Virtual Reality, a knowledge tool for cultural heritage

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Objective

- to show how creating 3D models of heritage:
  - requires at all times the integration of non-computer knowledge
    - during the data gathering information
    - to go through an interpretative phase of the information, analyse it and synthesis it
  - enriches cultural heritage with new knowledge
    - to present hypothetical re-constructions
- to show how during the model exploration phase
  - visualisation techniques support research
  - immersion creates a cognitive and is a didactic tool

Outline

- historical building documentation:
  - Suchilquitongo
- digital reconstruction of archaeological sites:
  - Cacaxtla
- Virtual Reality installations
- Use of VR for cultural heritage

The value of documentation

- Archaeological sites are the only source of information about the pre-Hispanic history and civilisations.
- Archaeological information can disappear.
- Documentation is recording the memory of humanity.

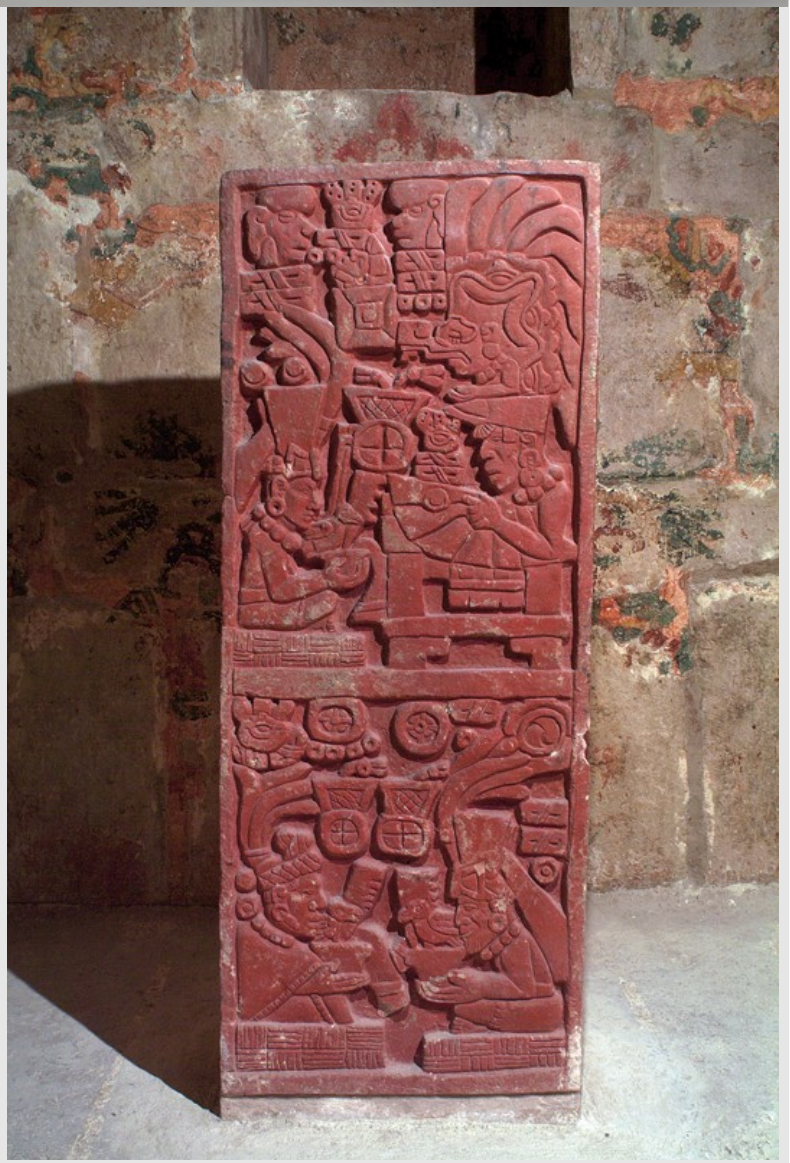
Registry objectives

- Which information should be registered?
- What level of precision?
- What is the purpose of the registry?
  - Restoration...
  - Art history or architecture...
  - Archaeological recording
  - Research

