Campus FM Technology Association

WESTERN MICHIGAN UNIVERSITY

Facilities Management Department

DeVon Miller
Building Commissioning Administrator

INTRODUCTION

DeVon C. Miller, CPMP, LEED® AP
Building Commissioning Administrator
Engineering Division
Facilities Management
Western Michigan University
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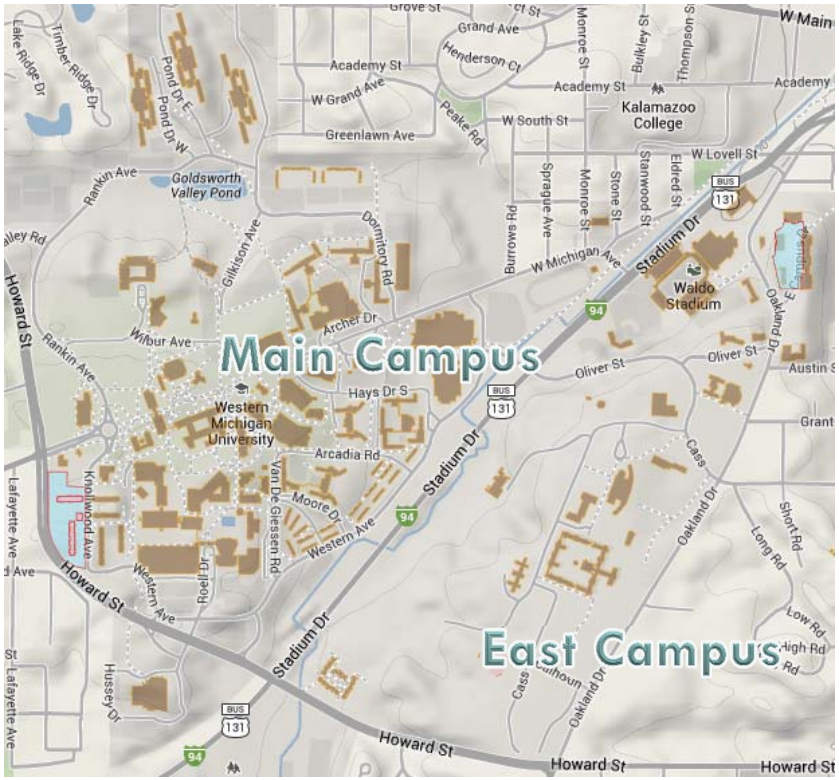
DeVon Miller is the Building Commissioning Administrator at Western Michigan University. DeVon is new to Facilities Management but has over 15 years of experience in project management including energy conservation, building automation systems, building commissioning and is a Commissioning Process Management Professional and LEED Accredited Professional with ASHRAE and Green Building Certification Institute (GBCI) respectively. He holds a BS in Mechanical Engineering from Michigan Technological University.

AGENDA

- WMU Fast Facts
- WMU FM
- BIM for new construction
- BIM for existing buildings

WMU FAST FACTS

- Established in 1903
- Enrollment 24,294
- 1,200 acres and 167 buildings
- 8 million square feet of University space
- On-campus residence halls and apartments are able to house 6,400 students
- 39 miles of sidewalk and 26.5 lane miles of roadway
- 49 miles of utilities



WMU FAST FACTS

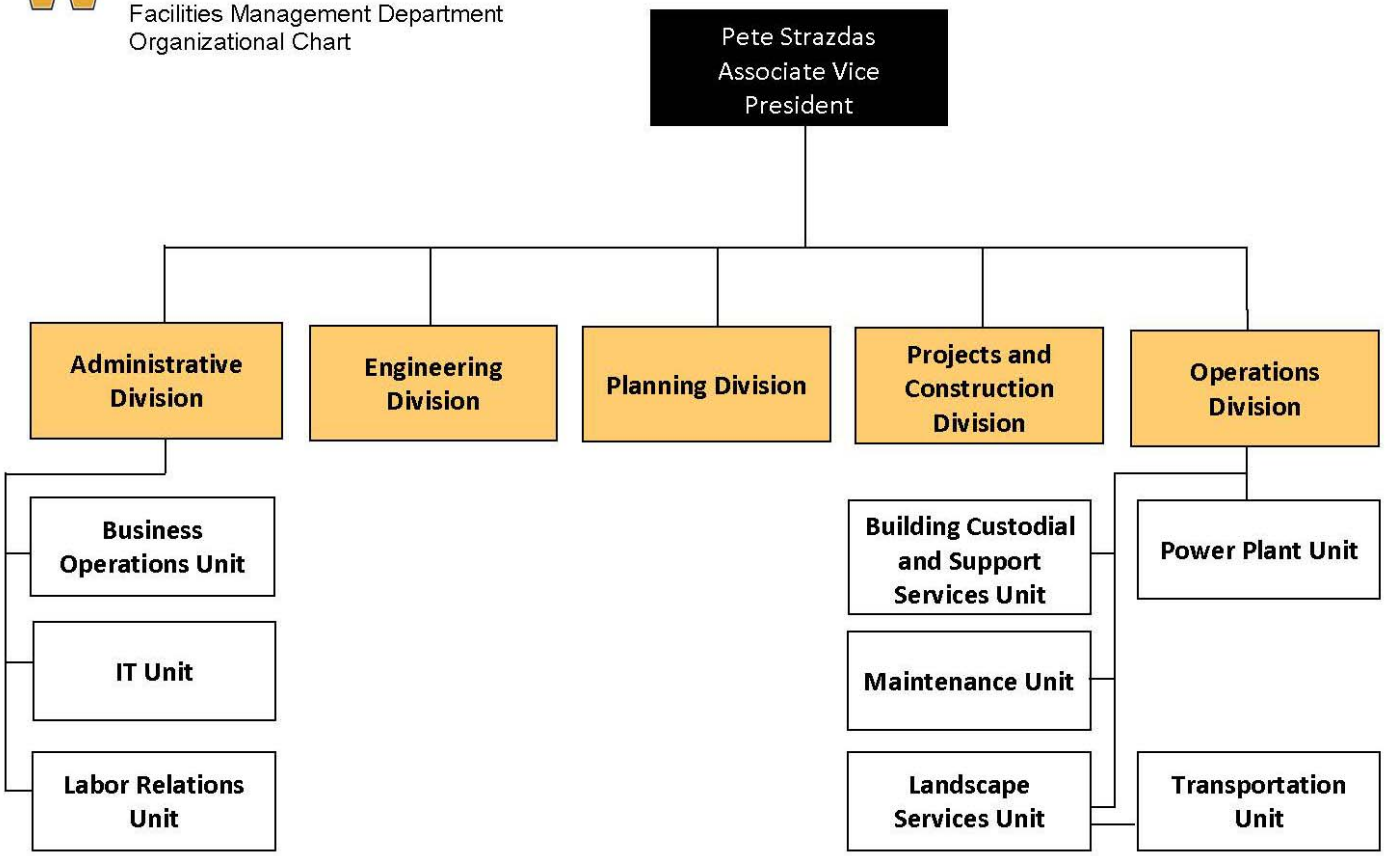
Western Michigan University
Facilities Management

- 467 employees
- 50,000 work orders in 2013
- 20,000 PM maintenance orders
- Annual dispatch of 72 million KWh of electricity and 510 million pounds of steam

FM DEPARTMENT ORGANIZATIONAL CHART

WESTERN MICHIGAN UNIVERSITY

Facilities Management Department
Organizational Chart



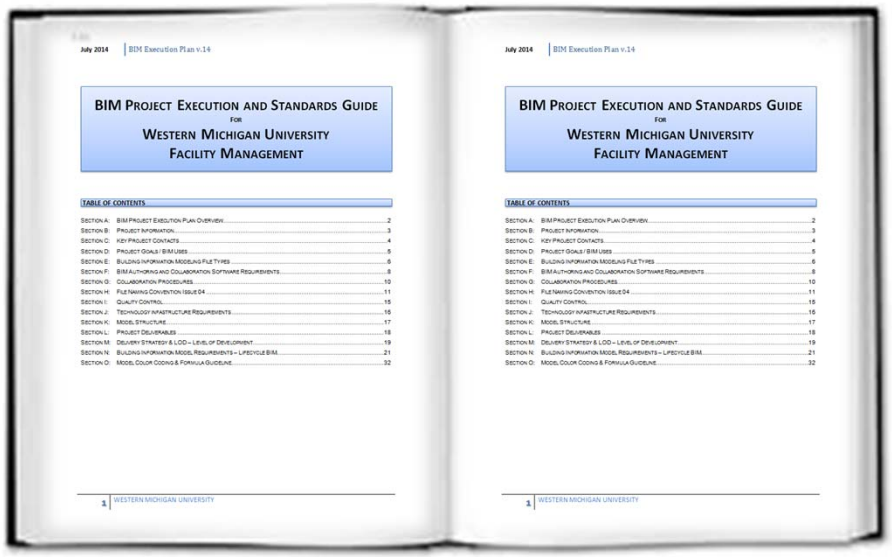
BIM FOR NEW CONSTRUCTION

CAPITAL CONSTRUCTION PROJECTS

BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?



1. PROJECT GOALS / BIM USES

BIM EXECUTION PLAN

1. BIM Goals and uses

GOALS

PRIORITY (HIGH/ MED/ LOW)	GOAL DESCRIPTION	PROJECT PHASE
H	Provide WMU a LOD 300 model including Arch, MEP, and Structure for construction	Construction
H	Coordinate all disciplines through the design/construction process to reduce RFI's	Construction
M	Reference all building components per the Western Michigan University BIM guideline	Lifecycle
H	Improve commissioning process by adding equipment information into BIM process	Lifecycle
H	Improve visualization of design intent using BIM design principles	Design

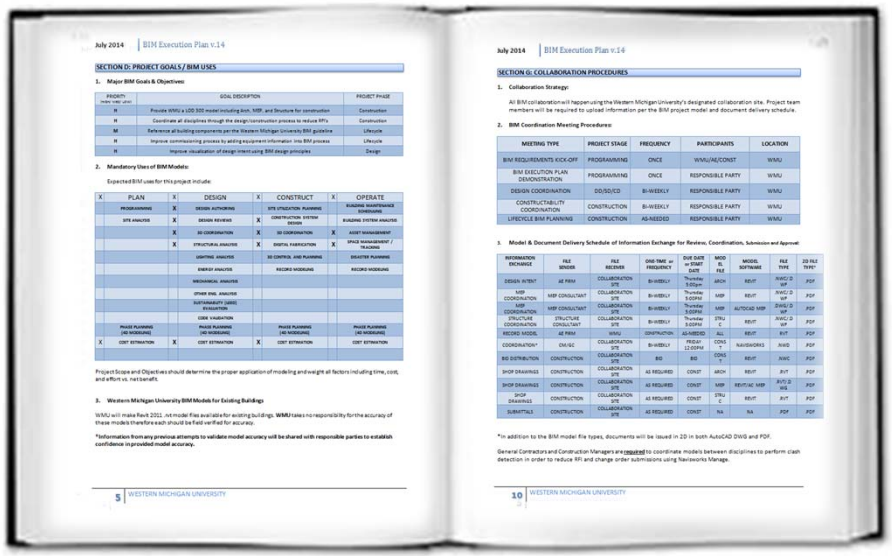
BIM USES

X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING	X	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING MAINTENANCE SCHEDULING
	SITE ANALYSIS	X	DESIGN REVIEWS	X	CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
		X	3D COORDINATION	X	3D COORDINATION	X	ASSET MANAGEMENT
		X	STRUCTURAL ANALYSIS	X	DIGITAL FABRICATION	X	SPACE MANAGEMENT / TRACKING
			LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
			ENERGY ANALYSIS		RECORD MODELING		RECORD MODELING
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS				
			SUSTAINABLITY (LEED) EVALUATION				
			CODE VALIDATION				
	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
X	COST ESTIMATION	X	COST ESTIMATION	X	COST ESTIMATION		COST ESTIMATION

BIM PLANNING

Setting expectations

BIM Project Execution Plan: What's in it?



July 2014 | BIM Execution Plan v.14

SECTION D: PROJECT GOALS / BIM USES

1. Major BIM Goals & Objectives:

PRIORITY (High / Med / Low)	GOAL DESCRIPTION	PROJECT PHASE
H	Provide WMU a LOD 300 model including Arch, MEP, and Structure for construction	Construction
H	Coordinate all disciplines through the design/construction process to reduce RFI's	Construction
M	Reference all building components per the Western Michigan University BIM guideline	Lifecycle
H	Improve commissioning process by adding equipment information into BIM process	Lifecycle
H	Improve visualization of design intent using BIM design principles	Design

2. Mandatory Uses of BIM Models:

Expected BIM uses for this project include:

X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING	X	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING MAINTENANCE SCHEDULING
	SITE ANALYSIS	X	DESIGN REVIEWS	X	CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEMS ANALYSIS
		X	3D COORDINATION	X	3D COORDINATION	X	ASSET MANAGEMENT
		X	STRUCTURAL ANALYSIS	X	DIGITAL FABRICATION	X	SPACE MANAGEMENT / TRACKING
			LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
			ENERGY ANALYSIS		RECORD MODELING		RECORD MODELING
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS				
			SUSTAINABILITY (LEED) EVALUATION				
			CODE VALIDATION				
	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
X	COST ESTIMATION	X	COST ESTIMATION	X	COST ESTIMATION		COST ESTIMATION

Project Scope and Objectives should determine the proper application of modeling and weight all factors including time, cost, and effort vs. net benefit.

3. Western Michigan University BIM Models for Existing Buildings

WMU will make Revit 2011 .rvt model files available for existing buildings. WMU takes no responsibility for the accuracy of these models therefore each should be field verified for accuracy.

*Information from any previous attempts to validate model accuracy will be shared with responsible parties to establish confidence in provided model accuracy.

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July 2014 | BIM Execution Plan v.14

SECTION G: COLLABORATION PROCEDURES

1. Collaboration Strategy:

All BIM collaboration will happen using the Western Michigan University's designated collaboration site. Project team members will be required to upload information per the BIM project model and document delivery schedule.

