BIM for Facility Managers

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CEO and Founder, FM:Systems

Paul Teicholz, Ph.D.
Founder and former Director, Center for Integrated Facility Engineering at Stanford University

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Project Manager,
Facility Engineering Associates

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Meet Our Presenters:

Michael Schley, IFMA Fellow

- CEO and Founder, FM:Systems
- Trustee, IFMA Foundation
- Chair, IFMA Foundation Knowledge Management Committee
- Chair, AIA CAD Layer Guidelines Task Force

Meet Our Presenters:

Paul Teicholz, Ph.D.

- Professor Emeritus at Stanford University
- Founding Director of the Center for Integrated Facility Engineering at Stanford
- Co-author of “The BIM Handbook” published by John Wiley and editor/author of “BIM for Facility Managers” published by John Wiley and IFMA.

Meet Our Presenters:

Angela Lewis, Ph.D., P.E., LEED AP

- Project Manager with Facility Engineering Associates
- Contributor to “BIM for Facility Managers” book
- Organized 2013 COBie Challenge for FM
- Past Technical Editor of IFMA Foundation Sustainability How-to Guides

Introduction

BIM and Facility Management

- The IFMA Foundation
  - Education, Scholarships, and Research

- Significance of BIM to Facility Management
  - 90% of the costs of a building occur during operations.
  - BIM can play a significant role in managing these costs.

- Early Discussions in 2011


Paul Teicholz


Chuck Eastman


Eric Teicholz


Mike Schley

Introduction

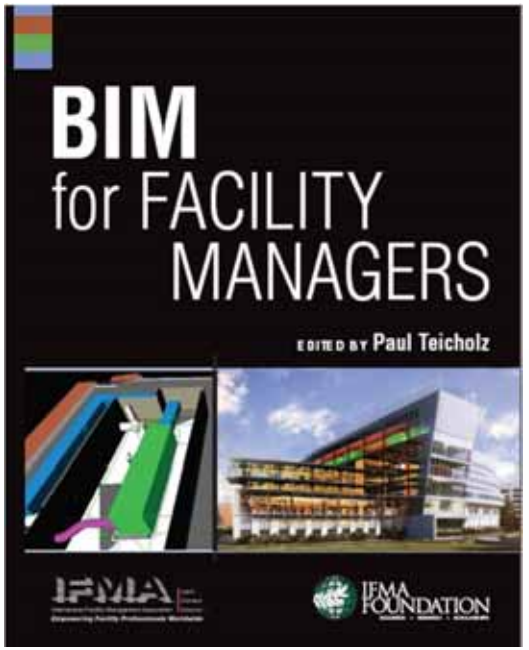
The Need for a Book

- Information on BIM Standards
- Information on BIM Practices
- Case Studies from Early Adapters

- IFMA/John Wiley partnership

IFMA International Facility Management Association

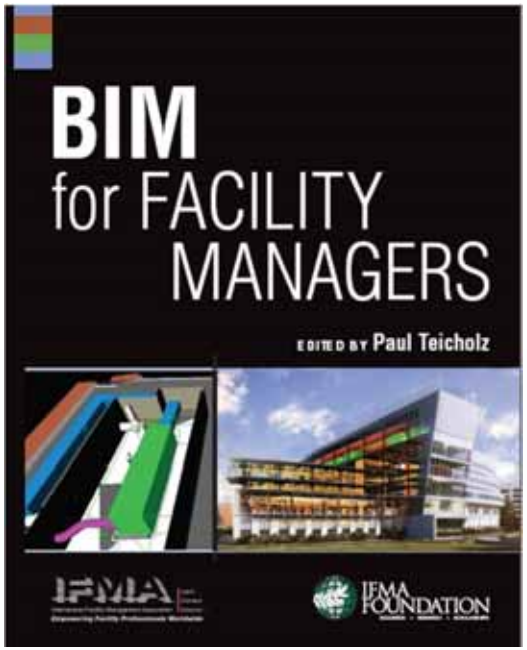
WILEY



Introduction

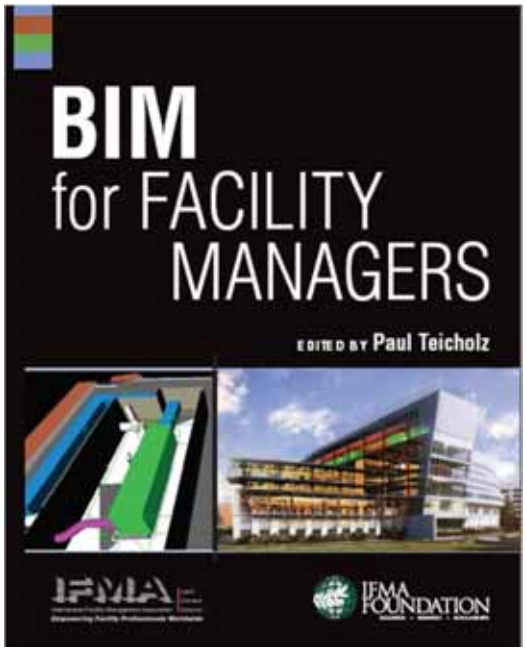
Contents

1. Introduction
2. BIM Technology for FM
3. Owner BIM for FM Guidelines
4. Legal Issues When Considering BIM for FM
5. Using COBie
6. Case Studies



Agenda- Highlights from the Book

- Benefits and Costs of BIM for FM
- BIM Standards
- Legal and Contractual Issues
- Case Studies
  - University of Chicago Administration Building
  - USC School of Cinematic Arts
  - Xavier University
- Questions



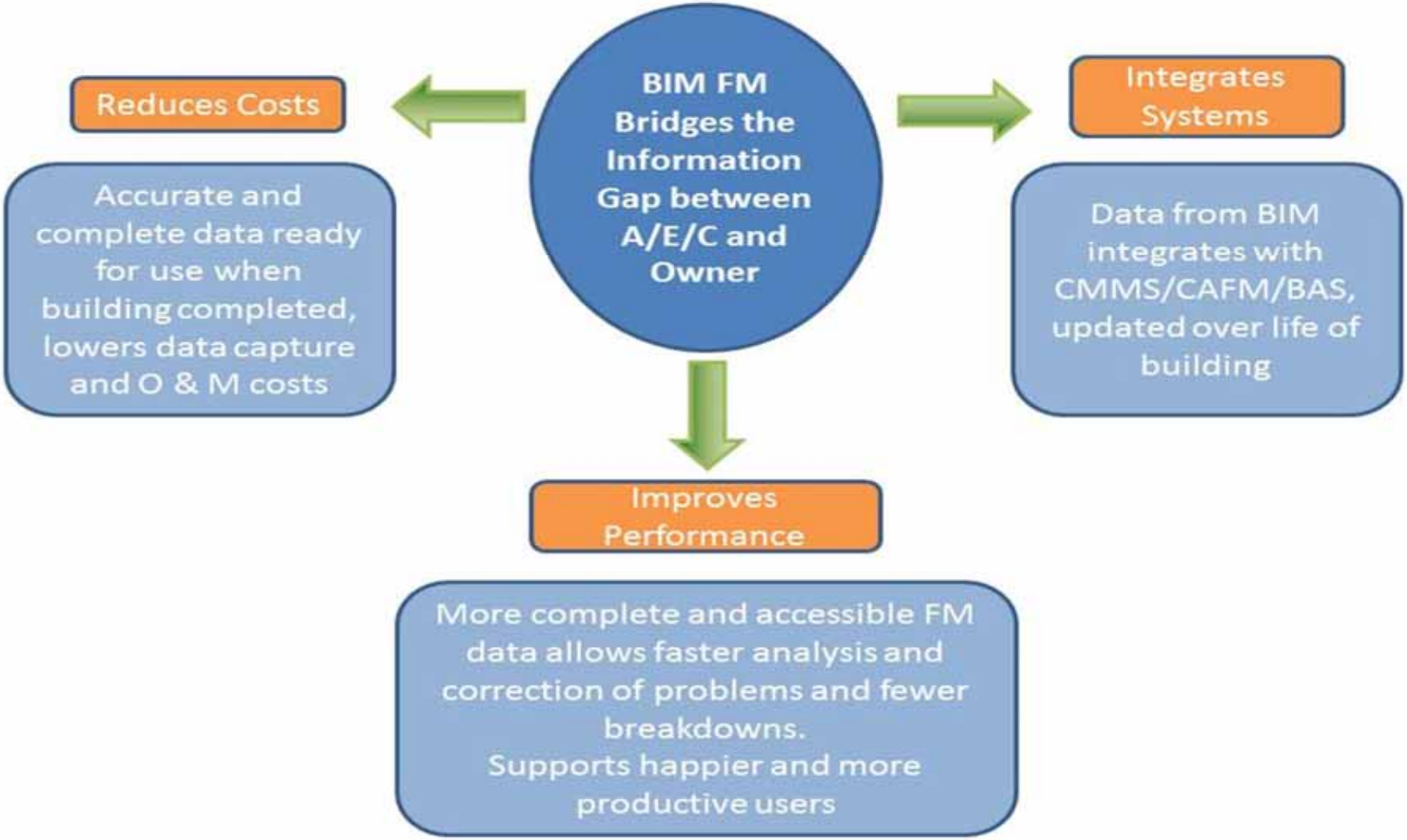
Problems with Current FM Practice

Use of paper-based files for building and equipment information (hard to file & access), quickly outdated often inaccurate

