



Challenges for Owners and Operators

- Long lead time populating MM systems with required data for O&M (asset creation)
- Loss of connection to 'as built' data once MM system is populated and operationalized – no ability to support 'as maintain' model (asset reconciliation)
- Lack of visualization in MM tools/workflows – limits ability to fully understand problem and efficiently service work order requests (asset visualization)
 - Recognize 80+% of total building cost occurs during O&M phase of the building lifecycle
 - Under pressure to optimize building portfolios, given economic downturn
 - Seeking greater efficiencies in O&M – lower operating costs, reduced energy usage, improved workflows
 - Seeking full lifecycle management approach and solutions
 - Dynamic Data Management, Integrate Bim and GIS etc

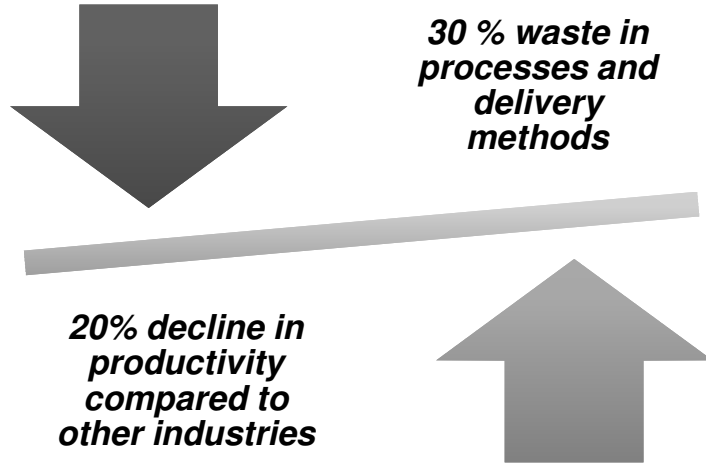
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HK Building Industry

- Key Factors
- **Recovered** Construction Economy contributes 6% of overall GDP (USD141.16Mil)
 - Property index growing at 20% YoY
 - Construction Cost
 - 35% Material 45% Labour 20% overheads and profits (For Building project labor cost is 30%)
- Directly engages \approx **2.1% of Total Workforce of total 3.7 mil**
 - Enhance Access into the mainland- 10 major project
 - Inflation-MTR's South Island Line to cost 55% more

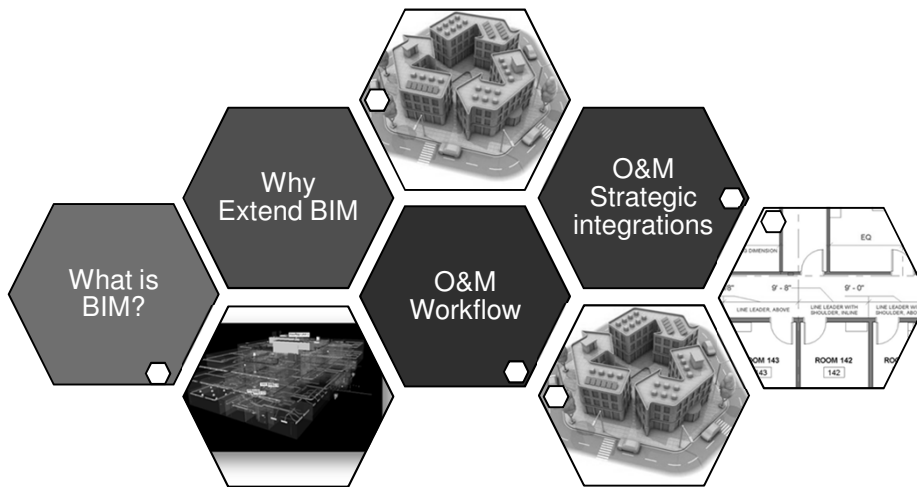
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Bottom-line



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Agenda



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What is BIM?

WHAT IS BIM?

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BIM...A Retrospective

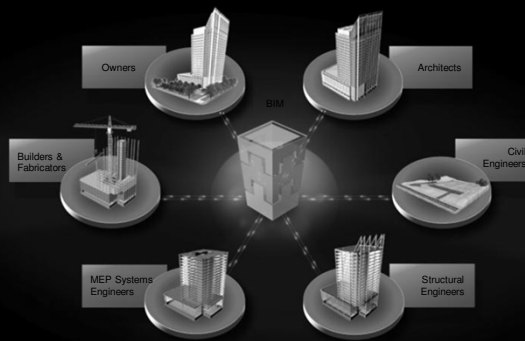


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What is building information modeling

An integrated process

- Allows professionals to explore a project's key physical and functional characteristics
- Coordinated, consistent information is used to:
 - *Design*
 - *Visualize, Simulate, & Analyze*
 - *Document*
 - *Deliver*



