

## **SBEnc Project 2.82**

# **Digitally-enabled Asset Life-cycle Management**

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# Project Aim and Objectives

This project seeks to examine the industry best practices and international standards related to the value of DE and BIM and develop a practical approach that can efficiently guide industry people to keep their DE models alive after construction and handover.

1. To demonstrate the value of BIM, especially for small-scale built projects.
2. **A DE-enabled asset life-cycle management process and prototype**
3. To demonstrate the use of latest technologies, e.g. image processing, for collecting real-time asset condition and investigate the approach to translate the raw data collected from these latest technologies into useful asset data.

# Critical Issues of the BIM Data Management



- Inconsistent BIM object classification
- Insufficient level of information



- BIM data version control
- BIM data change management



# MetaBIM: Key Functions

## OpenBIM Standards

Support IFC2X3, IFC4 and IFC4.3  
Support BCF create, view, and edit  
Support bsDD connection

## Model Comparison

Compare BIM models in real time;  
Visualise differences for both  
geometry and non-geometry data

## Version Control

Git-like version control allows you to  
keep track of your BIM data and  
helps you to easily explore the  
changes you and your team have  
made

## Blockchain Integration

Provide secure access to a BIM model  
and allow for a reliable audit of who  
made changes, when they were  
made, and what those changes were.

## Intelligent BCF

BIM object parameters including  
placement coordinates and  
geometric dimensions can be  
automatically captured and used for  
driving BIM model auto-updating

## AI & Graph Representation

Convert BIM data into Graph format,  
and apply Graph Neural Network to  
automate BIM object classification

# MetaBIM: Blockchain-enabled BIM data auditing

The screenshot displays the MetaBIM Platform interface. At the top left, the 'MetaBIM Platform' logo and a 'Back' button are visible. The top right corner shows the user profile for 'Jun Wang' with the email 'jun.wang@amantic@gmail.com'.

**File Management:** A sidebar on the left lists three files, all with a size of 0 and a status of 'complete'. A 'Open' button is located to the right of the list.

**3D Model:** The central area features a 3D architectural rendering of a building complex with blue outlines.

**User Profiles:** On the right, two user profiles are listed: '[owner] Yifeng Chen' (yifeng@taifupods.com) and '[collaborator] Jun Wang' (jun.wang@amantic@gmail.com). Below them is an 'invite people to project' button and a 'Send Invite' button.

**Asset Chain:** A horizontal timeline shows a sequence of 12 transactions. Each transaction is represented by a colored square (blue, green, or yellow) with a number inside, connected by a line. Above each square is a circular icon indicating the asset size and a timestamp.

**Asset Transaction Table:** Below the asset chain is a table with the following columns: Date, Name, Type, Asset size, Account, Chain Node, Confirmed, Owner, and Token.

| Date             | Name               | Type     | Asset size | Account       | Chain Node   | Confirmed     | Owner         | Token                                |
|------------------|--------------------|----------|------------|---------------|--------------|---------------|---------------|--------------------------------------|
| 2022-02-16 11:05 | MetaBim Request A1 | complete | 0 KB       | @389566c195ab | 0146bc7901ed | @389566c195ab | @389566c195ab | 22a55c73-4e06-4039-8402-84af51fad141 |
| 2022-02-16 14:13 | MetaBim Request A1 | upload   | 906 KB     | @389566c195ab | 3722f1c175c2 | @0000         | @389566c195ab | 4f03723b-4077-4374-8458-3b4301a34cc  |
| 2022-02-16 14:13 | MetaBim Request A1 | upload   | 3223 KB    | @389566c195ab | x375013eeddc | @0000         | @389566c195ab | 001e3e6a-c688-4620-8780-b6e20701c282 |

