

NCID

A DVANCED  
C ONSTRUCTION  
I NFORMATION  
D EVELOPMENT



**H**eritage

**I**nformation

**M**odelling

VICTORIA PEAK FIRE STATION





# Introduction

## Objective

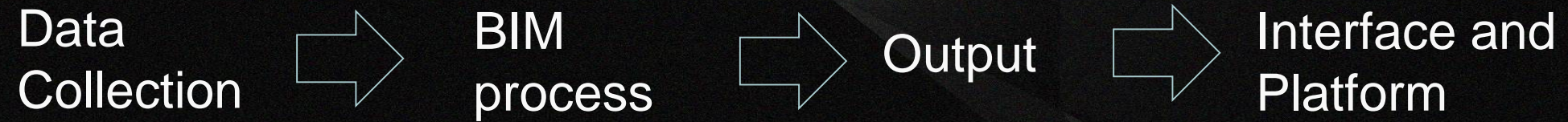
This study is to develop a Heritage Information Modeling (HIM) prototype for the Victoria Peak Fire Station (VPFS) to help the heritage conservation and facility management of Historic assets managed by ArchSD. It is a pilot project for the adoption of HIM. The process of HIM shall be or will be applicable to other heritage projects of similar nature.





# HIM Framework

HIM consists of 4 progressive layers or process:





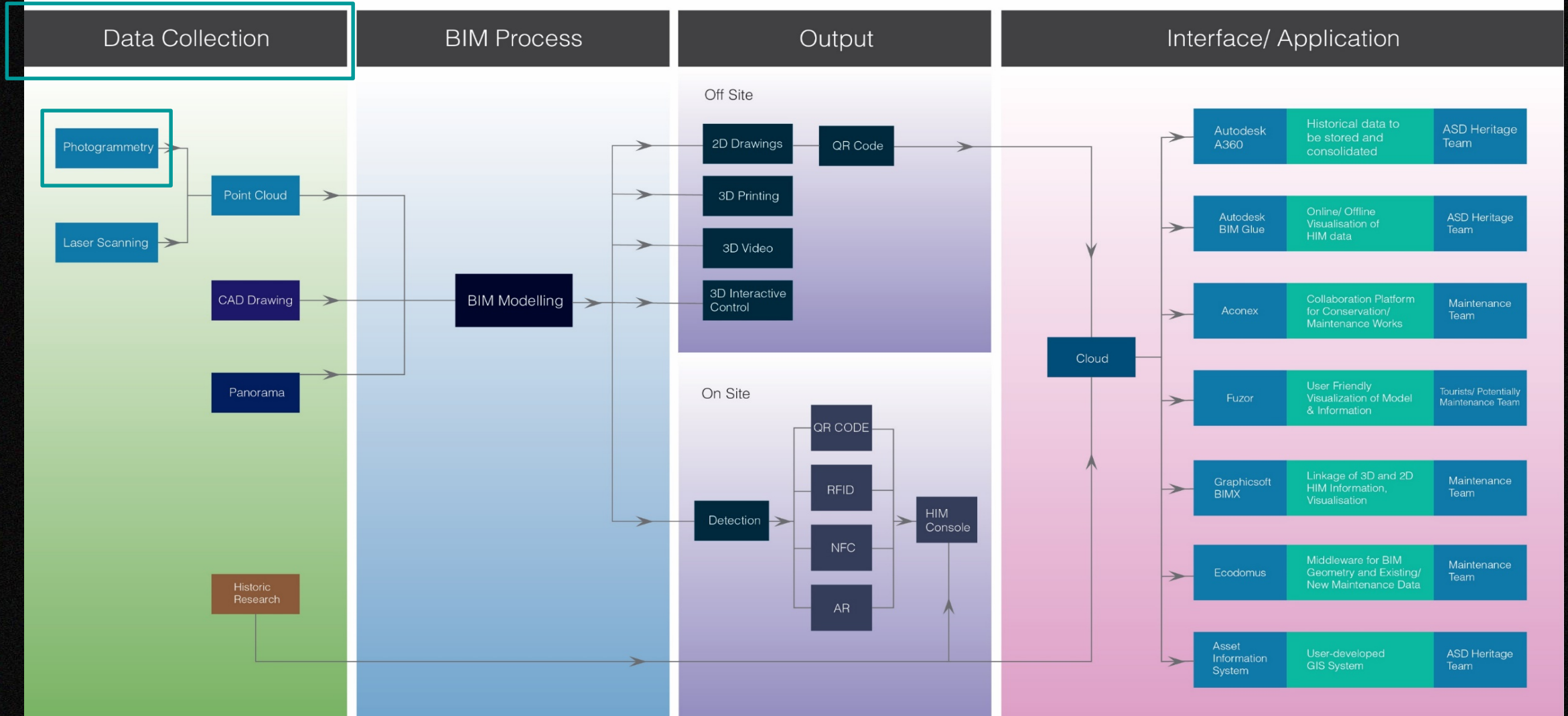
# Data Collection

The background of the slide is a solid black color. On the right side, there is a large, abstract geometric shape composed of several dark gray, semi-transparent polygons. These polygons are layered and oriented in various directions, creating a complex, crystalline or star-like pattern that extends from the right edge towards the center of the slide.



# HIM Framework

## Heritage Information Modelling Framework



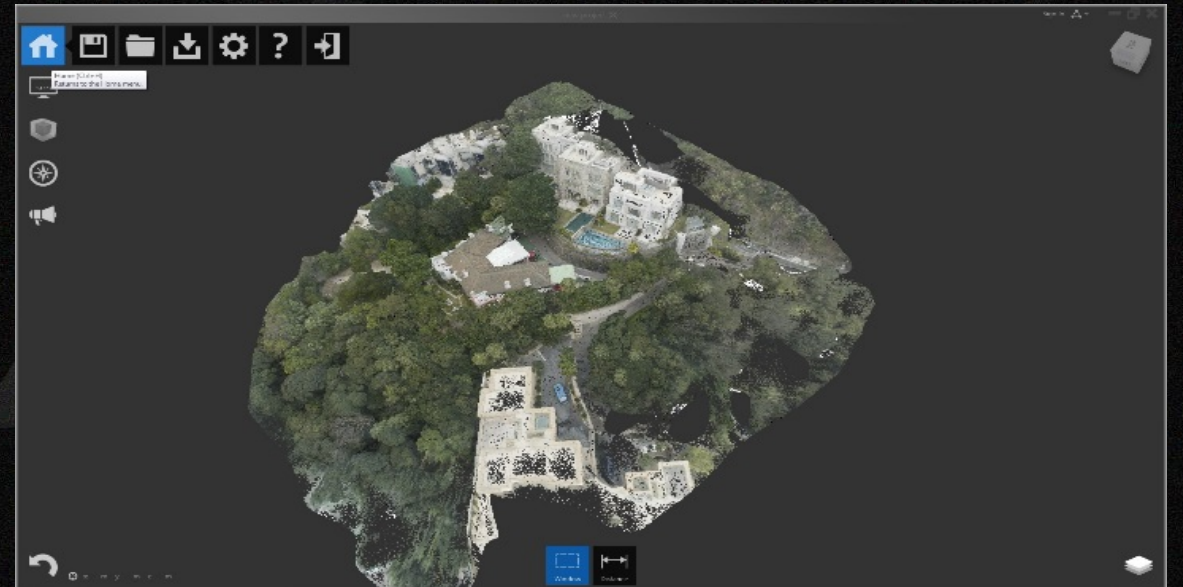
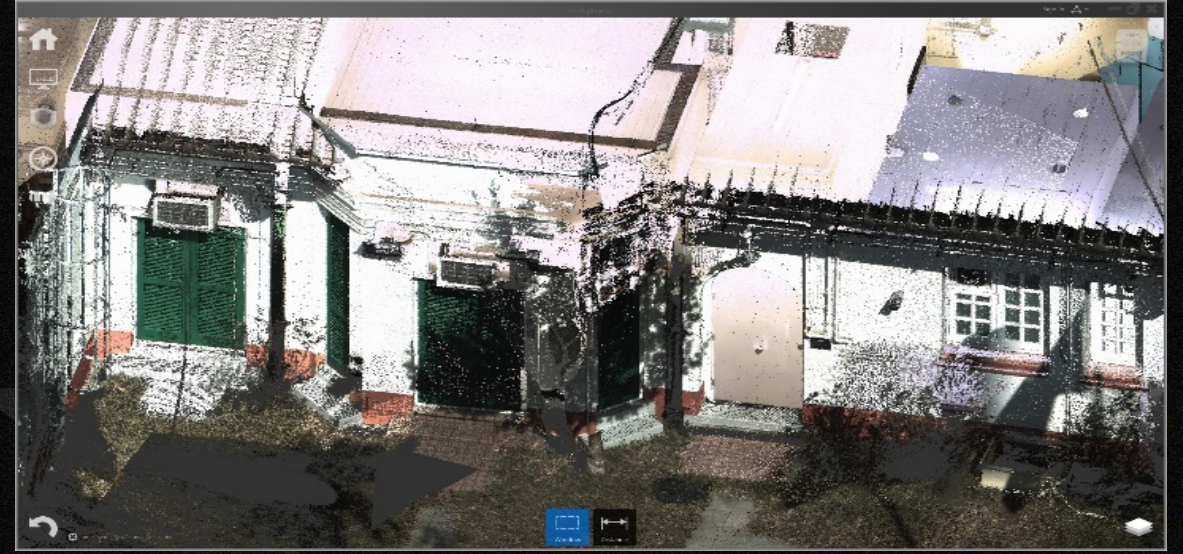


# Aerial Photogrammetry





# Aerial Photogrammetry





# Close Range Photogrammetry

A branch of photogrammetry in which more point cloud data were generated at a closer range than the aerial photogrammetry but shooting with hand held cameras



Real



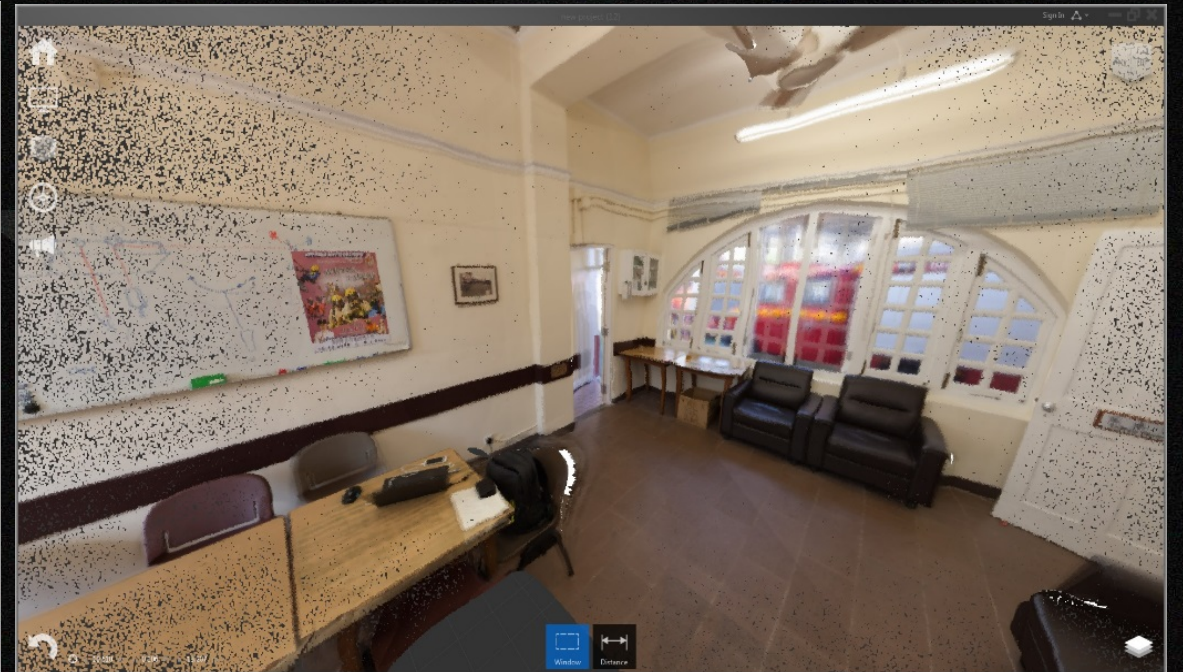
Real



# Close Range Photogrammetry



Point Cloud

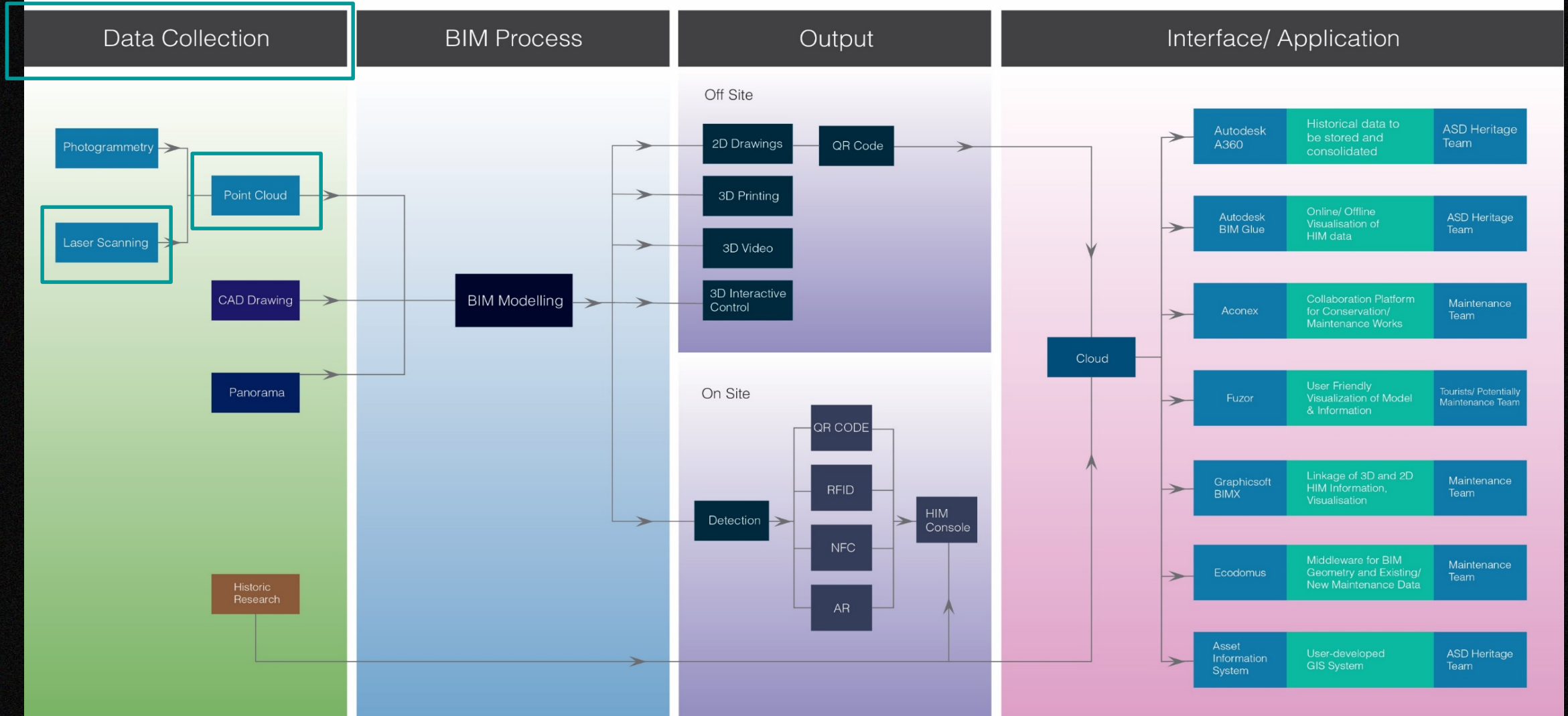


Point Cloud



# HIM Framework

## Heritage Information Modelling Framework





# Laser Scanning & Point Cloud

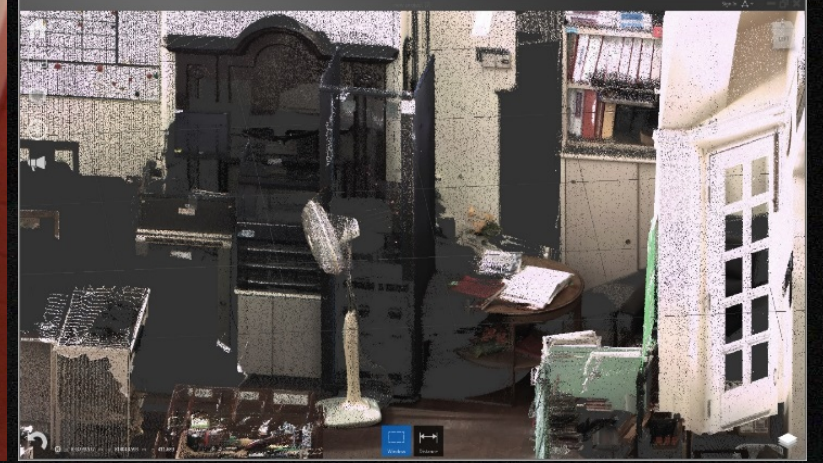
Collecting accurate dimensions of the existing environment



