

GE
SMART
ASIA 2018



Locate
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WHEN

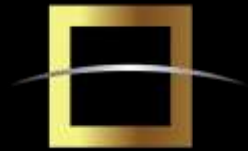
9 – 11 APRIL 2018

WHERE

ADELAIDE, AUSTRALIA

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Presented by:



GLOBAL HERITAGE CONSULTANCY SDN. BHD.

*“digital solution & visualization for
sustainable cultural preservation”*

**Digital Data Creation of Masjid
Negara Kuala Lumpur Heritage
Conservation Management Plan
through 3D Laser Scanning (3D-TLS)**



INTRODUCING TO GLOBAL HERITAGE CONSULTANCY (GHC)

GHC's SERVICES & CONSULTANCY

- 3D TERRESTRIAL LASER SCANNING (DIGITAL HERITAGE DOCUMENTATION)
- BUILDING INFORMATION MODELLING (BIM)
- BUILDING AUDIT & ASSESSMENT
- DIGITAL REPLICATION & 3D PRINTING
- DRONE & VIDEOGRAPHY

DIGITAL ARTIFACTS REPLICATION USING RP TECHNIQUE
 Rapid prototyping or construction of physical objects using additive manufacturing. Using 3D printing where a three-dimensional object is created by laying down successive layers of material.

Result: exact replica of the precious sample

Data captured using 3D Scanner

Reconstruct model into 3D CAD

3D Model

3D CAO (mesh)

Print Cloud

Printed into a better product or finished

High-precision brass on waxing model

3D DIGITAL DOCUMENTATION & RP REPLICATION
 Case Study 2: Metal Jewellery Box Using Digital Rp Replication

3D Model

Point Cloud

3D CAO (mesh)

Print Cloud

RP (Rapid Prototyping) Replication: 1st Stage - Object Recognition

KAMPUNG LAUT MOSQUE COMPLETED DIGITAL DOCUMENTATION

3 D digital Data Scanning on Malay Muslim Architecture and Art: Scanning and Storing digital Information in a Database

Complete scan

ISTANA SERI MENANTI COMPLETED DIGITAL DOCUMENTATION

RECONSTRUCTION OF JEM PETARA SEM
 REKONSTRUKSI BANGUNAN JEM PETARA SEM
 (Reconstruction Project Proposed by Jem Petara Sem, Heritazhi Baitulqur'an Baitul Quran Kompleks Living, 3D Laser Scanning, Technology)

Reconstruction of Jem Petara Sem

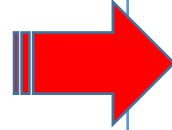
3D Scanning Model of Jem Petara Sem

RECONSTRUCTION OF 4 3D 4D BUILT ENVIRONMENT FOR ISTANA SERI MENANTI

3D Scanning Model of Istana Seri Menanti

GLOBAL HERITAGE VISION & MISSION

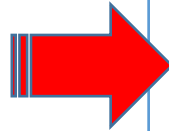
To provide feasible and sustainable approach in documenting cultural heritage properties



Method

- Advancement of technology
- The emergence of digital solution – in multi-disciplinary practices
- Accuracy

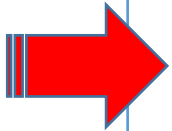
To provide sustainable and practical approach in Conservation and Preservation practice



Policy

- Best Practice
- Accountability
- And work closely with enforcement agency

To provide sustainability approaches in promoting conservation and preservation of cultural heritage through digital and multi-media



Data sharing & API

- Education
- Public awareness & participation
- For community involvement in decision making

GLOBAL HERITAGE AREA OF EXPERTISE

Digitalization (Methodology)



Digitalization (Methodology)

- 3D Scanning
- Forensic Investigation
- Measured Drawing
- 3D Visual Assessment tools

Application (Policy)



Application (Policy)

- **CONSERVATION MANAGEMENT PLAN (CMP)**
- Heritage ACT
- Standard
- Tender Document
- Risk Management
- Guideline
- BIM / H-BIM

Computerization (Data sharing & API)



Computerization (Data sharing & API)

- Big Data
- IOT
- Mobile App
- Archival & Retrieval System

3D TLS: SCAN TO BIM PRACTICE

WHY SCAN TO BIM? Is to achieve:

Feasibility

Sustainability

which to justify the **feasibility** and **sustainability** in our conservation approach to safeguard our cultural heritage properties

Masjid Negara Conservation Management Plan

SUSTAINABILITY - as defined by United Nations report as early as 1987, is 'a development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Report on Historic Preservation and Sustainability, 2011).

As such in the effort of preparing CMP in context of Masjid Negara itself should be perceived as an act to achieve sustainability which to meets our contemporary needs and without compromising **THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR OWN**

HERITAGE ACT 2005

(Chapter 5 : Conservation area and conservation management plan)

Pelan pengurusan pemuliharaan

46. (1) Pesuruhjaya hendaklah, selepas berunding dengan Majlis, menyediakan suatu pelan pengurusan pemuliharaan bagi maksud—

- (a) menggalakkan pemuliharaan, pemeliharaan, pemulihan, pembaikpulihan atau pembinaan semula suatu tapak warisan;
- (b) memastikan pengurusan wajar sesuatu tapak warisan termasuk penggunaan dan pembangunan semua bangunan dan tanah dalam tapak warisan itu dan pemeliharaan persekitaran termasuk langkah-langkah memperelok persekitaran hidup dari segi fizikal, perhubungan, kesejahteraan sosio-ekonomi, pengurusan lalu lintas dan penggalakan pertumbuhan ekonomi; dan
- (c) menggalakkan skim bagi pendidikan, atau bagi bantuan praktikal dan kewangan kepada, pemunya dan penduduk, dan bagi penglibatan masyarakat dalam membuat keputusan.

