BIM Bam Boom—Getting the Most from Your BIM Data

Guy Penfold
Sr. BIM Technical Consultant – Autodesk Inc.
MEP (mechanical, electrical, and plumbing) services are often considered by most in the construction industry to be a means to an end, restricting architectural and structural creativity. MEP services, however, are the lifeblood of a building and are fundamentally the main source of pain for facility managers. This class will focus on managing MEP data propagation from design concept through to facilities management, identifying the importance of MEP systems completion and appropriate assignment right through to addition of data to components at the various phases of the Building Information Modeling (BIM) delivery. This class will capitalize on an array of Autodesk, Inc., technologies, including Revit software, Navisworks Manage software, and BIM 360 software. For anyone involved in the MEP and construction industries, this class is a must as an aid in understanding the end goals for model handover and also the benefits to each project stakeholder at each BIM delivery phase.
Class Ground rules

- Please turn your cell phones to silent
- Interaction is encouraged during this class
- Some of the topics and opinions discussed may not agree with your own
- I will be asking questions during the session, completely unrelated to the topic.
Based in Sydney Australia
Senior BIM Technical Consultant - Autodesk
24 years experience in the MEP Industry
Strong background in HVAC design
Held CAD and BIM roles with a variety of firms
Accredited Autodesk Integration Consultant
BIM 360 Glue, field, APL and Ops Implementer
Experienced Revit and Navisworks trainer and implementer
Key learning objectives

At the end of this class, you will be able to:

- Discover the importance of strategic MEP systems’ creation and management

- Gain insight into Level of Development requirements pertaining to MEP services at each delivery phase

- Discover the tangible benefits to all project stakeholders

- Have an open discussion on pain points for each project stakeholder
Change is important

“If you don’t like something, change it. If you can’t change it, change your attitude”

*Maya Angelo – Author, Poet and civil right evangelist*

“Only the wisest and stupidest of men never change”

*Confucius.*

“When you translate a dream into reality, it's never a full implementation. It is easier to dream than to do”

*Shai Agassi – CEO Better Place*
Change is challenging

You have to understand, most of these people are not ready to be unplugged. And many of them are so insured, so hopelessly dependent on the system, that they will fight to protect it.

- Morpheus
MEP Systems – Strategy & Management
 MEP Systems – Strategy & Management

- Systems Classifications
- System Types
- System Naming Conventions
- Closed MEP Systems and Data
- Equipment Metadata
- Revit Content Requirements
- Revit Template Requirements
MEP Systems – Strategy & Management
System Classifications

- System Classifications drive how systems families behave
- System Classifications are hard coded in Revit
- You can duplicate to create new systems
- Each class has its own calculation options
- Important to duplicate the correct class for each system
# MEP Systems – Strategy & Management

## System Classifications

<table>
<thead>
<tr>
<th>System Classification</th>
<th>All</th>
<th>Flow Only</th>
<th>Volume Only</th>
<th>None</th>
<th>Performance</th>
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<tr>
<td>Supply Air</td>
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<td></td>
<td>✓</td>
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</table>
MEP Systems – Strategy & Management
System Types

- Define System types beyond the generic types.
- I.E. Outside Air, Kitchen Exhaust, Toilet Exhaust etc.
- Associate each type with the correct System Class
- Define the Calculation requirements
- Define a clear naming convention for each type
MEP Systems – Strategy & Management
System Types
MEP Systems – Strategy & Management
System Naming Conventions

- Equipment Identification – i.e. Origin of Duct / Pipe
- Space / Room or Zone Served
- Type of systems – Supply Air, Hydronic Supply etc.
- Service Type for Cable tray networks
- Custom Parameters to expand BIM use opportunities
MEP Systems – Strategy & Management
Revit Templates

- Define required system families
- Configure routing preferences for those that need it
- Configure system family data requirements
- Set-up MEP standards for each services
- Define custom properties if required
MEP Systems – Strategy & Management
Revit Templates - Duct Routing
MEP Systems – Strategy & Management
Revit Templates – Mechanical Settings
MEP Systems – Strategy & Management
Revit Templates – Electrical Settings
MEP Systems – Strategy & Management
Revit Content - Components

- Strict Content creation standards required
- Understand what each connector type does
- Configure the connector for each component based on desire systems connectivity
- Ensure geometry parameters link to connector parameters.
For extensive component types use Catalogue files.