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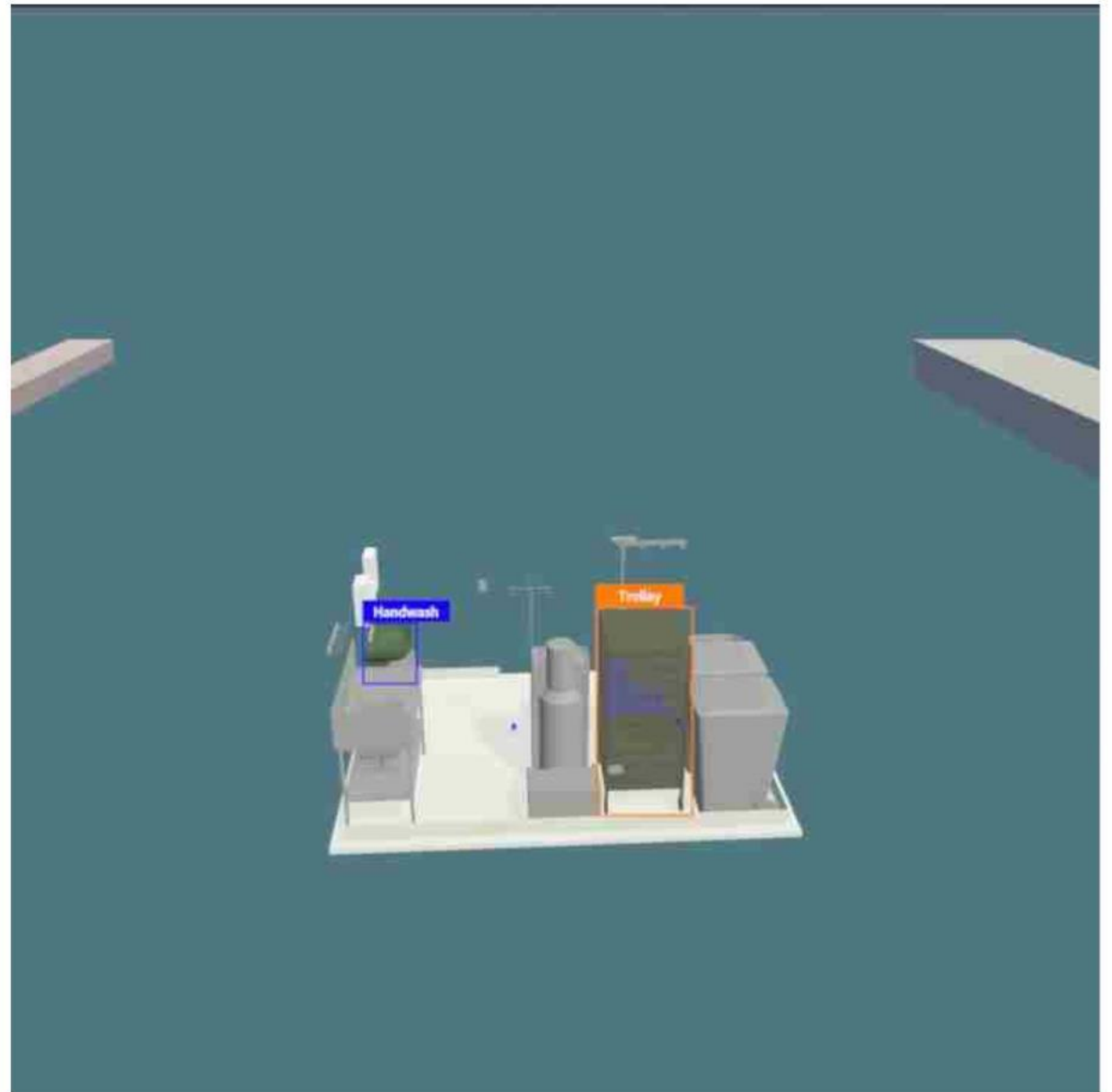
# BIM object auto-labelling

Data sources:

