AUTODESK UNIVERSITY

Managing Space, Assets, and Maintenance through BIM to FM

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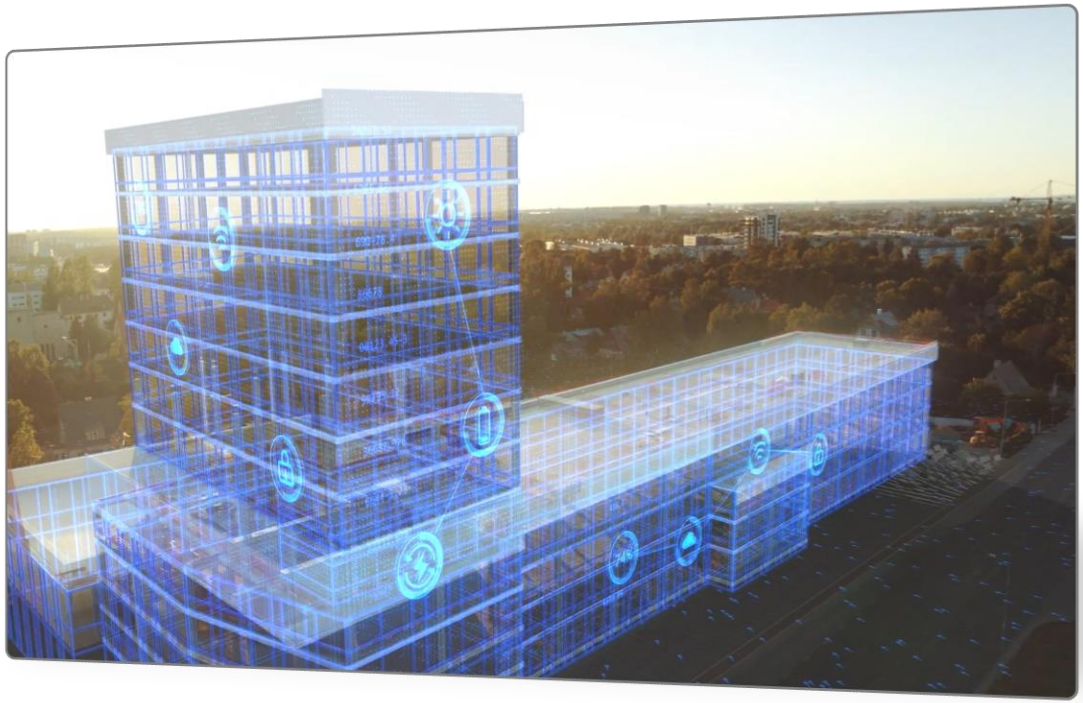
Session goals

The Learning Objectives of this session aim to address the following questions

- What is this “BIM to FM” thing anyway?
- How does BIM help with managing space and assets?
- Where do I start?
- What is a Facility Management (IWMS) system?
- What are the key elements of a BIM Execution Plan for FM?
- What does BIM to FM look like in action?

Summary

Leverage rich BIM data to manage space, occupancy, assets, and maintenance.



