BIM Bam Boom—Getting the Most from Your BIM Data

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Class summary

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.

Presenter

- 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

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 it’s own calculation options
- Important to duplicate the correct class for each system

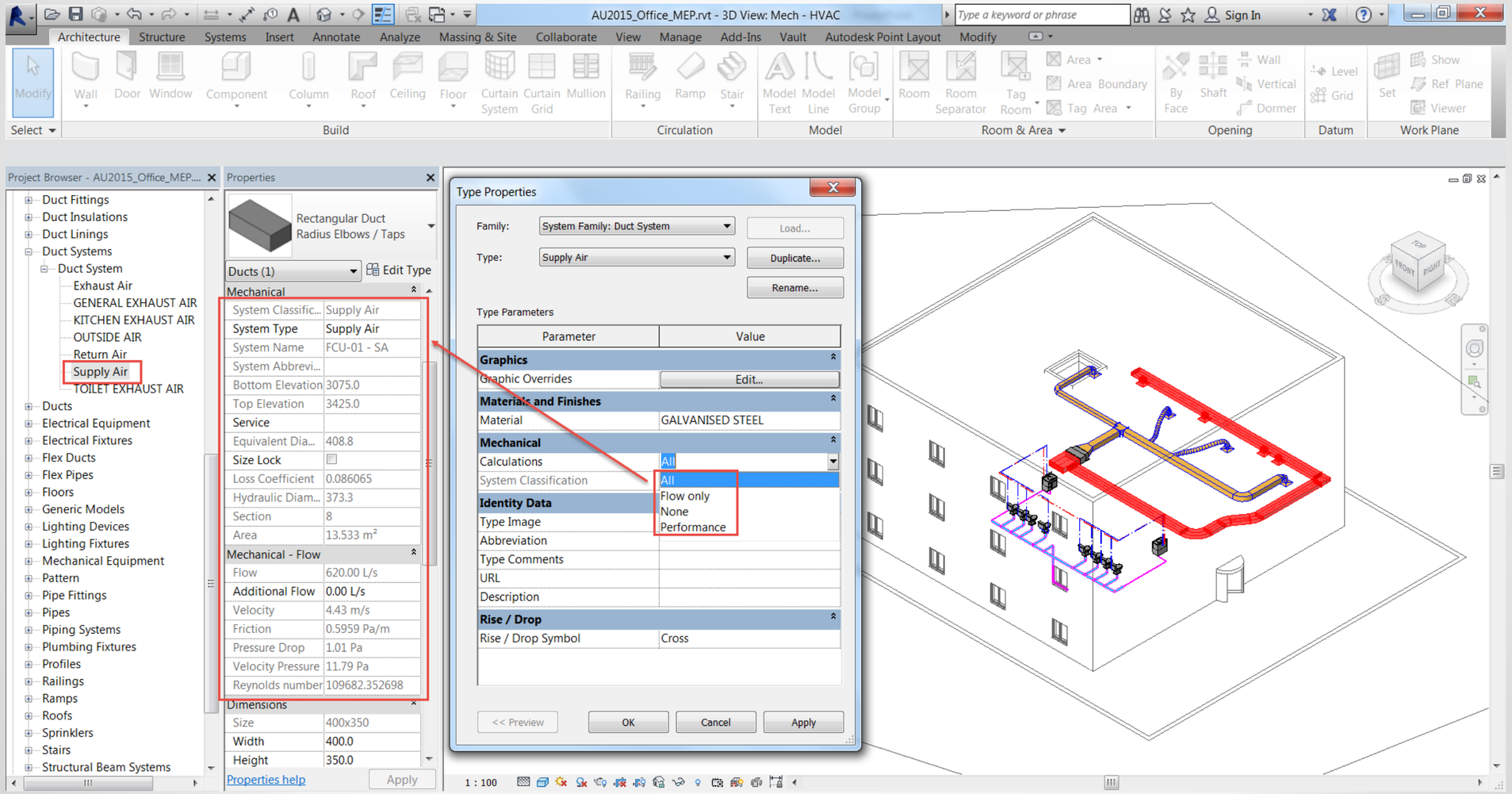
MEP Systems – Strategy & Management System Classifications

	Calculations Setting				
System Classification	All	Flow Only	Volume Only	None	Performance
Supply Air	✔	✔		✔	✔
Return Air	✔	✔		✔	✔
Exhaust Air	✔	✔		✔	✔
Domestic Cold Water	✔	✔		✔	✔
Domestic Hot Water	✔	✔		✔	✔
Hydronic Supply	✔	✔		✔	✔
Hydronic Return	✔	✔		✔	✔
Sanitary		✔		✔	✔
Vent			✔	✔	✔
Other			✔	✔	✔
Fire Protection Wet			✔	✔	✔
Fire Protection Dry			✔	✔	✔
Fire Protection Pre-Action			✔	✔	✔
Fire Protection Other			✔	✔	✔

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



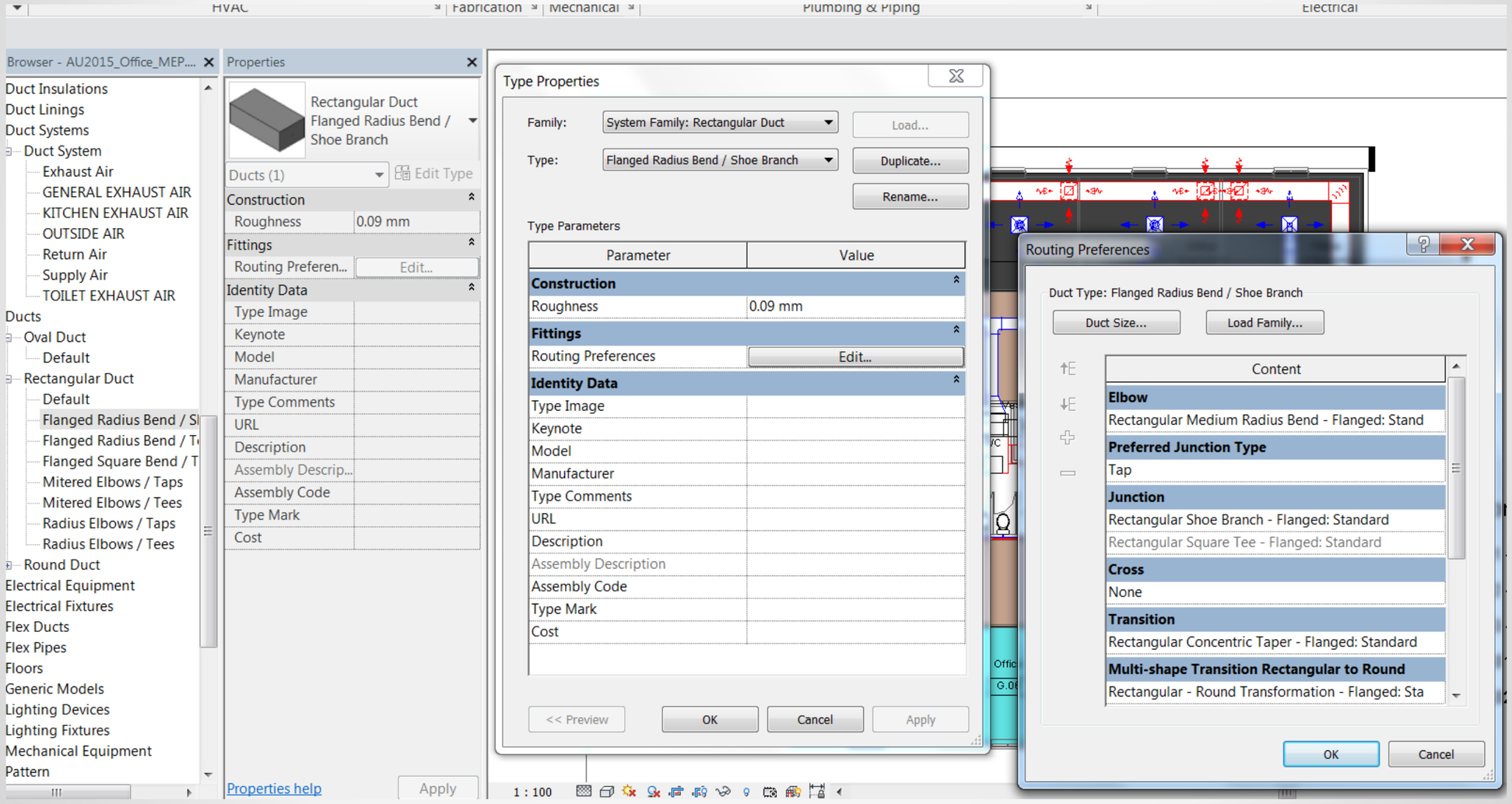
MEP Systems – Strategy & Management
System Naming Conventions

