BIM BASICS
AIRAH PRESENTATION SERIES

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Presentation Content

- What will be covered
  - Common terms and software utilised
  - A basic overview of BIM workflows
  - BIM team structure
  - The ‘I’ in BIM
  - Prefabrication
  - Onsite Robotic Point Layout (Trimble)
  - BIM = Improved productivity
  - Building operation and maintenance
  - BIM misconceptions
  - Legal considerations
Your Own Journey

- What will not be covered
  - How to use the software packages
  - One size fits all approach
  - Contractual approaches
  - How to become a BIM expert
Common Terminology

- BIM  Building Information Modeling
- LOD  Level of Detail
- IPD  Integrated Project Delivery
- IDP  Integrated Design Process
- MEP  Mechanical, Electrical & Plumbing
- CAD  Computer Aided Drafting
- Prefab  Components / systems assembled offsite
Common Terminology – Cont.

- **BIM Collaboration**
  - All services working together by utilising BIM as the tool of communication
- **Interoperability**
  - The provision of model data being shared by more than one stakeholder
- **Lean Construction**
  - Maximum value from minimum cost and time, continuous improvement
- **Quantity Takeoff**
  - Model containing material and component quantities
- **Clash Detection**
  - Utilising model software to determine clashes between services and structures
What is BIM

- Short answer
  - The construction of a digital model within a virtual environment that enables effective coordination and contains multilayered sub sets of information that can be leveraged by the design / construct and operations team
Software

- **Revit**
  - Complex but powerful
  - Additional functions over standard CAD packages
  - Design functions

- **Autodesk Fabrication Suite**
  - Allows drawings to be easily translated to manufacturing files

- **Navisworks**
  - Can view a large array of input files
  - Is better at clash detection than Revit
  - Has a free viewing tool
  - Quicker learning curve
Standardising BIM

- NATSPEC
- BIM-MEP\textsuperscript{AUS}
- ANZRS
# BIM Evolution

## Drafting, CAD, BIM - Evolution Table

<table>
<thead>
<tr>
<th>Era</th>
<th>Before 1982</th>
<th>1982 to Current</th>
<th>2000 on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools</td>
<td>Triangle and tee square</td>
<td>AutoCAD® software</td>
<td>Revit</td>
</tr>
<tr>
<td>Product</td>
<td>Hand-drawn technical artwork</td>
<td>Digital-drawn technical artwork</td>
<td>Database of building objects</td>
</tr>
<tr>
<td>Method</td>
<td>Lines, arcs, circles, hatch, and text</td>
<td>Lines, arcs, circles, hatch, and text</td>
<td>Walls, beams, columns, windows, doors</td>
</tr>
<tr>
<td>Format</td>
<td>2D and isometric views</td>
<td>2D, 3D, and some solids</td>
<td>2D, 3D, 4D (plus time), 5D (money and time), Dn (energy, materials, and so on)</td>
</tr>
<tr>
<td>Summary of Product</td>
<td>Noncomputable data represented in technical artwork</td>
<td>Noncomputable data represented in technical artwork</td>
<td>Database of structure that can digitally interact with many other BIM processes and applications</td>
</tr>
<tr>
<td>Way Information is used</td>
<td>Highly trained and skilled professionals must interpret the artwork and manually use the information.</td>
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<td>Highly trained and skilled professionals use the information in an automated format with BIM.</td>
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BIM Workflow
Level of Detail (LOD)
Old vs. New Workflow
Old vs. New Workflow
BIM Team Structure

- The ‘Old Way’ of designing, constructing and putting into operation is costly
- The team must be formed early to have impact and work efficiencies into the project from inception
- Work together to generate the BIM Implementation Plan, this should also include the client
- Every project is different
Bringing the Models Together

- The Federated Model
  - Allows viewing of various formats
  - Allows for easier coordination
  - Reduction in file sizes
BIM Workflow in Detail

- Building Services Design
- Hydraulic Design
- Client
- Architect
- Mechanical Design
- Electrical Design
- Structural Design

- BIM
- IFC (Not truly 3D CAD compatible)
- 3D CAD Software
- 3D CAD Drawing
- NAVIS WORKS Coord.
- Site
- Duct/ Module Manufacture
- Site Documentation
- Ready for Construction
- Yes
- No

Interchange File (Not truly compatible)
The ‘I’ in BIM

- Design Process
  - Equipment spatial req.
  - System layouts
  - System design parameters
  - System design capacities
  - Project Database / BIM

- Construction Process
  - Virtual construction review
  - Project program and status
  - Prefab / Modulisation
  - Enhanced Project Database / BIM

- Commissioning Process
  - Equipment / system QA checks
  - Equipment performance verification
  - Enhanced Project Database / BIM

- Building Operation
  - Changes tracked
  - Operational data logged
  - Performance monitored
  - Enhanced Project Database / BIM

- Building Tuning / Retro Commissioning
  - Performance Improvements
  - “As Operating” system data
  - Enhanced Project Database / BIM

- Building Alterations / Additions
Managing Data

- Too much data can make a model unmanageable
- Too little – it’s just a model without a purpose

Ask yourself:
- What is the data for?
- How is it going to enhance a process?
- Can it be accessed easily?
- Does it need to be accessed offline?
- Who maintains?
Prefabrication / Modularisation
Due to the full coordination of all MEP services, space can be capitalised on parallel manufacturing. This leads to a safer and more controlled working environment. Additionally, there is a major reduction in material waste and rework. More rigorous off/on site QA is also achieved, resulting in higher commissioning quality.
Prefabrication / Modularisation
Prefabraction / Modularisation
Onsite Robotic Point Layout

- Trimble system vastly improves site efficiencies
  - Hanger points place on the deck

- Equipment positions
- Penetration locations
- Site Measures
BIM and Improved Productivity

- Data is leveraged and enhanced as the project progresses
- Clashes are typically resolved in the digital environment
- Reworks are dramatically reduced
- Remote access to current and accurate data
- Building status easily tracked
- Progressive handovers / certification / occupancy
Building Operation and Maintenance

- Building baseline operation verified
- Changes / additions align with intent
- Very detailed assets list
- Automated maintenance process
- Improved building operating costs and conditions

Improves the value of the building
BIM Misconceptions

- BIM is not Revit
- The ‘Mechanical’ contractor runs BIM
- Loss of productivity (on implementation)
- Just follow the BIM Execution / Implementation Plan
- BIM is too costly to implement
- File sizes are very large
- ‘I have no authority over other trades’
Legal Considerations

- Data IP
- Coordination responsibility
- Overall management of the model
- Who is responsible for the cost of a change
- Accuracy of information and who pays if it is incorrect
- Who owns the risk (should reap the benefit)
Pictures and Flythrough
Questions/Discussions

- What is your current level of BIM Implementation?
- What benefits / Issues are there?
- Skills gap – Who / Where