Challenges

FM & CRE Executives face difficult challenges

Poor Asset Management and Maintenance programs can be disruptive to the mission

Wasted Efficiency

30% of energy in buildings is wasted with inefficiency

Energy Star

Employee Dissatisfaction

More than 40% of workers are dissatisfied with comfort in their space

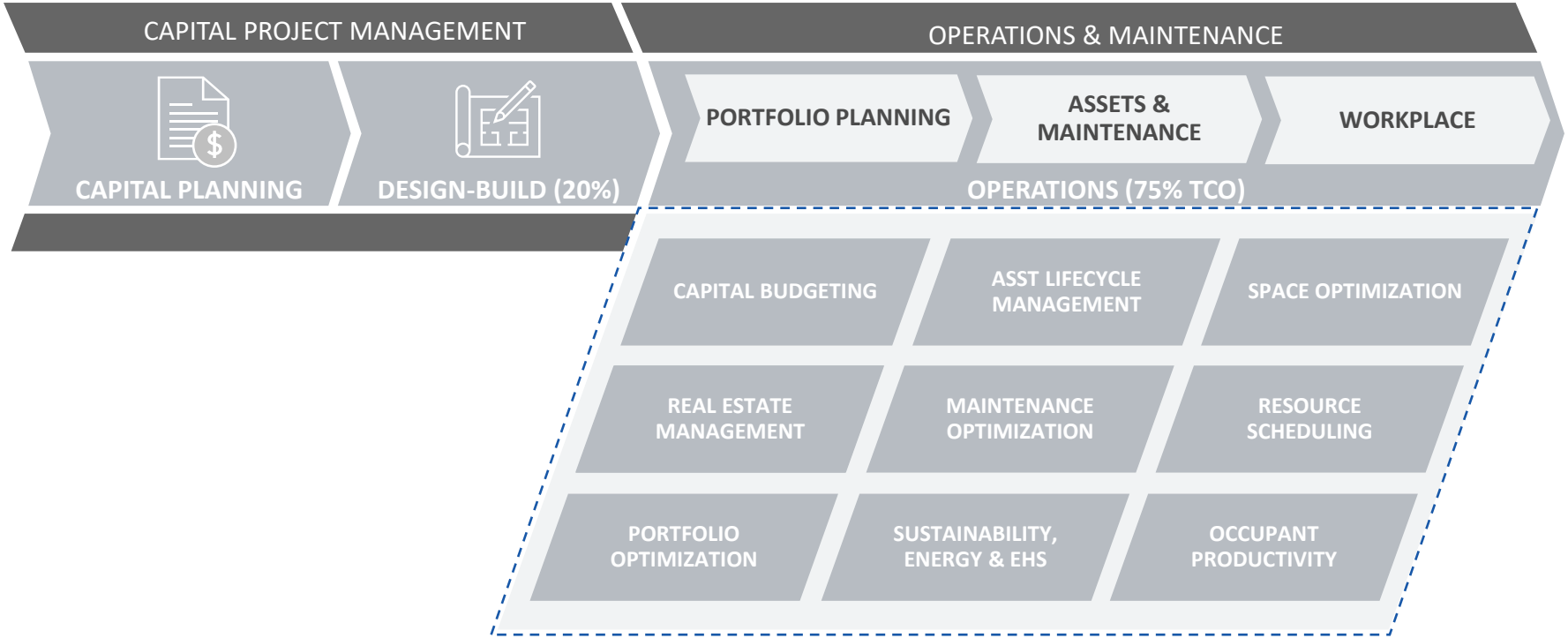
Center for the Built Environment

Maintenance Related Failures

More than 80% of equipment fail for non-age-related reasons, ie., before them time

Reliability Centered Maintenance

Operations represent largest component of TCO



What is BIM to FM?

- A lifecycle management process that allows for facilities and operations considered throughout the building design and construction periods.
- The process also presents an opportunity, to transfer operational data generated at different building lifecycle phases to a facility management system to enable facilities professionals to “hit the ground running” once the building is commissioned and occupied.

The case for BIM to FM

Solve difficult Space and Facilities Challenges

Create spaces and experiences to attract and retain the best talent

Combine utilization data with collaboration tools to inform space planning and facilities

BIM & BMS alone are incomplete solutions for operations

Great sources of data but not as an aggregator of data for operations processes across campus or portfolio

Centralize data management to reduce upkeep of BIM element data

Integrated Solution

Combine Corporate/HR, Facilities, Space and IoT data into an integrated, holistic solution

FM as integration platform for BIM sensor and BAS/BMS data

Visualize and Manage

BIM aware IWMS with an Open and Flexible platform that supports a broad range of needs.