2. BIM Coordination Meeting Procedures:

MEETING TYPE	PROJECT STAGE	FREQUENCY	PARTICIPANTS	LOCATION
BIM REQUIREMENTS KICK-OFF	PROGRAMMING	ONCE	WMU/AE/CONST	WMU
BIM EXECUTION PLAN DEMONSTRATION	PROGRAMMING	ONCE	RESPONSIBLE PARTY	WMU
DESIGN COORDINATION	DD/SD/CD	BI-WEEKLY	RESPONSIBLE PARTY	WMU
CONSTRUCTABILITY COORDINATION	CONSTRUCTION	BI-WEEKLY	RESPONSIBLE PARTY	WMU
LIFECYCLE BIM PLANNING	CONSTRUCTION	AS-NEEDED	RESPONSIBLE PARTY	WMU

3. Model & Document Delivery Schedule of Information Exchange for Review, Coordination, Submission and Approval:

INFORMATION EXCHANGE	FILE SENDER	FILE RECEIVER	ONE-TIME or FREQUENCY	DUE DATE or START DATE	MOD EL FILE	MODEL SOFTWARE	FILE TYPE	2D FILE TYPE*
DESIGN INTENT	AE FIRM	COLLABORATION SITE	BI-WEEKLY	Thursday 5:00pm	ARCH	REVIT	.NWC/.DWF	.PDF
MEP COORDINATION	MEP CONSULTANT	COLLABORATION SITE	BI-WEEKLY	Thursday 5:00PM	MEP	REVIT	.NWC/.DWF	.PDF
MEP COORDINATION	MEP CONSULTANT	COLLABORATION SITE	BI-WEEKLY	Thursday 5:00PM	MEP	AUTOCAD MEP	.DWG/.DWF	.PDF
STRUCTURE COORDINATION	STRUCTURE CONSULTANT	COLLABORATION SITE	BI-WEEKLY	Thursday 5:00PM	STRU C	REVIT	.NWC/.DWF	.PDF
RECORD MODEL	AE FIRM	WMU	CONSTRUCTION	AS-NEEDED	ALL	REVIT	.RVT	.PDF
COORDINATION*	CM/GC	COLLABORATION SITE	BI-WEEKLY	FRIDAY 12:00PM	CONS T	NAVISWORKS	.NWD	.PDF
BID DISTRIBUTION	CONSTRUCTION	COLLABORATION SITE	BID	BID	CONS T	REVIT	.NWC	.PDF
SHOP DRAWINGS	CONSTRUCTION	COLLABORATION SITE	AS REQUIRED	CONST	ARCH	REVIT	.RVT	.PDF
SHOP DRAWINGS	CONSTRUCTION	COLLABORATION SITE	AS REQUIRED	CONST	MEP	REVIT/AD MEP	.RVT/.DWG	.PDF
SHOP DRAWINGS	CONSTRUCTION	COLLABORATION SITE	AS REQUIRED	CONST	STRU C	REVIT	.RVT	.PDF
SUBMITTALS	CONSTRUCTION	COLLABORATION SITE	AS REQUIRED	CONST	NA	NA	.PDF	.PDF

*In addition to the BIM model file types, documents will be issued in 2D in both AutoCAD DWG and PDF.

General Contractors and Construction Managers are required to coordinate models between disciplines to perform clash detection in order to reduce RFI and change order submissions using Navisworks Manage.

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1. **Project Goals / BIM Uses**
2. **Collaboration Procedures: how often to share? how?**

BIM EXECUTION PLAN

2. Collaboration Procedures: how often to share? How?

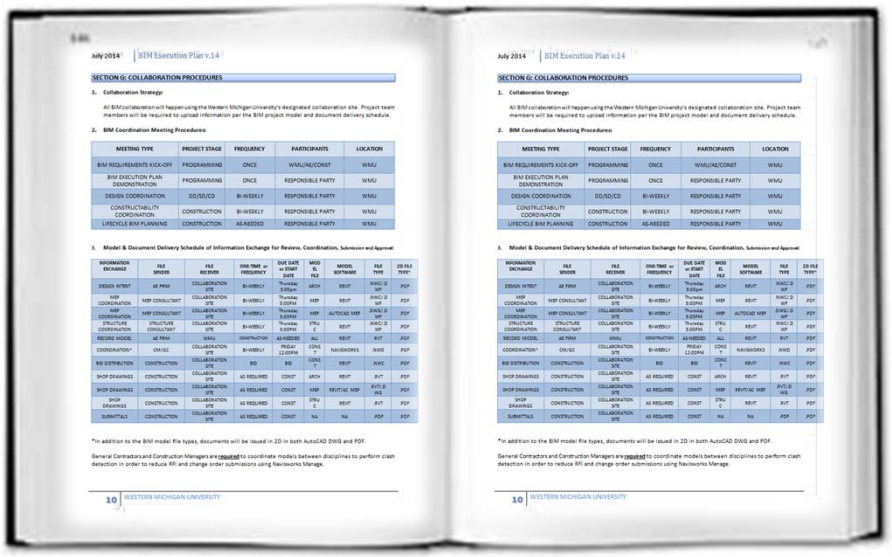
- **BIM Coordination <u>Meeting Procedures</u>**

Meeting type	*Project stage*	*Frequency*	*Participants*	*Location*
BIM REQUIREMENTS KICK-OFF	PROGRAMMING	ONCE	WMU/AE/CONST	WMU
BIM EXECUTION PLAN DEMONSTRATION	PROGRAMMING	ONCE	RESPONSIBLE PARTY	WMU
DESIGN COORDINATION	DD/SD/CD	BI-WEEKLY	RESPONSIBLE PARTY	WMU
CONSTRUCTABILITY COORDINATION	CONSTRUCTION	BI-WEEKLY	RESPONSIBLE PARTY	WMU
LIFECYCLE BIM PLANNING	CONSTRUCTION	AS-NEEDED	RESPONSIBLE PARTY	WMU

BIM PLANNING

Setting expectations

BIM Project Execution Plan: What's in it?

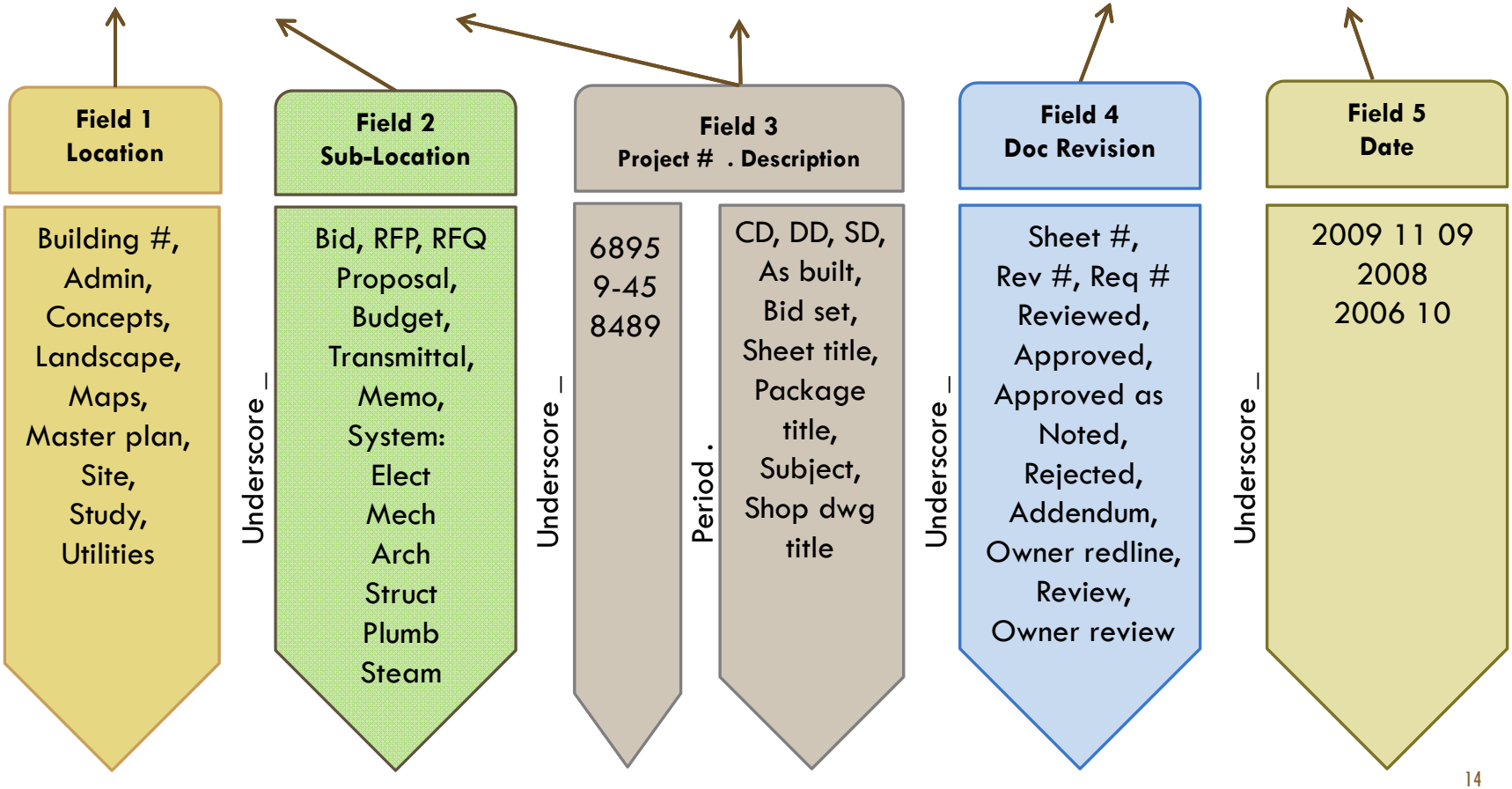


1. Project Goals / BIM Uses
2. Collaboration Procedures: how often to share? how?
3. File naming convention

BIM EXECUTION PLAN

3. File naming convention

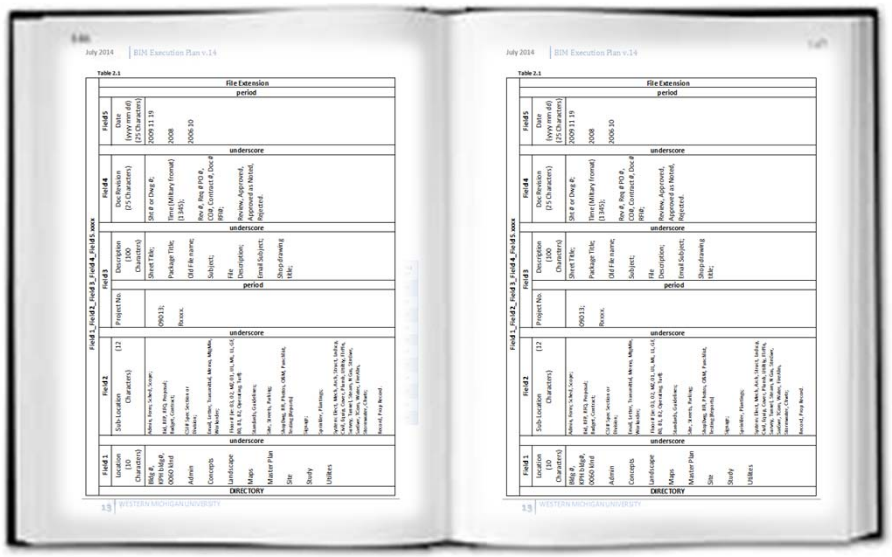
145_struct_03455.steel frame north elevation_approved_2010 11



BIM PLANNING

Setting expectations

BIM Project Execution Plan: What's in it?



1. Project Goals / BIM Uses
2. Collaboration Procedures: how often to share? how?
3. File naming convention
4. Technology infrastructure requirements

BIM EXECUTION PLAN

4. Technology infrastructure requirements

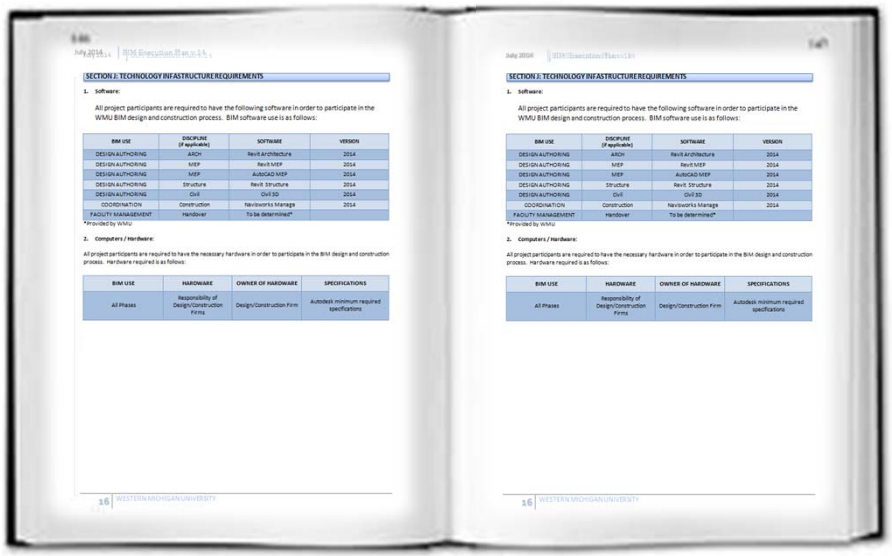
Project participants must have certain **software** in order to **participate** in the BIM process.

BIM use	*discipline*	*software*	*version*
Design Authoring	ARCH	→ Revit Architecture	2014
	MEP	→ Revit MEP/AutoCAD MEP	2014
	STRUCT	→ Revit Structure	2014
	CIVIL	→ Civil 3D	2014
Coordination	CONSTRUCTION	→ Naviswork Manage	2014
Owner	LIFECYCLE	→ Naviswork Manage	2014

BIM PLANNING

Setting expectations

BIM Project Execution Plan: What's in it?