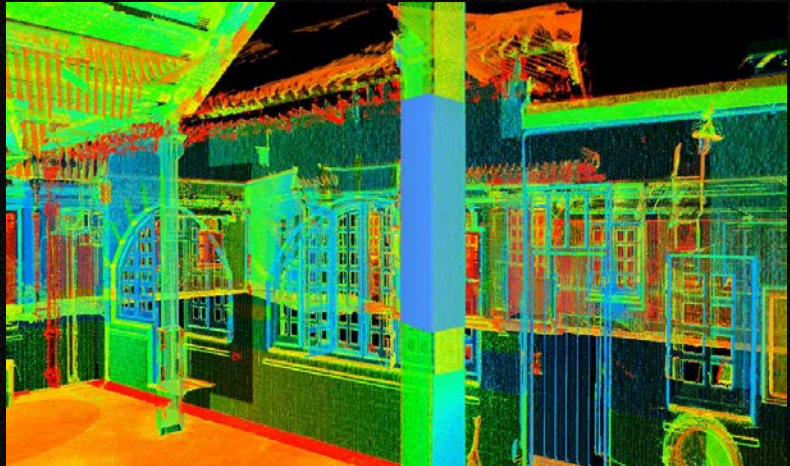
Laser Scanner



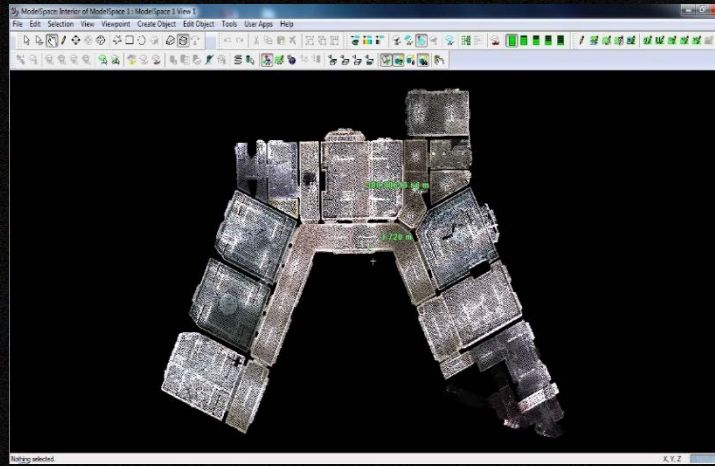
Laser Scanner



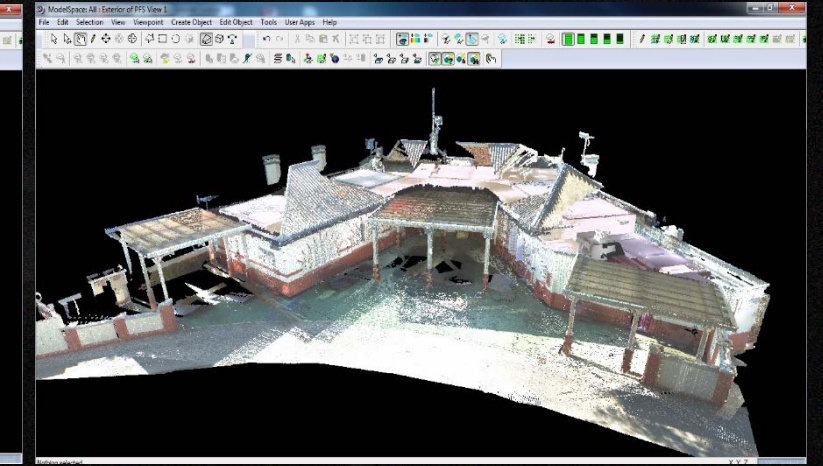
Point Cloud



Laser Scanning



Point Cloud



Point Cloud



```

graph LR
    subgraph Data_Collection [Data Collection]
        Photogrammetry --> Point_Cloud[Point Cloud]
        Laser_Scanning[Laser Scanning] --> Point_Cloud
        Point_Cloud --> BIM_Modelling[BIM Modelling]
        CAD_Drawing[CAD Drawing] --> BIM_Modelling
        Panorama --> BIM_Modelling
        Historic_Research[Historic Research] --> Cloud
    end

    subgraph BIM_Process [BIM Process]
        BIM_Modelling
    end

    subgraph Output
        subgraph Off_Site [Off Site]
            BIM_Modelling --> 2D_Drawings[2D Drawings]
            BIM_Modelling --> 3D_Printing[3D Printing]
            BIM_Modelling --> 3D_Video[3D Video]
            BIM_Modelling --> 3D_Interactive_Control[3D Interactive Control]
            2D_Drawings --> QR_Code[QR Code]
        end
        subgraph On_Site [On Site]
            BIM_Modelling --> Detection
            Detection --> QR_CODE
            Detection --> RFID
            Detection --> NFC
            Detection --> AR
            QR_CODE --> HIM_Console[HIM Console]
            RFID --> HIM_Console
            NFC --> HIM_Console
            AR --> HIM_Console
        end
    end

    subgraph Interface_Application [Interface/ Application]
        Cloud
        Autodesk_A360[Autodesk A360]
        Autodesk_BIM_Glue[Autodesk BIM Glue]
        Aconex[Aconex]
        Fuzor[Fuzor]
        Graphicsoft_BIMX[Graphicsoft BIMX]
        Ecodorus[Ecodorus]
        Asset_Information_System[Asset Information System]
        ASD_Heritage_Team[ASD Heritage Team]
        Maintenance_Team[Maintenance Team]
        Tourists_Potentially_Maintenance_Team[Tourists/ Potentially Maintenance Team]
    end

    Cloud --> Autodesk_A360
    Cloud --> Autodesk_BIM_Glue
    Cloud --> Aconex
    Cloud --> Fuzor
    Cloud --> Graphicsoft_BIMX
    Cloud --> Ecodorus
    Cloud --> Asset_Information_System
    Cloud --> ASD_Heritage_Team
    Cloud --> Maintenance_Team
    Cloud --> Tourists_Potentially_Maintenance_Team

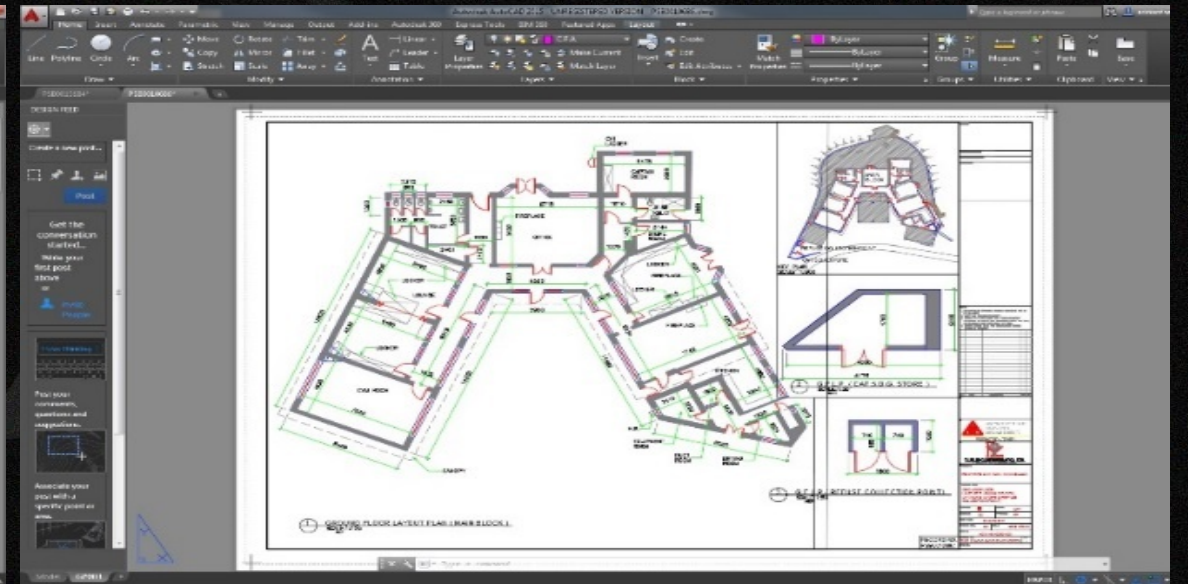
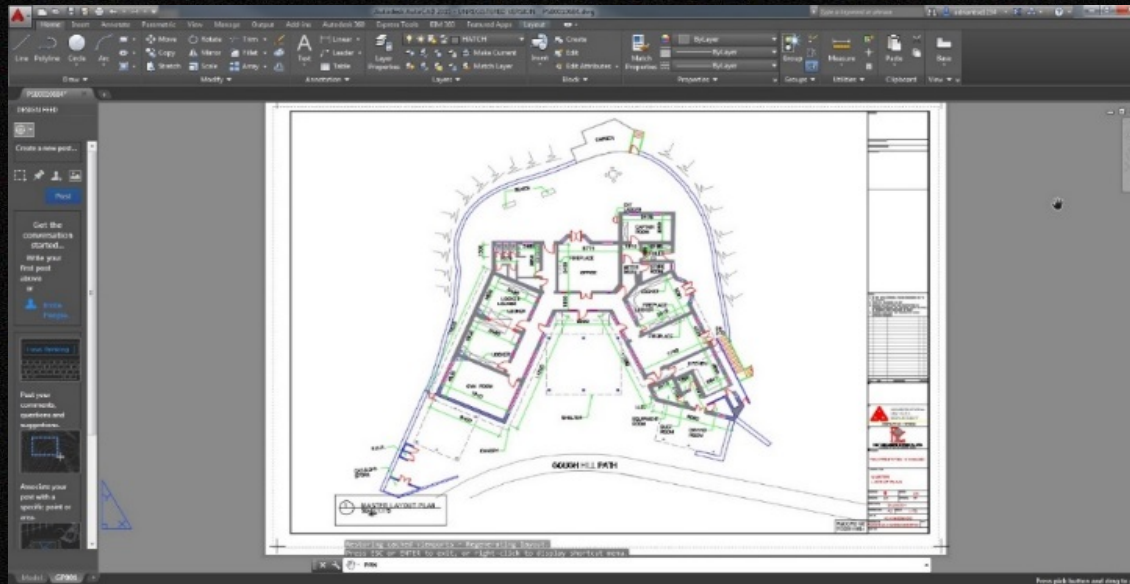
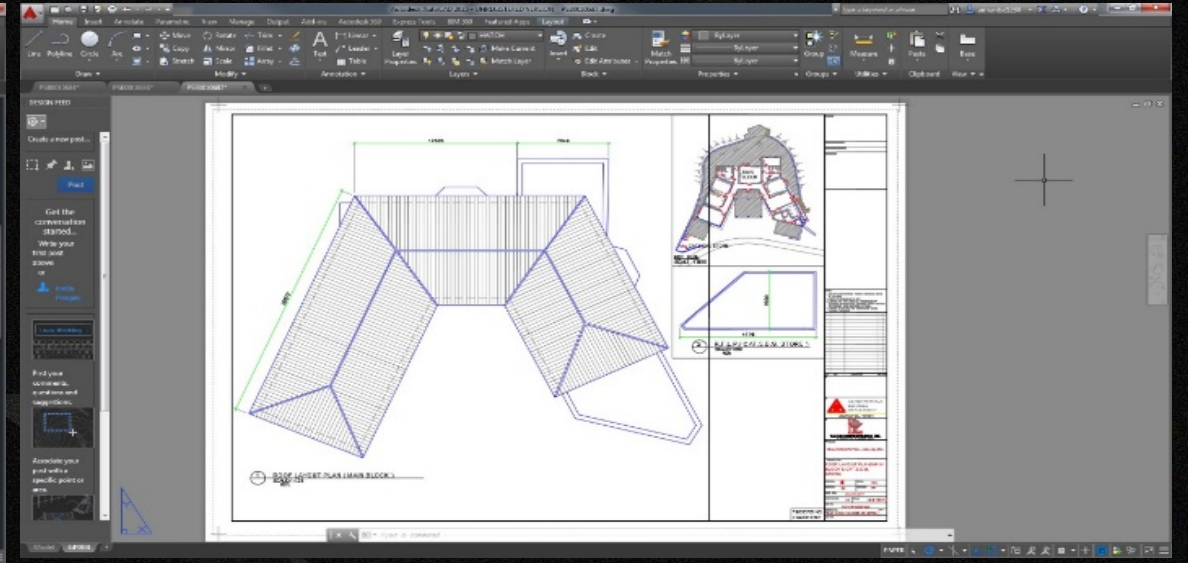
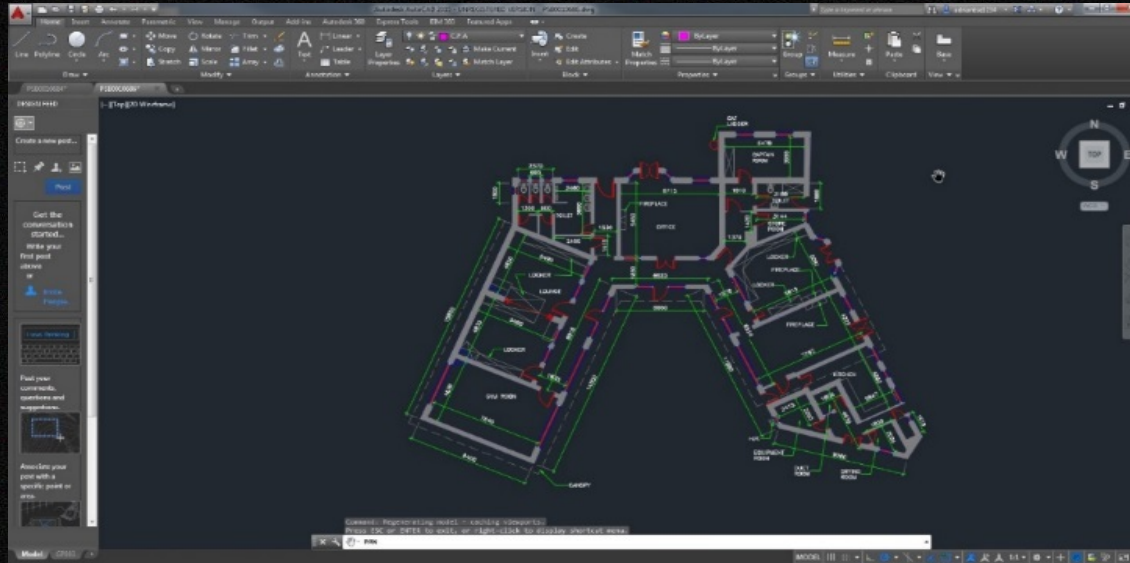
```

The diagram illustrates the BIM process for heritage conservation, organized into four main stages:

- Data Collection:** Includes Photogrammetry, Laser Scanning, CAD Drawing, Panorama, and Historic Research. Photogrammetry and Laser Scanning feed into Point Cloud, which then feeds into BIM Modelling. CAD Drawing and Panorama also feed into BIM Modelling. Historic Research feeds into the Cloud.
- BIM Process:** The central stage where BIM Modelling occurs, receiving input from the Data Collection stage.
- Output:** Divided into Off Site and On Site.
  - Off Site:** BIM Modelling outputs 2D Drawings, 3D Printing, 3D Video, and 3D Interactive Control. 2D Drawings also output QR Code.
  - On Site:** BIM Modelling outputs Detection. Detection outputs QR CODE, RFID, NFC, and AR. QR CODE, RFID, NFC, and AR all output to the HIM Console.
- Interface/ Application:** The Cloud acts as a central hub, connecting to various applications and teams:
  - Autodesk A360: Historical data to be stored and consolidated (ASD Heritage Team)
  - Autodesk BIM Glue: Online/ Offline Visualisation of HIM data (ASD Heritage Team)
  - Aconex: Collaboration Platform for Conservation/ Maintenance Works (Maintenance Team)
  - Fuzor: User Friendly Visualization of Model & Information (Tourists/ Potentially Maintenance Team)
  - Graphicsoft BIMX: Linkage of 3D and 2D HIM Information, Visualisation (Maintenance Team)
  - Ecodorus: Middleware for BIM Geometry and Existing/ New Maintenance Data (Maintenance Team)
  - Asset Information System: User-developed GIS System (ASD Heritage Team)



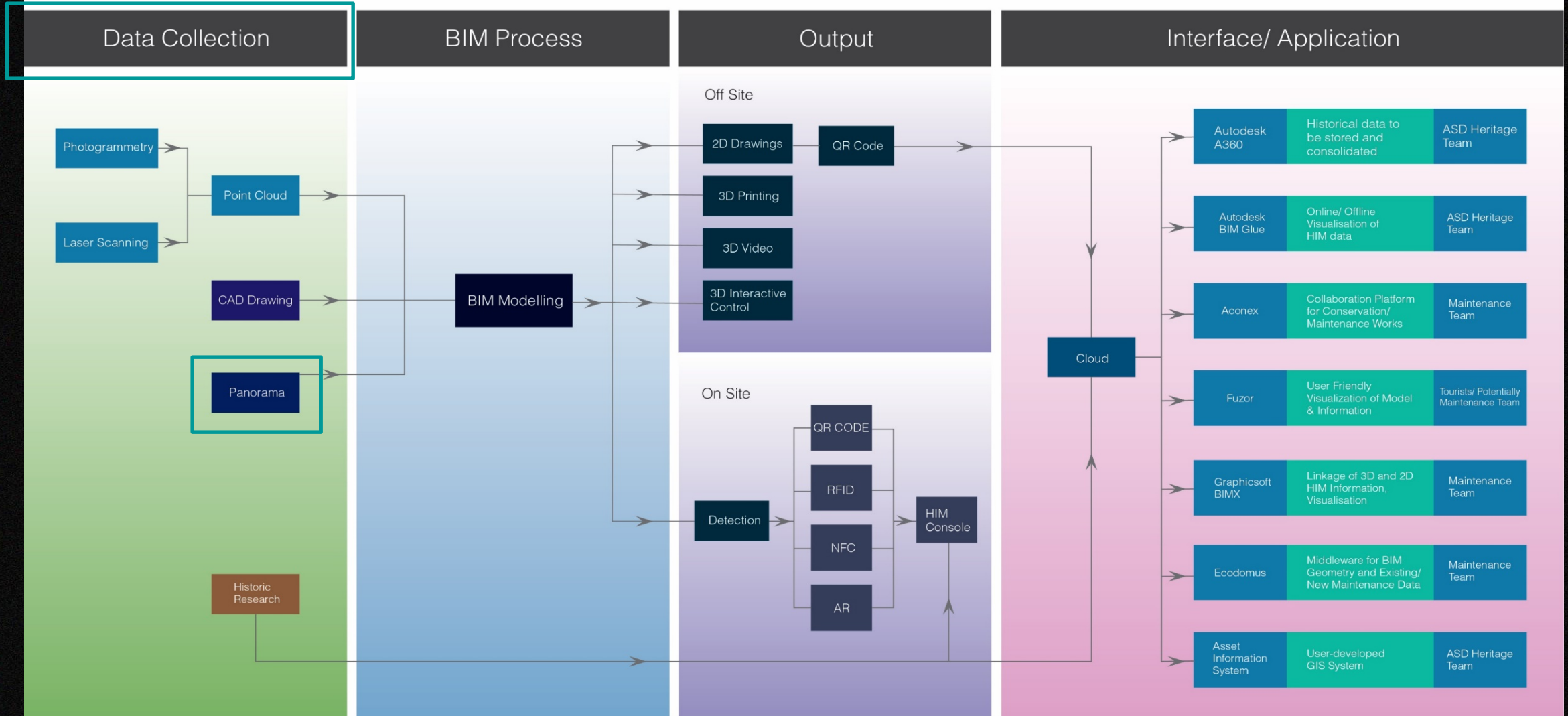
# As Built CAD Drawings





# HIM Framework

## Heritage Information Modelling Framework





# Panorama





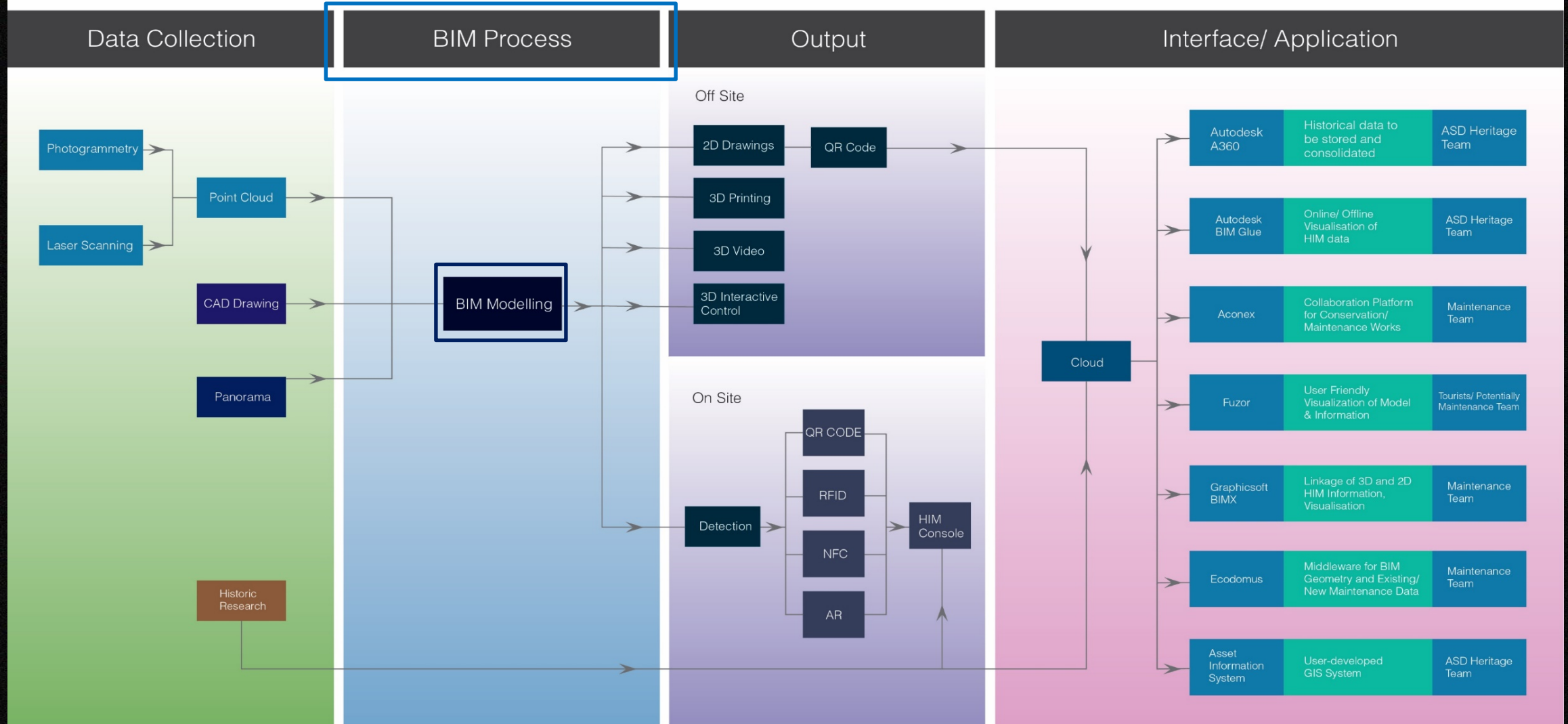
# BIM Process





# HIM Framework

## Heritage Information Modelling Framework





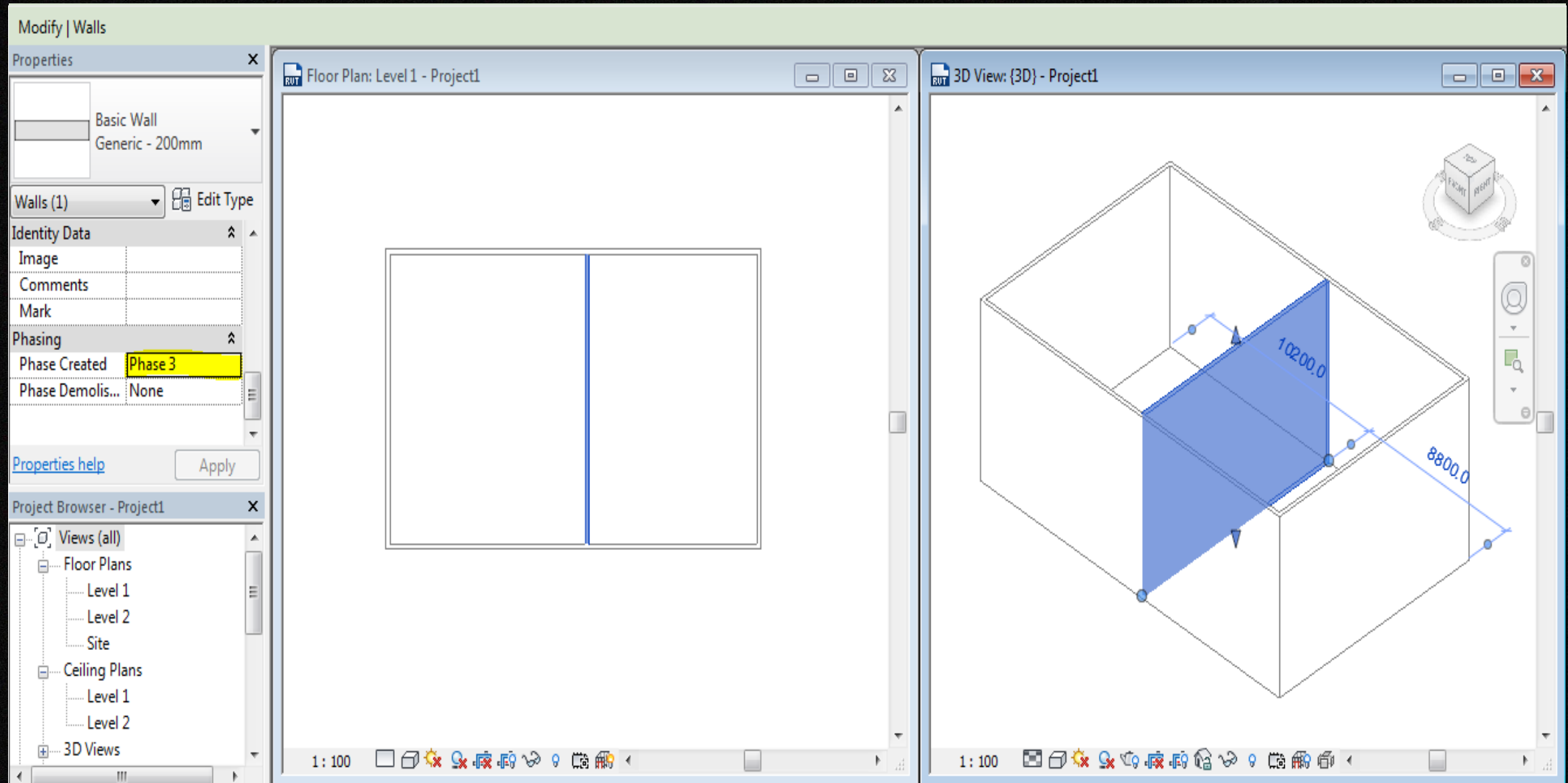
# BIM Process and Check List for HIM

BIM Process involves the building up of BIM elements from point cloud files, CAD information and the supplement of panorama and site photos. The common point of all data collection methods is the reference of existing geometry information. As illustrated in the HIM framework, all data collected will be integrated manually in revit for BIM process

- GIS data including Co-ordinations and Points
- 3D Spatial Data (3D-BIT00) Maps from Lands Department
- Tree Survey Plan
- Breaking up of Files
- Timeline (phase setting)
- CAD reference
- Point Cloud from Aerial Photogrammetry
- Point Cloud from Close Up Photogrammetry
- Point Cloud from Laser Scanning
- Reference from Panorama
- Materials and colour
- Product Catalogue
- O&M information/record
- Aerial photos of district in past years
- District maps of heritage in past years
- Any records of renovation inside(past CAD, Documents to mark up all changes)
- Defining CDEs from heritage report

