



Digital Transitions, R.B. Toth Associates and Equipoise Imaging announce Cultural Heritage Partnership for Multi-Spectral Imaging

NEW YORK and WASHINGTON D.C., June 15, 2016 – Digital Transitions, R.B. Toth Associates LLC and Equipoise Imaging, LLC are partnering to market next-generation Multi-spectral Imaging Systems for the world's libraries, museums and universities. This follows the successful integration of high-end multi-spectral imaging systems utilizing 60 megapixel Phase One cameras in the USA and Europe that proved capable of imaging key manuscripts, including Archimedes and Galen Palimpsest folios, papyrus mummy masks, American and Danish archival records, printed books and Nordic maps.

Digital Transitions has been providing high-end digitization solutions and technical services to the cultural heritage community for the last 13 years. Their understanding of the specific needs and requirements of this market segment is why they have partnered with Phase One, the world leader in digital imaging technology, to provide fully integrated hardware and software that can provide preservation grade assets within an efficient capture and post-processing workflow. The next logical step was to join forces with multi-spectral imaging pioneers Michael B. Toth and William A. Christens-Barry to now offer clients the state-of-the-art Multi-spectral Imaging technology that can support their study and preservation of important cultural heritage artifacts. These multi-spectral imaging advances have been utilized for projects including St. Catherine's Monastery Palimpsests in the Sinai, David Livingstone's Diaries from Africa, Library of Congress treasures, and University College of London artifacts, as well as work on archival materials, printed books and other objects. Furthermore, this multi-spectral system is compatible with existing Phase One camera systems used in many libraries and museums.

"Multi-spectral imaging is a real game-changer for the cultural heritage community wanting to learn more about their important collection objects," noted Mike Toth, owner of R.B. Toth Associates LLC. "Our partnership with Digital Transitions capitalizes on our 15 years of multi-spectral imaging and support around the globe – from the Walters Art Museum and Penn Libraries to the UCL DH Centre, John Rylands Library and New Mexico Museums. With Digital Transitions', support for Phase One cameras, software, services, along with their cradles and copy stands, together we can offer an integrated multi-spectral imaging system with the training and support institutions need to capitalize on these systems."

Dr. Bill Christens-Barry, owner of Equipoise Imaging, LLC, said, "Together with Digital Transitions we can continue to empower institutions that want multi-spectral imaging technology – offering clients integrated cameras, lighting and processing algorithms that are tailored to their needs. This collaboration enables us to provide institutions with their own capabilities to not only image objects, but to do their own image processing to reveal that which was previously unseen. With these images and advanced research,

processing and data management, institutions can make even greater contributions to cultural heritage studies.”

This partnership enables the creation of the latest generation multi-spectral imaging system and services. This new system includes the leading-edge Phase One IQ260 achromatic camera synchronized with a unique narrowband LED illumination designed by Dr. Christens-Barry, with a Phase One iXr or DT RCam Reprographic Camera body. This system can be mounted on Digital Transitions' Capture Cradles or copy stands. Development of Phase One's Capture One and Spectral XV software with integrated spectral image processing tools and training streamlines throughput, workflow and data management and access for clients.

About R.B. Toth Associates LLC and Equipoise Imaging, LLC

Working with experts in the field, the partnership of Equipoise Imaging LLC and R.B. Toth Associates LLC has developed and implemented standardized technologies, work processes and procedures needed to provide digital access to cultural objects. Integrated teams of scientists, engineers, scholars and technical experts managed by Mike Toth support the study and preservation of cultural objects for museums, libraries and private collections. This includes use of multi-spectral imaging systems based on narrowband LED spectral illumination modules developed by Dr. Bill Christens-Barry.