Ability to deliver new experiences by connecting physical and digital twins

Use Cases:

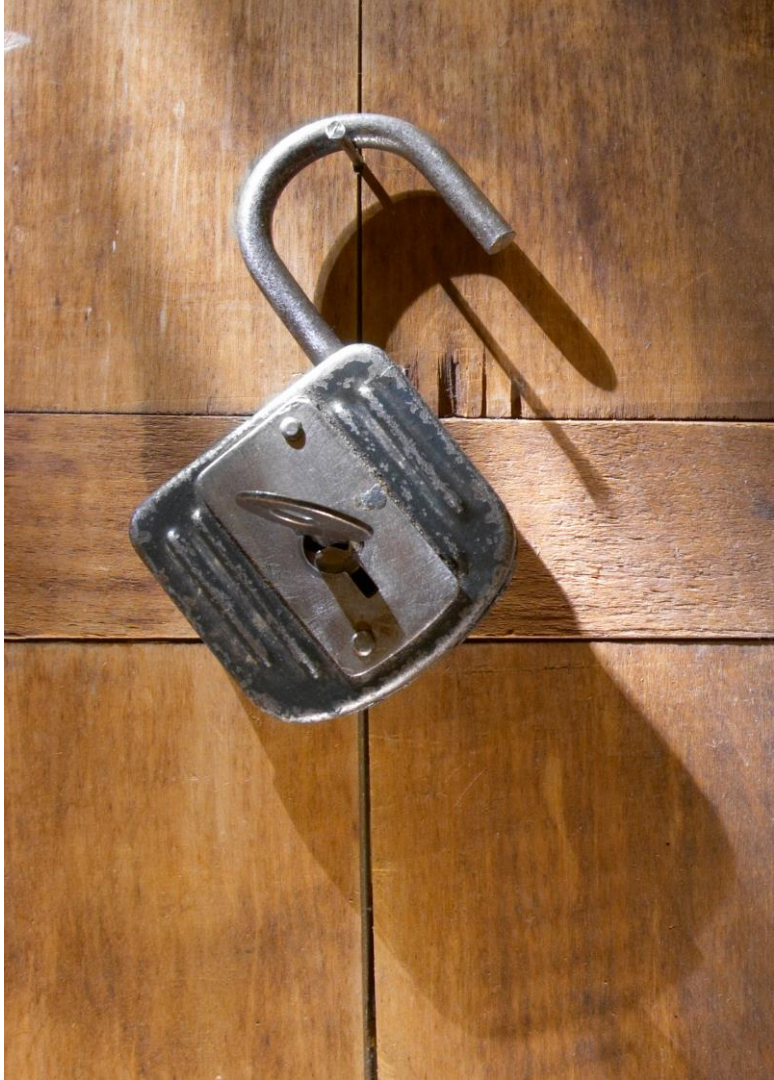
- Space Management
- Visualizations of Space
- BIM-based Asset & Maintenance
- Real-time IoT data interactions
- Self-monitoring facilities

Considerations

Keys to success

Considerations for a successful and sustainable BIM to FM Journey

- Clearly define needs
- Designate system of record
- Data standards and classification ontology
- Identify maintainable assets
- Digital “job crawl” and commissioning



Clearly define needs

Owner’s expectations from BIM to FM journey

- Why are we doing this?
- What benefits do we expect to achieve?
- Are our systems ready?
- What information do we need to manage our facilities and assets?
- How will we manage the data in the future?

Designate system of record

Determine where the ***source of truth*** is for data and attributes.

- What are the maintainable Assets?
- Which attributes do we need to manage in FM versus BIM?
- What is the workflow?
- What data, if any, is important to flow back into the Model?

Select data standards & classification ontology

Consistent asset classification is critical to collecting, identifying and managing

- Do we have a system in place today?
- Does is meet our needs? Why/why not?
- Which is the right classification system?
- Which elements should be classified?
- Who is responsible for entering the data?
- Validate the model!

