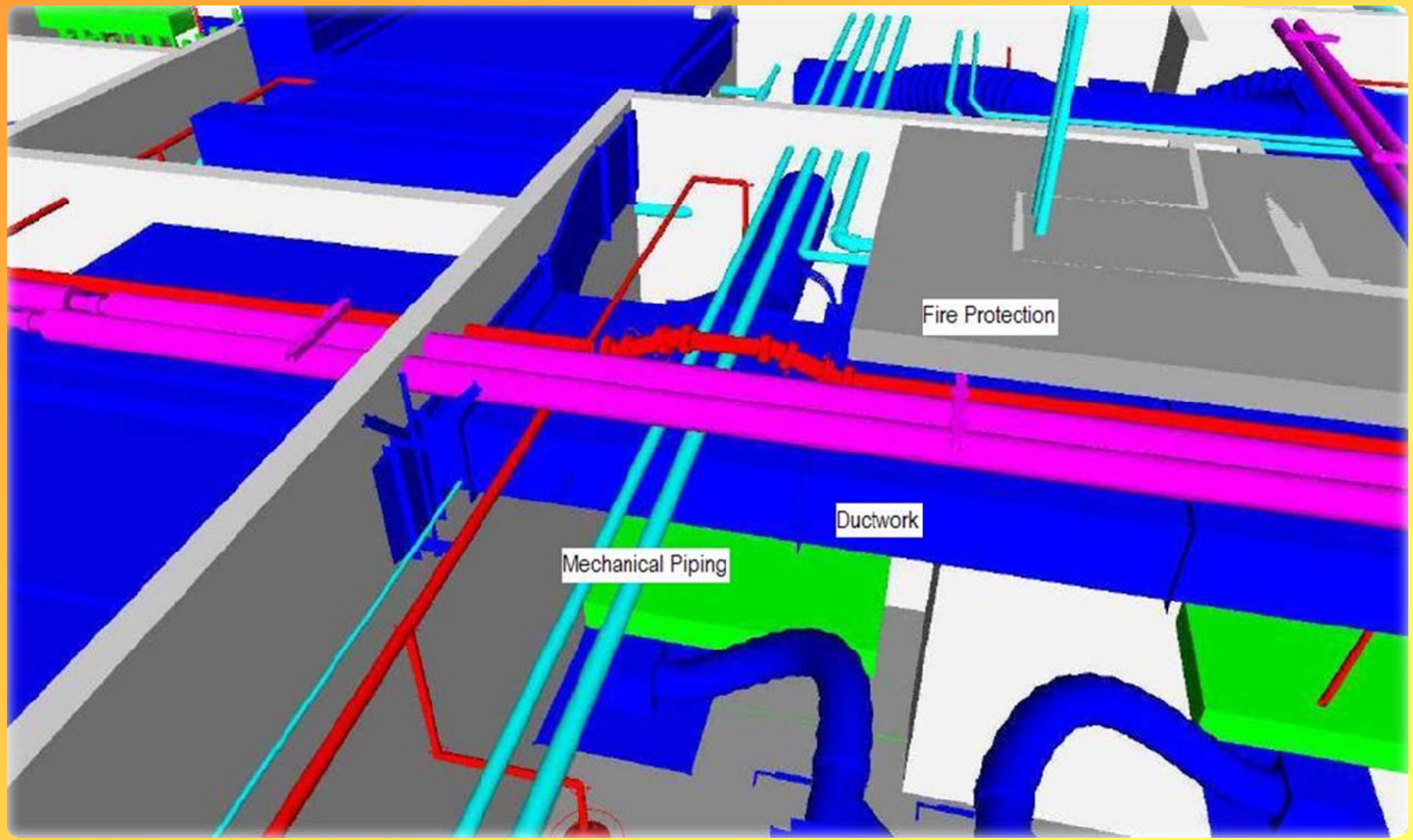
What in the world is the Fire Protection Contractor doing?