Problems with Current Practice - continued

- Cost and time needed to develop input for CMMS and CAFM files (normally around $1-$3 per gross SF, takes significant time after startup
- Cost and time needed to refer to paper files when FM problems occur
- Poorer building and equipment performance (lack of adequate data for preventive maintenance)

Benefits of BIM FM Integration



Benefits of BIM FM Integration

- Reduced cost and time needed to collect and build CMMS, CAFM and BAS systems
- Improved data quality in FM systems so that paper files not required
- Reduced cost and time needed to address equipment problems
- Better building and equipment performance (reliability, energy use)
- Use of integrated system to plan building modifications

Costs of BIM FM Integration

it doesn't come free!

- Front-end costs during design, construction and turnover to enter data into BIM model that will be needed by FM systems (associated with COBie data) note: There are alternative processes available to define/collect/transfer this data – see book
- On-going cost to update BIM and FM systems to reflect changes to building and systems (files need to reflect reality, not as-designed or as-built)

ROI Analysis of BIM FM Integration-1

Based on 2009 IFMA Maintenance cost survey data:
400,000 GSF office HQ with useful life of 25 years

- Initial costs to create integrated system

  Investment in systems, data collection & verification, training of project team $100,000

- Ongoing costs to maintain integrated system to reflect changes to building and equipment 25% time for 1 FTE at $125,000/yr (fully burdened), $31,250/yr

ROI Analysis of BIM FM Integration-2

- Initial Savings
  - from less labor and time needed to collect data regarding building and equipment: avoid cost of minimum of 2 months for 2 FM gathering initial data: $41,667

ROI Analysis of BIM FM Integration-3

- Ongoing Savings
  - O&M savings of faster access to better information, 0.5 hrs per work order, 1600 work orders per year, $50/hr fully burdened = **$40,000/yr**
  - Utility cost savings from better equipment performance, reduced energy use, 3% of $2.39/GSF/yr = **$28,680/yr**
  - Total savings = **$68,680/yr or $0.17/GSF/yr**

ROI Analysis of BIM FM Integration-4

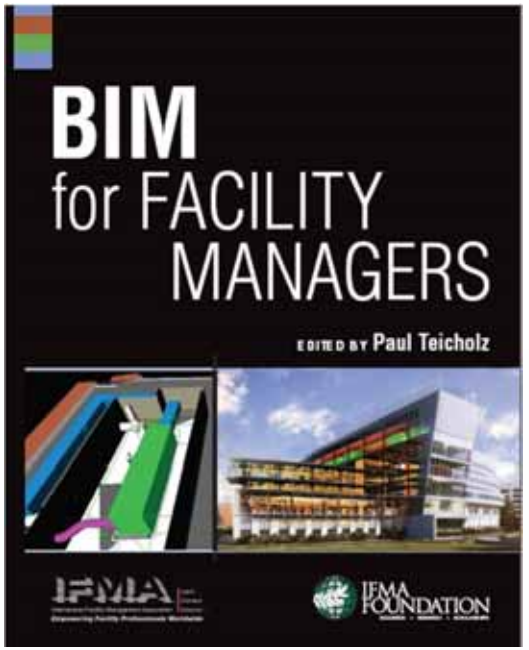
- Initial costs
  - $100,000 - $41,667 = $58,333
- Present Value of ongoing savings
  - Annual savings = 68,680 - $31,250 = $37,430/yr
  - Present value over 25 years at 6% interest rate = $478,481
- Net Present Value
  - $478,481 - $58,333 = $420,148
- Internal ROI = **64%**
- Payback period: $58,333 / $37,430 = **1.57 years**

ROI Analysis of BIM FM Integration-5

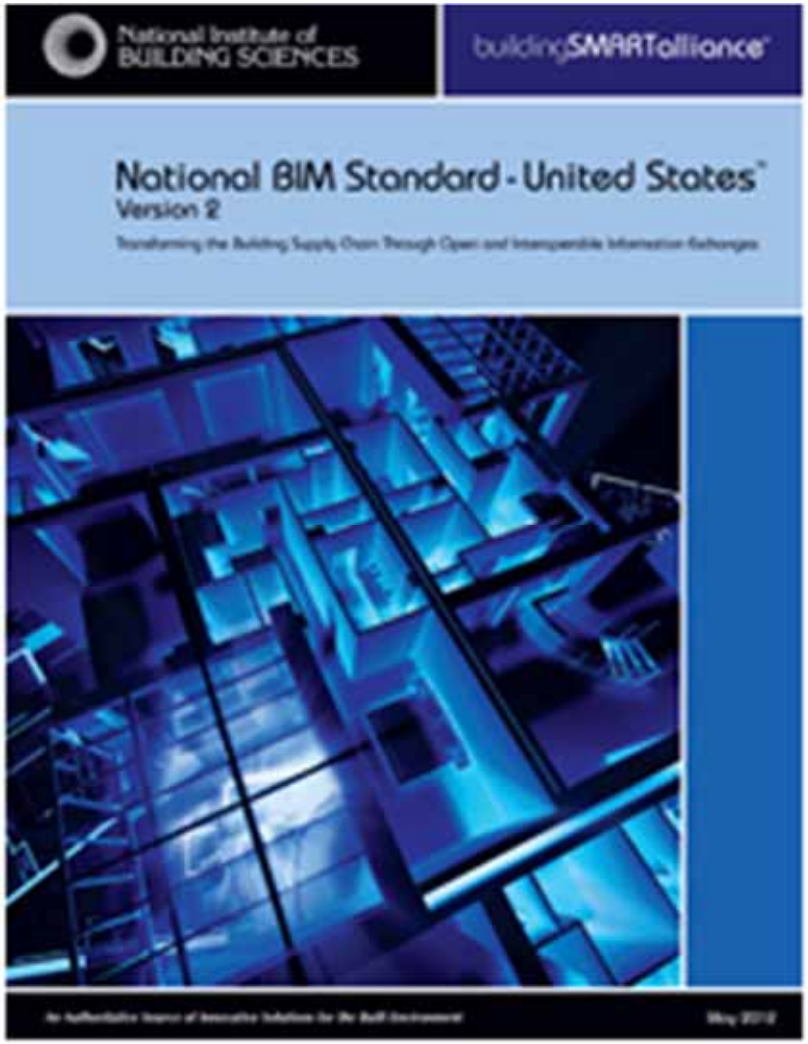
- These are extraordinary results and they exclude the following “soft” benefits:
  - Better building performance for users
  - Fewer equipment breakdowns
  - Improved inventory control of spares
  - Longer equipment lives (can be a significant saving)
  - Use of combined BIM FM model for remodeling and upgrades

Conclusion: Many benefits, few downside risks

BIM Standards



National BIM Standard (NBIMS V2)



Examples of Topics

- OmniClass
- Information exchanges
  - Construction operations building information exchange
  - Spatial program validation
  - Design to building energy analysis
- Practice documents
  - BIM Project Execution Planning Guide
  - Spatial coordination information for MEP

To download:
www.nationalbimstandard.org

Construction Operations Building Information Exchange (COBie)

What is it?

What COBie is not

What is Included

Value of COBie

How to Get Started

What is COBie?