UniFormat
A Uniform Classification of Construction Systems and Assemblies

OMNICLASS™
A Strategy for Classifying the Built Environment

RealEstateCore

The Construction Specifications Institute

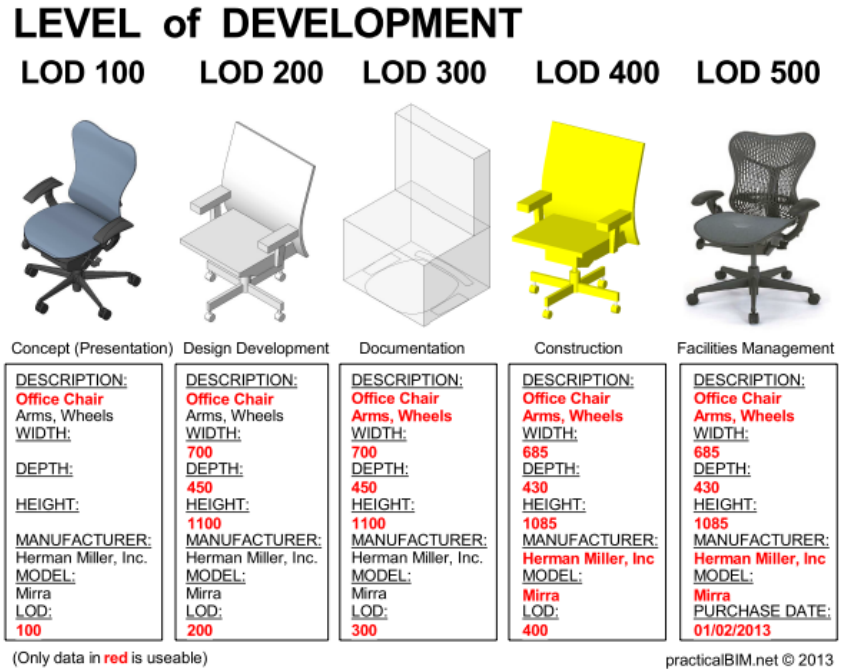
Hierarchy	
Category	Mechanical Equipment [16]
Floor	00-Foundation Level [00] 97
Group	Centrifugal Liquid Chiller - Single Compresso...
Type Properties	
Apparent Load	3444451.333
Assembly Code	
Assembly Description	
Chilled Water Return Diameter	0.667
Chilled Water Return Radius	0.333
Chilled Water Supply Diameter	0.667
Chilled Water Supply Radius	0.333
Chiller Height	6.875
Chiller Length	14.563
Chiller Material	-1
Chiller Width	6.51
Classification	0
Code Name	
Cooling Water Return Diameter	0.667
Cooling Water Return Radius	0.333
Cooling Water Supply Diameter	0.667
Cooling Water Supply Radius	0.333
Cost	0
Default Elevation	0
Description	
Diameter 1	2.406
Diameter 2	2.475
Height 1	1.65
Height 2	4.125
Height 3	5.583
Height 4	1.238
Height 5	1.203
Keynote	
Length 1	3.641
Load Classification	Cooling
Manufacturer	CARRIER
Model	CLCSC-500
Number of Poles	3
OmniClass Number	23.75.10.24.21.21.14
OmniClass Title	Centrifugal Water Chillers

Data use after construction

How will the data be used?

Different facility activities require:

- Different Components or subset of Components (Maintenance vs. Space Management)
- Different parameters of the same Components or Different Level of Data Completion



"LOD" number defines the level of completeness to which model components or elements are developed.

Identify maintainable assets

Which systems, components and spaces do we need to inspect, manage and maintain?

- Which asset types by classification?
- Common core attributes; family, type, location, ID
- Other attributes – specific to asset type
  - Think of these like **Type** parameters
- Managed/maintained assets?