An example of documentation: Suchilquitongo

Information registering

Survey with a Total Station



Rigourous control for mural paintings registering

Mural paintings

- illumination
- colour
- lens distortion

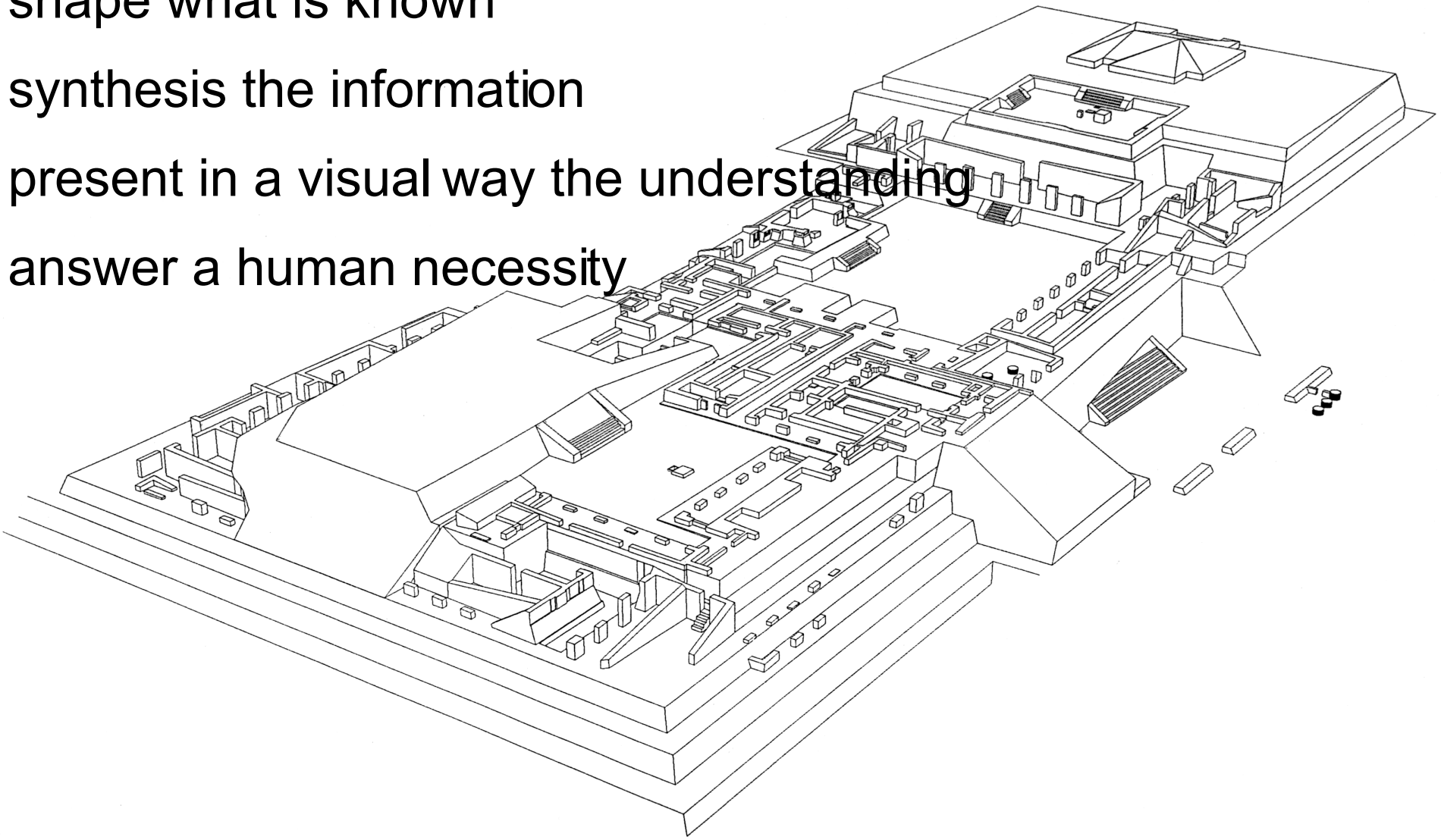
- 4 pixels / mm
- 17195 x 7191 pixels

Virtual reality

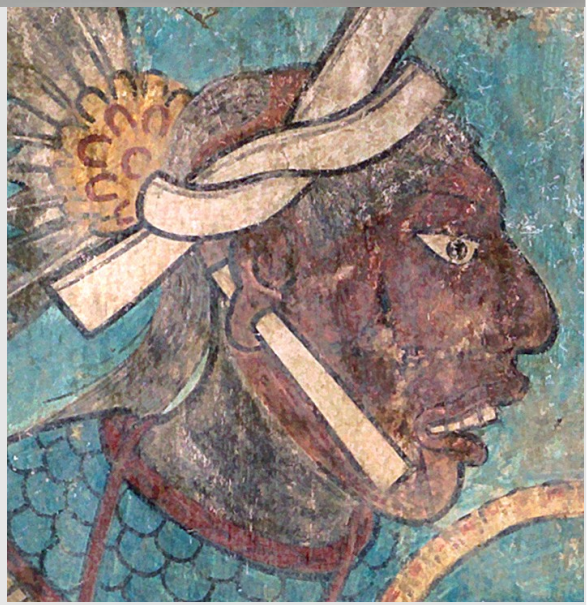
Suchilquitongo

Digital reconstruction

- To shape what is known
- To synthesis the information
- To present in a visual way the understanding
- To answer a human necessity