46. Conservation management plan

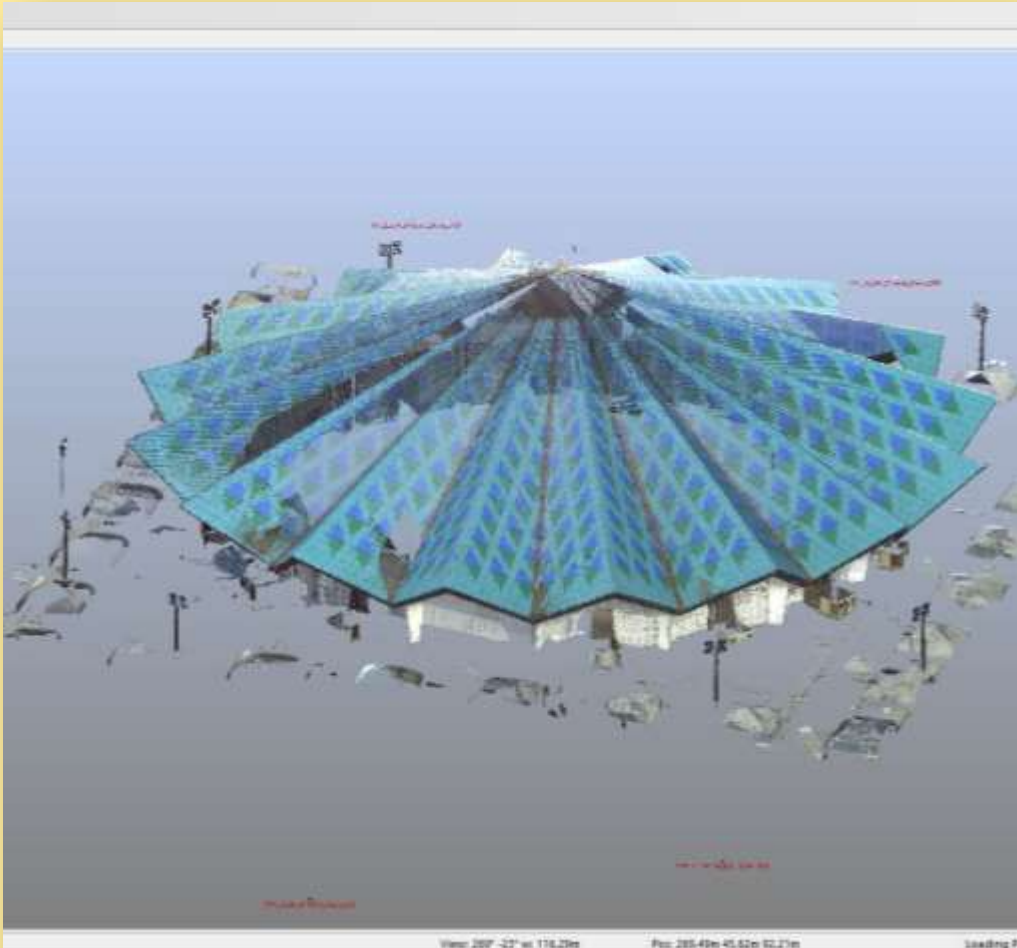
(1) The Commissioner shall, in consultation with the Council, prepare a conservation management plan for the purposes of—

- (a) promoting the conservation, preservation, rehabilitation, restoration or reconstruction of a heritage site;

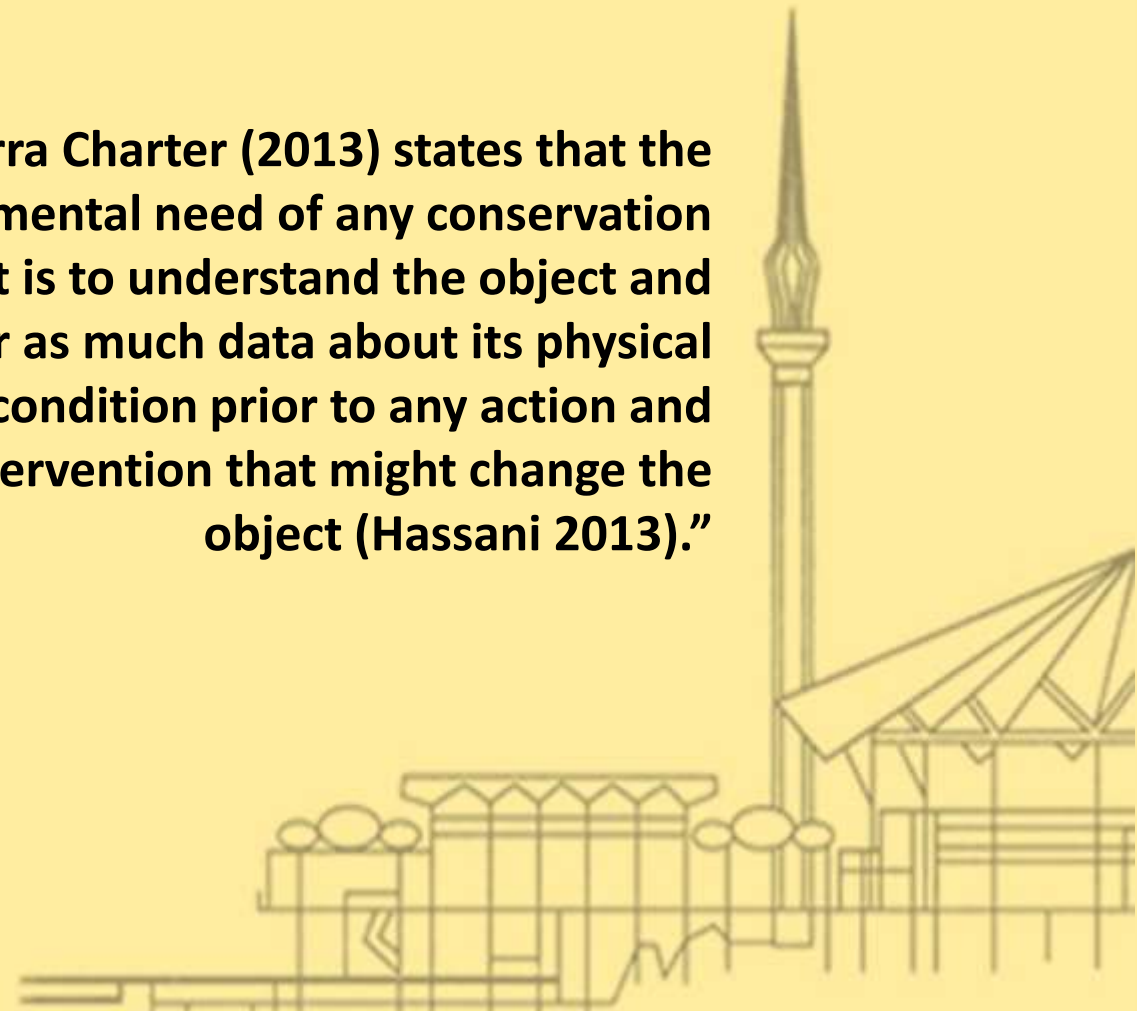
b) ensuring the proper management of a heritage site including the use and development of all buildings and lands in the heritage site and the preservation of the environment including measures for the improvement of the physical living environment, communications, socio-economic well being, the management of traffic and the promotion of economic growth; and

(c) promoting schemes for the education of, or for practical and financial assistance to, owners and occupiers, and for community involvement in decision making.

DEFINING BEST PRACTICE IN APPLICATION OF DIGITAL TOOLS AND 3D LASER SCANNING FOR HERITAGE DOCUMENTATION



“Burra Charter (2013) states that the fundamental need of any conservation project is to understand the object and gather as much data about its physical condition prior to any action and intervention that might change the object (Hassani 2013).”