- 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

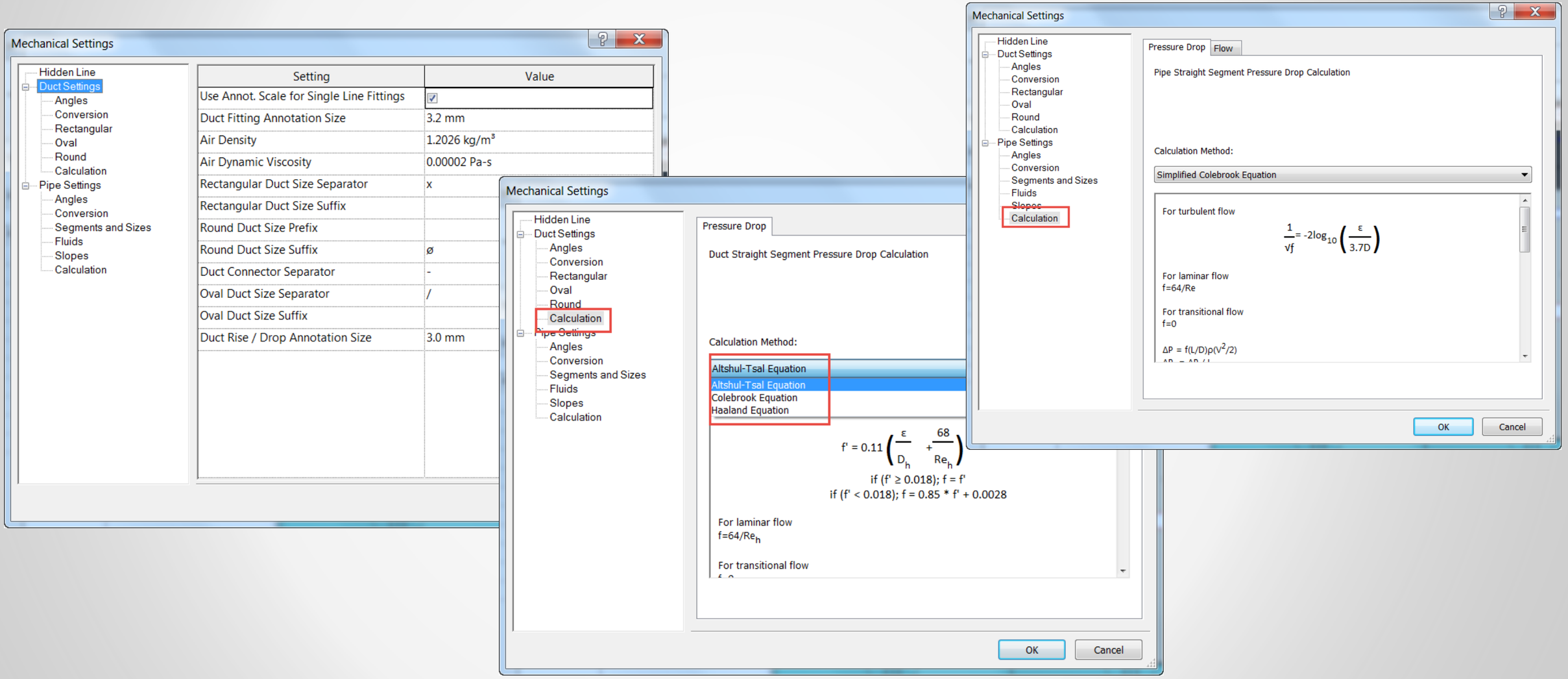
MEP Systems – Strategy & Management
Revit Templates