A standard method of exchanging information that drives down cost *(paraphrased statement from Bill Brodt)*

COBie

Design and Construction Data

Facility Management

http://thelinkbetween.wordpress.com/2011/02/16/bridge-building/

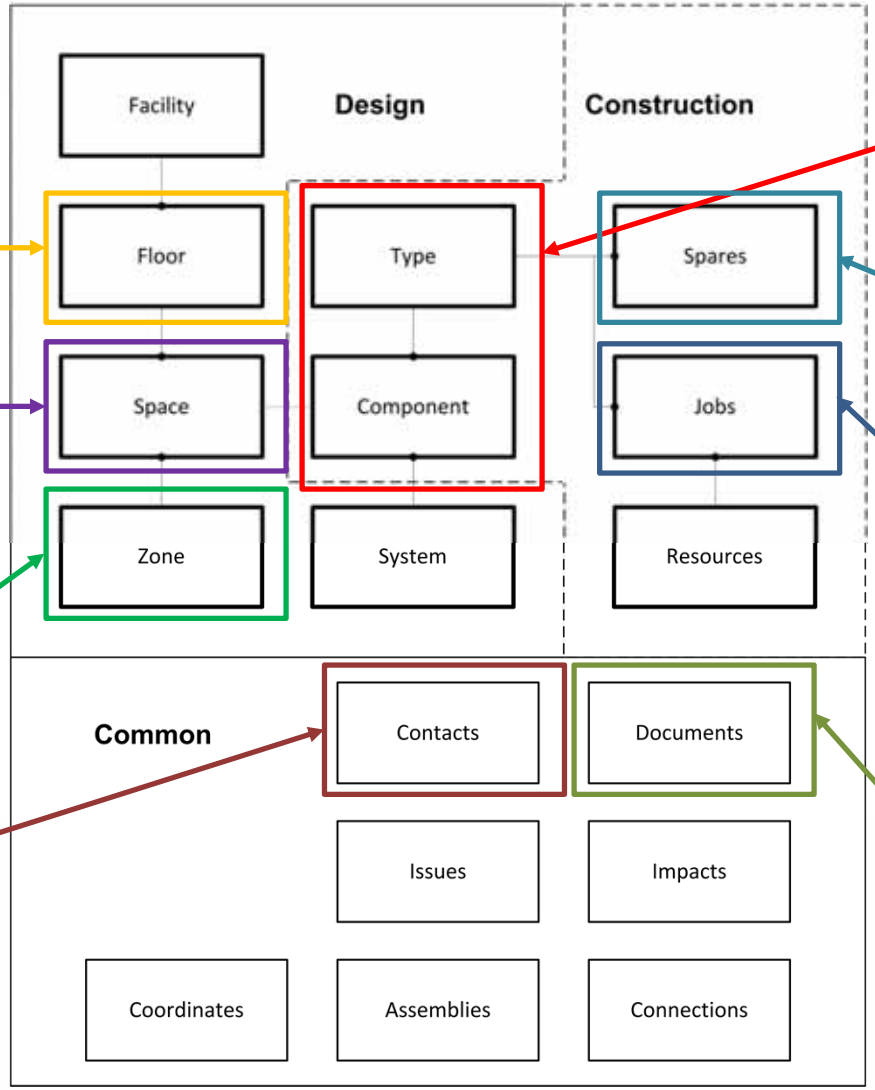
What COBie is **NOT**

- "Just" a spreadsheet
  - IFC, ifcXML, spreadsheetML
- "Just" a model
- A process
- A specification for naming data
- A product
- A BIM requirement

COBie is MORE than "just" a spreadsheet

~~PRODUCT~~

What is Included in COBie



Number and names of floors

Room numbers and names

Occupancy classification

Contact information

Asset data

Spare part information

Preventive maintenance procedures

Closeout submittals, O&M manuals, product data

Value of COBie

- Prevents loss of data between design and construction to facility management handover
- Minimizes data entry
- Use of industry standards reduces cost of software implementation

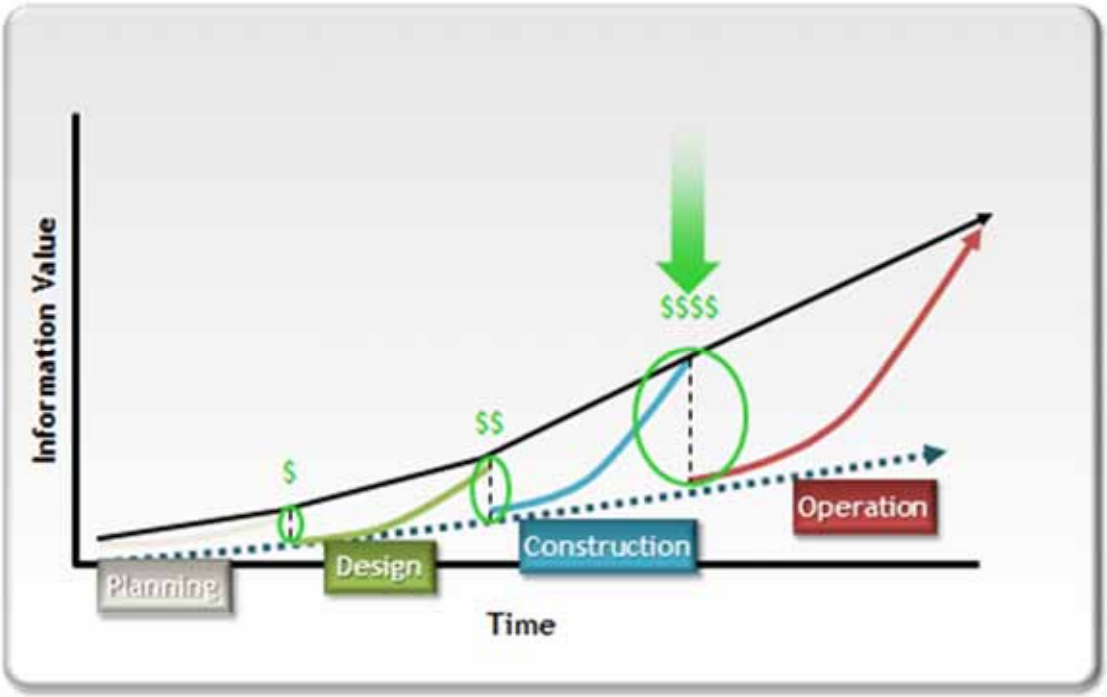


Image courtesy Birgitta Foster– buildingSMART alliance

How to Get Started (1)

1. Determine what data is important

	A	C	D	E	F	G	H	
1	Name	CreatedOn	Category	FloorName	Description	ExtSystem	ExtObject	
2	1A01	2011-09-14T16:57:52	13-11 11 31: Reception Space	First Floor	PATIENT ADMIN. RECEPT.	Autodesk Revit Architecture 2011	IfcSpace	0zt
3	1A02	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	RMO ANALYST	Autodesk Revit Architecture 2011	IfcSpace	0zt
4	1A03	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
5	1A04	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
6	1A05	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
7	1A06	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
8	1A07	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
9	1A08	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	PHARM. OFFICE	Autodesk Revit Architecture 2011	IfcSpace	0zt
10	1A09	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	W. TOILET	Autodesk Revit Architecture 2011	IfcSpace	0zt
11	1A10	2011-09-14T16:57:52	13-51 11 21: Break Room	First Floor	LOUNGE	Autodesk Revit Architecture 2011	IfcSpace	0zt
12	1A11	2011-09-14T16:57:52	13-75 11 11: Storage Room	First Floor	JAN.	Autodesk Revit Architecture 2011	IfcSpace	0zt
13	1A12	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	M. TOILET	Autodesk Revit Architecture 2011	IfcSpace	0zt
14	1A13	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	STAFF TOILET	Autodesk Revit Architecture 2011	IfcSpace	0zt
15	1A14	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	SUPER / NCOIC	Autodesk Revit Architecture 2011	IfcSpace	0zt
16	1A15	2011-09-14T16:57:52	13-41 41 99: Other Healing Spaces	First Floor	COUNSELING	Autodesk Revit Architecture 2011	IfcSpace	0zt
17	1A16	2011-09-14T16:57:52	13-75 11 11: Storage Room	First Floor	PHARM. DISP.	Autodesk Revit Architecture 2011	IfcSpace	0zt
18	1AC1	2011-09-14T16:57:52	13-51 31 11: Waiting Room	First Floor	CENTRAL WAITING	Autodesk Revit Architecture 2011	IfcSpace	0zt
19	1AC2	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace	0zt
20	1AC3	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace	0zt
21	1AC4	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace	0zt

Instruction | Contact | Facility | Floor | Space | Zone | Type | Component | System | Assembly | Connection | Spare | Resource | Job | Impact | Document | Attribute | Coordinate | Issue

Contact / Facility / Floor / **Space** / Zone / Type / Component

System / Assembly / Connection / Spare / Resource / Job

Impact / Document / Attribute / Coordinate / Issue

Buy in from both sides of the process is critical to success

How to Get Started (2)

2. Determine what level of detail about the data to collect

COBie standard defines the column names

COBie standard does not define content of rows

	A	C	D	E	F	G	H	
1	Name	CreatedOn	Category	FloorName	Description	ExtSystem	ExtObject	
2	1A01	2011-09-14T16:57:52	13-11 11 31: Reception Space	First Floor	PATIENT ADMIN. RECEPT.	Autodesk Revit Architecture 2011	IfcSpace	0zt
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Instruction / Contact / Facility / Floor / Space / Zone / Type / Component / System / Assembly / Connection / Spare / Resource / Job / Impact / Document / Attribute / Coordinate / Issue / PickLists

How to Get Started (3)

3. Determine who will collect the data and how

Who?