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Broader BIM Concept



Building Information Modeling



Virtual Design & Construction



Infrastructure Modeling



2D to 3D & 4D/5D



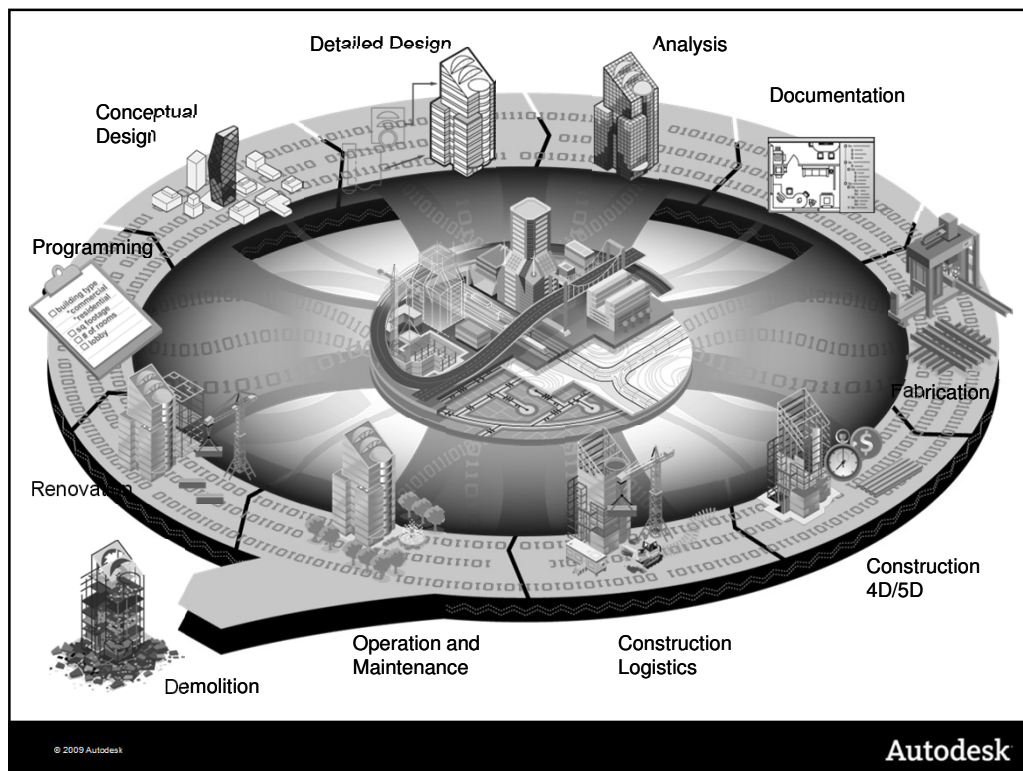
Model Based Design

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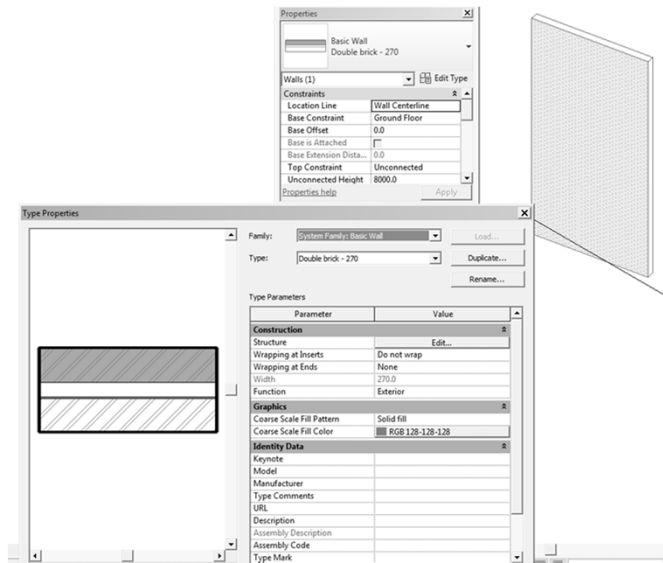
Building Information Model

- **Virtual Prototype** of the building
- **Computable representation** of physical and functional characteristics
- A **repository of information** for the developer, designer, constructor, facility operator and end user throughout its **life-cycle**

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Parametric Objects

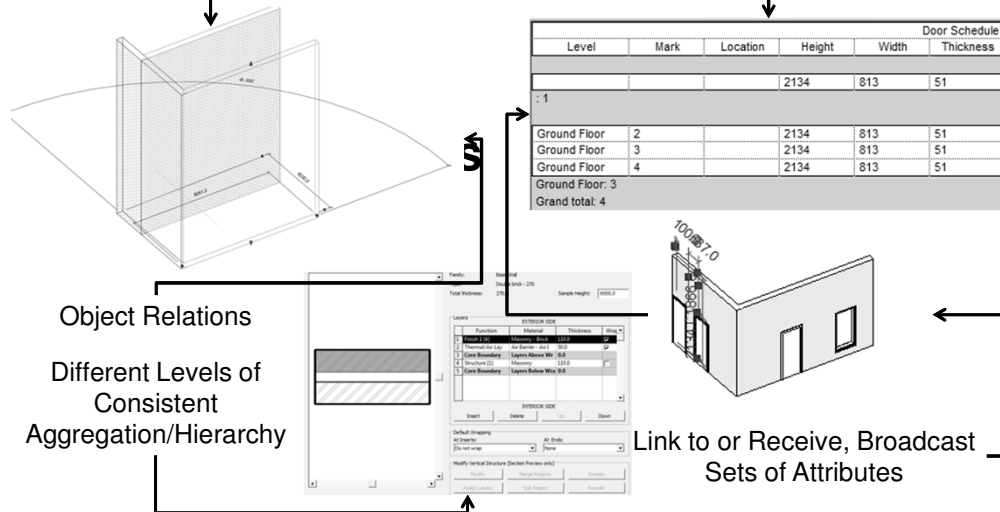


Building Element
= Properties (P)
+ Behaviour (B)