SECTION 3: TECHNOLOGY INFASTRUCTURE REQUIREMENTS

1. Software:

All project participants are required to have the following software in order to participate in the WMU BIM design and construction process. BIM software use is as follows:

BIM USE	DISCIPLINE (if applicable)	SOFTWARE	VERSION
DESIGN AUTHORING	ARCH	Revit Architecture	2014
DESIGN AUTHORING	MEP	Revit MEP	2014
DESIGN AUTHORING	MEP	AutoCAD MEP	2014
DESIGN AUTHORING	Structure	Revit Structure	2014
DESIGN AUTHORING	Civil	Civil 3D	2014
COORDINATION	Construction	Navisworks Manage	2014
FACILITY MANAGEMENT	Handover	To be determined*	

*Provided by WMU

2. Computers / Hardware:

All project participants are required to have the necessary hardware in order to participate in the BIM design and construction process. Hardware required is as follows:

BIM USE	HARDWARE	OWNER OF HARDWARE	SPECIFICATIONS
All Phases	Responsibility of Design/Construction Firms	Design/Construction Firm	Autodesk minimum required specifications

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DESIGN AUTHORING	MEP	Revit MEP	2014
DESIGN AUTHORING	MEP	AutoCAD MEP	2014
DESIGN AUTHORING	Structure	Revit Structure	2014
DESIGN AUTHORING	Civil	Civil 3D	2014
COORDINATION	Construction	Navisworks Manage	2014
FACILITY MANAGEMENT	Handover	To be determined*	

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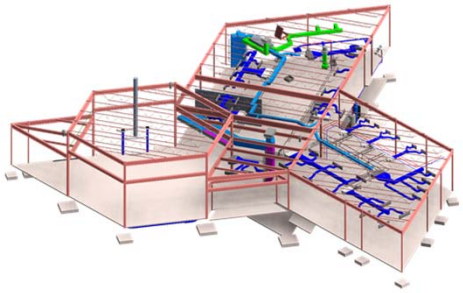
1. Project Goals / BIM Uses
2. Collaboration Procedures: how often to share? how?
3. File naming convention
4. Technology infrastructure requirements
5. Delivery Strategy & LOD – Level of Development

BIM EXECUTION PLAN

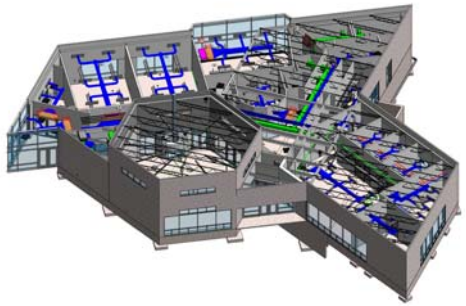
5. Delivery Strategy & LOD – Level of Development

LOD 100 Conceptual Modeling
"Guesstimate"



LOD 200 General Modeling
"Specify it"

LOD 300 Accurate Modeling & Shop Drawings
"Buy it"

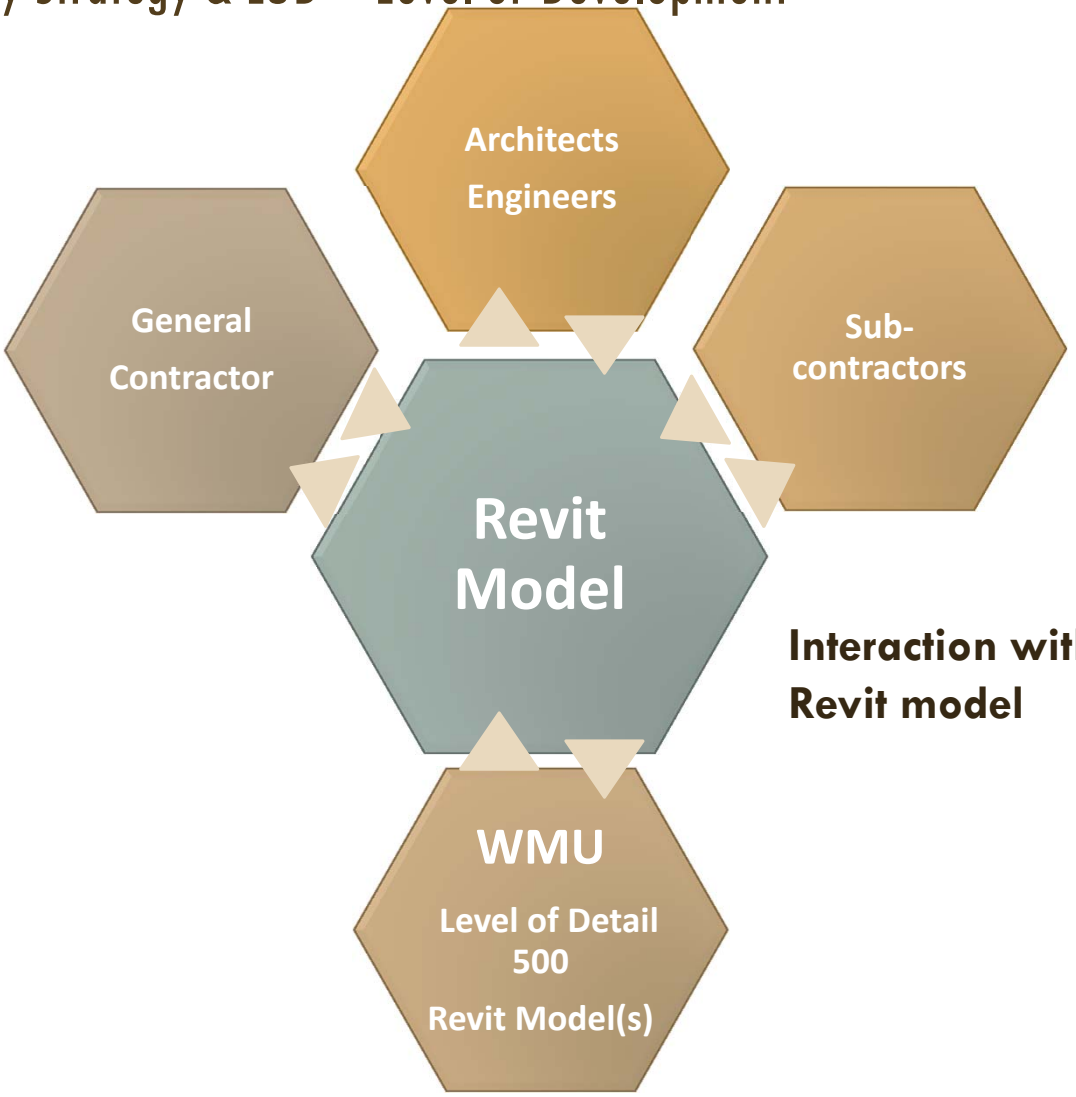


LOD 400 Fabrication & Assembly
"Build or Install it"

LOD 500 M & O
"Maintain it"

BIM EXECUTION PLAN

5. Delivery Strategy & LOD – Level of Development

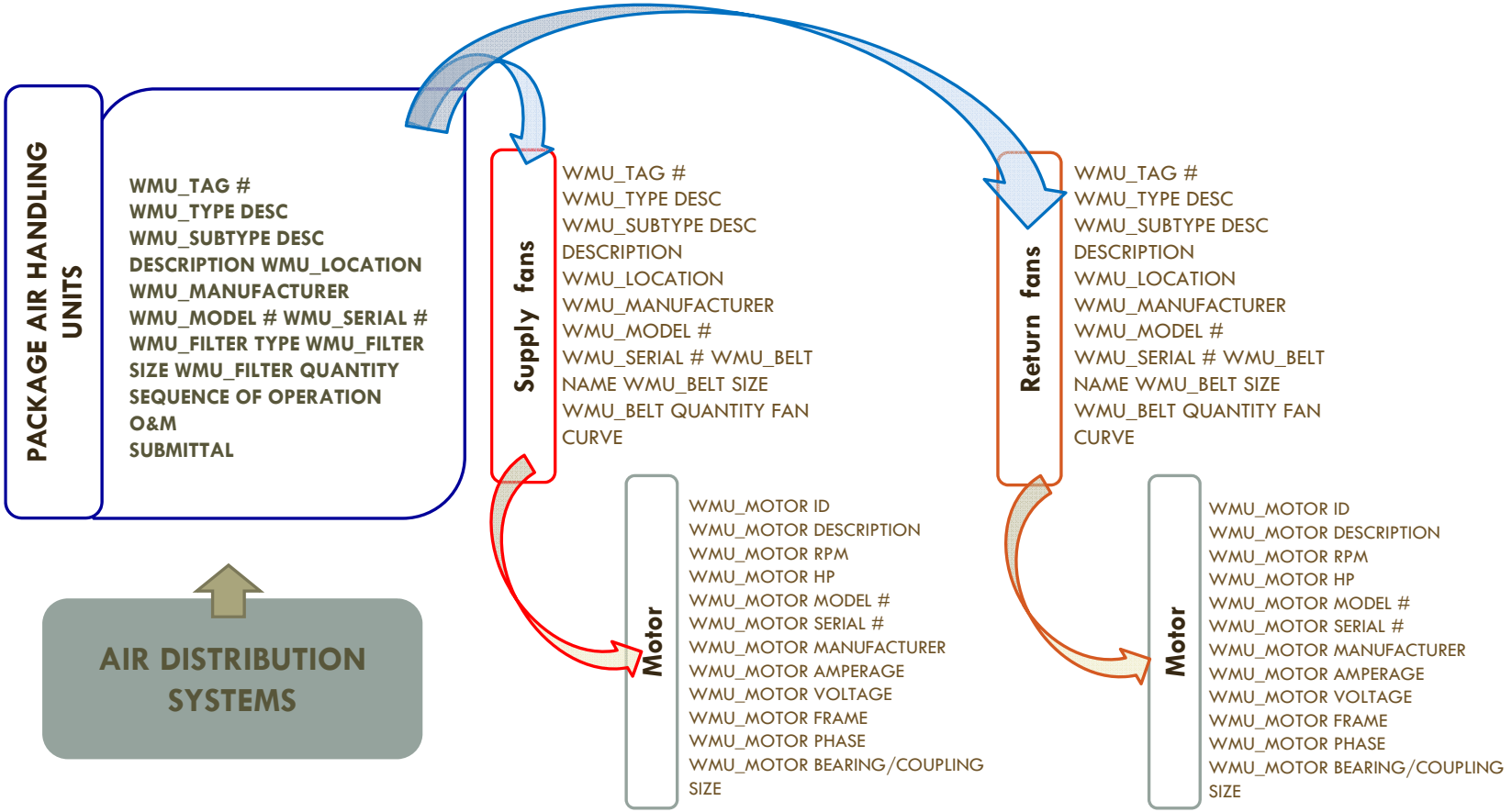


Interaction with the Revit model

BIM EXECUTION PLAN

Building information model requirements Lifecycle BIM

Specific list of **Information** (parameters) required to be **attached** to the BIM model



WHAT IS NEW?

The “BIG ROOM” process

WHAT IS NEW?

BIM for interferences "Clash detections"

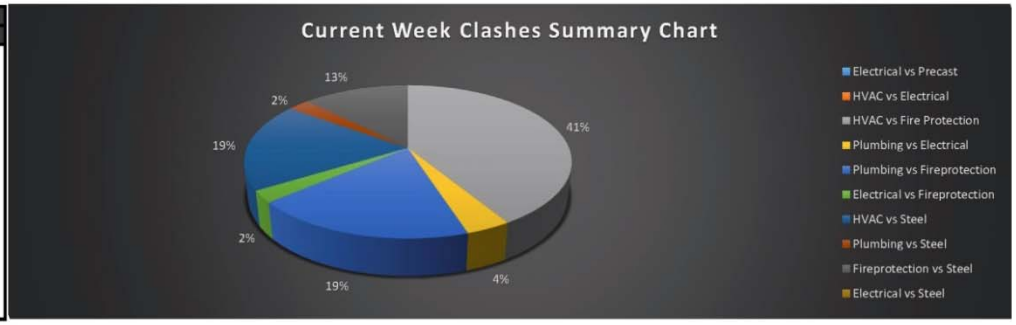
BIM COORDINATION REPORT

PROJECT: **WMU NEW RESIDENCE HALL**
BUILDING: **175**
LEVEL: **FIRST, HOUSE B, HOUSE C**
WEEK: **07/03/14**

BIM COORDINATION TEAM				
NAME	COMPANY	COMPANY TYPE	CONTACT NO.	EMAIL
Kristen Schleick	Lord Aeck Sargent	Architect	(734) 827-3929	kschleick@lordaecksargent.com
Taimoor Khan	Miller-Davis	Construction Manager	(269) 345-3561 EXT. 243	tkhan@miller-davis.com
Matt Voster	RW Lapine/ EPI	HVAC & Plumbing	(269) 978-4150	mvoster@eng-plus.com
Scott Garberick	Circuit Electric/ Tower Pinkster	Electrical	(269) 343-6133 EXT. 753	sgarberick@towerpinkster.com
Dennis Scott	Total Fire Protection	Fire Protection	(616) 735-2300 EXT. 7833	dscott@totalfire.biz
Andy Eustice	Kerkstra	Precast & Steel	(616) 301-1281	aeustice@kerkstra.com

Total Numbe of Clashes Found:	**1,161**
Total Number f Clashes Resolved:	**1,086**

CLASHES SUMMARY - CURRENT WEEK		
Name	New/ Active	Assigned to
HVAC vs Precast		
HVAC vs Precast		
Plumbing vs Precast		
Fireprotection vs Precast		
Electrical vs Precast		
HVAC vs Electrical		
HVAC vs Fire Protection	33	Fire Protection
Plumbing vs Electrical	3	Electrical
Plumbing vs Fireprotection	15	Fire Protection
Electrical vs Fireprotection	2	Fire Protection
HVAC vs Steel	15	HVAC & Plumbing
Plumbing vs Steel	2	HVAC & Plumbing
Fireprotection vs Steel	10	Fire Protection
Electrical vs Steel		

