BIMplementation BIMtergration

P5 Presentation
Paul J van Berkel
A research to the implementation and integration of BIM as a building process for existing buildings.
Research at a company

Fascination with airports
Largest building in the Netherland
Round the clock operation
VolkerWessels Bouw Schiphol
Upgrade Wortel g-pier
Meet Bob
Meet Bob
Meet Bob

Hi, I'm Bob. I work for VWBS. I am tasked with work preparations for the upgrade Wortel g-pier.
What is BIM?

- **Building Information Modeling**
- Technology versus Social
- Modern method of project management
What is BIM?

- **Building Information Modeling**
- Technology versus Social
- Modern method of project management
A bit more BIM

- Building Information Modeling (BIM) is the process of creating and managing 3D building data during its development. BIM is a complex multiphase process that gathers input from team members to model the components and tools that will be used during the construction process to create a unique perspective of the building process.

- The 3D process is aimed at achieving savings through collaboration and visualization of building components into an early design process that will dictate changes and modifications to the actual construction process. It is a very powerful tool that when used properly will save money, time and simplify the construction process.
Upgrade Wortel g-pier

“How can BIM be optimally used as a building process when considering a building which already exists and is constantly being transformed?”
Interviews

43 INTERVIEWS
FINDING OUT FIRST HAND WHAT THE VISION OF EVERY COMPANY IS
FINDING OUT HOW EVERY COMPANY EXPERIENCED THE COLLABORATION DURING THIS PROJECT
SUMMARIZING THE RESULTS
## Company versus BIM

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Willingness to work in a BIM environment</th>
<th>General BIM knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schiphol ASM</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>Schiphol Consumers</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>Schiphol Security</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>Schiphol Operations</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>PLUS</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Benthem Crouwell</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>DEERNS</td>
<td>HIGH</td>
<td>HIGH</td>
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<tr>
<td>ABT</td>
<td>MEDIUM</td>
<td>HIGH</td>
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<tr>
<td>RHDHV</td>
<td>MEDIUM</td>
<td>HIGH</td>
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<td>VWBS</td>
<td>HIGH</td>
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<tr>
<td>ENGIE</td>
<td>MEDIUM</td>
<td>HIGH</td>
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<tr>
<td>BAM</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>KONE</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>
The current situation

DIFFERENCE BETWEEN BIM AS PROCESS AND BIM AS TOOL
THE COMPANIES INVOLVED AND COMMUNICATION
TRADITIONAL HIERARCHY
The BIM theory

DIFFERENCE BETWEEN BIM AS PROCESS AND BIM AS TOOL

THE COMPANIES INVOLVED AND COMMUNICATION

TRADITIONAL HIERARCHY
Back to Bob
Back to Bob

There are problems in the model and I cannot contact the Structural engineer
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The actual situation

The design phase

The building process

Why is Bob mad?
The design phase
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What should have been
What should have been

The BIM circle

PLuS

The benefits of BIM

A new project manager
What should have been

The BIM circle

PLuS

The benefits of BIM

A new project manager
What should have been

When companies work together problems can be solved before the actual building stage.
The BIM circle
Samenwerken in BIM

5 disciplines:
- Inrichting interieur
- Inrichting bouwkracht
- Installatie aanpassingen
- Bouw bestaand
- Constructies bestaand
Samenwerken in BIM

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Lagees Fieni DD
The benefits of BIM
The benefits of BIM
The benefits of BIM
A new project manager
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The BIM collaboration
The BIM collaboration

The quadrants

Collaboration

Back to Bob
The quadrants

Project management

R&D

Architectural Design

Detailed Design

Conceptual Design

Program specifications

Technical Design

Analysis

Documentation

Project initiation

Management and operation

Building and construction

AS/NO/Security/Cost/Com.

V&W/ENGINEERING

P
t

Construction Mgmt.

Construction Logistics

V&W/ENGINEERING

AS/NO/Security/Cost/Com.