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Parametric Objects

Geometric Definitions and Associated Rules



Object Relations

Different Levels of Consistent Aggregation/Hierarchy

Link to or Receive, Broadcast Sets of Attributes

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BIM—Collection of BEMs

The screenshot displays a software interface with three main toolbars:

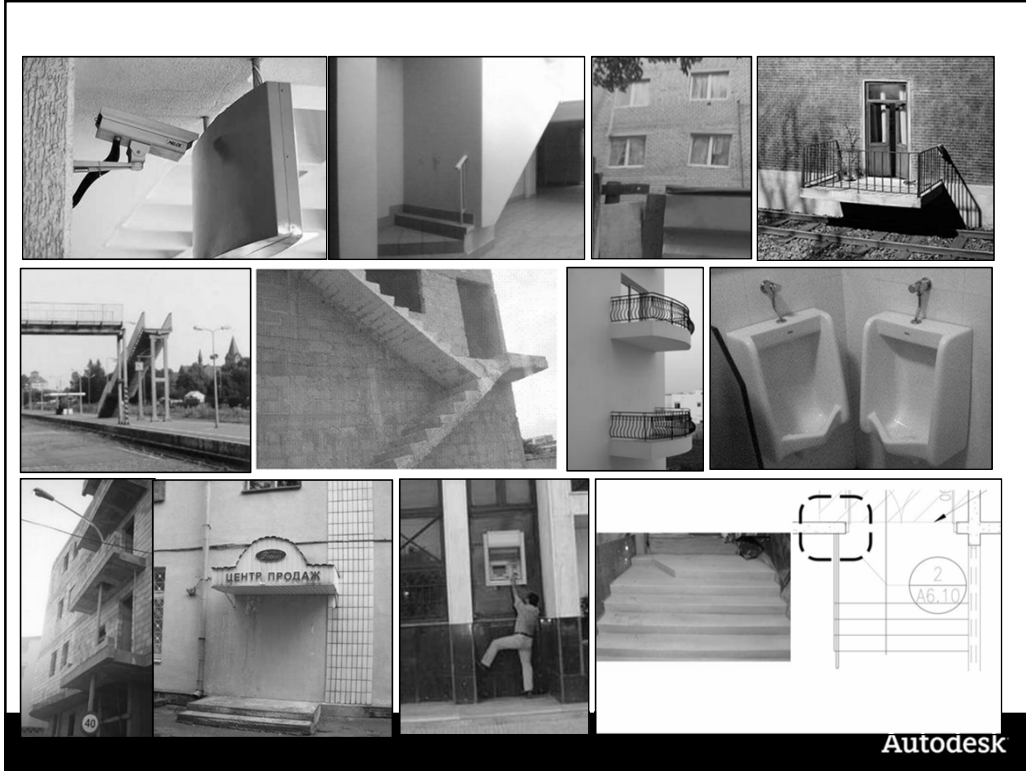
- Architectural:** Includes icons for Wall, Door, Window, Component, Column, Roof, Ceiling, Floor, Curtain System, Curtain Grid, and Mullion. A 'Build' button is located below these icons.
- Structural:** Includes icons for Beam, Wall, Column, Floor, Truss, Brace, Beam System, Isolated Wall, and Slab. It is divided into 'Structure' and 'Foundation' sub-sections.
- Mechanical Electrical Plumbing (MEP):** Includes icons for HVAC (Duct, Duct Fitting, Duct Accessory, Convert to Flex Duct, Flex Duct, Air Terminal), Mechanical (Mechanical Equipment), Plumbing & Piping (Pipe, Pipe Fitting, Pipe Accessory, Flex Pipe, Plumbing Fixture, Sprinkler), Wire, Electrical (Cable Tray, Conduit Tray, Cable Tray Fitting, Conduit Fitting, Electrical Equipment, Device, Lighting Fixture).

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Demo

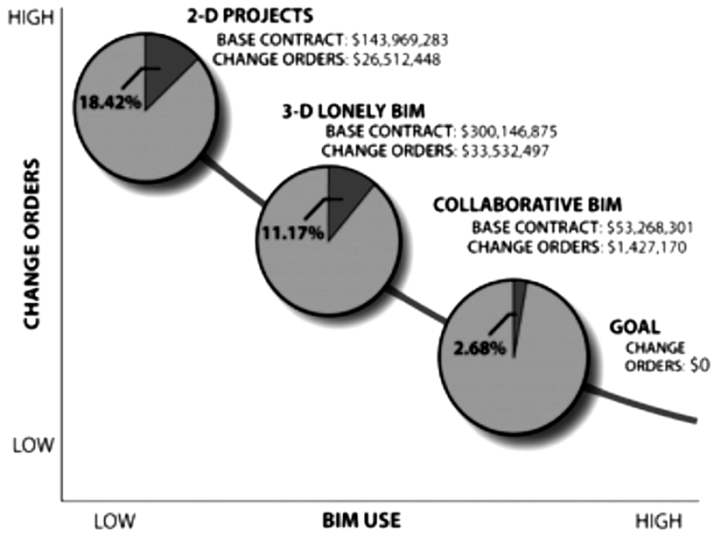
This section is a large, empty rectangular area, likely reserved for a video demonstration or a detailed screenshot of the software's capabilities.