Model geometry in each of the detail levels if necessary
MEP Systems – Strategy & Management
Revit Content - Components
Question: The Australian Coat of Arms has two native animals holding it up, the Red Kangaroo is one, what is the other?
Answer:
The Emu
Question: If someone calls you a ‘galah’, what are they saying about you?
Answers:

a) You are a loud and rude person
b) You are gallant, a real gentleman
c) You are a criminal, headed for the gallows
LOD requirements
LOD requirements

- Many standard guidelines exist around the world
- American Institute of Architects - AIA Document G202™
- Building Information Modelling Guide – GSA
- Building Information Modelling Guidelines - USC
- US Army Core of Engineers
- ANZRZ Revit standards – Australia and New Zealand
- Natspec BIM Guide – Australian Guide
LOD requirements

- What does the designer need / Want?
- What does the construction team need / Want?
- What does the FM and Owner need / Want?
- What process need to change?
- Educate the wider team on benefit to provide value downstream
LOD requirements

- Align BIM Uses to data requirements
- Provide a flexible avenue for metadata propagation
- Consistent unique identification of assets
- Drive BIM data with the end in mind
Define Model Delivery Specifications for each service

Provide detail in the physical requirements

Provide detail on the metadata requirements

Clearly outline inclusion and exclusions in the specs

Expand on the information for each LOD
LOD requirements

LOD 100 – Conceptual Model

- Model Content – Data assigned to massing Elements
- Analysis – Based on Volume, area and orientation. Application of general performance criteria
- Cost Estimating - Based on Volume, area and conceptual estimating techniques
- Sequencing – Overall Phasing
- Documentation – Project scope, floor levels, building forms, staging
LOD requirements
LOD 200 – Approximate Geometry

- Similar to Schematic design or design development
- Analysis – systems performance with applied general criteria to model elements
- Cost Estimating – develop cost estimates based on conceptual estimating techniques.
- Schedule – Ordered, time scaled appearance of major elements and systems.
LOD requirements
LOD 300 – Precise Geometry

- Construction – Suitable for Shop model production
- Analysis – Performance of selected systems. Application of specific performance criteria
- Cost Estimating – develop cost estimates based on specific data provided and conceptual estimating techniques.
- Scheduling – Ordered, time-scaled appearance of detailed elements and systems.
LOD requirements
LOD 400 – Construction

- Construction – Virtual representation of proposed elements are suitable for construction.

- Analysis – Performance of approved selected systems. Application of specific performance criteria.

- Cost Estimating – Costs are based on actual cost of specific elements at buyout.

- Scheduling – Ordered, time-scaled appearance of detailed specific elements and systems including construction means and methods.
LOD requirements
LOD 500 – FM and Management Model

- Operational use and facilities management
- As-Built Record Model representation of built project for FM purposes
LOD Delivery Workflow

Project Lifecycle Model Development

TIME

Start

LOD 100 Conceptual Design
- Overall Building Design
- Approx. Geometry Schematics

LOD 200 Schematic Design / Design Development
- Generalised Systems Including approx. quantities, size, location and orientation

LOD 300 Construction Documentation
- Precise Geometry (Consultants Model)

LOD 400 Construction
- Construction Detail (Sub-Contractors Models, Trade Detail)

LOD 500 As-Built Model
- Central Data Storage and Integration into Building Maintenance and Operations Systems

Pre-construction (Model Management)
- BIM 360 Glue

Construction/Commissioning Data (BIM 360 Field)

FM System (Building Ops)

Model Development for FM*

Changes over Lifecycle
Question: Australia has two egg laying mammals, one is the Echidna. What is the other?
Answer: Platypus
MEP & BIM Data
BIM & MEP Data

- What information is critical to each stake holder?
- At what point do we apply metadata to objects?
- What is the benefit of data over modelled objects?
- Who should be involved in these decisions?
BIM MEP Data

- Allocate a unique ID or Name from Inception
- Maintain unique ID or Name through entire lifecycle
- Define data that provides benefit to the end goals
- Engage with the FM team or owner as soon practical
- Map out metadata requirements for each component
BIM & MEP Data

- Metadata requirement will vary project to project
- Important to outline Location data – e.g. level, unit, room
- Important to outline typical information – e.g. class cost code, trade package.
- Important to define systems names.
BIM & MEP Data

- Leverage the in-built parameters to drive calculations
- Utilise shared parameters to enhance delivery process
Tangible Benefits – MEP Data
Tangible Benefits – MEP Data
Concept Design

- Provide building performance data – weights etc.
- Rough calculations based on load per area
- Equipment sizing
- Rough Cost estimation aligned with model
Tangible Benefits – MEP Data
Detail design

- Performance data – Equipment and systems
- Load calculations & Equipment sizing
- Schedule output
- Parametric tagging etc.
- MEP Cost estimation
Tangible Benefits – MEP Data Construction

- Effective construction management workflow and associated reporting.
- Defect management
- Timely rectification of defects prior to handover
- Zero delay in providing handover information
- Data capture addressing the need of the final Operator
- Data handover at completion provides integration with chosen CAFM system
Tangible Benefits – MEP Data Construction

- Utilise BIM 360 Glue to drive equipment sets
Tangible Benefits – MEP Data Construction

- Construction progress and status tracking utilising field data.
Tangible Benefits – MEP Data Construction

- Data captured in the field
Tangible Benefits – MEP Data Construction

- Data capture in the field
Tangible Benefits – MEP Data Operations

- Construction data available to FM on handover
Question:
A traditional Easter treat in the U.S is a chocolate bunny. What chocolate likeness is popular in Australia?
Answer:
a) Kangaroo
b) Koala
c) Bilby
d) Boomerang
Questions & Discussion