V&W/ENGINEERING

AS/NO/Security/Cost/Com.
Collaboration
- Project Manager
- BIM expert technical
- BIM expert management and operation
- BIM expert architectural
- BIM expert building and construction
Back to Bob

Collaboration environment
Back to Bob

With everyone present we can now communicate and solve issues.

Collaboration environment
10 steps to success as explained by Bob
Step 1

Find teams for every step of the BIM circle. For every step of the BIM circle below there should be at least one, or more companies which oversee each step. These companies should have a good amount of knowledge in working in BIM and should also be willing to work in a BIM organization.
Building Information Modeling Process

- Conceptual Design
- Programming
- Detailed Design
- Analysis
- Documentation
- Fabrication
- Construction 4D/5D
- Demolition
- Renovation
- Operation and Maintenance
- Construction Logistics
**Step 2**

Assign a BIM expert from every quadrant of the BIM circle led by a project manager with ample BIM experience. These BIM experts can be part of the companies which are part of the teams of the BIM circle. It is important to have an expert of each quadrant, because this way the conditions of every quadrant and the complete process can be guaranteed.
- Project Manager
- BIM expert architectural
- BIM expert technical
- BIM expert building and construction
- BIM expert management and operation
Step 3

Write contracts which are in line with the BIM process. All companies in every quadrant should get contracts with the same conditions in them. This step is also the first step where the existing building is mentioned. It is important that the contracts include clauses for modeling the current state of the building. This can be set up in a way that every team models the current situation based on its expertise.
Step 4

Make sure that every team understands their responsibility as an adviser when the project is at another step. This is very important because this advice makes the overall design stronger. Making sure costly mistakes during the building and construction phase are prevented.
Create a BIM coordination model and database which is updated in real-time and includes communication possibilities. This way all data can be viewed real time, preventing teams working for extended periods of time on objects or parts of the design which then prove to be impossible due to clashes. The including of the communication possibilities make sure that everything is available in one environment. This way no team can fall back on “other” methods of communication which possibly cannot be retraced. The more dimensions are integrated in the BIM environment the better the results will be.
Step 6

The project manager (collaboration) continuously monitors progress and makes sure deadlines are kept and the quality of the coordination model is up to spec during the BIM process. The quality of the coordination model can be monitored according to the expected level of detail (LOD). This LOD is also part of the contracts and the IDM.
<table>
<thead>
<tr>
<th>LOD 100</th>
<th>LOD 200</th>
<th>LOD 300</th>
<th>LOD 400</th>
<th>LOD 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual</td>
<td>Approximate geometry</td>
<td>Precise geometry</td>
<td>Fabrication</td>
<td>As-built</td>
</tr>
</tbody>
</table>

**The Model Element may be** graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e., cost per square metre, etc.) can be derived from other Model Elements.

**The Model Element is graphically represented in the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation.**

Non-graphic information may also be attached to the Model Element.

**The Model Element is graphically represented in the Model as a specific system, object, or assembly accurate in terms of quantity, size, shape, location, and orientation.**

Non-graphic information may also be attached to the Model Element.

**The Model Element is graphically represented in the Model as a specific system, object, or assembly that is accurate in terms of quantity, size, shape, location, and orientation with detailing, fabrication, assembly, and installation information.**

Non-graphic information may also be attached to the Model Element.

**The Model Element is a field verified representation accurate in terms of size, shape, location, quantity, and orientation.**

Non-graphic information may also be attached to the Model Element.
Step 7

Build the project according to the coordination model and BIM database making sure all aspects of the model and the database are produced as intended by the documentation
Step 8

Update the coordination model with as-built information. As-Built data is added to the coordination model to document discrepancies between the execution model and the actual placed object. This way when handing over the model and database to asset management the data is up to date.
Step 9

Operate and manage the building with the coordination model including the BIM database and as-built information updating the model continuously if any changes are made.
Step 10

Start a new renovation and/or upgrade project with the coordination model and BIM database intact eliminating the need to first document the current situation as that has continuously been done.
What should it have looked like at Schiphol
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Question Time?
Thank You For Your Time!
Drinks in the Bouwpub!
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