MASJID NEGARA CMP: A CASE STUDY

Scan To BIM Method

BIM WORKFLOW



VirtuSurv



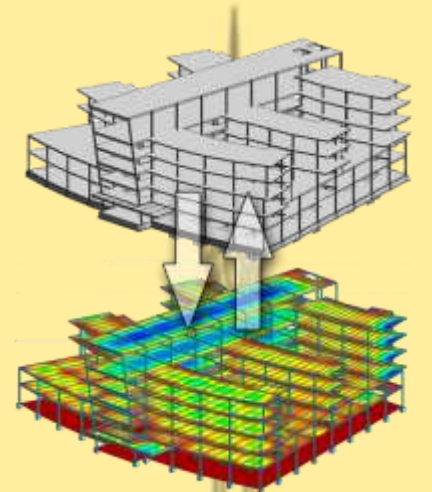
AUTODESK

REVIT



AUTODESK

AUTOCAD



Scanning Process

Using FARO Focus 3D
X130 Laser Scanner
System



Merge/ Registration

Scene 6.0 (.fls/.lsporj)



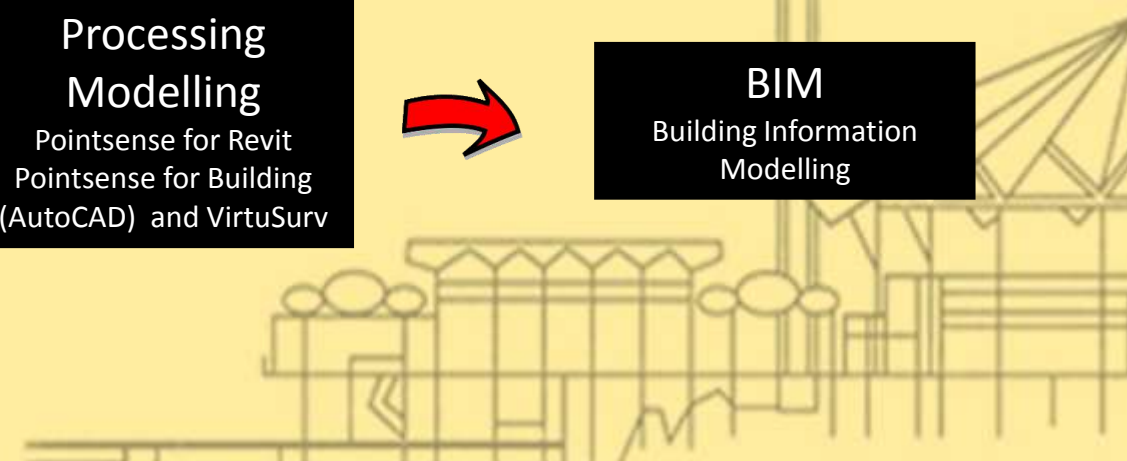
Processing Modelling

Pointsense for Revit
Pointsense for Building
(AutoCAD) and VirtuSurv

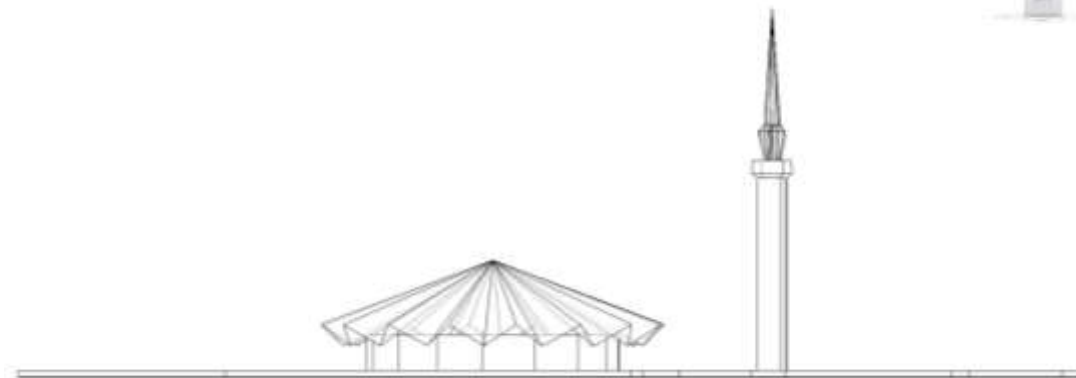
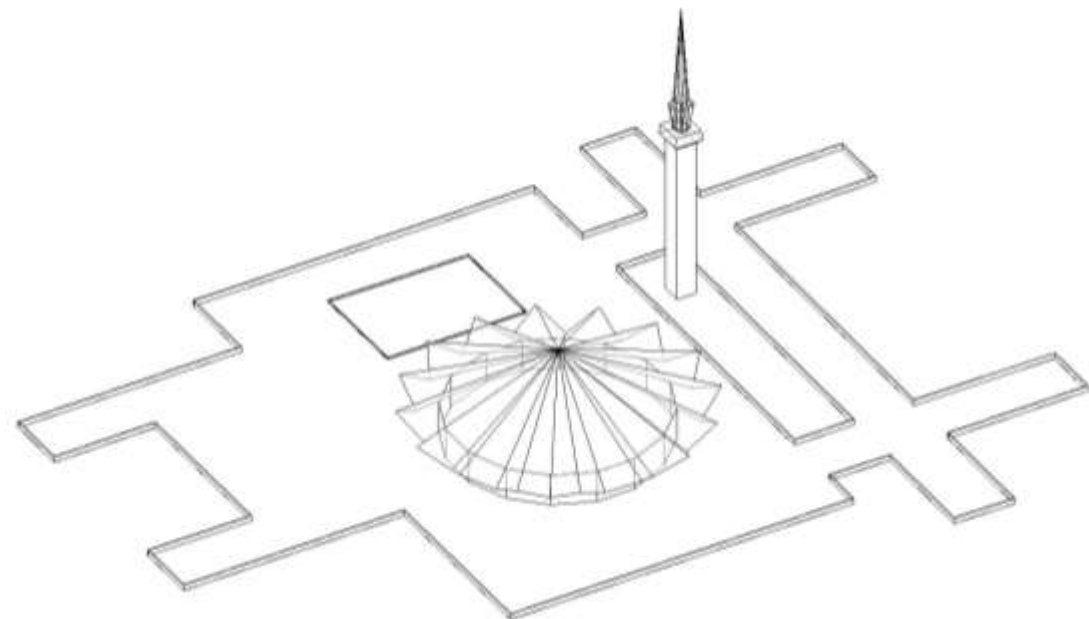


