# Are Photogrammetry and 3D Scanning real alternatives to 3D modelling for Virtual Heritage applications?

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**Motivation**: To reduce the modelling effort in the creation of Virtual Reality environments used to engage the public with Cultural Heritage

- Comparison of Photogrammetry and 3D scanning for the creation of low polygon 3D models
- A practical investigation into how Photogrammetry and handheld 3D scanners help in the creations of realistic low polygon 3D models?

#### **3D Scanning**:

G\_3413.JPG

Hardware: Faro Freestyle Handheld 3D scanner Software: Scene, Meshlab

#### Photogrammetry:

Hardware: Nikon D800e, iPhone Software: Agisoft Metashape, Autodesk ReCap, MeshRoom

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G 3436.JPC

IMG\_3435.JPG

IMG 3428.JPG

IMG 3439.JPG

IMG\_3426.1

**Test objects:** A range of objects and ground features were chosen from about 20 cm up to 8m.





#### **3D Scan Point Cloud**

#### **Data Capture**:

- Roughly equivalent time for both methods, but it is slightly quicker using the cameras
- Taking more photographs and longer scanning times improves accuracy of models
- Bright sunshine was a problem for both methods

# **Processing**:

The scanner software was relatively quicker to process

Photogrammetry Photograph Alignment

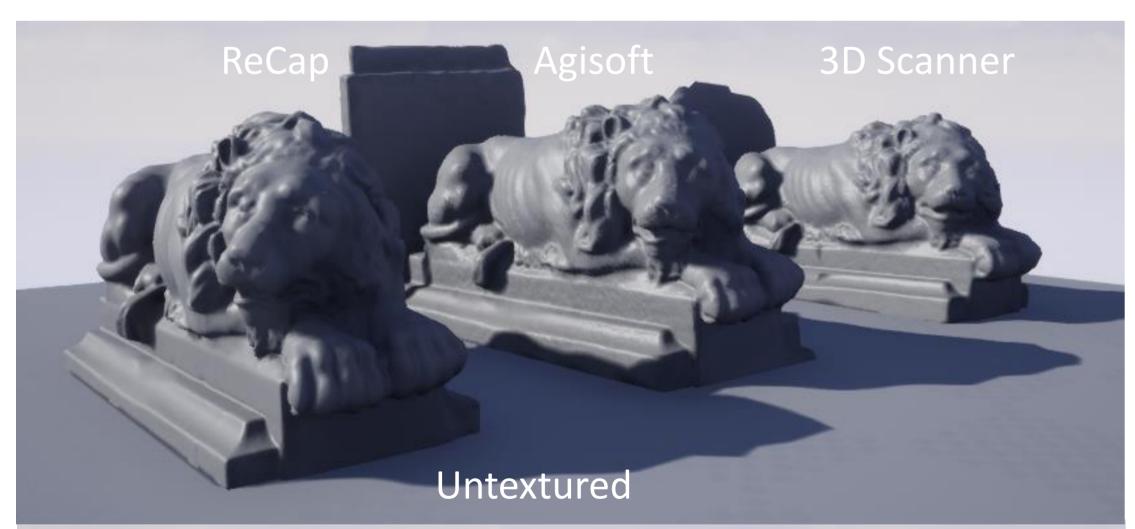
Photogrammetry with large numbers of photographs takes a prohibitively