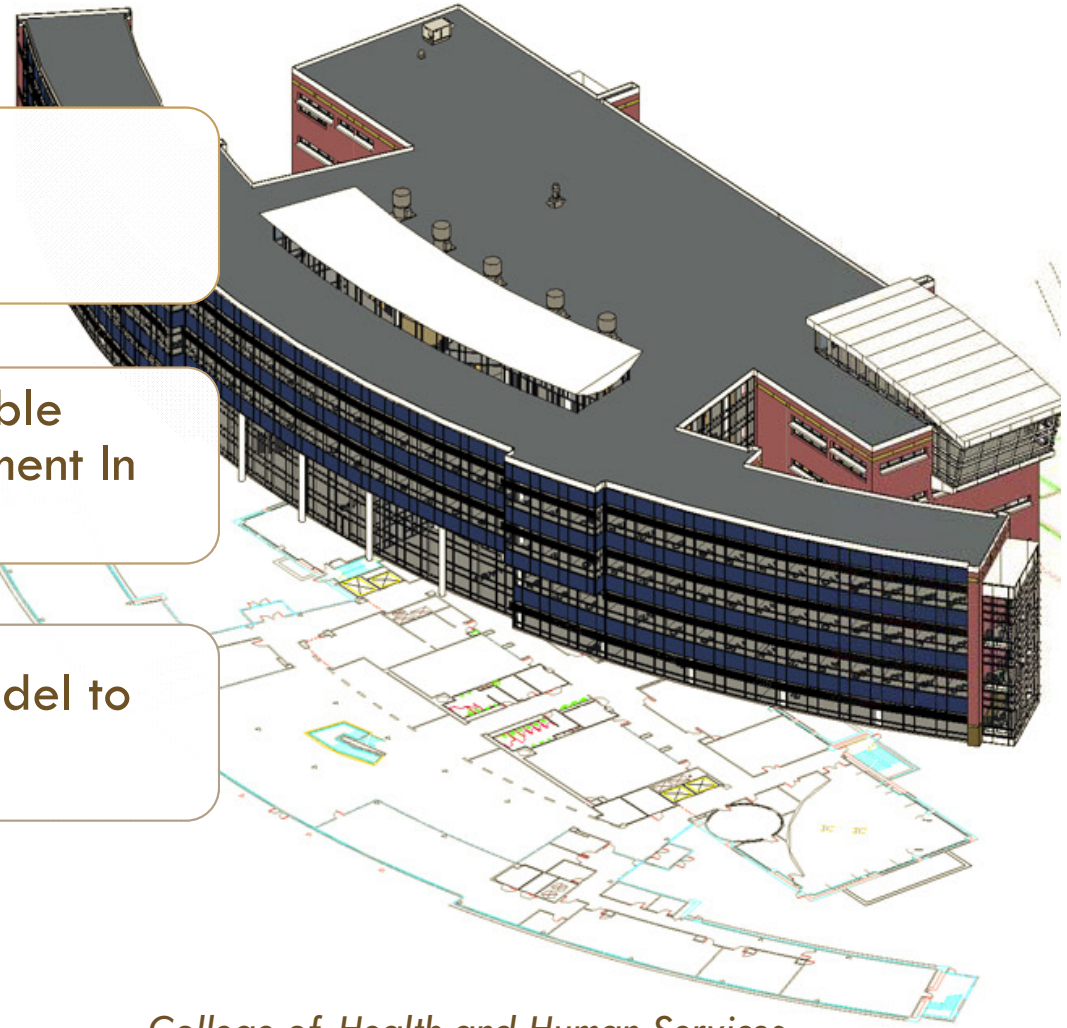


BIM FOR EXISTING BUILDING

College of Health and Human Services

BRONCO BIM

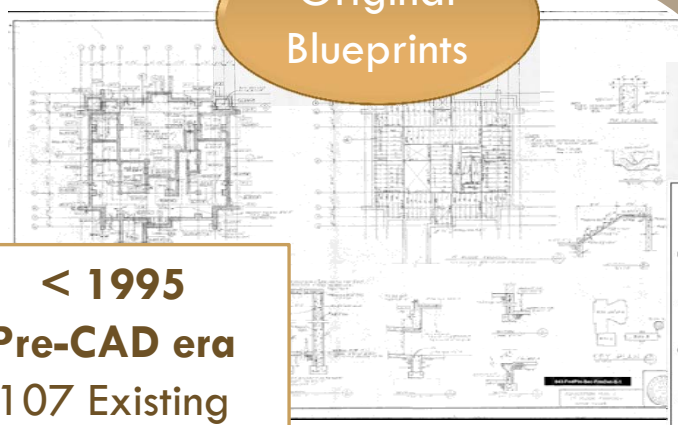
1. Prints to 3D Model
2. Adding Maintainable Mechanical Equipment In BIM
3. Connecting the Model to our CMMS-TMA



PRINTS TO 3D MODEL

From Existing AutoCAD floor plans to 3D Model using Autodesk Revit Platform

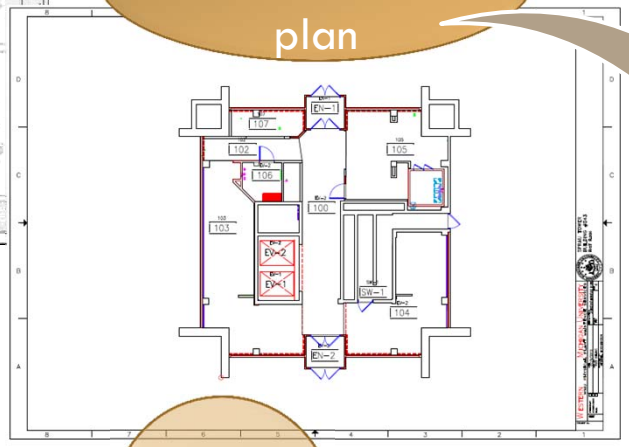
Original Blueprints



< 1995
Pre-CAD era
107 Existing Buildings
6.19 million SF

1995-2000

Standardized Simple floor plan



About 520 Floor Plans

1995-Present
Post-CAD era
31 Buildings
2.64 million SF

2011-2013

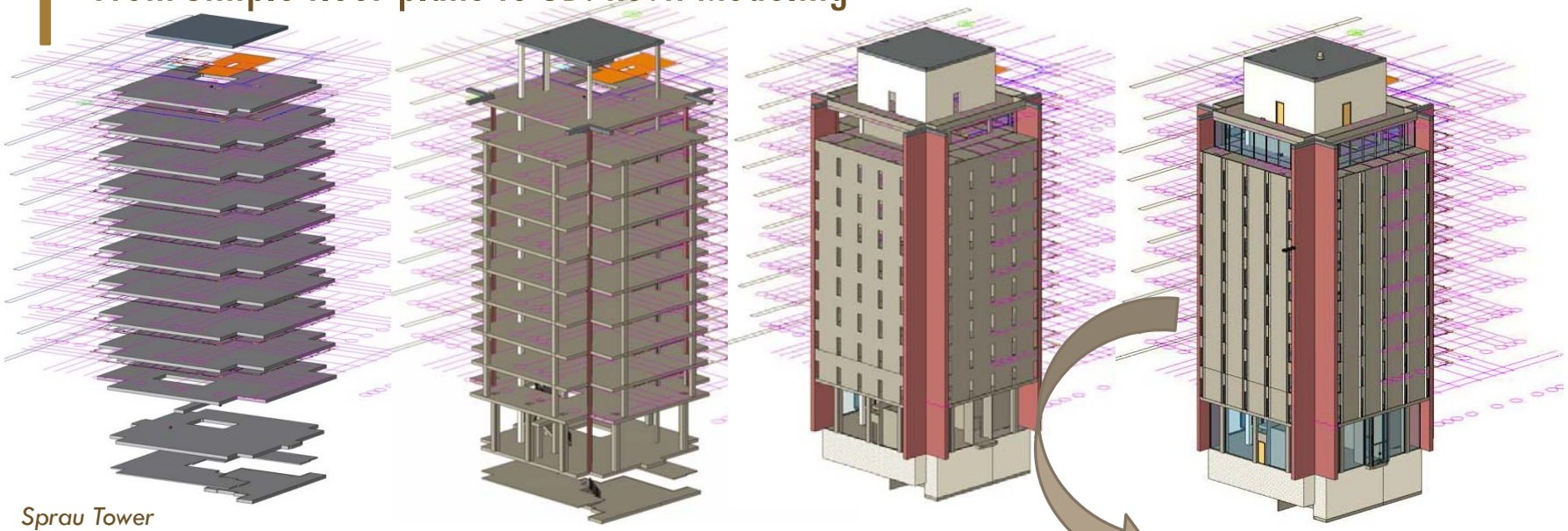
3D Model

Existing building
Sprau Tower

3D Model
Sprau Tower

PRINTS TO 3D MODEL

From Simple floor plans to 3D: Revit Modeling

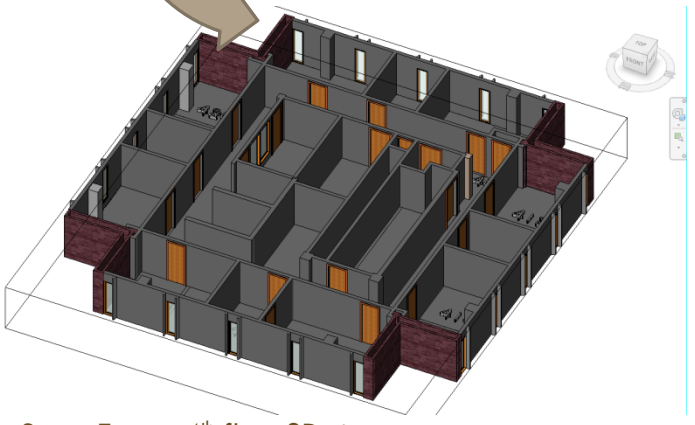


Sprau Tower

TIMELINE: 2011-2013

138 Existing buildings modeled in 3D Revit

- White-box empty rooms
- Windows & doors location
- Generic library
- Highly detailed exteriors
- **NO MEP**

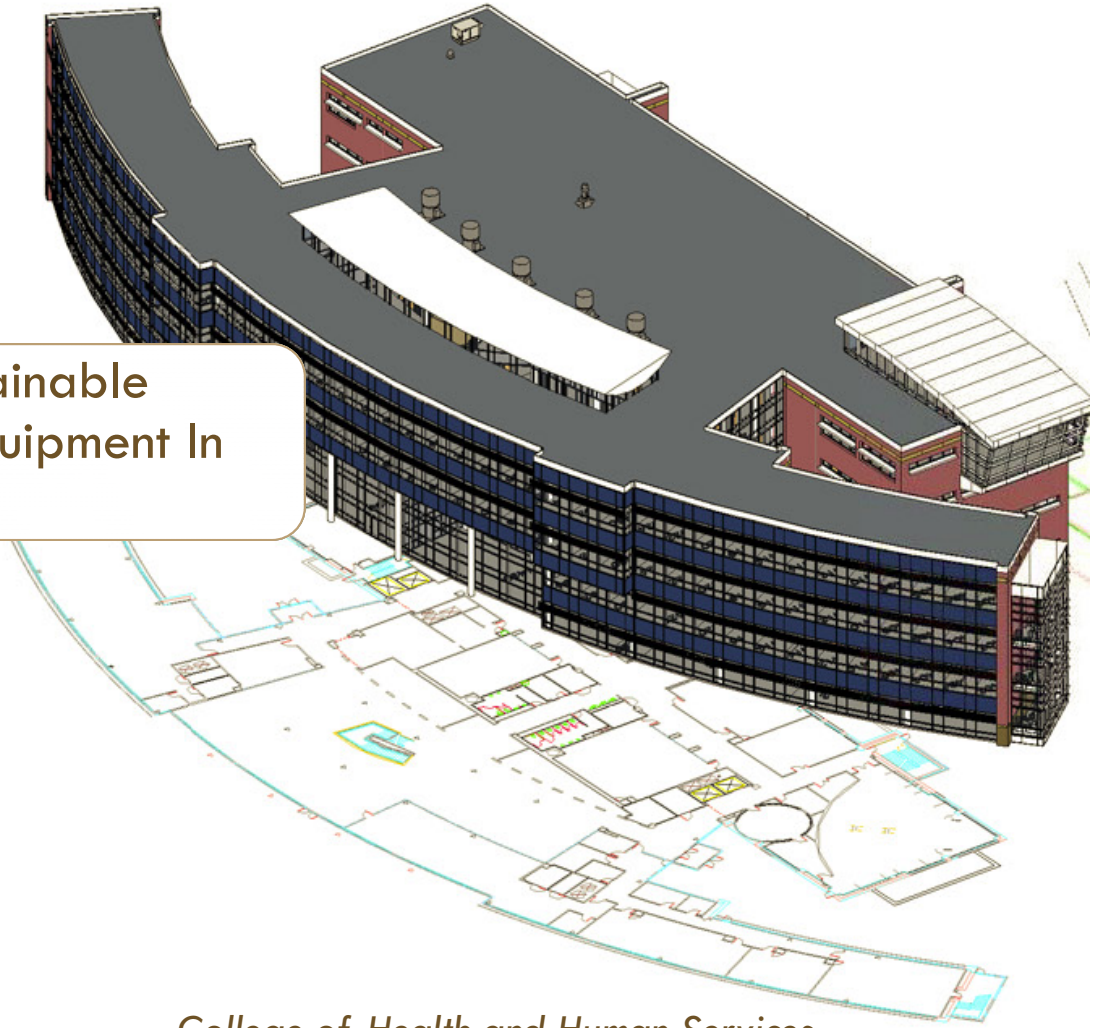


Sprau Tower, 4th floor 3D view

CONNECTING THE DOTS FOR EXISTING BUILDINGS

2

- Adding Maintainable Mechanical Equipment In BIM



ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Types of equipment and parameter

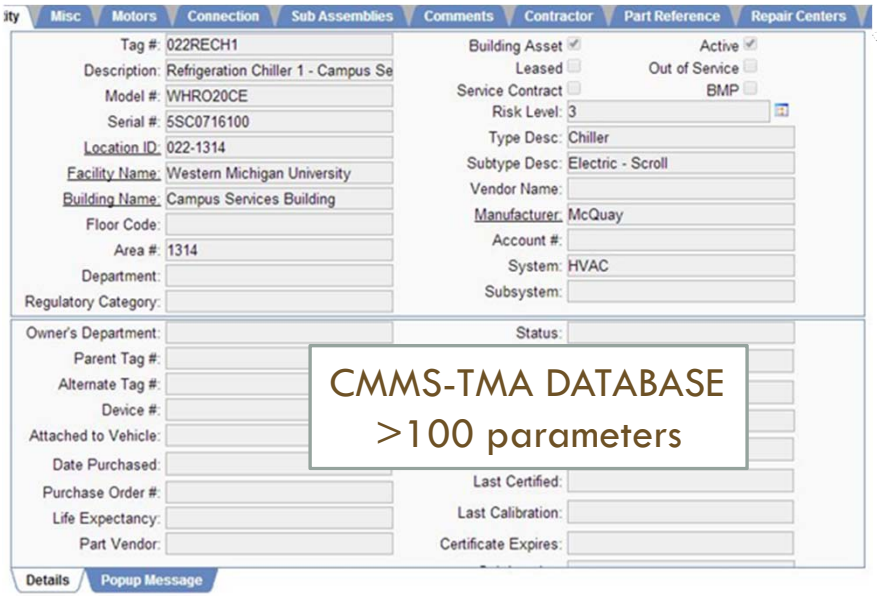
Air Conditioning Unit
Condensing Unit
Air Handler
Air Compressor
Chiller
Centrifugal Pump
Condensate Pump
Cooling Tower
Exhaust Fan
Supply Fan
Sump Pump
Return Fan

ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Types of parameter

CMMS TMA

20 years of maintenance experience with 9 shops and 110 skilled tradespeople



CMMS-TMA DATABASE
>100 parameters

BIM PARAMETERS
20 parameters

- WMU_SUBTYPE DESC
- WMU_TYPE DESC
- DESCRIPTION
- WMU_TAG #
- WMU_LOCATION
- WMU_MANUFACTURER
- WMU_MODEL #
- WMU_SERIAL #
- WMU_FILTER TYPE
- WMU_FILTER SIZE
- WMU_FILTER QUANTITY
- WMU_MOTOR ID
- WMU_MOTOR MODEL #
- WMU_MOTOR SERIAL #
- WMU_MOTOR HP
- WMU_MOTOR FRAME
- WMU_BEARING/COUPLING SIZE
- WMU_BELT NAME
- WMU_BELT SIZE
- WMU_BELT QUANTITY

ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

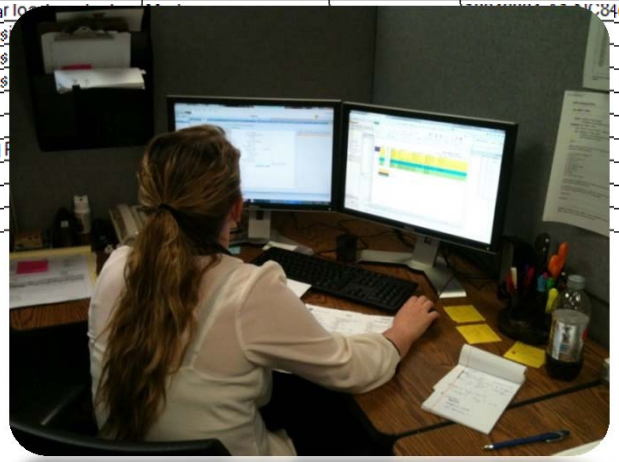
Field Validation and TMA Data Update

BIM Equipment Report

Building Name is equal to Schneider Hall

List #	Tag #	Type Name	Sub Type Name	Location ID	Sub Location	Manufacturer Name	Model #	Serial #
1	083CACOM1	Air Compressor	Control Air	083-SB05	Northeast corner of room - left unit	Pureflow		
2	083CACOM2	Air Compressor	Control Air	083-SB05	Northeast corner of room - right unit	Pureflow		3543-458-443
3	083AHAHU1	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	480 BB	89315451
4	083AHAHU2	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	405	89315453
5	083AHAHU3	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	405	89315454
6	083AHAHU4	Air Handling Unit	Air Handler	083-SB05		Carrier ~~Buffalo Forge~~	480 BB	89315452
7	083AHAHU5	Air Handling Unit	Air Handler	083-1460		Buffalo Forge		89315455
8	083CWCH1	Chiller	Electric - Centrifugal	083-SB05		Trane	CVHE032	L89H02893
9	083CWCH2CP3	Chiller	Electric - Centrifugal	083-SB05		Trane	CVHE032	L89H02840
10	083CWCH3	Chiller	Steam Absorption	083-SB05	South end of room	Thermax - USA	SS30CCU	10
11	083CWCH4	Chiller	Steam Absorption	083-SB05	South end of room	Thermax - USA	S530CCU	9
12	083SCCR1CP1	Condensate Equipment	Condensate Pump	083-SB05	West End of Room		52CR-25-30	0D7040 47036
13	083SCCR1CP2	Condensate Equipment	Condensate Pump	083-SB05	West End of Room	Bell & Gossett	52CR-25-30	0D7040 47036
14	083CTCET1	Cooling Tower	Air Cooled	083-EXTR	Southeast corner - near loading dock	Marley	2200 13530	10042804-A1-NC8407BG-11
15	083CTCET2	Cooling Tower	Air Cooled	083-EXTR	Southeast corner - near loading dock	Marley		10042804-A1-NC8407BG-11
				083-EXTR	Southeast corner - near			8407BG-11
				083-EXTR	Near loading dock - in$			
				083-EXTR	Near loading dock - in$			
				083-EXTR	Near loading dock - in$			
				083-CU-3010				
				083-CU-3020				
				083-ROOF-PM	Access from Electrical			
				083-SB05				
				083-SB05				
				083-SB05				

Receive Building TMA Equipment Report

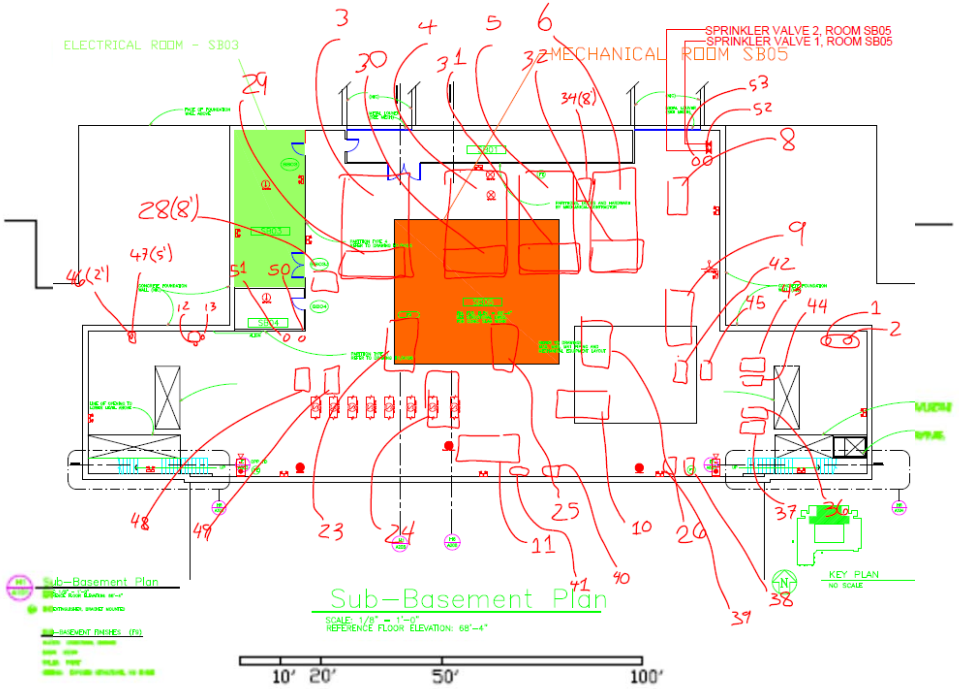


ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

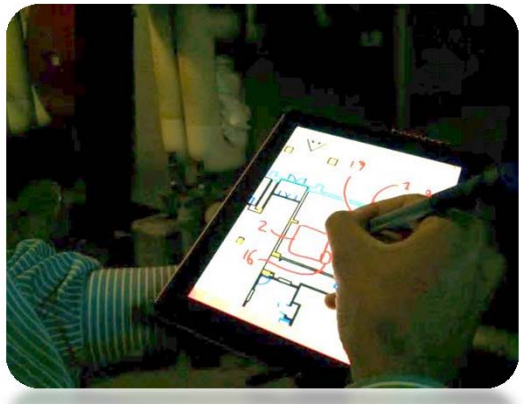
Position BIM equipment model

Mechanical Room, Schneider Hall

Equipment Location



Tag #



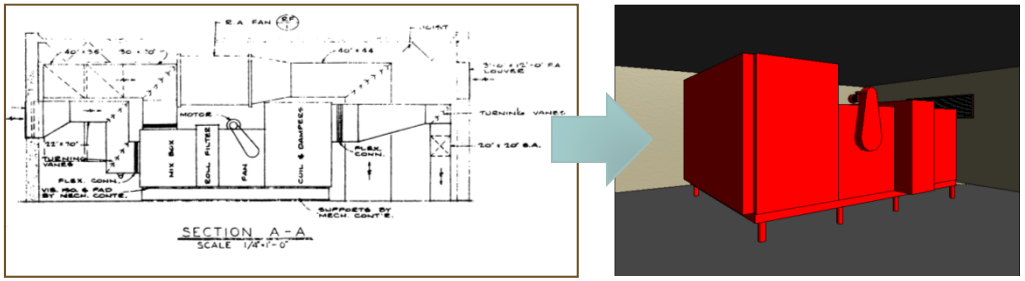
ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Creation of the Equipment Library

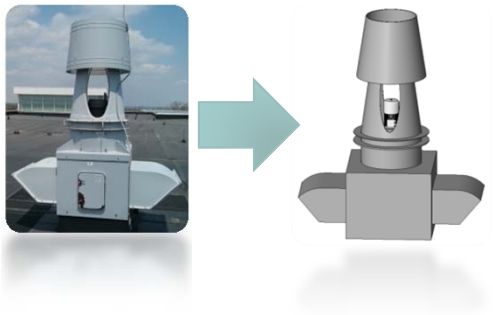
1 DOWNLOADED FROM THE INTERNET (Manufacturer, Forums etc.)

2 MODELED IN REVIT (Custom made such as air handlers)

From mechanical drawings



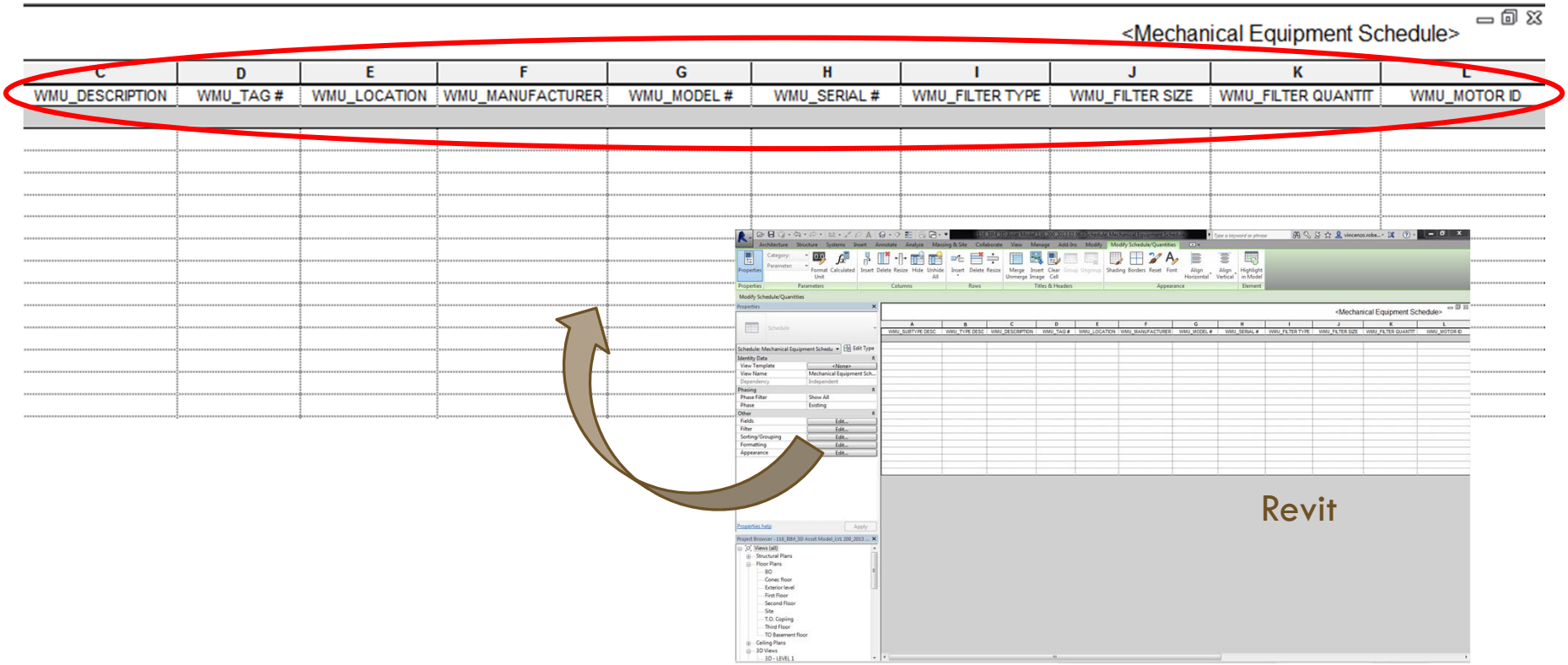
From pictures



ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Equipment Parameters Schedule

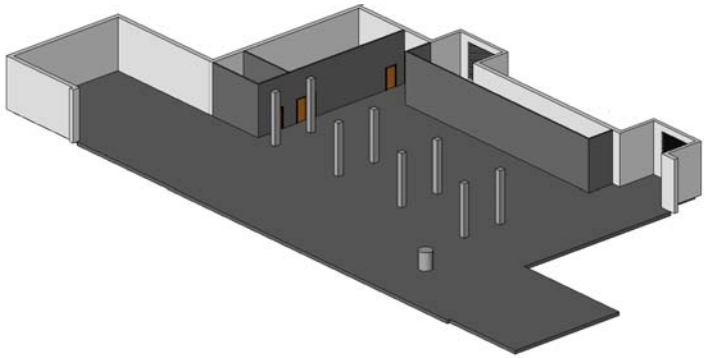
4 Create a Mechanical Equipment Schedule on Revit



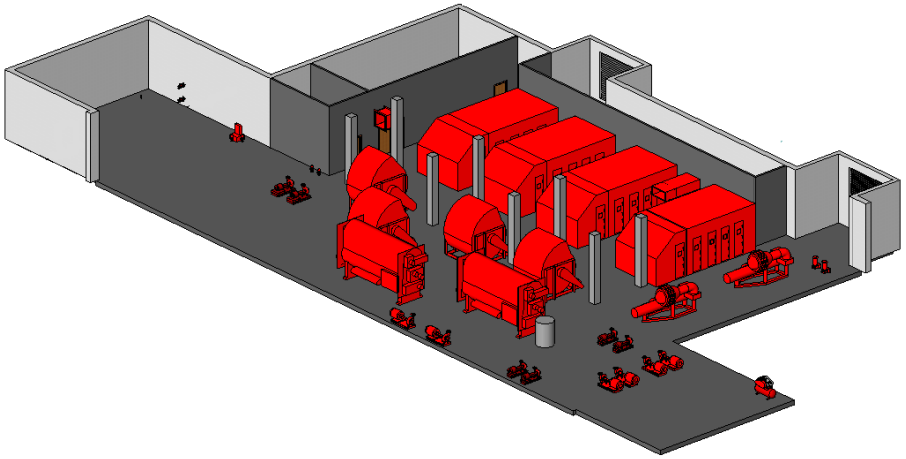
ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Plugging equipment in the model (Mechanical Room, Schneider Hall)