- Architects?
- Engineers?
- Construction contractor?
  - Subcontractors?
- Commissioning agent?
- Facility manager?

How?

- BIM authoring software?
- COBie capable software?
- Spreadsheet?
- Other?

Legal and Contractual Issues

Chapter 4: Legal Issues When Considering BIM for Facilities Management

- What is the BIM Model's contractual status
- Who owns the model?
- Who owns the intellectual property
- Issues with Interoperability and Data Exchange

Chapter 4 Authors:
Howard Ashcraft and Kymberli Aguilar
HansonBridgett, San Francisco

BIM and Contracts

In standard architectural and engineering practice, the plans and specifications are, by reference, part of the construction contract.

What then is the role of the Building Information Model?

Option	Implications
1. BIM is used to create the plans and specifications but has no contractual status	Straightforward Reflects current typical practice.
2. BIM is co-equal with the plans and specifications	Requires rules of precedence in case of conflicts.
3. BIM is the controlling document.	

Who Owns the Model?

Option	Implications
1. Building owner owns the model.	Issue of designer's library elements
2. Designer owns the model.	Owner is licensed to use. Derivative works can be complicated.
3. Each party owns what they create.	Can be complicated

Licensing can be used instead of ownership.

Indemnification- Managing risk.

The Power of Licensing

"Typically, parties will agree to provide a license, which allows limited use to another party while maintaining copyright and ultimate control. A license is permission to do something with another's property that, absent the license, would be legally actionable."

"From an FM perspective, it is important that the owner either own the design or have a broad license to use the design information to operate, maintain, and upgrade the project facilities."

- *Ashcraft and Aguilar, BIM for Facility Managers*

AIA E202 – BIM Protocol Exhibit

LOD- Level of Detail
100 Conceptual Design
200 Schematic Design
300 Construction Documents
400 Assembly and Fabrication
500 As Constructed

Model Elements

Model Element Author

Model Elements Utilizing CSI UniFormat™					LOD	MEA	LOD	MEA
A SUBSTRUCTURE	A10	Foundations	A1010	Standard Foundations				
			A1020	Special Foundations				
			A1030	Slab on Grade				
	A20	Basement Construction	A2010	Basement Excavation				
			A2020	Basement Walls				
B SHELL	B10	Superstructure	B1010	Floor Construction				
			B1020	Roof Construction				
	B20	Exterior Enclosure	B2010	Exterior Walls				
			B2020	Exterior Windows				
			B2030	Exterior Doors				
	B30	Roofing	B3010	Roof Coverings				
			B3020	Roof Openings				
C INTERIORS	C10	Interior Construction	C1010	Partitions				
			C1020	Interior Doors				
			C1030	Fittings				

American Institute
of Architects

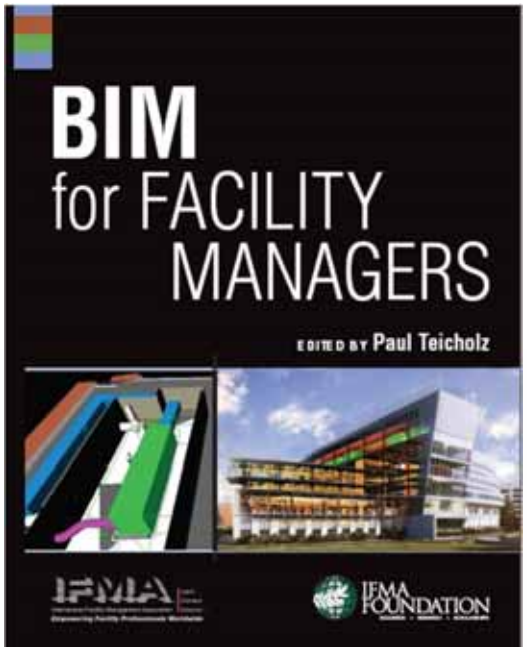
www.aia.org

Case Studies

University of Chicago

USC School of Cinematic Arts

Xavier University



University of Chicago Administration Building Renovation: Project Overview

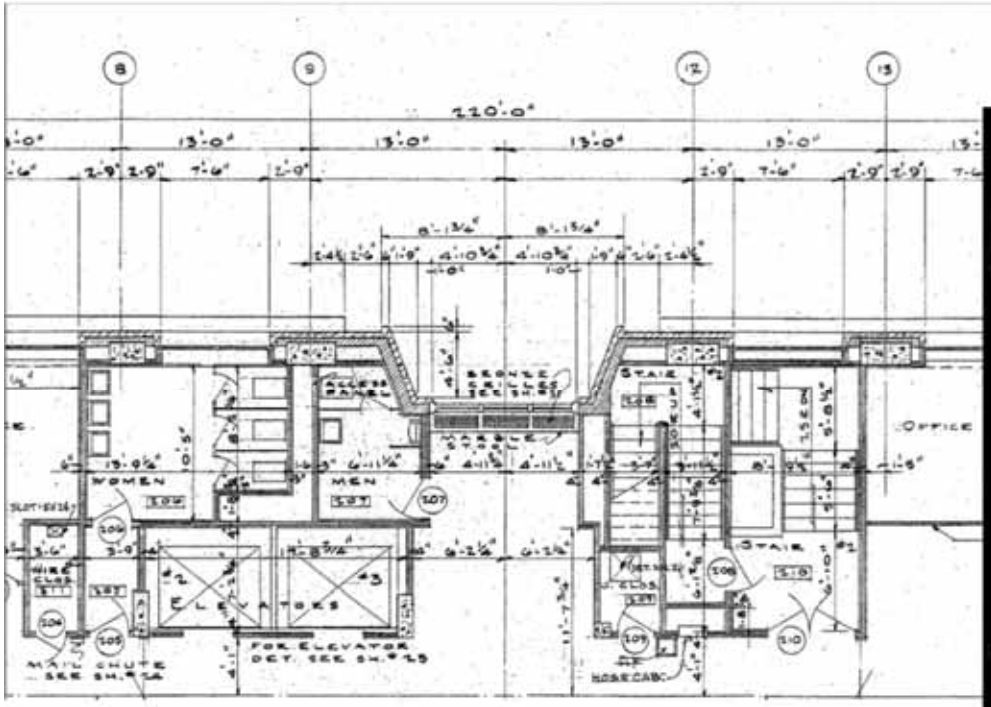
15,000 SF building built in 1949

Renovation and modernization of restrooms and HVAC

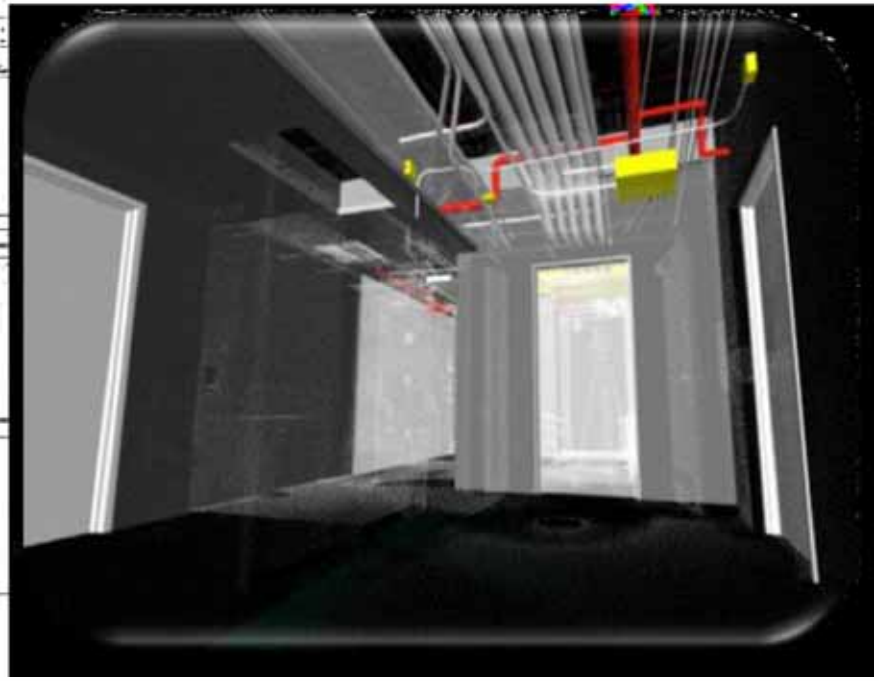
Tight spaces for rerouting ductwork

Images courtesy: M.A. Mortenson Company; , from Teicholz, P. (2013). BIM for Facility Managers. Wiley.

