BIM Implications for Facility Management

Dana K. “Deke” Smith, FAIA
Executive Director, buildingSMART alliance

Birgitta Foster
Assisting Director, buildingSMART alliance

Moderator: Jennifer Wickwire, AIA
CAFM KC Advisory Group Member

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Executive Director, buildingSMART alliance
National Institute of Building Sciences

Birgitta Foster, (BSME,MBA)
Assisting Director for buildingSMART alliance (bSa)
National Institute of Building Sciences

Jennifer M. Wickwire, AIA, NCARB
Teradyne; CAFM Advisory Group Member

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Email: knowledgecommunities@aia.org

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Other Housekeeping Items:

- This event handout and recording will be posted on the CAFM home page:

  http://network.aia.org/committeeofcorporatearchitectsandfacilitymanagement/home/

- Please feel free to ask questions during the presentation through Chat !!!
  - Good ones will passed on to Deke & Birgitta for "insta" answers.
  - Bad ones will be ignored, or worse, ridiculed. ;-)

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Learning Objectives

1. Improve understanding of BIM and why is important to both the architecture and facilities management professions.

2. Provide insight and understanding of potential expansion of the architect's scope, roles, and opportunities to the client/customer as it pertains to maintaining the life of their facilities.

3. Discuss benefits of BIM to the facilities management profession and how BIM will fundamentally reshape their profession from leveraged knowledge of integrated technology to work flow processes.

4. Give participants, both architects and facilities management professionals, common understanding necessary to create a meaningful dialogue from project inception through the full life-cycle management of the facilities.

1.5 AIA/CES credit are available for this webinar

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Agenda

- What is happening in BIM up to and including Commissioning?
  - The Alliance
  - The need for involvement of the Facility Manager in the standards process
  - What we are able to deliver today – what may be available that they need to take advantage of.
- What are the current results after the hand-off, is this your current reality?
- How could we create a better outcome?

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Dana K. Smith, FAIA

- My Journey
  - Summer jobs as Surveyor, Draftsman, Asst. Field Engineer
  - Graduated VT 1974 – BArch - Generalist
  - Naval Facilities Engineering Command – Designer, Cost Engineering, Programming
  - Smith Group – Value Management Division
  - Naval Facilities Engineering Command – HQ Engineering Systems / NIBS Volunteer - NCS
  - Army Research Laboratory – Deputy CIO / Infrastructure
  - Office of Secretary of Defense – Installations & Environment / Chief Domain Architect
  - Executive Director buildingSMART alliance and BSSC Program Director / NBIMS

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Birgitta Foster
BSME, MBA

- **Fabricator**
  Caterpillar
  Project Eng
- **General Contractor**
  Project Mgr
- **Mechanical Contractor**
  Project Mgr
- **Owner :**
  National Lab, Facilities Dept
- **Organization :**
  building SMART alliance,
  Assisting Director
- **Manufacturer**
  Ingersoll Rand
  App Engr
- **Engineering & Construction**
  John Brown
  ME Dept

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National Institute of Building Sciences

- 1974 - Public Law 93-383, Sect. 809
  - Bridge between Private and Public Construction
  - Non-governmental – Unique 501c3 Organization
  - Unique in that it represents all disciplines in industry
  - Engineers, Contractors, Insurers, Unions, Manufacturers, Legal, Housing, Vendors, Owners, Consumers, State & Federal Government, Codes & Standards, and Testing

An Authoritative Source of Innovative Solutions for the Built Environment

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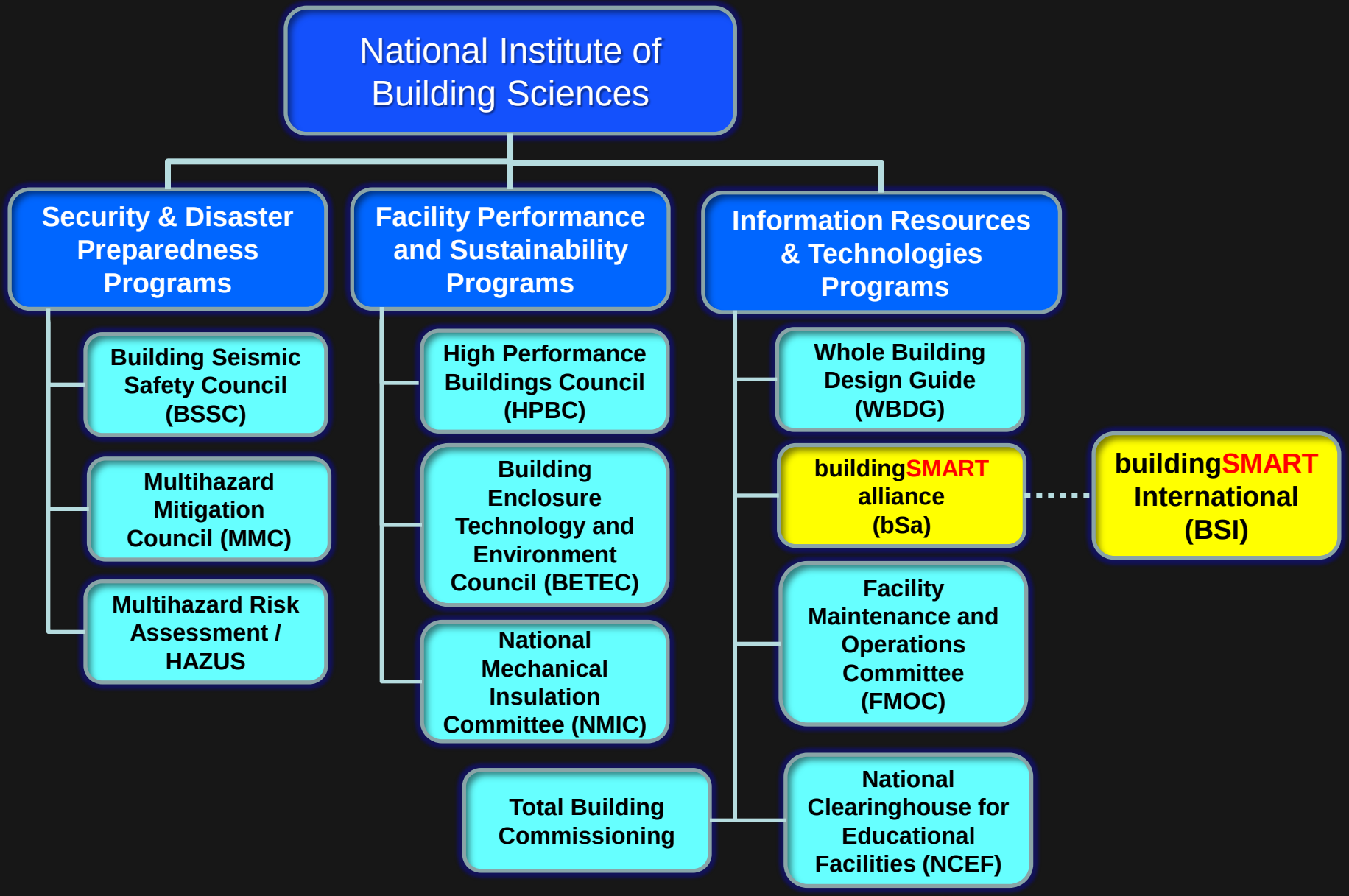

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AIA Changing Culture

Policy Statement:

- The AIA believes that all industry-supporting software must facilitate, not inhibit, project planning, design, construction, commissioning and lifecycle management. This software **must support** **non-proprietary, open standards** for auditable information exchange and allow for confident information exchanges across applications and across time. This is best accomplished through professional, public- and private sector **adoption of open standards**. The AIA encourages its members and other industry organizations to assume a leadership role in the ongoing development of open standards.

(approved December 2009)

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Memorandum of Agreement

- Work to further open BIM Standards
- Seat on bSa Board of Direction
- Develop of SPie Templates
- Coordinate through BIM Committee

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IFMA International Facility Management Association

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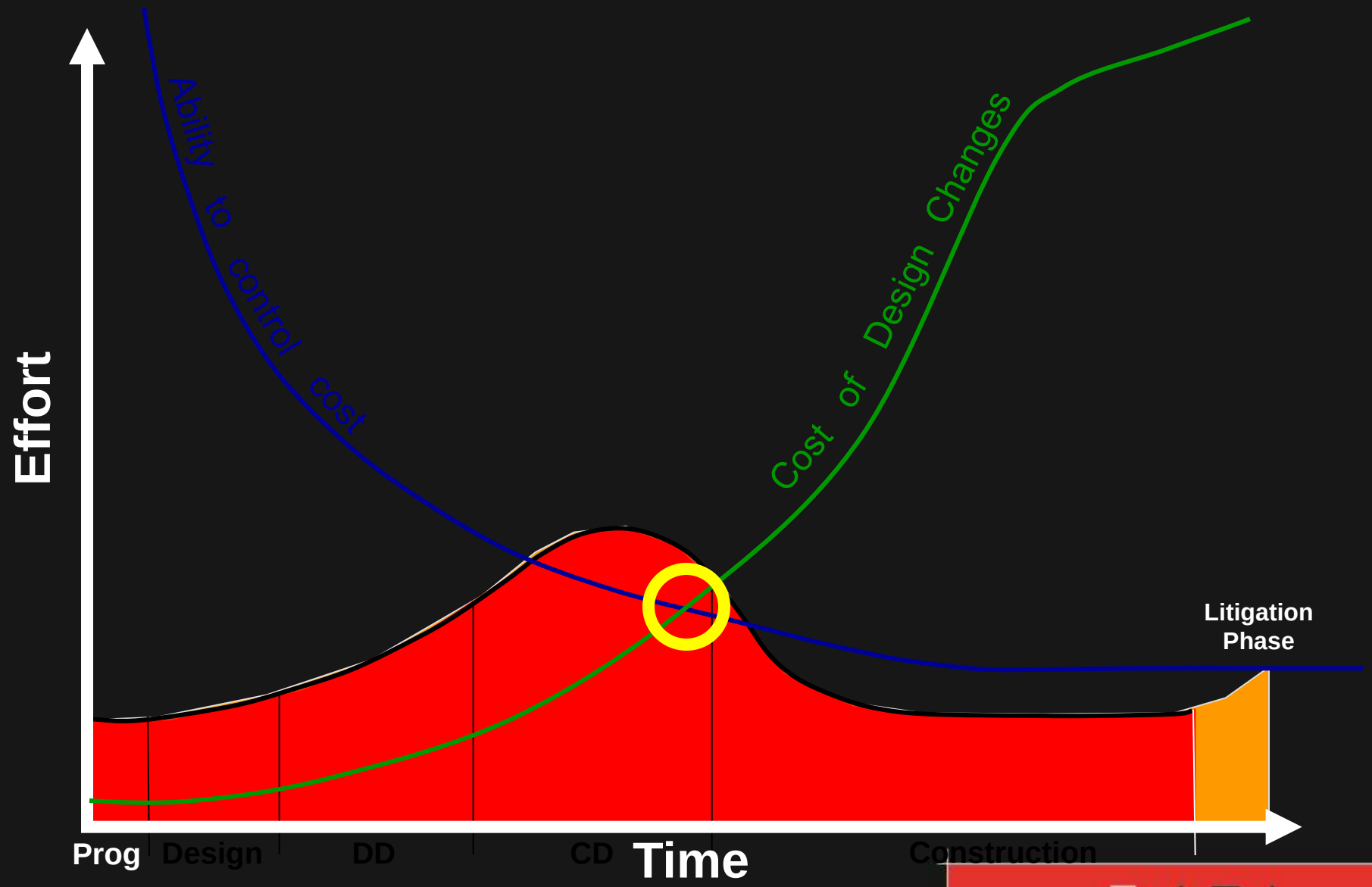
AIA

Traditional Design



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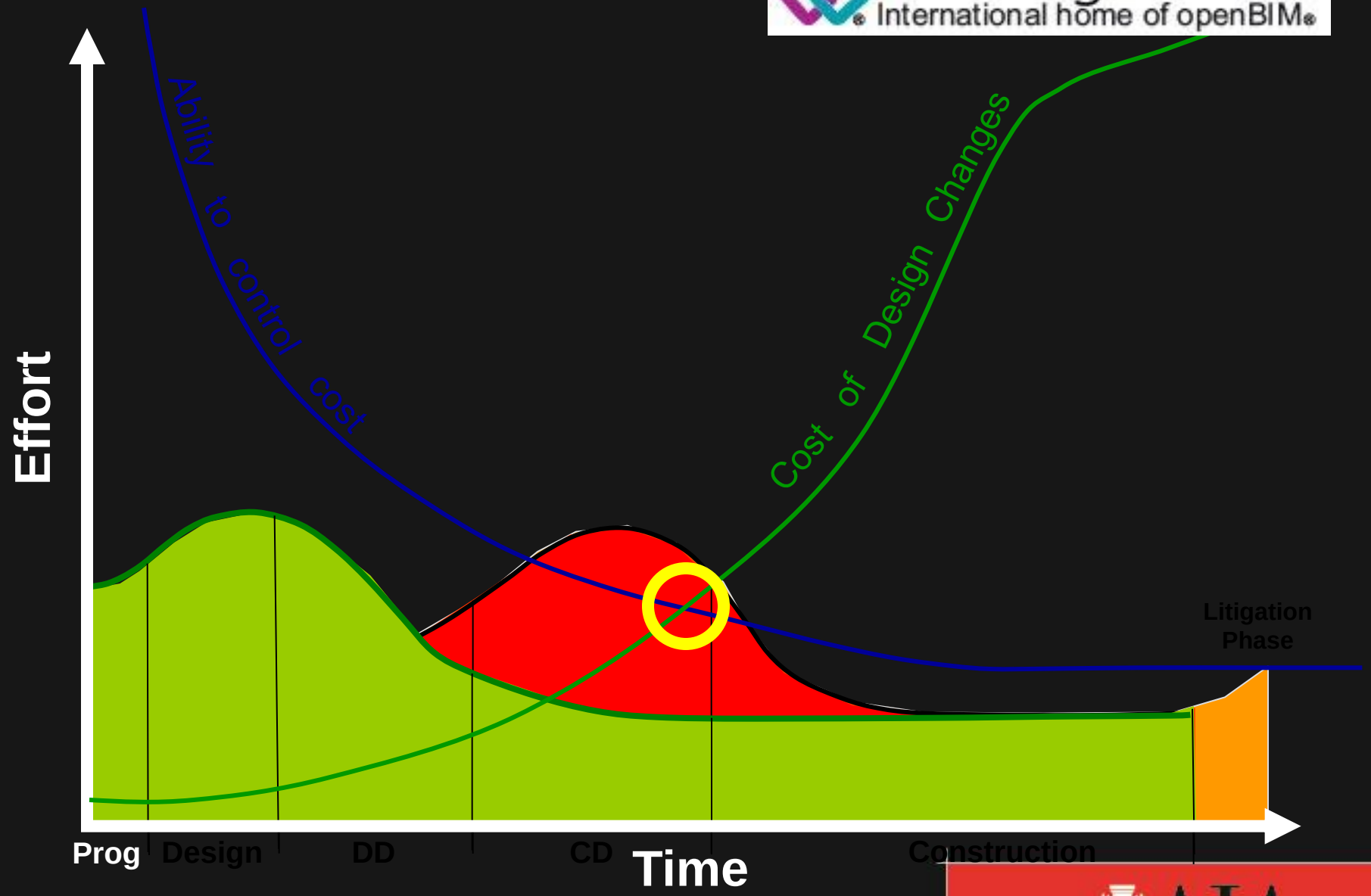