Before

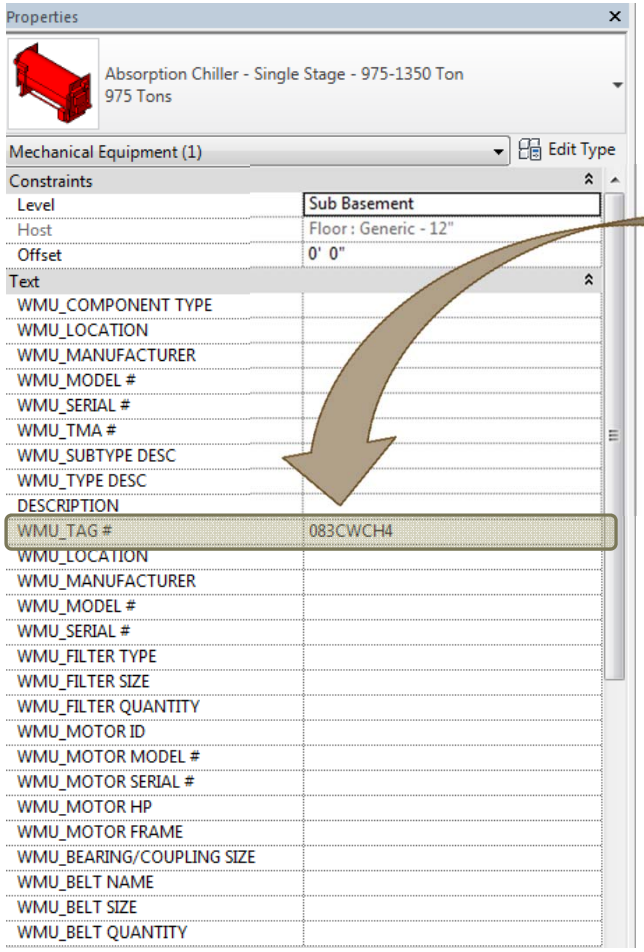


After



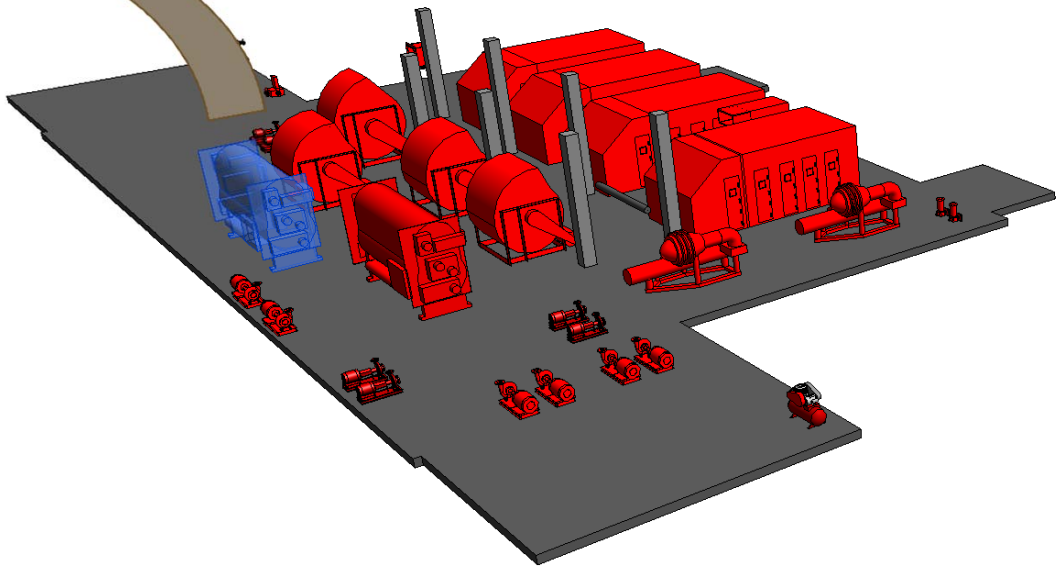
ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Equipment Info



CMMS-BIM

Matching Parameter



ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM

Summary

TIMELINE: 2014 - 2016

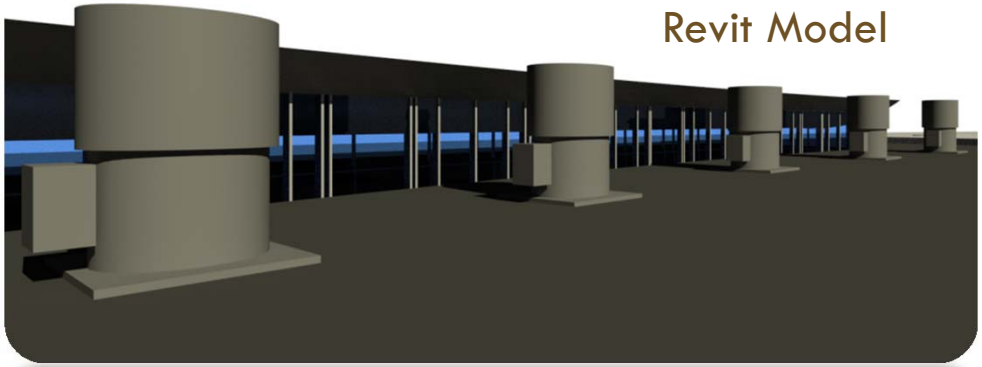
Reality

College of Health and Human Services

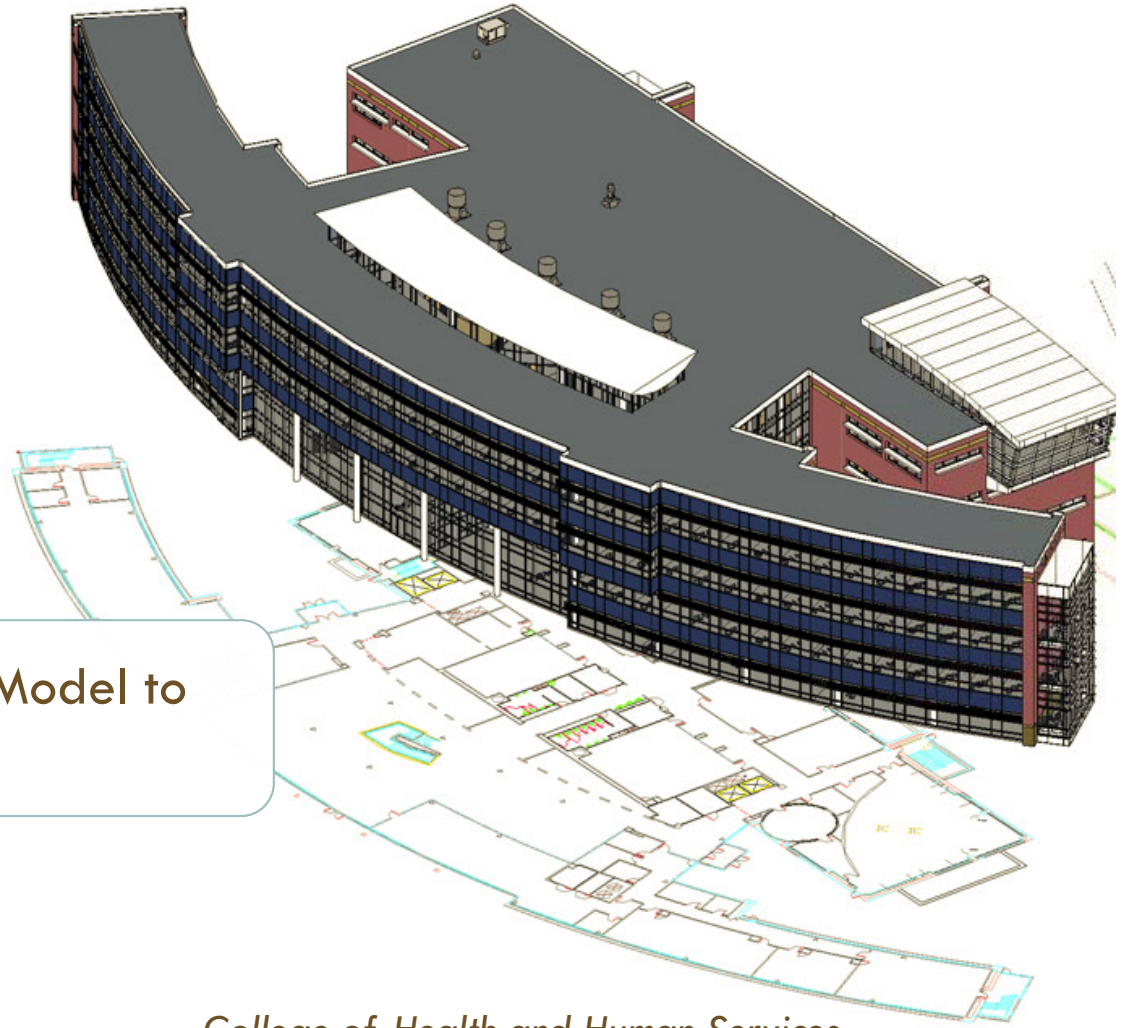
138
existing buildings

2,694
maintainable equipment

Revit Model



CONNECTING THE DOTS FOR EXISTING BUILDINGS



3

- Connecting the Model to our CMMS-TMA

CONNECTING THE MODEL TO OUR CMMS-TMA

Overall View – Moving Data Between Data Silos

AUTODESK REVIT

IMPORT

55000

PIECES OF INFORMATION

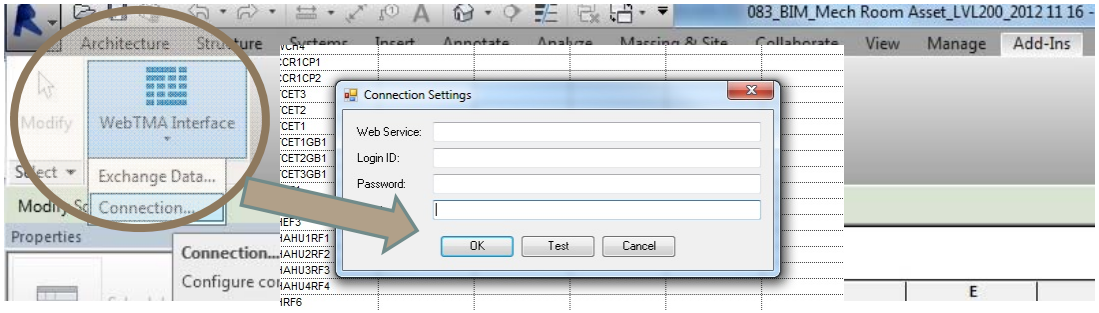
EXPORT

TMASYSTEMS

CONNECTING THE MODEL TO OUR CMMS-TMA

Connecting to Revit and TMA: the Revit tool

REVIT ADD-IN "WebTMA Interface"

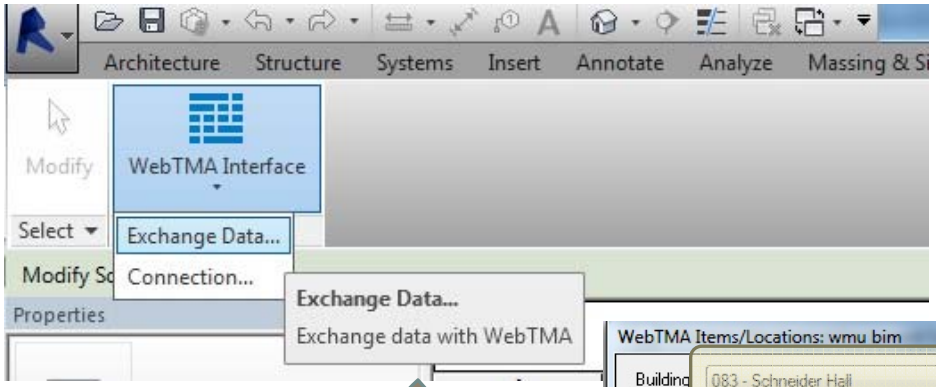


Logging in from Revit

Logging in from WebTMA

CONNECTING THE MODEL TO OUR CMMS-TMA

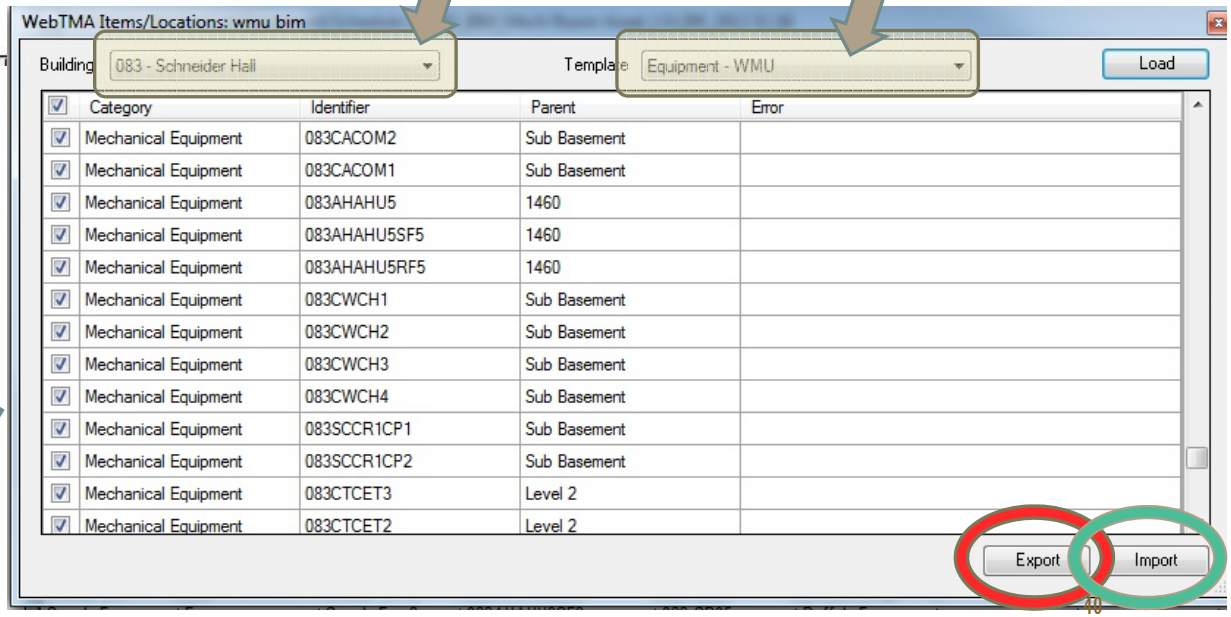
Exchanging Data BIM/TMA- Importing and Exporting