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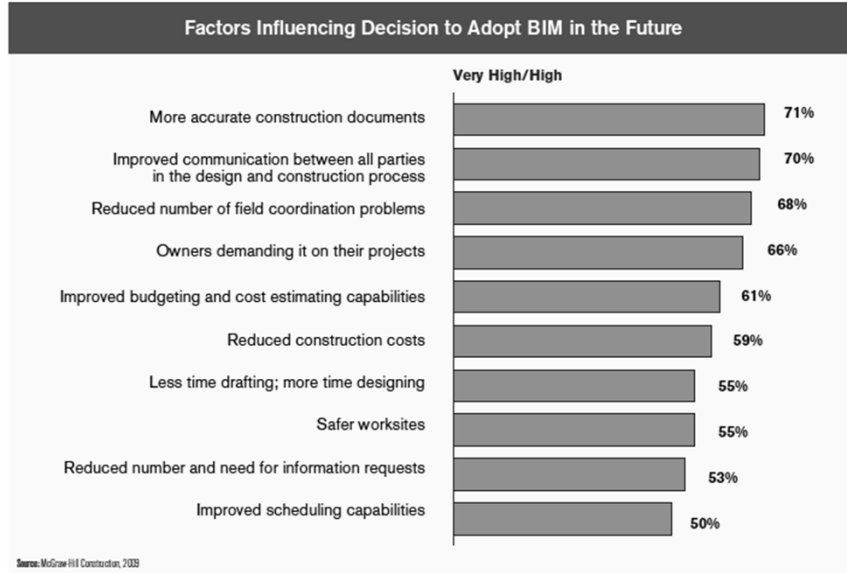
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Recent Reports



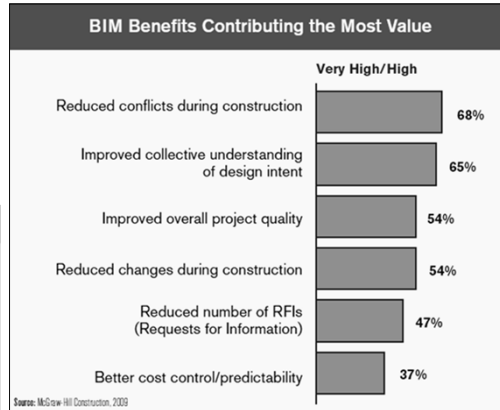
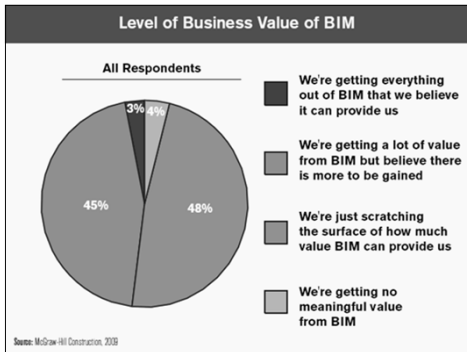
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U.S. BIM Adoption



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What are the Benefits?



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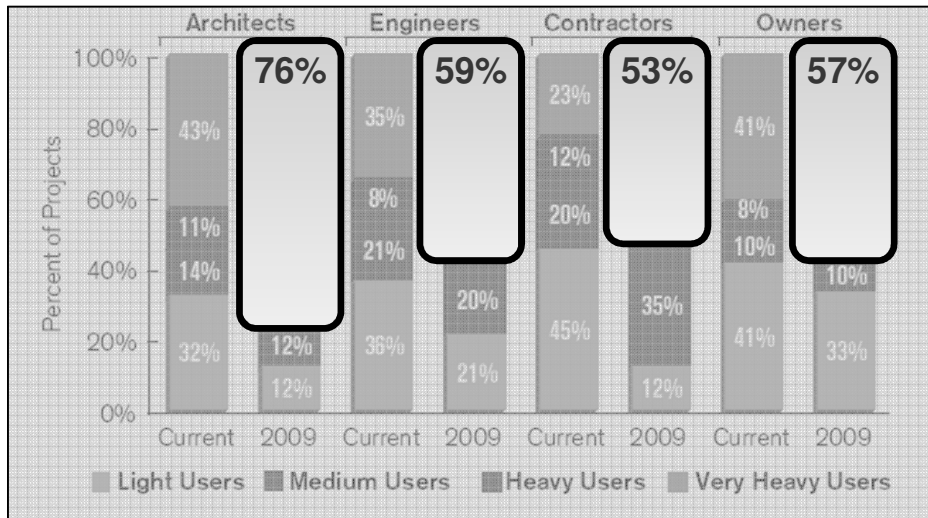
United States



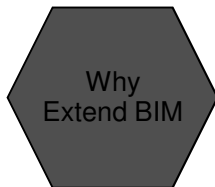
Courtyard scene at the NASA Sustainability Base. Image courtesy of AECOM and William McDonough + Partners.

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Percent of Current & Future Projects Involving BIM



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WHY EXTEND BIM

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Autodesk Building Owner Strategy

Expand the reach of BIM in the Owner segment in order to support full building lifecycle management

Approach:

- *Continue to drive our existing business opportunity with Owners*
- *Develop Operations & Maintenance opportunity*
- *Drive Owners to mandate BIM to their AEC ecosystems (Designed-In)*

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Capital Program Management (CPM)

CPM Defined

- New construction, renovation and retrofit projects and activities for building Owners



What is used in CPM

- **Design Solutions**
 - Revit, AutoCAD, 3DS Max Design
- **Building Performance Analysis Solutions**
 - Revit and Green Building Studio
- **Collaboration, Data Management, Project Management**
 - Buzzsaw, Vault, Navisworks, Constructware

Solutions used by

- **Owner-staffed** Design and Construction Professionals, Project Managers
- Ecosystem of Design and Construction professionals that support Owner