Asset Category	Tracked Level of Detail	Identification	System of Record	As-Built Data
D30 Heating, Ventilation, And Air Conditioning (HVAC)				
D3010 Facility Fuel Systems				
D3010.00.a - (SYS.FOS) Fuel Oil Supply System	**Generic asset - One per system/zone**	**No barcode**	**FM**	**CxA**
D3010.00.c - (FLD) Fuel Oil Leak Detection System	Each system, separate from Tank	Barcode on main panel	FM	CxA
D3010.30 - (FOP) Fuel Oil Pump	Each pump set	On Control Panel	FM	CxA
D3010.50 - (FOT) Fuel Oil Tanks	Each tank	Next to level gate (tanks are usually underground), or no barcode at all	FM	CxA
D3010.90 - (SYS.NGS) Natural Gas System	**Generic asset - One per system/zone**	**No barcode**	**FM**	**CxA**
D3010.90.a - (NGC) Natural Gas Compressor	Each compressor unit	On control panel	FM	CxA
D3020 Heating Systems				
D3020 - (SYS.HTS) Heating Systems	**Generic asset - One per system/zone**	**No barcode**	**FM**	**CxA**
D3020.10.a - (BLR) Boiler	Each Boiler	Place barcode on control panel	FM	CxA
D3020.10.b - (HX) Heat Exchanger	Each unit (only if standalone, otherwise this is part of Boiler)	On control panel	FM	CxA
D3020.10.c - (DA) Deaerator	Each Dearator	Place barcode on control panel	FM	CxA
D3020.10.e - (BFP) Boiler Feed Pump	Each Pump	On Control Panel (or pump if no panel)	FM	CxA
D3020.10.f - (FDF) Forced Draft Fan	Each unit (	On control panel	FM	CxA
D3020.10.g - (BDT) Blowdown Tank	Each Tank	On unit	FM	CxA
D3020.10.h - (BDS) Blowdown Separator	Each unit (unless it is subasset)	0	FM	CxA
D3020.10.k - (ECO) Economizer	Each economizer	Place barcode metal and hang from economizer	FM	CxA
D3020.10.l - (HRB) Heat Recovery Boiler	Each Recovery Boiler	0	FM	CxA
D3020.70 - (HTG.DCN) Decentralized Heating Equipment	Each unit	On Unit/Control panel	FM	CxA
D3020.70.d - (UH) Unit Heater	Each unit	On control panel	FM	CxA
D3020.70.e - (IND) Induction Unit	Each unit	On Unit	FM	CxA

Digital “job crawl” and commissioning

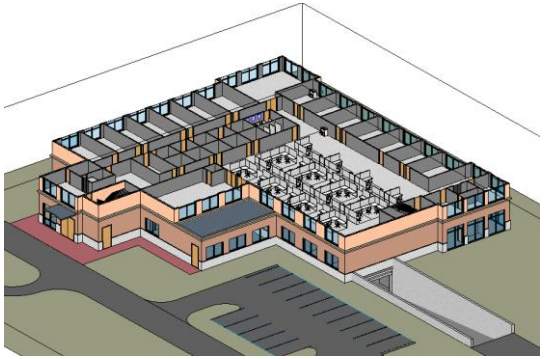
Collect as-built or installed parameters for each managed asset

- What are the key as-built parameters to collect?
  - Think of these like **Instance** parameters
- When to collect? Install, commissioning, post handover?
- How to efficiently collect the data and reduce errors and redundant steps

Building Information Model

Building Information Modeling (BIM)

Modeling



Information

Properties

Single-Flush
34" x 80"

Doors (1) | Edit Type

Constraints	
Level	Floor 1
Sill Height	0' 0"
Construction	
Frame Type	Double
Materials and Finishes	
Frame Material	Maple
Finish	Red
Identity Data	

Construction	
Function	Interior
Wall Closure	By host
Construction Type	
Materials and Finishes	
Door Material	Door - Panel
Frame Material	Door - Frame
Dimensions	
Thickness	0' 2"
Height	6' 8"
Trim Projection Ext	0' 1"
Trim Projection Int	0' 1"
Trim Width	0' 3"
Width	2' 10"
Rough Width	

Who is the model for?

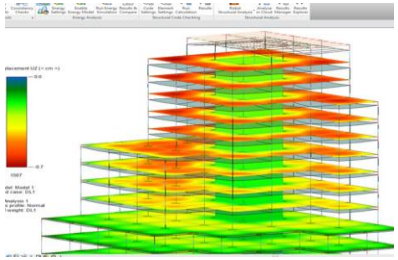
What data is required?