Creation of Accurate As-Built Drawings



1947 hand drawn as-built drawing



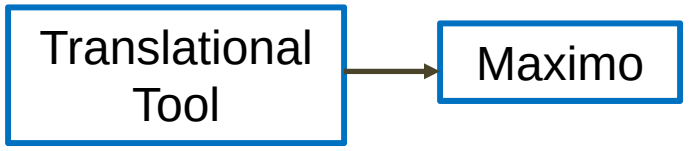
Laser scan overlay on BIM

Images courtesy: M.A. Mortenson Company; from Teicholz, P. (2013). BIM for Facility Managers. Wiley.

Translational Tool using the “Spirit of” COBie as the Foundation

Envisioned Information Flow

Possible Information Flow



Results of Translational Tool: Asset Tab

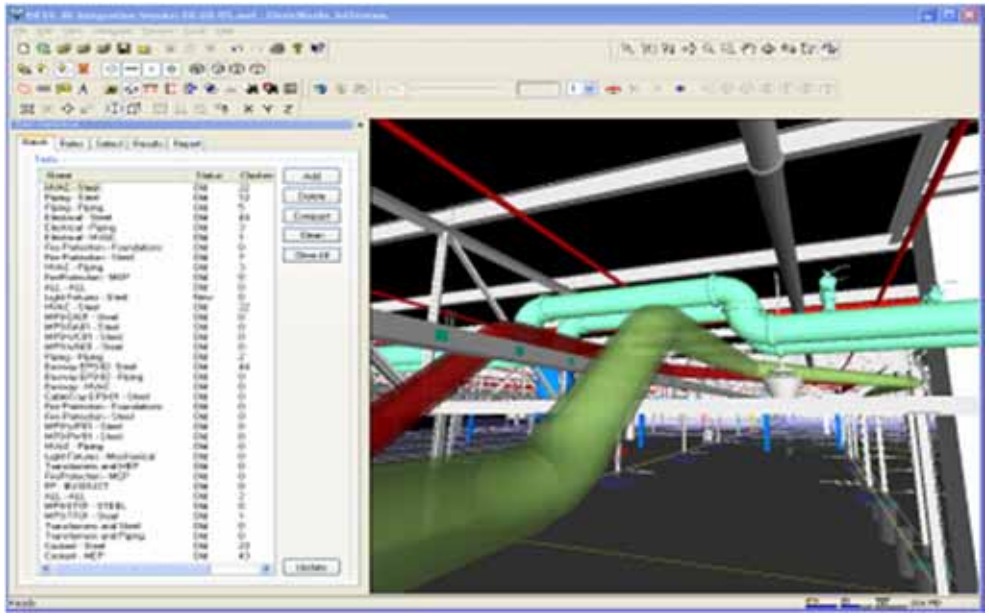
Name	Design Manufacturer	Design Model Number	Installed Manufacturer	Applicable Vendor	Warranty Duration	Expected Life
Air Terminal Unit	Nailor	NAILOR-D30HQW	M0000001	M0000001	2	10 Years
Air Handler Unit	McQuay	McQuay-CAH017GDAC	M0000002	M0000002	2	10 Years
Split A/C Unit	Carrier	Carrier-40MVC012	M0000003	M0000003	2	5 Years
Supply Fan	Carrier	AirFoil AFMV01181	M0000003	M0000003	2	5 Years
Return Fan	Carrier	AirFoil AFMV01181	M0000003	M0000003	2	5 Years
Hot Water Recirculation Pump	Armstrong	Armstrong 1.25B 1050-001	M0000004	M0000004	2	10 Years
Silencer	Vibro-Acoustics	EXPD-MHV-F1-L11165	M0000005	M0000005	2	20 Years
Air Cooled Condenser	Carrier	Carrier-38MVC012	M0000003	M0000003	2	10 Years
F1	Lightolier	LIGHTOLIER CFH2GPF217UNVP2	M0000006	M0000006	2	2000 Hours
F1A	Lightolier	LIGHTOLIER CFH2GPF217UNVP3	M0000006	M0000006	2	2000 Hours
F2	Lightolier	LIGHTOLIER D6132BU-8021CLW	M0000006	M0000006	2	1000 Hours
F3	Lightolier	LIGHTOLIER PTS7T254E8UP2, PTS7248E8UP2, PTS7EP	M0000006	M0000006	2	1000 Hours
F4	Axis	AXIS CUB-F-4-T8-2-AP-X-X-P-UNV-1-CA36	M0000007	M0000007	2	1000 Hours
F5	Lightolier	LIGHTOLIER SS3S125HPFUNVP2	M0000006	M0000006	2	1000 Hours
F6	Lightolier	LIGHTOLIER KW4A232UNVP2	M0000006	M0000006	2	1000 Hours
F7	Lightolier	LIGHTOLIER 22MC6WH	M0000006	M0000006	2	2000 Hours
F8	Lightolier	LIGHTOLIER 6003NWH, 6001NWM	M0000006	M0000006	2	1000 Hours
F9	Kurt Versen	Kurt Versen H8432	M0000008	M0000008	2	50,000 Starts
F10	Kurt Versen	Kurt Versen H8455	M0000008	M0000008	2	50,000 Starts
F11	Lumetta	Lumetta P2094	M0000009	M0000009	2	2000 Hours
X1	Lightolier	LIGHTOLIER MJES2RW23	M0000006	M0000006	2	3 Years
Drinking Fountain	Elkay	Elkay EDFPBMV117C BI-LEVEL	M0000010	M0000010	2	15 Years
Urinal	Toto	TOTO TEU1UN w/ Vitreous China Urinal	M0000011	M0000011	2	10 Years
Water Closet	Toto	TOTO CT708E w/ Vitreous China Elongated Bowl	M0000011	M0000011	2	10 Years
Lavatory	Kohler	Kohler K-2610	M0000012	M0000012	2	10 Years

Images courtesy: M.A. Mortenson Company; , from Teicholz, P. (2013). BIM for Facility Managers. Wiley.

University of Chicago: Lessons Learned

- No “out of the box” solutions
- New processes are needed
- Existing systems are both a restraint and a decision driver
- Team member skills
- Communication between disciplines

University of Chicago: Challenges



- How much data?.... and how detailed?
- Should the 3D model be used for FM?

University of Southern California (USC): Overview

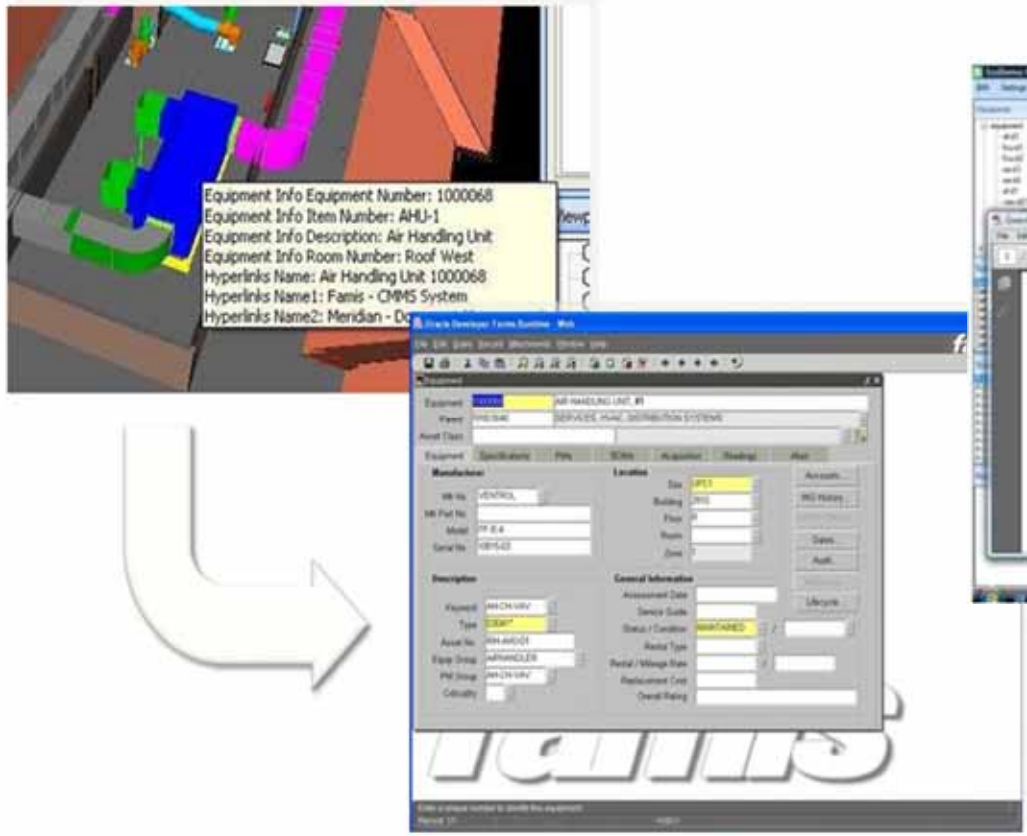
- School of Cinematic Arts
- 3 Phase, 6 building $165 million complex
- BIM FM further defined through each phase