Building

Type of list

Maintainable equipment



Category	Identifier	Parent	Error
Mechanical Equipment	083CACOM2	Sub Basement	
Mechanical Equipment	083CACOM1	Sub Basement	
Mechanical Equipment	083AHAHU5	1460	
Mechanical Equipment	083AHAHU5SF5	1460	
Mechanical Equipment	083AHAHU5RF5	1460	
Mechanical Equipment	083CWCH1	Sub Basement	
Mechanical Equipment	083CWCH2	Sub Basement	
Mechanical Equipment	083CWCH3	Sub Basement	
Mechanical Equipment	083CWCH4	Sub Basement	
Mechanical Equipment	083SCCR1CP1	Sub Basement	
Mechanical Equipment	083SCCR1CP2	Sub Basement	
Mechanical Equipment	083CTCET3	Level 2	
Mechanical Equipment	083CTCET2	Level 2	

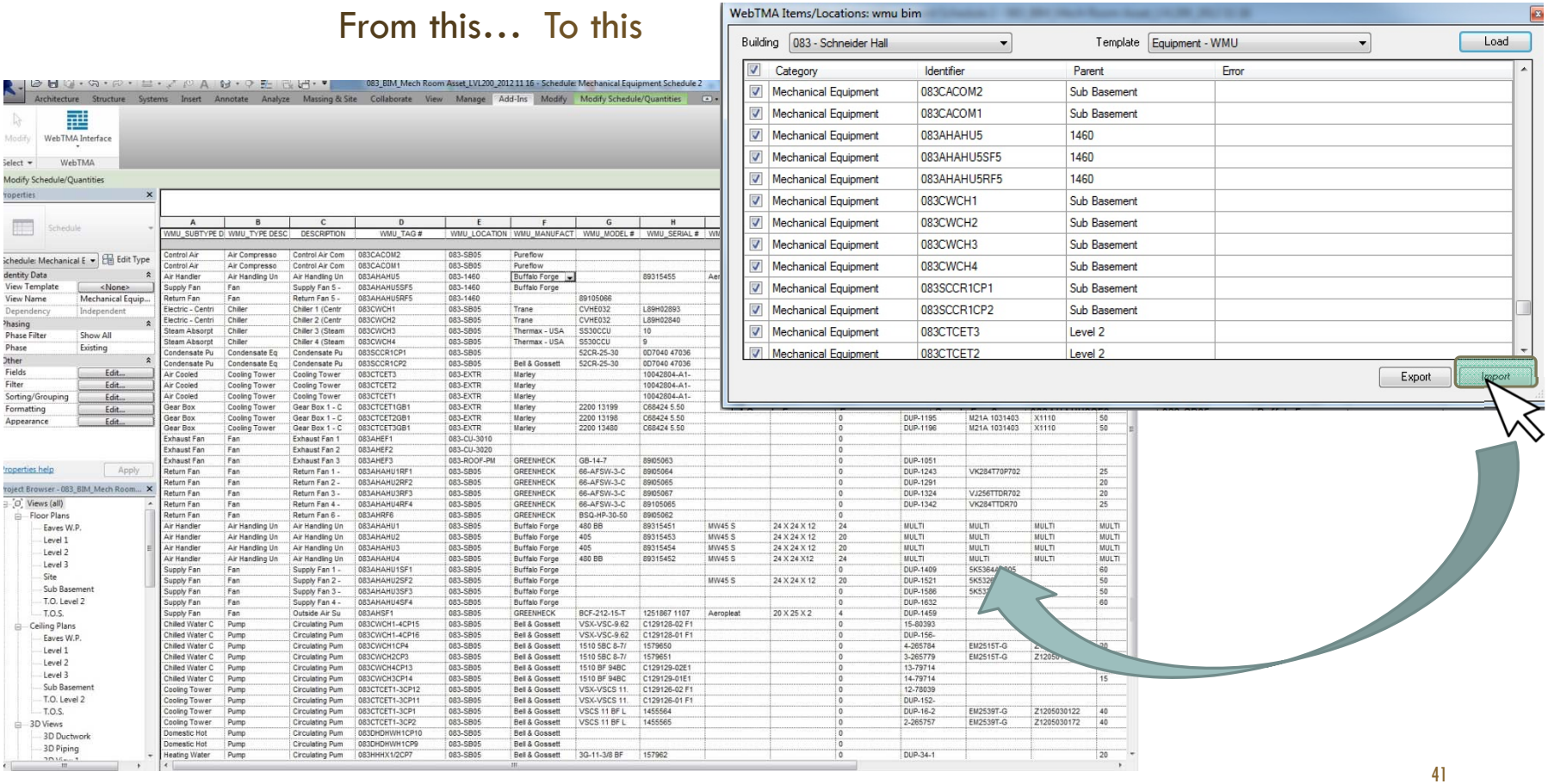
CONNECTING THE MODEL TO OUR CMMS-TMA

Importing from TMA to Revit

The Results

TMA → AUTODESK REVIT

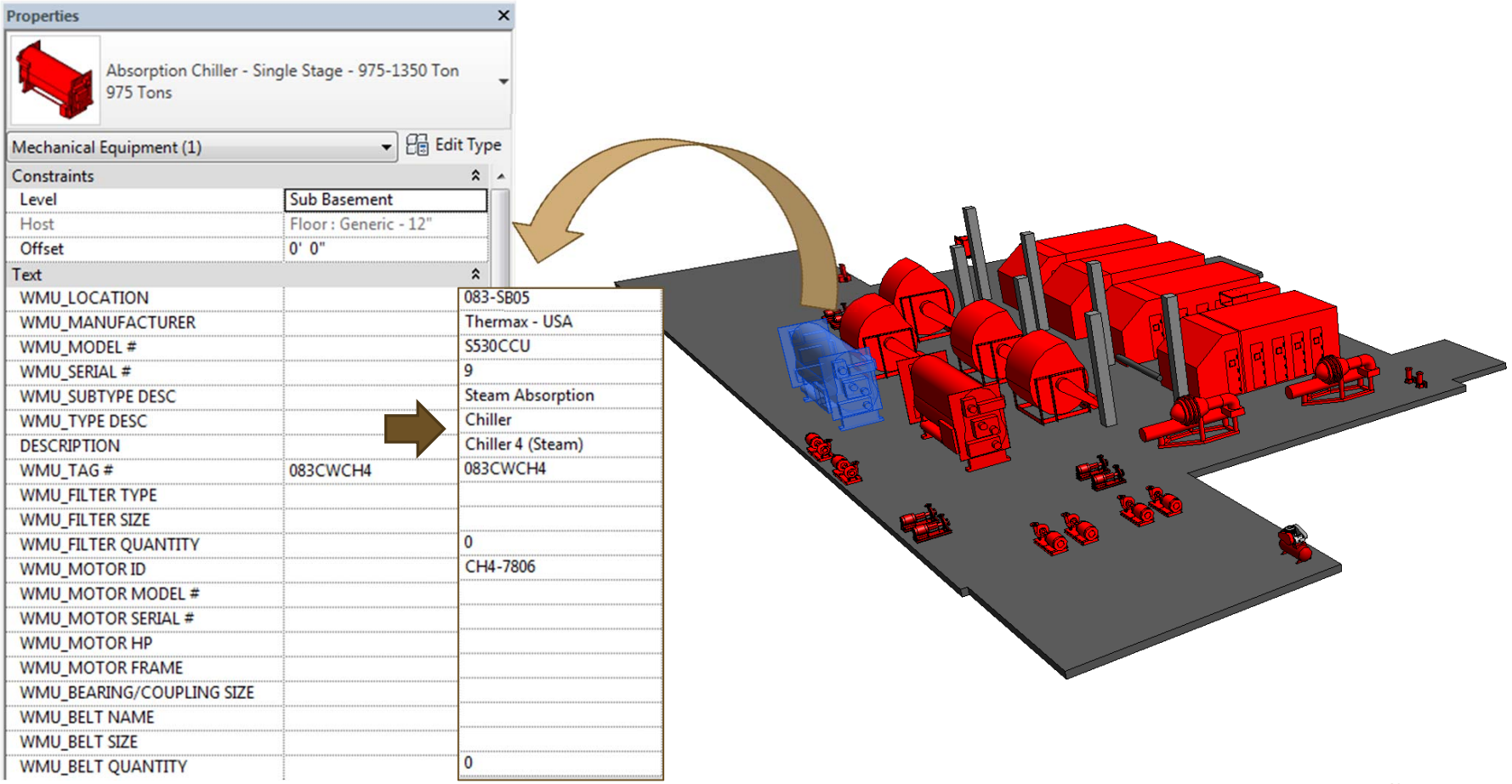
From this… To this



CONNECTING THE MODEL TO OUR CMMS-TMA

Importing from TMA to Revit

Individualized Equipment Data



CONNECTING THE MODEL TO OUR CMMS-TMA

Exporting from Revit to TMA

AUTODESK REVIT → TMA

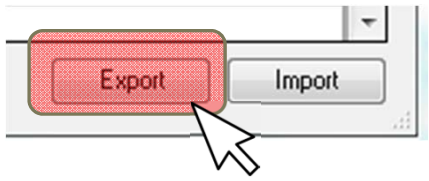
Revit schedule

A	B	C	D	E	F		
WMU_SUBTYPE D	WMU_TYPE DESC	DESCRIPTION	WMU_TAG #	WMU_LOCATION	WMU_MANUFACT	WMU_	
Control Air	Air Compresso	Control Air Com	083CACOM2	083-SB05	Pureflow		
Control Air	Air Compresso	Control Air Com	083CACOM1	083-SB05	Pureflow		
Air Handler	Air Handling Un	Air Handling Un	083AHAHU5	083-1460	Buffalo Forge		
Supply Fan	Fan	Supply Fan 5 -	083AHAHU5SF5	083-1460	Buffalo Forge		
Return Fan	Fan	Return Fan 5 -	083AHAHU5RF5	083-1460		8910506	
Electric - Centri	Chiller	Chiller 1 (Centr	083CWCH1	083-SB05	Trane	CVHE032	L89H02893
Electric - Centri	Chiller	Chiller 2 (Centr	083CWCH2	083-SB05	Trane	CVHE032	L89H02840
Steam Absorpt	Chiller	Chiller 3 (Steam	083CWCH3	083-SB05	Thermax - USA	SS30CCU	10
Steam Absorpt	Chiller	Chiller 4 (Steam	083CWCH4	083-SB05	Thermax - USA	S530CCU	9
Condensate Pu	Condensate Eq	Condensate Pu	083SCCR1CP1	083-SB05		52CR-25-30	0D7040 47036
Condensate Pu	Condensate Eq	Condensate Pu	083SCCR1CP2	083-SB05	Bell & Gossett	52CR-25-30	0D7040 47036
Air Cooled	Cooling Tower	Cooling Tower	083CTCET3	083-EXTR	Marley		10042804-A1-
Air Cooled	Cooling Tower	Cooling Tower	083CTCET2	083-EXTR	Marley		10042804-A1-
Air Cooled	Cooling Tower	Cooling Tower	083CTCET1	083-EXTR	Marley		10042804-A1-
Gear Box	Cooling Tower	Gear Box 1 - C	083CTCET1GB1	083-EXTR	Marley	2200 13199	C68424 5.50
Gear Box	Cooling Tower	Gear Box 1 - C	083CTCET2GB1	083-EXTR	Marley	2200 13198	C68424 5.50
Gear Box	Cooling Tower	Gear Box 1 - C	083CTCET3GB1	083-EXTR	Marley	2200 13480	C68424 5.50
Exhaust Fan	Fan	Exhaust Fan 1	083AHEF1	083-CU-3010	Loren Cook	EF9-666	223233232232
Exhaust Fan	Fan	Exhaust Fan 2	083AHEF2	083-CU-3020	Loren Cook	EF9-666	232332322355
Exhaust Fan	Fan	Exhaust Fan 3	083AHEF3	083-ROOF-PM	GREENHECK	GB-14-7	89I05063
Return Fan	Fan	Return Fan 1 -	083AHAHU1RF1	083-SB05	GREENHECK	66-AFSW-3-C	89I05064
Return Fan	Fan	Return Fan 2 -	083AHAHU2RF2	083-SB05	GREENHECK	66-AFSW-3-C	89I05065

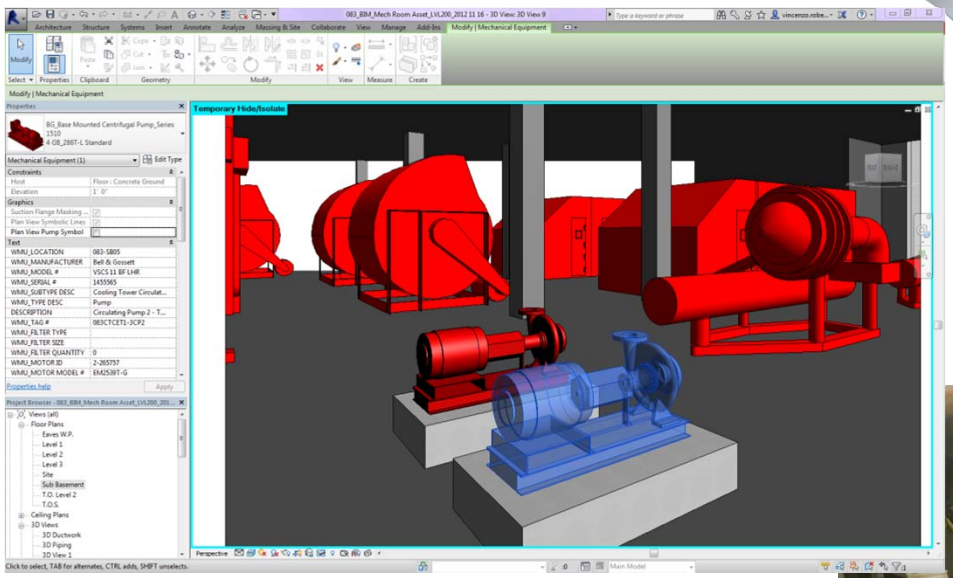
TMA schedule

Identity | Misc | Motors | Connection | Sub Assemblies | Comments | Contractor | Part Reference | Repair Centers