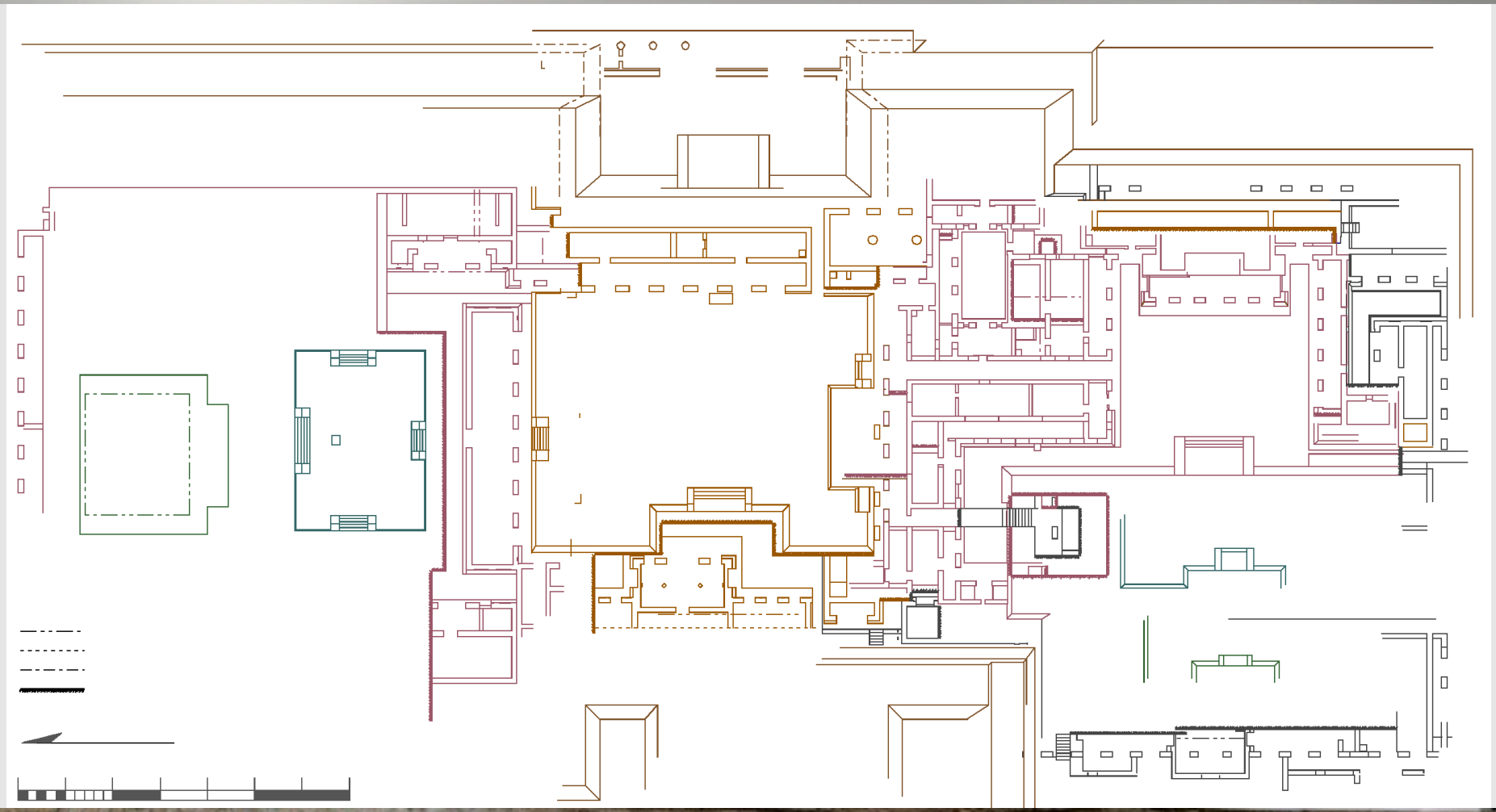
An example: Cacaxtla



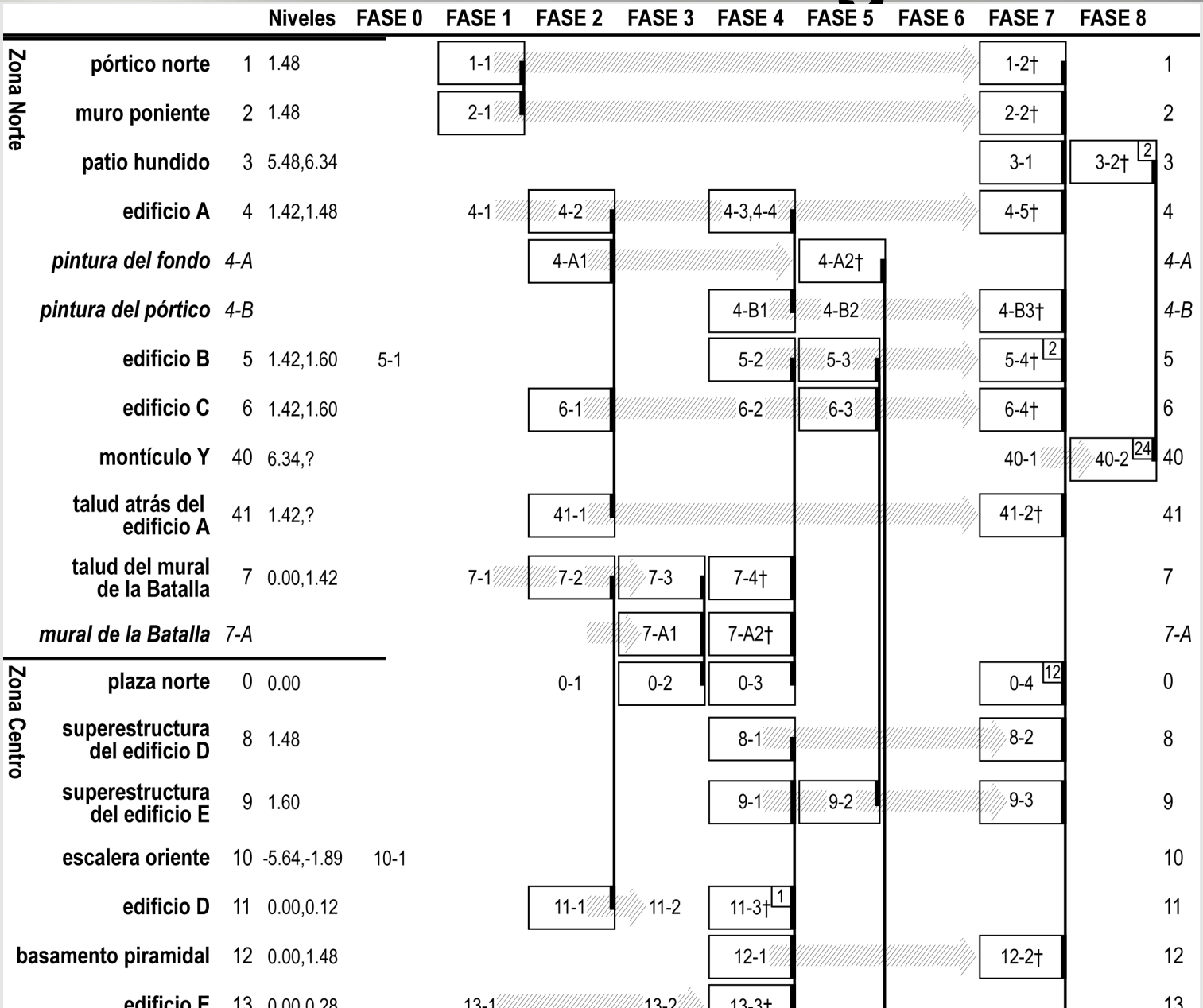
Characteristics

Several layers of intertwined construction stages

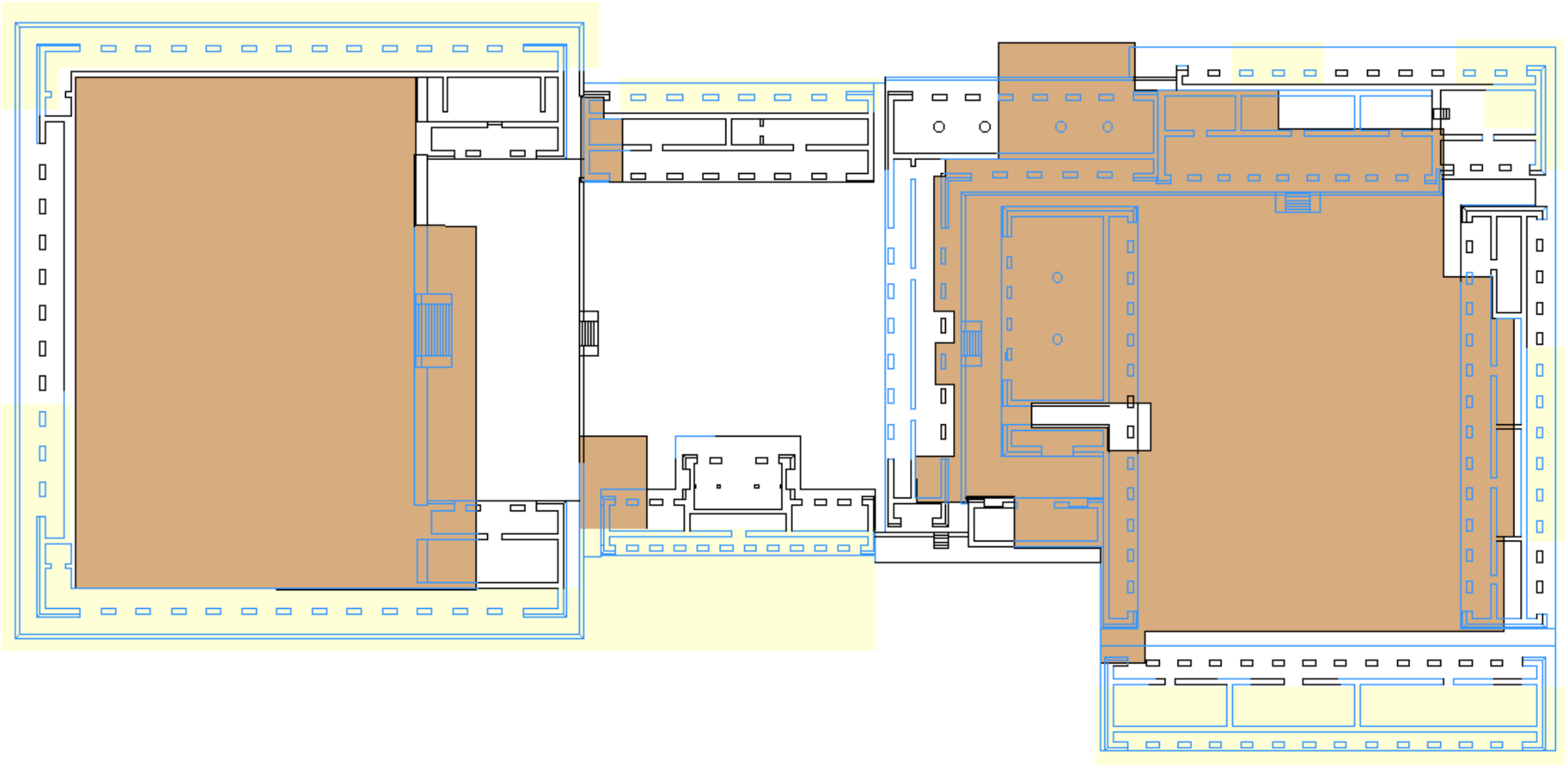
The survey