Small Scale BIM Advantages

Enabler for Lean Construction

Small Scale BIM Advantages

Enabler for Lean Construction



Small Scale BIM Advantages

Enabler for Lean Construction

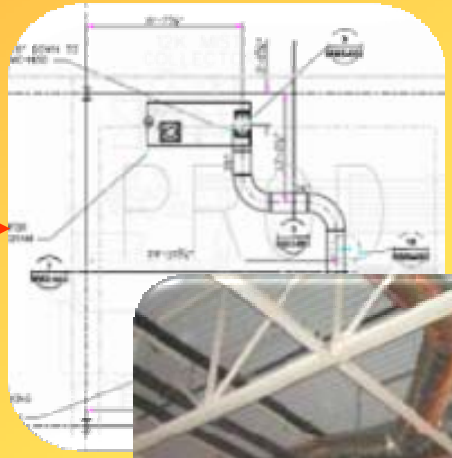
Pre-fabricated mechanical pipe assembly - ready for placement

Lean Principles – Design for Manufacturing

HVAC Sheet Metal – JIT Delivery

Fully coordinated HVAC model with steel and other MEP systems

Installation drawings from 3D Model.



JIT delivery & installation without field changes

Direct interface from fully coordinated 3D model to cutting table

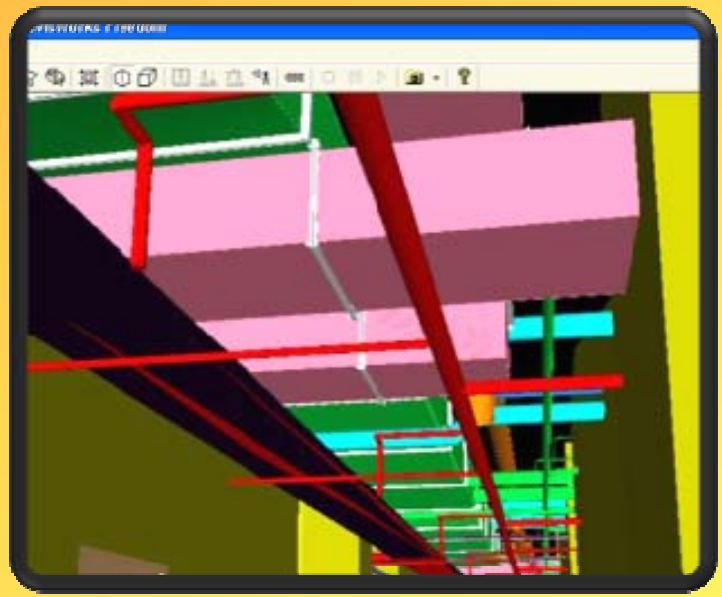
Potential to reduce raw material by up to 20%

Offsite fabrication in shop

Small Scale BIM Advantages

The Job Fits – The First Time

* Eliminates the need to field measure certain pieces due to collisions



*No Interferences = No Interruptions

* No Interruptions to work flow means higher productivity in the field

* Conflicts are resolved with less wasted time – check the model – little or no GC involvement

