



FBIM

Can FM be spelled with BIM?

Leveraging Integrated Project Information to Manage the FM Delivery Processes

Michael Ruiz, Applied Software
Todd Barrett, Choate Construction

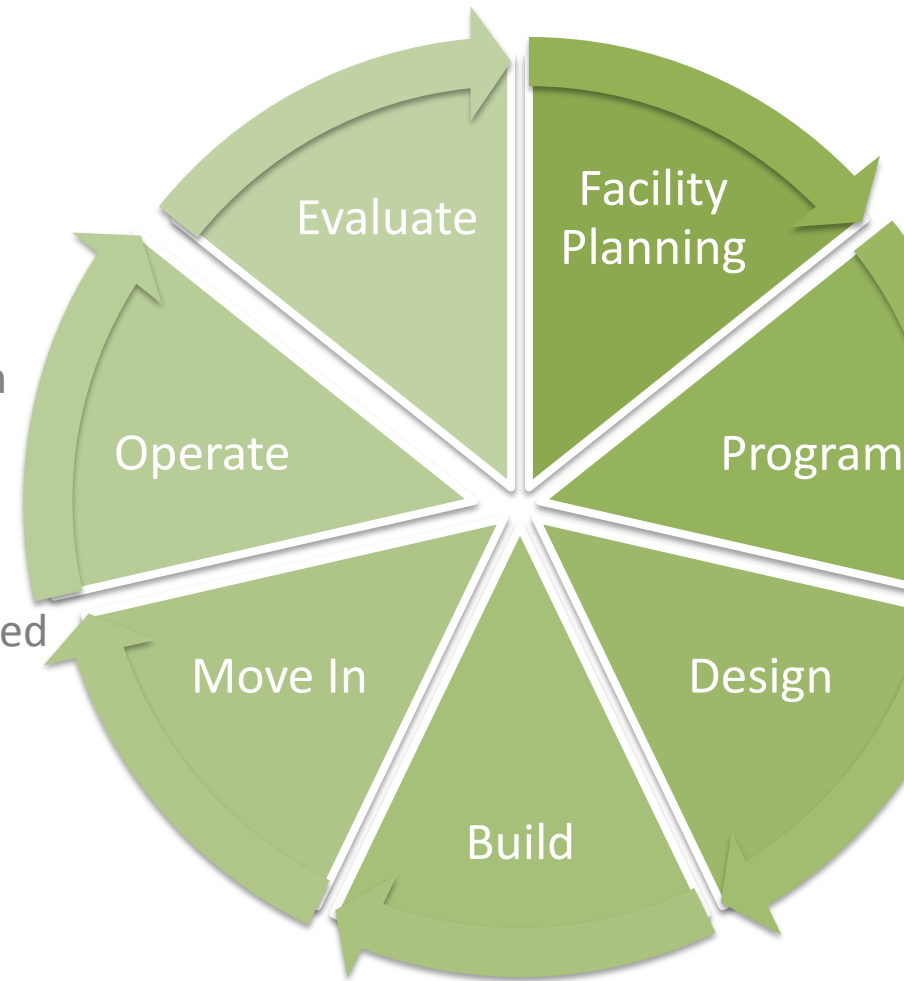
Introduction

Discussion topics

An examination of Owner BIM+FM projects

Owner as BIM & project information consumer

How are consulting professionals impacted by the use of Owner defined BIM Requirements



Introduction

Clients



ROSSER



Introduction

Goals

- O&M Department able to obtain beneficial Operations & Planning documentation at 70% construction completion
- Take current manual methodology and have an automated process from beginning to end resulting in significant savings



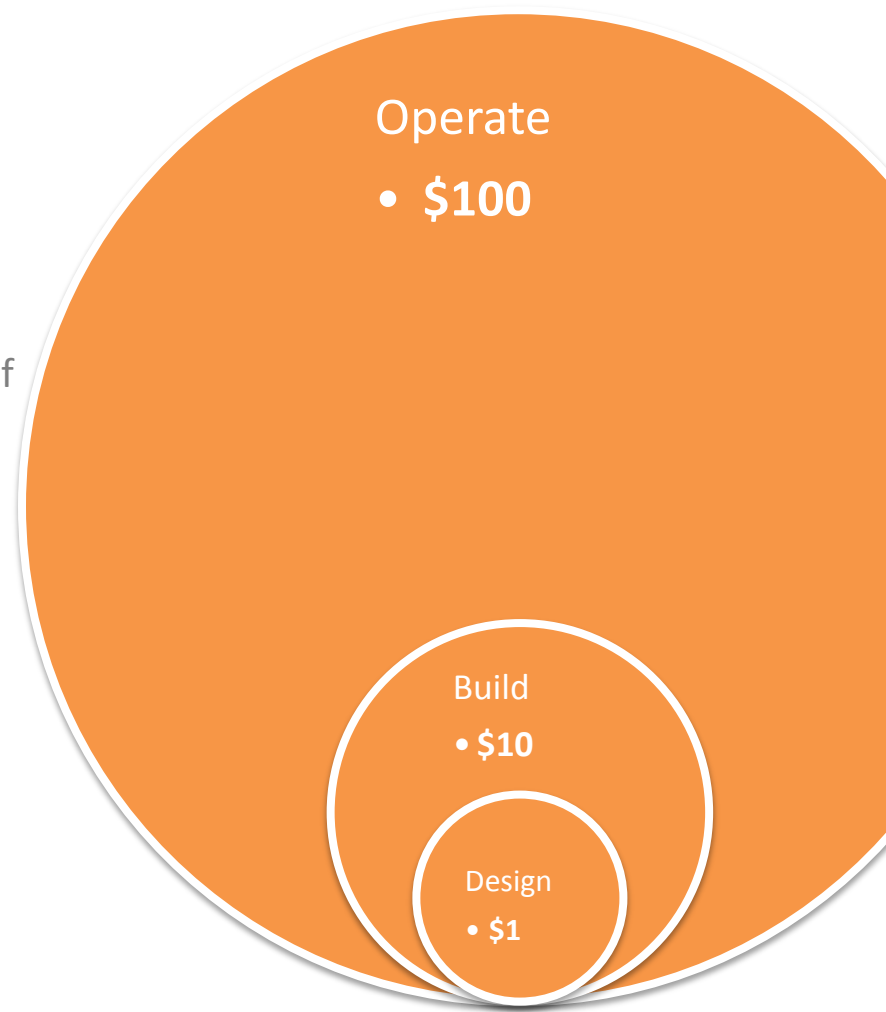
Introduction

Over \$15 billion dollars per year is being spent

The issue

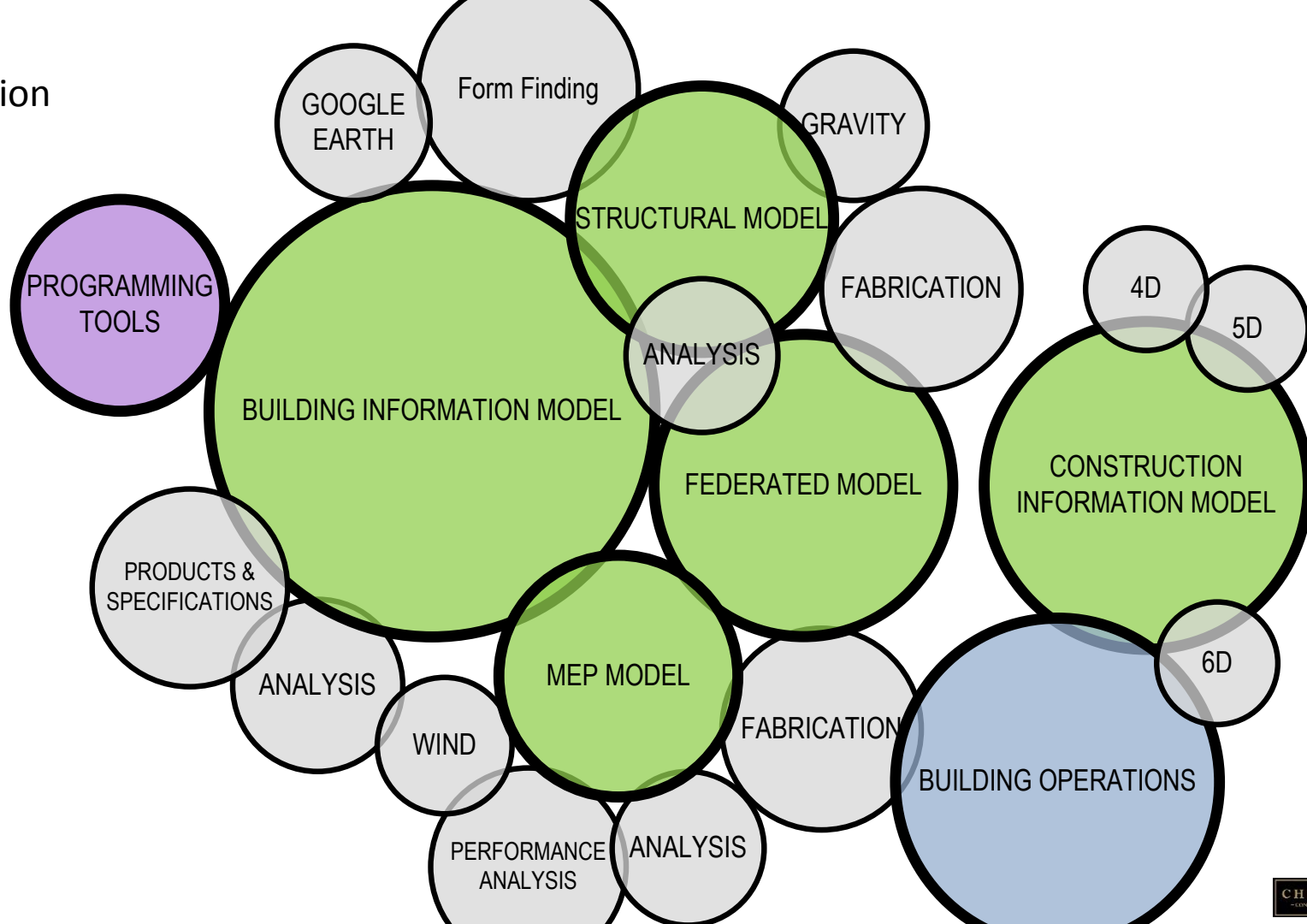
- Inefficient processes supporting lack of information exchanges
- No interoperability in the facility life cycle.