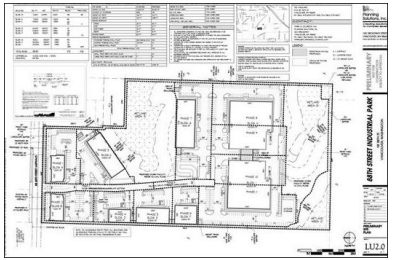
What level of design/detail is necessary?

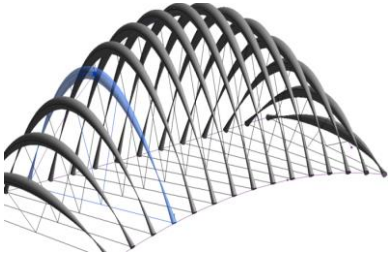
Building Information Modeling (BIM)

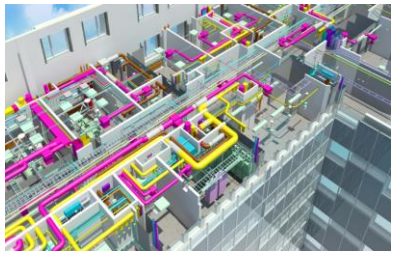
Common Use of Design/Build

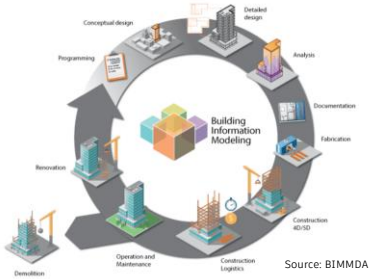
- Collaboration
- Design
- Analysis
- Deliverables
- Scheduling
- Commissioning









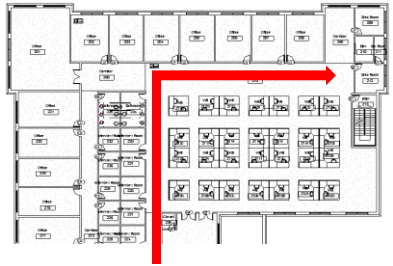


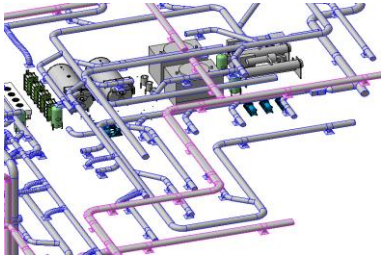
Source: BIMMDA

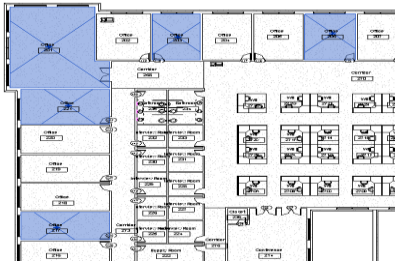
Building to facilities management

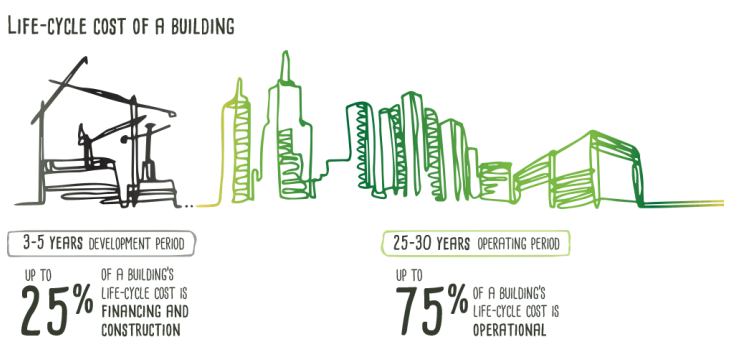
Operations represent largest component of TCO

- Space Management
- Asset Management
- Building Operations
- Compliance
- Energy Management