Small Scale BIM Advantages

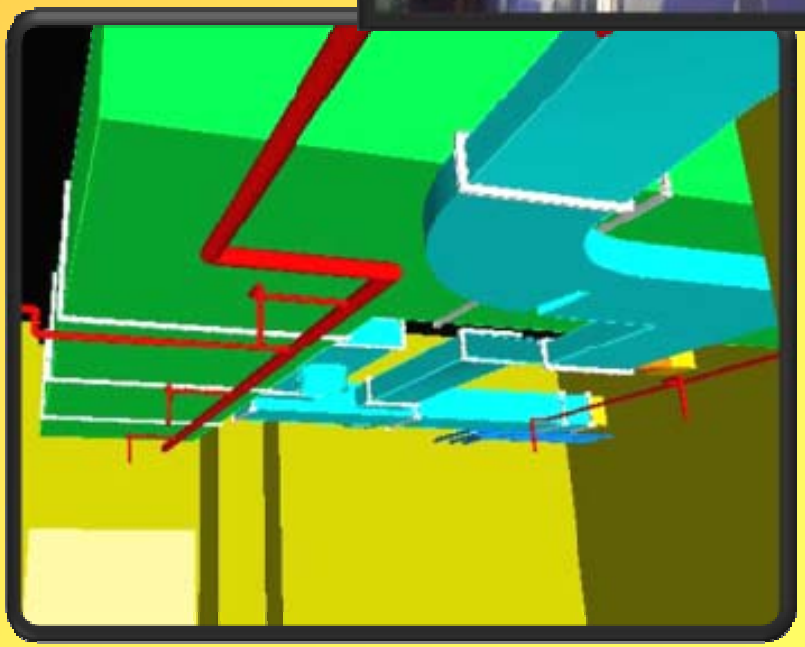
Eliminates Guesswork on Actual Productivity

* Subs Risk is in Field Labor

* If you eliminate uncertainties which negatively impact our productivity – there is less risk

* Less Risk = Lower Cost

* Hospital in Lansing – Increased productivity 18% in the bid due to BIM



Small Scale BIM Advantages

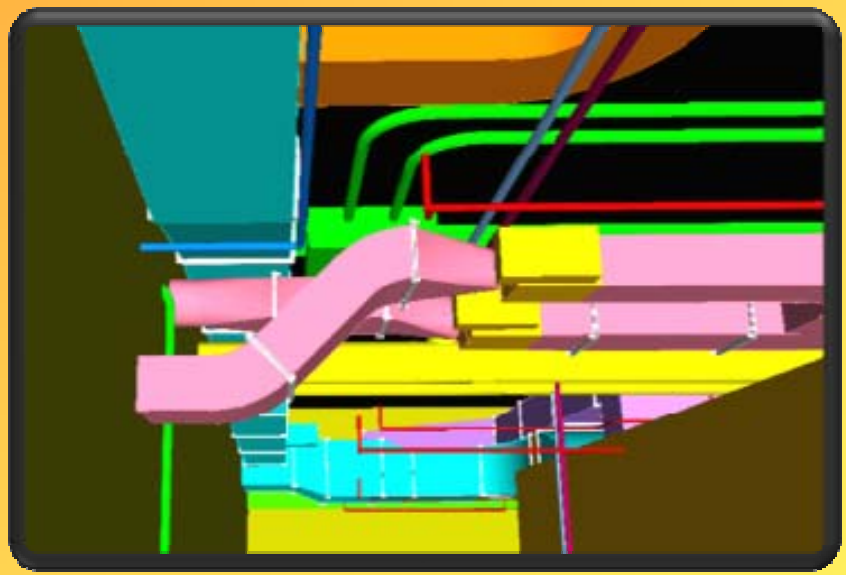
BIM makes Scheduling and Coordination Easier

*** Phase the 3D Modeling with the GC's schedule for Construction**

*** Completed Model is like a puzzle – it's clear what needs to be installed first**

*** Smoother Jobs = Faster Schedule**

*** Eliminates unnecessary Change Orders due to interferences**



*** Eliminates the need to "redo" as builts based on actual installation**

Small Scale BIM Advantages

BIM Allows for:

*** Less wasted materials and rework**

*** Less Interferences/interruptions to work flow which allows everyone to be more productive**

*** Less Risk = Lower Cost**

*** Fewer/No Change Orders**

*** Better Trade Coordination and Sequencing – Less Congestion of Trades**

*** Safer Job – Less clutter, fewer lifts, etc.**

Want to learn more about BIM

- National Institute of Building Sciences (NIBS)
  - JBIM –Journal of Building Information Modeling
  - Available FREE online

- SMACNA
  - Website – members only, links, video, papers
  - Local Chapter publications
    - http://sheetmetaljournal.com/ -free

Which technology would you invest in?

Thank You

Questions…