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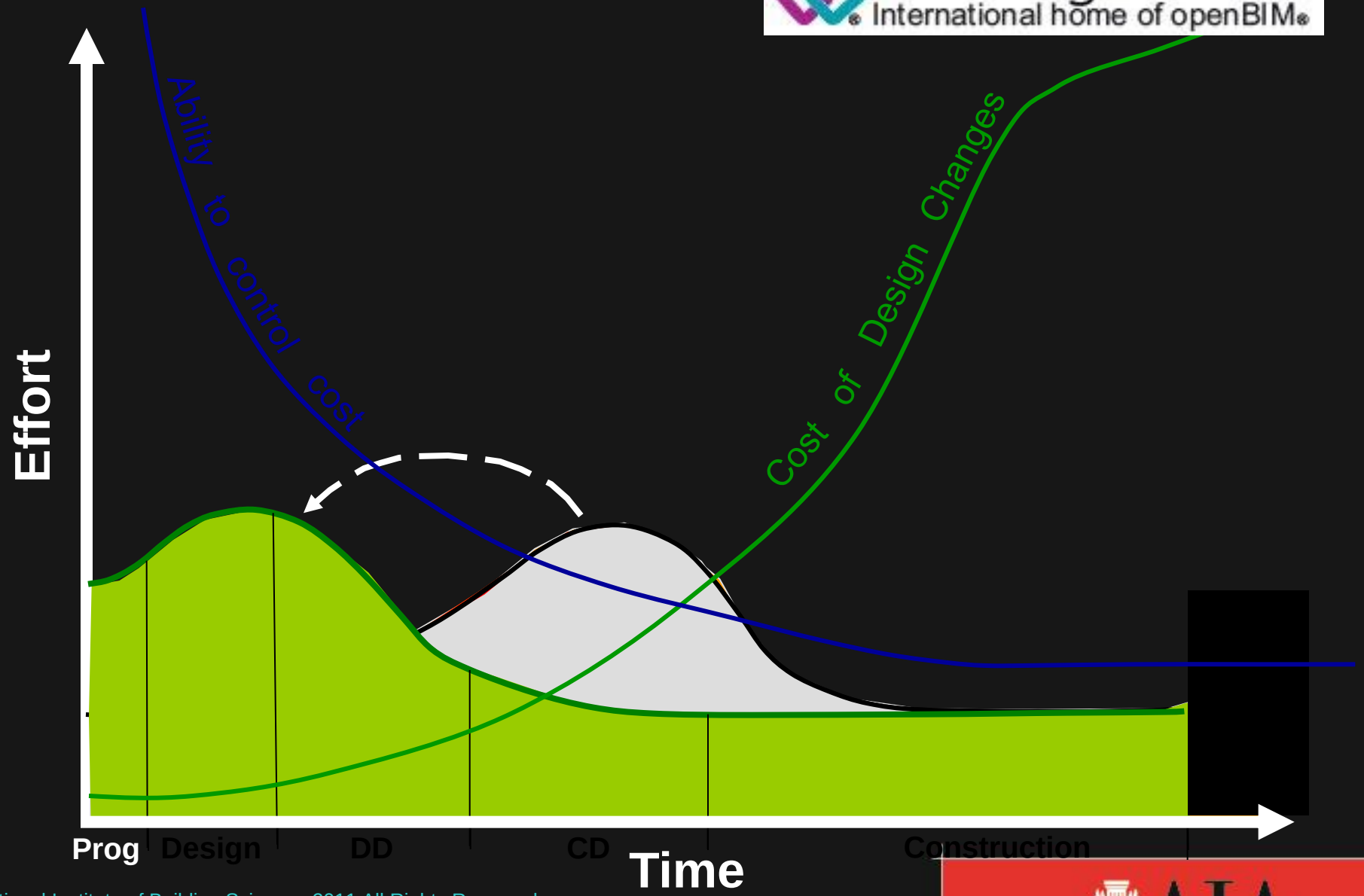

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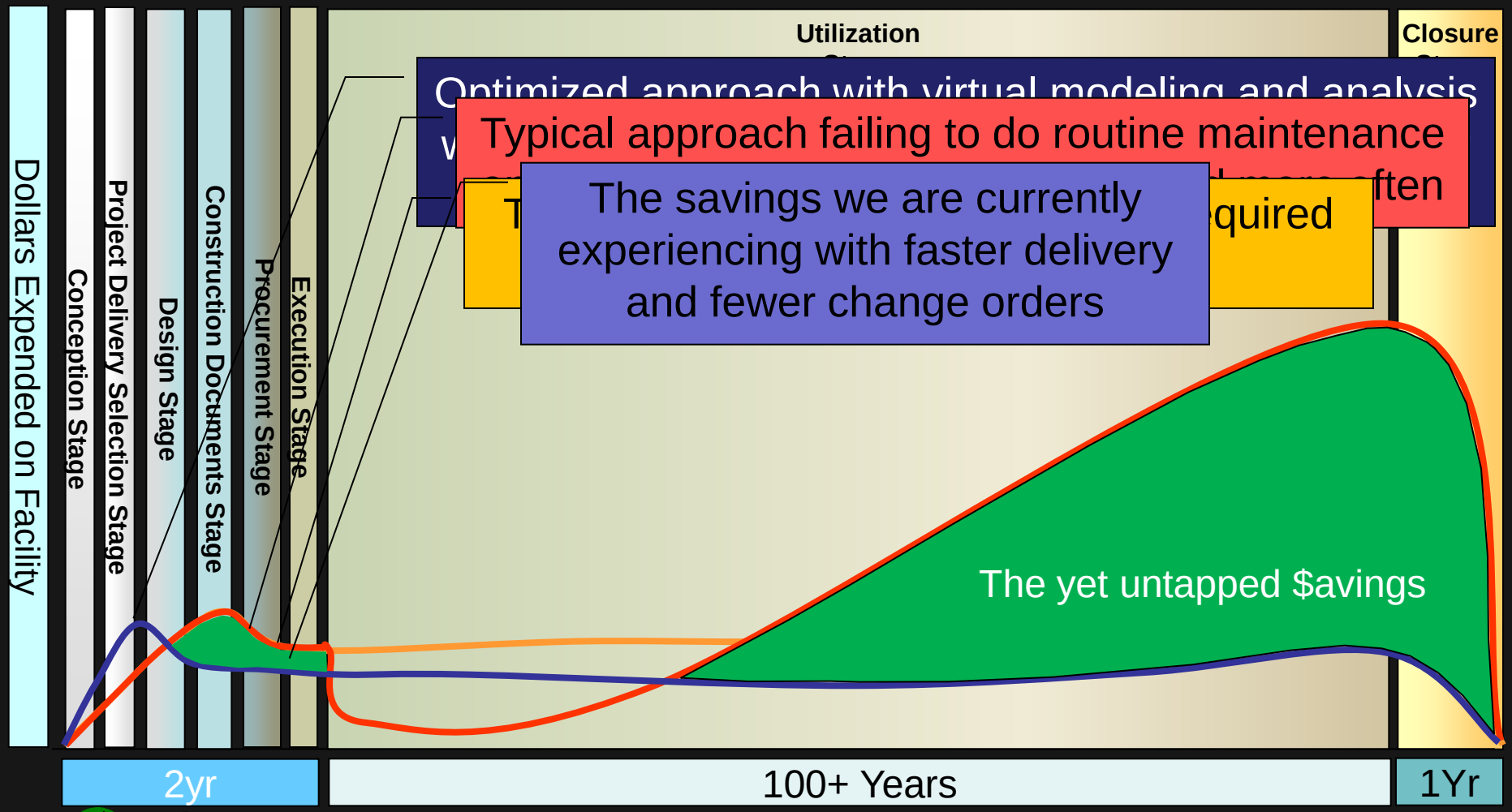
The Real ROI of BIM - Business Model



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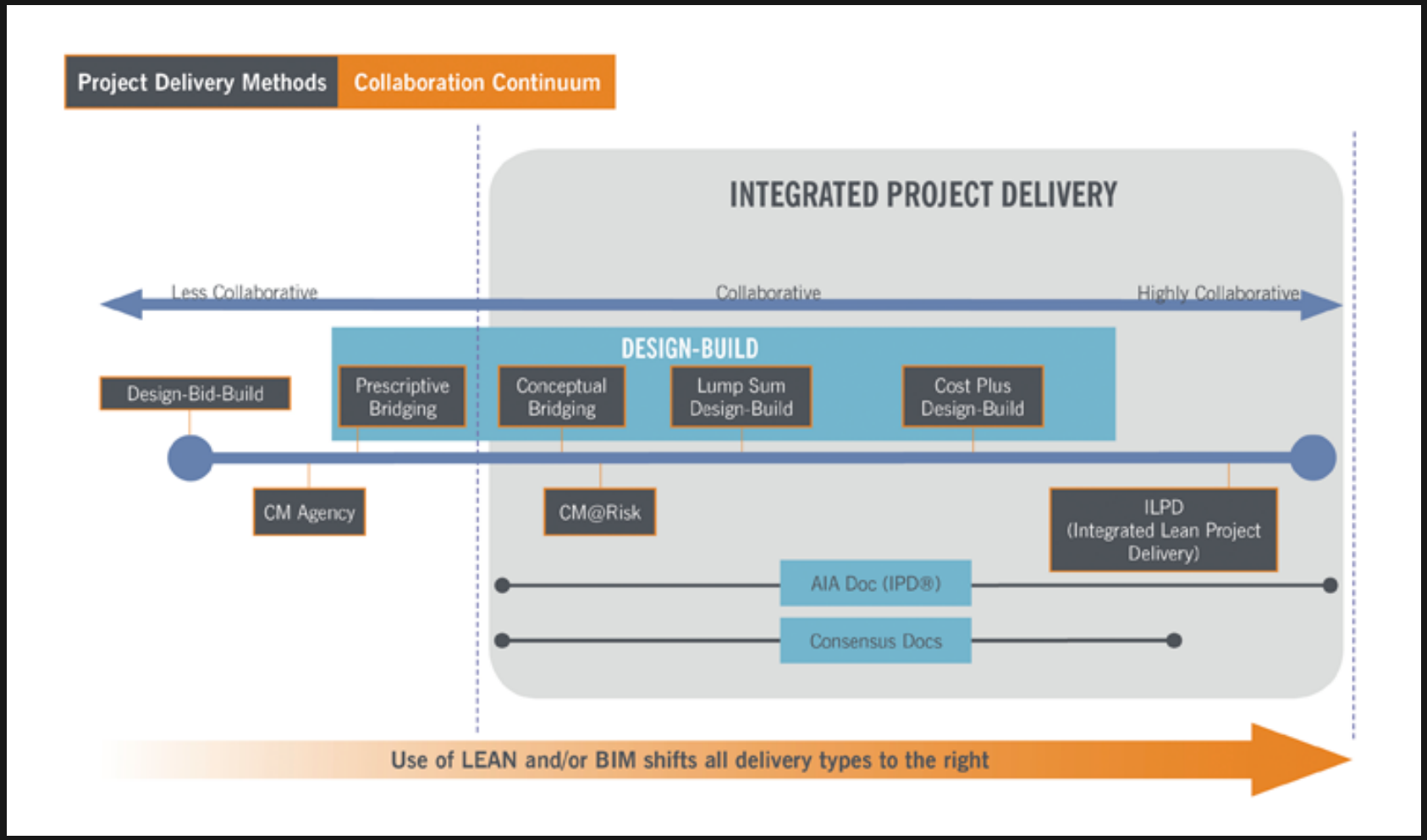
Integrated Project Delivery



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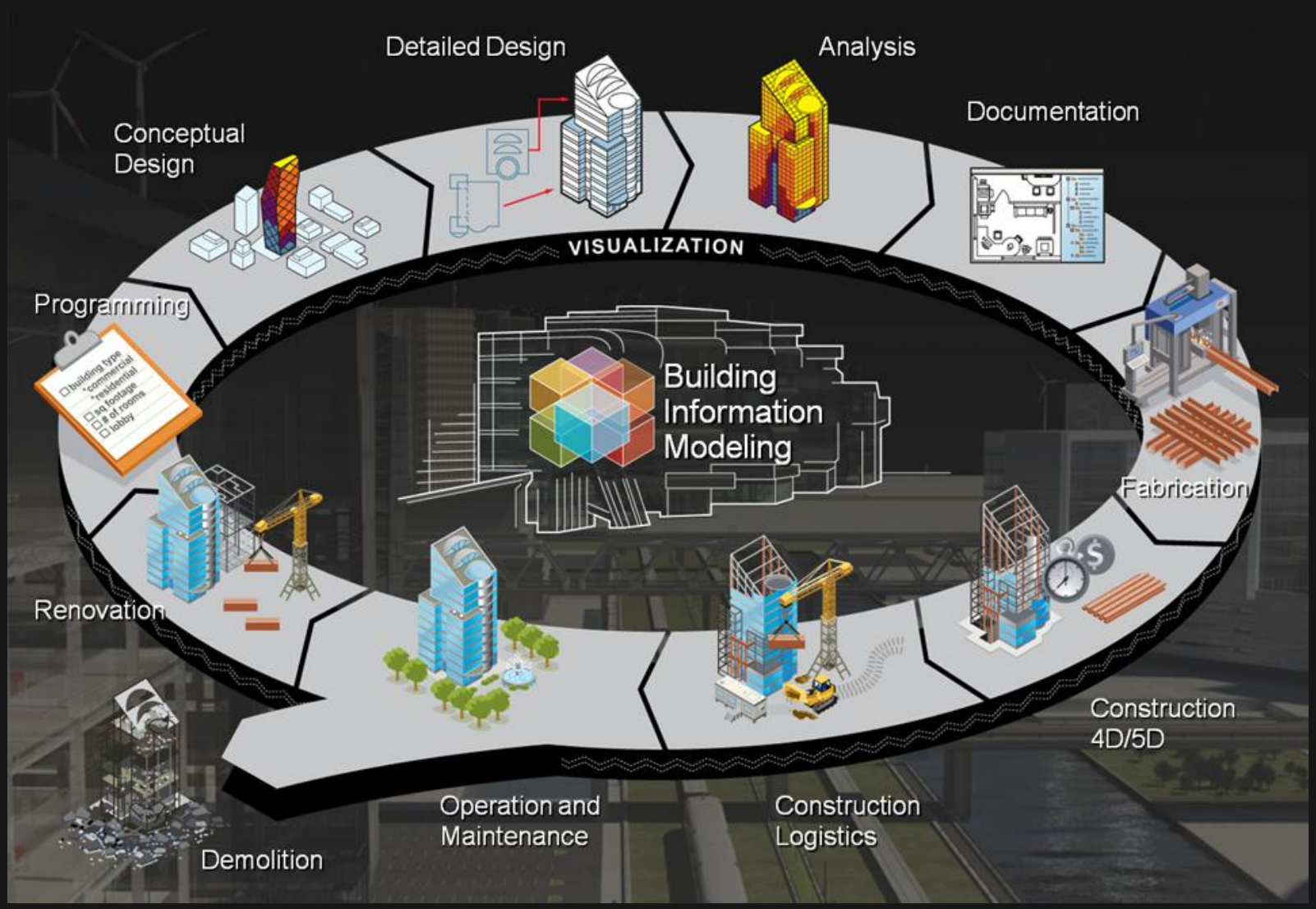
The Facility Lifecycle