- 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

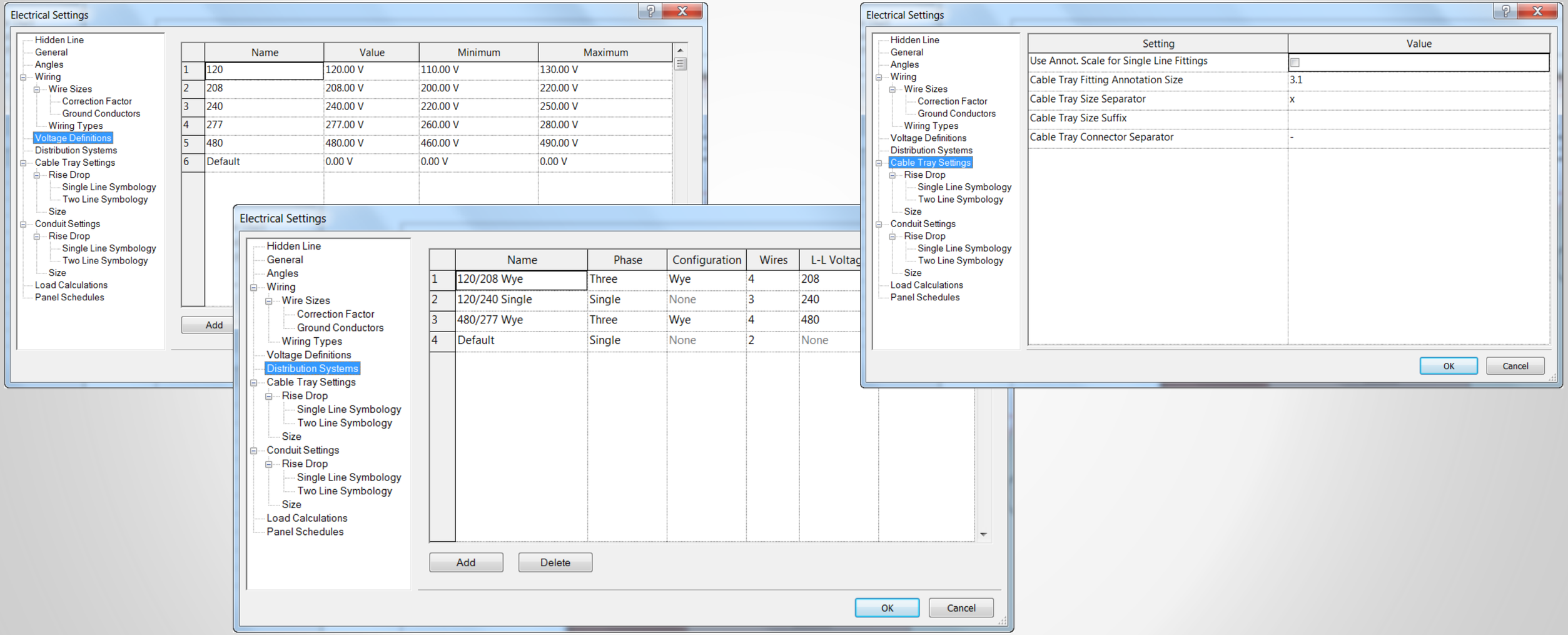
MEP Systems – Strategy & Management
Revit Templates - Duct Routing



MEP Systems – Strategy & Management
Revit Templates – Mechanical Settings



MEP Systems – Strategy & Management
Revit Templates – Electrical Settings



MEP Systems – Strategy & Management
Revit Content - Components

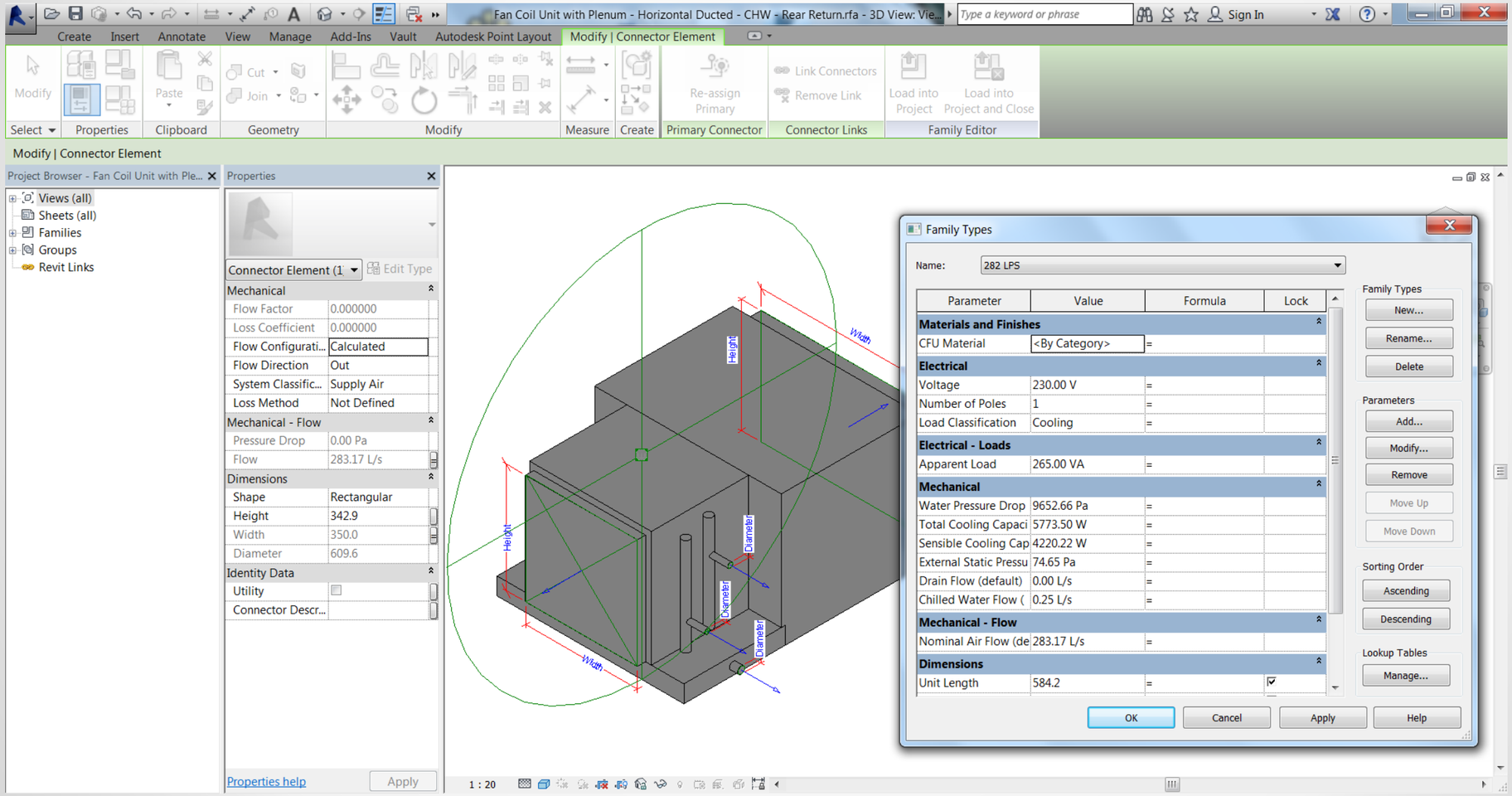
- Strict Content creation standards required
- Understand what each connector type does
- Configure the connector for each component based on desire systems connectivity
- Ensure geometry parameters link to connector parameters.

MEP Systems – Strategy & Management
Revit Content - Components

- For extensive component types use Catalogue files.