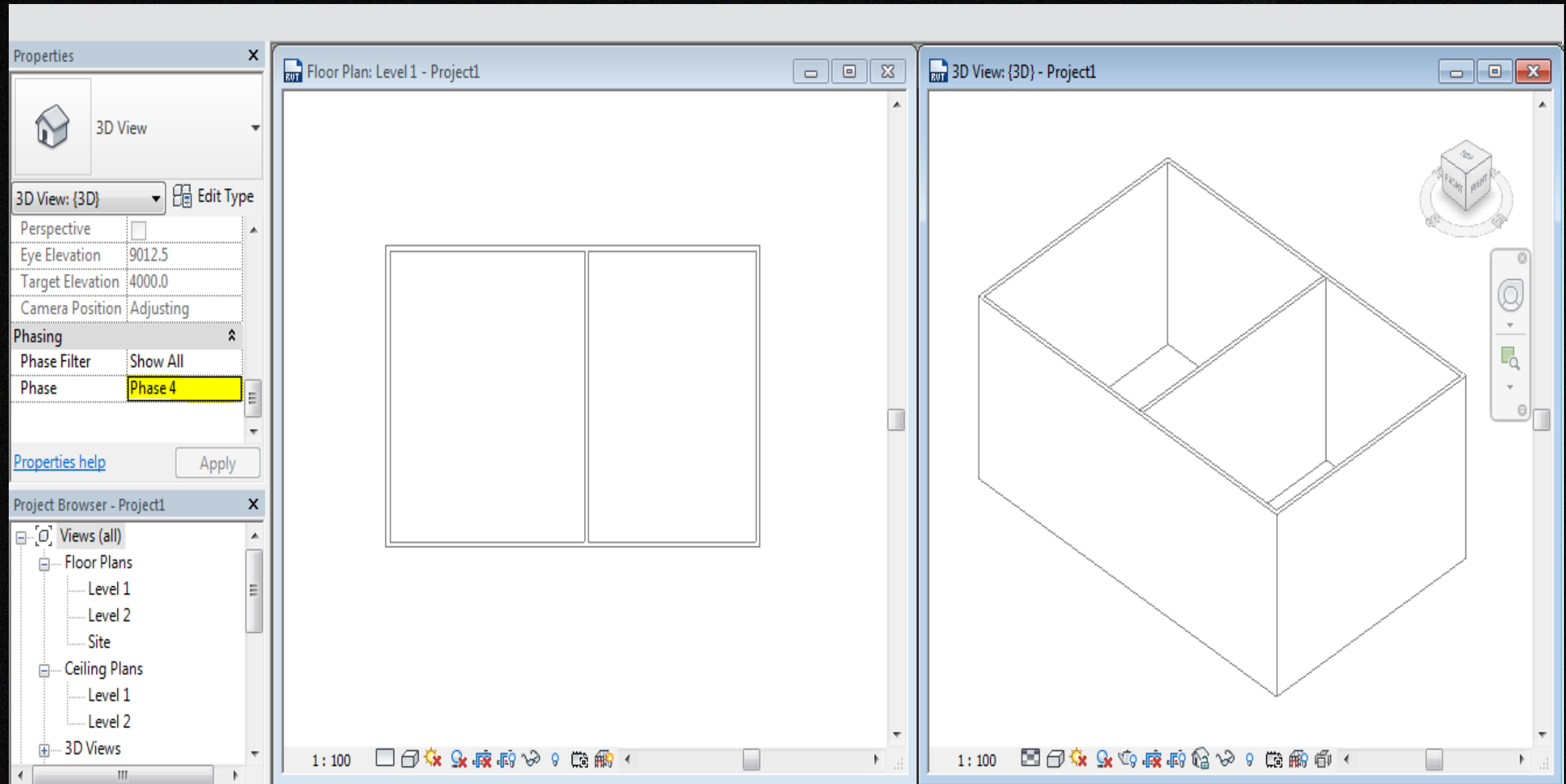


# Timeline - Phasing





# Timeline - Phasing



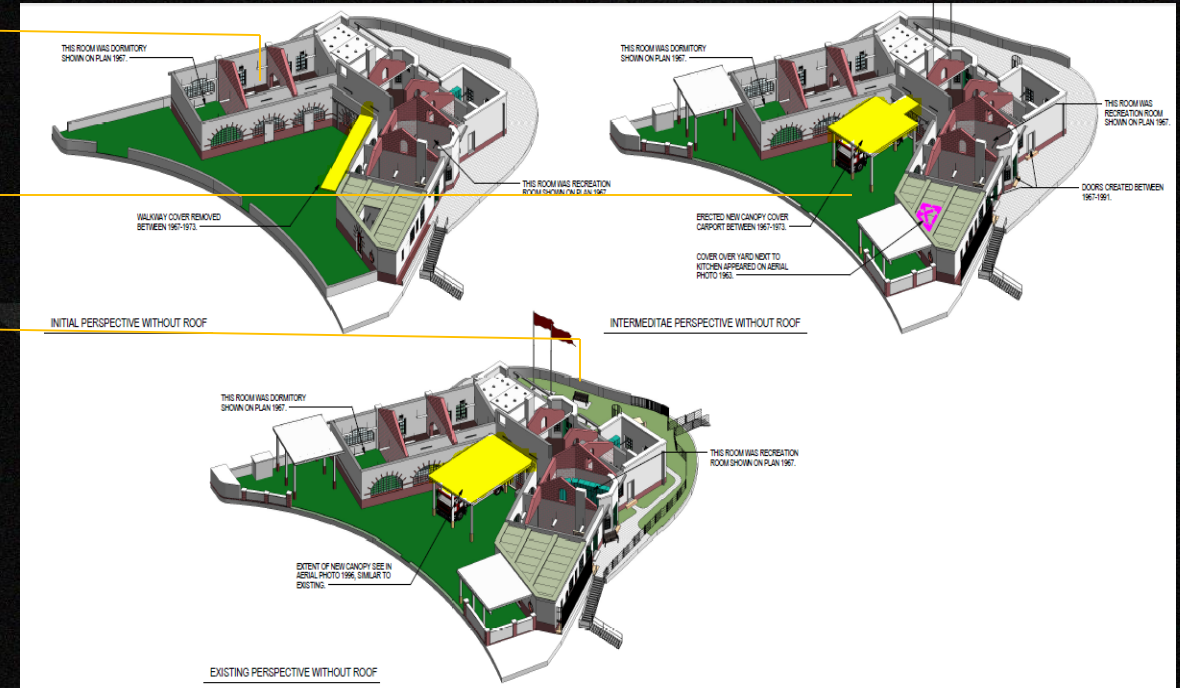


# Phasing

Initial Stage – Original School configuration

Intermediate Stage -1967 when the School was converted to a Fire Station

**Existing Stage** – the current status as it stands



Phase 1 = Phase 1 (Initial)

Phase 2 = Phase 1 + Phase 2

Phase 3 = Phase 1 + Phase 2 + Phase 3

Phase 4 = Phase 1 + Phase 2 + Phase 3 + Phase 4



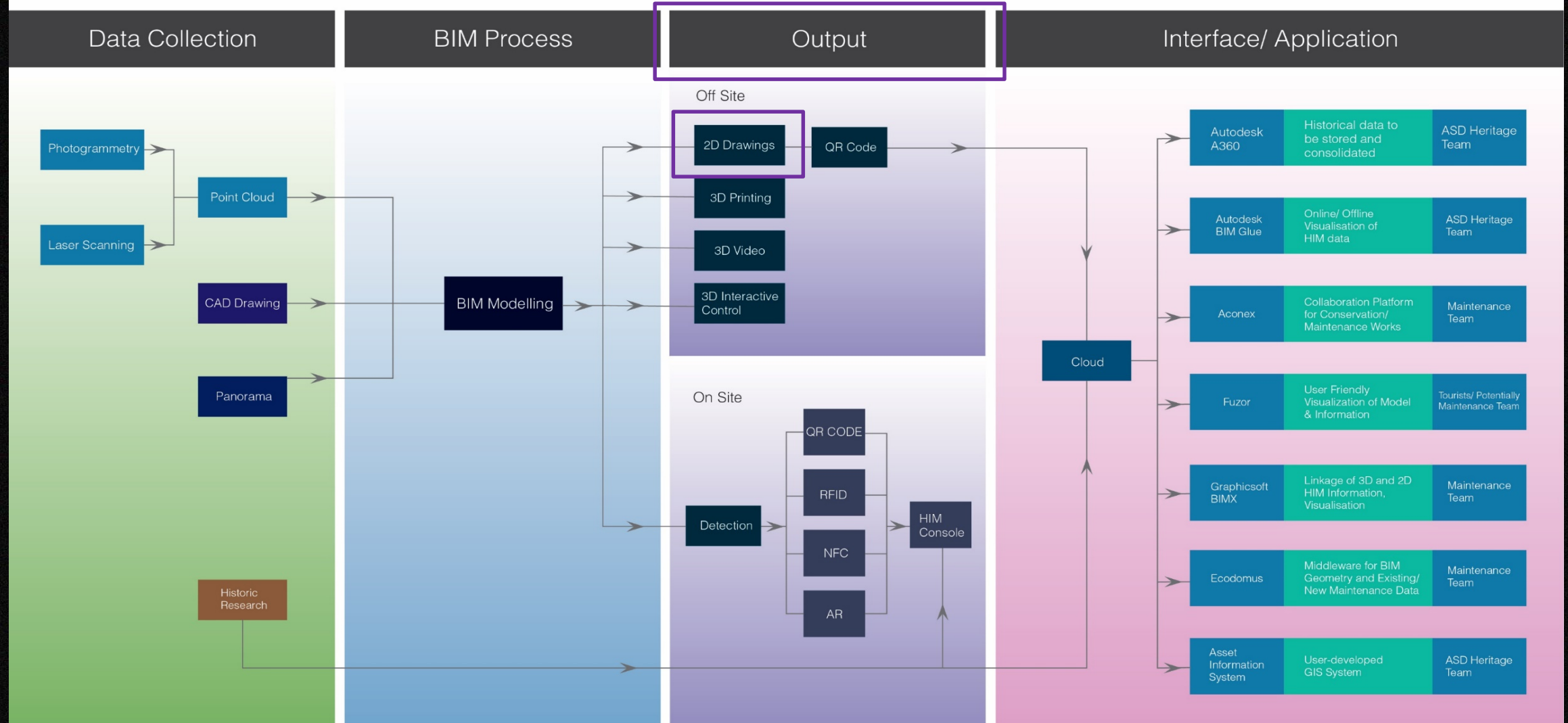
# Output





# HIM Framework

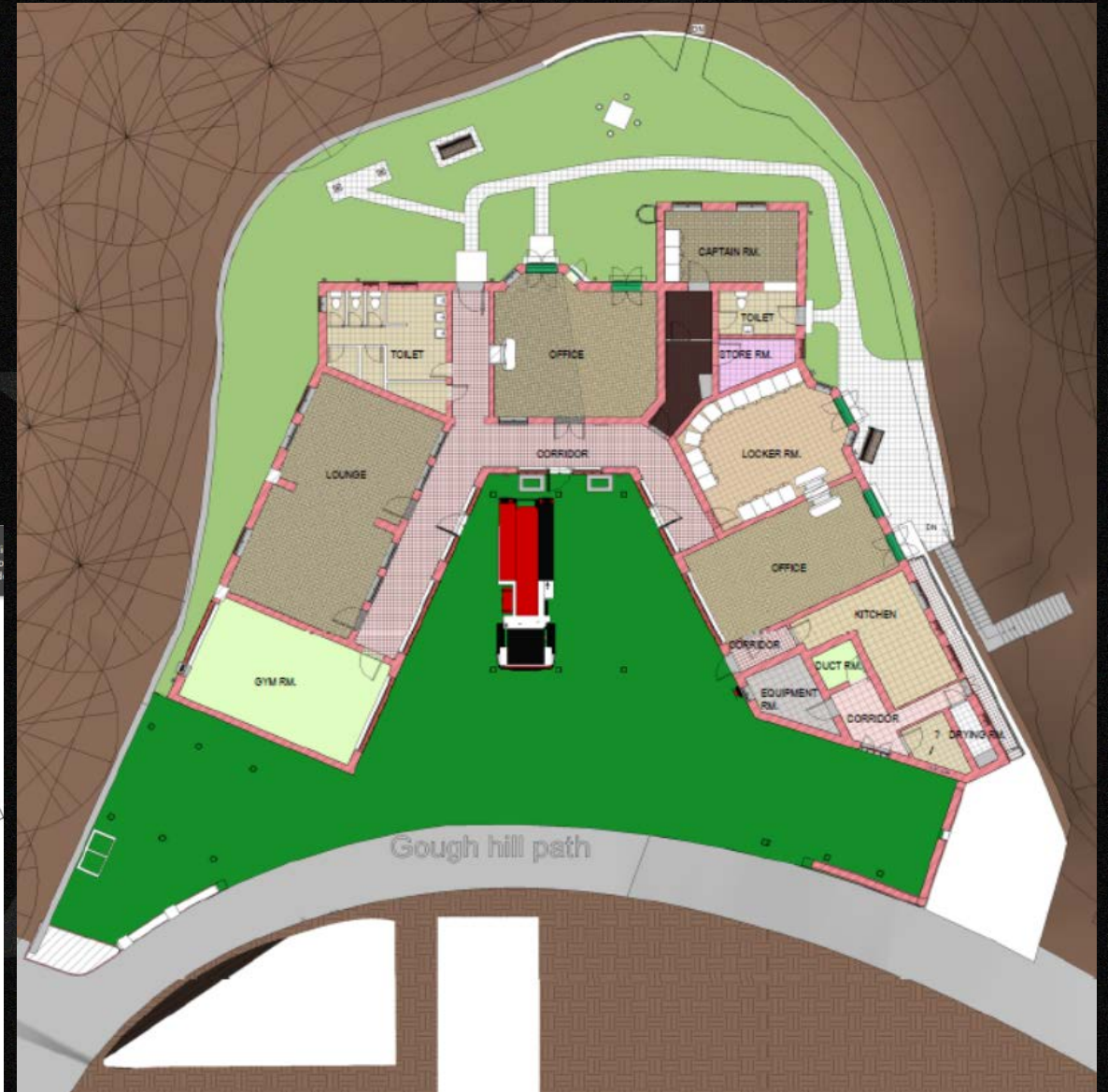
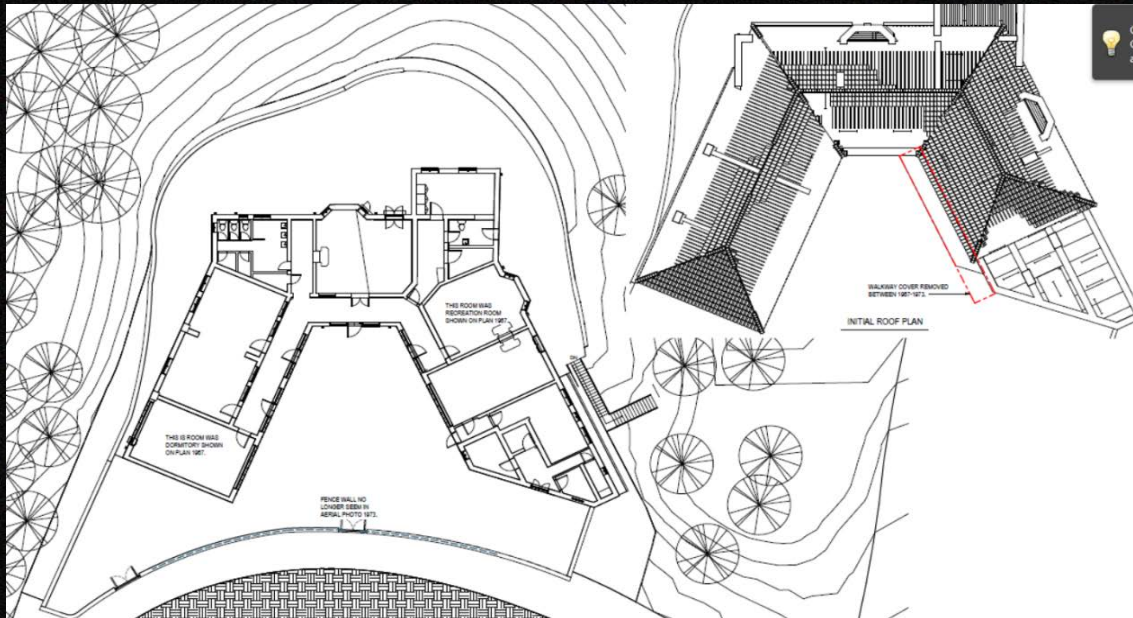
## Heritage Information Modelling Framework