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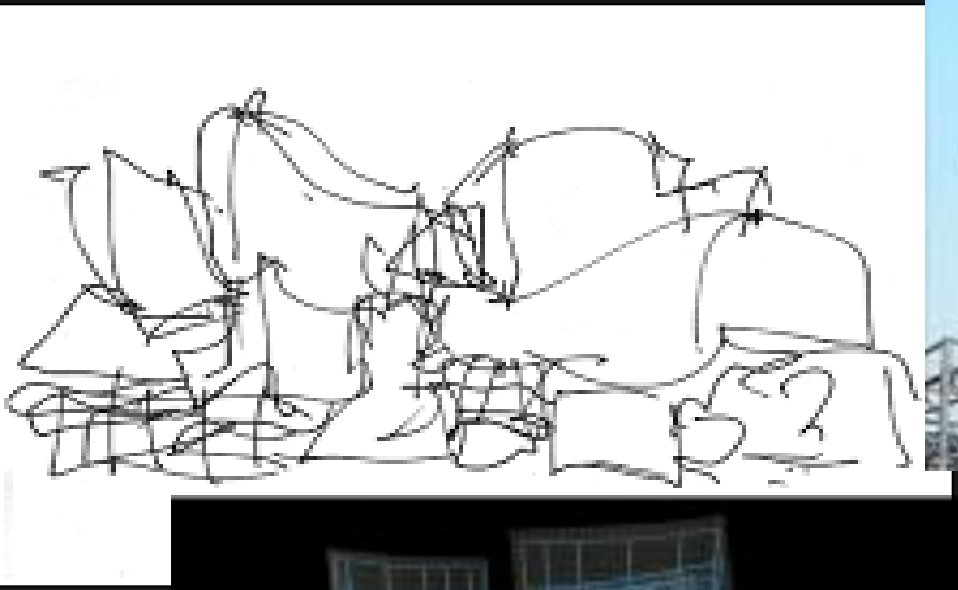
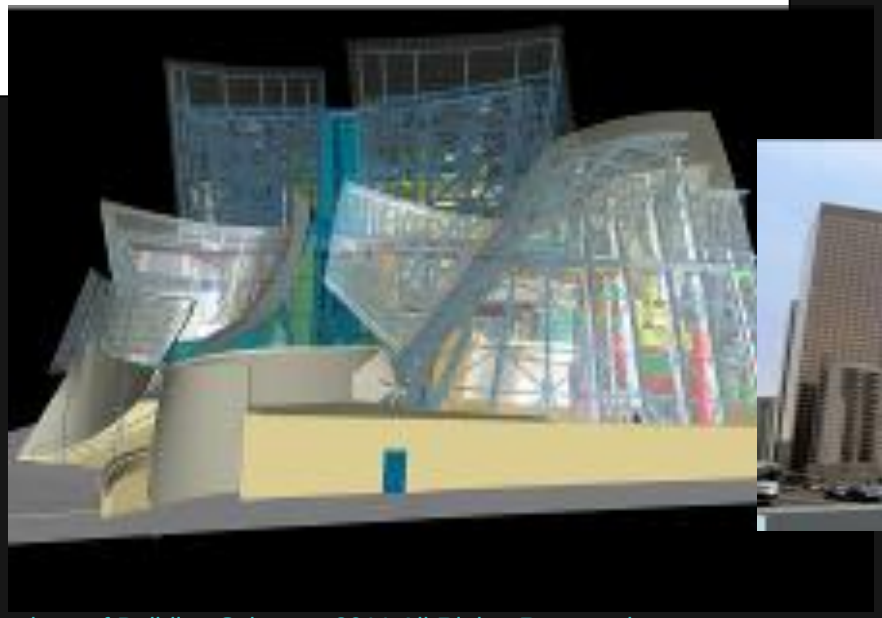
No Limits On Creativity





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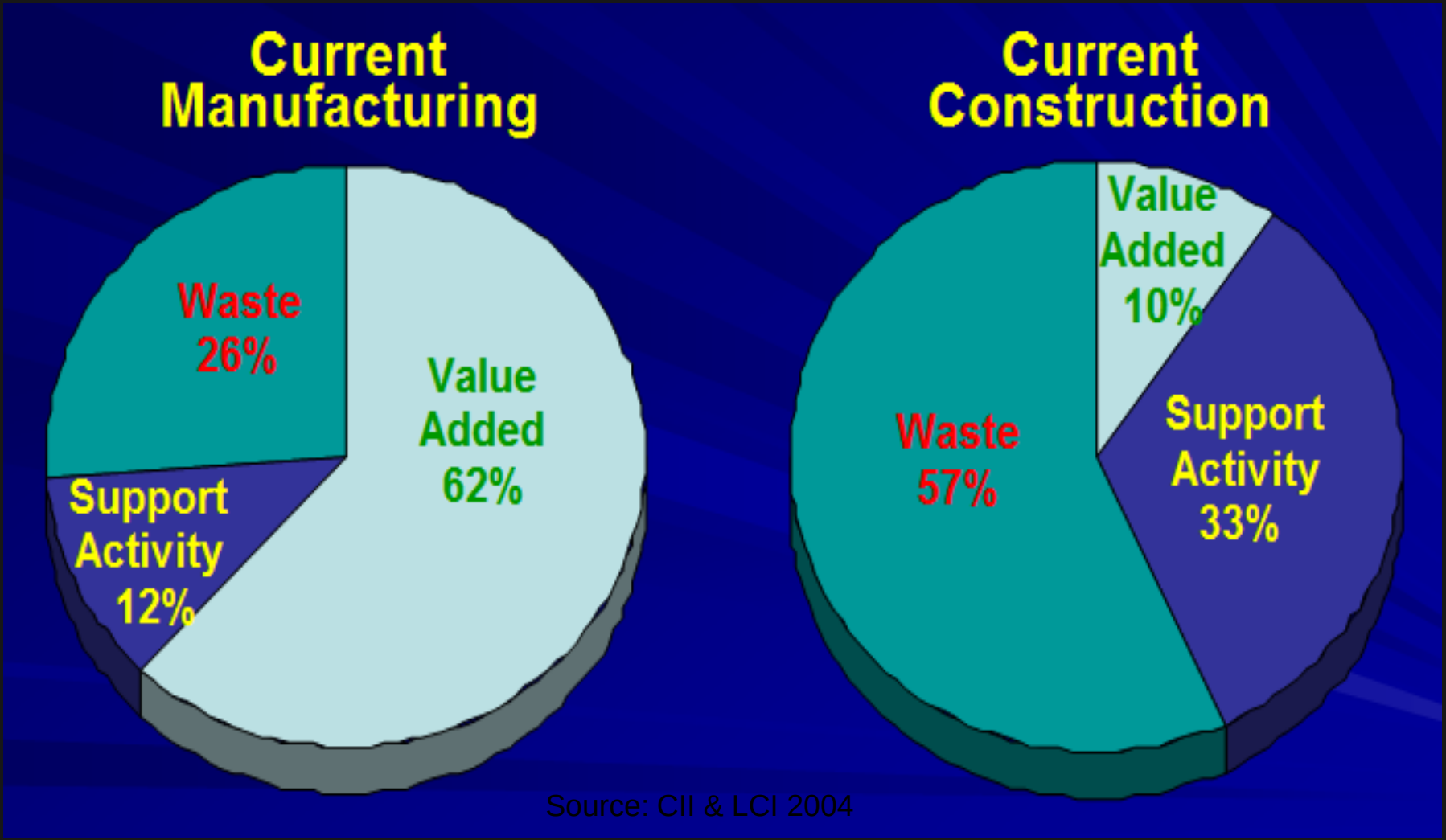
We Must Change!



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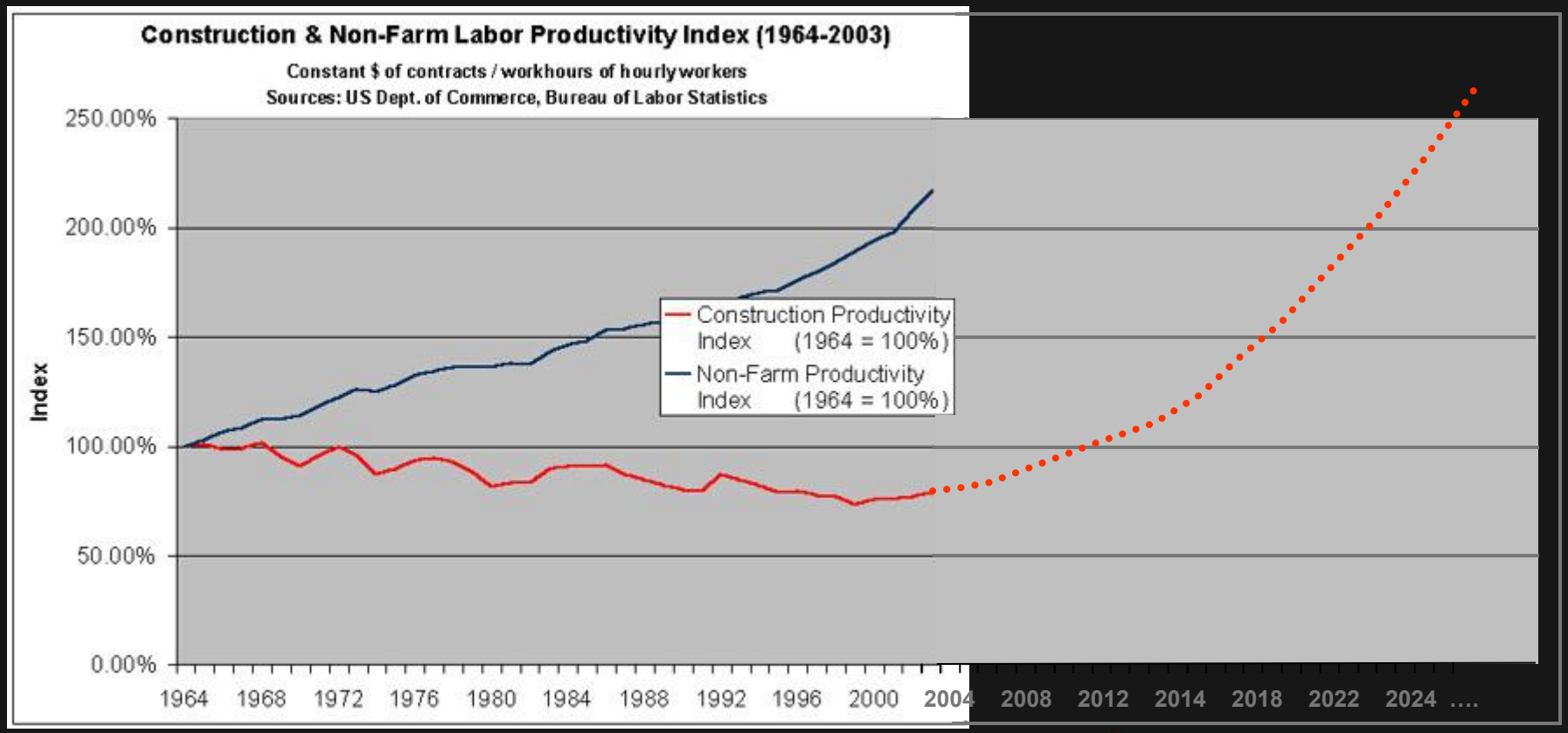
Reversing the Trend

- building**SMART** Goal - Turn a stagnant or declining productivity curve to an exponentially improving one



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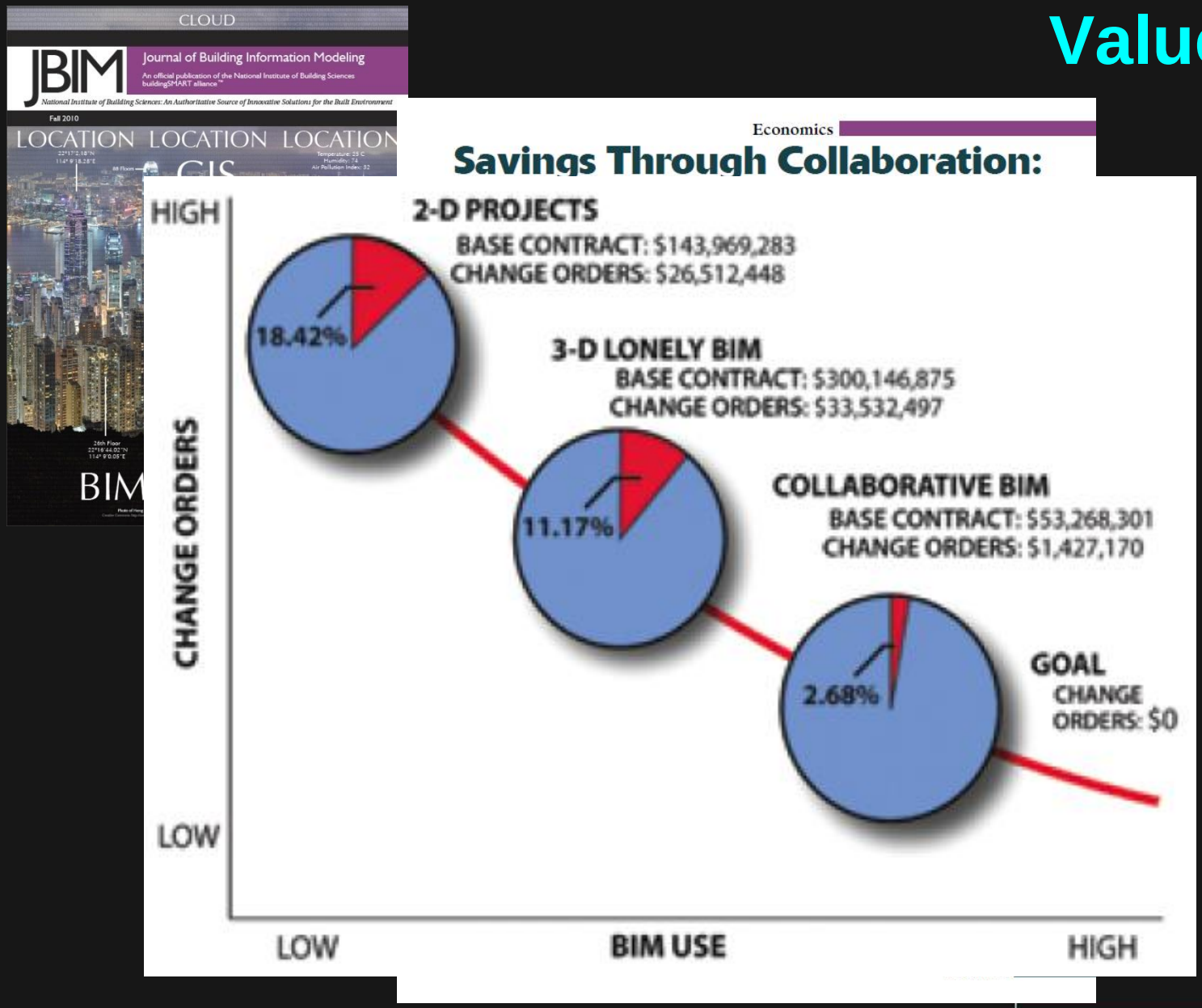
Value of BIM



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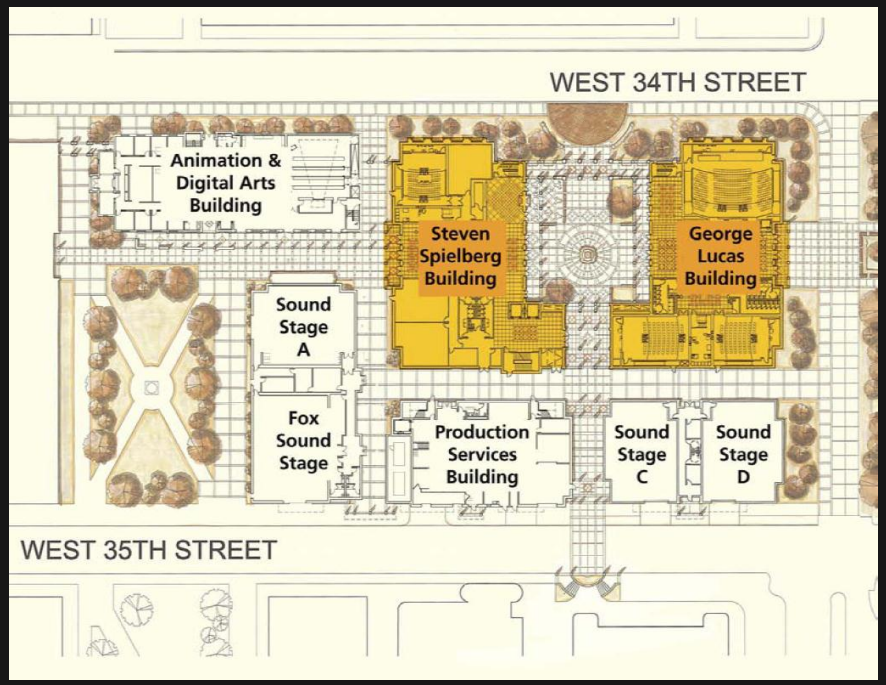
USC College of Cinematic Arts

$175M Project – Phase 2 (~$50M)

Phase 2 of project completion scheduled was for early 2011, but it was delivered 4 months ahead of schedule and cost $6.4M less than anticipated.