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Existing Owner Customers – Illustrative

<p>Healthcare</p>	<p>Education</p>
<p>Retail</p>	<p>Hospitality</p>

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Owner Customer Education: Rutgers University

Profile

- Seven Campuses
- \$2.8 Billion Real Estate Portfolio



Design and Construction Activities

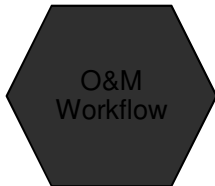
- New construction, Renovation and Retrofit
- Use Buzzsaw to manage project information for projects ranging from \$100 MM to \$10K



O&M Activities

- Maintenance and Facility Management, Energy Performance Management

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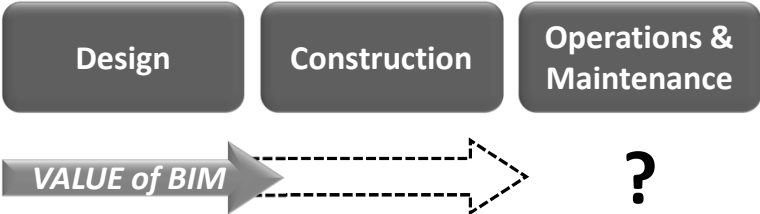


O&M WORKFLOW

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O&M Workflow

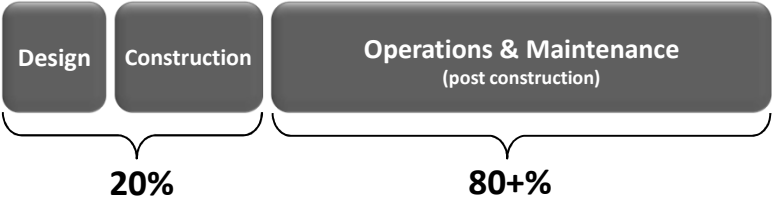
Building Lifecycle Management



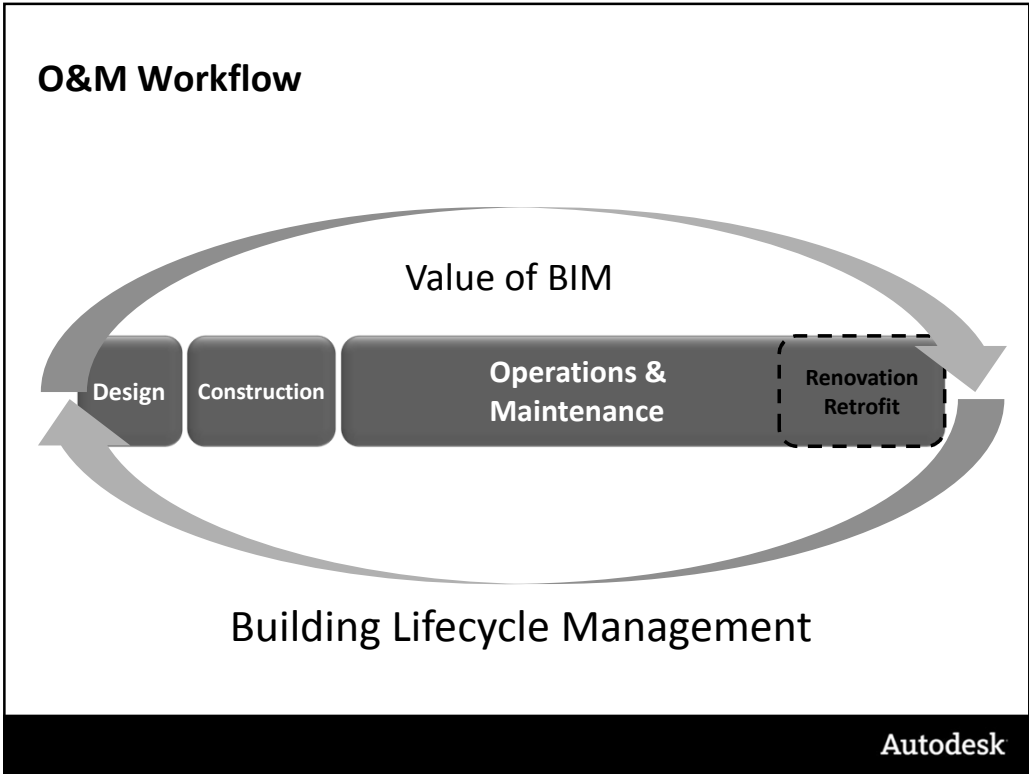
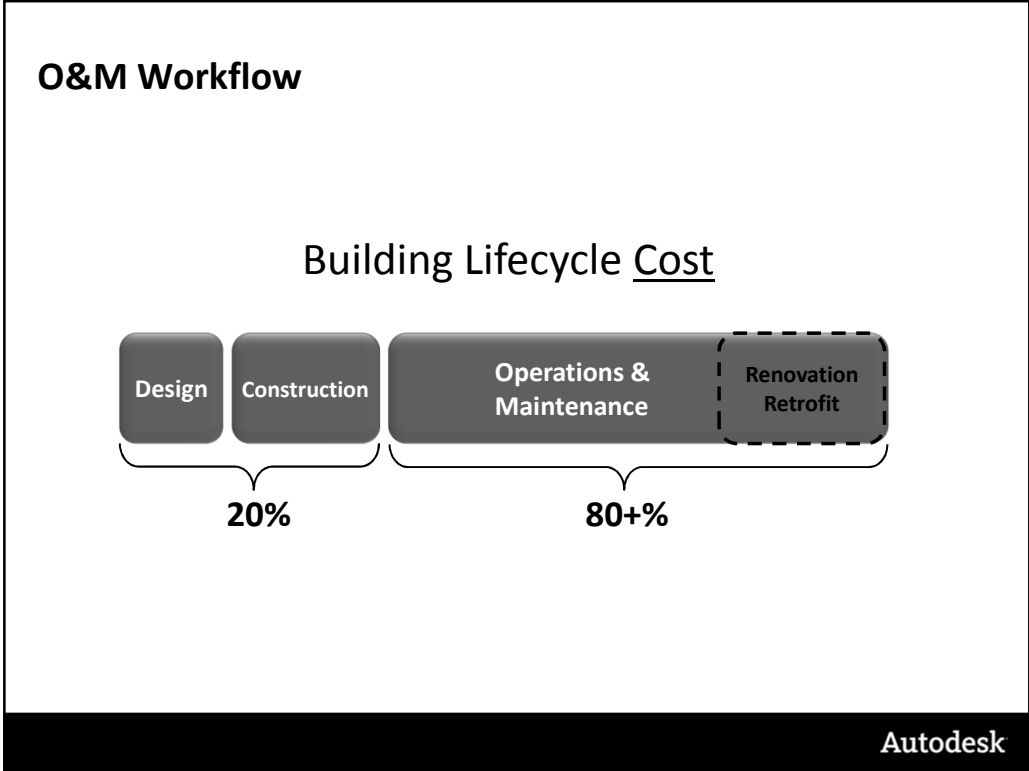
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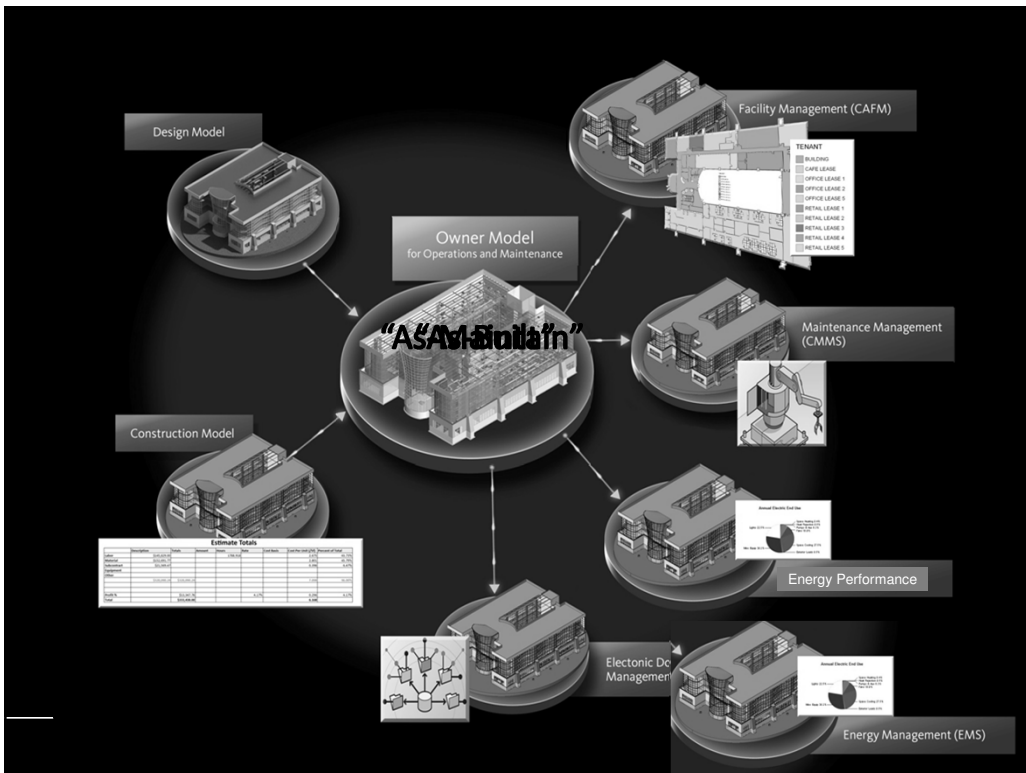
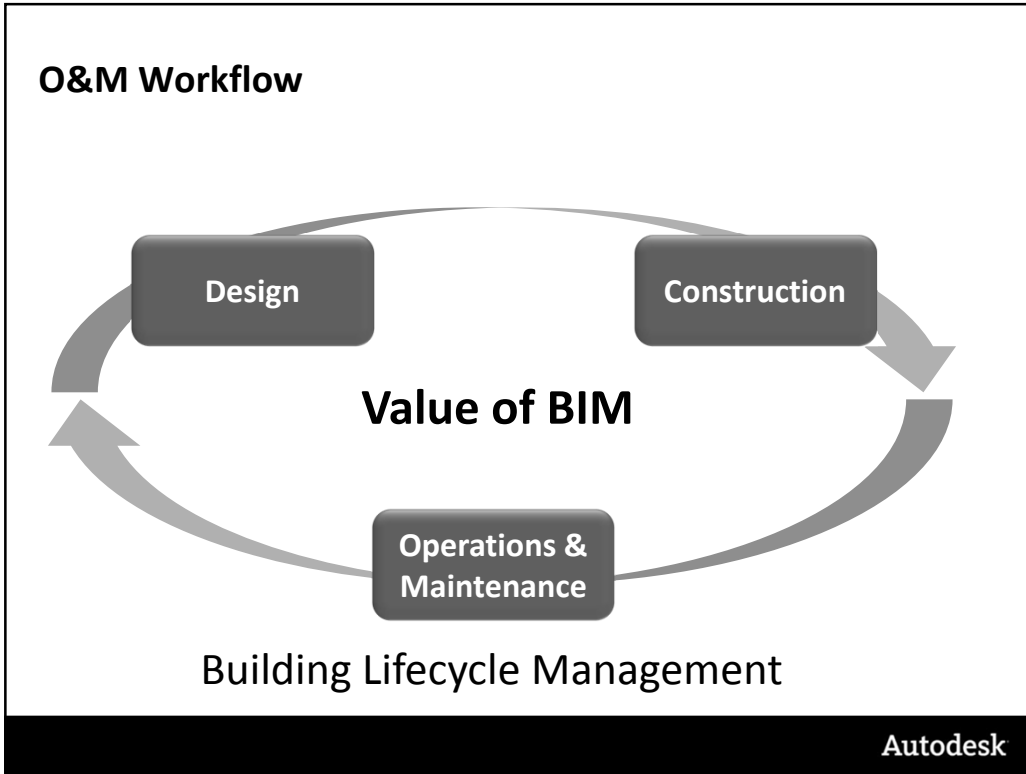
O&M Workflow