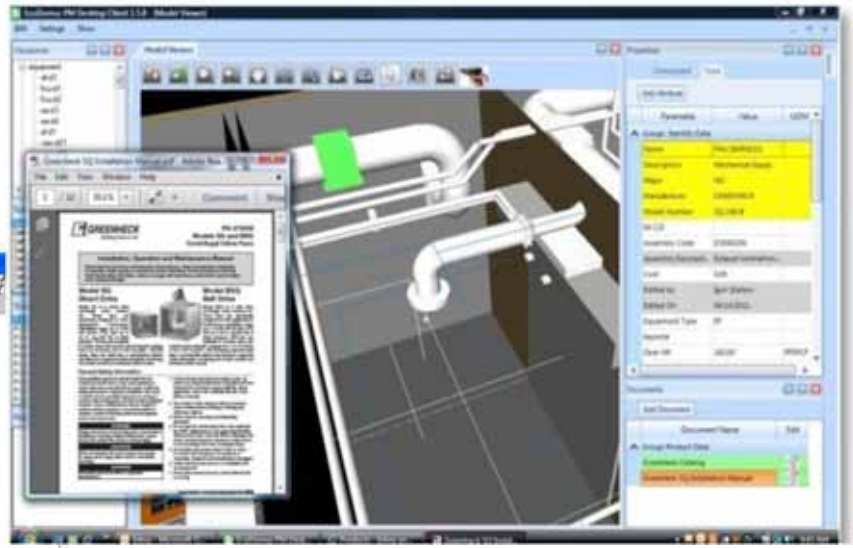
Images courtesy: Hathaway Dinwiddie; from Teicholz, P. (2013). BIM for Facility Managers. Wiley.

USC FM Portal

Phase 1 Portal: Using Navisworks

Phase 3 Portal: Using EcoDomus (middleware)





Images courtesy: USC FMS; from Teicholz, P. (2013). BIM for Facility Managers. Wiley.

USC BIM Guidelines

Milestone	Deliverable
Contract Award	Final BIM Execution Plan
Schematic Design Phase	Architectural Model
	Civil Model
	COBie Design Data • Contact • Facility • Floor • Space • Zone
Design Development	Architectural Model
	Civil Model
	MEPF Model or Models
	Structural Model
	COBie Design Data • Contact • Facility • Floor • Space • Type • Component

COBie Design Data

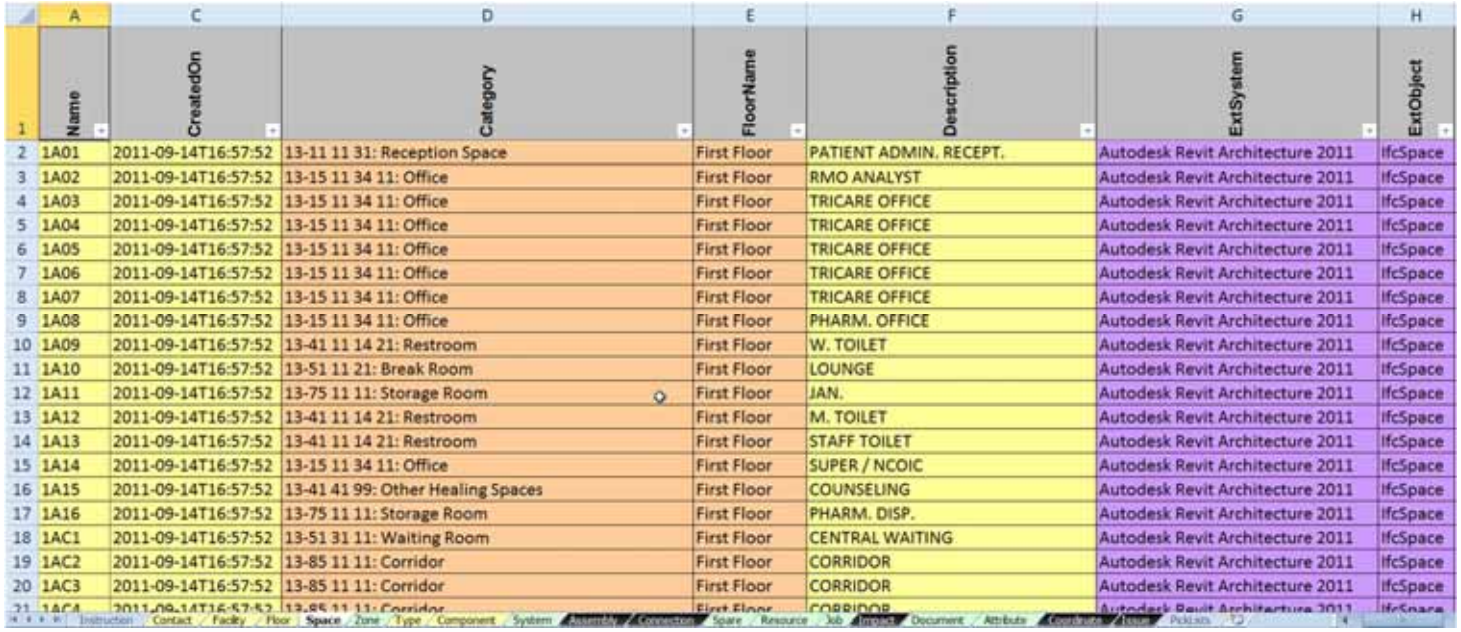
- Contact
- Facility
- Floor
- Space
- Type
- Component

Link to access
http://www.usc.edu/fms/documents/cad_web_links/BIMGuidelines_VS1_6_2012.pdf

USC: Lessons Learned

New processes ≠ New tools

- Develop a BIM Guideline early, and use it
- Use industry standards, such as COBie
- Importance of top level support for BIM FM



	A	C	D	E	F	G	H
1	Name	CreatedOn	Category	FloorName	Description	ExtSystem	ExtObject
2	1A01	2011-09-14T16:57:52	13-11 11 31: Reception Space	First Floor	PATIENT ADMIN. RECEPT.	Autodesk Revit Architecture 2011	IfcSpace
3	1A02	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	RMO ANALYST	Autodesk Revit Architecture 2011	IfcSpace
4	1A03	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace
5	1A04	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace
6	1A05	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace
7	1A06	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace
8	1A07	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	TRICARE OFFICE	Autodesk Revit Architecture 2011	IfcSpace
9	1A08	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	PHARM. OFFICE	Autodesk Revit Architecture 2011	IfcSpace
10	1A09	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	W. TOILET	Autodesk Revit Architecture 2011	IfcSpace
11	1A10	2011-09-14T16:57:52	13-51 11 21: Break Room	First Floor	LOUNGE	Autodesk Revit Architecture 2011	IfcSpace
12	1A11	2011-09-14T16:57:52	13-75 11 11: Storage Room	First Floor	JAN.	Autodesk Revit Architecture 2011	IfcSpace
13	1A12	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	M. TOILET	Autodesk Revit Architecture 2011	IfcSpace
14	1A13	2011-09-14T16:57:52	13-41 11 14 21: Restroom	First Floor	STAFF TOILET	Autodesk Revit Architecture 2011	IfcSpace
15	1A14	2011-09-14T16:57:52	13-15 11 34 11: Office	First Floor	SUPER / NCOIC	Autodesk Revit Architecture 2011	IfcSpace
16	1A15	2011-09-14T16:57:52	13-41 41 99: Other Healing Spaces	First Floor	COUNSELING	Autodesk Revit Architecture 2011	IfcSpace
17	1A16	2011-09-14T16:57:52	13-75 11 11: Storage Room	First Floor	PHARM. DISP.	Autodesk Revit Architecture 2011	IfcSpace
18	1AC1	2011-09-14T16:57:52	13-51 31 11: Waiting Room	First Floor	CENTRAL WAITING	Autodesk Revit Architecture 2011	IfcSpace
19	1AC2	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace
20	1AC3	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace
21	1AC4	2011-09-14T16:57:52	13-85 11 11: Corridor	First Floor	CORRIDOR	Autodesk Revit Architecture 2011	IfcSpace

USC: Challenges

- Management of after construction BIM
  - Data validation
  - Who will manage?
  - With what funds?
- What is the business case?