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Building Trust

1. Metadata
   - Who entered – Authoritative Source?
   - When entered?
   - Level of quality?

2. Information Assurance
   - Did any one change the data?
   - Data must be locked, or versioned.

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BIM Definition

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.

United States National BIM Standard V1, P1 Jan 2008

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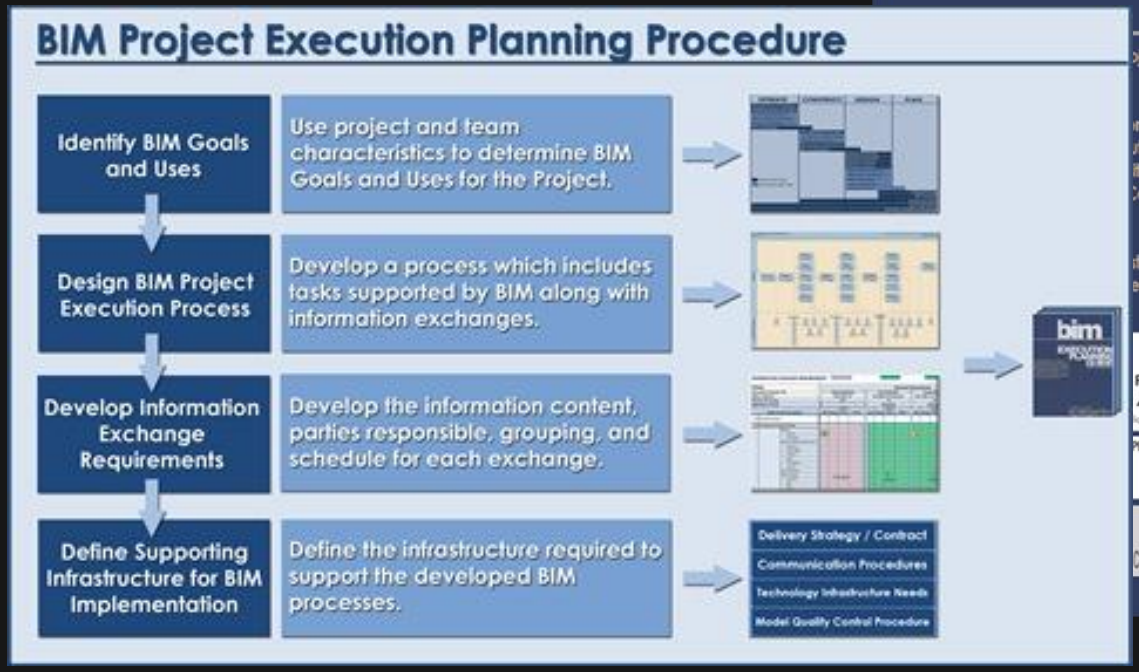
Execution Planning

- Provides opportunity for partners to agree on outcomes.
- Start with the end in mind



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This is How We Deliver Our Product Today

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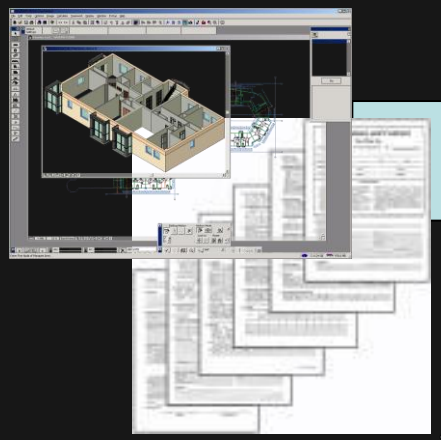
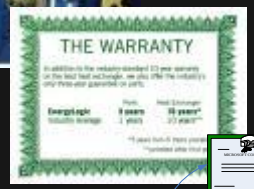
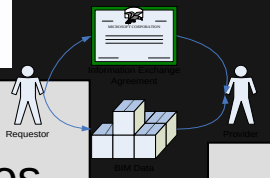
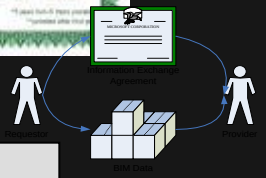
COBie Construction Operations Building Information Exchange









Conception & Definition Phases

Identify items from the specifications that will require warranty information

Procurement & Execution Phases

Collect information as items are ordered and delivered such as who is warranting, when the warranty starts, how long is the warranty period, what preventive maintenance is required to keep the warranty in force

Utilization & Closure Phases

Read the information collected directly into your CMMS software to ensure that the warranties are supported

COBIE will demonstrate the flow of information through the phases of a facility something that is not yet happening yet Is critical to realize the total potential ROI

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SPie and GE

WBDG a program of the National Institute of Building Sciences
WHOLE BUILDING DESIGN GUIDE

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- FEDERAL MANDATES
- CONSTRUCTION CRITERIA BASE
- PRODUCTGUIDE
  - Specifiers' Properties Templates
  - Search
  - Feedback
- PERIODICALS
- CASE STUDIES
- PARTICIPATING AGENCIES
- INDUSTRY ORGANIZATIONS

Home > Documents & References > ProductGuide > S

productguide™

Specifiers' Properties Templa

Your results are listed below:

Protective Wall Covering
102623 (MasterFormat 2004) / C1030 (UniFormat)

Property	Example Value
Application	• Locations indica • Remodel and cle
Manufacturers	• As selected
Sustainability	• Low-emitting ma
Type	• Rigid plastic • Prelaminated • Plastic sheet

XML Pset_Protective Wall Covering.xml
IFCXML Example_Protective Wall Covering
IFC Example_Protective Wall Covering.ifc
New search

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1090 Vermont Avenue, NW, Suite 700 | Washing
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Building Information Modeling (BIM)

As the industry continues to provide higher technology building solutions the electrical consultant and design build contractors are faced with the coordination of these variuos systems. **Building Information Modeling**, or BIM, is used for whole system designs comprised with data that utilizes the dimensions, spatial relationships and specific property data for coordination. BIM provides the data needed to support the entire building life cycle and allows access to information for future use and additions.

GE is currently able to provide the 3D models to assist with the coordination of our products in your solutions. We are proud to be involved with the Specification Properties Information Exchange with the BuildingSmart alliance and supporting the activity to further expand the interoperability in BIM utilizing IFC files.

Examples of BIM downloads:

AQ/AL Panelboard

IFC
IFC XML
Cut Sheet PDF

GE LightFixture (JVP25E1A45WHN01)

IFC
IFC XML
Cut Sheet PDF

GE LightFixture (HB84830AE1MAA126A)

IFC
IFC XML
Cut Sheet PDF

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Energy Use Validation Proposal

K2

CEREB
CENTRE FOR EFFICIENT AND RENEWABLE ENERGY IN BUILDINGS

LONDON SOUTH BANK UNIVERSITY

CITY UNIVERSITY LONDON

Kingston University London

Proposal:

Build a BIM of K2 and predict performance

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AIA

10 Core Principles

- ✓ **Coordinate** and plan with all parties before you start
- ✓ Ensure all parties have **life cycle view** – involve them early and often
- ✓ Build the model then **build to the model**
- ✓ **Detailed data** can be summarized (The reverse is not possible)
- ✓ **Enter data one time** then improve and refine over life
- ✓ Build **data sustainment** into business process – keep data alive
- ✓ Use **information assurance** and metadata to build trust – know data sources and users
- ✓ **Contract for data** - good contracts make good projects
- ✓ Ensure data is externally **accessible yet protected**
- ✓ Use **international standards** and cloud storage to ensure long term accessibility

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Prefabrication Demands Accuracy

SKANSKA

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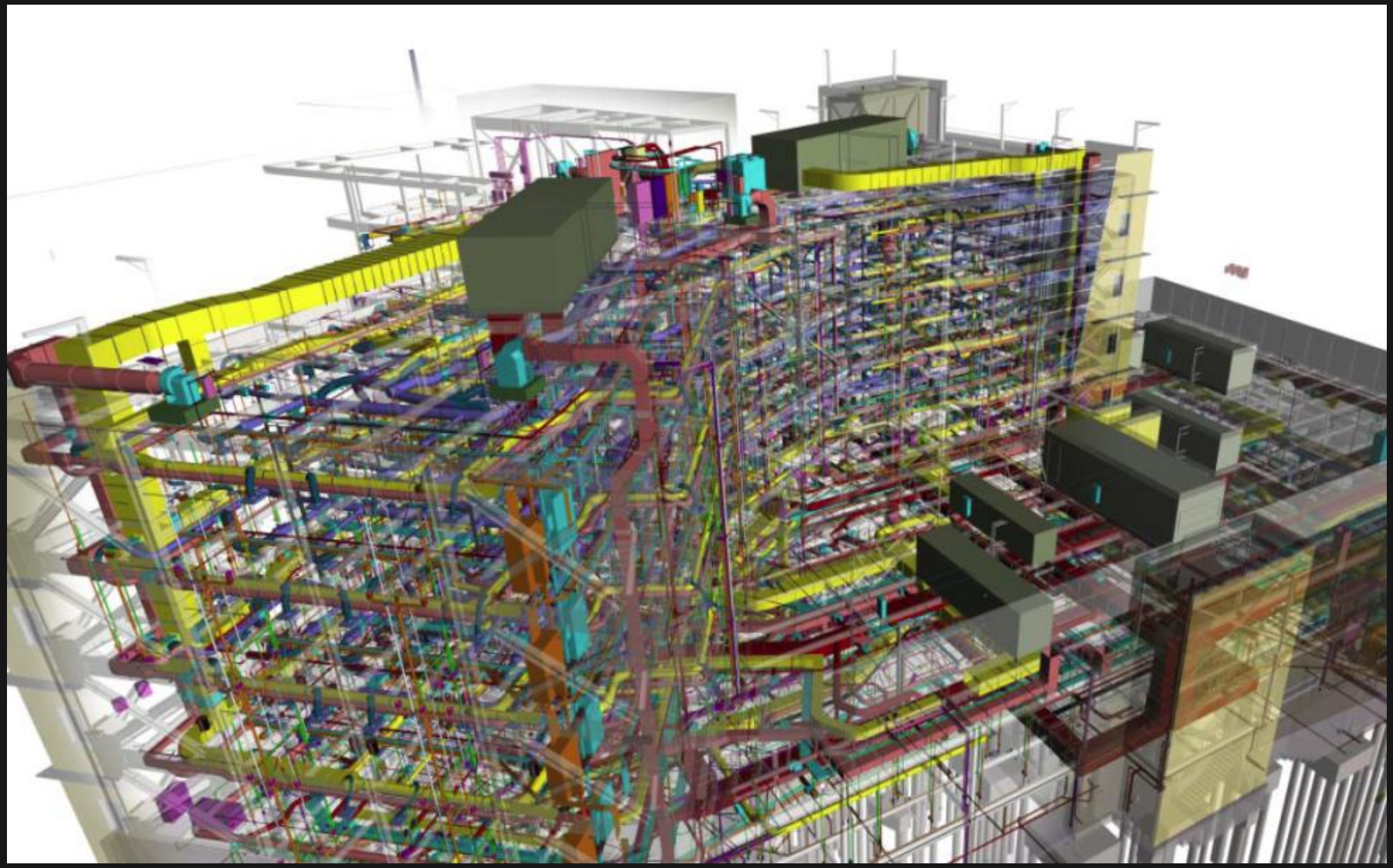