NIST 2004 Report



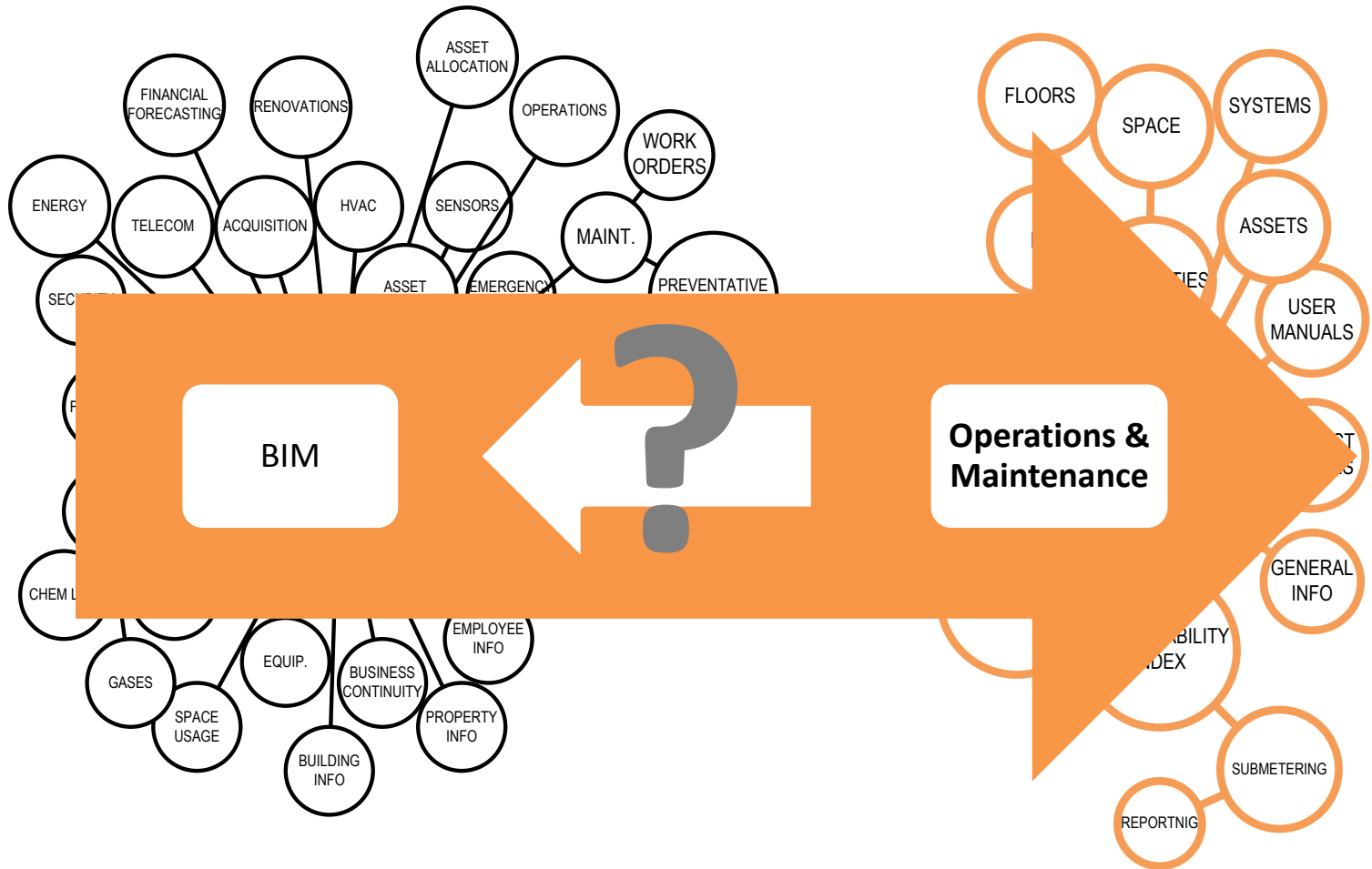
Introduction

BIM tools



Introduction

*Strategy &
tactics*

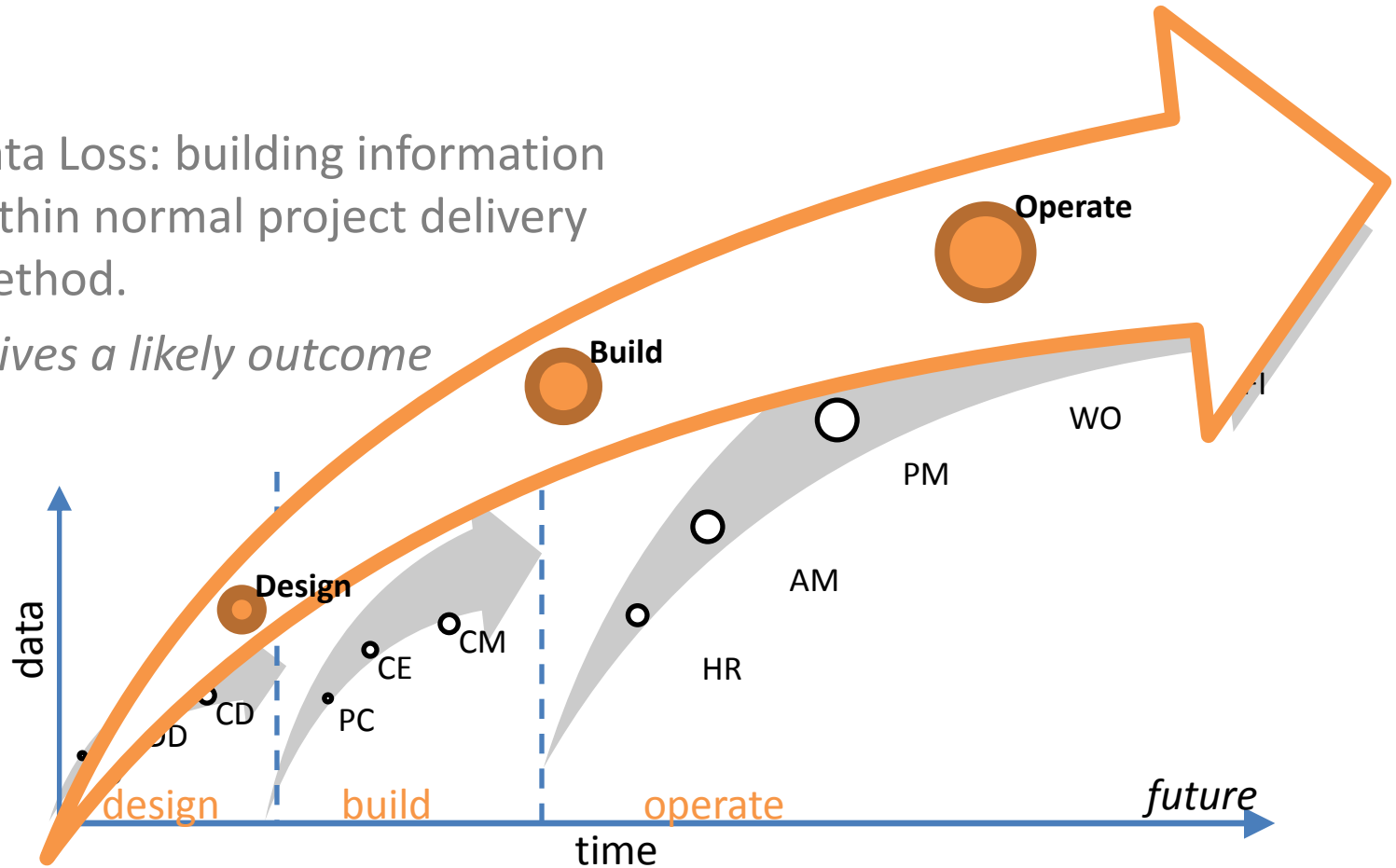


Introduction

*Mitigate
information
loss*

Data Loss: building information
within normal project delivery
method.

Drives a likely outcome



Case Studies

Case Studies

*GT BIM
Requirements for
AEC&O*

Developed the colleges' ability to validate building information modeling throughout the project cycle. Created Georgia Tech's first BIM guideline that is now being adopted by architects, engineers, and professional consultants that will produce BIM for Georgia Tech.



**Georgia Tech BIM Requirements &
Guidelines for Architects, Engineers
and Contractors**

September

2011

This Corporate BIM Requirements applies to Georgia Institute of Technology A/E/C selections advertised on or after 09/22/2011. Required for all construction (new and renovation) projects \$5 million or greater; all new construction \$2.5 million or greater and encouraged but not required on all other projects.

Version 1.0



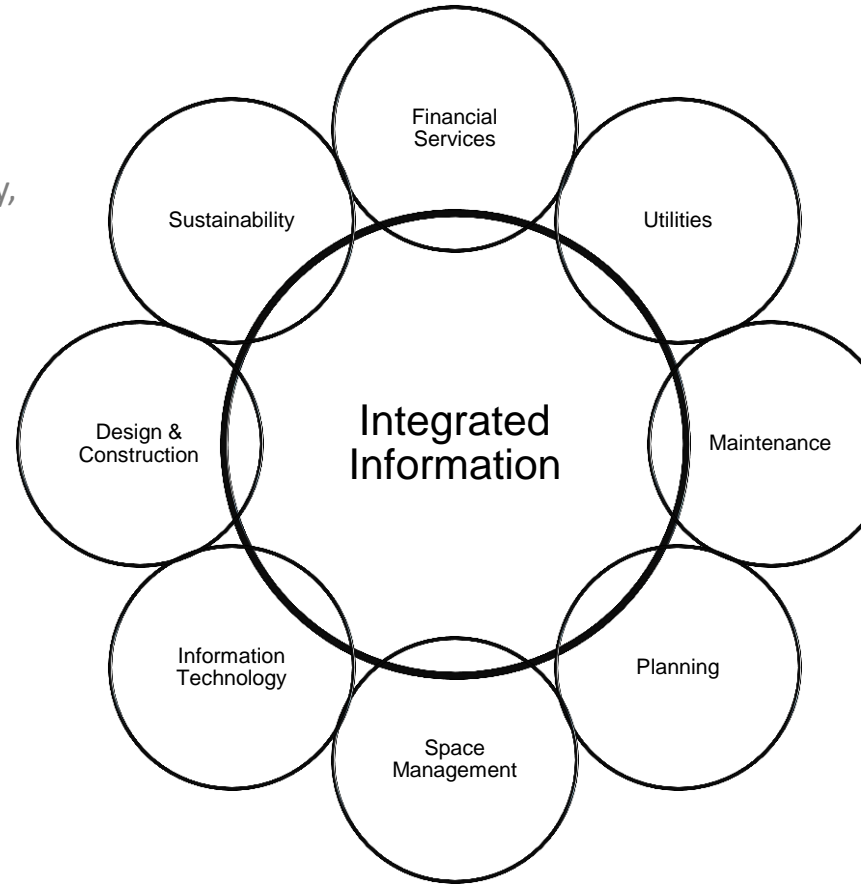
Case Studies

Florida State University BIM Implementation

Capital planning, space management, design, construction, utilities, maintenance, sustainability, grounds, and IT will benefit from BIM interoperability to their facilities management system AssetWorks.

Consulted with departmental leadership to map business, operations, data, controls and physical devices to a BIM based, open standards process.