Case Study- Xavier University

- A Jesuit, Catholic university in Cincinnati
- Founded 1831
- 7,019 total students
- 70 buildings – over 2 million GSF

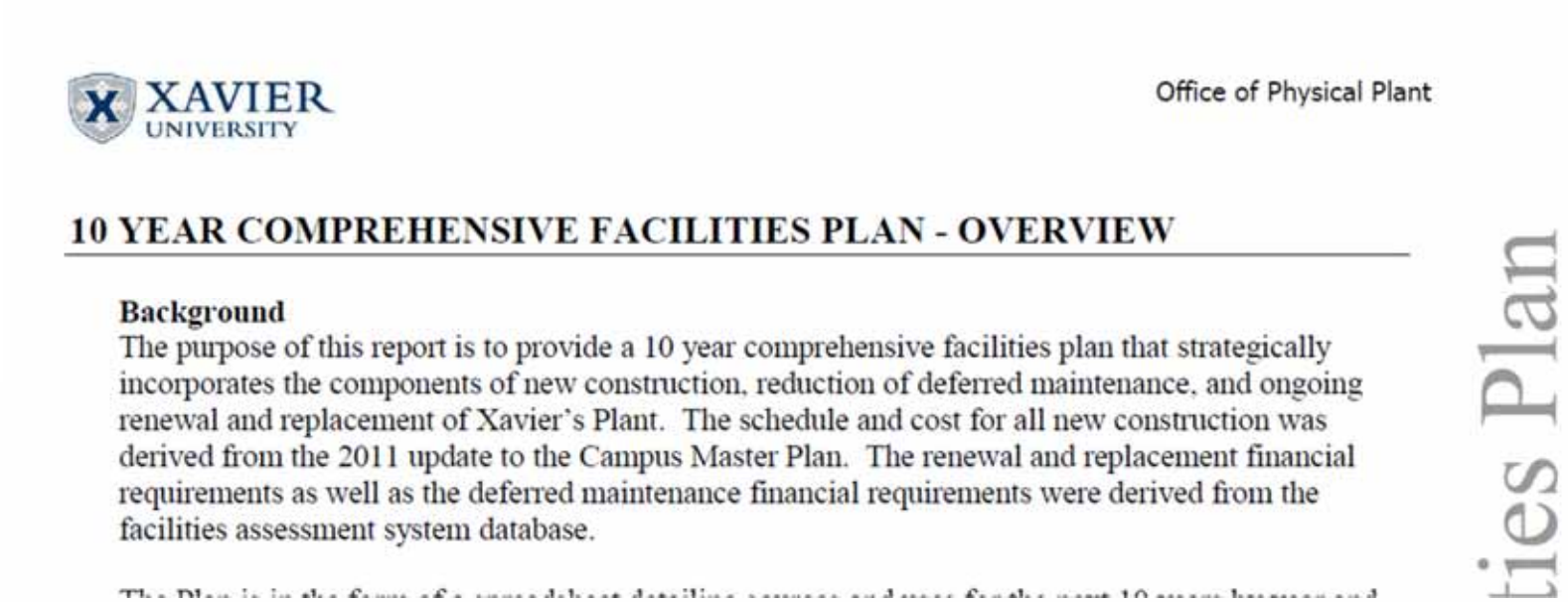
XAVIER
UNIVERSITY

Xavier's Hoff Academic Quad and Residence Hall Project

- $117 M, Largest capital projects in schools history
- Added 25% to campus
- 4 new buildings
- BIM used to facilitate design and construction

Xavier's Challenges

- Produce 10 Year Comprehensive Facilities Plan for entire campus
- Forecast facilities capital costs and obtain proper funding to reduce deferred maintenance