Building Lifecycle Cost

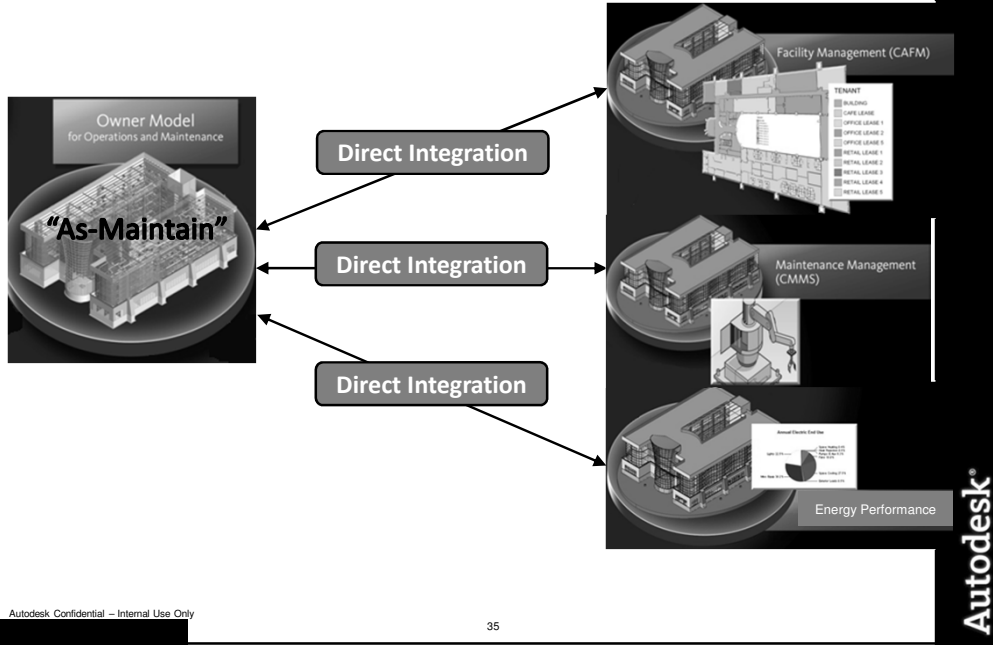


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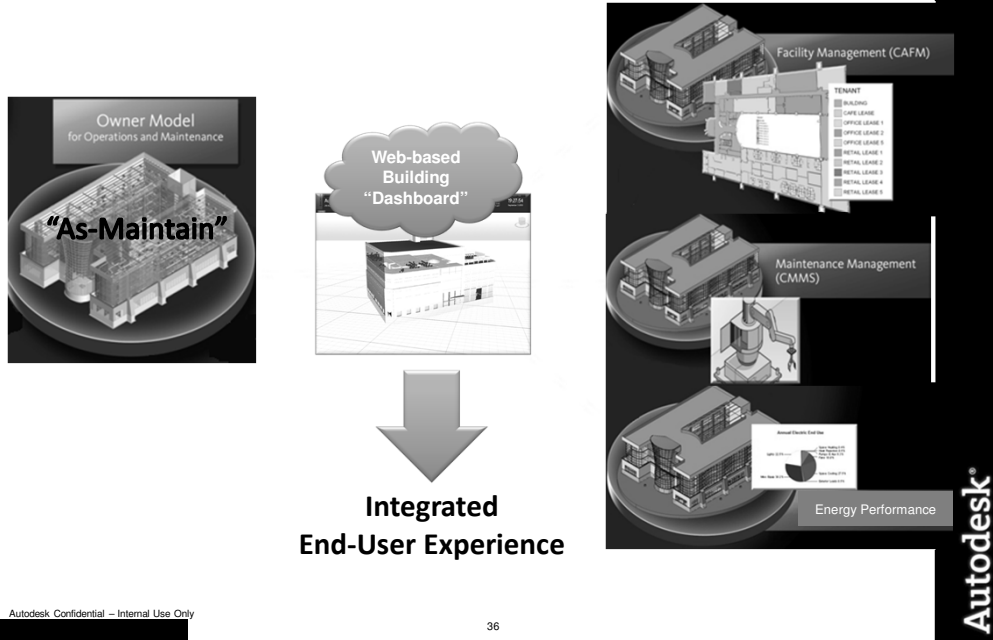