# Output (Off-site) 2D Drawings

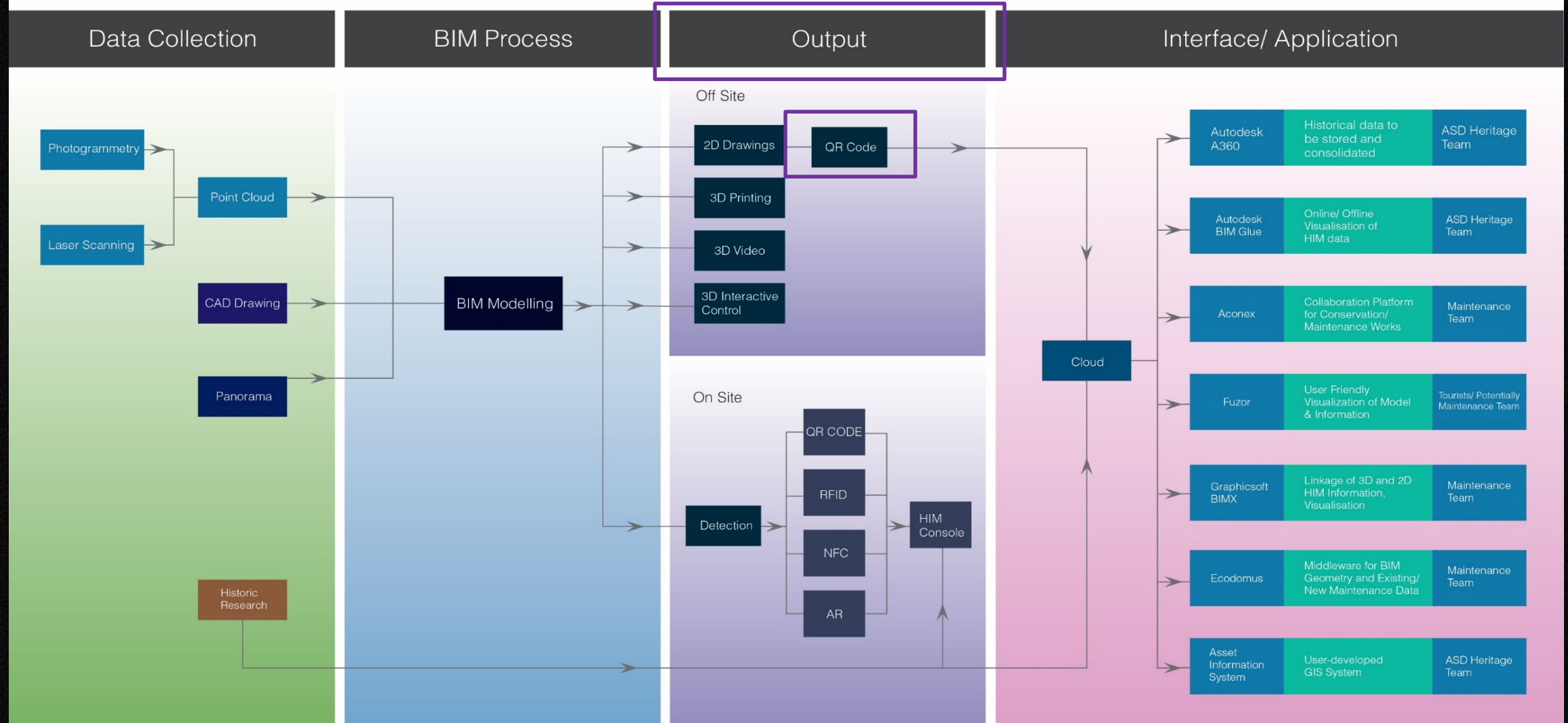
Production of traditional drawings



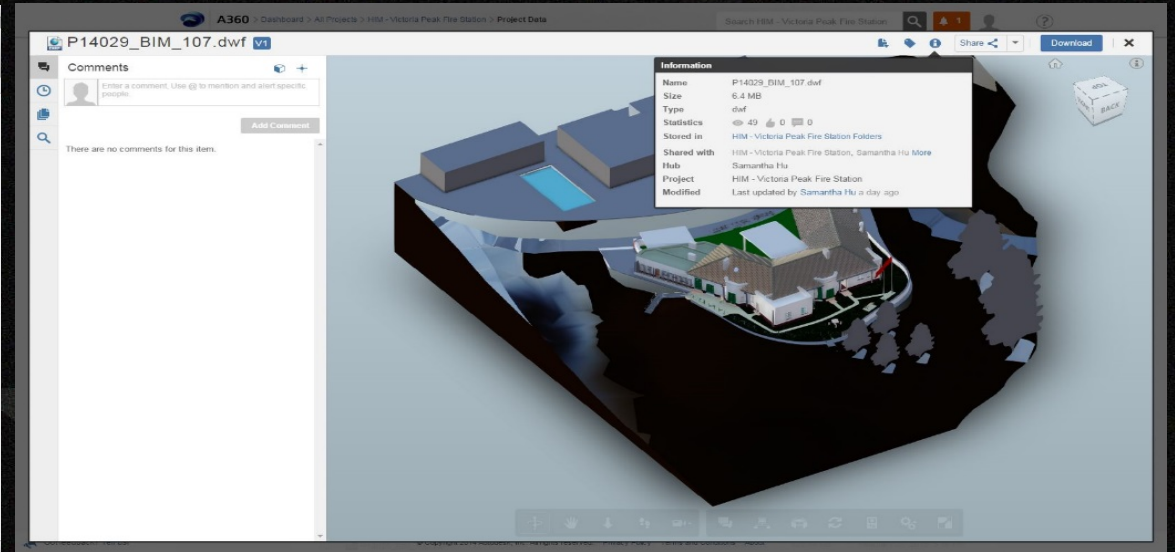


# HIM Framework

## Heritage Information Modelling Framework



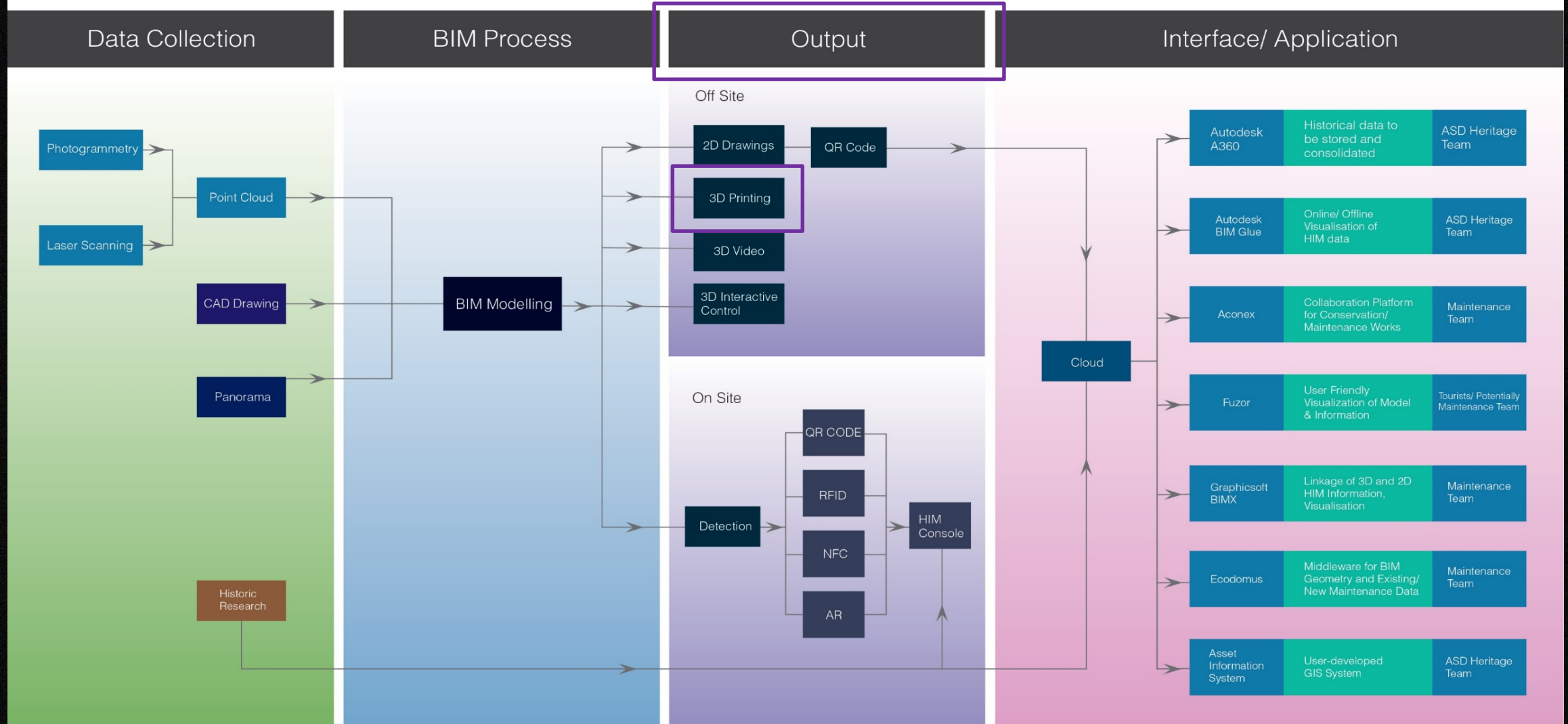






# HIM Framework

## Heritage Information Modelling Framework



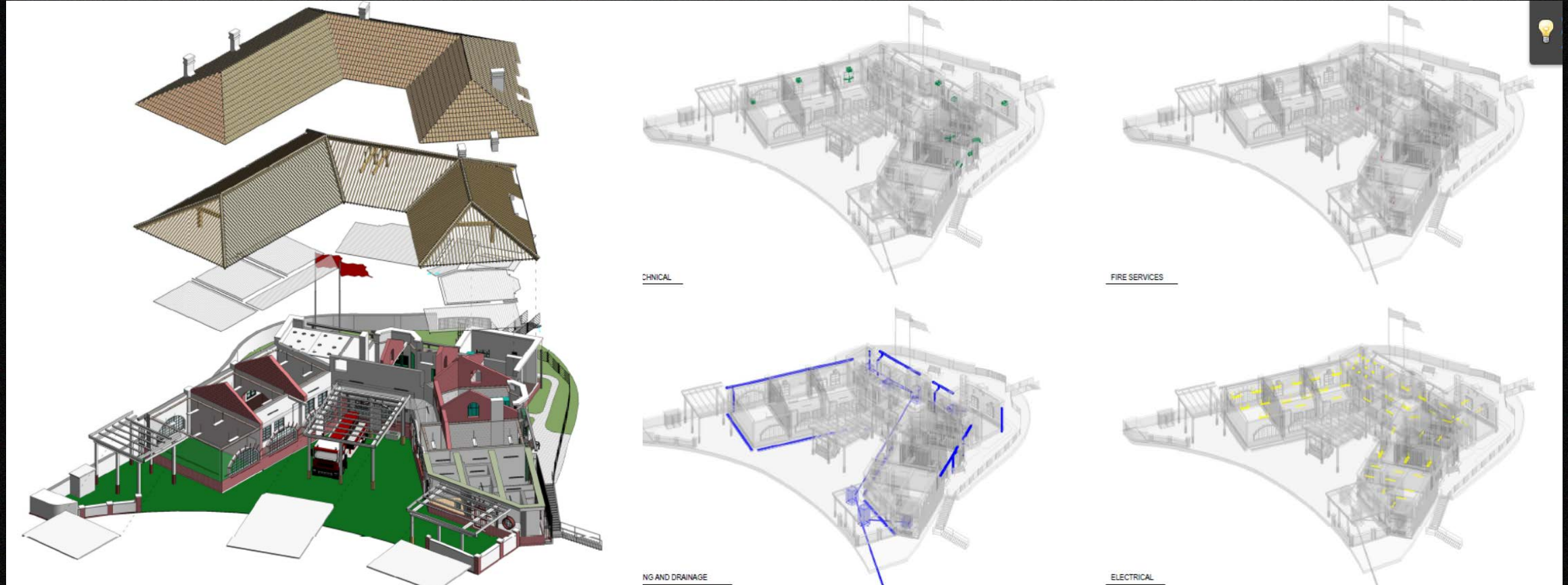


# Output (Off-site) Renderings





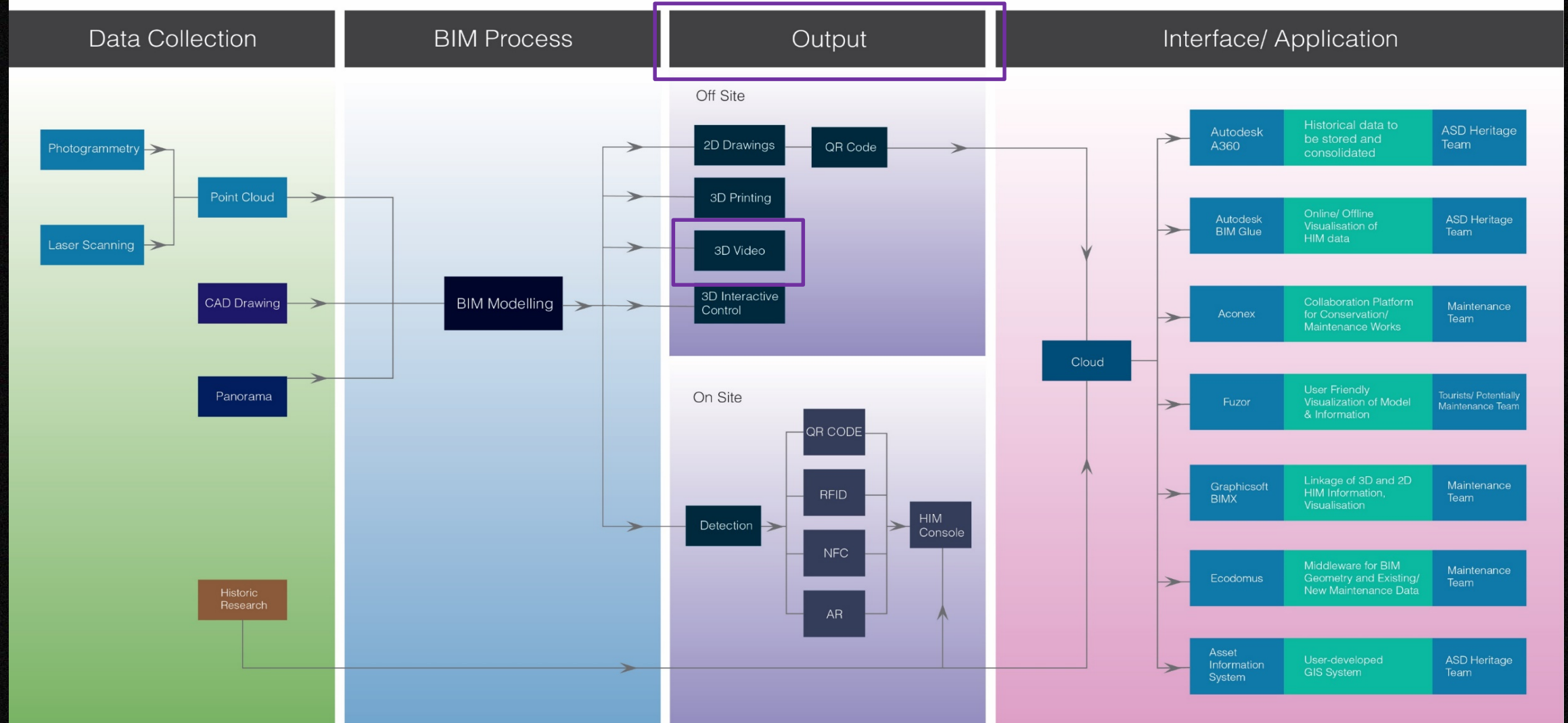
# Output (Off-site) 3D Drawings





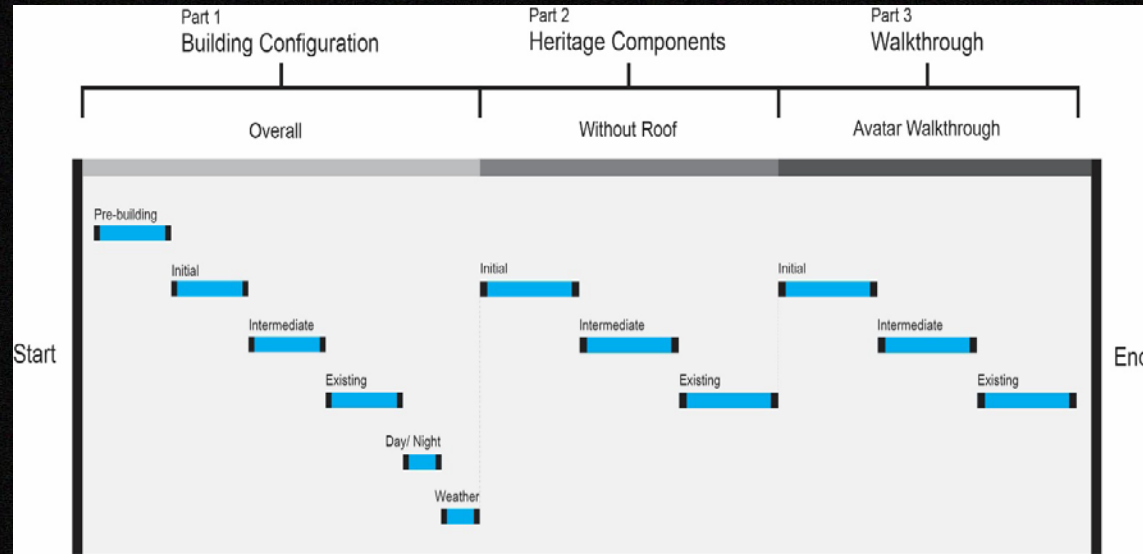
# HIM Framework

## Heritage Information Modelling Framework





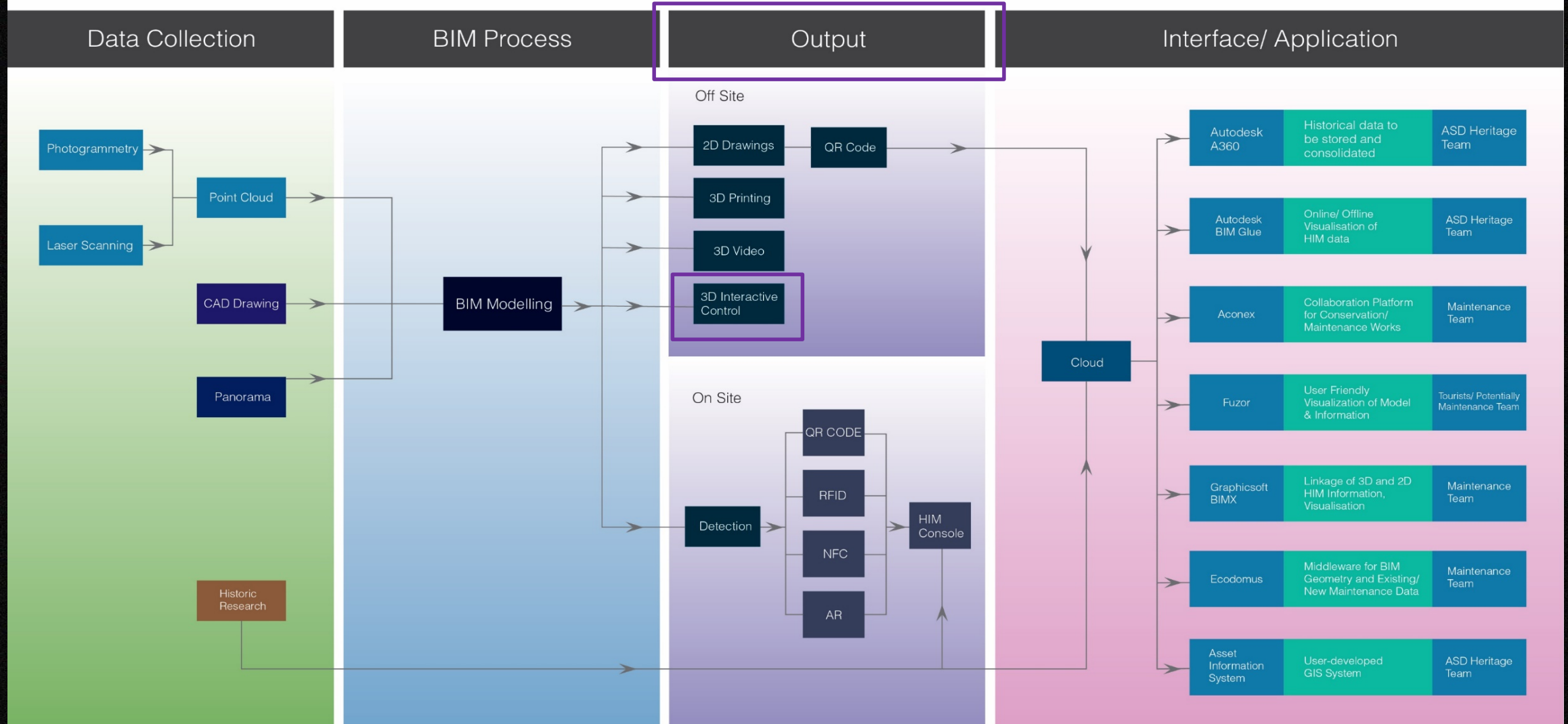
# Output (Off-site) 3D Video





# HIM Framework

## Heritage Information Modelling Framework





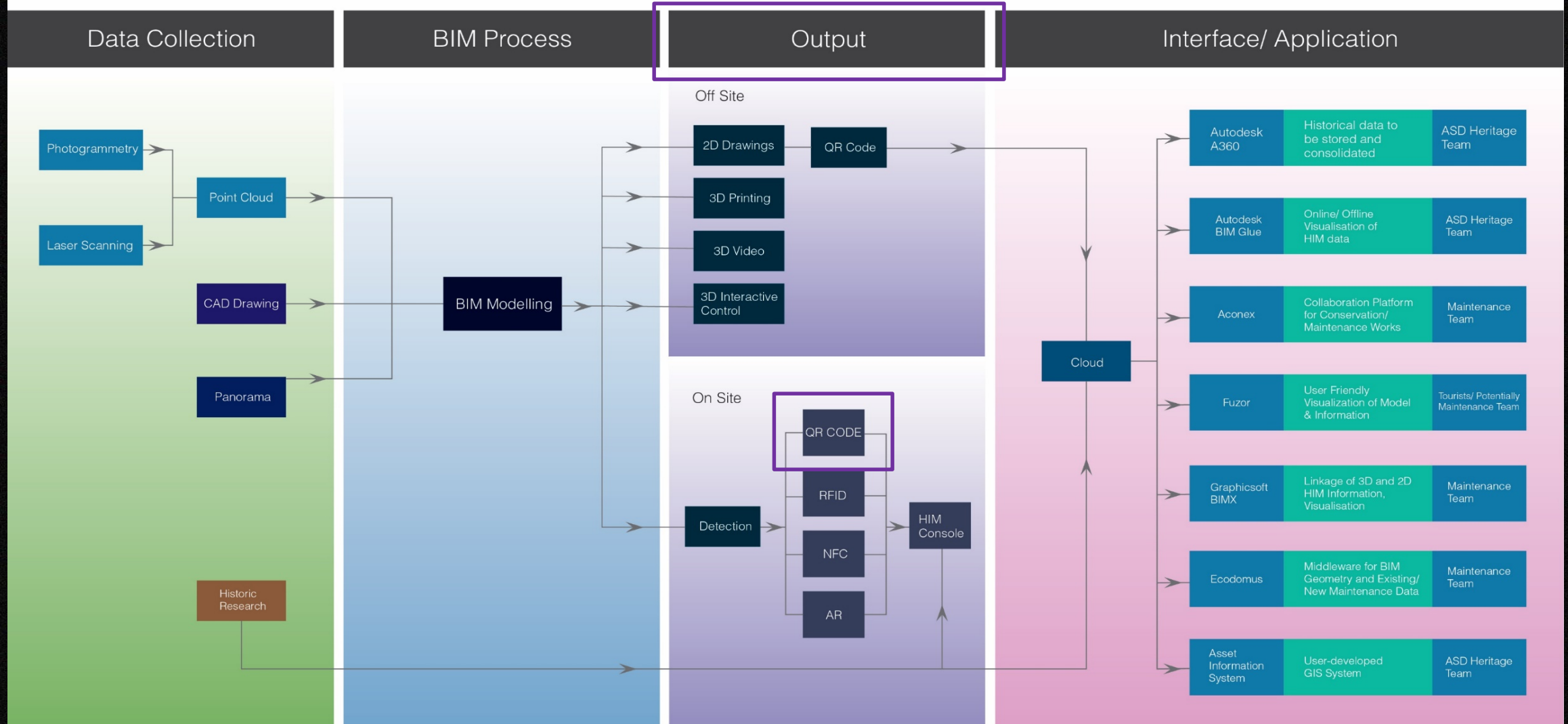
# Output (Off-site) 3D Interactive Tool - Fuzor





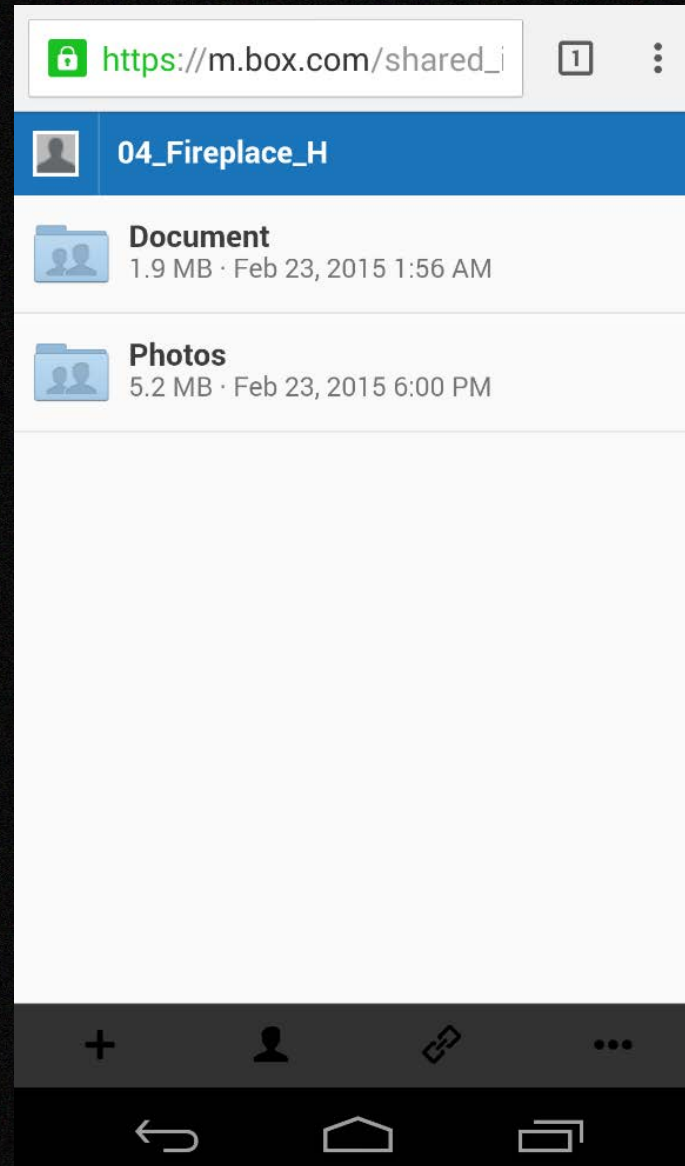
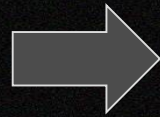
# HIM Framework