Since 2000, both companies have supported institutions with not only advanced multi-spectral imaging, processing technologies and data management, but also the needed planning, operation and integration of new digitization technologies. Toth and Christens-Barry have supported digitization and multi-spectral imaging studies around the globe:

- Pioneering multi-spectral imaging of the Syriac Galen and Archimedes Palimpsests for open access
- Vesalius 1st and 2d Editions and other books for prior ownership information
- Palimpsests in the Vatican Library and St. Catherine's Monastery in the Sinai
- Maps and manuscripts in Scandinavian University Libraries
- Library of Congress Treasures, including the Waldseemüller Map & Gettysburg Address Drafts
- Medieval Islamic and Western Manuscripts at the Walters Art Museum
- Zacharius Rhetor folios in Syriac at the British Library
- Modern and medieval texts and photos at the Harvard University Libraries
- Free access for digitized pre-modern manuscripts in the University of Pennsylvania Libraries
- Parchment and papyrus manuscripts at the Duke University Library
- Parchment, paper & papyrus manuscripts at the John Rylands Library, Manchester
- Culture and Heritage Photographs in Abu Dhabi

More information on these and other projects is available at www.rbtoth.com.

About Digital Transitions

Digital Transitions Division of Cultural Heritage designs and manufactures its own camera bodies, lens panels, reprographic copy stands, book capture systems and accessories in the United States. Digital Transitions is also Phase One's cultural heritage partner, serving the needs of cultural heritage institutions

around the world. Their diverse expertise in the areas of optical, mechanical, and software development provide them a virtually unlimited capacity to custom design solutions to meet specific needs. In addition, their systems are designed modularly to protect the client's investment and can be upgraded as new technology becomes available. The Digital Transitions Division of Cultural Heritage is also committed to providing education, training, integration and long-time technical support to ensure clients are getting the highest image quality reproductions within an efficient capture and post-processing workflow.

Some of our clients include:

- The Getty Trust
- Library of Congress
- National Archives
- The Museum of Modern Art
- The Smithsonian
- The Frick
- Harvard
- Yale
- Brown
- New York Public Library
- University of Pennsylvania Libraries

More information about Digital Transitions Division of Cultural Heritage can be found at www.dtdch.com

About Phase One

Phase One is the world's leader in open-platform, high-end camera systems and solutions. Phase One cameras, digital backs and lenses are designed to deliver superior quality image capture and investment value. Phase One's Capture One Pro and Media Pro software help streamline capture and post-production processes for both medium format and DSLR cameras. Phase One products are known for their quality, flexibility and speed, enabling institutions to capture images to meet their archival and digitization goals without compromise.

Phase One and Capture One are registered trademarks of Phase One A/S. All other brand or product names are trademarks or registered trademarks of their respective holders.

....

The Technology Behind Multi-Spectral Imaging

Where does the multi-spectral imaging technology originate?

Scientists developed the digital imaging technology used for multi-spectral imaging over the last decade and a half based on that used for earth resource, medical and astronomical imaging. This technology was initially developed to recover the writings of Archimedes in the Archimedes Palimpsest (www.archimedespalimpsest.org), managed by Mike Toth, with illumination systems developed by Dr. Bill Christens-Barry. Since then, this technology has been used to study other palimpsests, including a Syriac palimpsest with an early medical work by Galen and palimpsests in St. Catherine's Monastery in the Sinai and the Vatican Library, as well as studies of David Livingstone's Diaries in Scotland. Mr. Toth and Dr. Christens-Barry have focused on development of full end-to-end systems that include not just the capture of quality multi-spectral images, but also the data management and processing necessary to fully tap the technology and large amounts of data. This includes systems development in collaboration with the University College London, Museum of New Mexico, John Rylands Library at the University of Manchester, Gilcrease Museum of the University of Tulsa, and the U.S. Library of Congress.

How is multi-spectral imaging accomplished?