- Model geometry in each of the detail levels if necessary

MEP Systems – Strategy & Management
Revit Content - Components



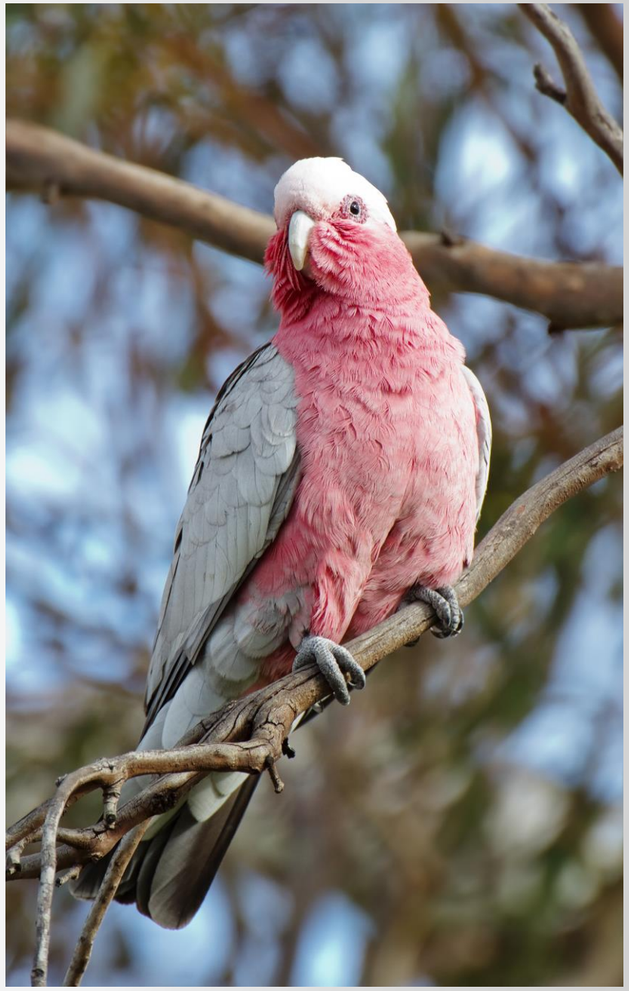
Question:
The Australian Coat of Arms has two native animals holding it up, the Red Kangaroo is one, what is the other?

Answer:
The Emu

Question:
If someone calls you a ‘galah’, what are they saying about you?

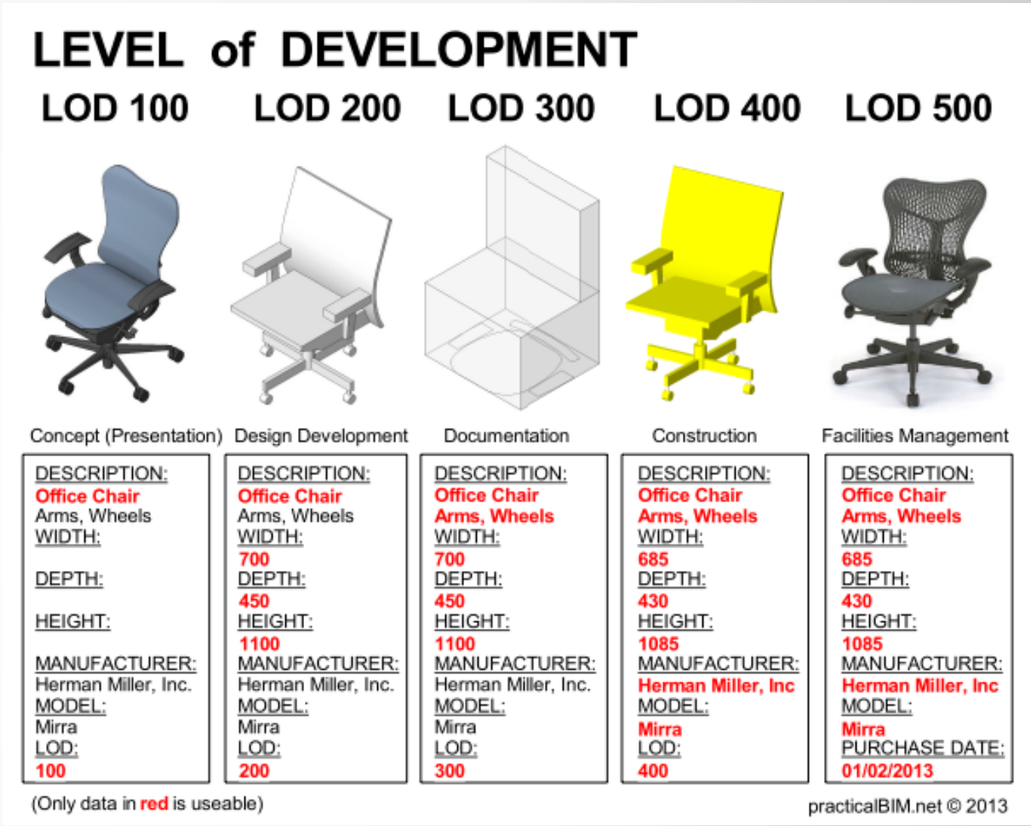
Answers:

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

LEVEL of DEVELOPMENT



LOD 100	LOD 200	LOD 300	LOD 400	LOD 500
Concept (Presentation)	Design Development	Documentation	Construction	Facilities Management
DESCRIPTION: **Office Chair** Arms, Wheels WIDTH: DEPTH: HEIGHT: MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: **100**	DESCRIPTION: **Office Chair** Arms, Wheels WIDTH: **700** DEPTH: **450** HEIGHT: **1100** MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: **200**	DESCRIPTION: **Office Chair** **Arms, Wheels** WIDTH: **700** DEPTH: **450** HEIGHT: **1100** MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: **300**	DESCRIPTION: **Office Chair** **Arms, Wheels** WIDTH: **685** DEPTH: **430** HEIGHT: **1085** MANUFACTURER: **Herman Miller, Inc** MODEL: **Mirra** LOD: **400**	DESCRIPTION: **Office Chair** **Arms, Wheels** WIDTH: **685** DEPTH: **430** HEIGHT: **1085** MANUFACTURER: **Herman Miller, Inc** MODEL: **Mirra** PURCHASE DATE: **01/02/2013**

(Only data in **red** is useable)

LOD requirements

- Many standard guidelines exists around the world
- American Institute of Architects -AIA Document G202™
- BS1192:2007 and PAS1192-2:2013 – UK standards
- 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