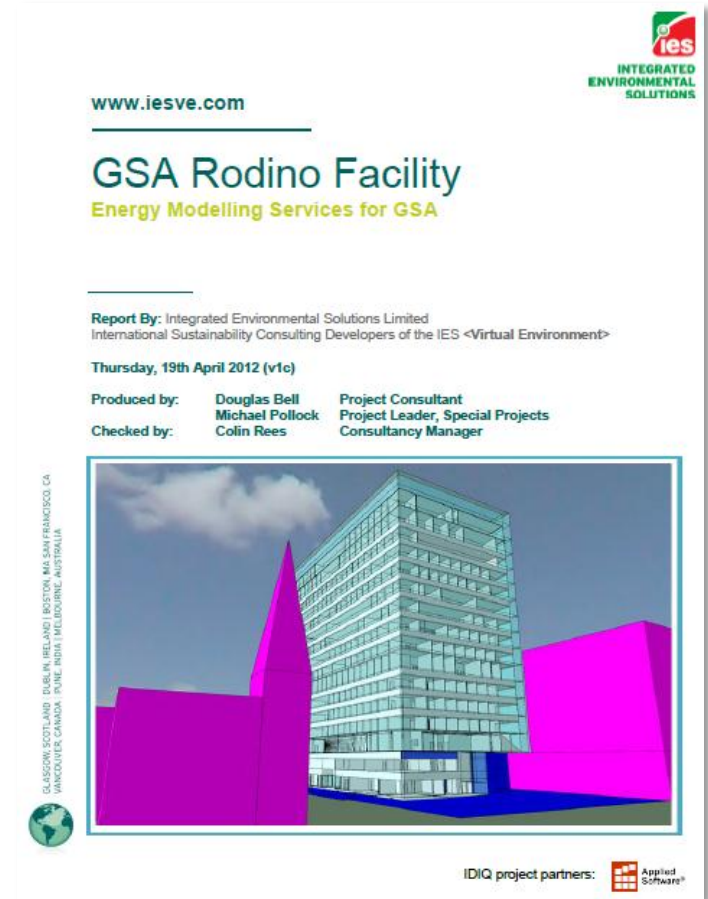
Developed processes and systems based in interoperability, open standards, COBie and FSU standards will seek an appropriate approach for AEC, and internal FM teams to produce capable and organized BIM information to be consumed by the university's future information exchange systems.



Case Studies

*GSA Energy
Analysis Pilot
Project for PBS &
Central Office*

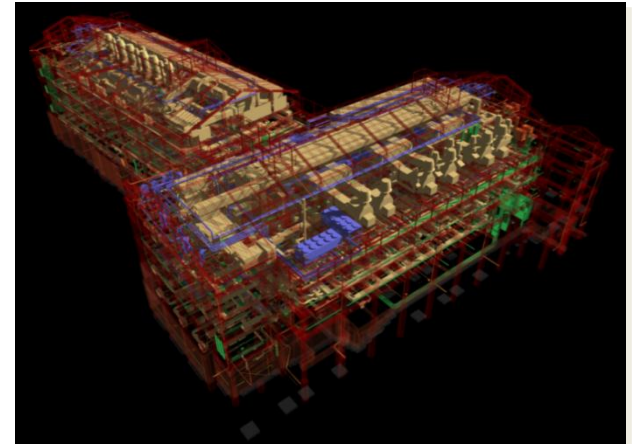
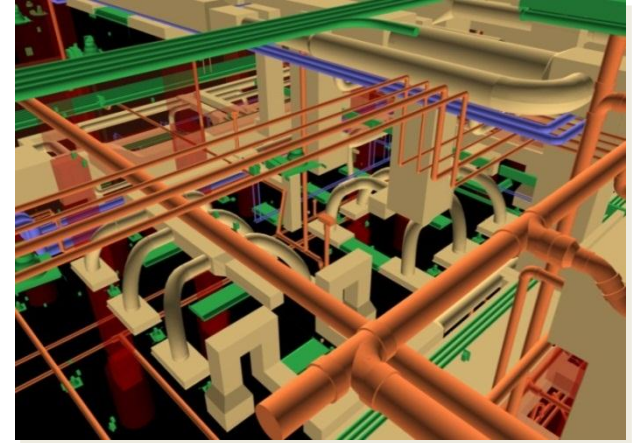
Program Manager for the IDIQ task order. Developed the integrated processes for the energy analysis of the Rodino Federal Building. Managed process, technical requirements and communication between IES, LAS Architects, SSRcx, BECK Technologies and GSA's Central Office. Project scope was to validate energy benchmarking sought by KlingStubbins. Three additional workflows developed will offer insight and content to the GSA Design Guide 05, BIM for Energy Analysis.



Case Studies

*University of
Alabama Phase
IV Science and
Engineering
Complex*

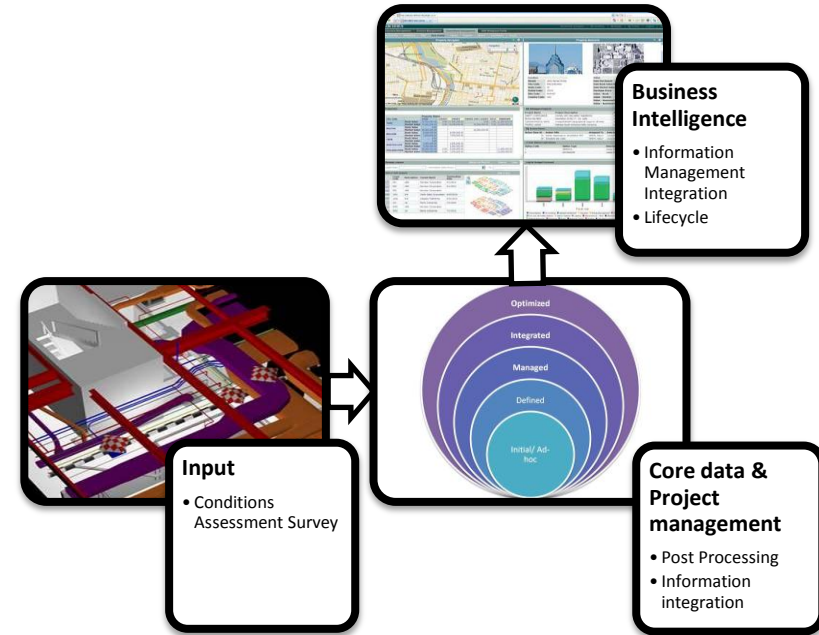
Developed a BIM approach for design team to deliver a project with a level of proficiency that accommodated the owner's agent, HOAR PM, with models and project information for bidding. Facilitated collaborative stakeholder discussions with owner to produce the BIM use case for driving the project execution plan strategy. Engagement included seminars, software sales and training across five teams in three states. Constant communication and clash detection services provided during design were key aspects of project success.



Case Studies

Unum Provident BIM Implementation

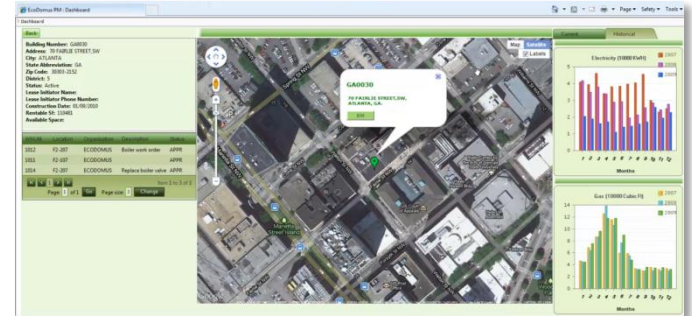
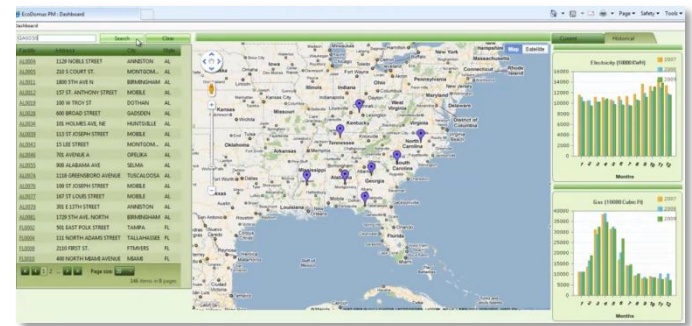
Provided BIM to O&M services. Developed a 3-D laser scanning approach and subsequent BIM Modeling objectives guideline for the owner. Graphics and data were reconciled and validated with the owners existing databases for migration into information exchange. COBie and OmniClass data was mapped to the owner's integrated workplace management systems (Archibus).



Case Studies

GSA O&M Portal Region 4

Developed strategies to create and integrate database systems that collectively brought together four separate technologies: BIM, Computerized Maintenance Management System (IBM Maximo), Geo-Spatial Systems, Building Automation System/Energy Management System, and Integration to eSmart.