Sutter Medical Center – Castro Valley – DPR Construction

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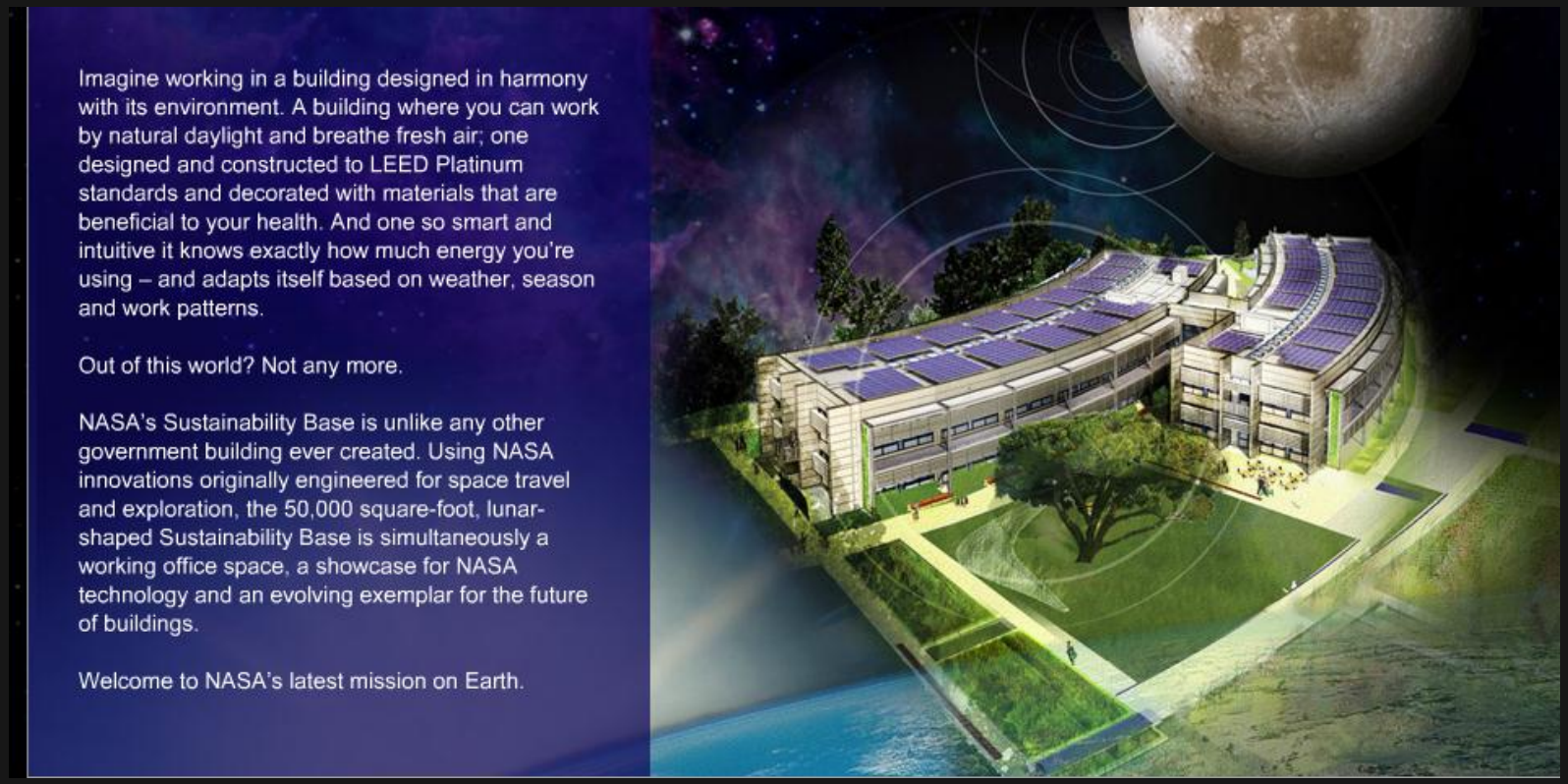
Sustainability – collaboration

NASA's Ames Research Center and the Department of Energy (DOE), at the Lawrence Berkeley National Laboratory, Berkeley, Calif. are collaborating on technologies and processes for what may be the "greenest," highest-performing building in the federal government.



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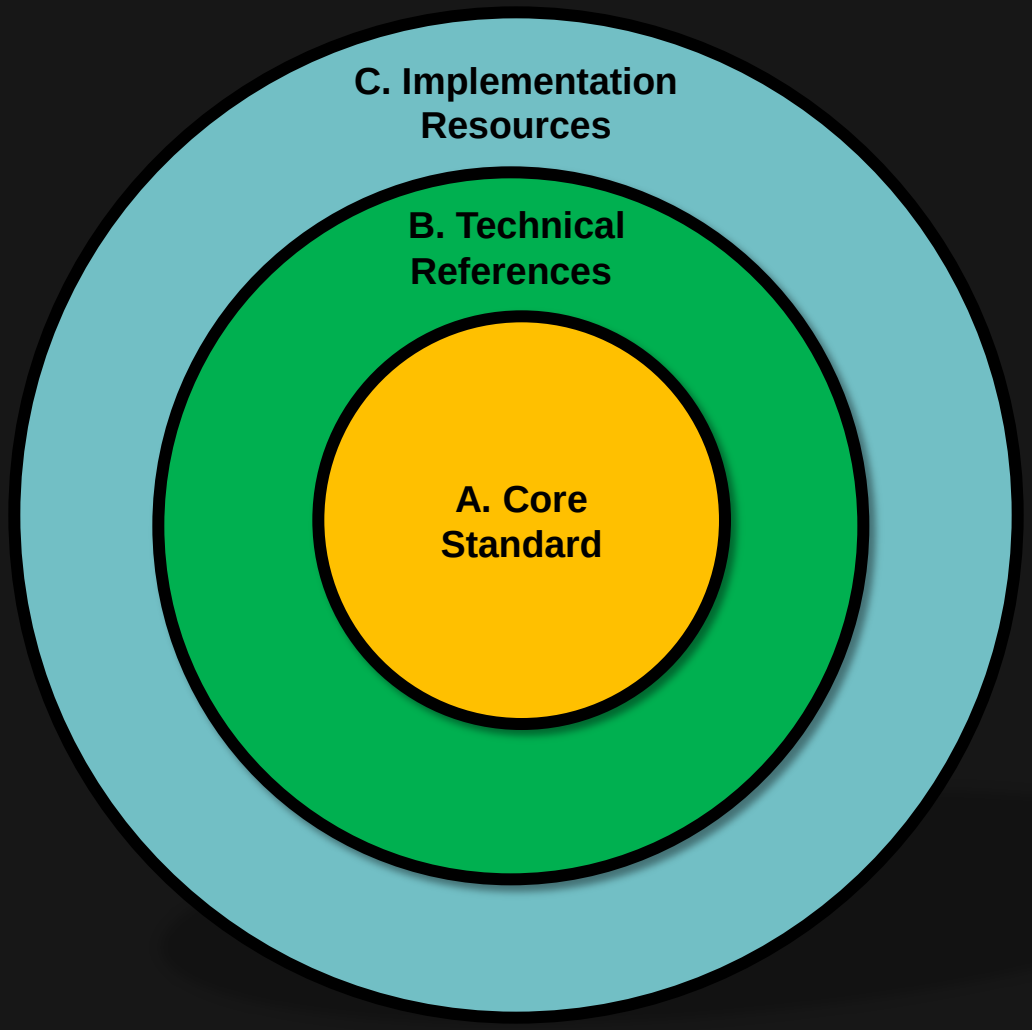
NBIMS-US Content Model



A. Core Standards

- A.1. ISO Standards
- A.2. Normative Standards
- A.3. Information Exchanges
- A. 4. Conformance Specifications
- A. 5. Test Suite

B. Technical Publications

- B.1. Reference Processes
- B.2. Reference Specifications
- B.3. Reference Examples

C. Implementation Resources

- C.1. Contract Specifications
- C.2. Best Practice Guides

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Types of Submissions

- Reference Standard
- Information Exchange Standard
- Terminology Standard
- Practice Guidelines – Information for users

- Commentary - Explains the document, use, approach, etc.

- Blue Sky Submission – Not yet a candidate

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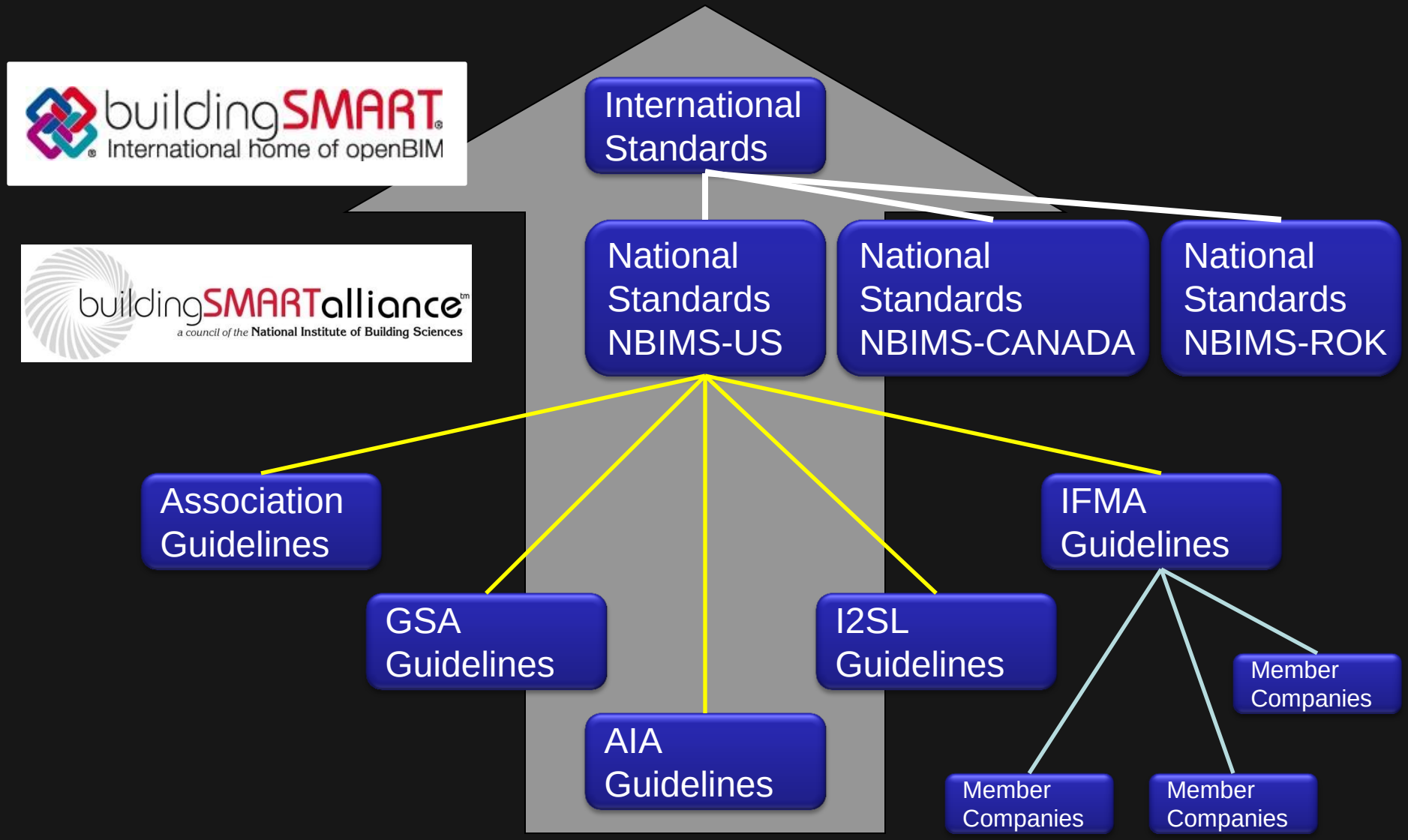
Where Do Submissions Come From?



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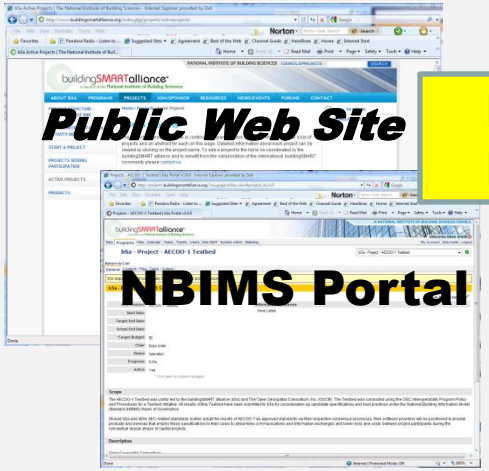


buildingSMARTalliance™

Manage Projects

Join Work Groups

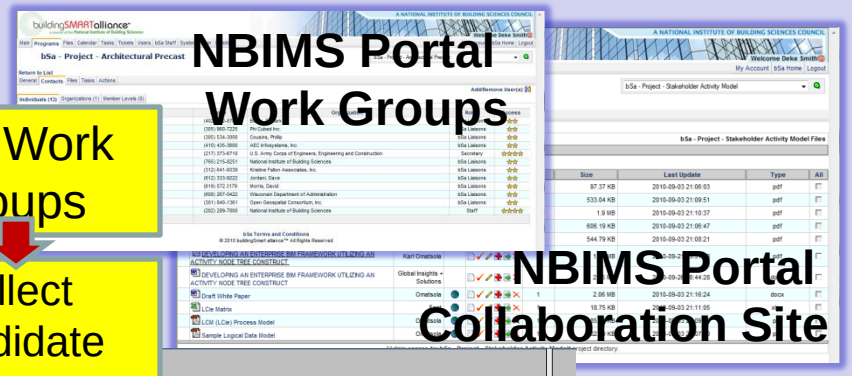
Collect Candidate Ballots

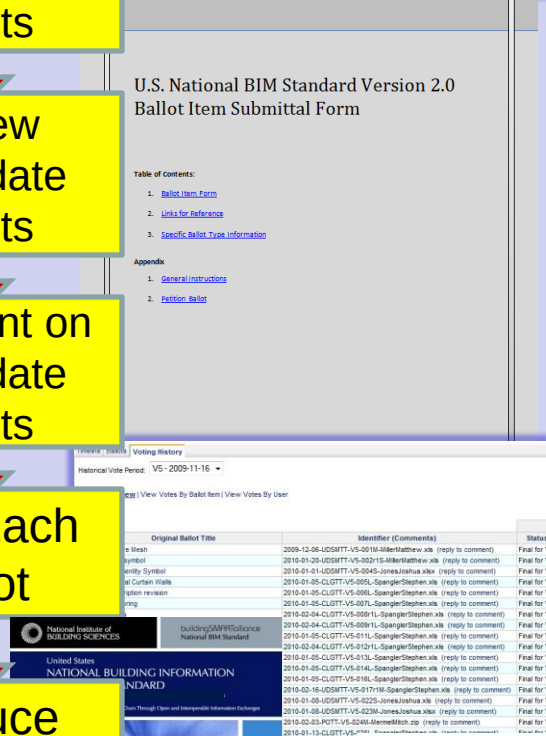
Review Candidate Ballots

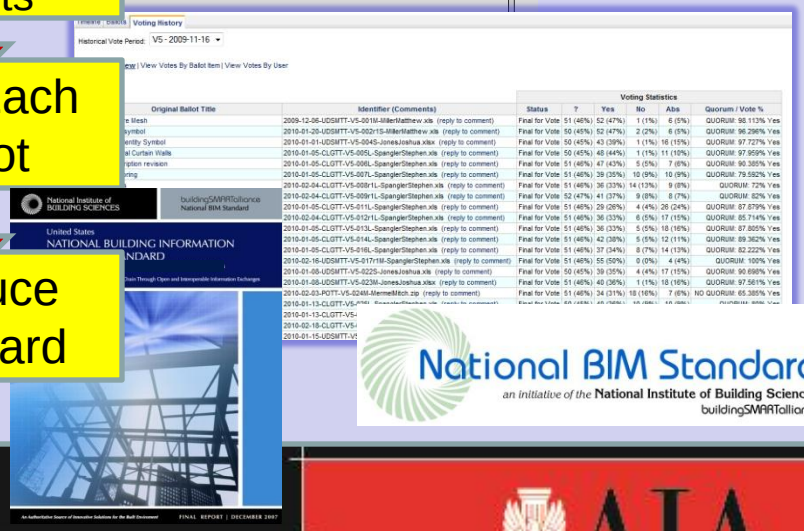
Comment on Candidate Ballots

Vote Each Ballot

Produce Standard







Step 1: Join NIBS* & buildingSMART alliance

Step 2: Join NBIMS Project Committee

Step 3: Sign up for Projects/Work Groups where you have expertise

Step 4: Participate in ballot development, commenting and finalizing ballots

Step 5: **Vote**

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NBIMS-US™ V2 Table of Contents

Foreword
Introduction
1. Scope
2. Reference Standards
3. Terms & Definitions
4. Information & Data Format & Structure
5. Information & Data Exchange
6. Information & Data Guidelines and Applications
7. Appendix A – Rules of Governance
8. Appendix B – Approved Semantic Exchange Standards
9. Appendix C – BIM Commentary

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Delivery Approach

- Web based
- Links to other documents
- Customizable for stakeholder or individual
- Will require login to store framework
- Incorporating an ISO style guide

Factoid: NBIMS V1P1 has had 450,000 downloads in 2011 – through August.