LOD requirements

- 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

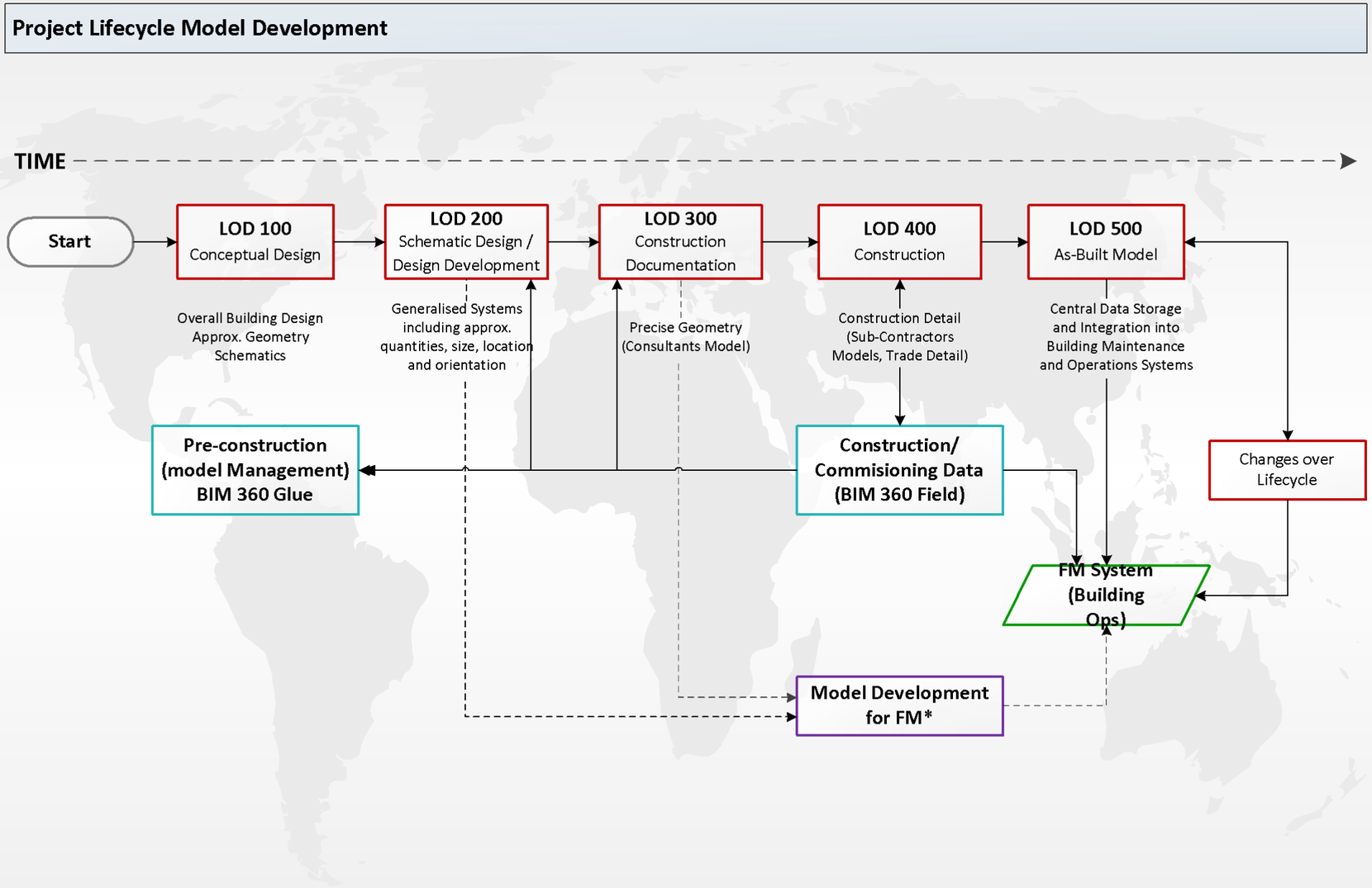
- Construction – Virtual representation of proposed elements are suitable for construction
- Analysis – Performance of approved selected systems. Application of specific performance criteria
- Cost Estimating – Costs are based on actual cost of specific elements at buyout
- Scheduling – Ordered, time-scaled 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



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

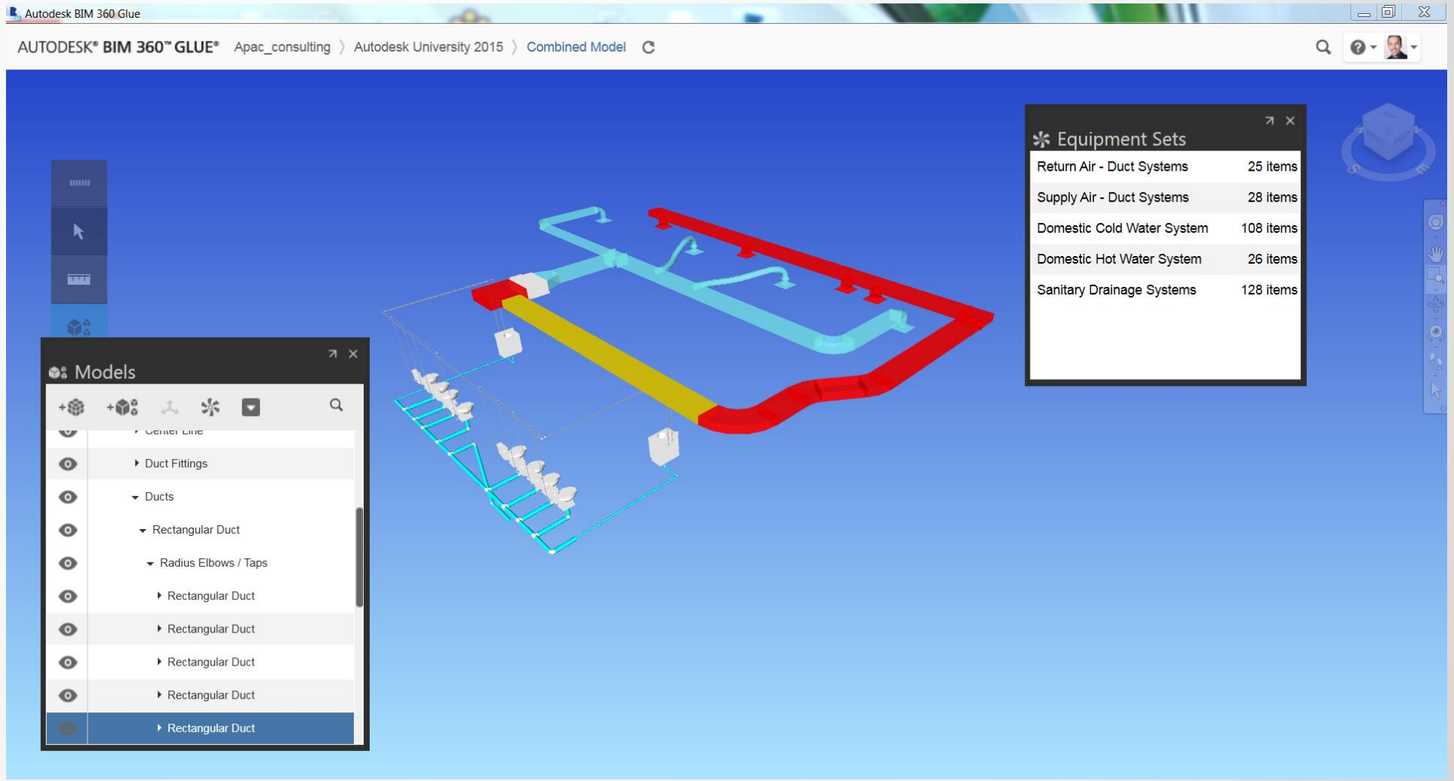
- Performance data – Equipment and systems
- Load calculations & Equipment sizing
- Schedule output
- Parametric tagging etc.
- MEP Cost estimation

