Reconstructing the Ancient Maya site of Cerros with Interactive 3d Graphics

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Problem / Question
Conventional archaeological maps and diagrams compress data, reduce accuracy, and poorly represent the world of the ancient inhabitants at any archaeological site.

Hypothesis
- Virtual reconstructions and 3d scanning of artifacts can illuminate various facets of the ancient world and ancient life-ways that otherwise would not be possible using conventional methods of mapping or illustration.
- 3d reconstructions are also useful teaching tools and provide a lower barrier of entry for novice learners.

Materials

<table>
<thead>
<tr>
<th>Materials (detailed list)</th>
<th>Quantity (be specific)</th>
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</thead>
<tbody>
<tr>
<td>i7 Quad core Processor</td>
<td>1</td>
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<tr>
<td>16 Gb Ram</td>
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<tr>
<td>Radeon 7950 GPU</td>
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<tr>
<td>Oculus Rift VR Dev Kit</td>
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<td>Next Engine 3d Scanner</td>
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<tr>
<td>Trimble Sketchup Pro</td>
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<td>Crytek Cryengine 3d Graphics</td>
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Procedure 1: Landscape

Step 1
Begin by tracing the original map to create 2d polygons. Each structural footprint must detailed exactly as the original archaeological maps illustrate. The coastline is also added as a polygonal footprint.

Step 2
Raise 2d polygons into models. Render the basic details and structural geometries. This information is taken from the original excavator notes.

Step 3
Import into advanced 3d rendering program. At this stage, fine details like stucco, roofing, stairways, environmental lighting and landscape features are added.

Procedure 2: Artifacts

Step 1
The Nextgen 3d scanner first gathers a set of 3d coordinates with its laser. It then assembles them into polygons which creates a 3d mesh.

Step 2
This mesh is then converted into an object that absorbs digital light. Shading is applied so that minute details of the artifact can easily be seen.

Step 3
The software then wraps photo imagery gathered by the scanner’s camera around the model retaining it’s shading and shape but providing realistic surface details.

Results

Structure 4: Cerro’s largest monumental construction

- The first monumental construction was built on platform used to view the solar zenith
- The site’s largest structure would provided elites with a unique gathering point to view celestial events.
- To test the learning potential, the maps were provided online in UF’s Development of World Civilizations class. Students were tasked to explore the ancient world and make their own discoveries.
- 3-D artifacts can be manipulated to study their forms and use or inserted in maps to show their original excavation context.

Conclusion

- Using 3-D interactive graphics helps visualize how over a period of 100 years, the landscape at Cerro dramatically changed. Public ritual spaces gained importance and were developed while becoming controlled by the burgeoning elite class.
- 3d interactive graphics are an exciting, easy-to-use, and successful interactive learning tool.

References

Sketchup 2013 Trimble Navigation Limited 2013
Cryengine 1 Crytek 2013 www.crytek.com

What’s next?

- Sketchup 2013 Trimble Navigation Limited 2013
- Cryengine 1 Crytek 2013 www.crytek.com