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2020 ….VISION

2011

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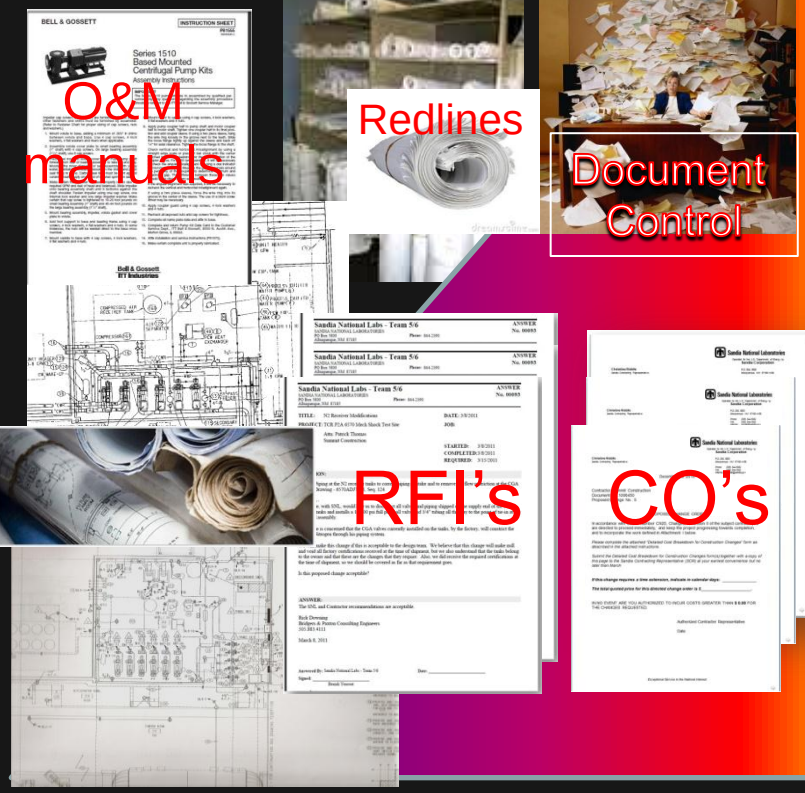
Ability to Repurpose Information

2011 Current Process

Traditional 2D CADD



Traditional O&M

Design/Construction phase

Operations Phase

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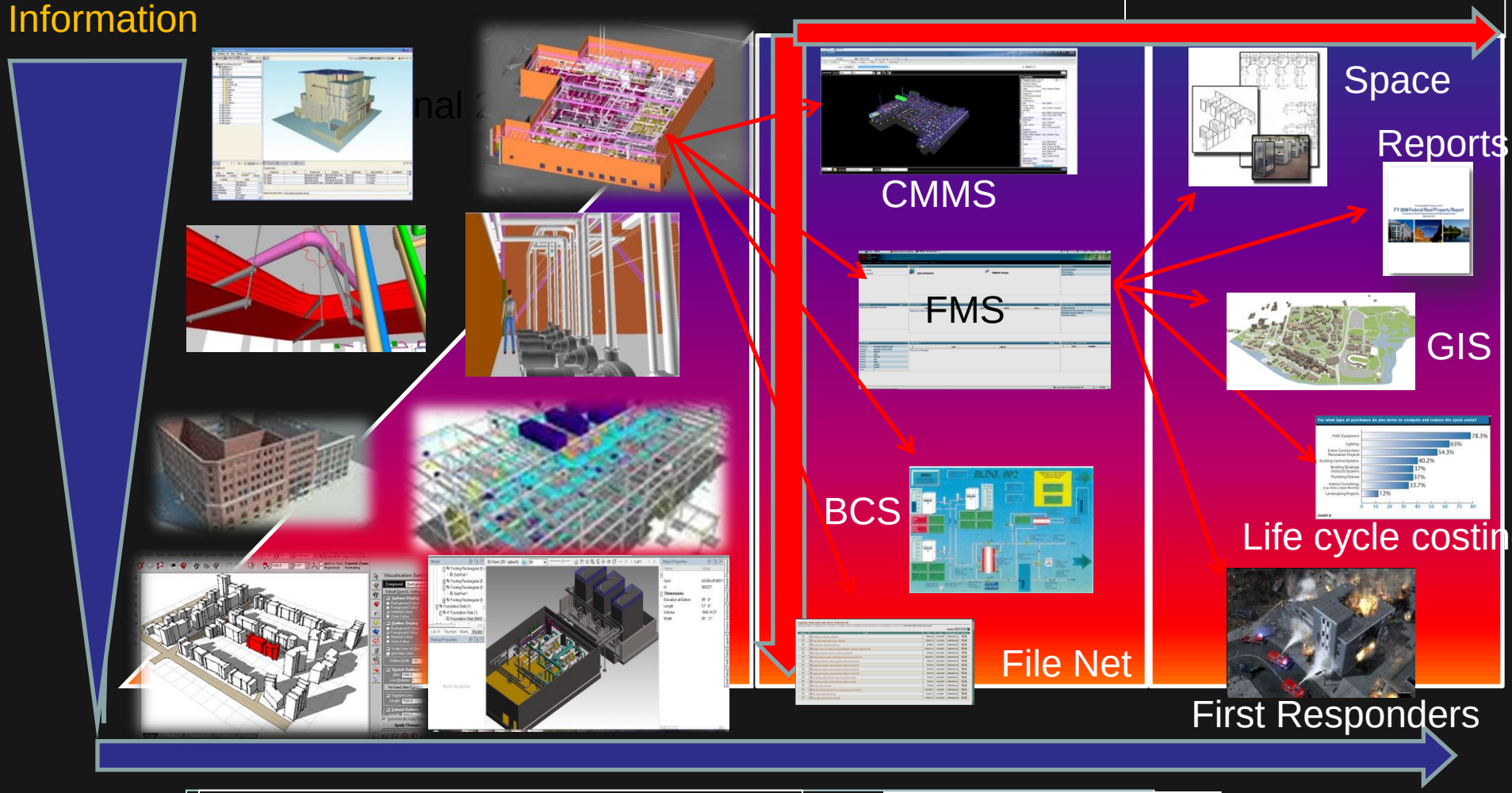
Building Information Transformation

2020

Ability to Repurpose Information

Building Information Modeling	**Building Information Management**	Facilities Information **Management**



Planning → Design → Construction → Operations Phase

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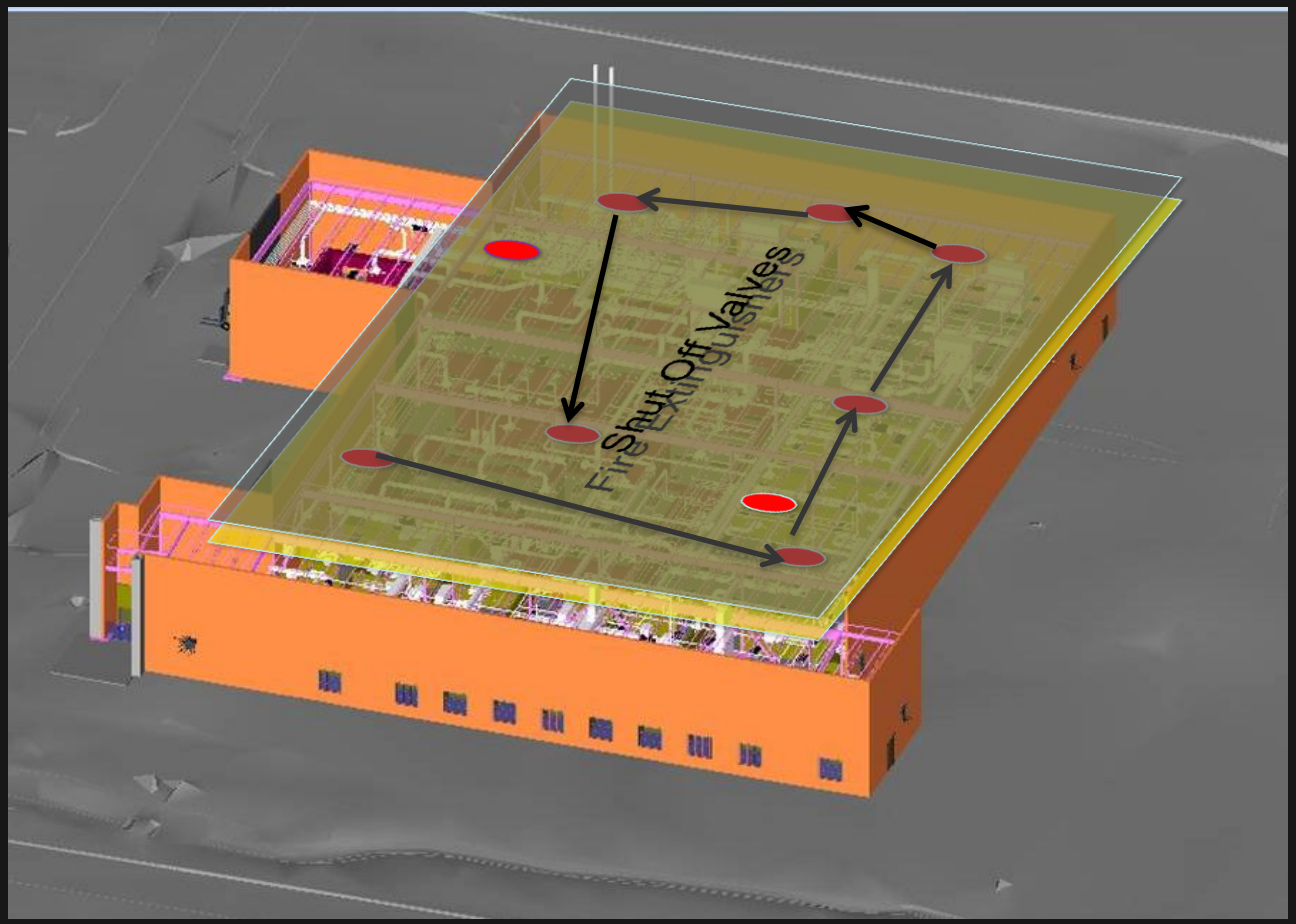
BIM with GIS

(Geographic Information Systems)

BIM/GIS for FM



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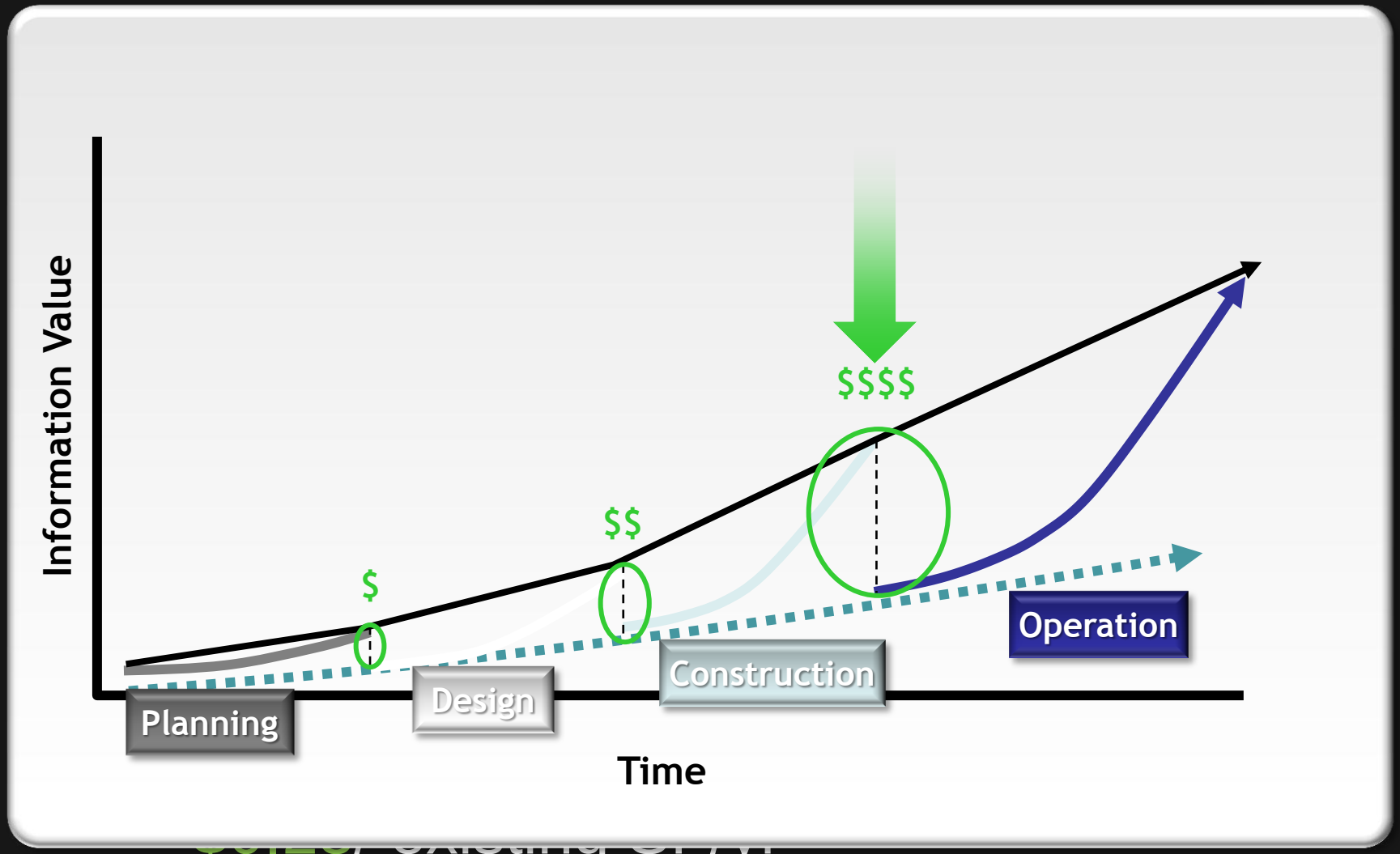
Research: Cost of NOT doing BIM

NIST STUDY



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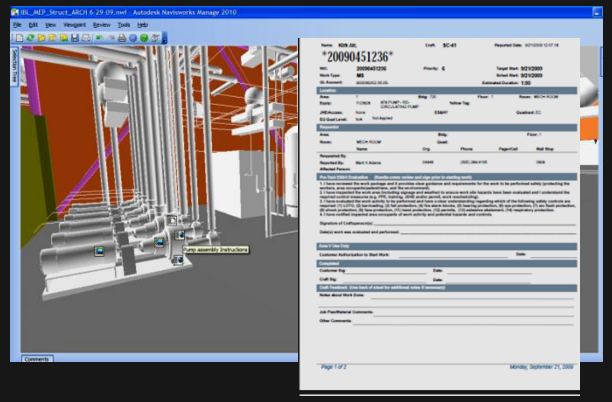
NIST Study Validation

NIST STUDY

Sandia Labs : 6M GSF

@ $0.23/ existing SF/yr

NIST Study = ~$1.4M



VIDEO

O&M team "straw man" survey

Using BIM, if you could get all needed information in 5 minutes, how much time would that save?

