



3D Digital Rock Art Documentation and Preservation Workshop | 2009-05

Cultural Heritage Imaging



National Park Service
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Final Report:
A Comprehensive Training
Program for 3D Digital
Rock Art Documentation
and Preservation

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A Comprehensive Training Program for 3D Digital Rock Art Documentation and Preservation

Executive Summary:

In July 2009, Cultural Heritage Imaging (CHI) presented "A Comprehensive Training Program for 3D Digital Rock Art Documentation and Preservation" in partnership with colleagues from the Bureau of Land Management (BLM), and with the support of rock art specialists, software developers, and museum experts. With generous funding from NCPTT and matching funds from partner organizations and donations, CHI organized a two-day hands-on workshop in which fourteen participants learned 3D imaging techniques in the historic Presidio of San Francisco, part of the NPS Golden Gate National Recreation Area.

In addition to the workshop, Do-it-yourself materials including a short instructional video, user guides and a checklist were produced and made available on the project webpage. Additional materials such as a photo gallery, blog post, and proposal materials were also made available.

This workshop and resulting materials represents a major step forward in the evolution of the next generation of cultural heritage tools used by field and museum researchers. Based on reflectance transformation imaging (RTI) technology originally developed at HP Labs and stereo photo techniques used by the Bureau of Land Management and others, these emerging methods offer new possibilities for saving and studying cultural treasures of all kinds – from rock art, ceramics, and sculpture to paintings, mosaics, and metalwork.

The focus of the workshop and do-it-yourself materials was Reflectance Transformation Imaging (RTI) and photogrammetry. Workshop participants learned how to photograph rock art specimens to produce interactive 3D images and movies that offer unparalleled detail of a specimen's surface topography, making visible minute characteristics of each rock art example. The development of freely available user guides and video allows people beyond those who could attend the workshop to get started with these techniques. Through RTI, computer software allows for an image to be re-lighted from many angles to bring forward different qualities. Mathematical enhancements add further information by helping to display details that remain invisible to the naked eye or to traditional photography or magnification. By also using photogrammetry, which generates 3D points in space, participants acquired different, complementary ways of recording rock art.



Fourteen workshop participants, including staff from grant partner organizations, learned digital 3D imaging techniques. The seven partner organizations also developed content for online materials, including do-it-yourself (DIY) guides and video. The multidisciplinary workshop attracted students from many fields – stone conservation experts, building and monument preservationists, museum professionals, archaeologists, stereo photographers, Native American scholars, and rock art supporters.

The project team united staff from the NMAI, the Presidio Archaeology Program, the US Bureau of Land Management (BLM) National Operations Center, University of California, Berkeley (UCB), Hewlett Packard Laboratories (HP Labs), Princeton University, and the University of California–Santa Cruz (UCSC).

Final Grant Products

A two day workshop was held at the Presidio of San Francisco in July 2009. Nine participants from around the US and the UK attended the workshop, along with several grant partners. Significant contributions were made by grant partners, most notably, Tom Noble and Neffra Mathews of the National Operations Center of the Bureau of Land Management who co-presented the workshop with Cultural Heritage Imaging staff.

DIY materials:

Performing Refection Transformation Imaging DIY Instructional Video – a three and a half minute video demonstrating key aspects of the capture of RTI images

RTI; Guide to Highlight Image Capture – a User guide describing in detail the methodology for capturing an RTI sequence

RTi: Highlight Capture Check List – a checklist of the critical steps for performing highlight image capture – intended to be used as a reminder and checklist in the field

Aerial and Close-Range Photogrammetric Technology - Providing Resource Documentation, Interpretation, and Preservation. By Neffra A. Matthews, Technical Note 428. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, Colorado.

[BLM Heritage Resource Publications](#)

While this tech note was not created with grant funds, it was part of the material presented at the workshop and is freely available on the web and there are links to it from the project web page.



Dissemination

A [project web page](#) was maintained on the Cultural Heritage Imaging (CHI) website. Updates on the project were included in the CHI electronic newsletter.

A call for participants was made at the Society for American Archaeology (SAA) conference in 2009, at the American Rock Art Research Association (ARARA) conference, through invitations to colleagues made by grant partners, and on the CHI website and electronic newsletter.

The project was discussed and elements of it presented at conferences including the Computer Applications in Archaeology Conference in both 2009 and 2010, and the American Rock Art Research Association conference in 2009.

CHI gives workshops and training sessions to museum professionals, archaeologists, photographers and others. The materials developed under this grant are provided to participants, and acknowledgement is given to NCPTT. Since the beginning of this grant, these programs have reached over 90 people representing institutions such as the Museum of Modern Art, the Museum Conservation Institute of the Smithsonian Institution, the Fine Arts Museums of San Francisco, Historic New England, the Phoebe A. Hearst Museum of Anthropology, the Oakland Museum of California, and the San Francisco Museum of Modern Art, as well as historians, archaeologists and other researchers from various Universities.

Acknowledgements

Many team members contributed their time and expertise to the project, including UC Berkeley anthropology professor Meg Conkey, National Museum of the American Indians's Carolyn McClellan, computer graphics researchers Tom Malzbender from Hewlett Packard Labs, James Davis from UC Santa Cruz, and Szymon Rusinkiewicz from Princeton University.

Videography support and advice was provided by Mark Christal and Kevin Cartwright of NMAI.

Senior technical writer Judy Bogart donated time to produce the *RTI Guide to Highlight Image Capture*. Judy provided a format and structure for the document, a significant amount of writing and also editing of existing materials.

Special thanks to BLM stereo photo experts Tom Noble and Neffra Matthews, who co-taught the workshop with CHI staff. They also provided copies of their excellent tech-note on photogrammetry. The Photogrammetry tech note is linked from the project web page

The Presidio archaeology program supplied workshop space and participant lodging.



Cultural Heritage Imaging

The RTI methodology presented at the workshop and described in the DIY materials was developed at Cultural Heritage Imaging by Mark Mudge, Marlin Lum and Carla Schroer with technical guidance from Tom Malzbender of Hewlett Packard Labs. The idea for Highlight RTI and its original execution was a collaboration between Tom Malzbender, Mark Mudge, Marlin Lum and Carla Schroer, prior to the inception of this grant. Many others commented, tweaked, gave ideas, and were generally helpful in the development of the capture methodology presented in the guide, checklist and video.

CHI staff donated their time, equipment, knowledge, and enthusiasm to the project. Additional funding was provided by charitable contributions to Cultural Heritage Imaging.

A special grant in the amount of \$5000 to complete grant products was provided by the Unbroken Chain Foundation in December 2009.

For more details about the project and links to the produced materials visit <http://culturalheritageimaging.org/ncptt/2008>