This integrated imaging system includes a Phase One Achromatic IQ260 Camera, with its robust 60 megapixel monochrome back, body and lens with 350 - 1,100 nm sensitivity. This is integrated with Equipoise Imaging LLC illumination panels, filters and computer systems using Capture One software. The imaging hardware is reasonably portable and has been used to image many objects in the US and Europe. During each imaging session, objects are imaged one at a time in a dark room. Each is illuminated with LEDs (Light Emitting Diodes) in custom light panels designed by Dr. Christens-Barry. Each LED emits narrow-band light of a very specific color, covering the multi-spectral range of 370nm to 950nm – from the ultraviolet (UV) through the visible and into the near infrared (IR). An image is taken using the Phase One Achromatic IQ260 Camera during each illumination. Information about the captured data (called metadata) is stored within each image based on defined standards, for use in processing the images on software developed by Dr. Christens-Barry. All the digital images and metadata are captured and stored on institutional systems.

What are multi-spectral images and what do they reveal?

For each page or object, a data cube with a stack of multi-spectral images is captured. This data cube comprises multiple images of a single object or page. These are taken sequentially with different wavelengths of light while the stationary object is illuminated by LEDs of different colors in a couple of minutes. With each illumination by the thirteen or more different wavelengths of light, the Phase One Achromatic IQ260 Camera captures a separate image. The resulting images form an image cube of perfectly registered images – where any given point on one image lines up with the same point on all the other images. This data cube of multiple images taken in different colors of light allows the variation in color of any single character or word on the page to be studied in minute detail. These small variations in detail are used to digitally process the unseen texts and markings from that which is visible to the eye.

How does the digital image post-processing reveal the hidden texts?

Post-processing is a critical part of the digitization work needed to reveal the hidden text. The Phase One Multi-Spectral Imaging System includes custom algorithms that can be used by a scholar, conservator or other users to process the images to reveal information needed to advance their studies. Handwritten text can be recovered from some manuscripts like palimpsests because the inks and parchment or paper respond differently to different colors of light. The ink of the visible text and the residual ink from the scraped off, faded and/or obscured text respond differently to different wavelengths of light. This difference in the ink responses is exploited to separate the texts. This technique builds upon a decade of privately funded work on the Archimedes and Galen Palimpsests and other manuscripts, and empowers institutions to complete their own multi-spectral imaging.

What is unique about this Phase One system?

With Phase One cameras and Capture One software, Mr. Toth and Dr. Christens-Barry bring a unique set of capabilities to cultural heritage studies based on over a decade and a half of experience. In collaboration with Phase One they are able to integrate a complete system with support and services that address the full range of user needs to enable institutions to capitalize on their own multi-spectral imaging systems: From imaging through processing to data management and storage.

Where can I find more information about this work?

- New York Times, [Medicine's Hidden Roots in an Ancient Manuscript](#), June 1, 2015
- Marketplace Tech, [Discovering hidden languages in centuries-old writing](#), October 1, 2014
- Washington POST, [In the Sinai, a global team is revolutionizing the preservation of ancient manuscripts](#), Sept 9, 2012
- Raleigh News and Observer, [At Duke, sibling sleuths try to unlock mummy mystery](#), March 1, 2016
- Fstoppers, [It's 'National Treasure' In Real Life: How Photography Is Used to Reveal Secrets of the Past](#), August 27, 2015
- VisionSystems Design, [Multispectral Imaging reveals secrets of ancient texts](#), October 5, 2015
- Smithsonian Magazine, [Decoding the Lost Diary of David Livingstone](#), Nov. 24, 2014
- NEH HUMANITIES Magazine, [Livingstone in a New Light](#), September/October 2010, Volume 31, No. 5
- Science News for Students, [The ultimate wordfind puzzle](#), January 31, 2014
- APR "The Story", [Secret Writings in the Monastery](#), November 5, 2012
- PRI "The World", [Deciphering Ancient Manuscripts at St. Catherine's Monastery](#), October 16, 2012
- Wake Forest Magazine, [Operation Archimedes](#), Fall 2011
- FT Magazine, [What lies beneath: Sinai's hidden texts](#), September 22, 2012
- The Archimedes Codex: How a Medieval Prayer Book Is Revealing the True Genius of Antiquity's Greatest Scientist, Netz and Noel, 2007