- Structured BIM Model Data: AusHFG
- BIM object library

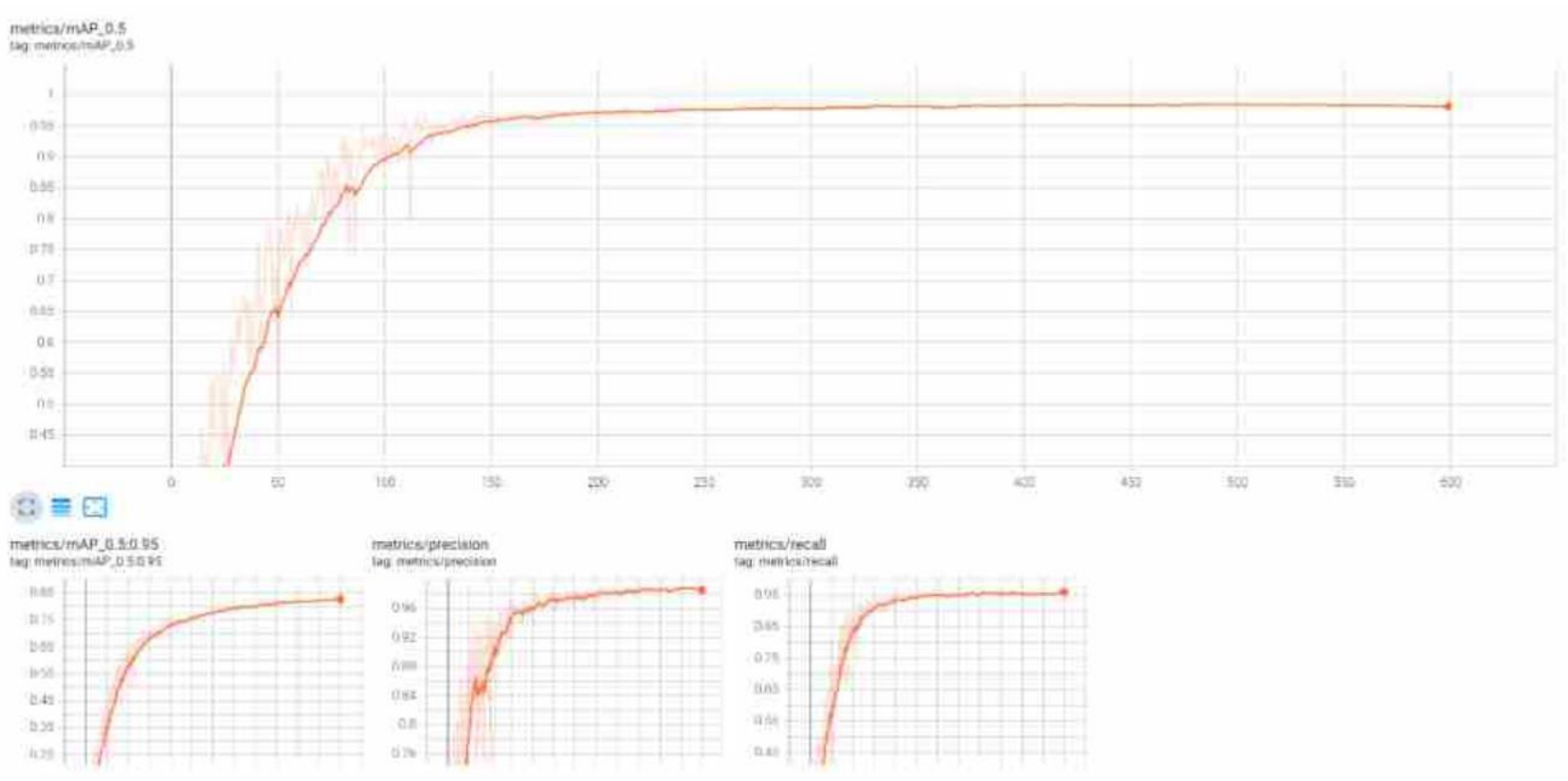
Data collection and labelling:

- Isolate single BIM object and take images from different angles of views
- Isolate a Room/Space, and take images from different angles of views





# AI algorithm: Training accuracy



# AI algorithm: Validation in a real healthcare building project

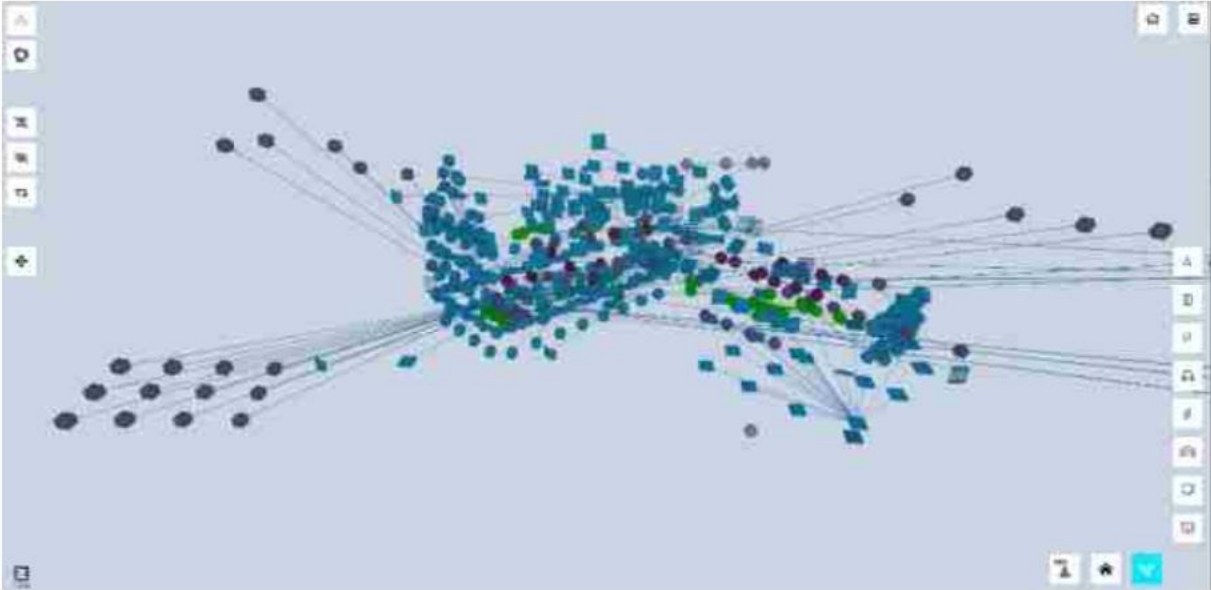


**Validation Accuracy:** Precision VS Recall?

# AI algorithm: Integration with Graph Neural Network



3D View



Graph View