## Heritage Information Modelling Framework





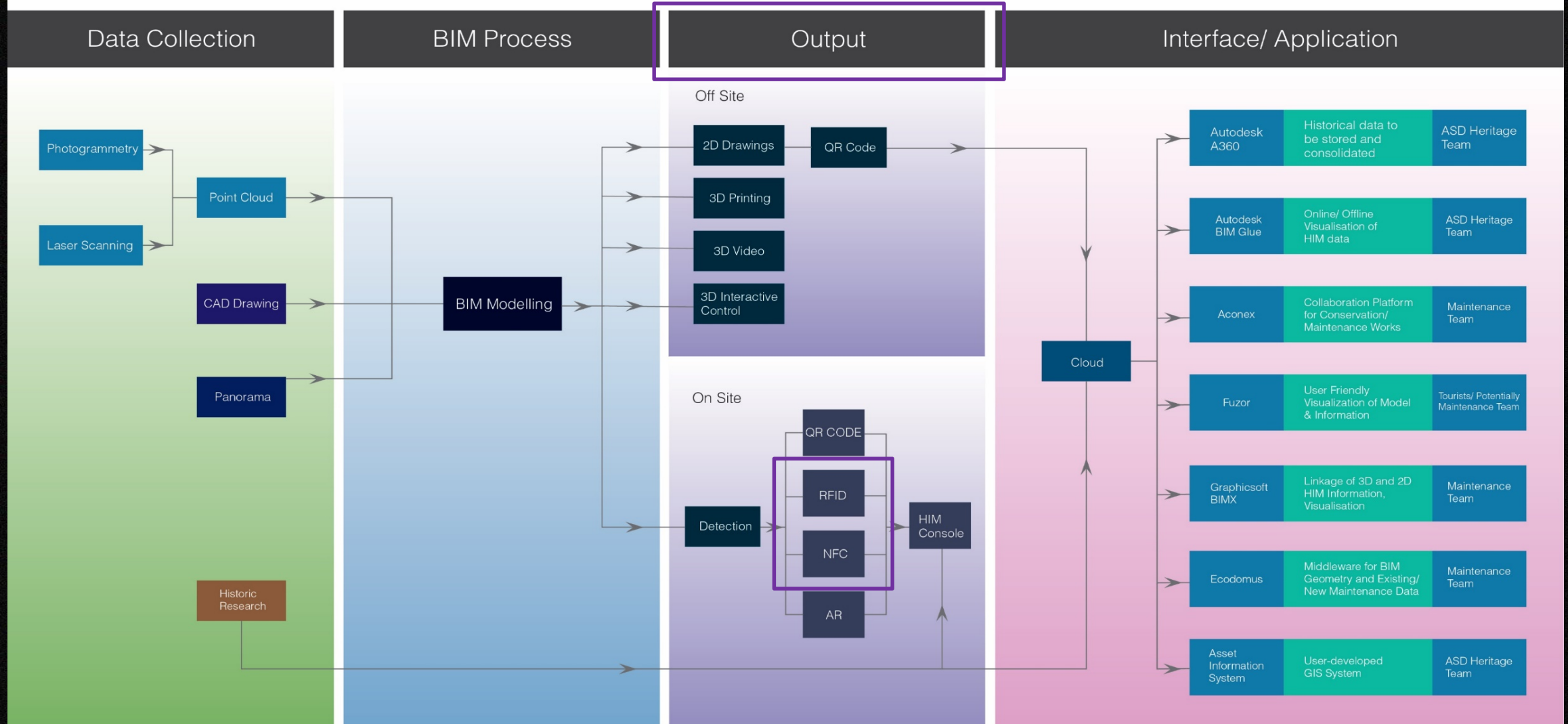
# Detection - QR Code





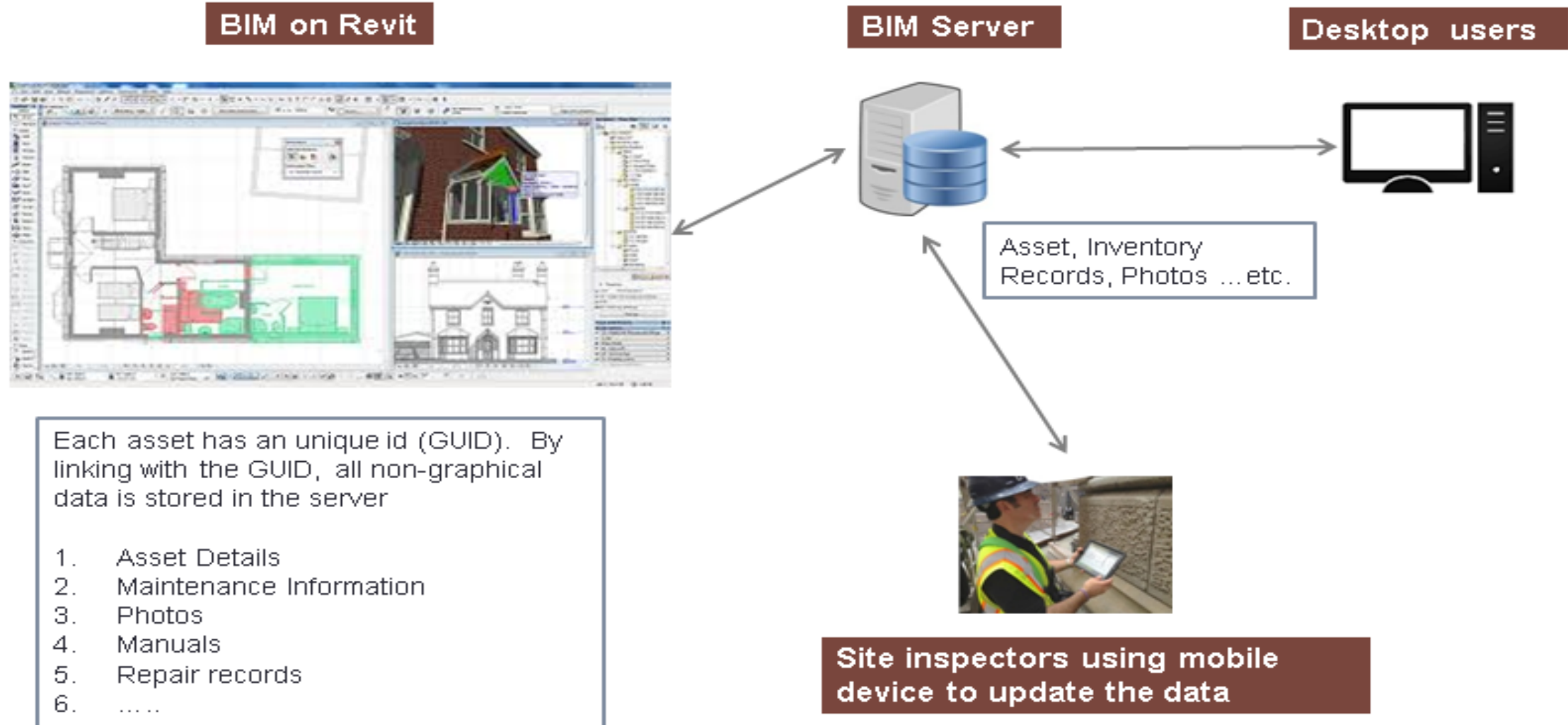
# HIM Framework

## Heritage Information Modelling Framework





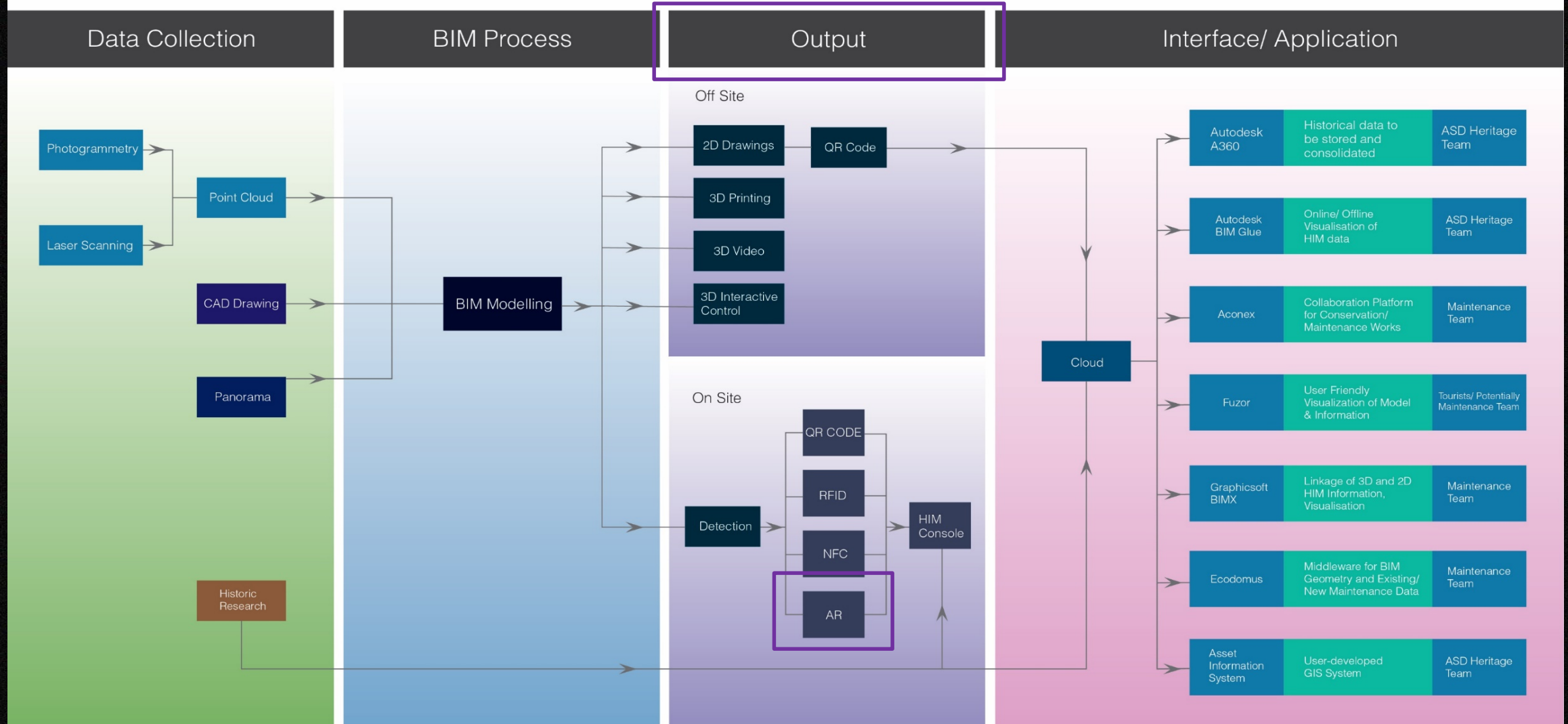
# Detection - RFID and NFC





# HIM Framework

## Heritage Information Modelling Framework





# Detection - Augmented Reality

Microsoft Kinect ONE



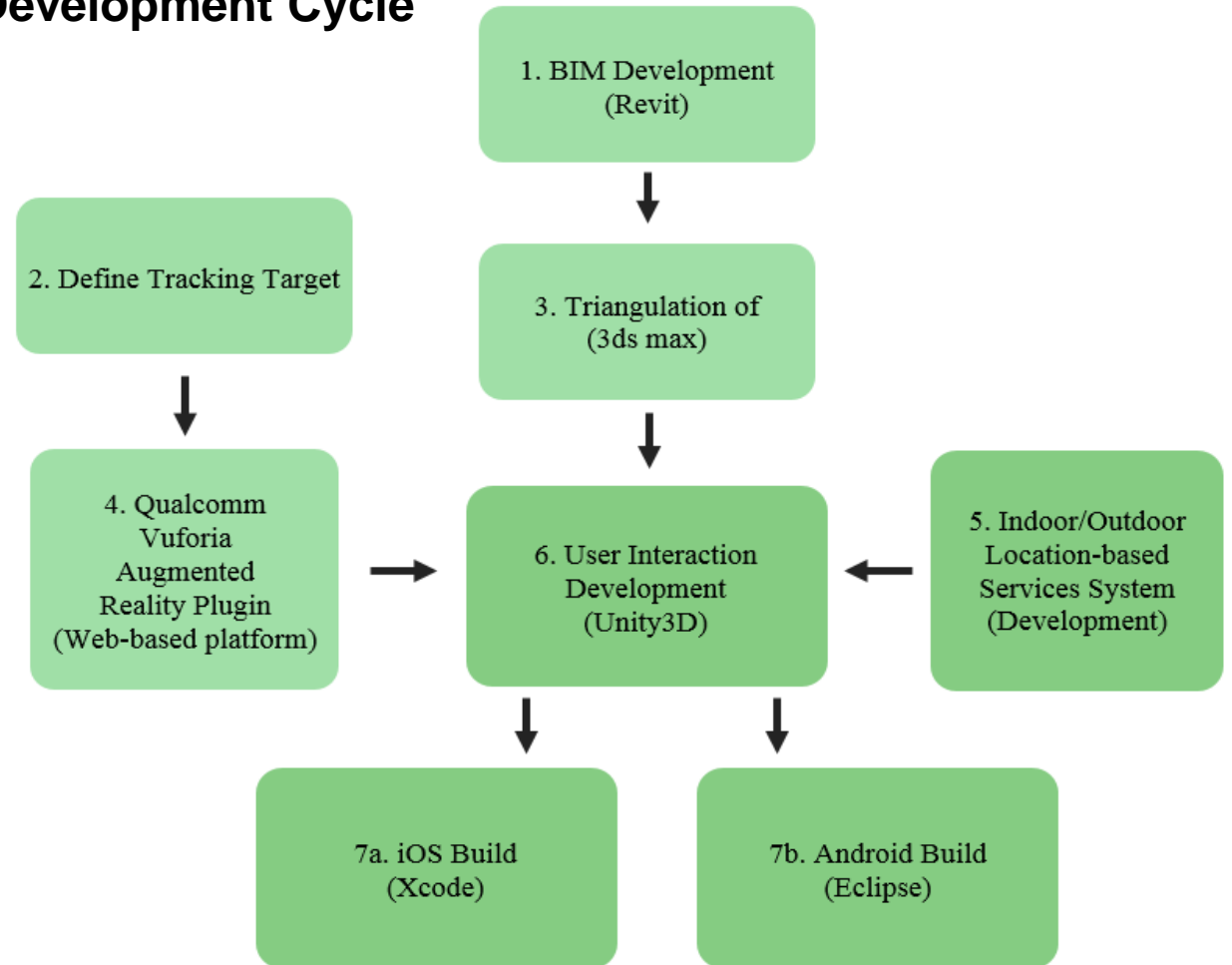
Google Project Tango



Microsoft Hololens



## Development Cycle





# Detection - Augmented Reality

## Implementation



Capturing the site GIS data  
for best viewing area



Screen capture



Future possibilities of prototyping  
Simulate and map non-existing  
groups of buildings / environment  
for users' vision (outdoor)

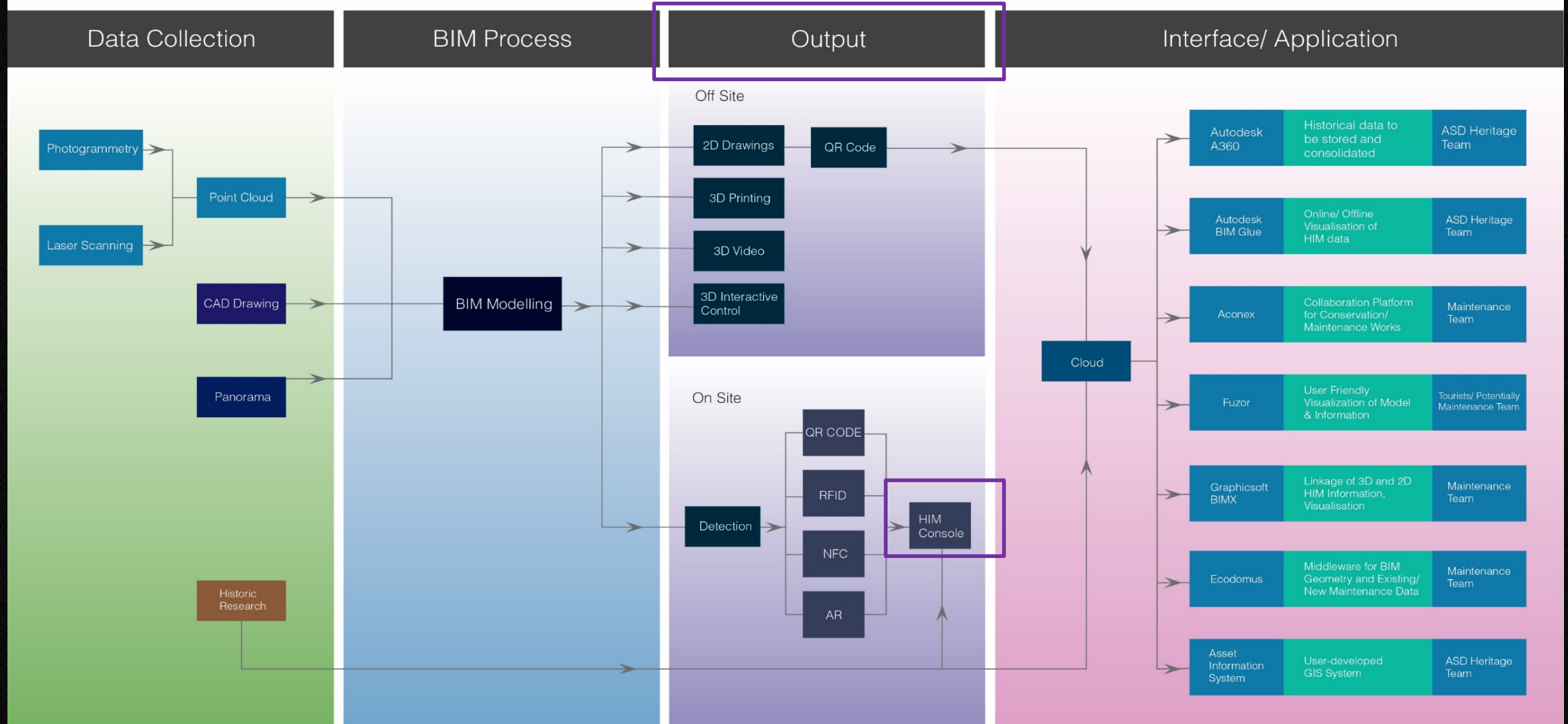


Building Maintenance  
Applications using Augmented  
Reality 3D Tracker



# HIM Framework

## Heritage Information Modelling Framework





# Detection HIM Console

Username: admin  
Password: admin

Admin login  
requires username  
and password

admin

\*\*\*\*\*

Admin Visitor

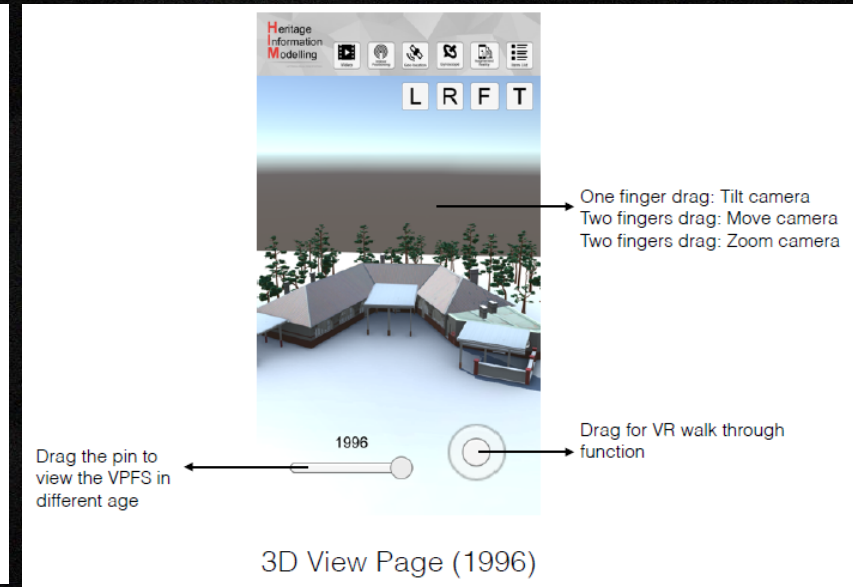
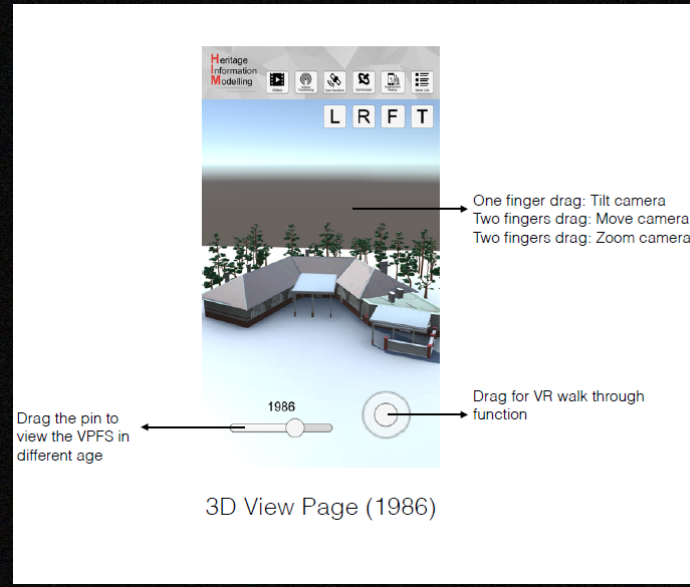
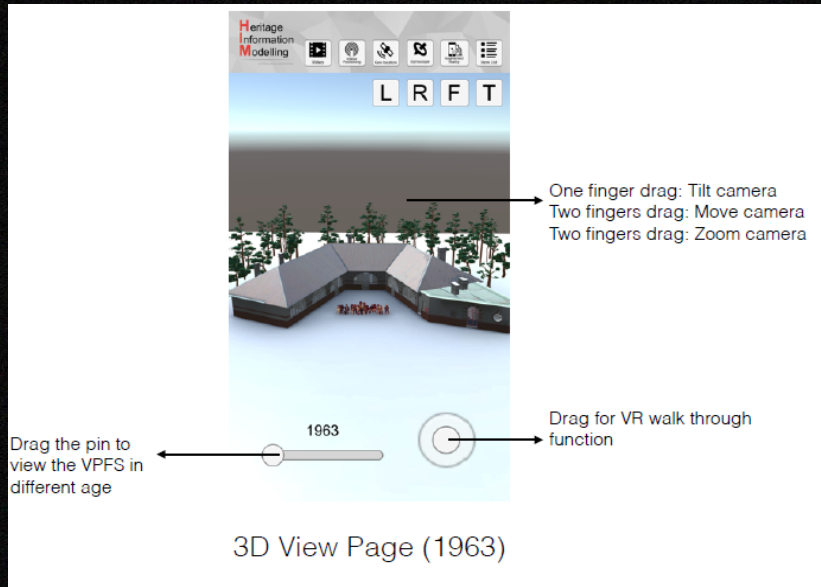
Architectural Services Department NCID

Login is not  
required for Visitor  
login

Login Page

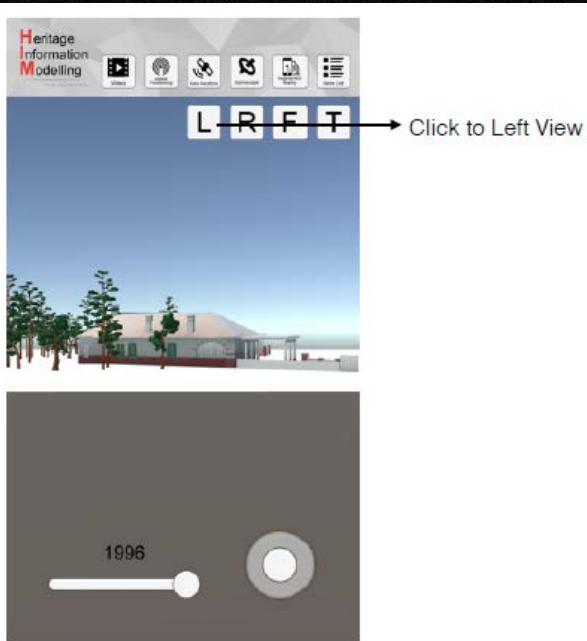


# Detection HIM Console

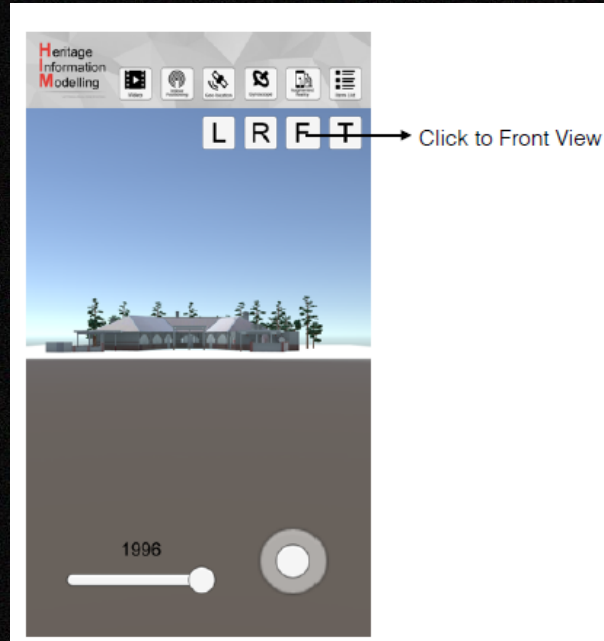




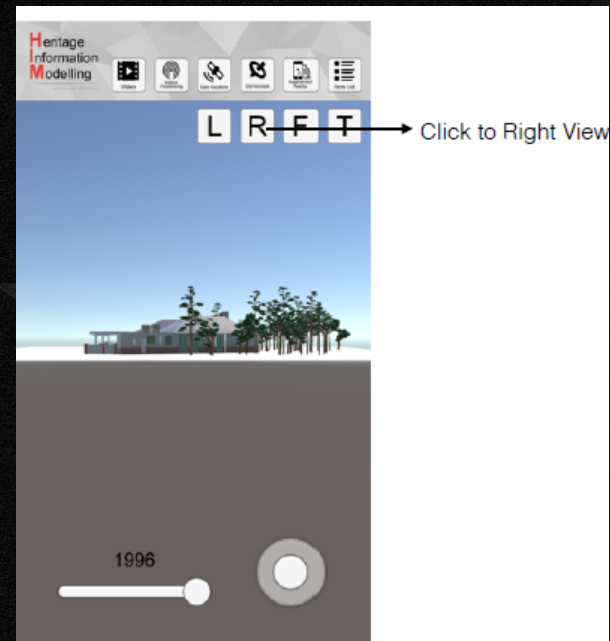
# Detection HIM Console



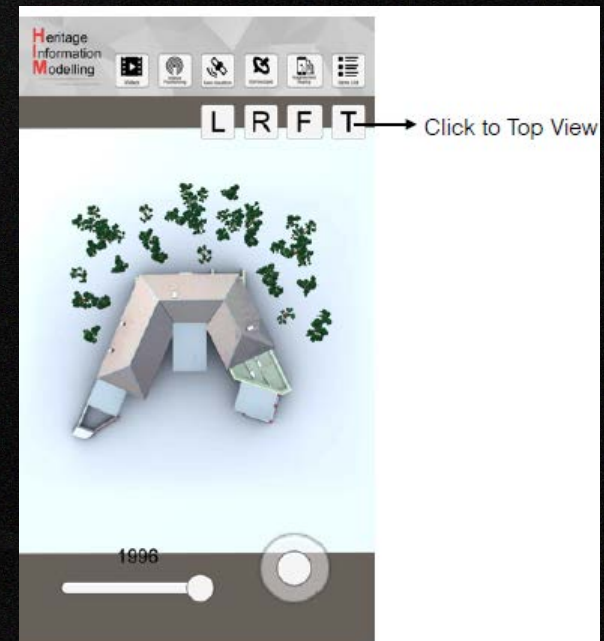
3D View Page (Left)