BIM

Building Information
Modelling



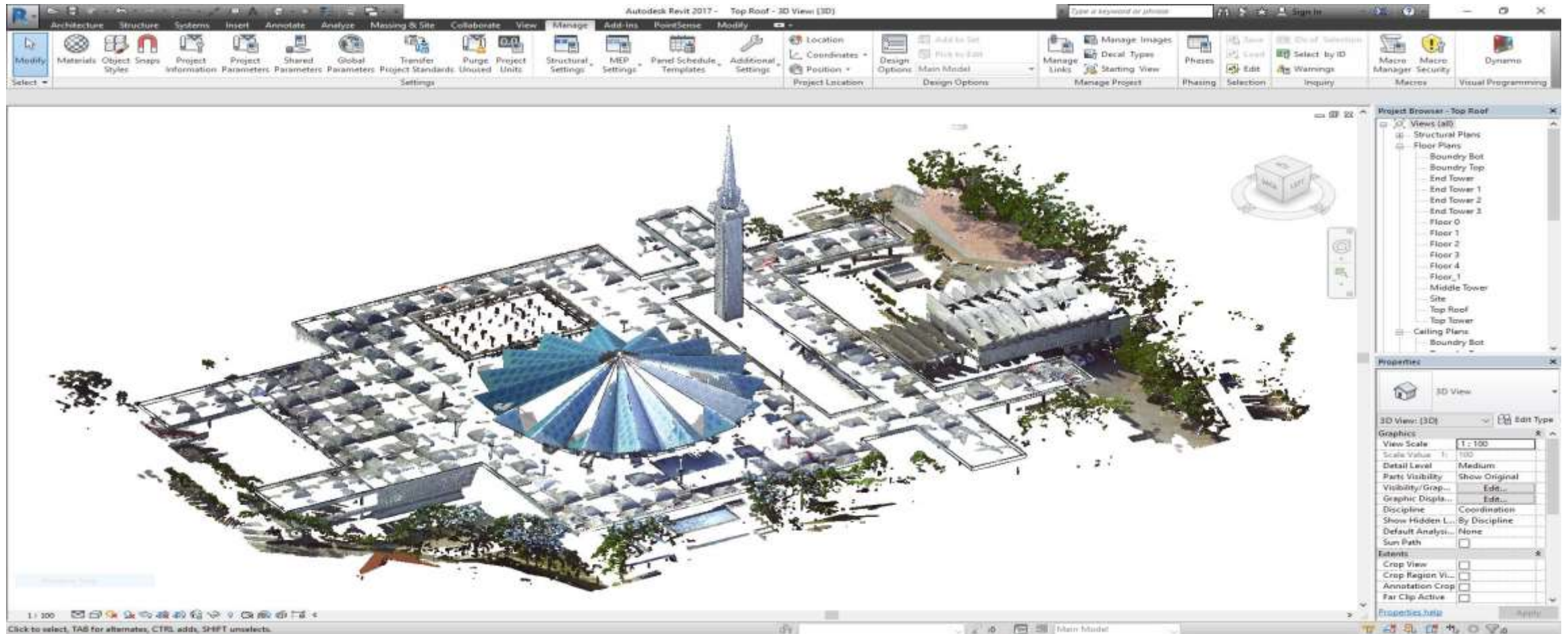
POINTCLOUD TO 3D MODEL FOR BIM



MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

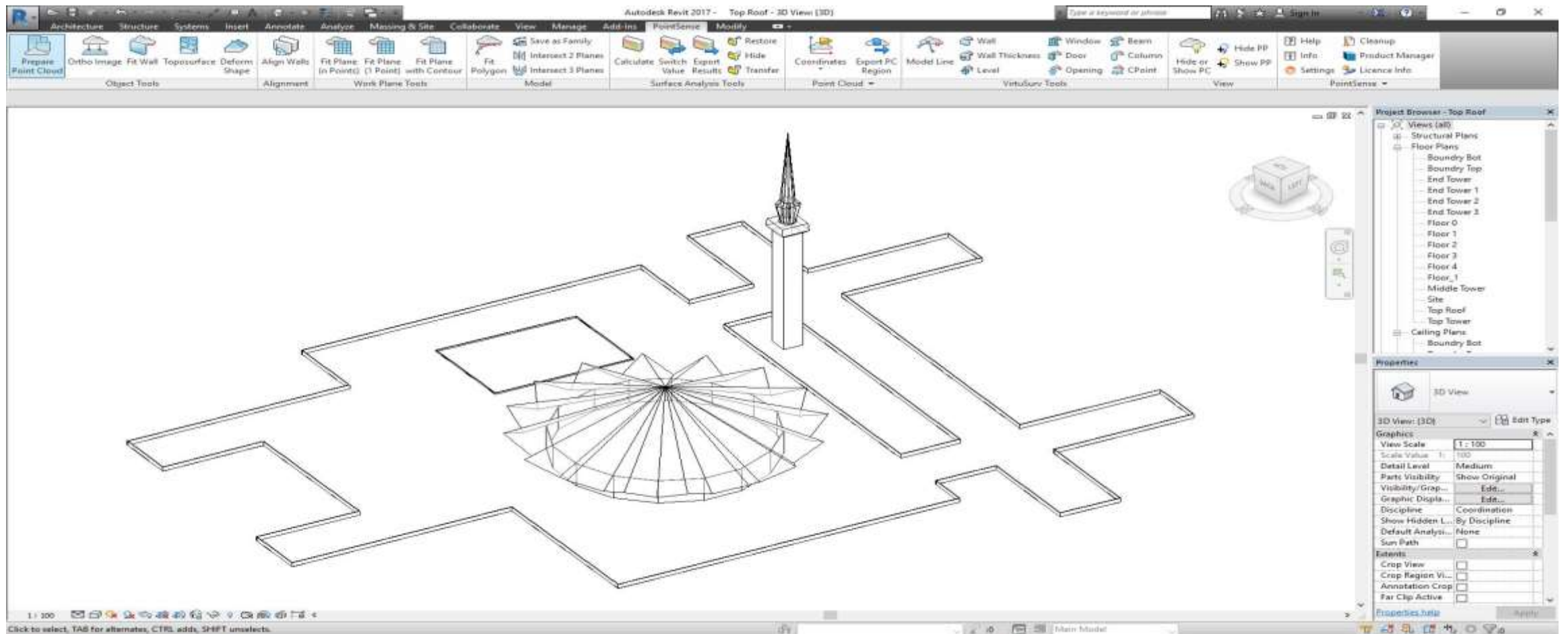


Data Pointcloud Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

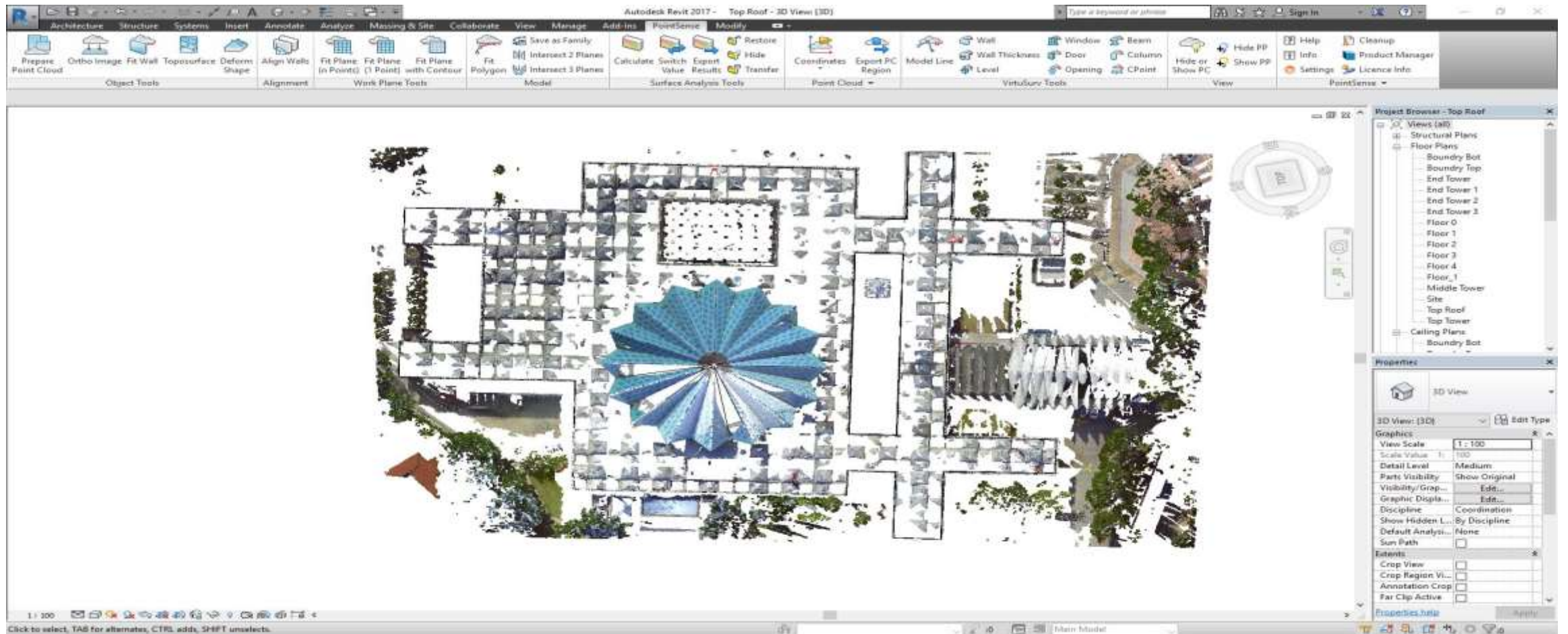