Separating the constructive stages



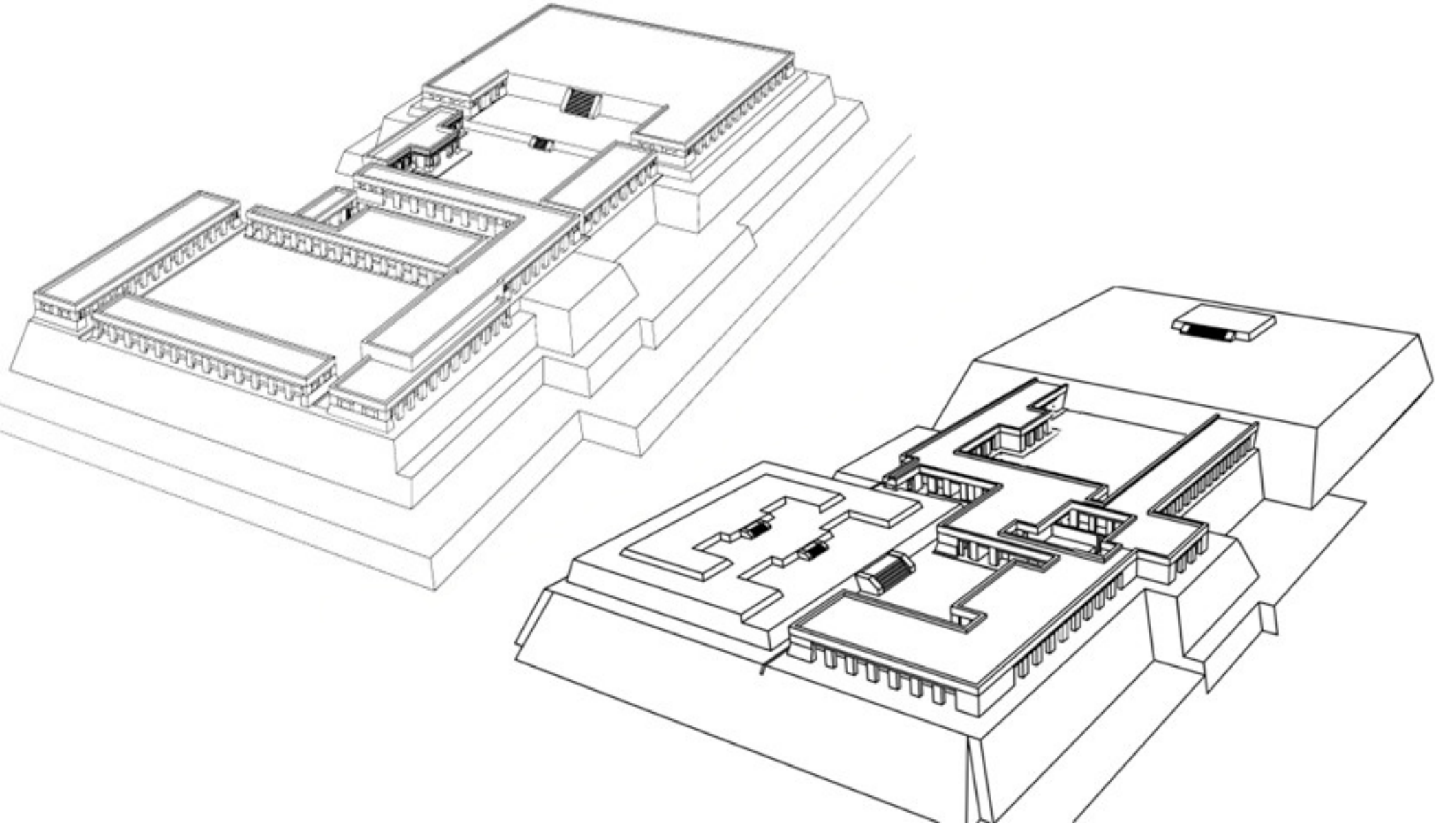
Restituting the missing parts



Cacaxtla, acquired knowledge

- Extraction of simple constructive rules:
  - use of symmetry