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

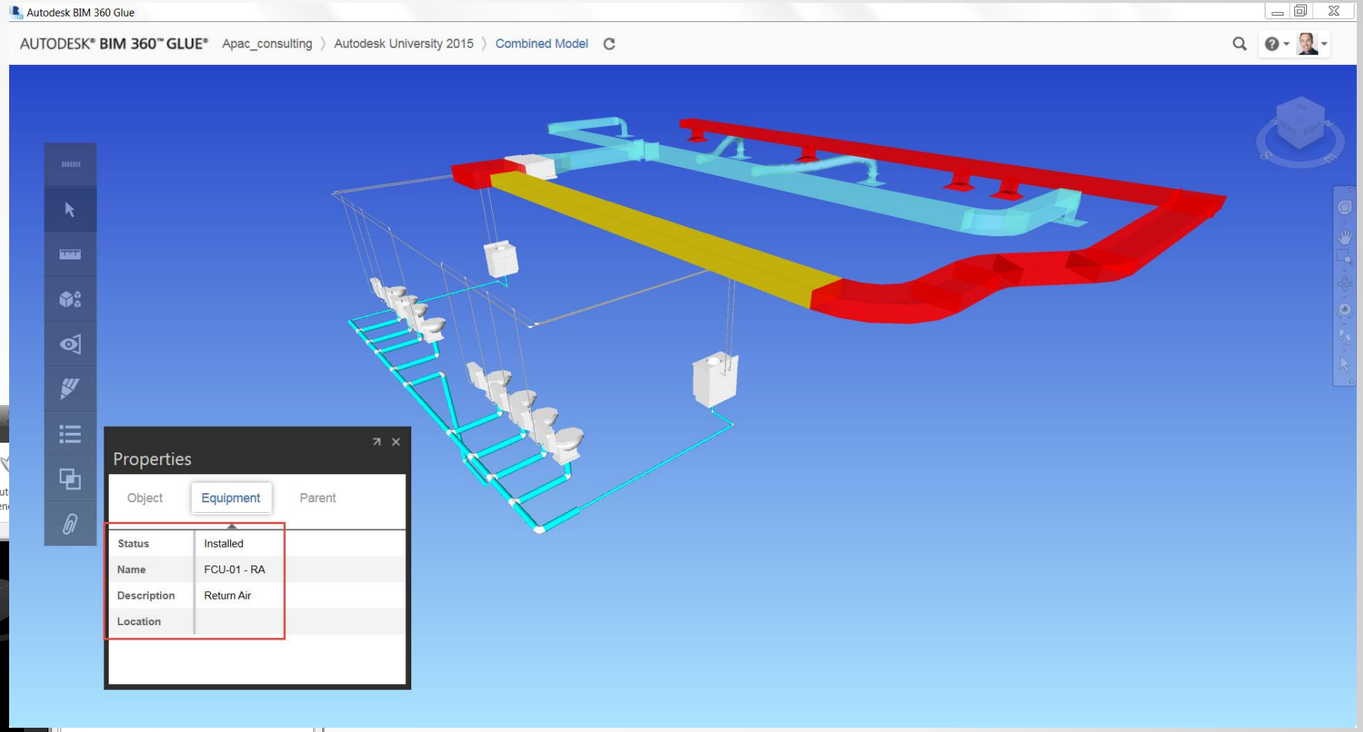
Tangible Benefits – MEP Data Construction

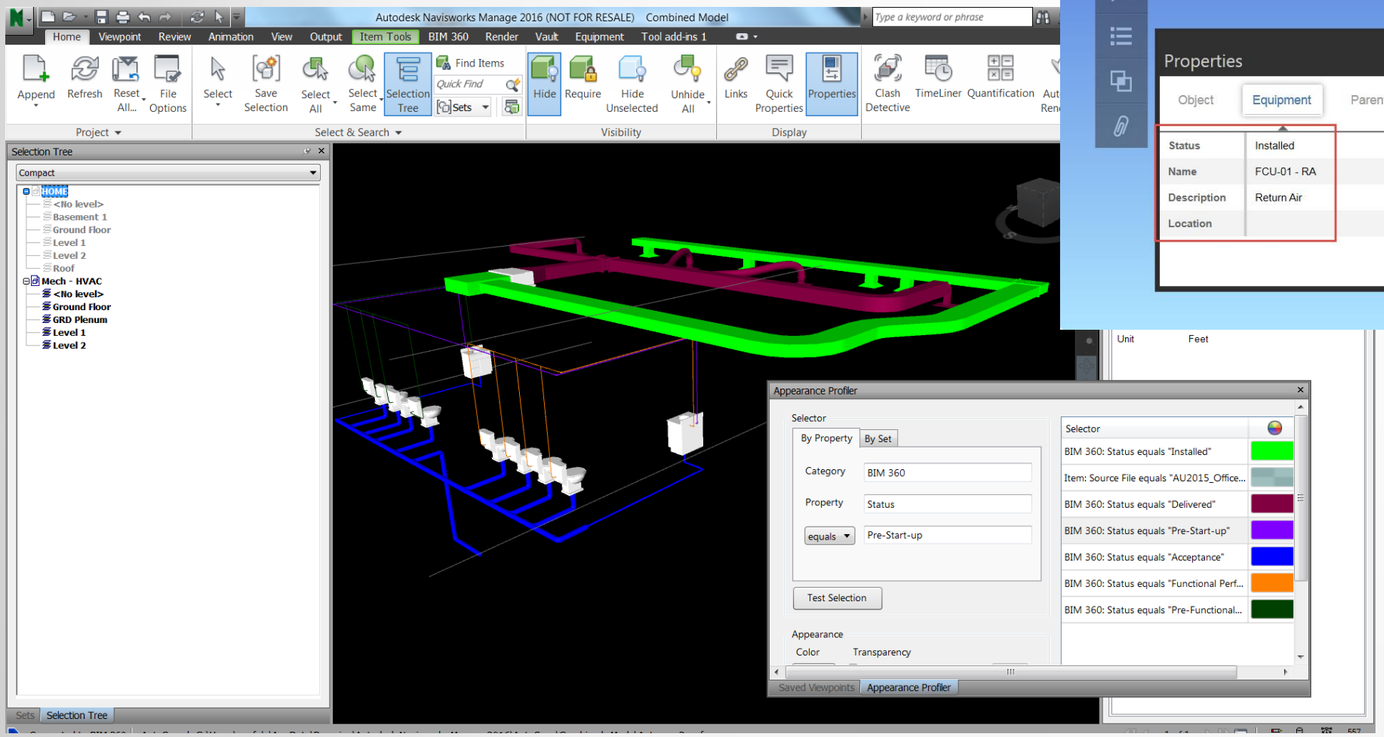
- Utilise BIM 360 Glue to drive equipment sets