BIM peringkat LOD 100 Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

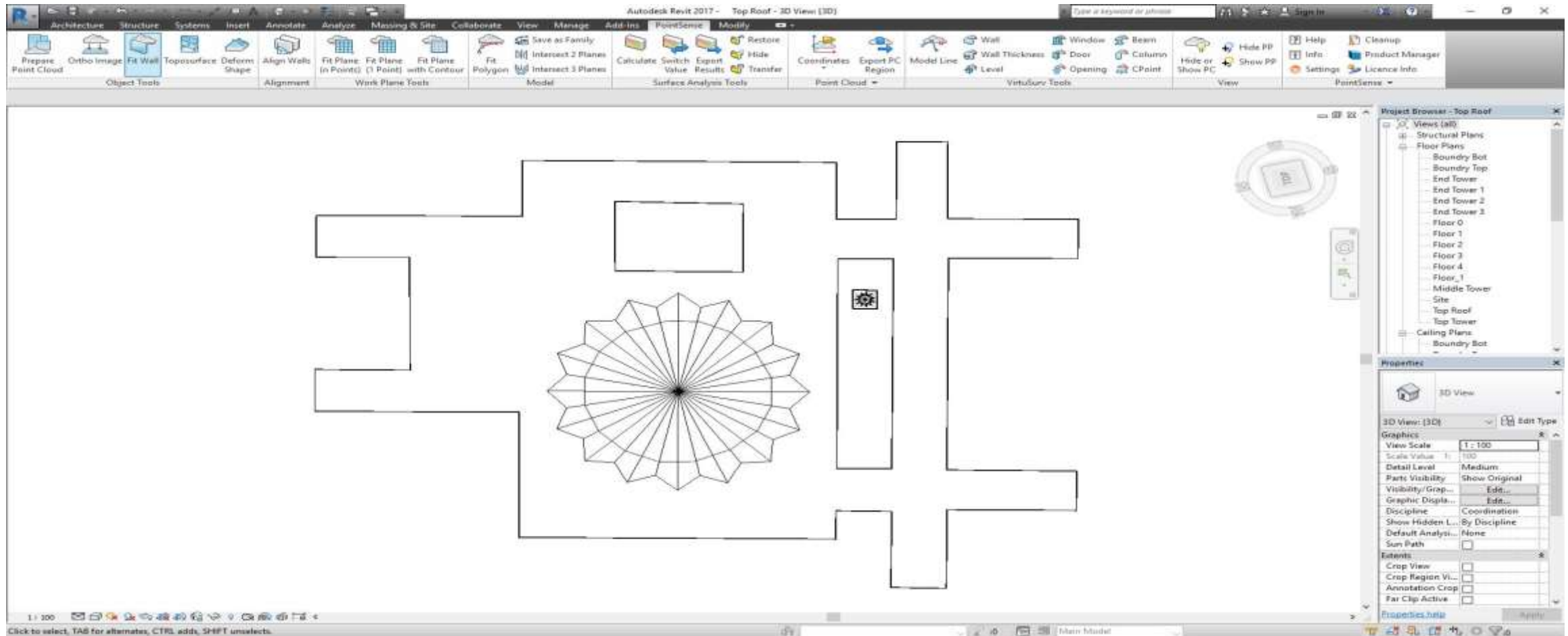


Pandangan atas pointcloud Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

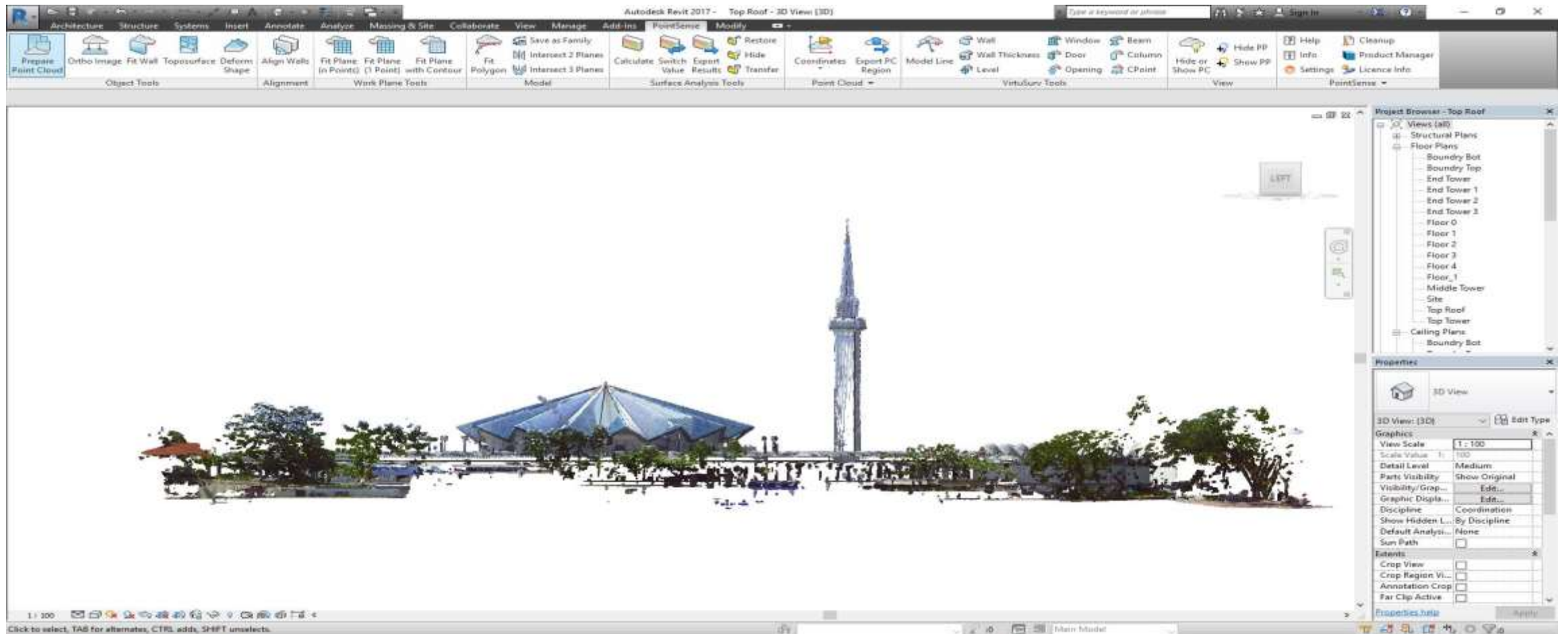