XAVIER UNIVERSITY

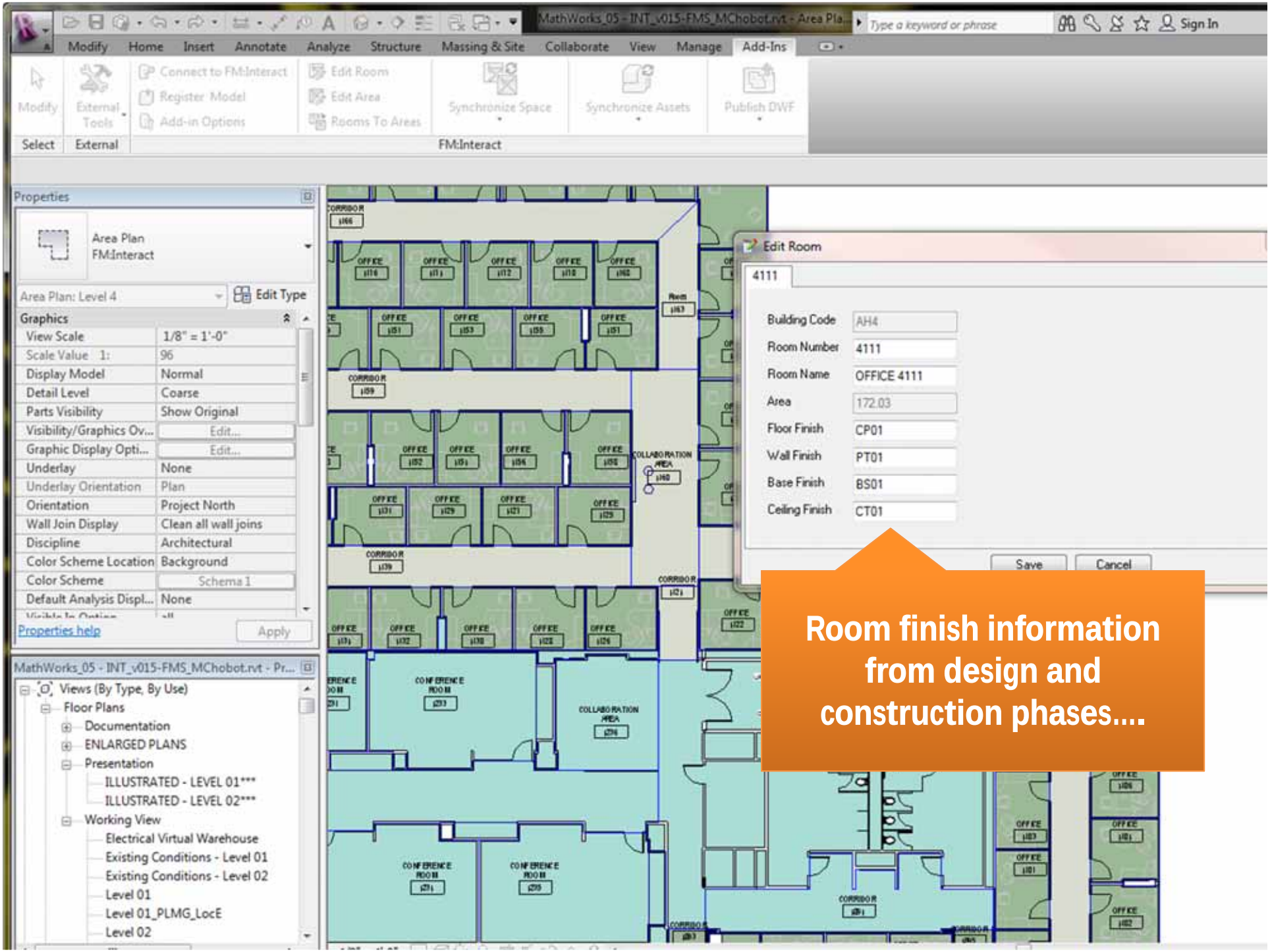
Office of Physical Plant

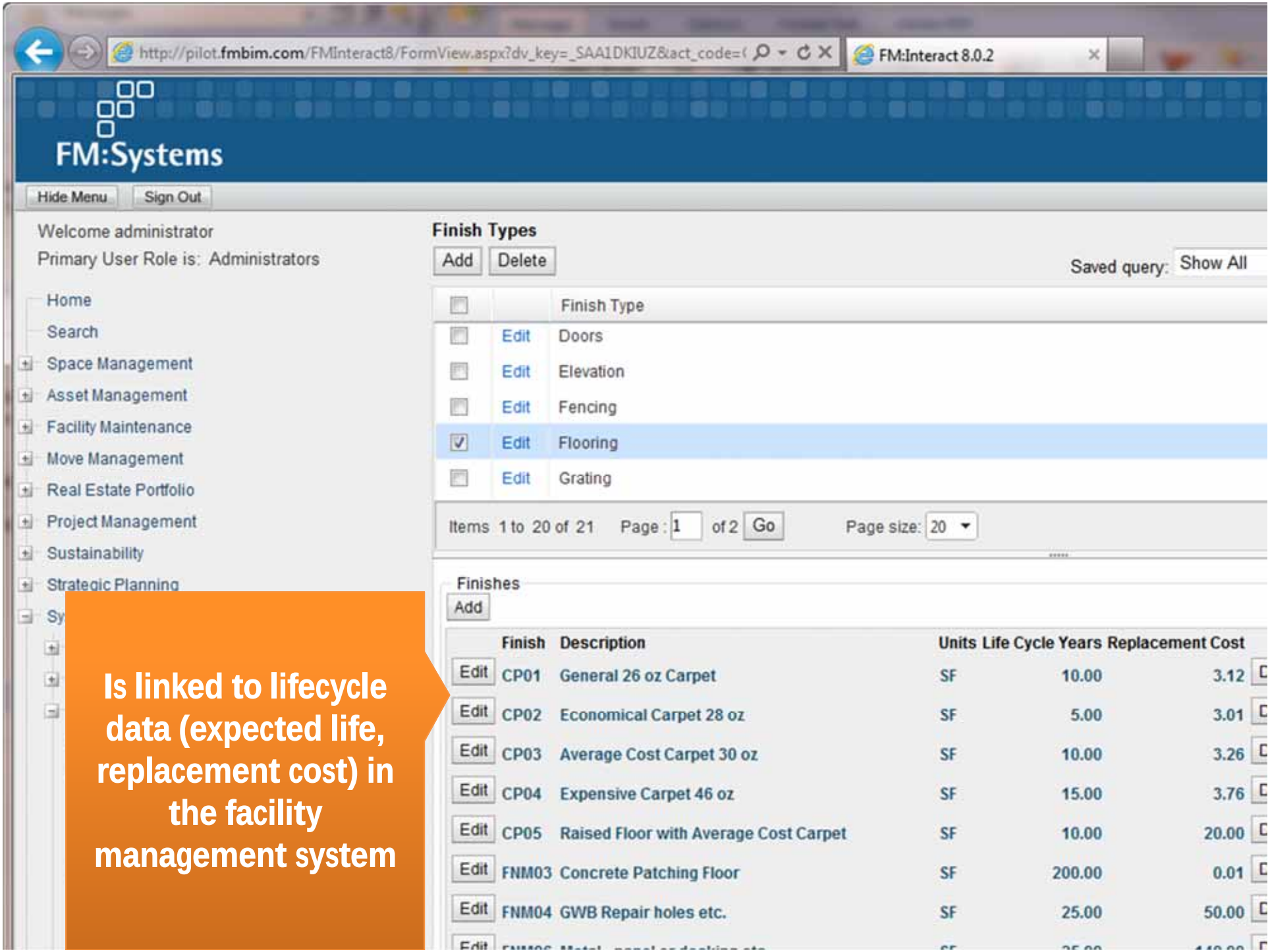
10 YEAR COMPREHENSIVE FACILITIES PLAN - OVERVIEW

Background

The purpose of this report is to provide a 10 year comprehensive facilities plan that strategically incorporates the components of new construction, reduction of deferred maintenance, and ongoing renewal and replacement of Xavier's Plant. The schedule and cost for all new construction was derived from the 2011 update to the Campus Master Plan. The renewal and replacement financial requirements as well as the deferred maintenance financial requirements were derived from the facilities assessment system database.

ties Plan


Modify
Home
Insert
Annotate
Analyze
Structure
Massing & Site
Collaborate
View
Manage
Add-Ins
Sign In
Connect to FM:Interact
Register Model
Add-in Options
Edit Room
Edit Area
Rooms To Areas
Synchronize Space
Synchronize Assets
Publish DWF
Select
External
FM:Interact
Properties
Area Plan
FM:Interact
Area Plan: Level 4
Edit Type
Graphics
View Scale
1/8" = 1'-0"
Scale Value 1:
96
Display Model
Normal
Detail Level
Coarse
Parts Visibility
Show Original
Visibility/Graphics Ov...
Edit...
Graphic Display Opti...
Edit...
Underlay
None
Underlay Orientation
Plan
Orientation
Project North
Wall Join Display
Clean all wall joins
Discipline
Architectural
Color Scheme Location
Background
Color Scheme
Schema 1
Default Analysis Displ...
None
Properties help
Apply
MathWorks_05 - INT_v015-FMS_MChobot.rvt - Pr...
Views (By Type, By Use)
Floor Plans
Documentation
ENLARGED PLANS
Presentation
ILLUSTRATED - LEVEL 01***
ILLUSTRATED - LEVEL 02***
Working View
Electrical Virtual Warehouse
Existing Conditions - Level 01
Existing Conditions - Level 02
Level 01
Level 01_PLMG_LocE
Level 02
Edit Room
4111
Building Code
AH4
Room Number
4111
Room Name
OFFICE 4111
Area
172.03
Floor Finish
CP01
Wall Finish
PT01
Base Finish
BS01
Ceiling Finish
CT01
Save
Cancel
Room finish information from design and construction phases....



Is linked to lifecycle data (expected life, replacement cost) in the facility management system

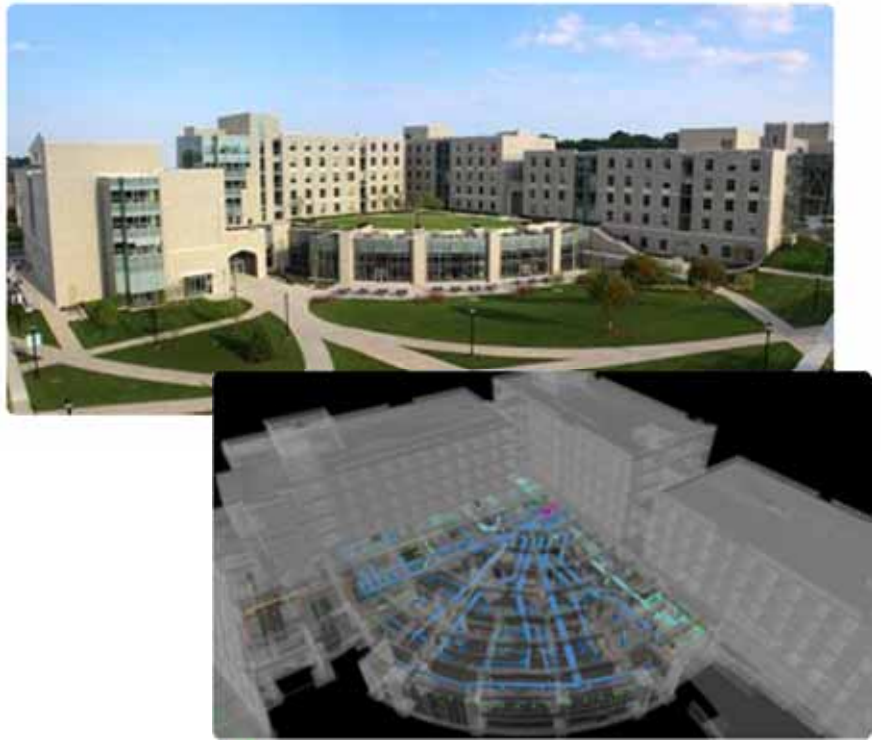
Xavier's Results

XAVIER UNIVERSITY

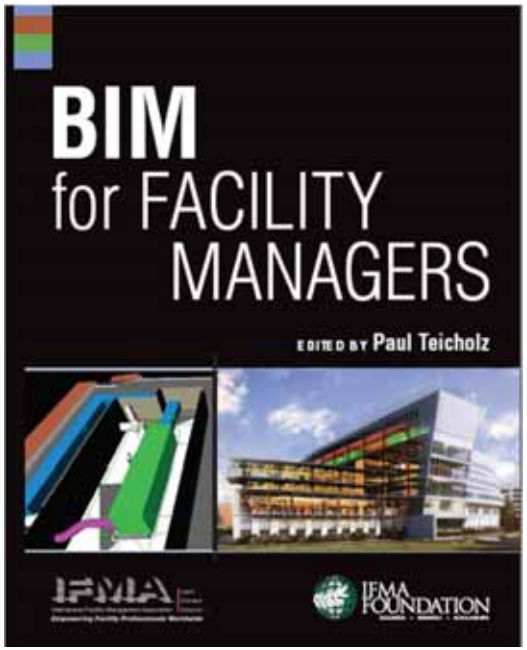
- Integration of BIM and FM data avoided **12 person months of data gathering and entry**
- Used FM data to document extensive deferred maintenance and **increase O&M funding from $750K to $12M per year**

Xavier Results and Lessons Learned

- Project started in 2009
- Modeled for design and construction not FM
- Subcontractor's models developed in various CAD-based tools
  - Costly to redo sub's models to meet Xavier's needs
- The earlier you plan your BIM data efforts, the better.



Questions?


BIM
for FACILITY
MANAGERS
EDITED BY Paul Teicholz
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