BIM & FM

BIM & FM

BIM management

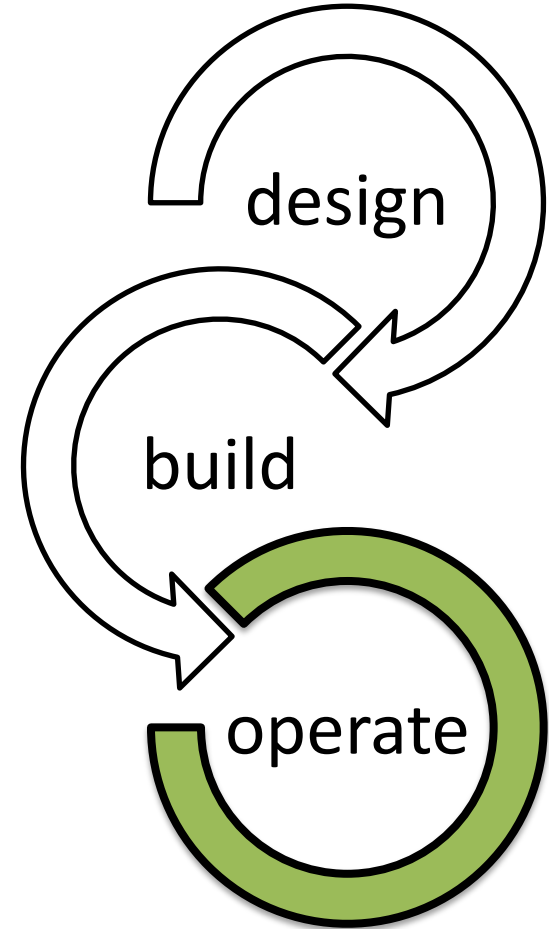
Preparing BIM Models

Defining Requirements for BIM Objects:
— Space & Equipment

Defining Requirements for Documentation

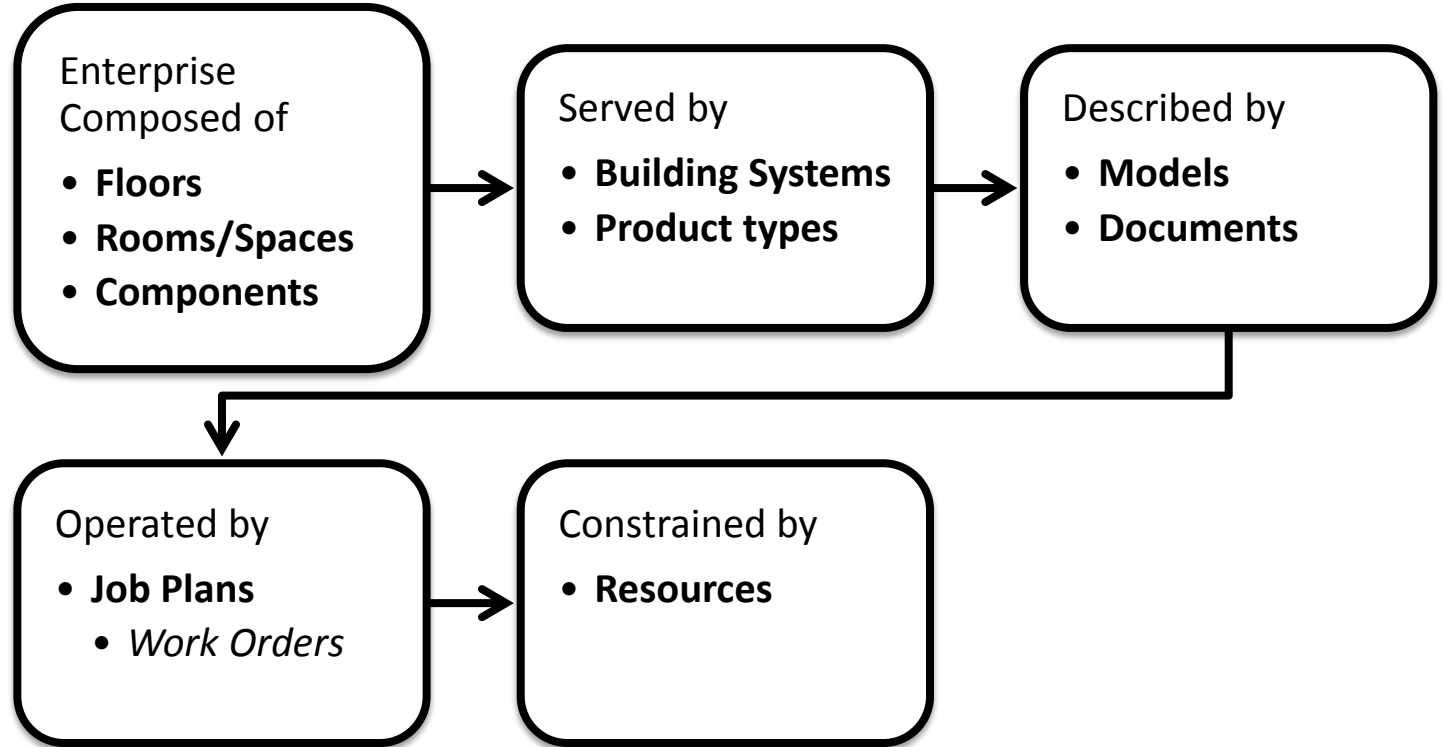
Scheduling Quality Control Actions

Mapping BIM Data with FM Data Structure:
— Product Data, As-built Layout, Tag
& Serial No, Warranties & Spares