Pandangan atas BIM peringkat LOD 100 Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

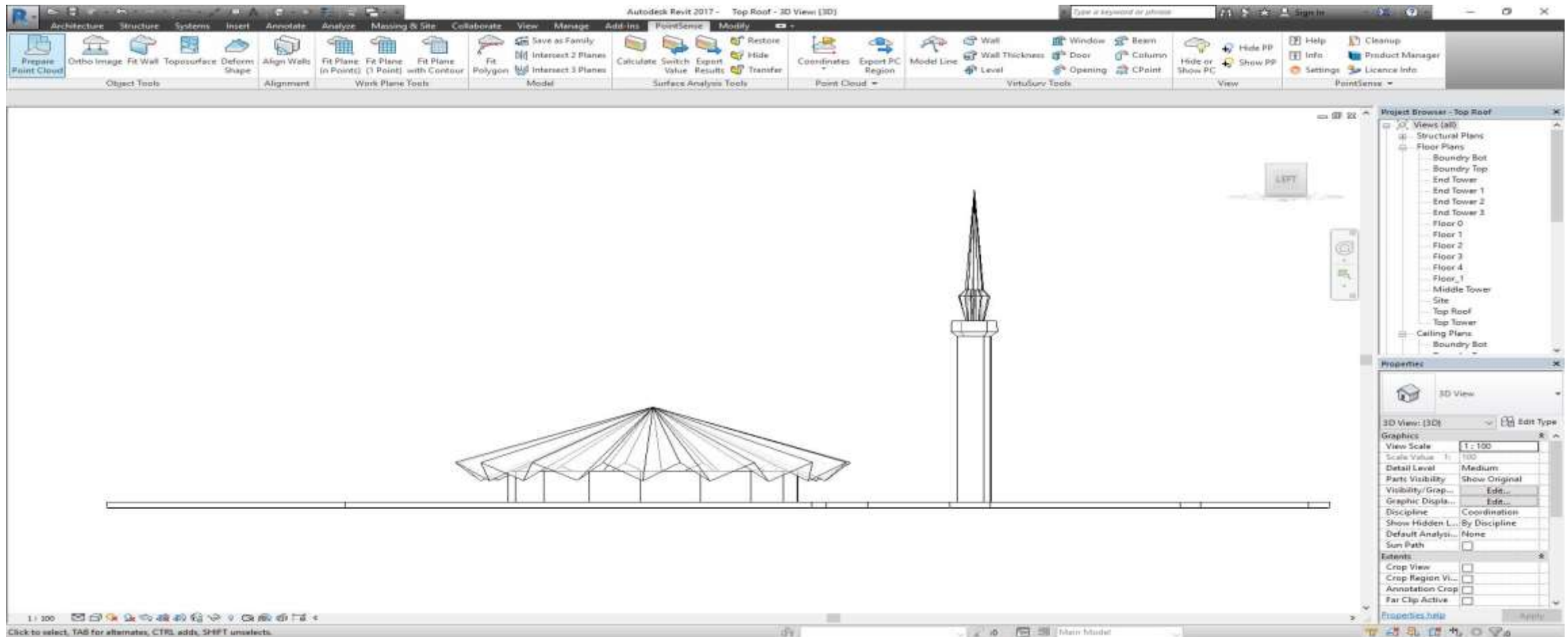


Pandangan sisi pointcloud Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

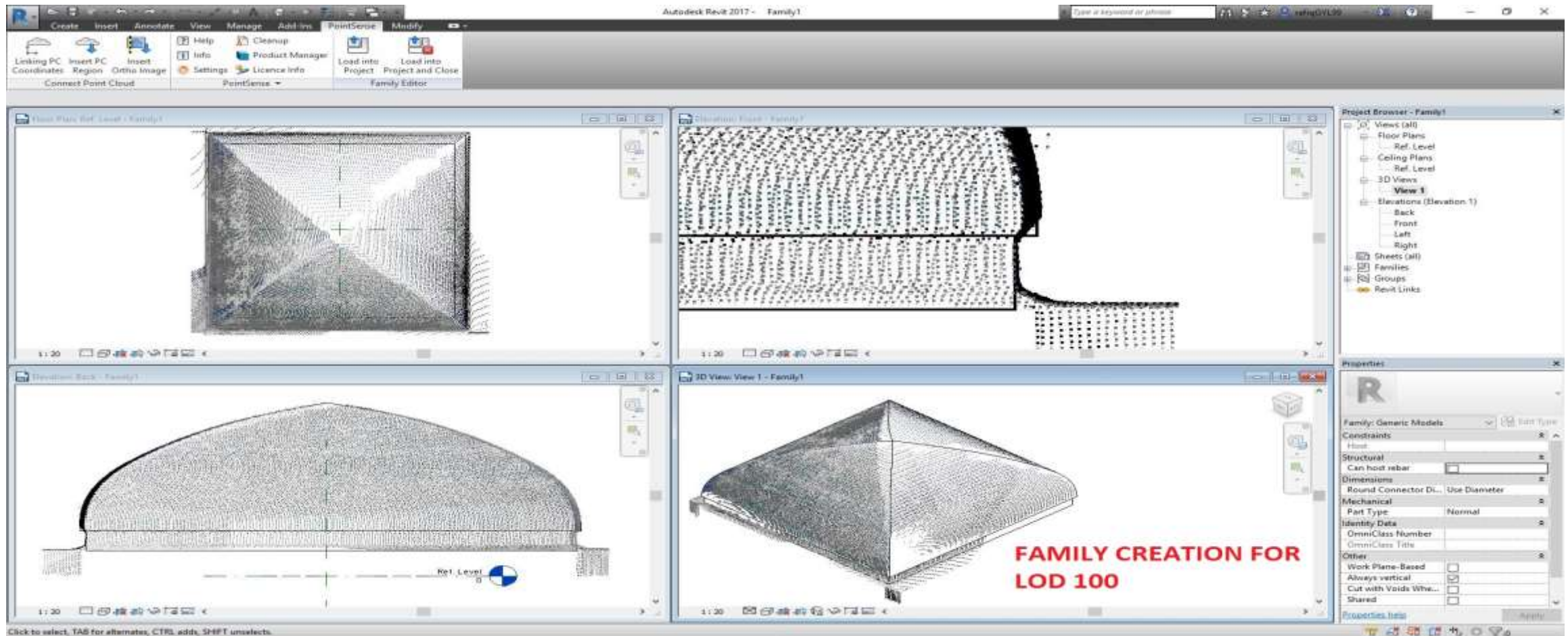


Pandangan sisi BIM peringkat LOD 100 Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