3D View Page (Front)



3D View Page (Right)



3D View Page (Top)



# Detection HIM Console

Camera mapping with the iBeacon signal



Indoor positioning mode  
Current camera located by indoor positioning system (iBeacon)

Drag the pin to view the VPFS in different age

VR walk through function locked, indoor positioning override the camera movement control

3D View Page (Indoor positioning mode)



Historical item list

FIREPLACE

LOW\_ARCH WINDOW

BRICK WALL W/ CIRCULAR ARCH

BAY WINDOW

BRASS PLAGUE

OLD HANGING LIGHT

OLD ALARM BELL

FLUORESENT LAMP

FIRE EXTINGUISHER

ROOF AND CHINESE TILES

SITE CHANGE

Click to view item detail (multimedia)

Historical Item List Page



# Detection HIM Console

Camera mapping  
with the iBeacon  
signal

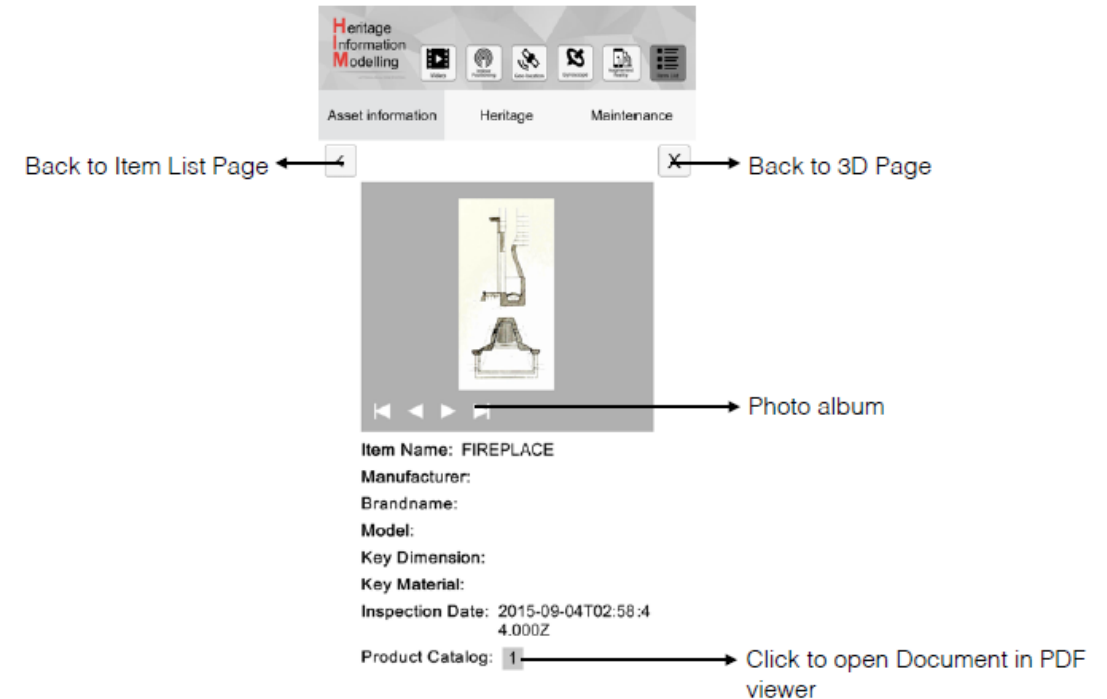


Click on the dot to view  
historical / maintenance details

Drag the pin to  
view the VPFS in  
different age

VR walk through function  
locked, indoor positioning  
override the camera movement  
control

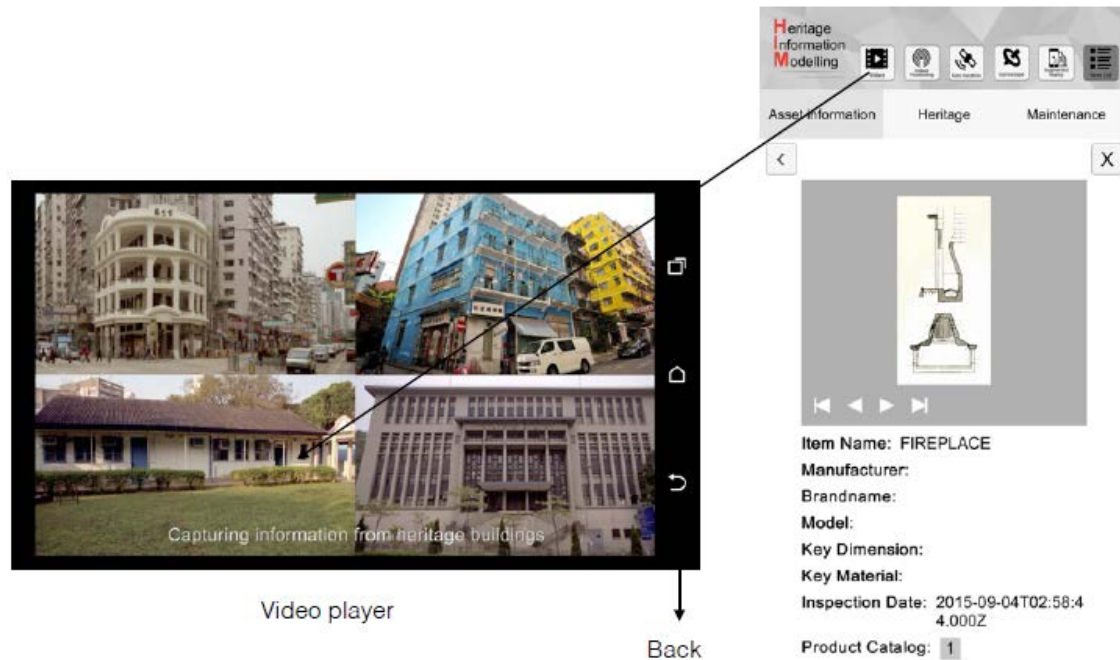
3D View Page (Indoor positioning mode)



Asset Information Page (Admin login ONLY)



# Detection HIM Console



Video Player Page



Old Light Switch Page



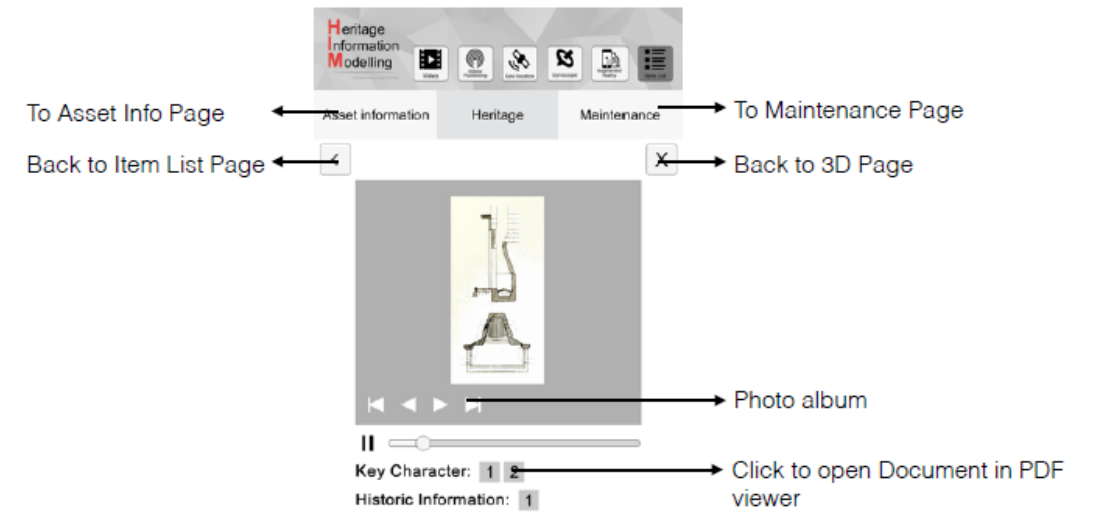
Recognition Sample



# Detection HIM Console



PDF / Document Page



Heritage Information Page (Admin and Visitor)



# Detection HIM Console



Fireplace Page

Recognition Sample



Low Arch Window

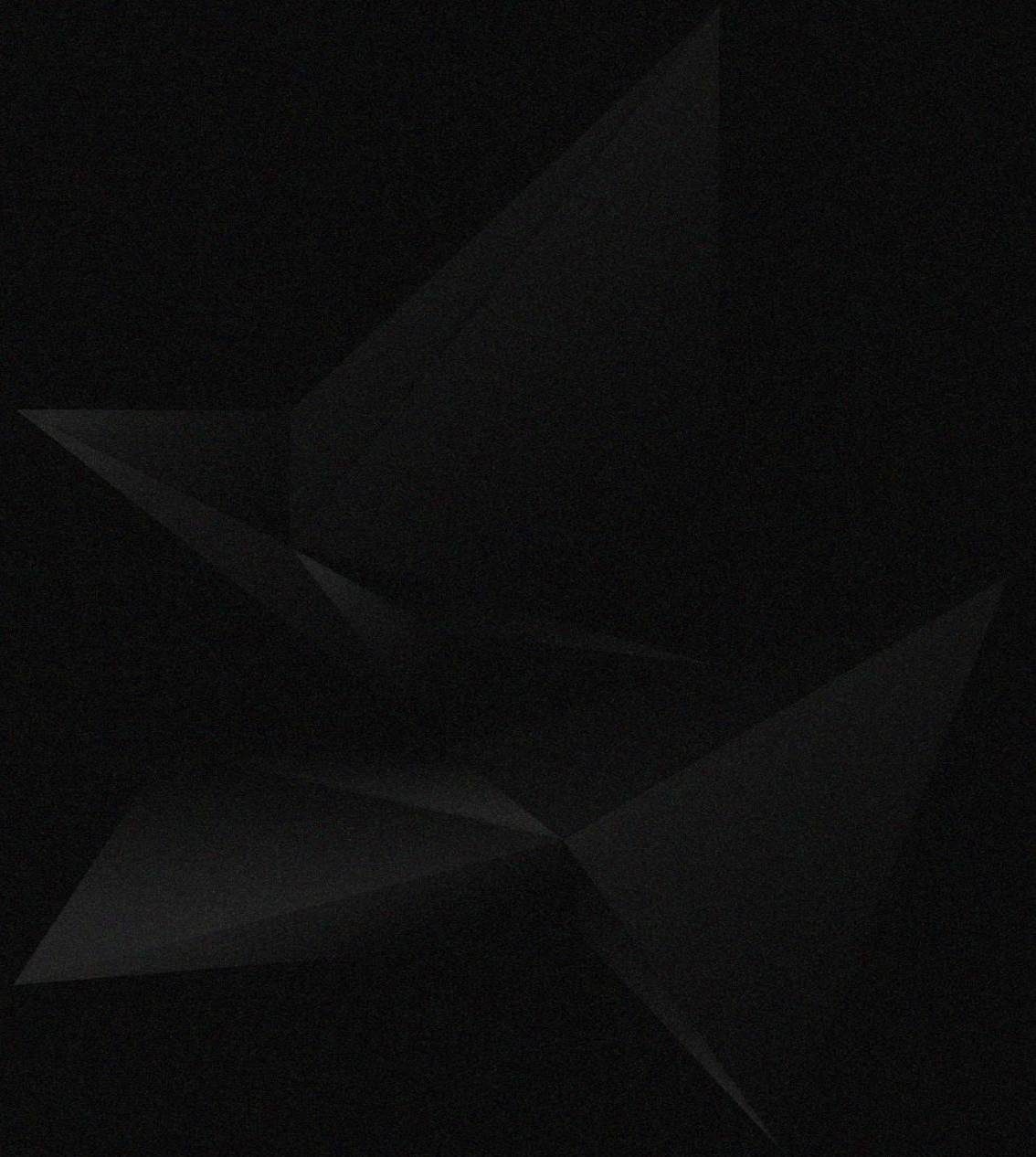


Old Alarm Bell

QR Code



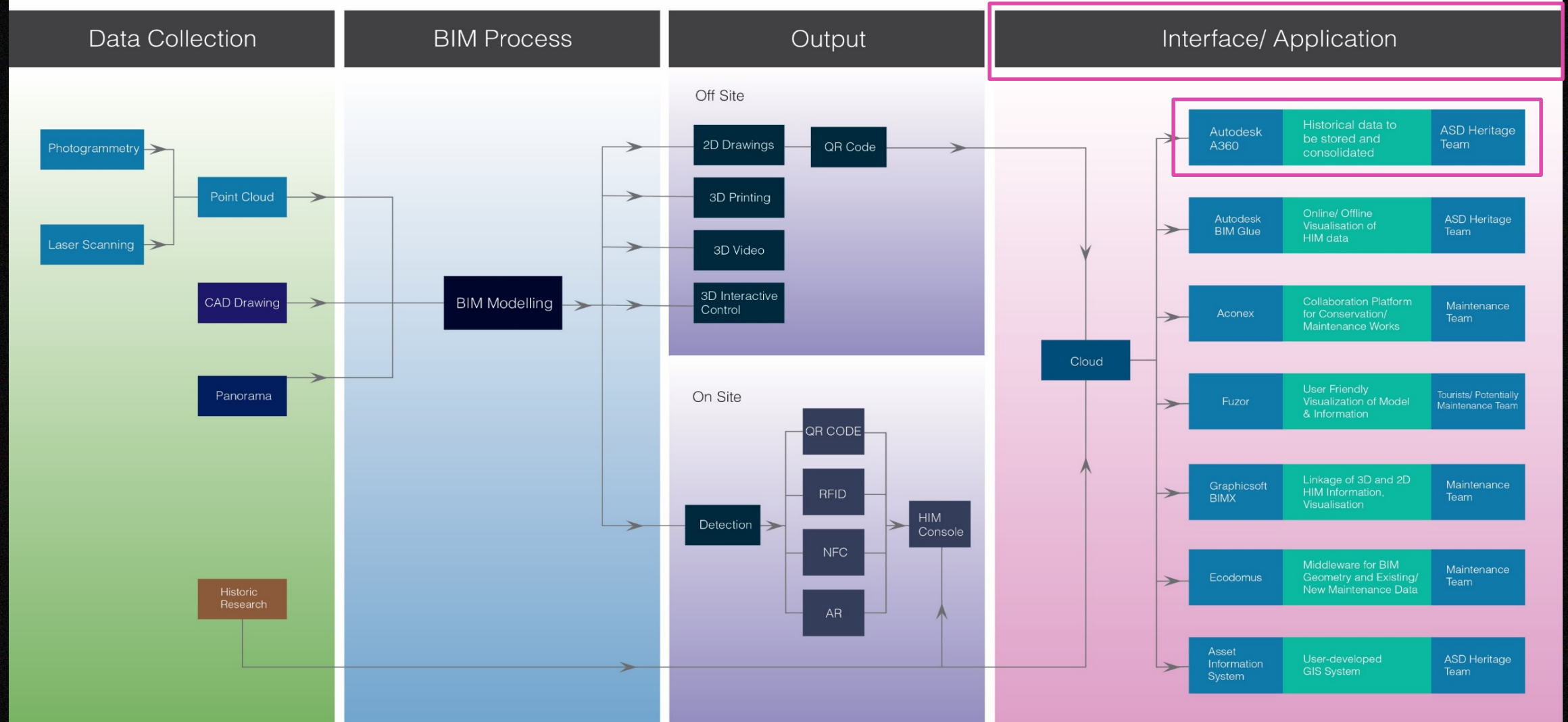
# Cloud





# HIM Framework

## Heritage Information Modelling Framework





# Cloud – Autodesk 360 / Design Review

The image displays four screenshots of the Autodesk 360 Design Review interface, illustrating the workflow for reviewing a 3D model and its associated 2D drawings.

**Top Left Screenshot:** Shows the 3D model of a building. The interface includes a 'Comments' panel on the left and a 'Project Data' panel on the right. The 3D model is a perspective view of a building with a red flag on top.

**Top Right Screenshot:** Shows the 'PROJECT DATA' panel. It lists the project files and their details.

Name	Owner	Type	Size	Last modified
20150228 to A360	Samantha Hu	Folder	0 KB	February 28, 2015, 5:32 PM
Information of HIM	Adrian Tse	Folder	1.54 MB	February 17, 2015, 4:40 PM
P14029_BIM_117.dwf	Samantha Hu	CAD file	3.36 MB	February 25, 2015, 5:36 PM
P14029_BIM_115.dwf	Samantha Hu	CAD file	436.15 KB	February 25, 2015, 5:36 PM
P14029_BIM_116.dwf	Samantha Hu	CAD file	647.42 KB	February 25, 2015, 5:36 PM
P14029_BIM_114.dwf	Samantha Hu	CAD file	332.35 KB	February 25, 2015, 5:36 PM
P14029_BIM_113.dwf	Samantha Hu	CAD file	6.95 MB	February 25, 2015, 5:36 PM
P14029_BIM_112.dwf	Samantha Hu	CAD file	6.45 MB	February 25, 2015, 5:36 PM
P14029_BIM_111.dwf	Samantha Hu	CAD file	4.46 MB	February 25, 2015, 5:36 PM
P14029_BIM_110.dwf	Samantha Hu	CAD file	626.42 KB	February 25, 2015, 5:36 PM
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P14029_BIM_108.dwf	Samantha Hu	CAD file	506.95 KB	February 25, 2015, 5:36 PM
P14029_BIM_107.dwf	Samantha Hu	CAD file	6.17 MB	February 25, 2015, 5:36 PM
P14029_BIM_106.dwf	Samantha Hu	CAD file	5.79 MB	February 25, 2015, 5:36 PM
P14029_BIM_105.dwf	Samantha Hu	CAD file	2.94 MB	February 25, 2015, 5:36 PM
P14029_BIM_104.dwf	Samantha Hu	CAD file	334.38 KB	February 25, 2015, 5:36 PM
P14029_BIM_101.dwf	Samantha Hu	CAD file	440.87 KB	February 25, 2015, 5:36 PM

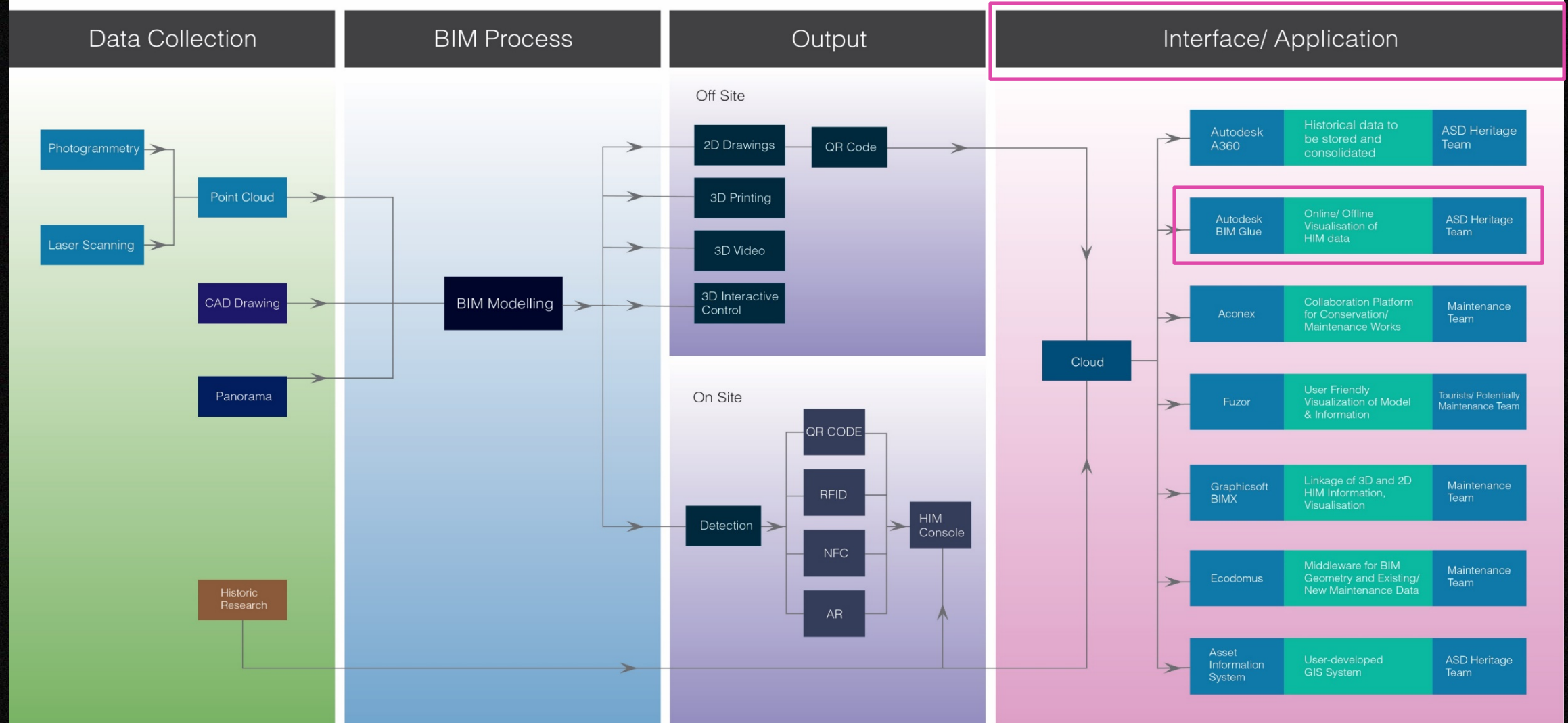
**Bottom Left Screenshot:** Shows the 3D model with an 'Information' panel open, displaying details for the selected file 'P14029\_BIM\_117.dwf'.

**Bottom Right Screenshot:** Shows the 2D section view of the building, labeled 'Section: EXISTING - EAST ...'. The view includes dimensions and a detailed cross-section of the building structure.