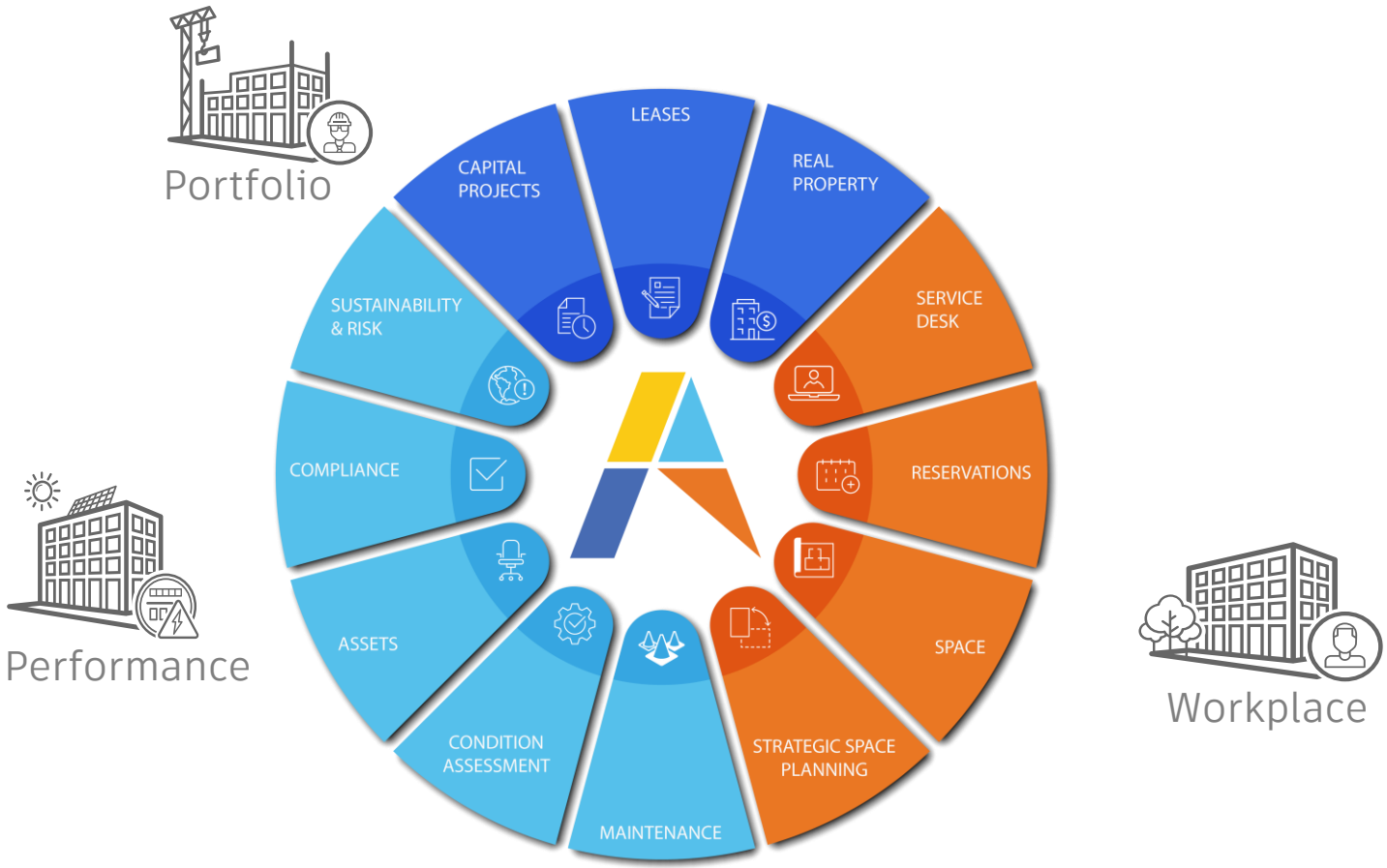




https://www.aurecongroup.com/markets/property/buildings-of-the-future/bottom-line-benefits/new-roi-narrative