Tangible Benefits – MEP Data Construction

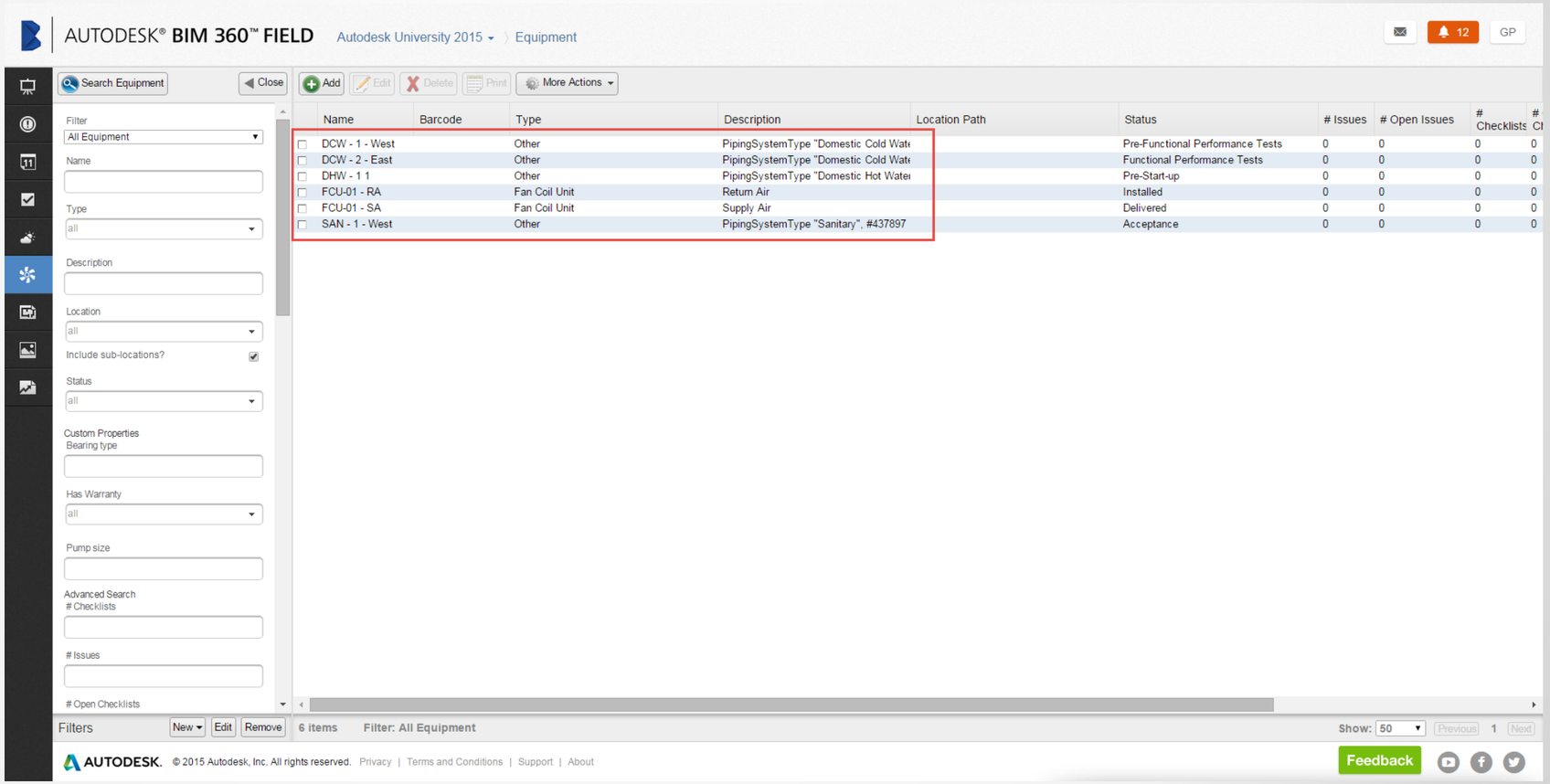
- Construction progress and status tracking utilising field data.