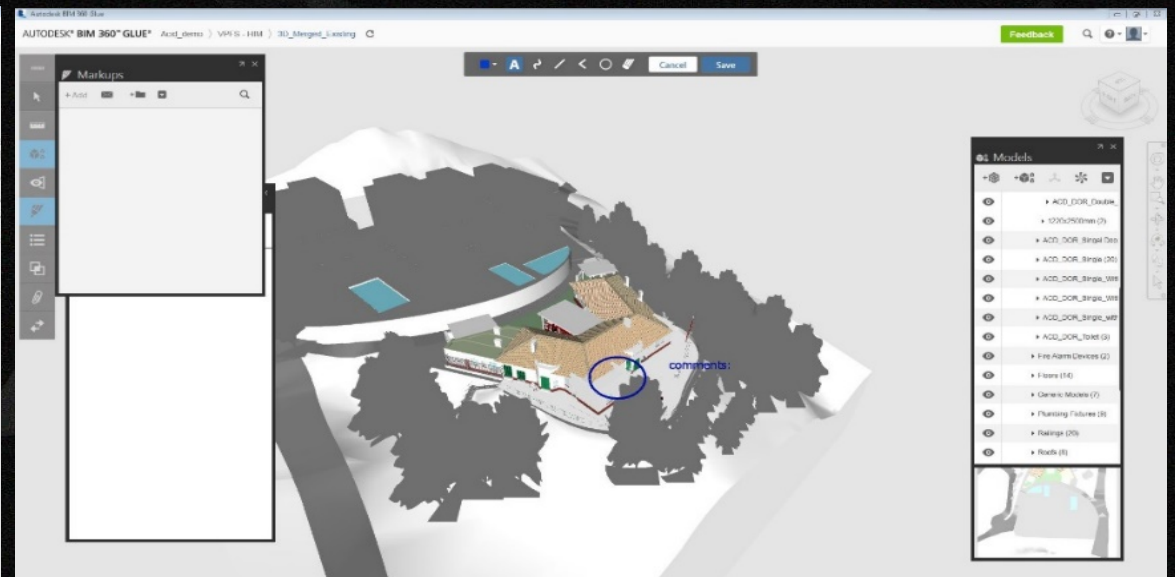
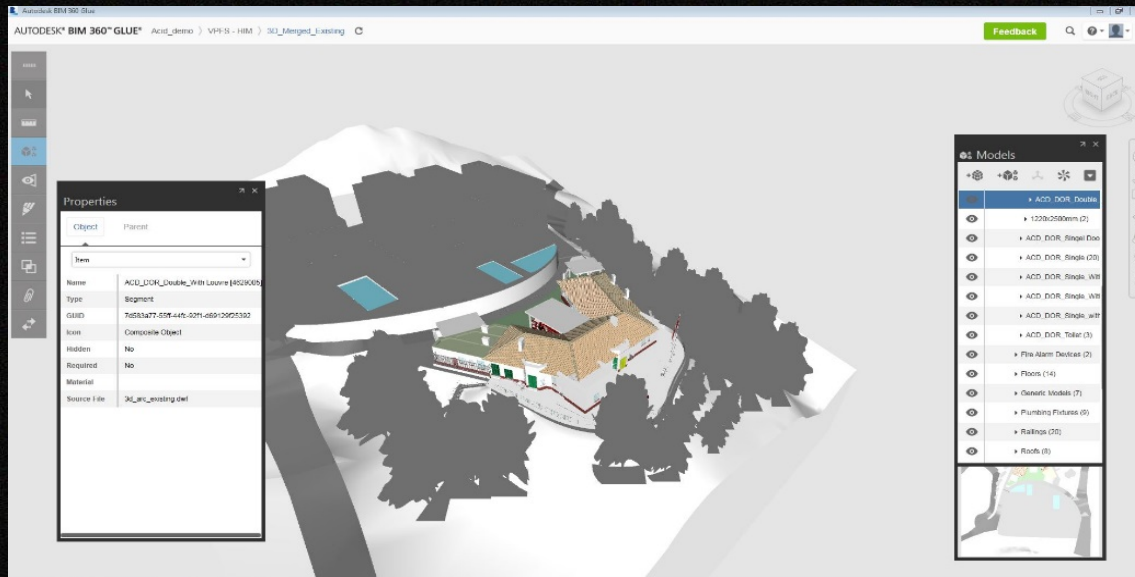
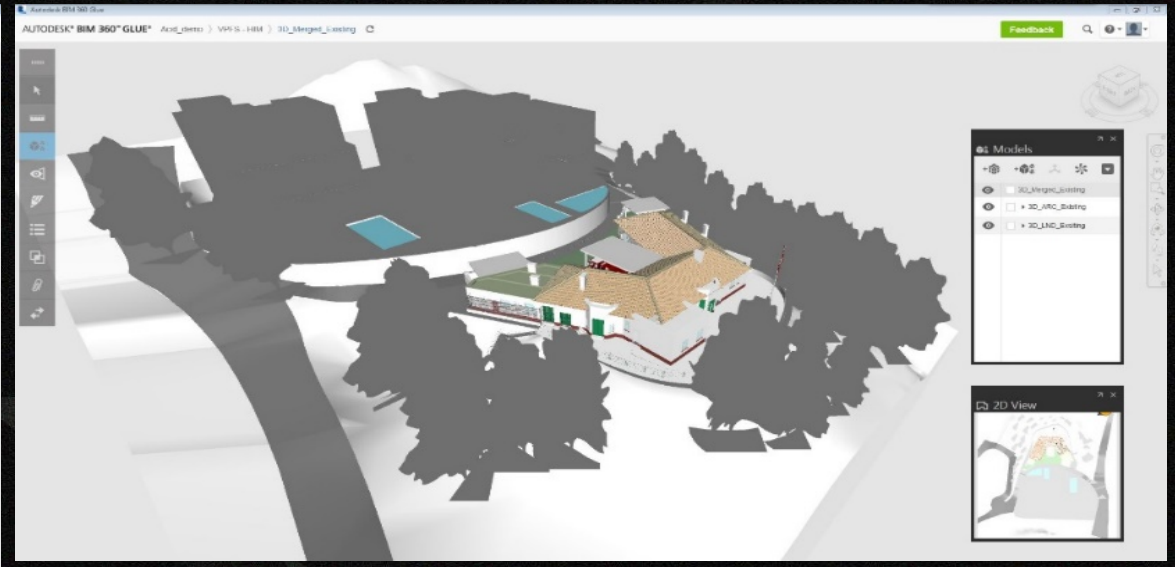
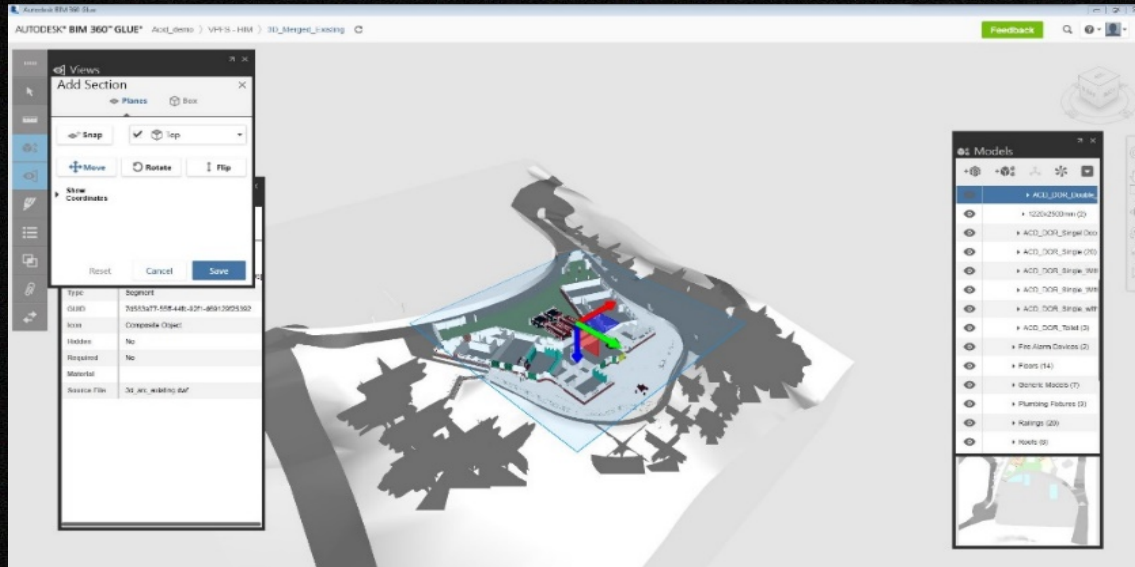
# HIM Framework

## Heritage Information Modelling Framework





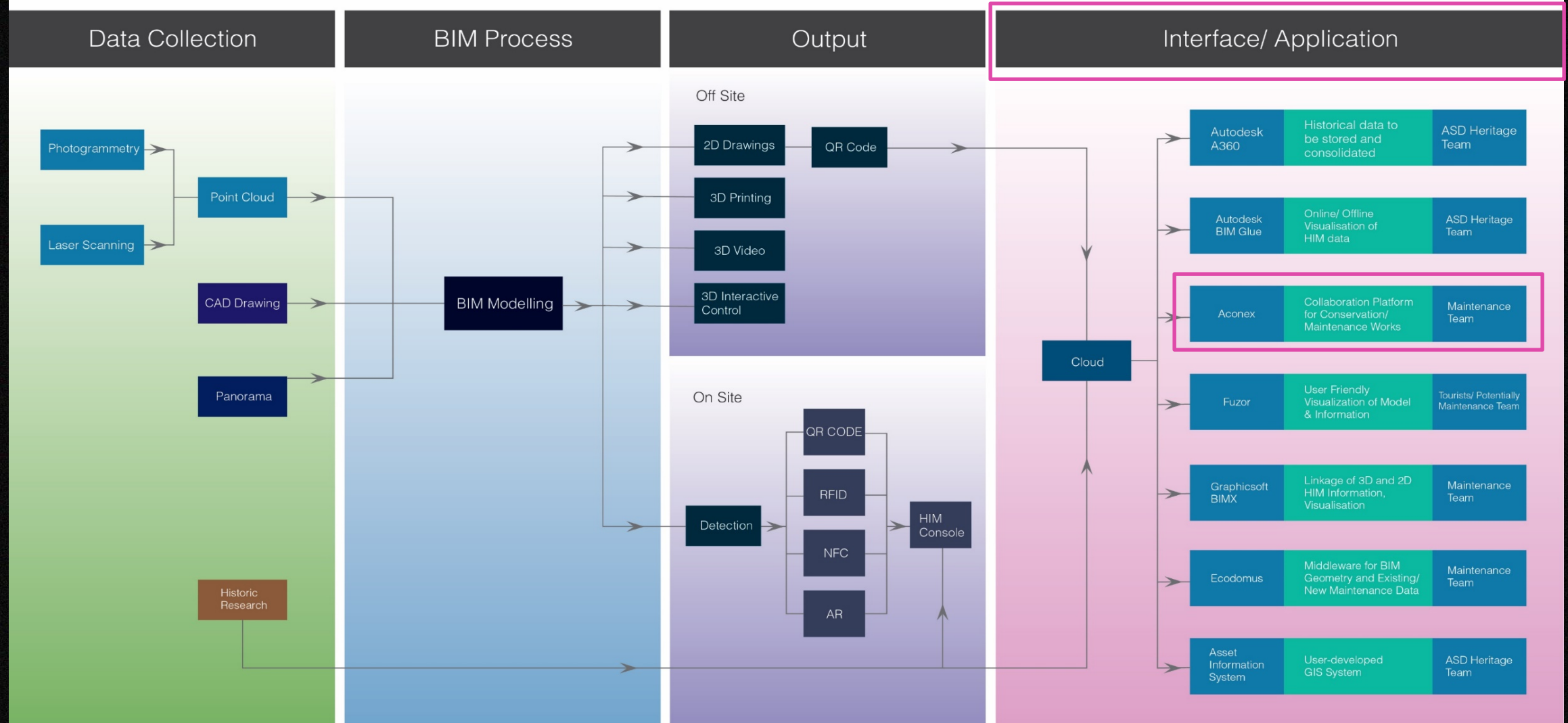
# Cloud – Autodesk Glue





# HIM Framework

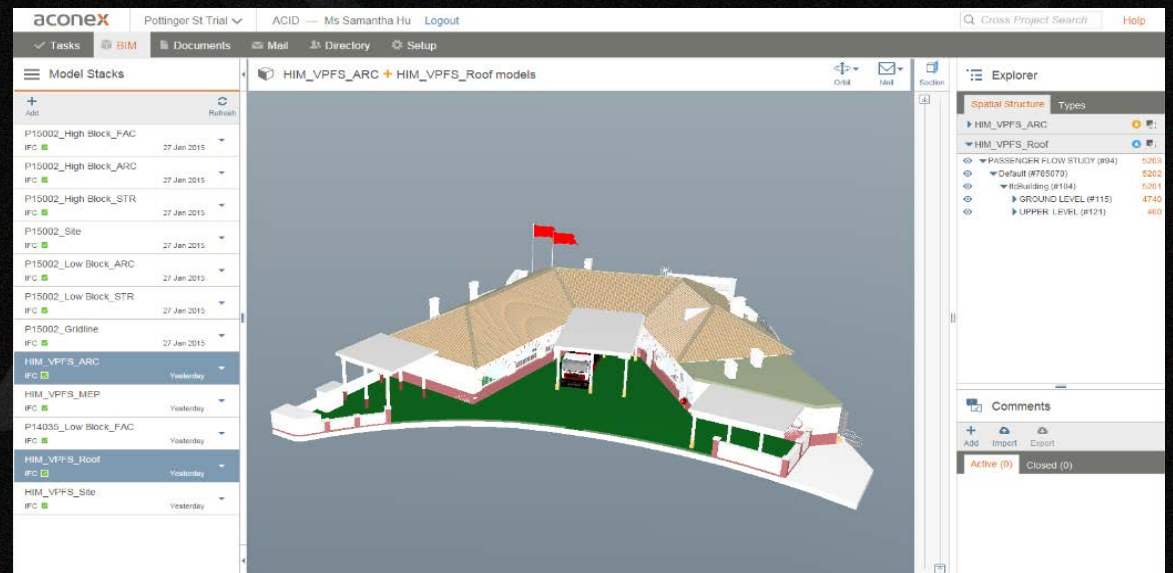
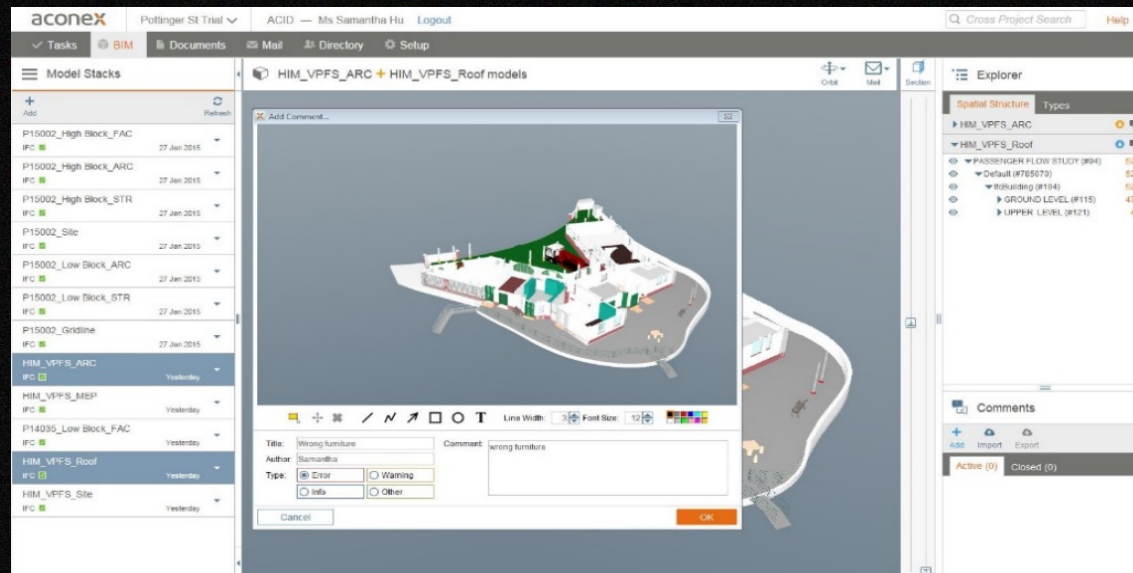
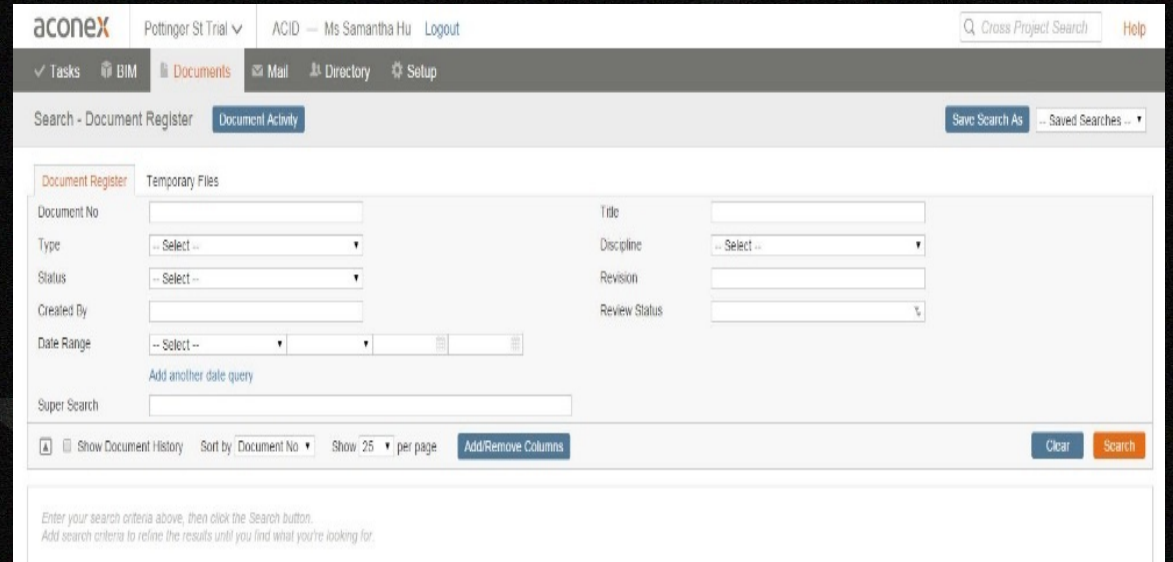
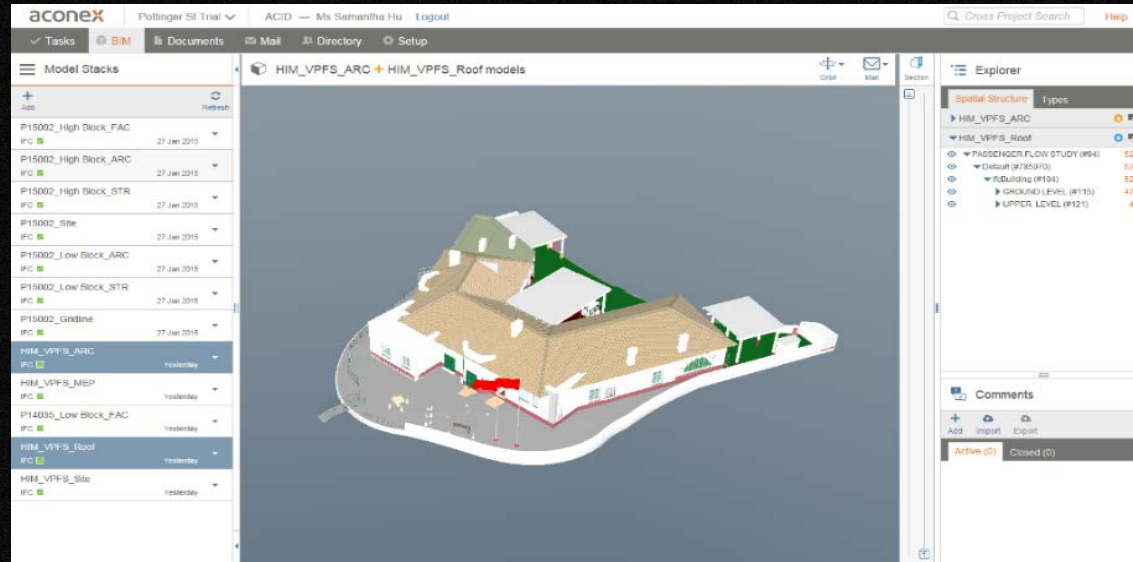
## Heritage Information Modelling Framework





# Cloud – Aconex

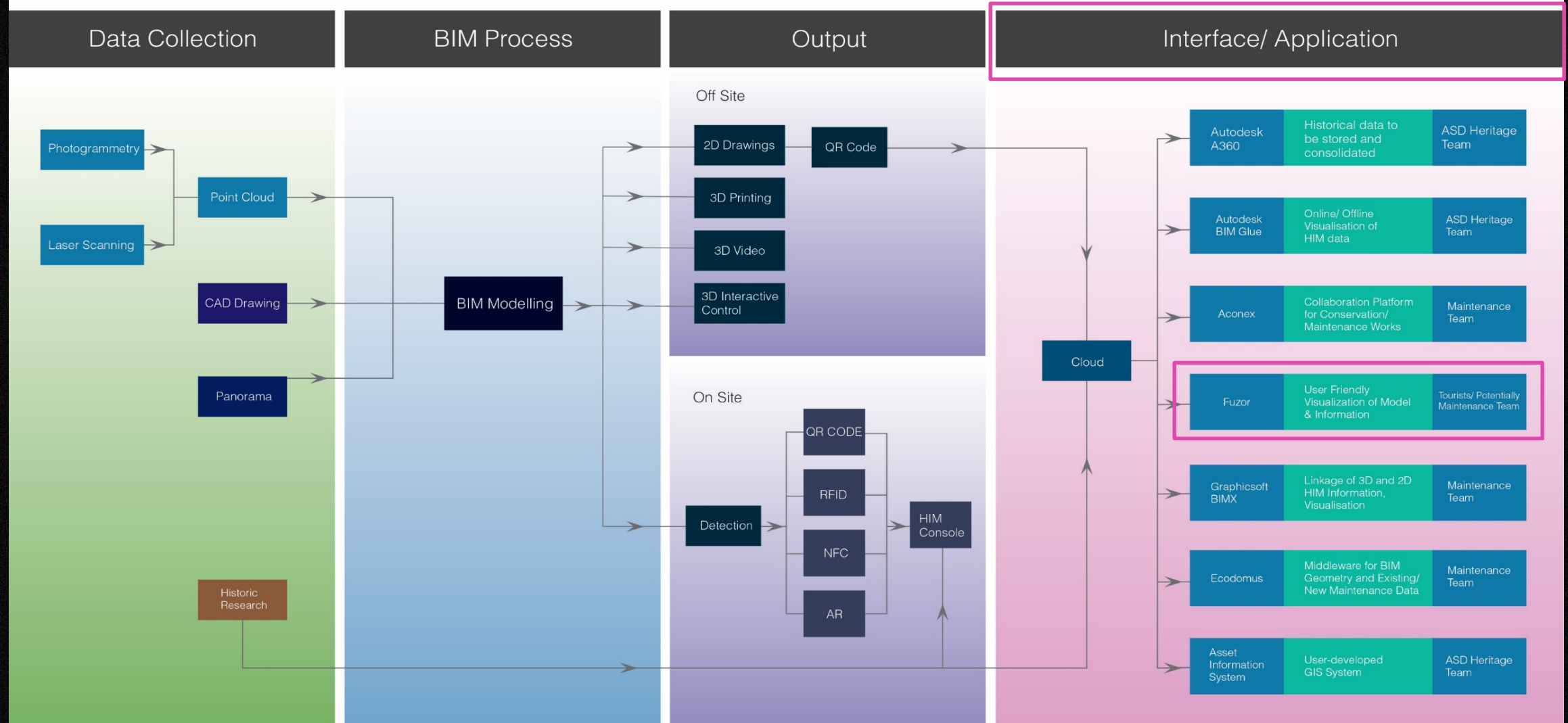
ADVANCED CONSTRUCTION INFORMATION DEVELOPMENT