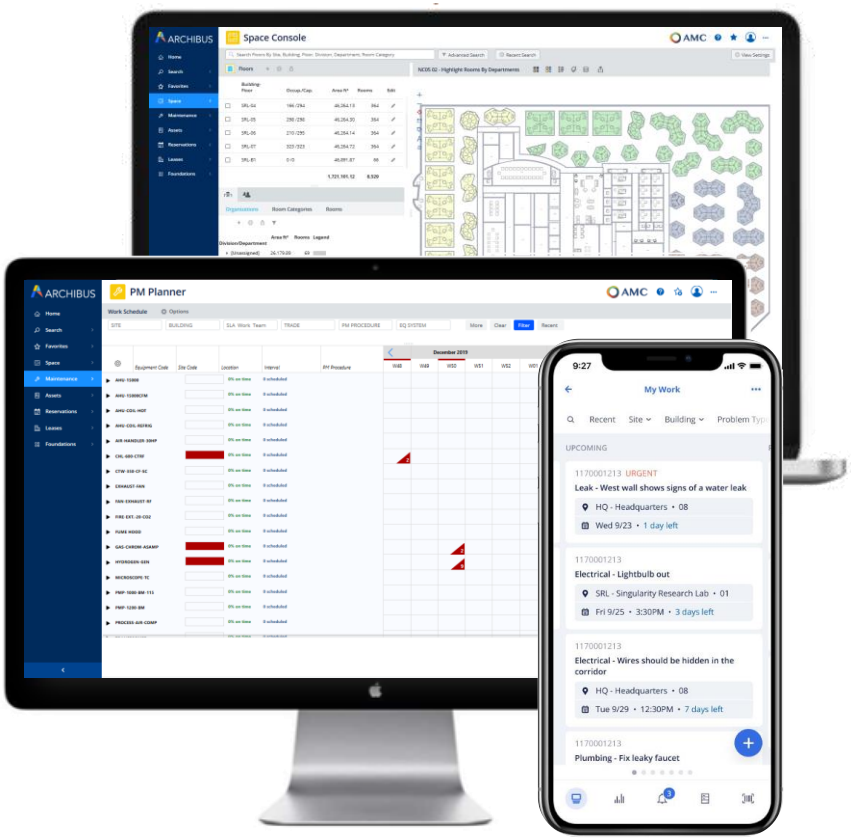
What is a Facility Management System (IWMS)?

Integrated Workplace Management System



Why deploy an FM/IWMS solution?

- Streamline operational processes
- Improve financial performance
- Informed investment decisions
- Track and demonstrate compliance
- Identify and mitigate risks
- Improve comfort & services for occupants
- Enhance reputation
- Demonstrate social responsibility
- Improve organizational accountability



BIM Plan

BIM Execution Plan

Outline and specify the entire BIM project

- Foundational framework to ensure successful deployment of BIM enabled projects.
- The key is good planning of the design-to-engineering-to-construction process
- Minimize downstream surprises
- Establishes goals, tasks, contacts, guidelines for collaboration, standards and conventions
- Determines which data to collect (e.g., FM data)
- Specifies the incorporation of non-model data

Final deliverable

Data collection by FM activity

Post-Construction Fields of Operation

Maintenance

Data Source Required

Model + Specs

Data

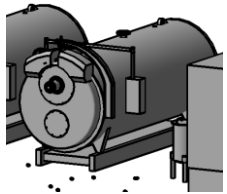
Enterprise Graphics , Asset Maintenance specs, Asset Data, Manuals, Warranty Info, Employee Information, Worker Data and Schedule

Asset Required	LOD	Data Source
Floor Plan	LOD300	Model

Parameters
Floor ID
Floor Name
Elevation/Geocoding

Asset Required	LOD	Data Source
Equipment	LOD500	Model

Parameters
Equipment ID
Equipment Type
Manufacturer
Equipment Model
Purchase Cost
Location (Building, Floor, Room)
Geocoding



BIM to FM in Action

demo

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