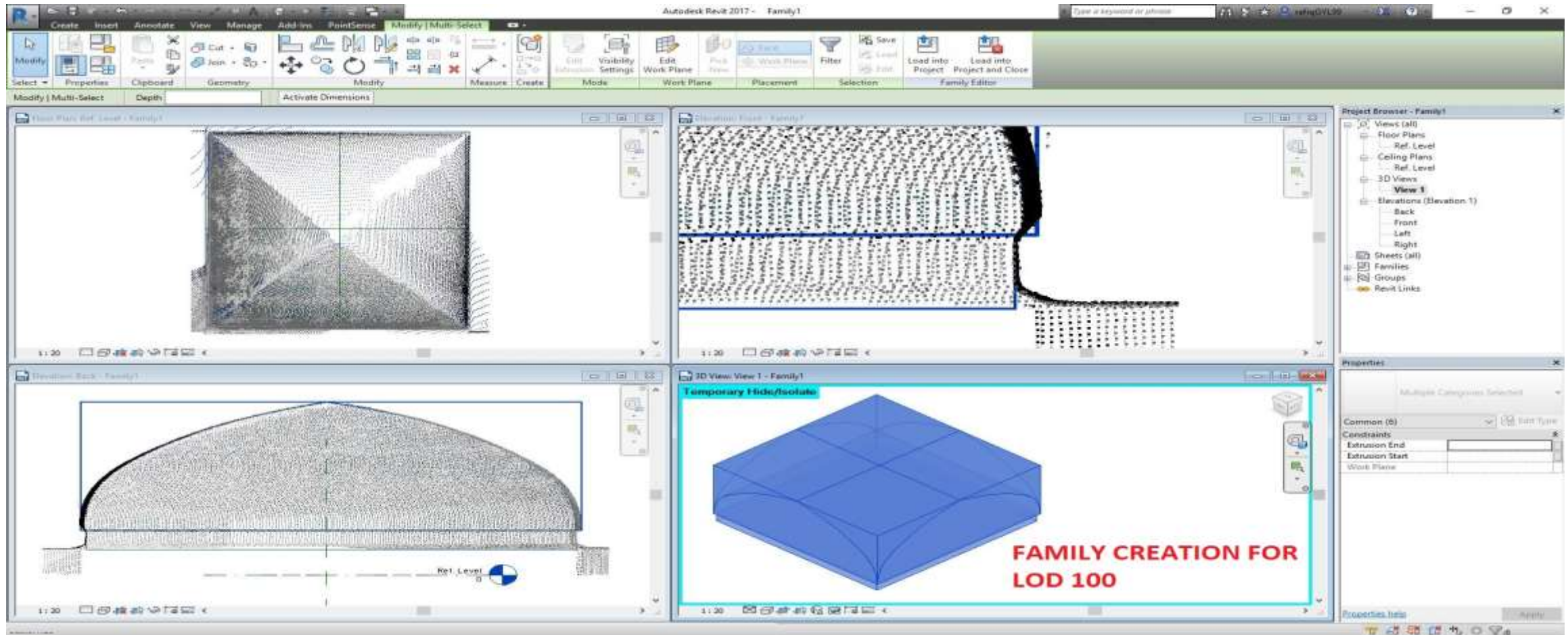


Family kubah dome LOD 100 Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

POINTCLOUD TO 3D MODEL FOR BIM

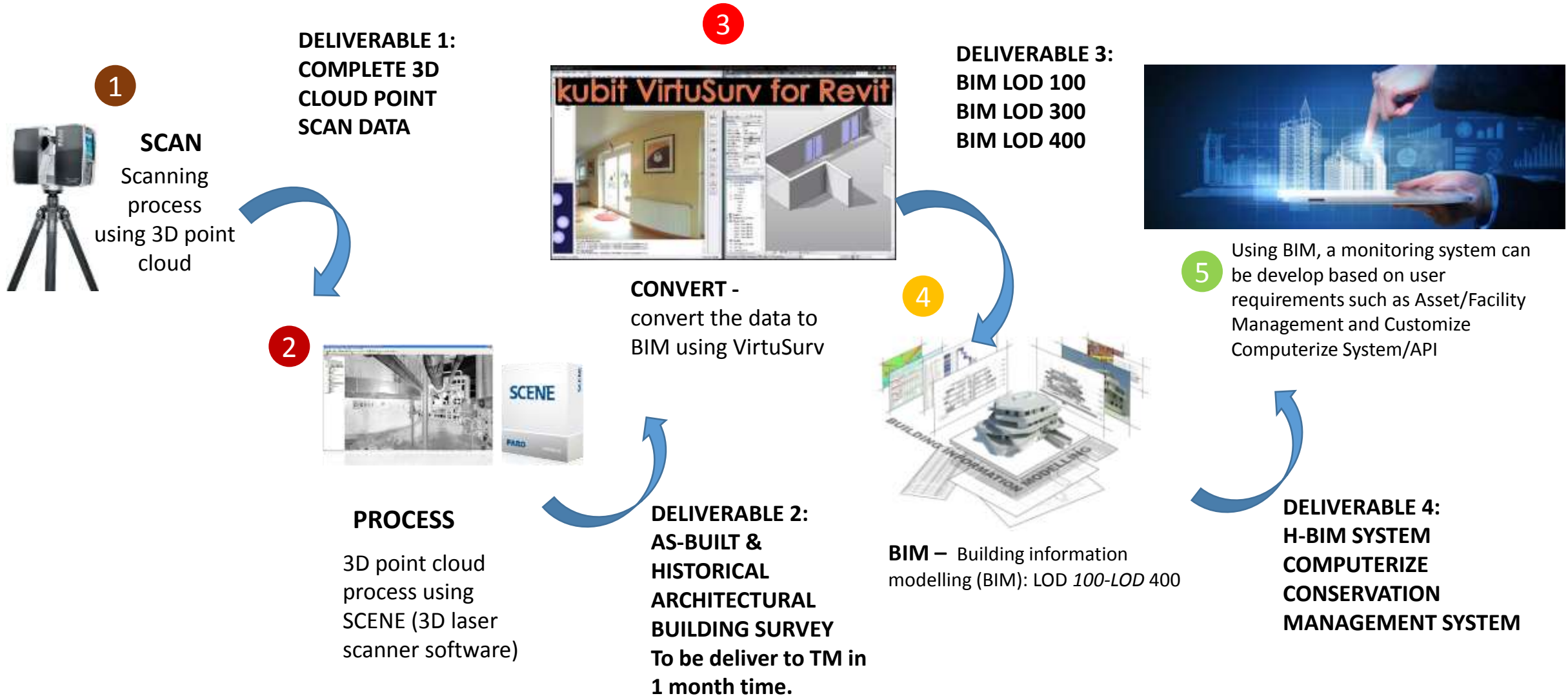


Family kubah dome LOD 100 Bumbung Masjid Negara

MASJID NEGARA CMP: A CASE STUDY

Methodology

3D SCANNING WORKFLOW



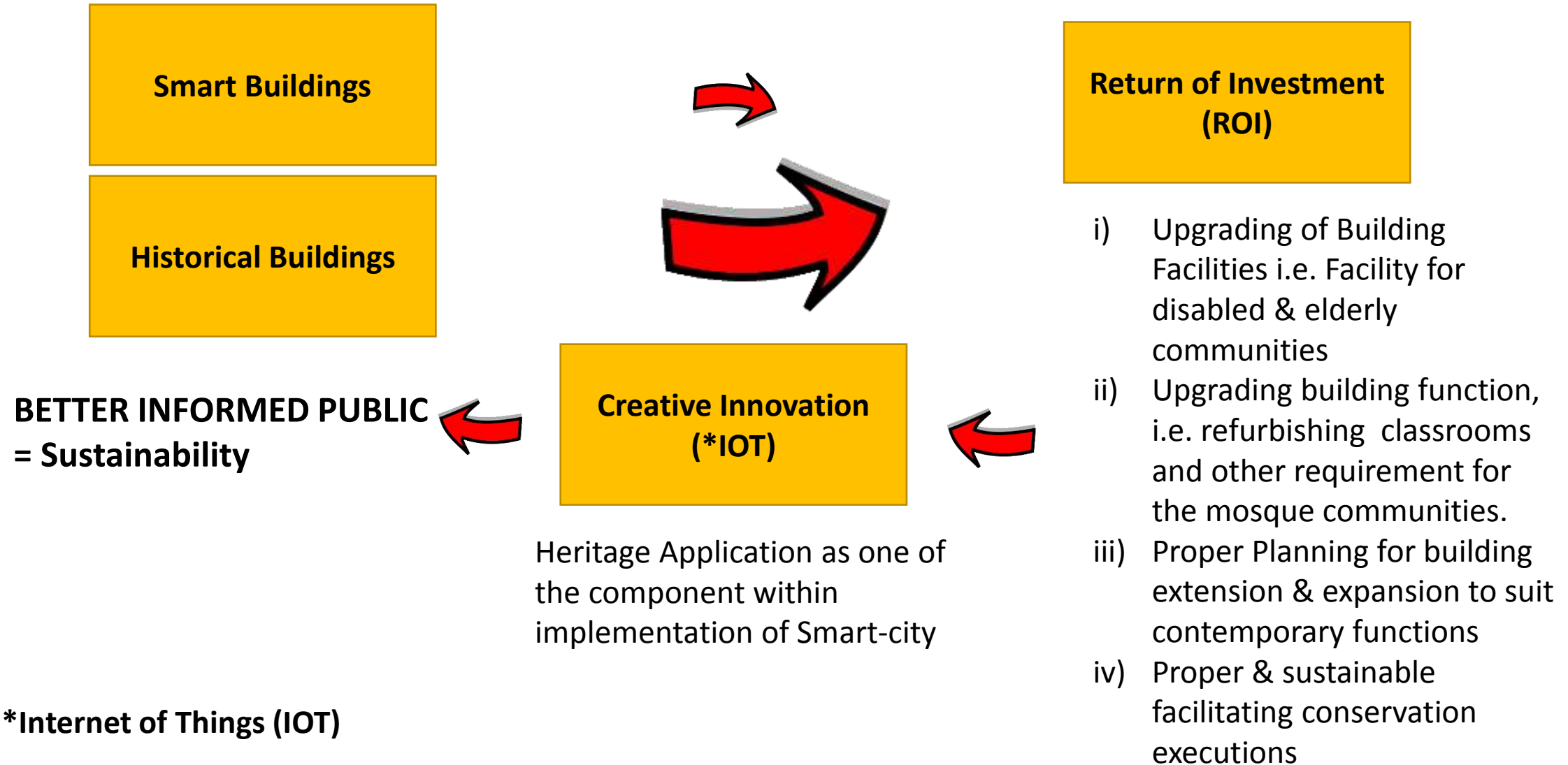
FINAL DELIVERABLES MASJID NEGARA

Nos	Phases	Methodology/ Technology	Deliverables
1	Reconnaissance Survey	a. Field survey of existing condition of the building	<ul style="list-style-type: none"> Determine scope of work and extent of repair Determine suitable methods/ techniques employed
		b. Visual documentation	<ul style="list-style-type: none"> Aerial photography and videography using drone Identification of roof parts and elements (Figure)
2	Dilapidation Survey	a. Manual tagging and indexing	Tagging of each roof element (Figure)
		b. Photography (Figure) and videography (Figure)	<ul style="list-style-type: none"> Documentation of existing condition of building Identification of extent of damage and repair required
