

## Poster Abstract Proposal

April 30th, 2012

### NCPTT 3D Documentation Summit 2012

#### **3d Data Recordation and Immersive Visualization: Considerations for Creative Mitigation Practices. Selected site documentation case studies and the interaction of data within UC Davis keckCAVES**

The proposed presentation approaches the potential of 3d data collection and analysis in an immersive 3d visualization system, emphasizing digital format site preservation, remote access research analysis, and public interpretation by way of 3d data acquisition as creative mitigation.

While 3d documentation has been explored in preservations studies for over 10 years, improved market interest and dynamic technological advances have allowed a sharp acceleration towards lowered costs, enhanced accuracies, robust field equipment, high allocation speeds and improved post processing and visualization methods (Balzani et. al. 2004, Barcelo et. al. 2000, Bianchi 2009, Guidi 2009, etc.). These achievements and workflow models have largely remained at international and academic project scales; however, as streamlined approaches become cost effective and agency interest continues to increase, a proliferation of 3d media will necessitate consideration within U.S. cultural heritage and preservation regulatory frameworks.

The current study explores the values and concerns of 3d data within U.S. mitigation and evaluation contexts, specifically in regard to the utility and interaction of data acquisition and visualization. Large scale environmental data collection is presented through a combination of terrestrial LiDAR scanning, stereo phased white light scanning and stereo-photogrammetry, with data sets first compiled and then actualized within the UC Davis keckCAVES visualization facility. The field process incorporates a scaled approach of data coverage by delineating effective visual environment areas, generalized boundaries of cultural constituents, and high resolution needs for specific culturally modified features. All inputs are considered, with visualization a key component of the end product. Archaeological survey models and theories (i.e Banning 2002, Jackson et al. 1994), current post processing formats, data accuracy and mathematical algorithms are considered (Agarwal et. al. 2011, Furukawa et al. 2010, Pollefeys et al. 1999, etc.). Large file format color xyz data is then realized within an open source software structure utilizing an indexed grid caching system (Kreylos et al. 2003; Kreylos 2004, 2011). A site is then experienced through an immersive CAVE system, employing head tracking and independent hand remote control devices. For additional practical application, the data set is explored through small scale and commercially available 3d displays in consideration of cost effective methods of visualization. In both instances, software tools are explored which allowed archaeological analysis, including interactive and high resolution measurement, surface comparison, feature data selection, variable shading, extraction of data points, screen capture imaging, etc.

It is proposed that similar 3d viewing systems can be deployed within museums, science centers or agency offices situated at the local or semi-local level as tools for displaying and analyzing collected 3d cultural resource data. A suggested collaborative network of facilities would allow remote digital access to resource data despite limitations of weather, access conditions and 'rights of entry' (as negotiated for digital ownership) and would provide unique site by site comparative analytical opportunities, achieved regardless of resources physical localities. It is also argued that digital interactions by the public imply a reduction of potential impacts to resources by allowing a self guided and thus self actualized and rewarding exploration by way of 'hands on' virtual experiences without physical impacts or disturbances to resources and without compromising sensitive site location information.

Discussion will summarize an approach to re-framing 3d data utility and user interaction while exploring replicable methods to compliment, supplement or correlate with creative mitigation practices. Existing HABS, HEAR, HALS and CRGIS documentation and the concerns and benefits of 3d data collection will be compared with regard to selected case studies and the outlined visualization process. A final argument will be made that rigorous data acquisition combined with immersive visualization systems provide a valuable product deliverable to be achieved within a regulatory context, parallel to National Park Service goals to preserve and communicate the American Cultural Heritage Experience.

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