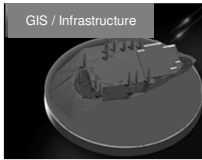
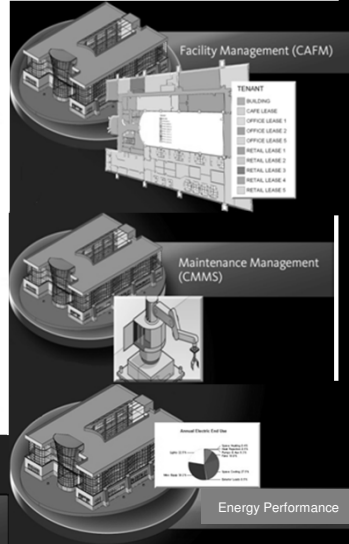
O&M Near-Term Vision



O&M Longer-Term Vision

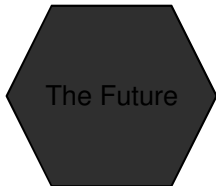


O&M Longer-Term Vision



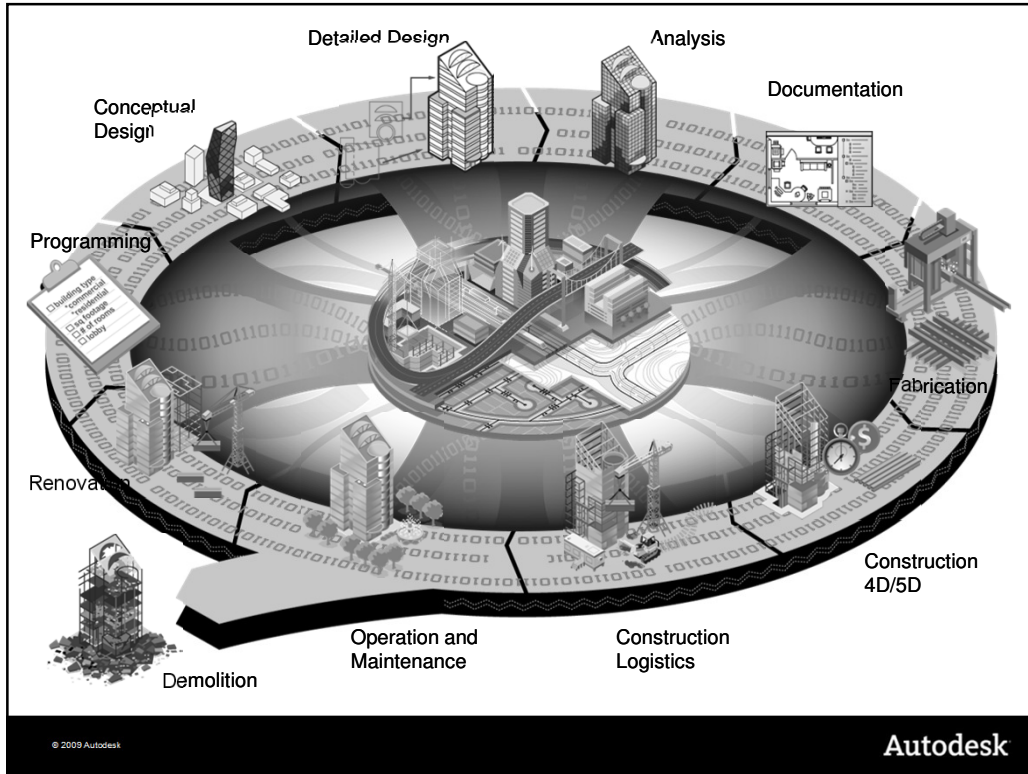
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LOOKING TO THE FUTURE

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Looking to the future

Building and Construction Authority

We shape a safe, high quality, sustainable and friendly built environment.

Singapore Government
Integrity • Service • Excellence

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Construction Productivity and Capability Fund (CPCF)

Introduction

The Building and Construction Authority (BCA) has introduced a S\$250-million Construction Productivity and Capability Fund (CPCF) as part of the Governments efforts to help the construction industry improve productivity and strengthen its capability.

The Fund comprises incentive schemes that focus on workforce development, technology adoption and capability development in Singapores built environment.

Workforce Development

- [BCA-Industry Built Environment Scholarship Scheme](#)
- [Workforce Training & Upgrading](#)

Technology Adoption

- [Building Information Model \(BIM\) Fund](#)
- [Mechanisation Credit \(MechC\)](#)
- [Productivity Improvement Projects \(PIP\)](#)

Capability Development

- [Construction Engineering Capability Development](#)

Request for Proposal (RFP) is closed. Guidelines and application forms are for reference only.

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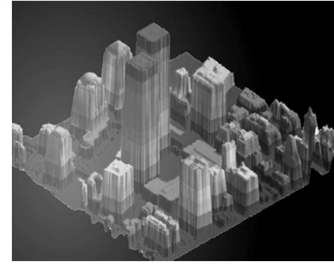
Looking to the future



Modeling



Cloud



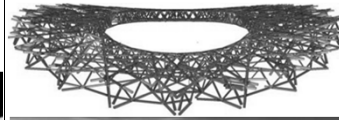
Simulation



Collaboration



Analog → Digital



Digital → Analog

Thank you