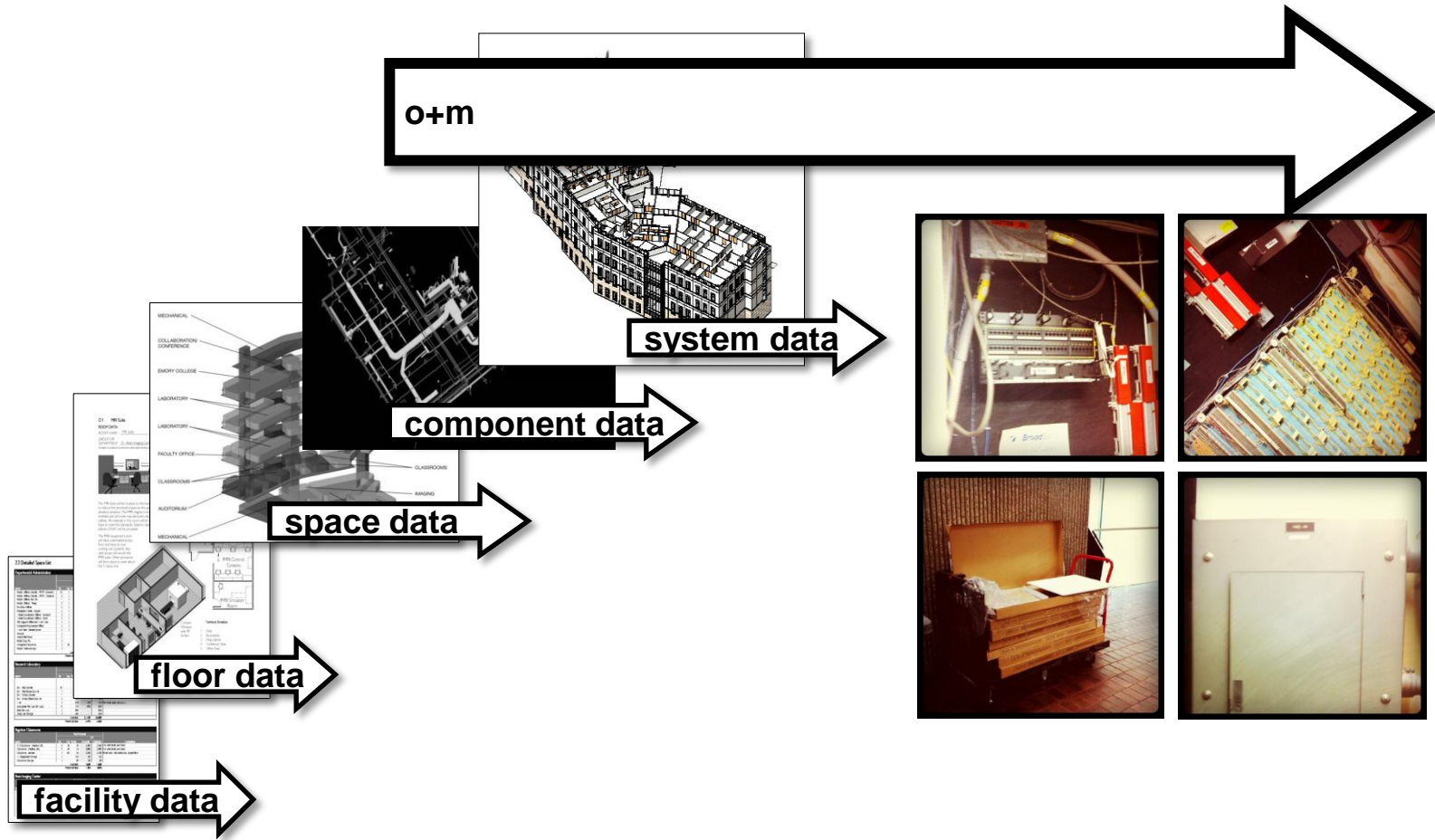
BIM & FM

Concept



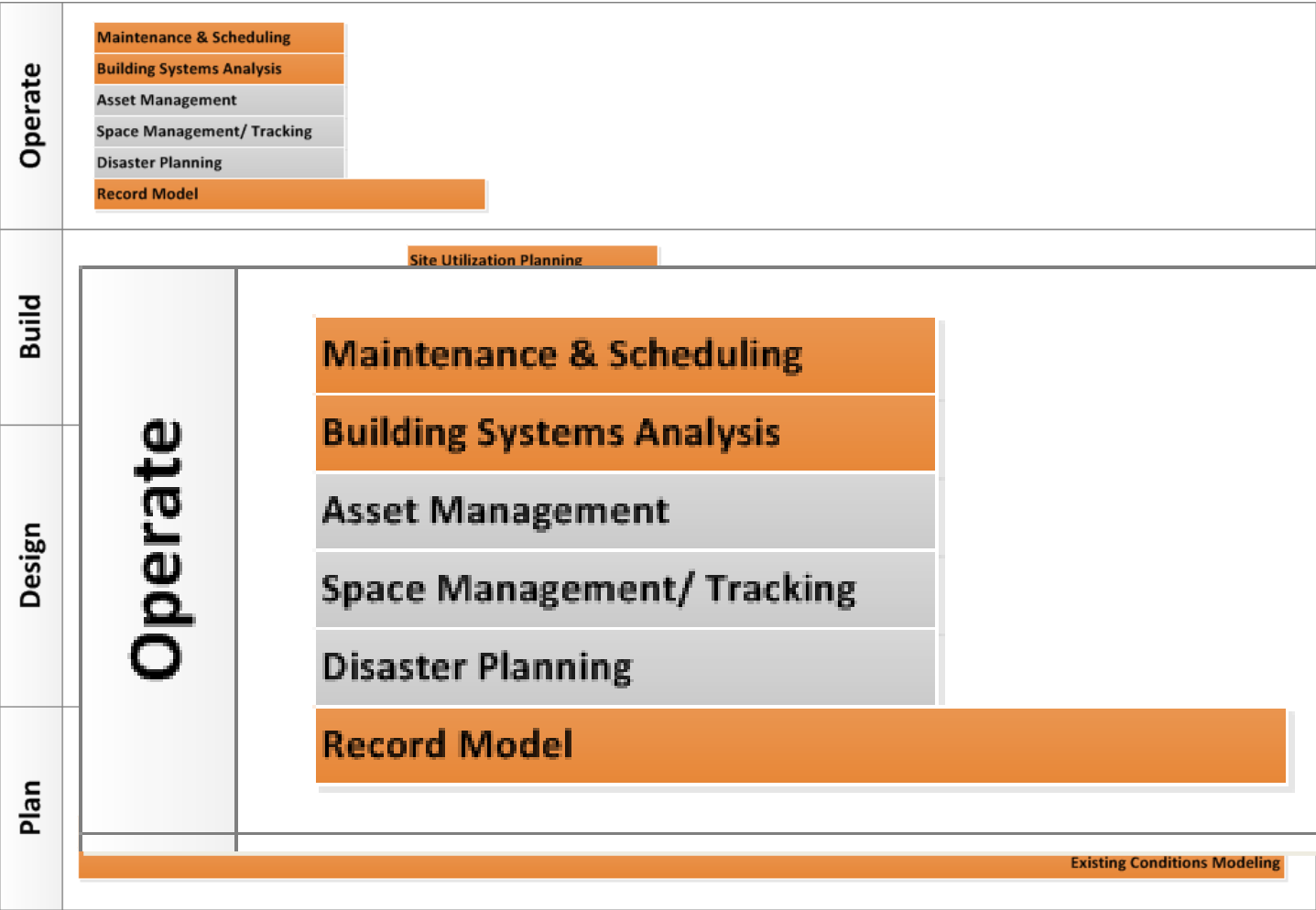
BIM & FM

*BIM to
operations &
maintenance*



BIM & FM

BIM uses



BIM & FM

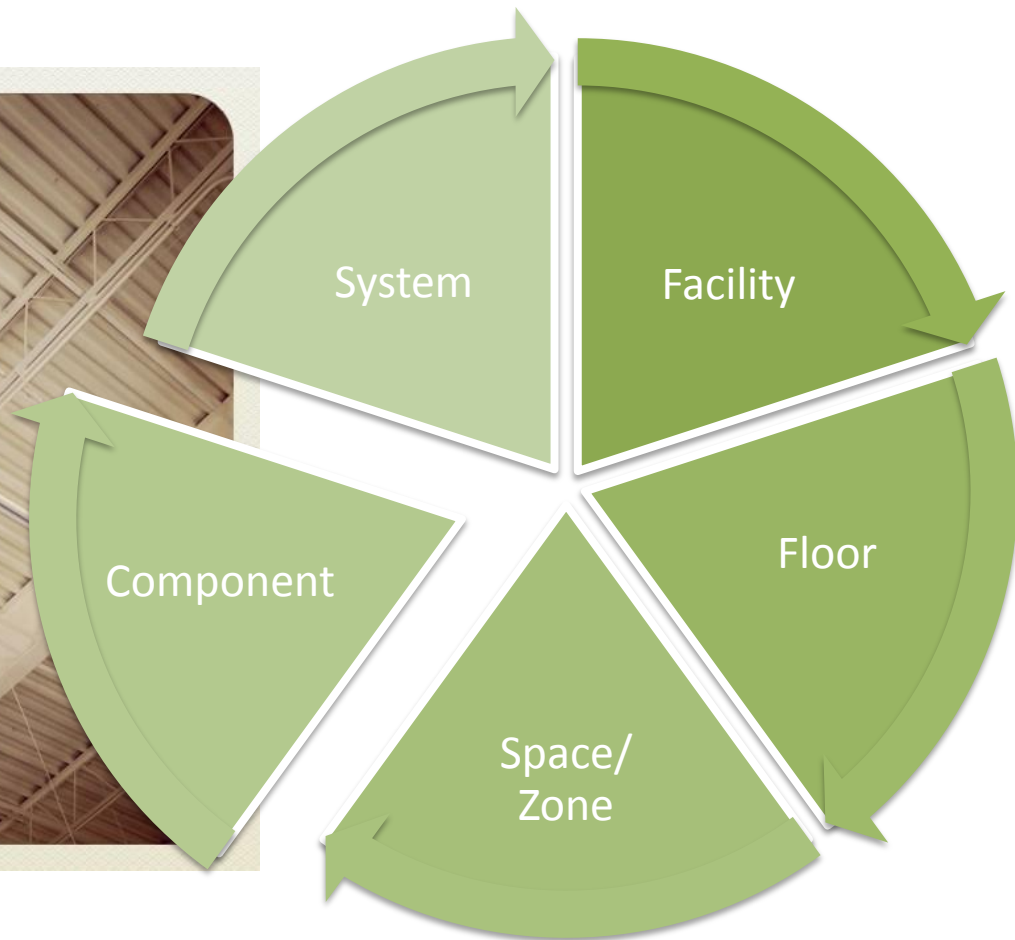
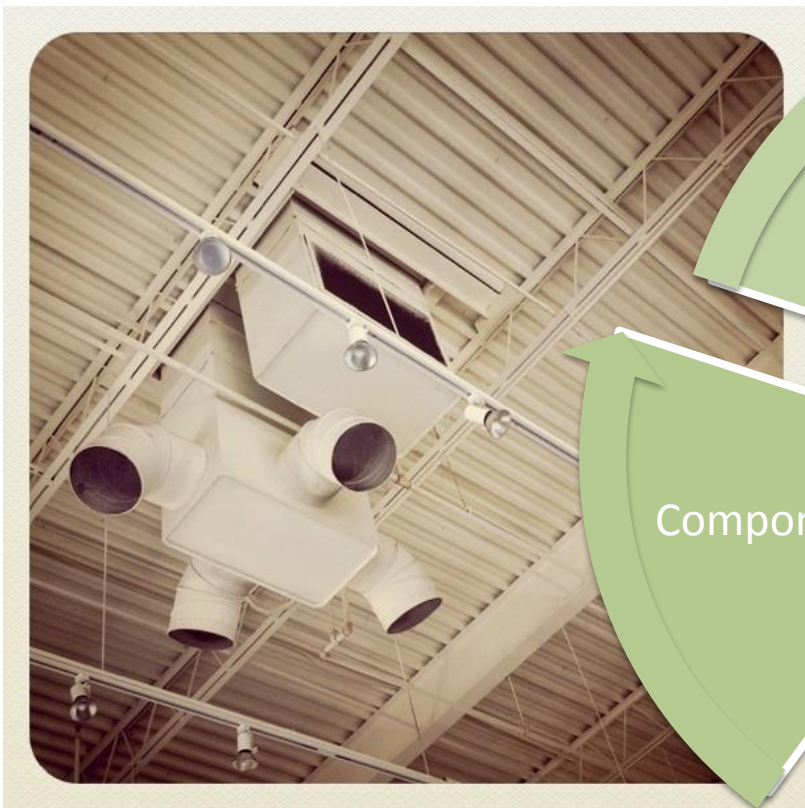
COBie & OmniClass

Equipment Data	AiM Fields	COBie 2.0 Tab	COBie 2.0 Column
Identification	Barcode	Component	BarCode
	UniFormat	Recommend: OmniClass	n/a
	Equipment Type	Component	TypeName
	Tag	Component	TagNumber
	System Number	System	Name
Location	Site	Facility	SiteName
	Zone	Zone	Name
	Building Number	Facility	ExtFacilityIdentifi
	Building Name	Facility	ProjectName
	Floor	Floor	Name
	Room Number	Space	Name
	Room Name	Space	Description
General Attributes	Manufacturer	Type	Manufacturer
	Series	Type	Description
	Model Number	Type	ModelNumber
	Serial Number	Component	SerialNumber
	Service	Job	Name, TaskNumber
	Weight	Owner Internal	Owner Internal
	Manufacturer Date	Component	WarrantyStartDate
	Notes	Owner Internal	Owner Internal
Specific Attributes	Air Flow	Attribute	Name
	Total Static Pressure	Attribute	Name
	Fan Horsepower	Attribute	Name

COBie 2.0 Sheets Requirements					
	A/E	GC/CM	Cx	FSU Facilities	Comment
Contact					
Design					
Facility					
Floor					
Space					
Zone					
Type					
Component					
System					
Construction					
Component					
Document					
Attribute					
Coordinate					
Connection					
Issue					
Construction Deliverables					
Operations Planning Set					An update of the Designer's COBie worksheets
Beneficial Occupancy Set					An update of the Operations Planning Set of items individually identified in the "Component" worksheets
Close Out					
Design Data					
As-built Data					

BIM & FM

*Maintainable
items*



BIM & FM

COBie Fields

Information exchange authors/ consumers

Data authoring source

Tab

Column

AE

GC/ CM

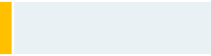
Cx

Owner

*COBie
development*

Component

TagNumber



BIM/ COBie

Type

Name



BIM

Type

AssetType



BIM

Type

Categry



BIM

Facility

SiteDescription



BIM

Facility

Name



BIM

Floor

Name



BIM

Component

Space



BIM

Type

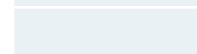
Manufacturer



BIM

Type

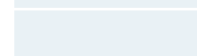
ModelNumber



BIM

Component

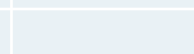
SerialNumber



BIM/ COBie

Component

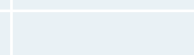
WarrantyStartDate



BIM/ COBie

Type

WarrantyDurationParts



BIM/ COBie

Design

Design

Program & space

Validate design with Program

- Financial objectives
- Strategic planning
- Leasing Strategy
- Space Identification
- Area classifications
- Departmental zoning
- Emergency response planning

Areas can be quantified by

- Department, Function, Occupant, Use, Space Type
- Objects can be linked for **external data sources**



Design

Space validation

2.2 Detailed Space List

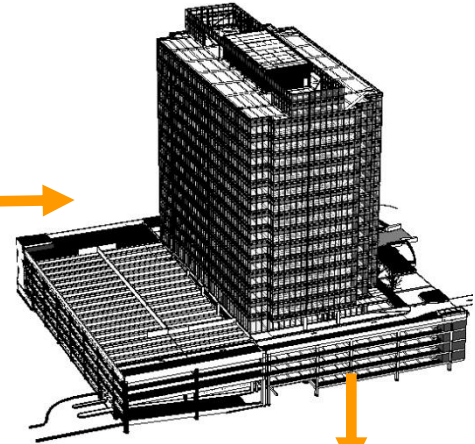
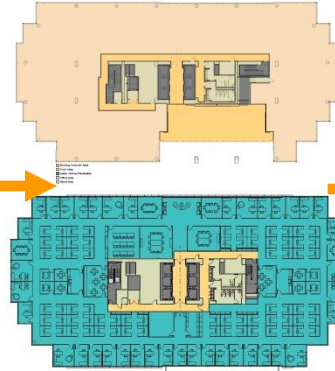
Department Administration									
Room	Area	Volume	Count	Category	Usage	Notes	Area	Volume	Count
Room 101	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 102	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 103	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 104	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 105	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 106	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 107	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 108	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 109	1,000	10,000	1	Office	Office		1,000	10,000	1
Room 110	1,000	10,000	1	Office	Office		1,000	10,000	1

Research Laboratory									
Room	Area	Volume	Count	Category	Usage	Notes	Area	Volume	Count
Room 201	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 202	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 203	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 204	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 205	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 206	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 207	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 208	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 209	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1
Room 210	1,000	10,000	1	Laboratory	Laboratory		1,000	10,000	1

Regular Classrooms									
Room	Area	Volume	Count	Category	Usage	Notes	Area	Volume	Count
Room 301	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 302	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 303	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 304	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 305	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 306	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 307	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 308	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 309	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1
Room 310	1,000	10,000	1	Classroom	Classroom		1,000	10,000	1

Student Engagement Center									
Room	Area	Volume	Count	Category	Usage	Notes	Area	Volume	Count
Room 401	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 402	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 403	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 404	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 405	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 406	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 407	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 408	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 409	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1
Room 410	1,000	10,000	1	Engagement Center	Engagement Center		1,000	10,000	1

Owner Program



- Leasing Strategy
- Life Safety
- BOMA measurement
- Facility information capture
- Gross/ NET SF
- Rent Rates