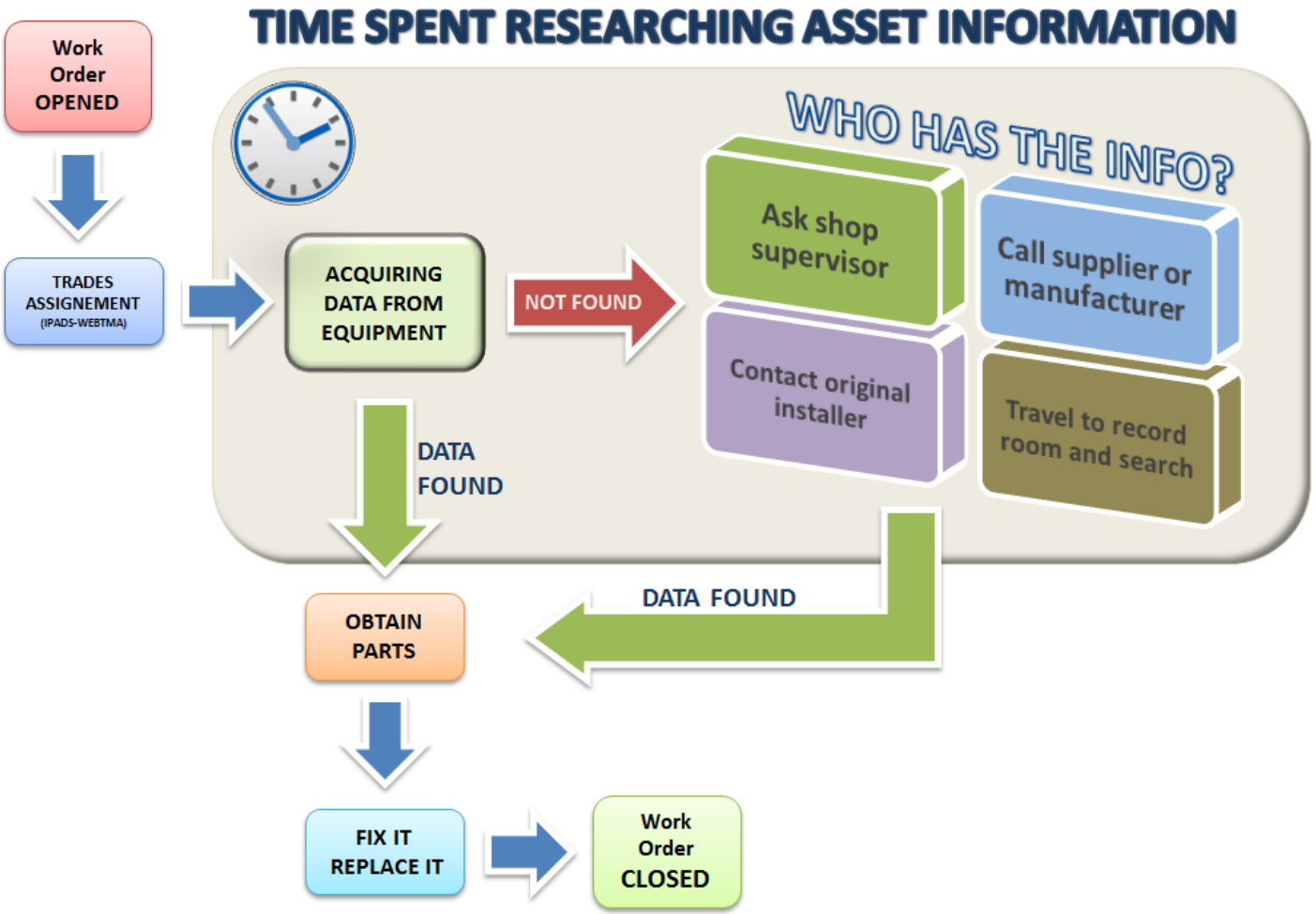
Tag #:	083AHEF1	Building Asset	Active
Description:	Exhaust Fan 1 - Northwest Restroo	Leased	Out of Service
Model #:	EF9-666	Service Contract	BMP
Serial #:	2232332322323	Risk Level:	3
Location ID:	083-CU-3010	Type Desc:	Fan
Facility Name:	Western Michigan Univ	Subtype Desc:	Exhaust Fan
Building Name:	Schneider Hall	Vendor Name:	
Floor Code:	083-Level 3	Manufacturer:	Loren Cook Company
Area #:	CU-3010	Account #:	
Department:		System:	HVAC
Regulatory Category:		Subsystem:	



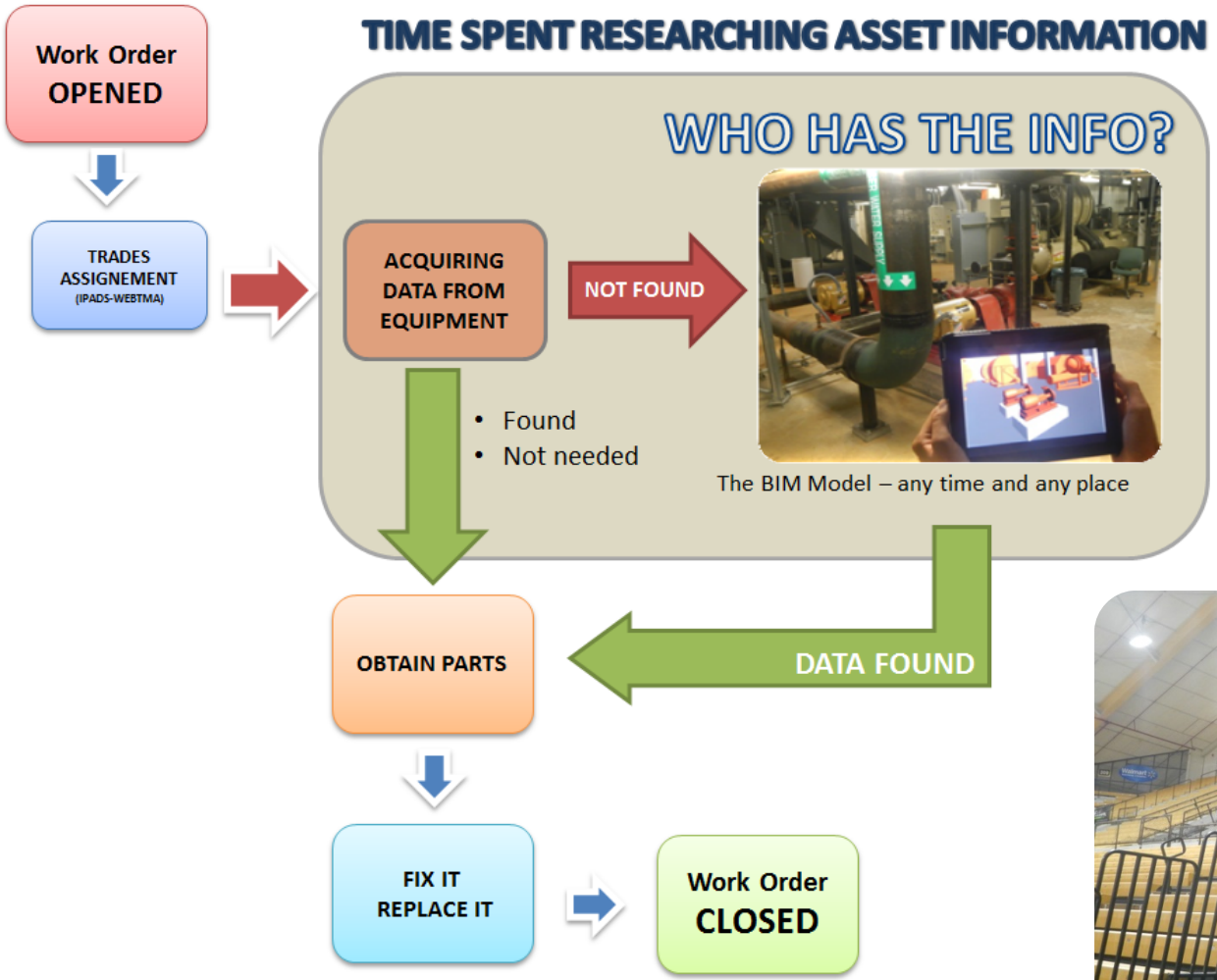
BIM IN FIELD

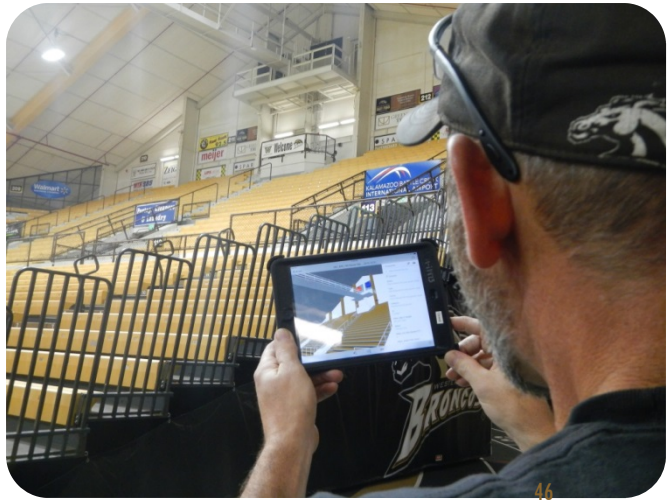


PREVIOUS WORK ORDER FLOWCHART

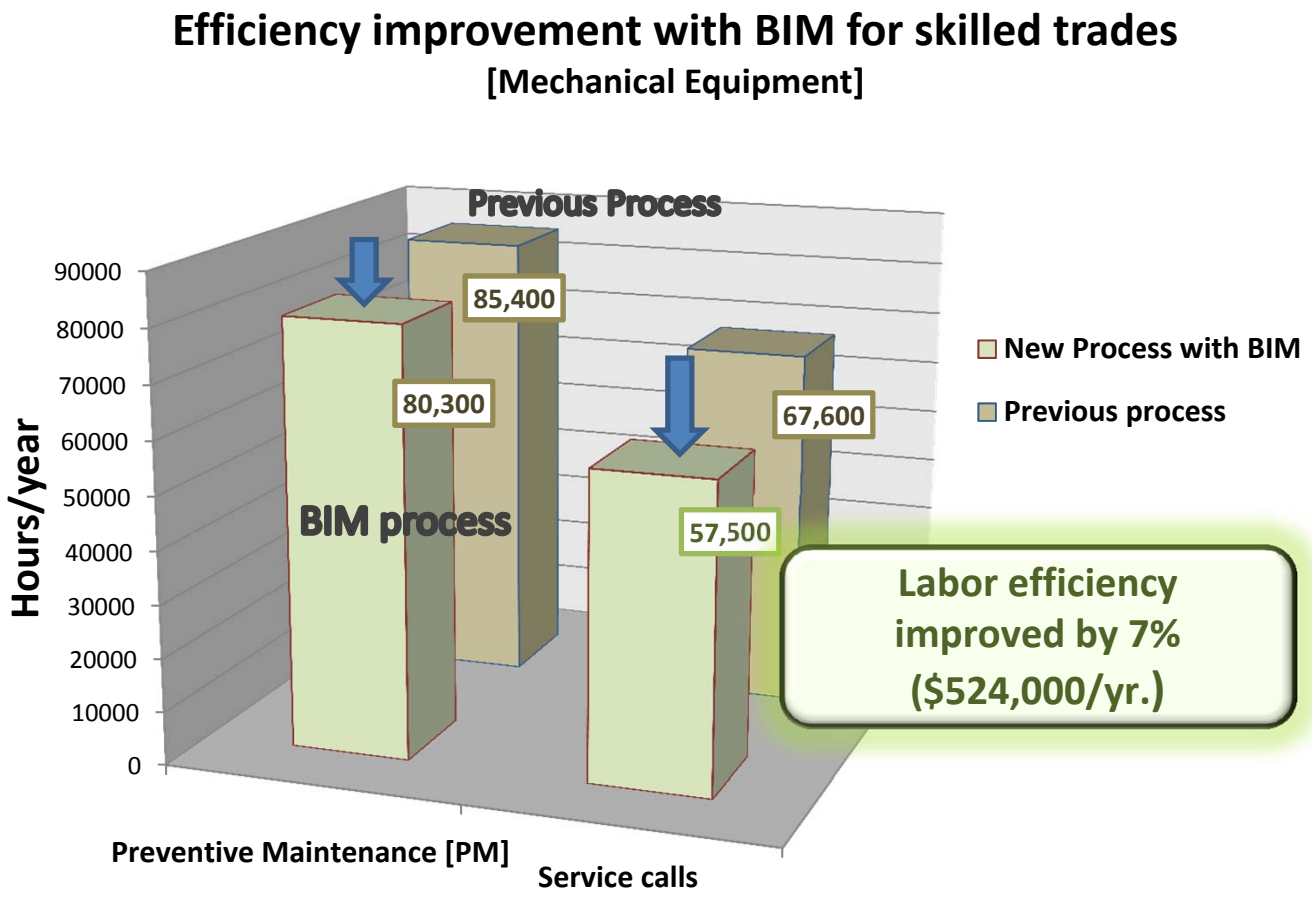


NEW WORK ORDER FLOWCHART





EFFICIENCY IMPROVEMENT



TAKEAWAYS – NEW CONSTRUCTION

- ✓ CREATE **BIM GUIDELINE**
- ✓ **PSA AGREEMENT:** GET IT IN THE CONTRACT!
- ✓ **KICKOFF MEETING:** SET EXPECTATIONS FOR ALL THE PARTIES INVOLVED
- ✓ DETERMINE **GATEKEEPER**
- ✓ BIM IS A **LIVING DOCUMENT**

Pic: www.pluspack.com

TAKEAWAYS – EXISTING BUILDINGS

- ✓ 3D models for existing building do not need to be highly detailed, LOD 100-200
- ✓ Define maintainable equipment and its parameters: use tradespeople's experience and operation manuals as reference
- ✓ Audit your CMMS data in the field while locating your maintainable equipment
- ✓ If equipment 3D models are not available on the web, create them using your construction documents or measurements
- ✓ Connect CMMS and BIM models
- ✓ Define standards for BIM-TMA data management

Pic: www.pluspack.com

Thank you!

Questions