Potential savings:

Response: up to 2 hours per work order $2.4 M/year

2 hrs/WO x $50/hr = $100/WO

WO/yr = ~ 24,000

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What data do we need?

FORMAT EXCHANGES

Assets

Bulletins (0) | Go To | Reports | Start Center | Profile | Sign Out | Help | IBM.

Find: | Select Action

List | Asset | Spare Parts | Safety | Meters | Specifications

Asset: 1006361
Status: OPERATING
Yellow Tag #: L00515
891:CIRCULATING CHILLED WATER PUMP #
Site: SNMFAC
Classification: PUMP
Attachments

Details

Parent
Maintain Hierarchy?
Location: 891 — Energy Technology Office and Lab Building
Bin
Rotating Item
Meter Group

Priority: 2
Serial #: 740113-2
Failure Class
Item Type
Asset/Property: REAL
SNL Site: ALBUQUERQU

JSHE/Access: P
Qual Level: N/A
Supp Data: VERIFIED
Room: BASEMENT EQUIP ROOM
Floor: BASEMENT
Quad: NE
Model #: 5L-3
Catalog #
Condition

Purchase Information

Vendor
Manufacturer: WEINMAN — WEINMAN, AMW INDUSTRIES
Installation Date
Warranty Expiration Date
Purchase Price*: 0.00
Replacement Cost*: 0.00
PO

Costs

Total Cost: 75.17
YTD Cost: 0.00
Budgeted*: 0.00
Inventory: 0.00
GL Account: 0000362/02.05.

Downtime

Asset Up?: ☑
Last Changed Date
Total Downtime: 0:00

Modified

Changed By: KNMEHLH
Changed Date: 3/29/00 8:04 AM

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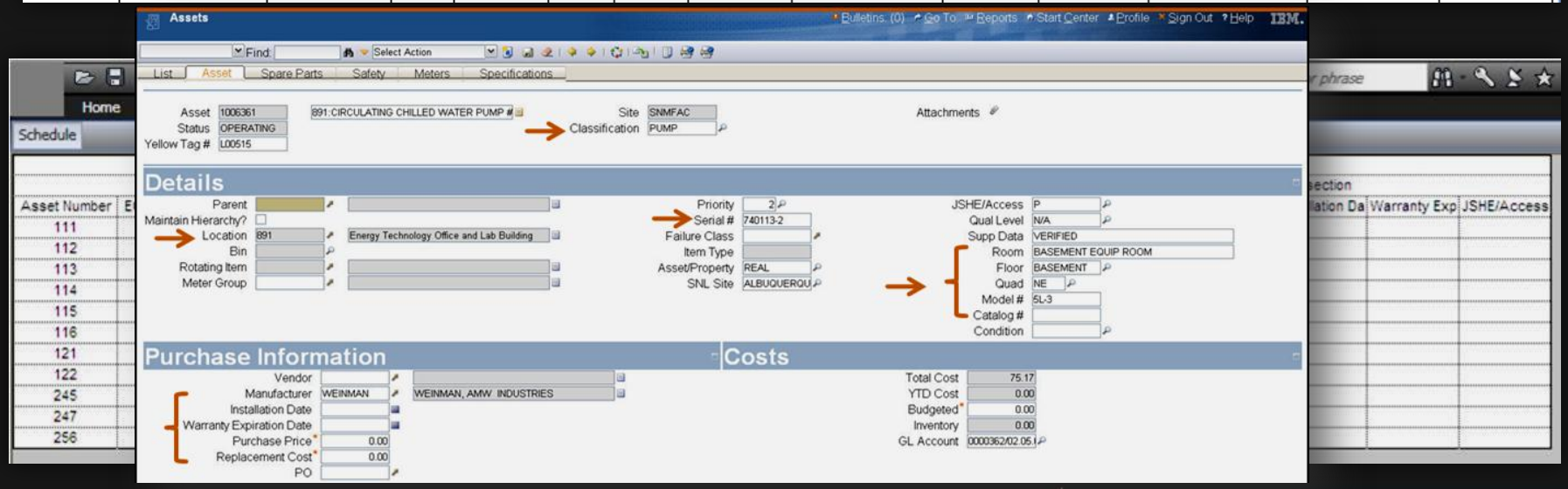
How to collect data?

FORMAT EXCHANGES

AE to complete this section								CONTRACTOR to complete this section					
Asset number	EQUIPMENT Classification	New Replace Remove	AREA	Location (Bldg#)	RM	FLR	Quadrant	Manufacturer	Model #	Catalog #	Serial Number	Installation date	Warranty Expiration date
100567	PUMP	Replace	I	880	26	BSMT	NE	Goulds					
	PUMP	New	I	880	26	BSMT	NE						
100570	MOTOR	Replace	I	880	26	BSMT	NE	Baldor					
	MOTOR	New	I	880	26	BSMT	NE						
	CHILLER	New	I	880	26	BSMT	NE						
101845	CHILLER	Remove	I	880	26	BSMT	NE	Trane					
101846	CHILLER	Replace	I	880	26	BSMT	NE	Trane					
	BOILER	New	I	880	26	BSMT	NE						



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Construction to Operations Building information exchange

FORMAT EXCHANGES

ERDC/CERL TR-07-30

Construction Engineering Research Laboratory

US Army Corps of Engineers®
Engineer Research and Development Center

Construction Operations Building Information Exchange (COBIE)

Requirements Definition and Pilot Implementation Standard

E. William East

August 2007

Approved for public release; distribution is unlimited.

COBie College on YouTube.com

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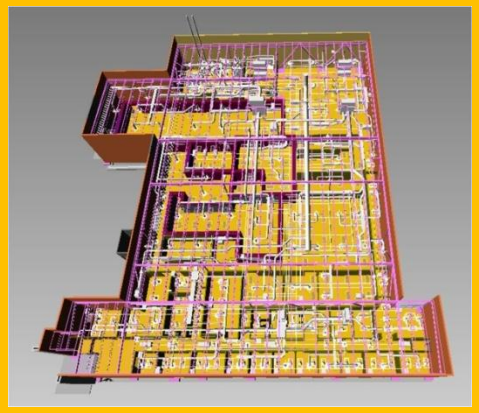
Real Metrics : CMMS Data Import



Sandia Model (27,000 GSF)

- 900 assets
- 12,000 individual attributes

<u>Manual Entry</u>

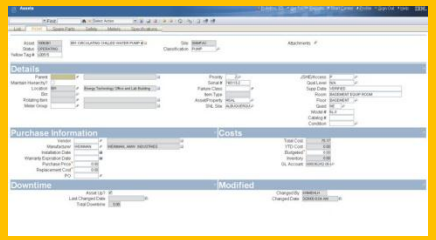
- Submittals/Field Data collection = 6 Months (after close out)
- Data entry = 2-3 weeks

TOTAL : ~ <u>7 months</u>

<u>Direct Import</u>

- IFC/COBie- Maximo Import

TOTAL : <u>15 minutes</u>



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BIM for FM

Design for Maintenance Strategy

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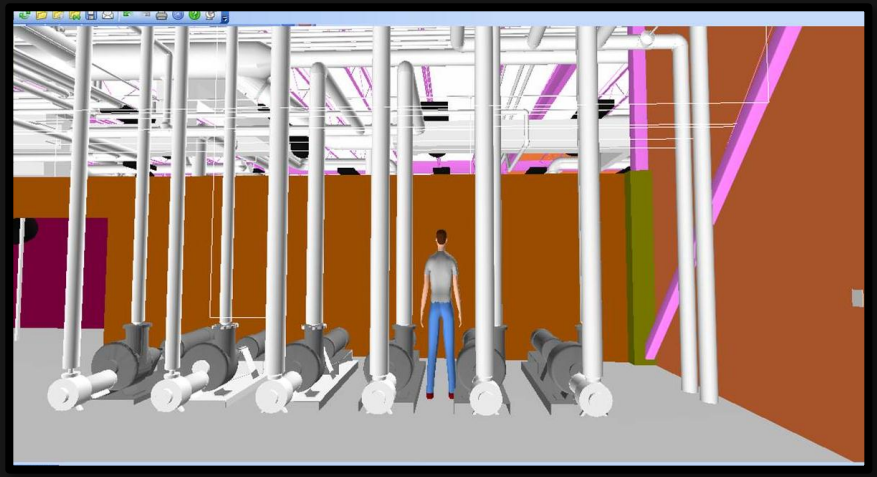

"Maintenance Friendly"

NOT "Maintenance Friendly"

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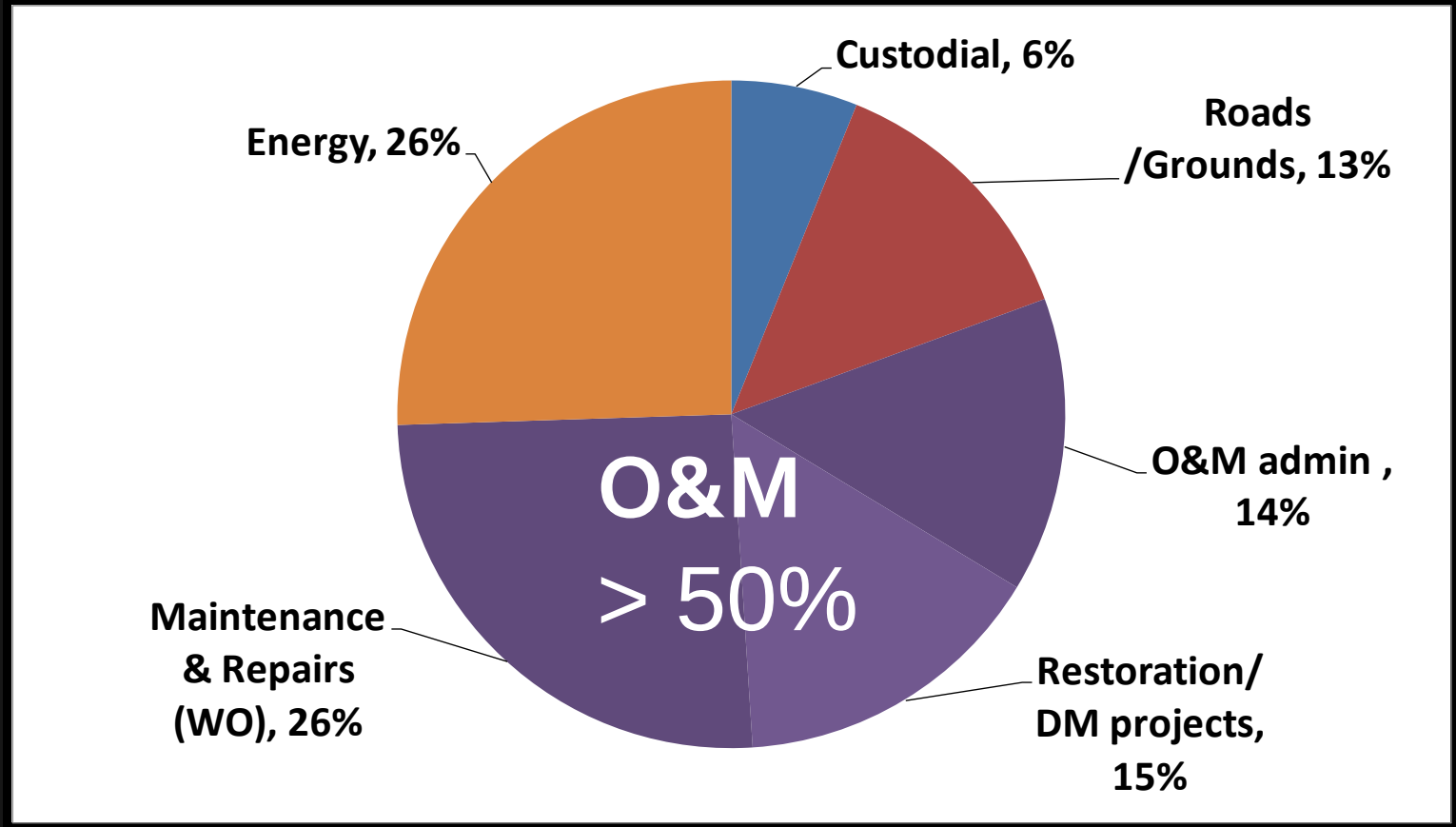
Covering Operating Costs : Space Charge Back

BIM for FM



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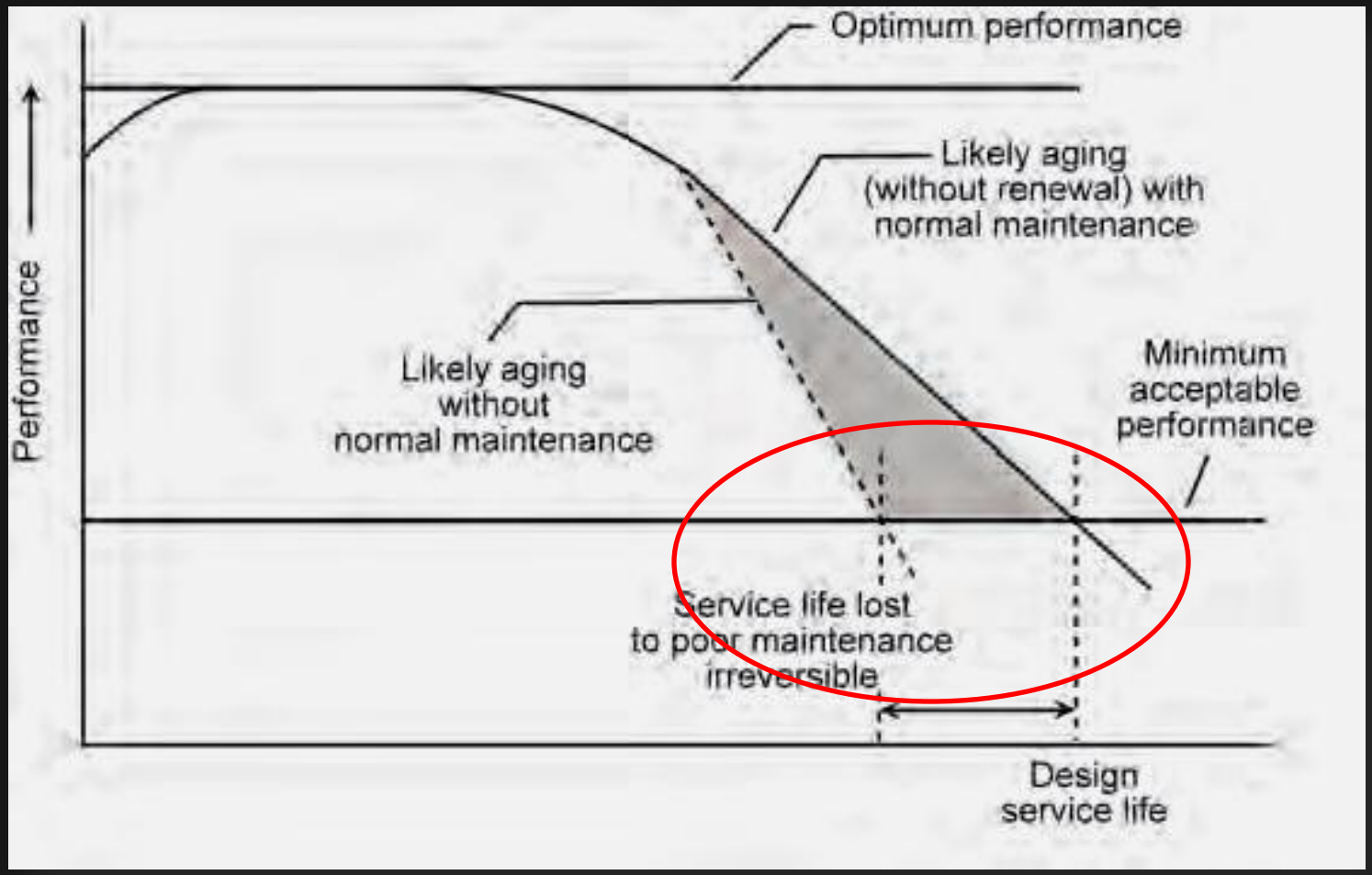
"Design For Maintenance"
Main Premise

BIM for FM



(National Research Council 1998).