- Marketing Material
- Asset gathering
- Products & Specifications
- Wayfinding

- 3D Model
- Analysis
 - Construct



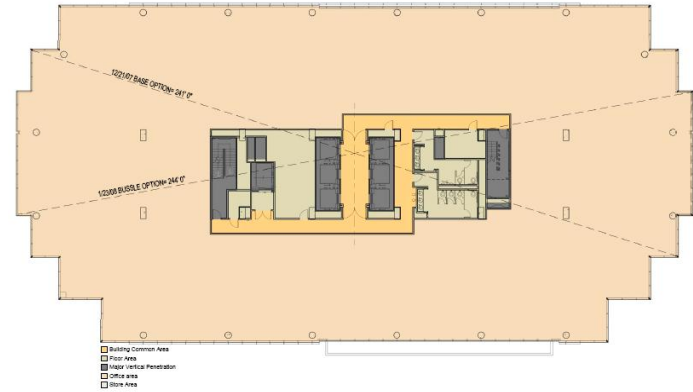
Design

Validate design with program

BOMA

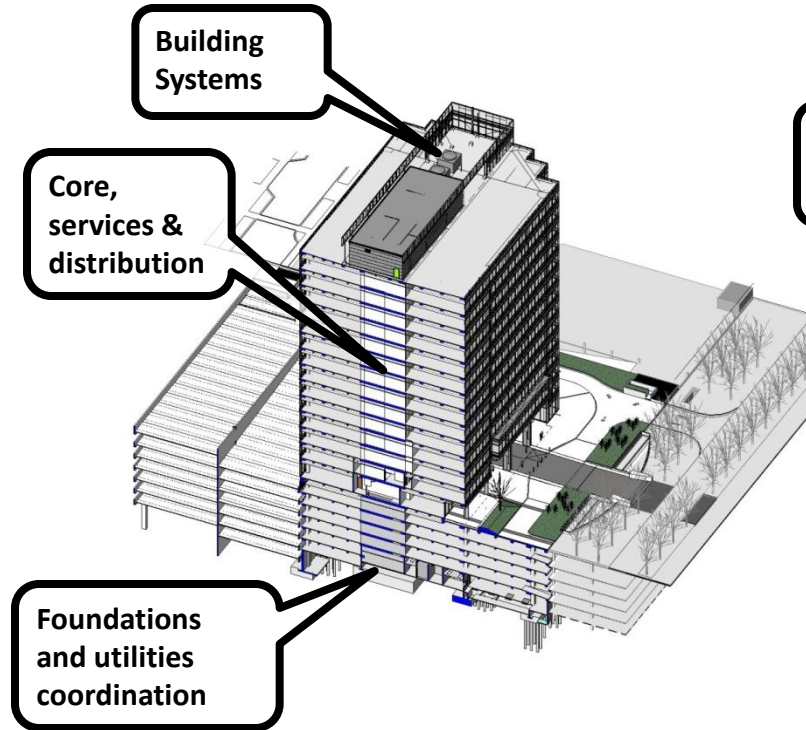
Space can be quantified by

- Common Floor Area
 - Major Vertical Penetrations
 - Space Type
 - Other Designations
-
- Assets
 - FF+E
 - Departments
 - Life Safety
 - COBIE

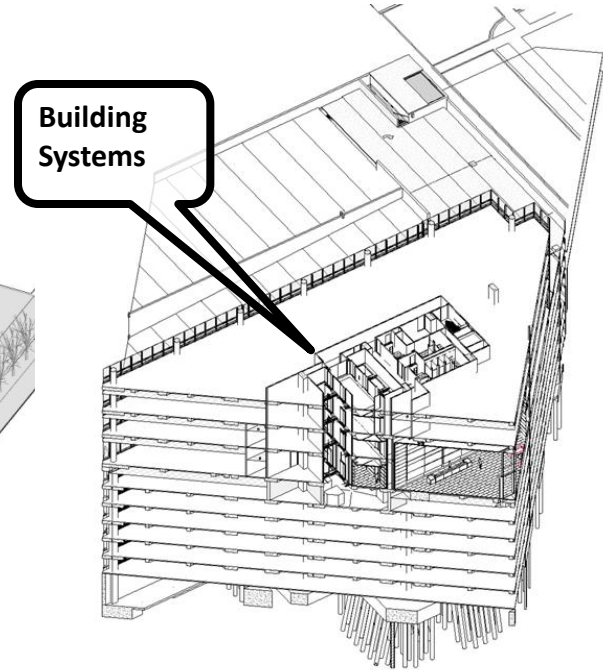


Design

*Building
systems*



Whole Model



Section thru Lobby and
Core

Design

*Space &
components*



Build

Build

*Who's doing
what?*

Program managers, architects and engineers are advancing BIM usage and proficiency in anticipation of owner requirements

GCs & subs are increasingly using BIM during all construction phases

- 4D, 5D, 6D
- Owners are developing BIM graphics and information requirements for operations and maintenance



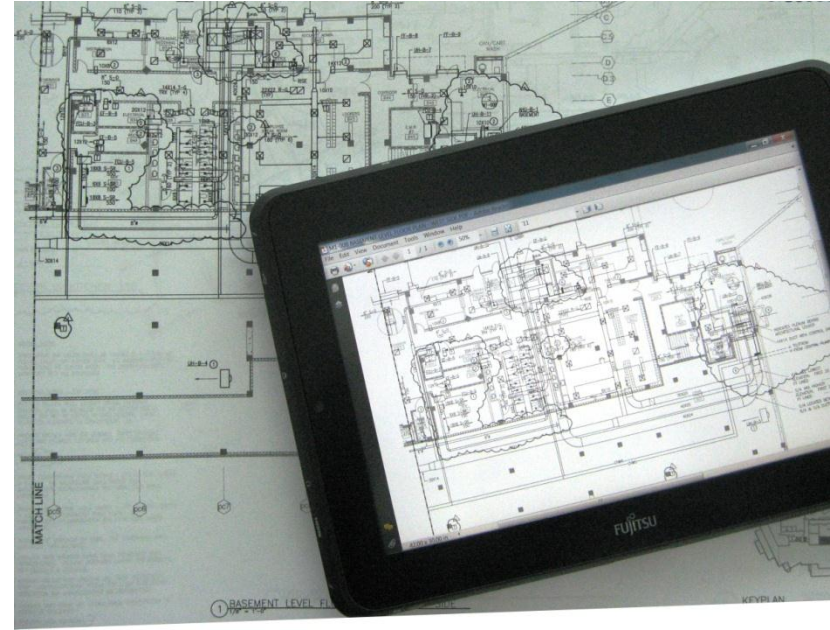
Build

Bringing the data together

Digital Document Sets allow all project team members to easily access project information

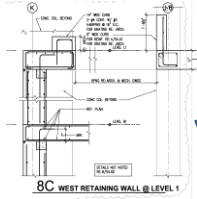
Hyperlinked PDF drawings sets, used on the jobsite for coordination, are updated with layers of information as the project progresses

This same data set is then passed to the owner for continued use and reference for operations.



Build

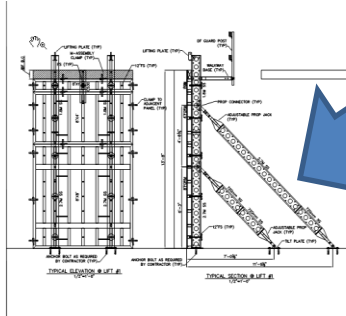
BIM in the field



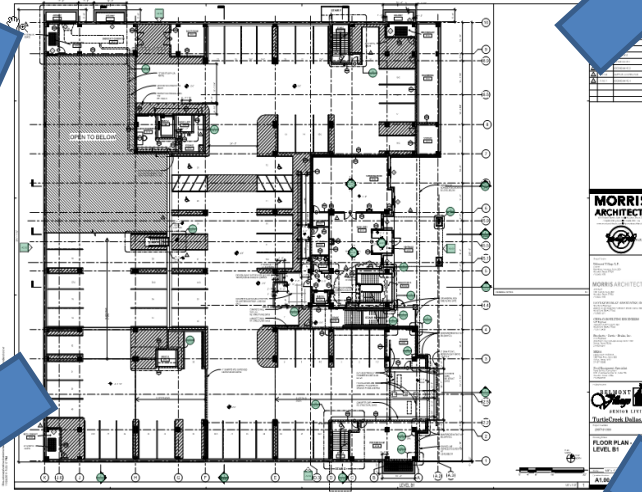
Details



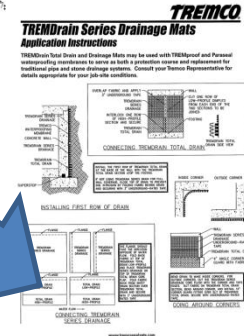
Pictures & Videos



Shop Drawings



Floor Plans

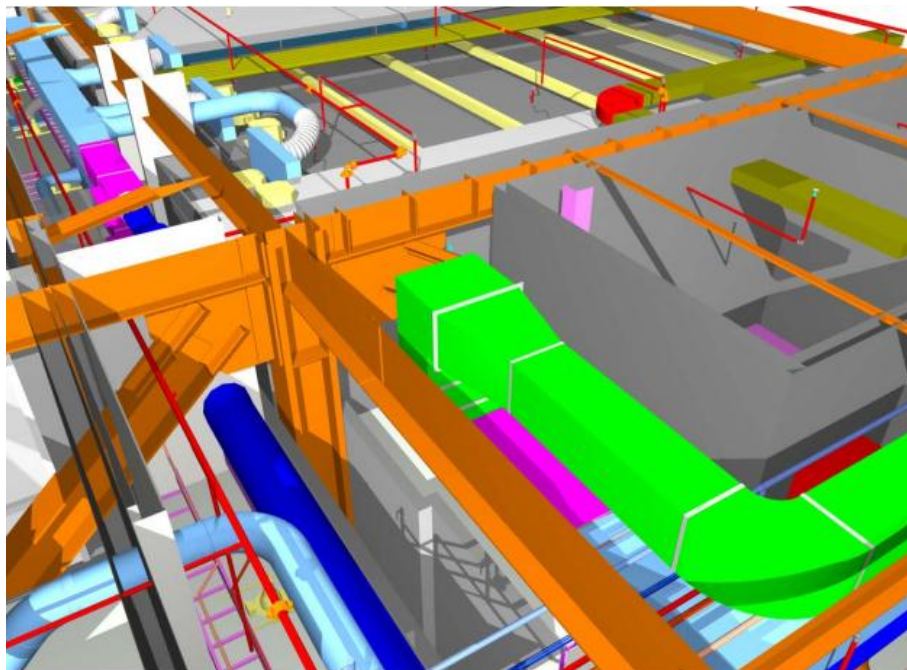
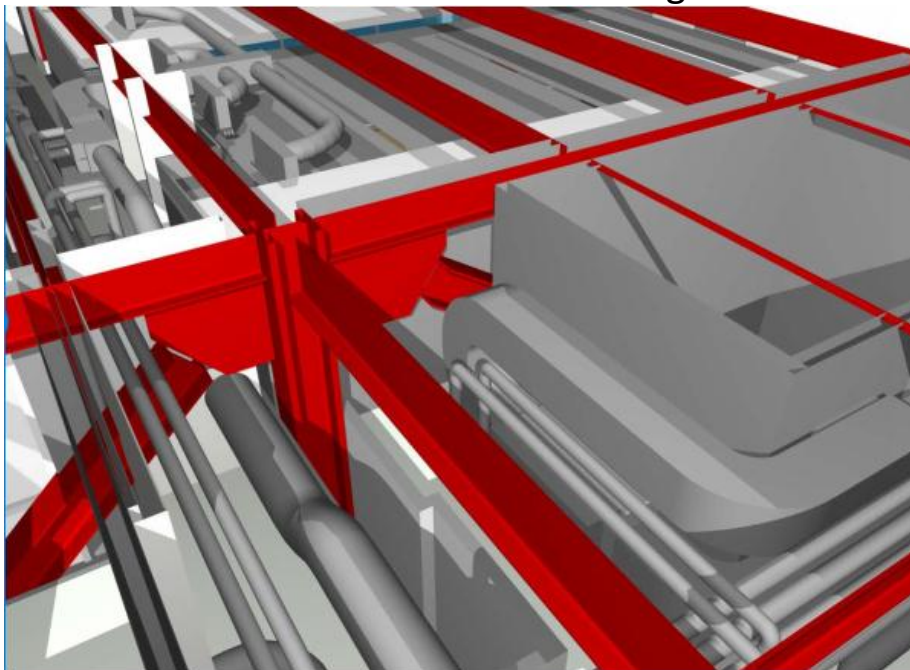