  - access doors are always in the centre
  - porches have even set of columns
  - stripe of polished stucco in interior spaces
- Understanding of the historic phases

Modeling



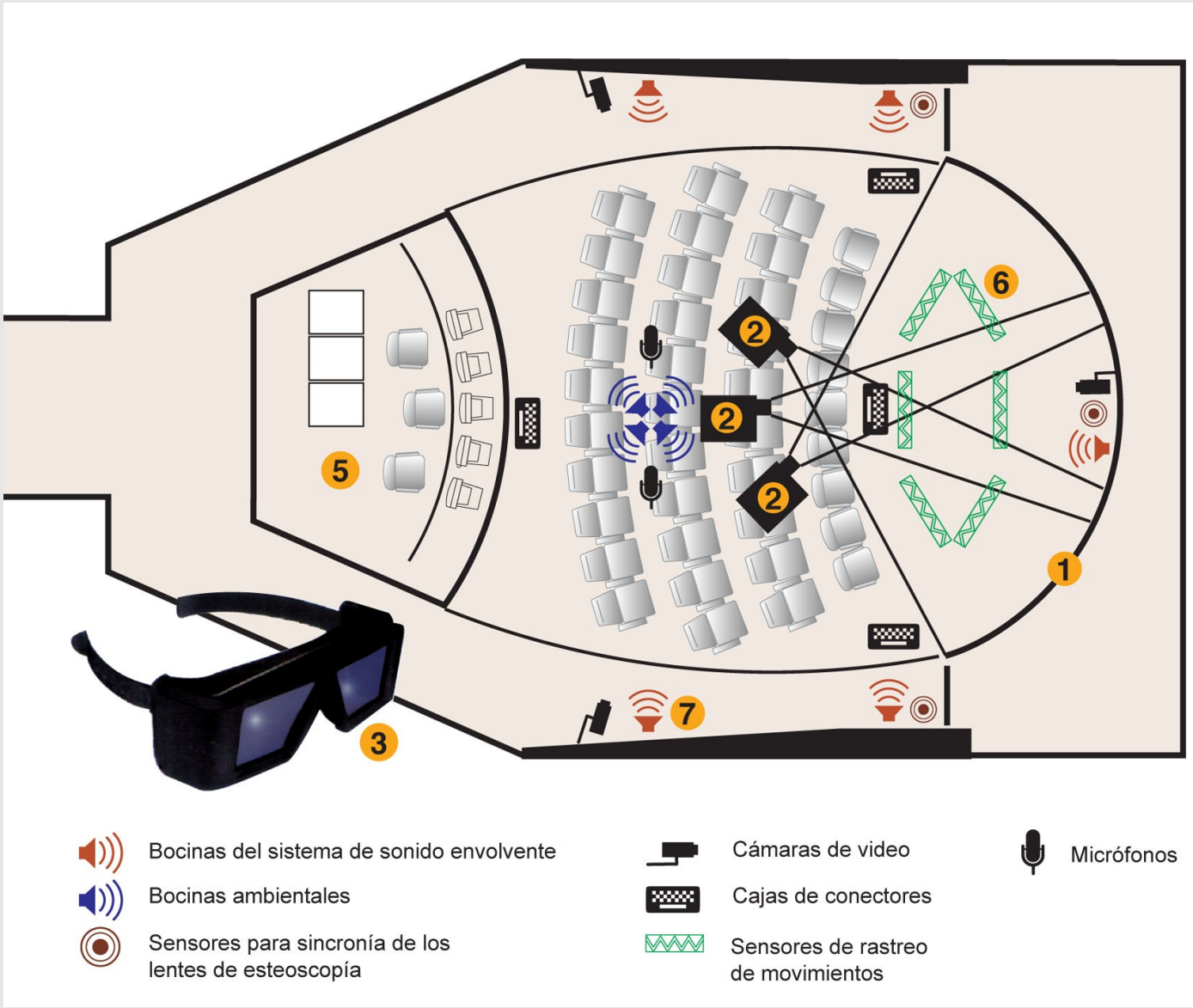
Virtual Reality

- Cacaxtla

General information

	Cacaxtla	Suchilquitongo
Model area (m2)	18474	22
Mural paintings area (m2)	173	30
# of polygons	13545	2045
# of images	2958	745
Texture storage (MB)	1851294	574096
Polygons storage (MB)	5196	961