Tangible Benefits – MEP Data Construction

- Data captured in the field



Tangible Benefits – MEP Data Construction

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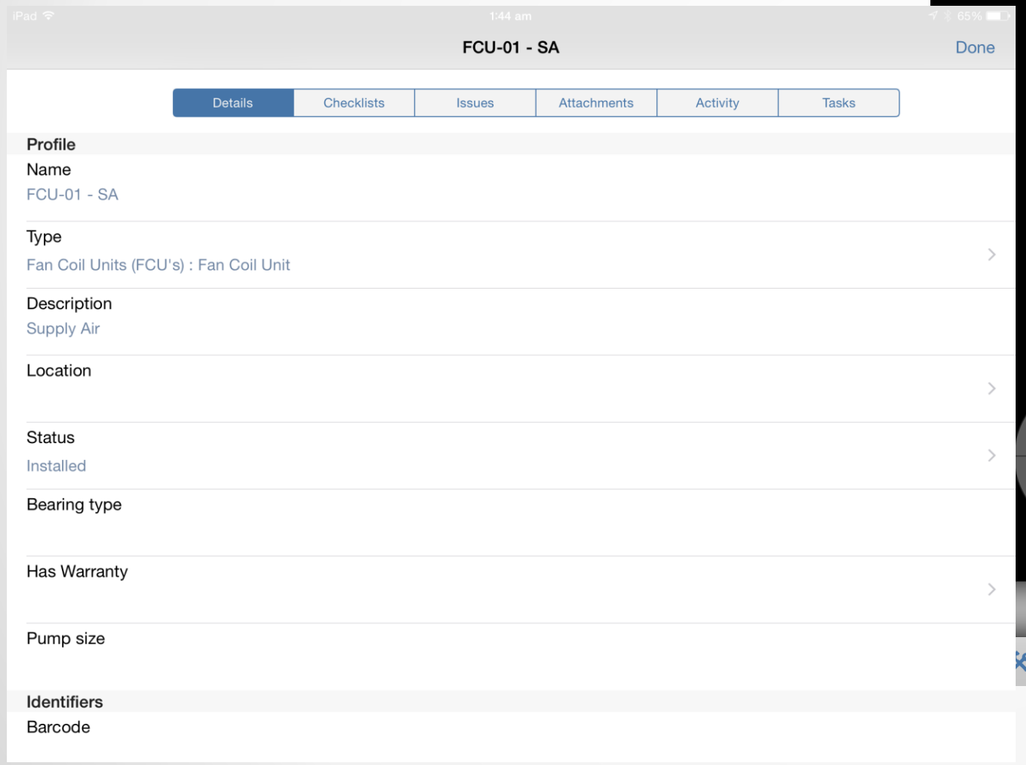
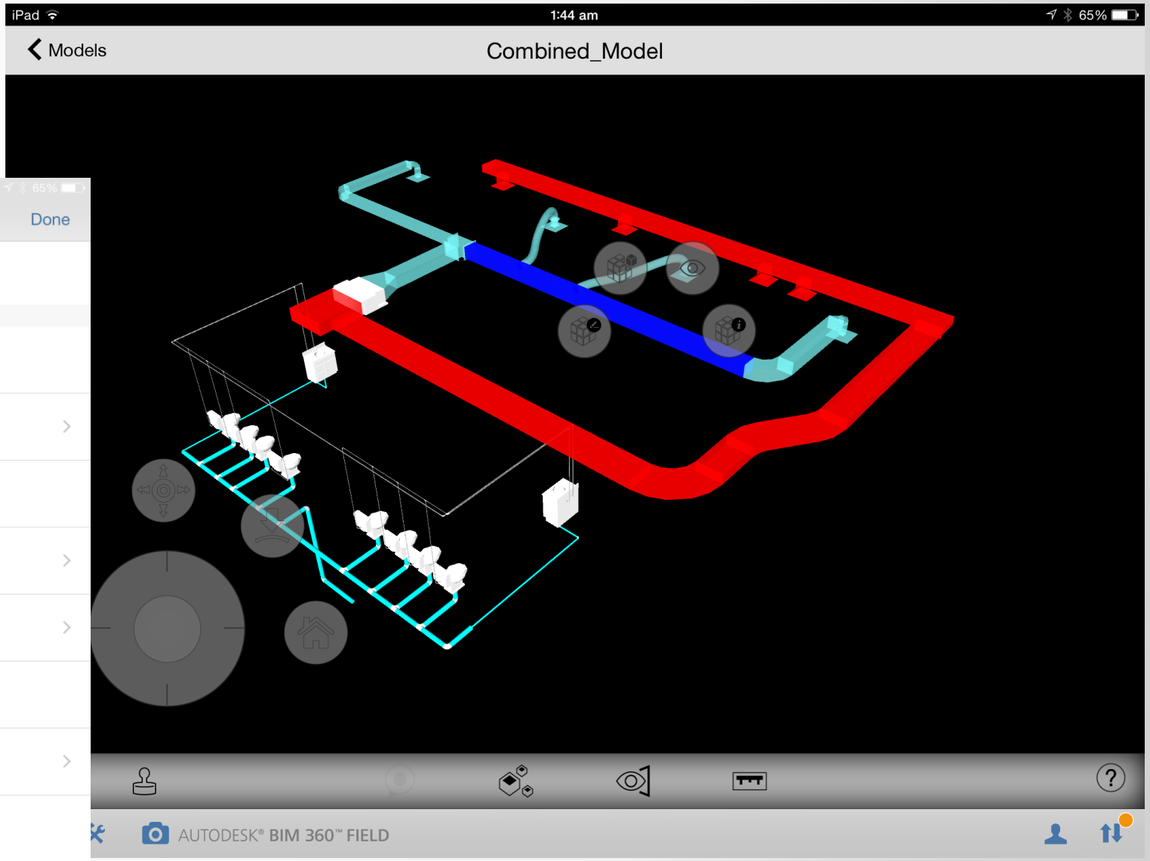
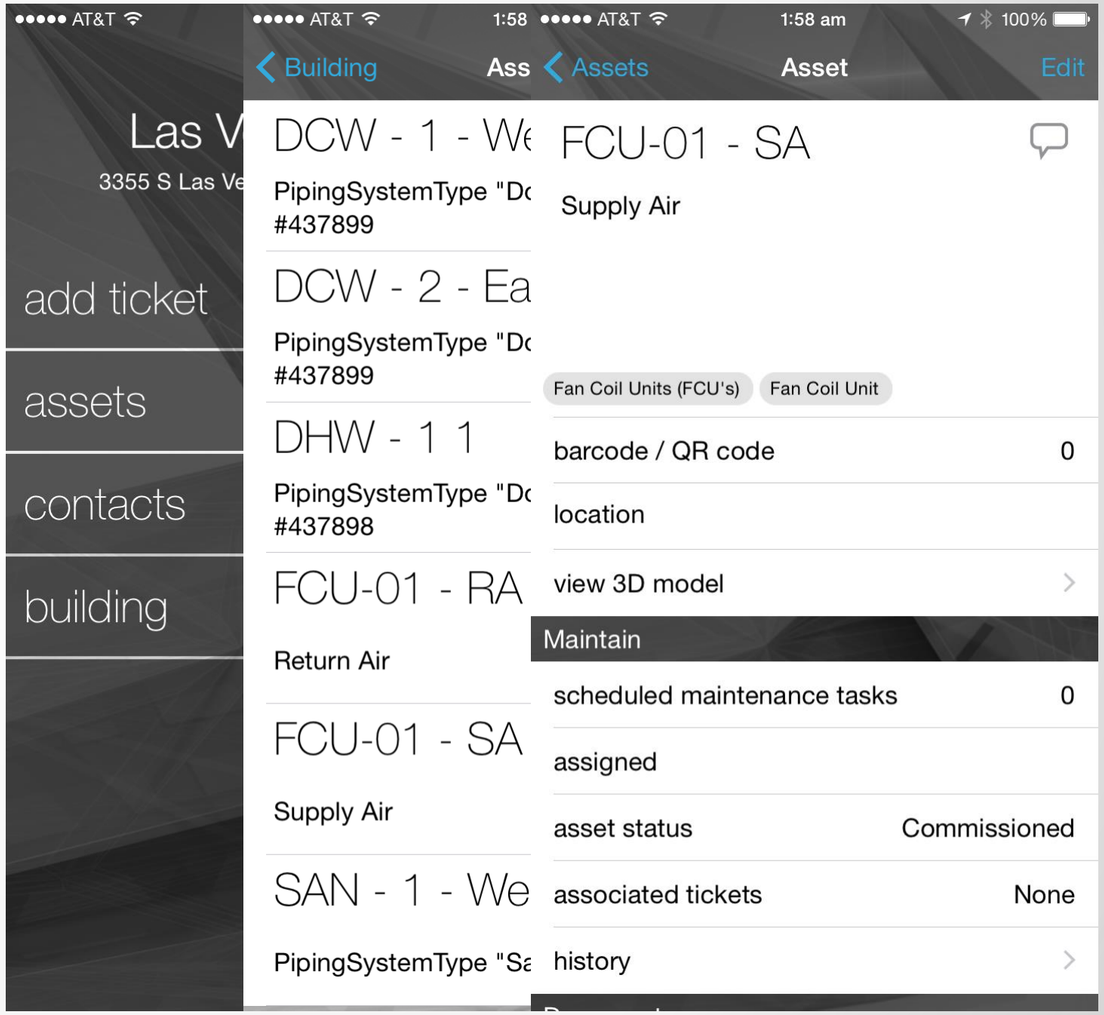




Tangible Benefits – MEP Data Operations

- 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