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"Maintenance Friendly"

BIM for FM

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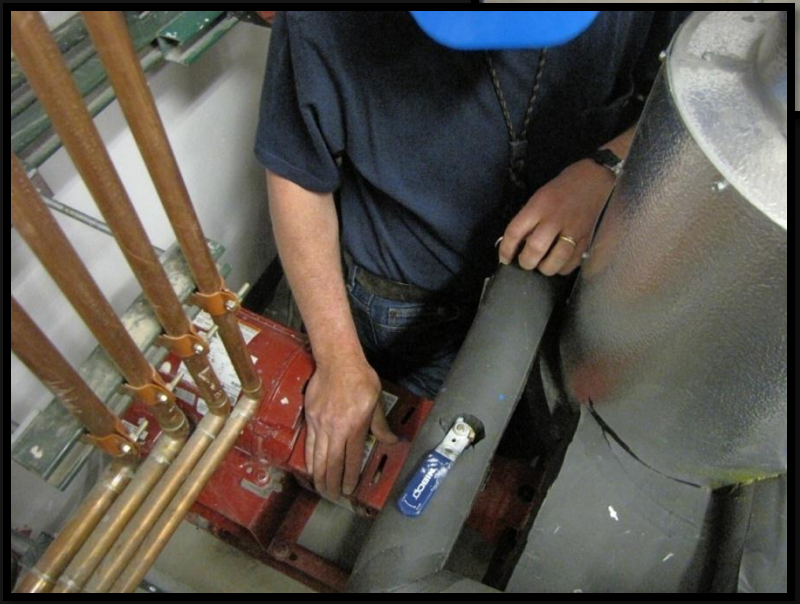
NOT "Maintenance Friendly"



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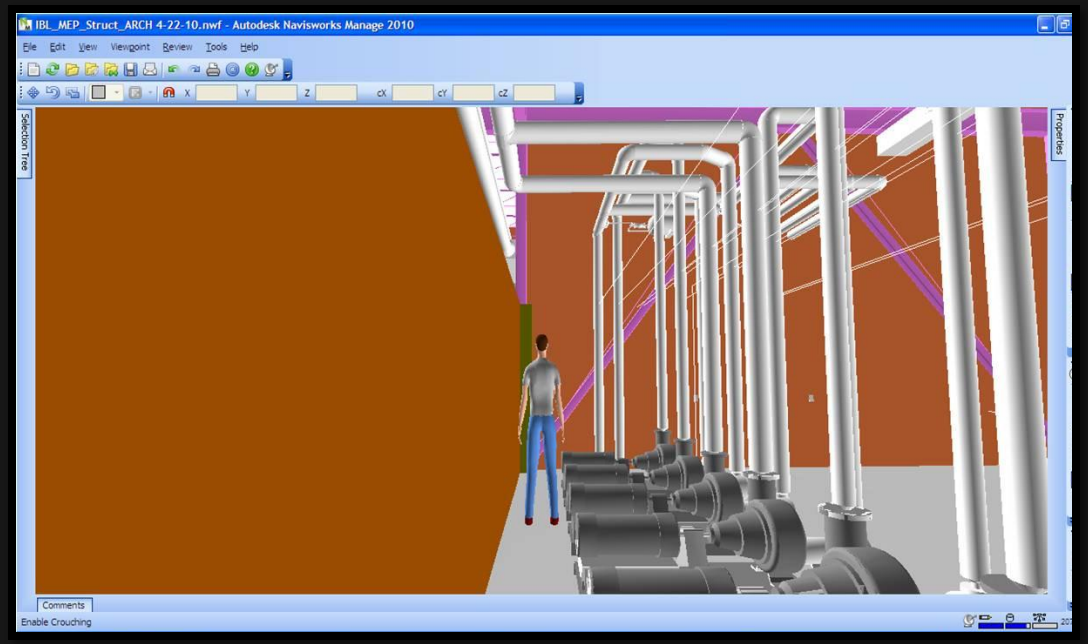
“Maintenance Friendly”



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NOT "Maintenance Friendly"

O&M Impact :

2x PM time

4x CM time

…….. Over 25 years

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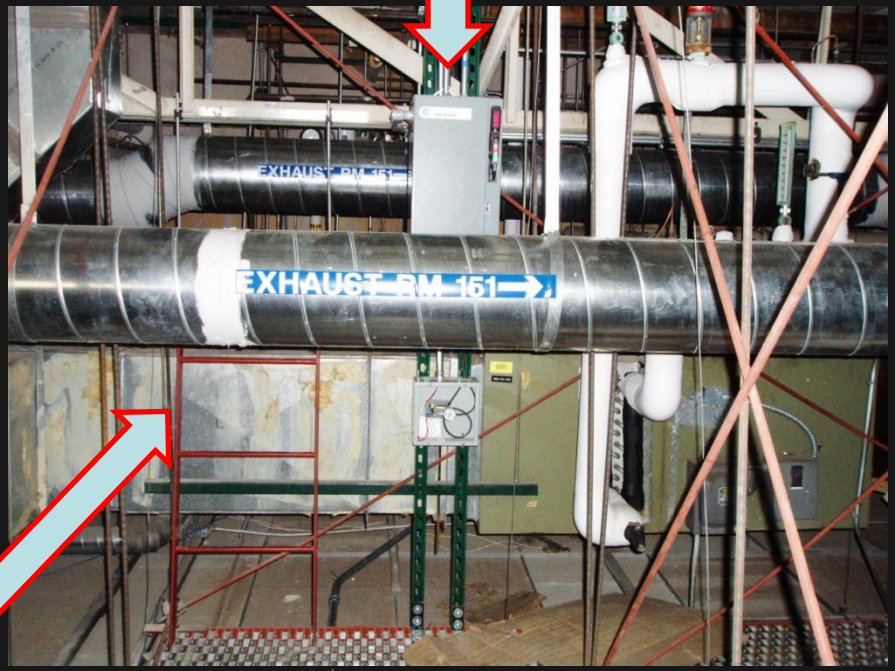
Maintenance Platforms



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Latest examples… Relief Fan

Dec 1, 2010 Forward email from a Facilities Senior Manager

From: Q J
Sent: Wednesday, December 01, 2010 05:03 PM
To: Foster, Birgitta T
Subject: FW: Building [illegible] Relief Fan Access

BIM anyone?

from Service Manager team

"Unless a team member can find an innovative access solution I will be initiating an end of any maintenance activities for Relief Fan, EF1,….I could not find a means of improving access to this fan.. thanks for bringing this to our attention the safety concerns that are associated with gaining access to this piece of equipment"

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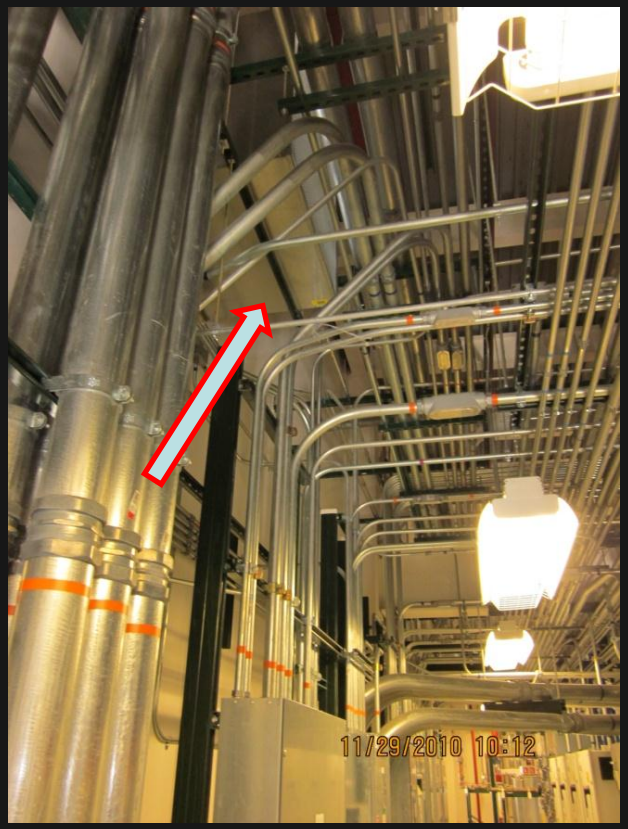
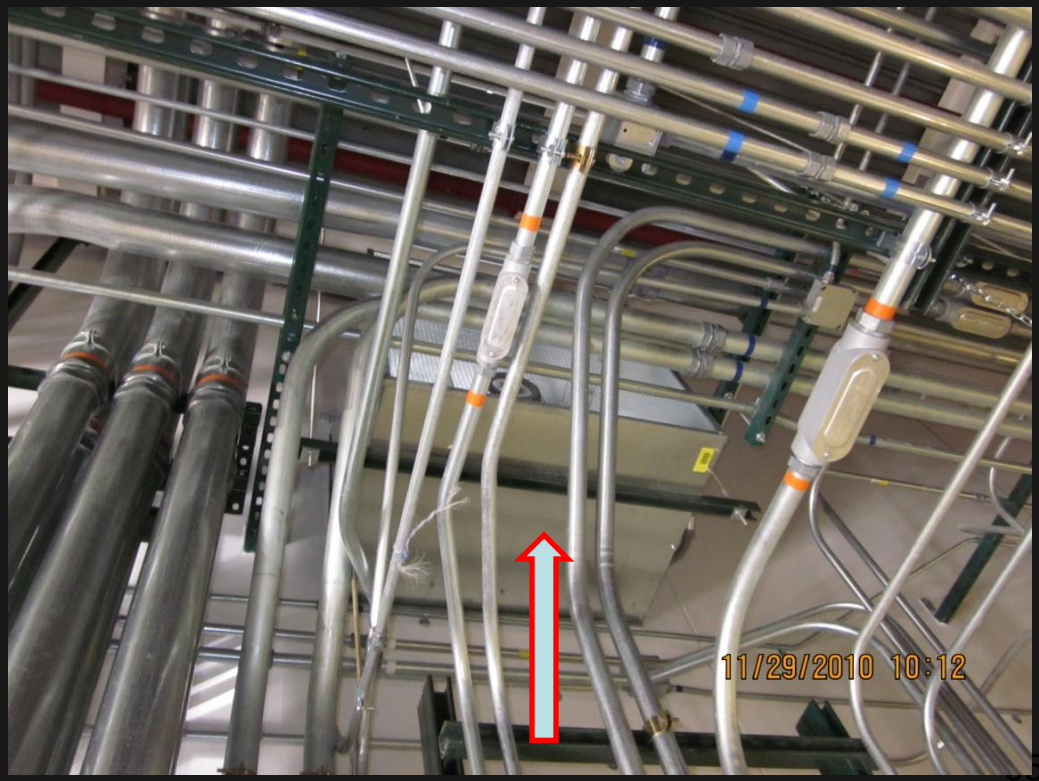
Latest example… Relief Fan

"I have put in service request …to find a solution to meeting the relief needs of the building, perhaps another exhaust fan can be used….Please discontinue any Preventative Maintenance to this exhaust fan."





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Maintenance nightmare - Automation

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Fall 2011 JBIM

- Cover story on MOA
- Issue dedicated to NBIMS-US™ Version 2
- Summary of Ballots
- OmniClass
- BIMXML

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- Join the Alliance $75 - $150
- Sustain the Alliance $1,000 - $5,000
- Sponsor the Alliance - $10,000 - $250,000

- What you receive –
  - International software interoperability – IFC, IFD
  - Access to Industry best practices – don't reinvent wheel
  - Opportunity to determine future standards
  - Standards imbedded in software – minimized technological impact

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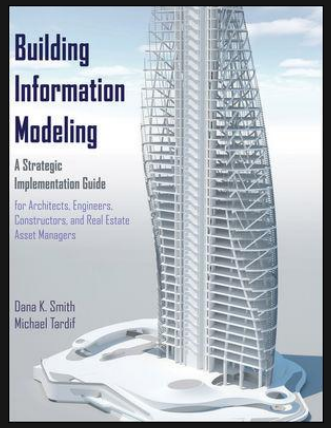
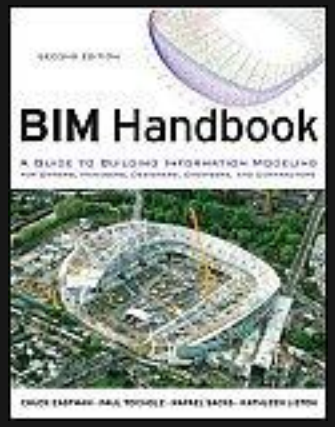
Your Action List

- ❑ **Sign up for JBIM - it's free**
- ❑ **Join buildingSMART alliance**
  - Consider Becoming a Sponsor – **Be recognized as a leader**
  - **www.buildingsmartalliance.org**
- ❑ **Sign up for NBIMS Project Committee to vote!**
- ❑ **Continue Your Education**
  - *Building Information Modeling: A Strategic Implementation Guide – Smith & Tardif*
  - *BIM Handbook – Eastman, Teicholz, Sacks & Liston*
  - **www.WBDG.org**





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buildingSMARTalliance™

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For additional information please contact:

Deke Smith
Executive Director
dsmith@nibs.org

Birgitta Foster
Assisting Director
bfoster.c@nibs.org

b_smart_all

Thank You

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http://www.zoomerang.com/Survey/WEB22DBG7KERLT

Register hosts/attendees should report multiple attendees.

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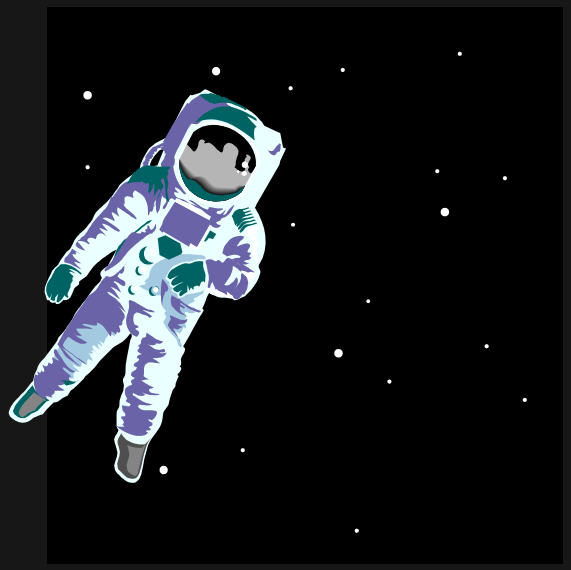
Thank you for your time and attention!

Exits are located at the rear.



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