		c. 3D laser scanning: non-intrusive, efficient and accurate	<ul style="list-style-type: none"> 3D documentation of existing building As-built drawing (HABS 1)
3	Forensic Investigation	a. On-site test:	Technical Report
		i. Ground Penetrating Radar (GPR) (Figure)	Forensic report on the condition of rainwater downpipes
		ii. Infrared Thermography (Figure)	Forensic report on the heating and cooling cycles of the building fabric.
		b. Off-site/ Laboratory Tests	Technical Report
		i. i. Petrography Test	<ul style="list-style-type: none"> Conservation work method statement. Proposed restoration treatment of the roof.
		ii. X-Ray Fluorescence Test	
		iii. X-Ray Diffraction Test	

MASJID NEGARA CMP: A CASE STUDY

Conclusion

THE NEED OF A GOOD COMPERHENSIVE CMP FOR HISTORICAL BUILDING TO BE MAINTAINED SMARTLY IS PART OF A GOOD INVESTMENT TO PRESERVE OUR NATIONAL HERITAGE & NEED TO BE TAKEN SERIOUSLY.



MASJID NEGARA CMP: A CASE STUDY

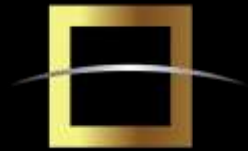
Conclusion: lighting study



MASJID NEGARA CMP: A CASE STUDY

Conclusion: lighting study





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THANK YOU