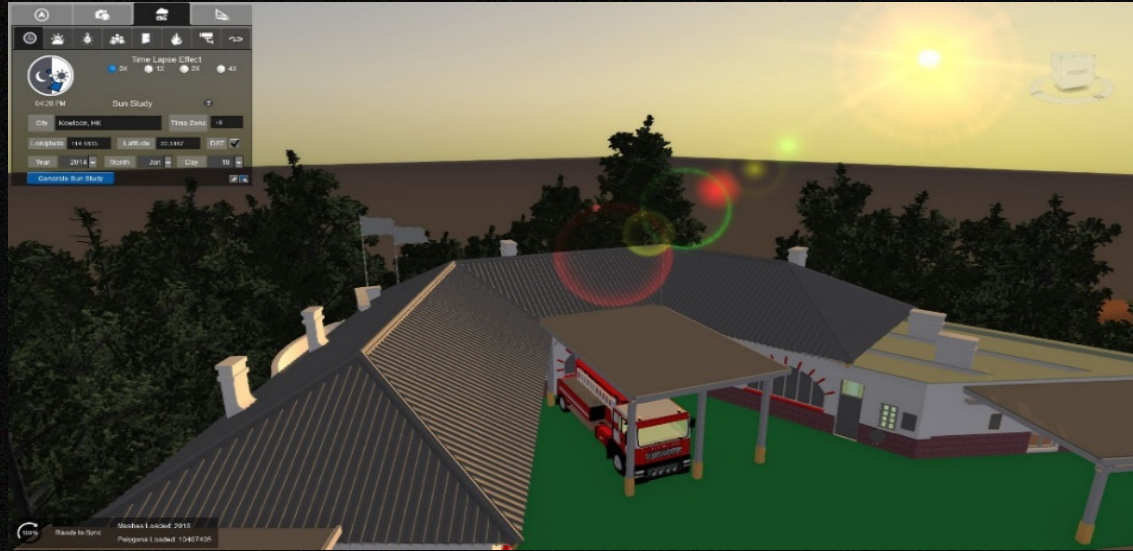
# HIM Framework

## Heritage Information Modelling Framework





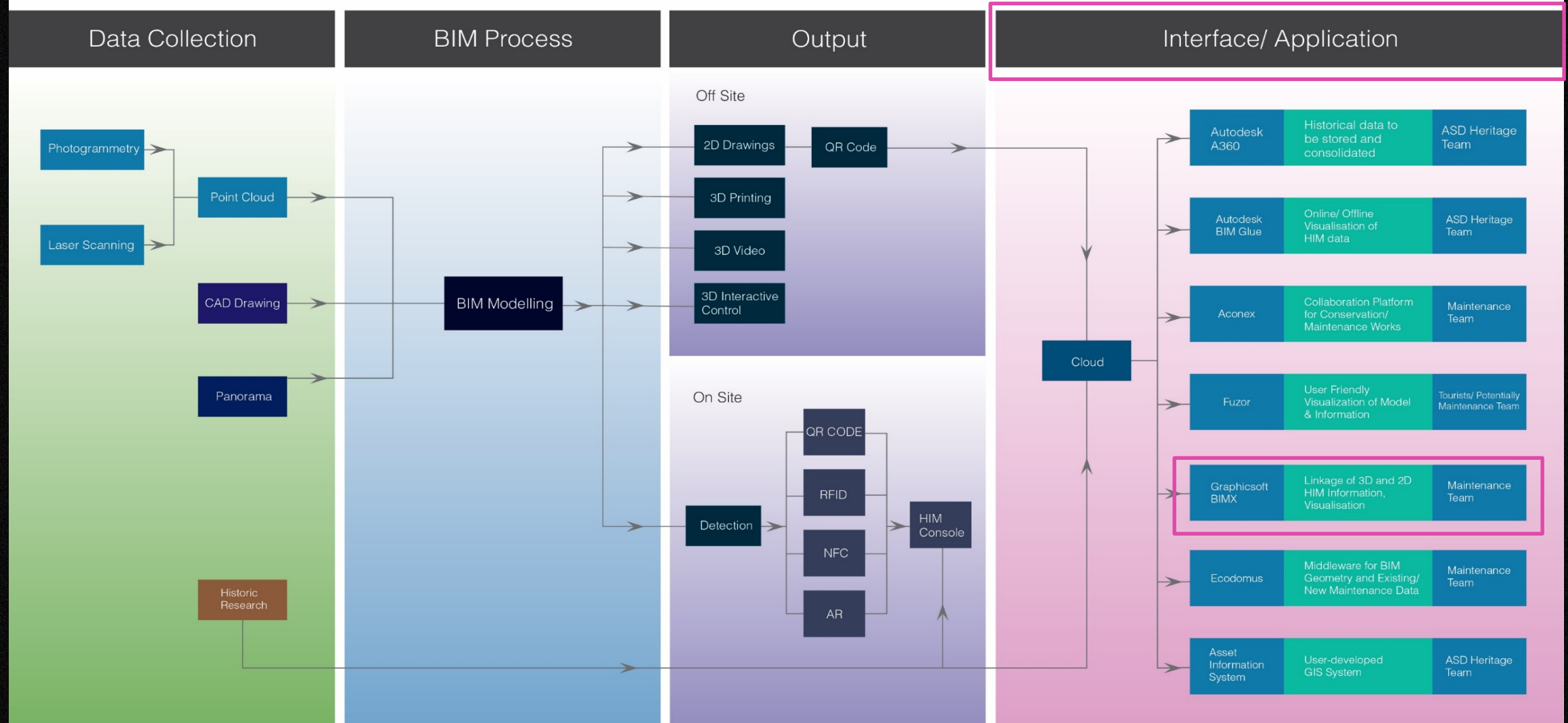
# Cloud – Fuzor





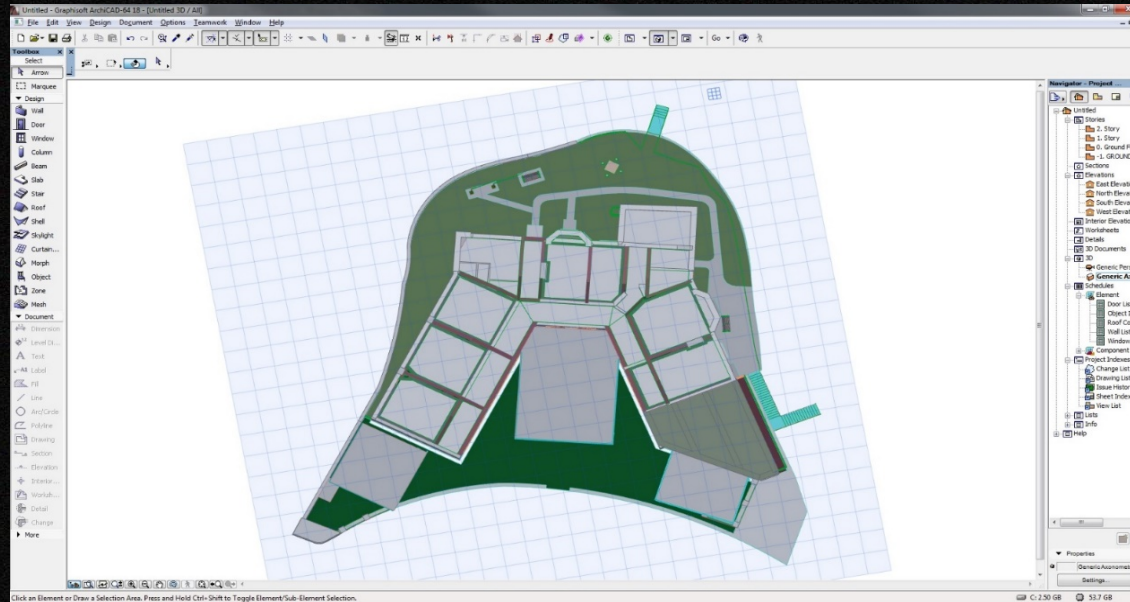
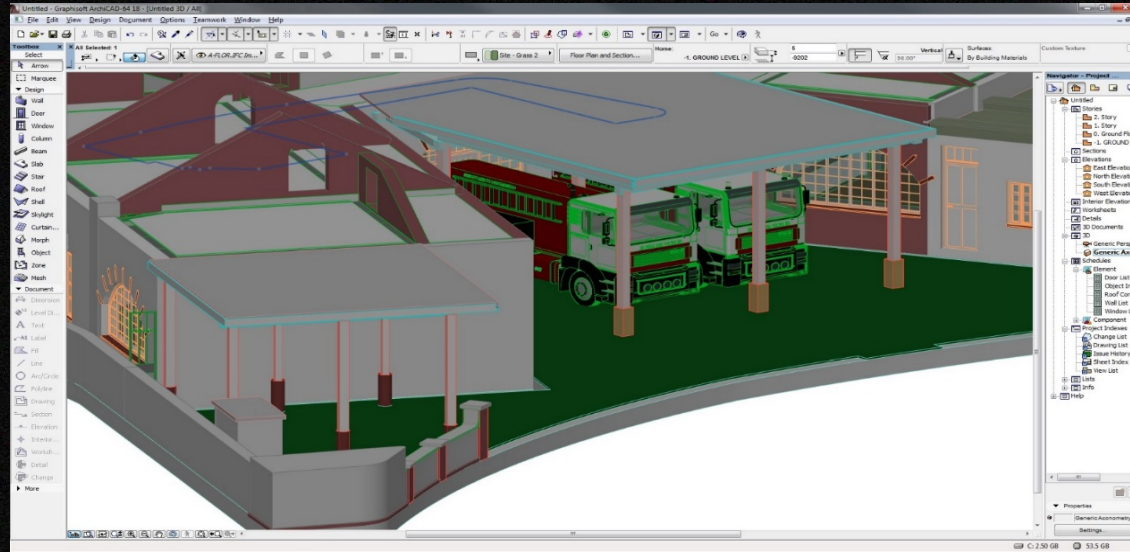
# HIM Framework

## Heritage Information Modelling Framework





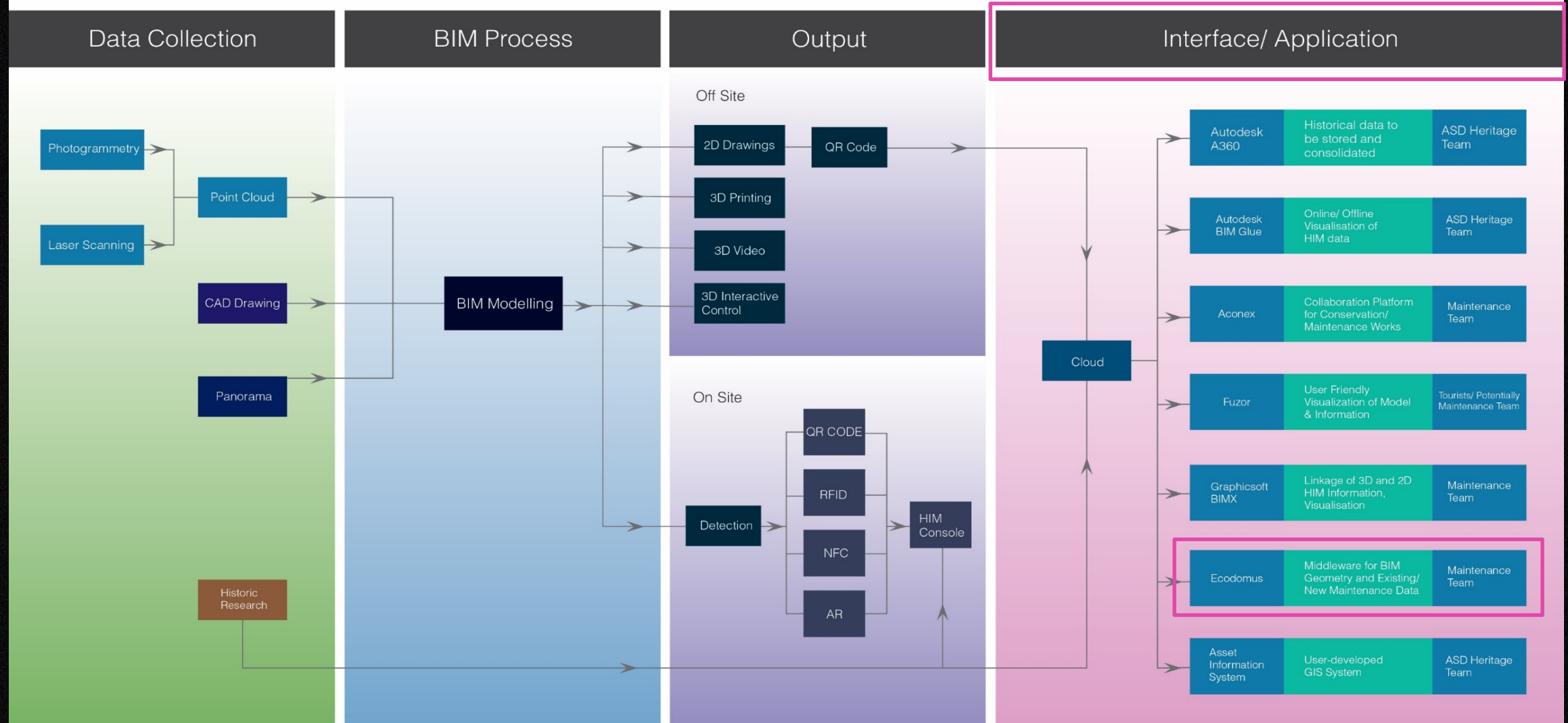
# Cloud – Graphisoft BIMX





# HIM Framework

## Heritage Information Modelling Framework





# Cloud - Ecodomus

The screenshots illustrate the Ecodomus software interface, which is used for managing construction information. The interface is divided into several panels:

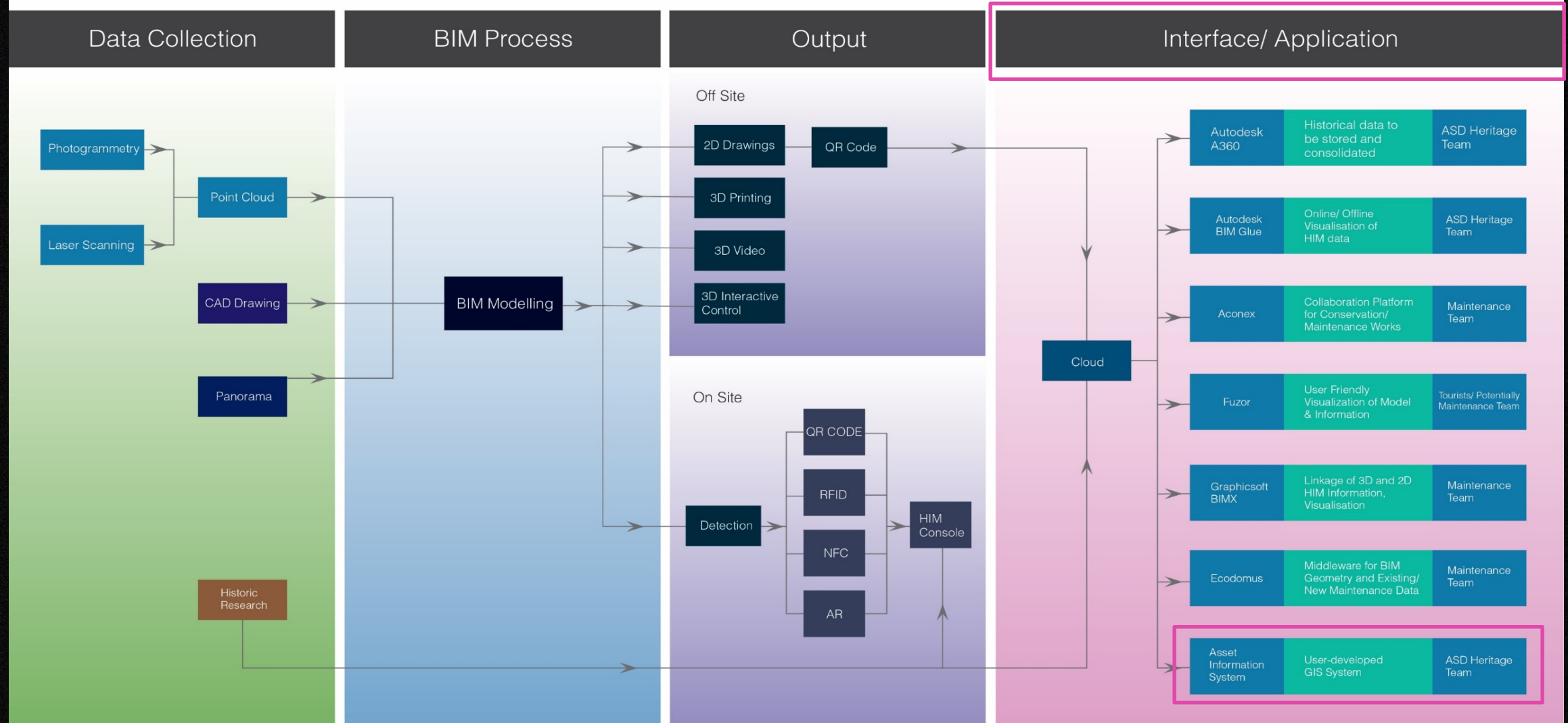
- Left Panel:** Contains a navigation tree with categories like 'Fireplaces', 'Fire engines', 'Patio', and 'Restroom'. It also includes a 'System' section with 'System Asset', 'System Asset List', 'System Asset Detail', 'System Asset List', 'System Asset Detail', and 'System Asset List'.
- Center View:** Displays a 3D model of a building. The model is shown from different perspectives, including a top-down view and a side view. The building has a complex roof structure with multiple gables and a central chimney.
- Right Panel:** Contains a 'Properties' section with a 'VIEWPOINTS' tab. This tab lists various components and their associated data. The 'VIEWPOINTS' list includes:
  - Entrance
  - Fire engines
  - Fireplace
  - Patio
  - Restroom
  - + SYSTEM
  - SYSTEM
  - + SPACE
  - ROOM I
- Bottom Panel:** Contains a 'Dashboard' section with a 'VIEWPOINTS' tab. This tab lists various components and their associated data. The 'VIEWPOINTS' list includes:
  - Entrance
  - Fire engines
  - Fireplace
  - Patio
  - Restroom
  - + SYSTEMS
  - SYSTEM ASSET
  - + SPACE
  - ROOM DATA SHEET

The interface also includes a 'Properties' panel on the right side of the 3D view, which displays detailed information about the selected component. The 'Properties' panel includes sections for 'Identity Data', 'TYPE', and 'DOCUMENTS'. The 'Identity Data' section includes fields for Name, Description, and Barcode. The 'TYPE' section includes fields for Name, Description, Cost, and Manufacturer. The 'DOCUMENTS' section includes a list of documents, such as '01\_Fireplace at former Peak S...' and 'Fireplace\_01'.



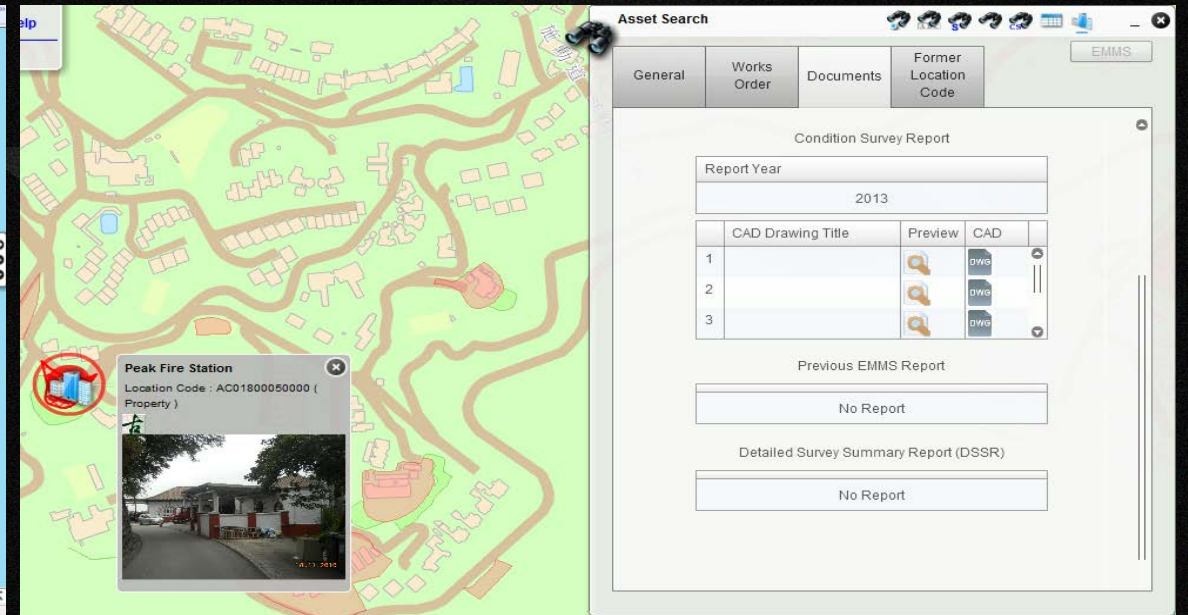
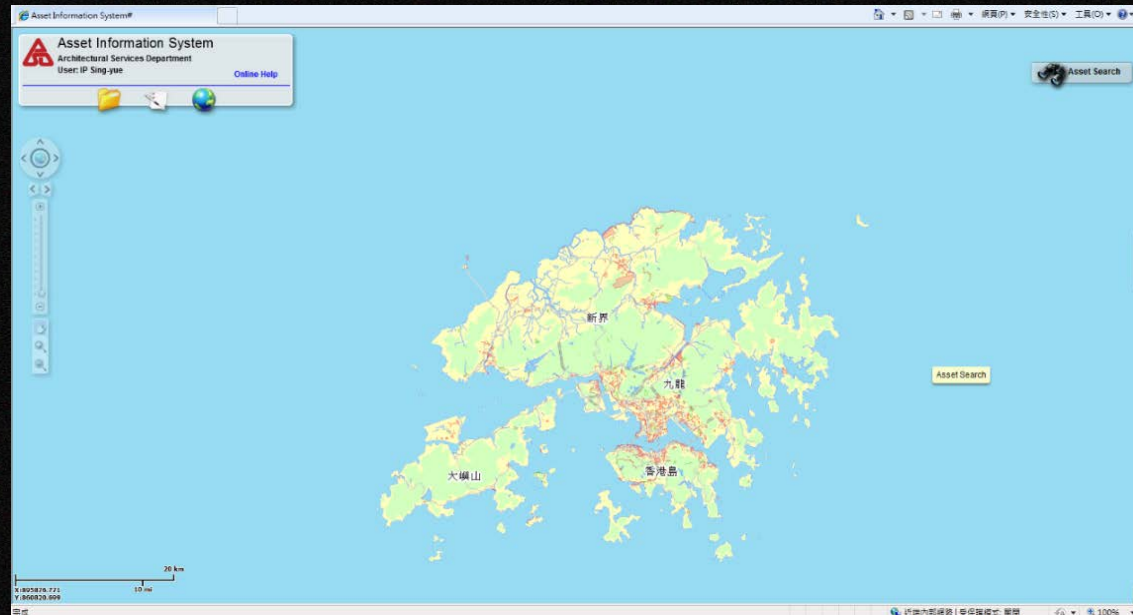
# HIM Framework

## Heritage Information Modelling Framework





# Cloud – AIS Integration





# Thank you