Describing IXTLI



Computer Hardware

Onyx 350

- 12 Processors
- 3 Graphic pipes
- 6 Raster managers
- 24 GB de RAM
- 1.7 Terabytes of storage

Interface

Tracking system

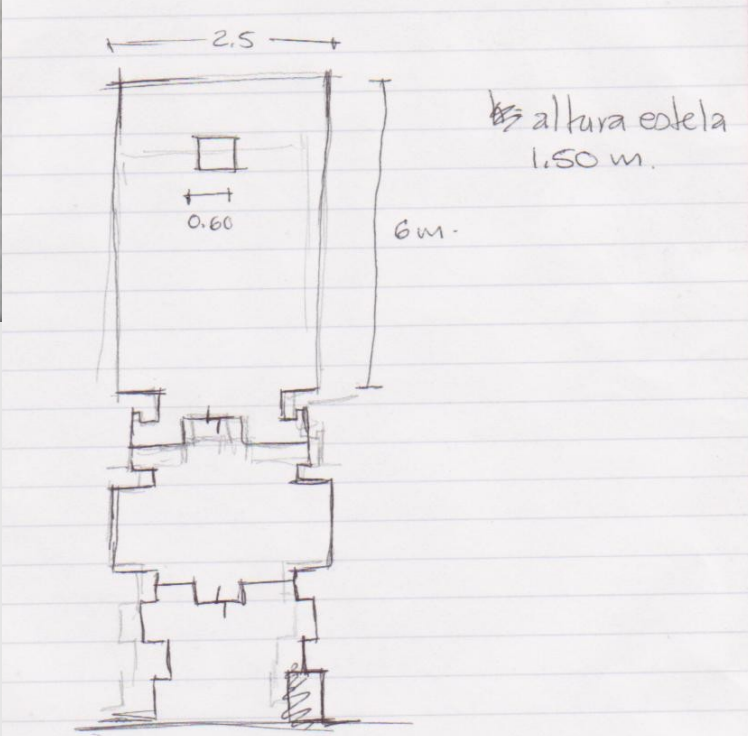
How do we use it

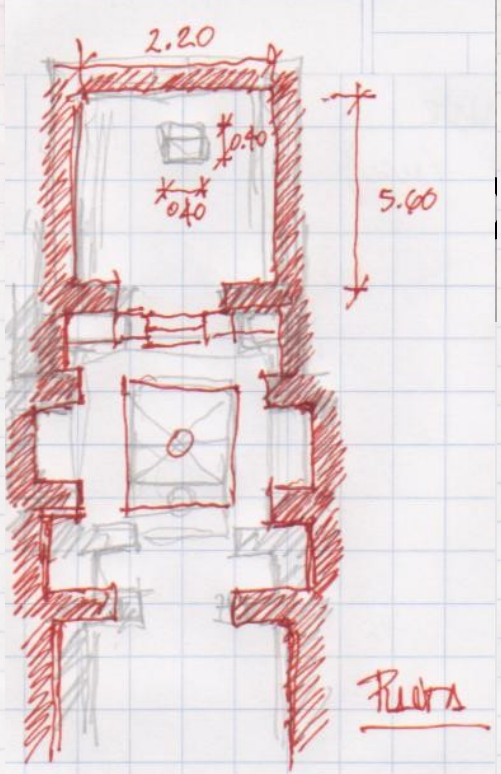
Acquired knowledge

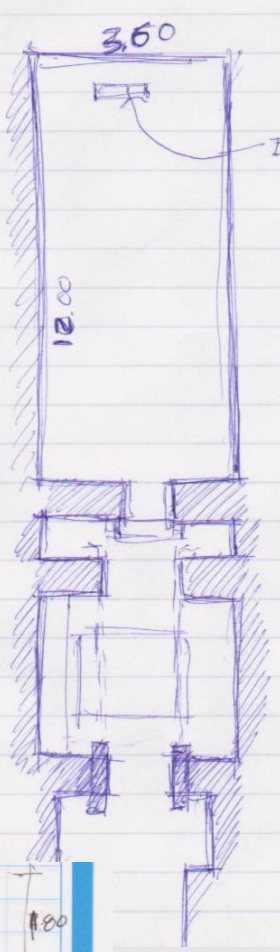
- Learning through perception mechanisms.
  - Cacaxtla: introverted spaces, human scale, rhythm and harmony, sense of order and tranquility
- Documentation
  - Memory of cultural heritage
  - Tool for research