As-Built Information

Build

BIM
Coordination

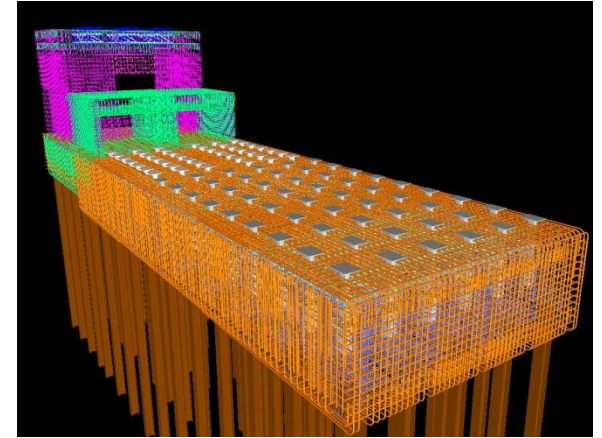
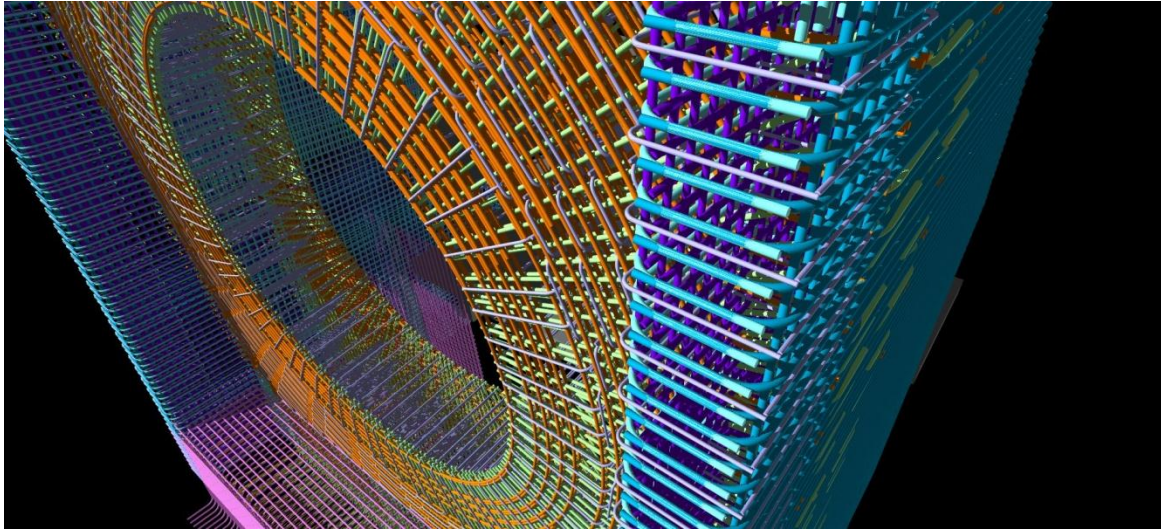
design models → to → construction models



Build

BIM Coordination

Constructability models allow the entire project team to analyze, visualize, and understand complex construction driven by specific programmatic needs of the owner.



Build

Laser Scanning

Laser Scanning for Existing Conditions

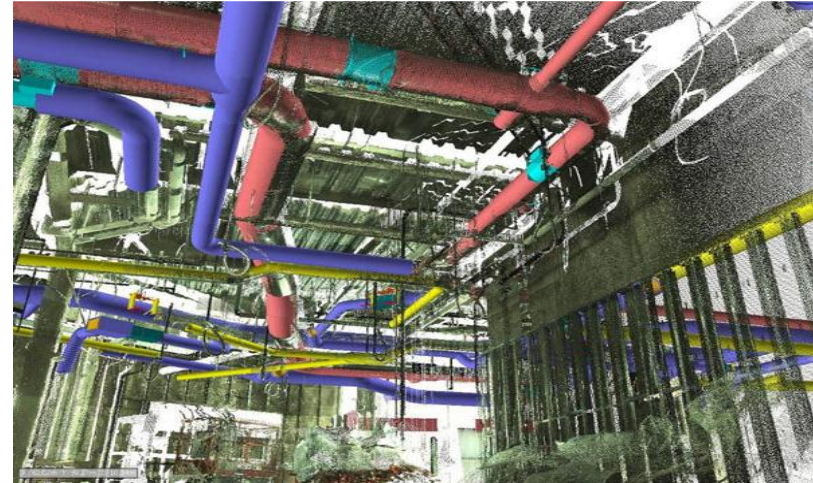
As-Built Coordination

- Defines existing conditions to $< 1/256$
- Accurate, low cost, and complete as-builts
- Reduce costly “return visits” to the site
- Topographic analysis
- Rapid 3D model creation

Scan To BIM

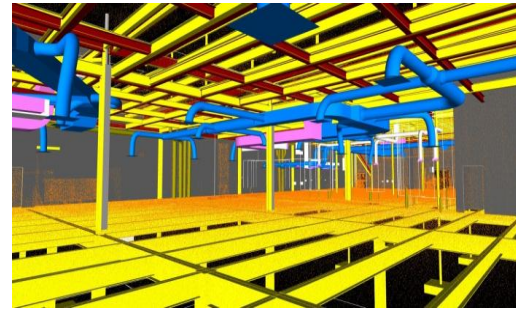
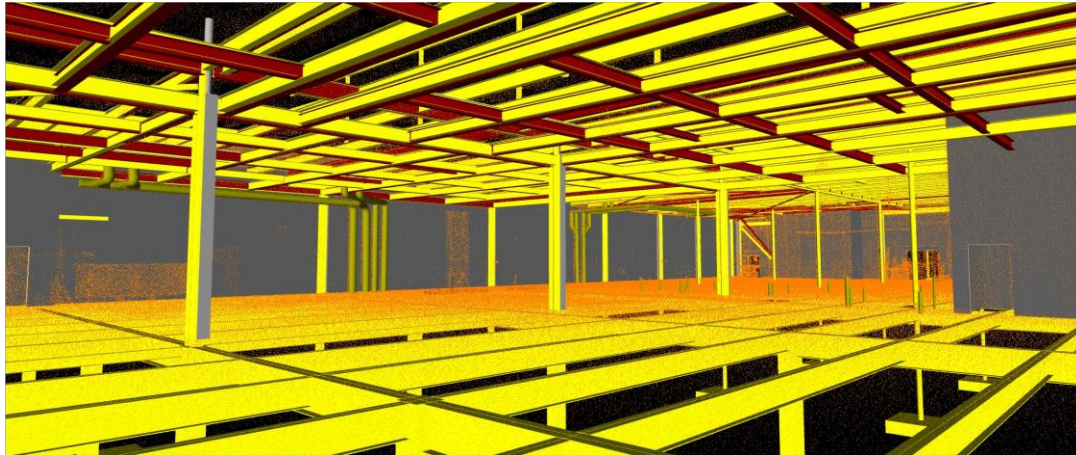
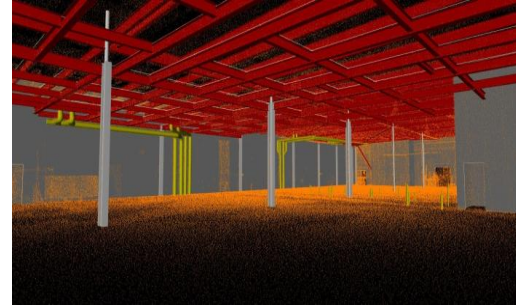
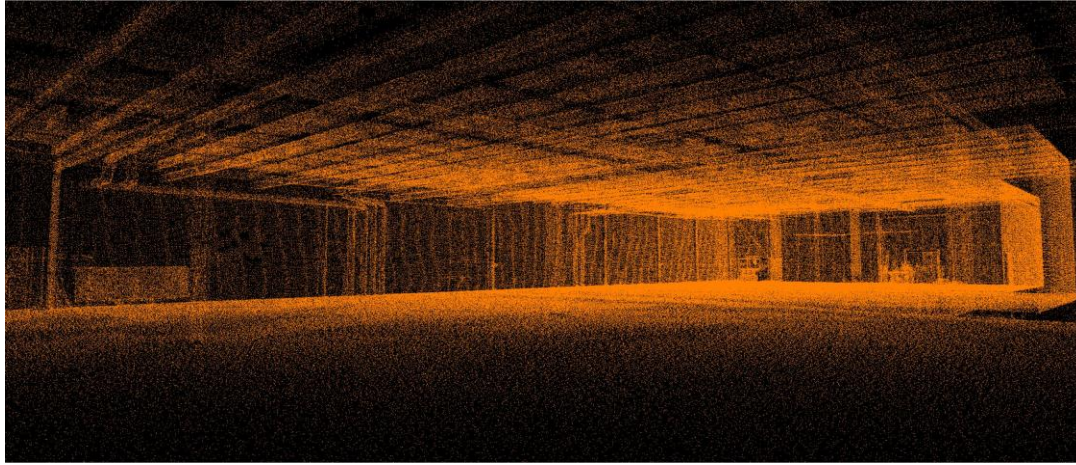
Detects and creates:

- Wall surfaces
- Pipe runs
- Topo surfaces
- Floor flatness



Build

Laser scanning



Build

Hyperlinked PDF Documents

+

Coordination Models

+

Submittal Documents

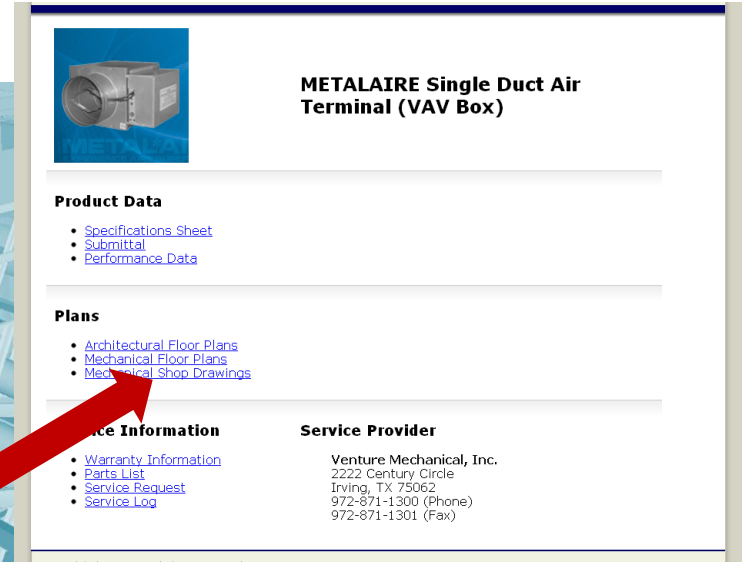
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Web Interface

=

Robust FM tool for Facility Managers

FM tools



METALAIR Single Duct Air Terminal (VAV Box)

Product Data

- [Specifications Sheet](#)
- [Submittal](#)
- [Performance Data](#)

Plans

- [Architectural Floor Plans](#)
- [Mechanical Floor Plans](#)
- [Mechanical Shop Drawings](#)

Service Information

- [Warranty Information](#)
- [Parts List](#)
- [Service Request](#)
- [Service Log](#)