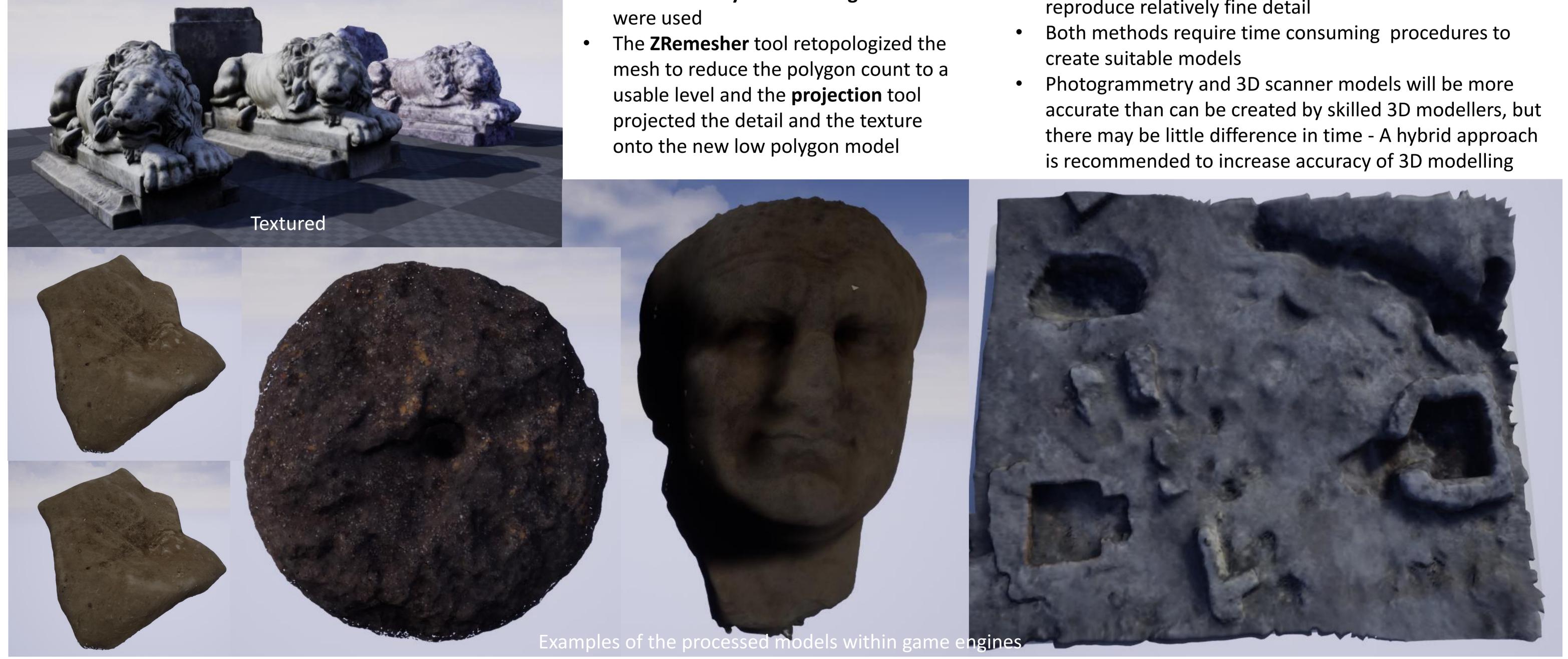
#### th War Memorial (W.A

**Distortions and holes** 

ational Roman Museum

Stitching together multiple scans can lead to inaccuracies

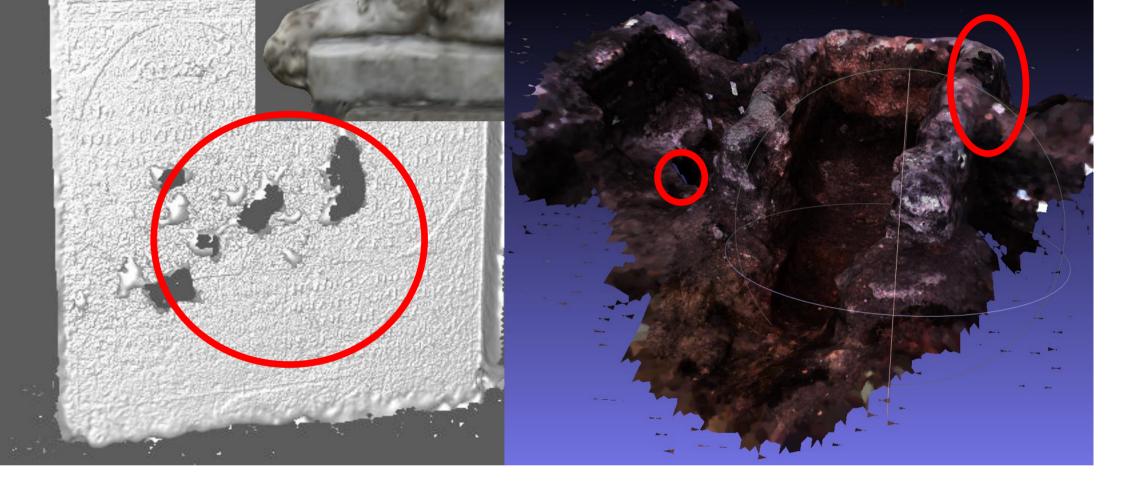




- longer time
- Some incorrect face normals can be generated from point clouds
- There may be problems of interpreting edges from photographs
- More lifelike textures are generated using photogrammetry

## **Creating Game Ready models**

- The polygon count of 3D models has to be low to be imported into a game engine
- To reduce polygons without losing too much detail a combination of Autodesk Maya and Pixologic ZBrush



### **Provisional Conclusions:**

- Depends on the level of accuracy required
- Detailed game meshes can be generated from Handheld 3D Scanners but that is not their primary purpose
- Photogrammetry is surprisingly accurate enough to reproduce relatively fine detail