Problems

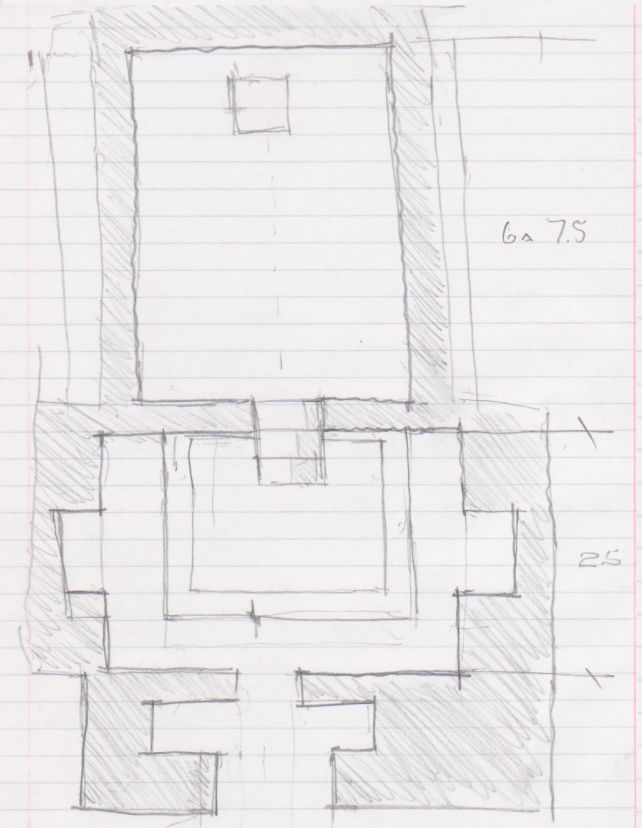
- More precise and faster survey
- Improve registering of mural paintings and materials
- Handling colours in the VR installation
- Improve the navigation
- Improve perception (scale, location, spatial reference, space and time)

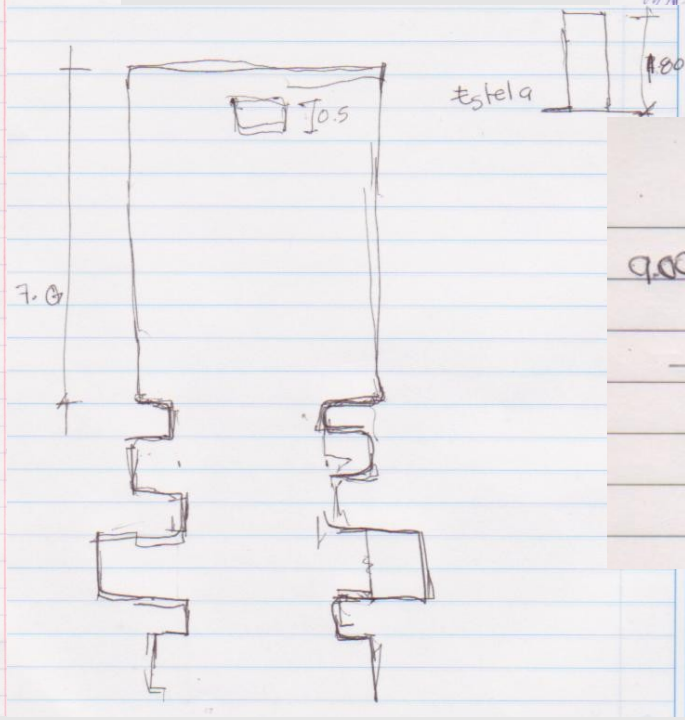


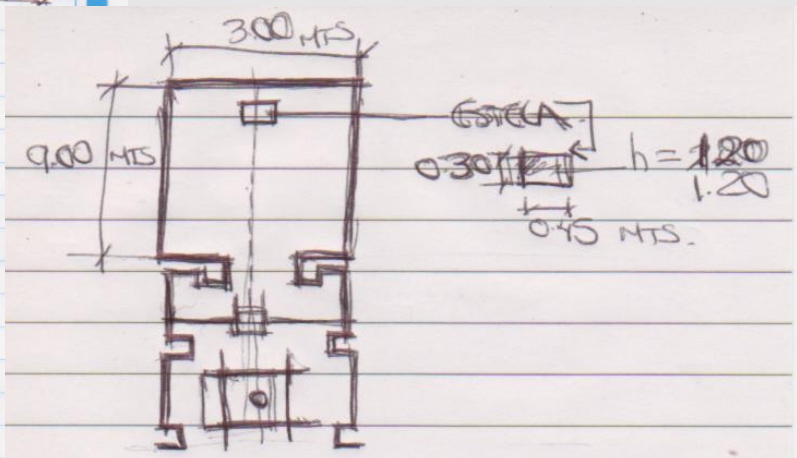




Estela 0.70 x 1.50 x .30
Cuarto:
longitud 12.00
ancho 3.60







Cámara 1.94 X 4.08 m

Estela Cara frontal .32 X.91 Grosor .13

Cognitive processes involved

- Great amount of information can be seen at the same time
- Immersion improves spatial perception
- Interaction and freedom for discovering

- Students concentrating in class.
- Emotional involvement
- Physical relation with the image
- Lecturer has better tools to explain

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