Service Provider

Venture Mechanical, Inc.
2222 Century Circle
Irving, TX 75062
972-871-1300 (Phone)
972-871-1301 (Fax)



Operate

Operate

Preparing BIM Model

Required BIM

Defining Requirements for BIM Object

Defining Requirements for Documentation

Scheduling Quality Control Actions

Mapping BIM Data with FM Data Structure

Exporting and Importing Data

Owner BIM Implementation Plan

Owner BIM/ O&M Requirements (RFP)

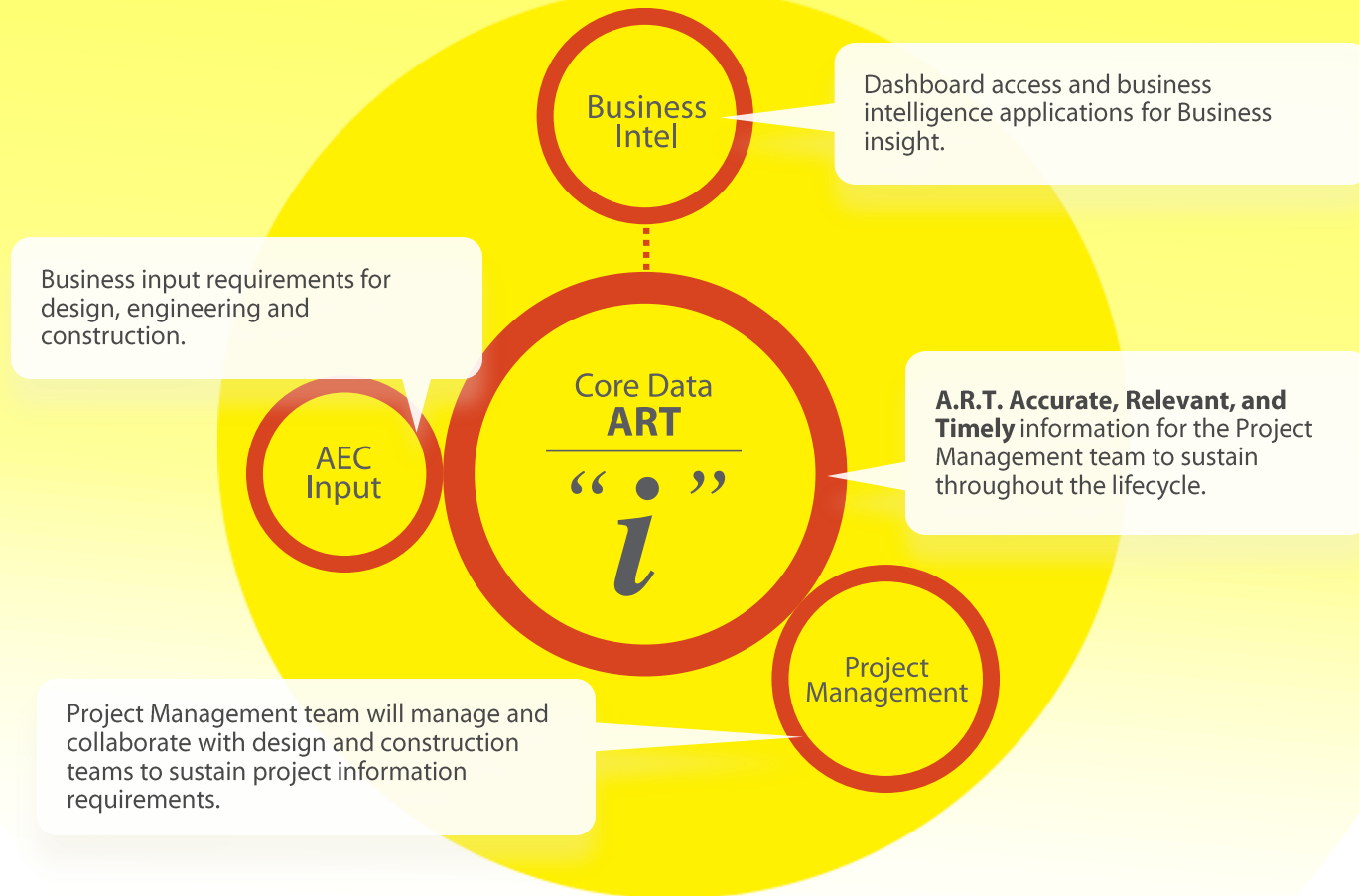
BIM Execution Planning

New
Construction

Existing
Buildings

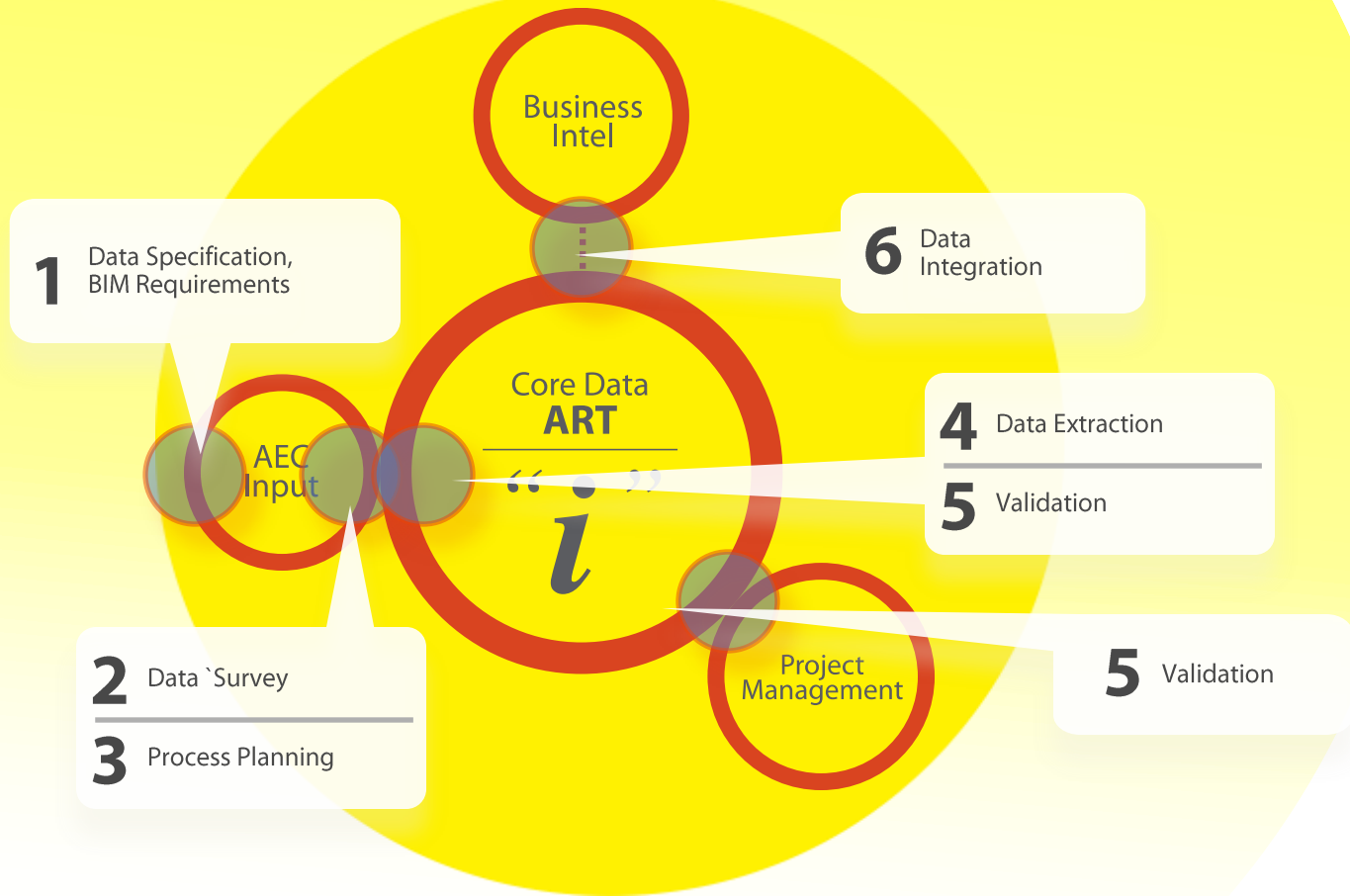
Operate

*Integrated
model state*



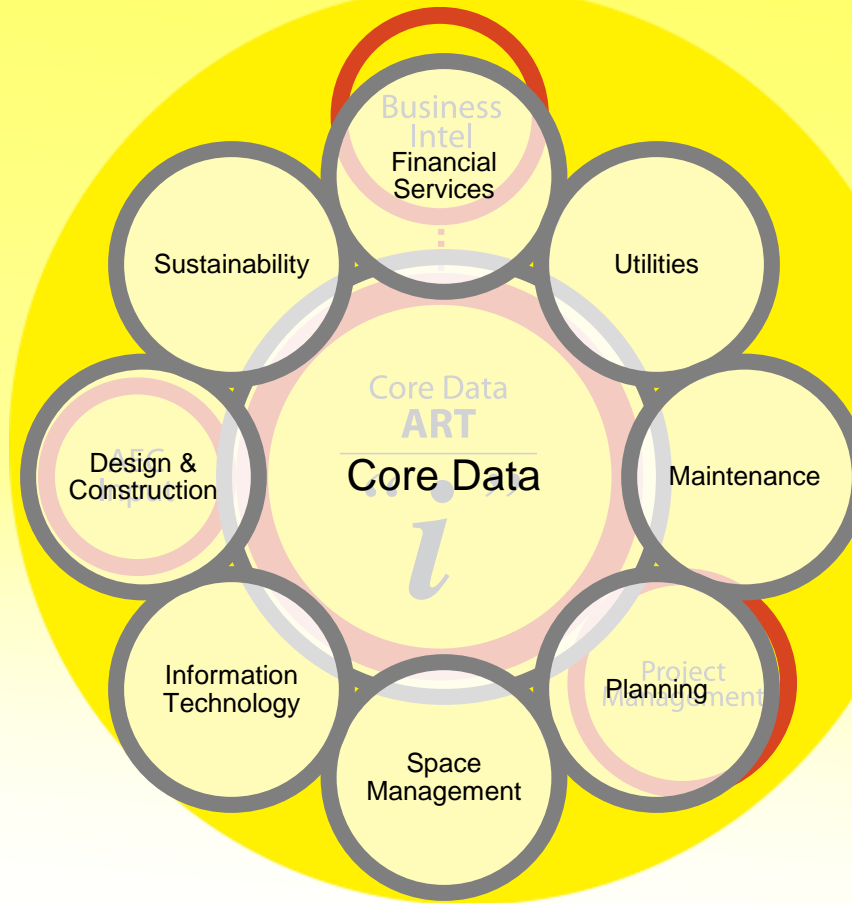
Operate

Owner as BIM
consumer



Operate

*Accurate,
relevant &
timely*



BIM files

- Native BIMs
- IFC, DWG, DXF, etc.
- Laser scans

Other project information

- COBie files
- Environmental criteria
- Energy model reports
- Cost/ quantity reports
- Warranties
- O&M manuals
- Spare parts list
- Preventative maintenance schedule
- Digitized drawings
- Other relevant documents

Q&A