

Reflections on InterPARES



Archivaria

Note from the Editor

This is the second part of a series, "Reflections on InterPARES," which was introduced in Archivaria 64 (Fall 2007). In keeping with the theme provided in this issue by the Special Section on Archives and Photography, the articles presented here address InterPARES investigations into non-textual records, including the record-keeping activities of photographers using digital technology; the problems and paradoxes associated with the preservation of digital artworks; and media windows and the archiving practices of motion picture studios.

He Shoots, He Stores: New Photographic Practice in the Digital Age

JESSICA BUSHEY

RÉSUMÉ Au cours de la dernière décennie, les photographes professionnels ont répondu aux nouveaux besoins du monde des affaires et aux possibilités créatives en s'éloignant des procédés et produits analogues pour adopter une pratique basée principalement sur les images numériques. Les différences fondamentales entre la création et la préservation de photographies analogues et la création et la préservation d'images numériques vont maintenant plus loin que les questions de stabilité du support et se concentrent davantage sur le nouveau rôle du photographe tant comme créateur que comme conservateur. Les liens entre les concepts d'originalité, de fiabilité et d'authenticité par rapport aux représentations photographiques dans l'ère du numérique sont au centre de ce discours. Ce texte y contribue en présentant les résultats d'un sondage InterPARES 2 sur les activités de gestion de documents des photographes qui se servent de la technologie numérique; il présente des nouveaux développements initiés par la communauté de l'imagerie pour répondre aux questions liées à la création, à l'utilisation et à la préservation des images numériques; il explore enfin comment le paradigme numérique définit les responsabilités de l'archiviste.

ABSTRACT In the last decade, professional photographers have responded to changing business needs and creative opportunities by transforming their analogue-based processes and products into a predominantly digital-imaging practice. The fundamental differences between the creation and preservation of analogue photographs, and the creation and preservation of digital images have moved beyond issues of media stability and now focus on the changing role of the photographer as both creator and preserver. Central to this discourse is the relationship among the concepts of originality, reliability, and authenticity in regards to photographic representation in the digital era. This article contributes to that discussion by presenting the results of an InterPARES 2 survey on the record-keeping activities of photographers using digital technology; presenting new developments instigated by the imaging community to address issues of digital-image creation, use, and preservation; and exploring how the digital paradigm shapes the responsibilities of the archivist.

Introduction

Since the invention of photography in the early 1800s photographers have interacted with mechanical apparatuses to create their images. The methods used to produce photographic prints have evolved over time and have incorporated innovative optics, diverse chemicals, and numerous printing surfaces. Throughout all these changes, photographic practice has always entailed procedures for manifesting latent information into a final format that is readable to the human eye.

The twentieth century heralded the unprecedented growth of modern photography. During this time the photographic market introduced colour , amateur cameras, and the instant Polaroid format. The photographic industry responded to the growing needs of “shutterbugs” by expanding photofinishing services to offer inexpensive and time-saving alternatives to development and printing by hand. The convenience of photofinishing enabled photographers to focus solely on the shoot (i.e., act of taking pictures.) Early amateur cameras actually required photographers to shoot a roll and then return the whole camera to the company for film removal, development, and printing. Photofinishing services added numbers to slide frames, provided protective housing for film and prints, and offered organizational materials at point-of-purchase. Thus, the modern photographic industry cultivated generations of amateur and professional photographers that trusted others to shape the management and storage framework of their photographic collections. The end result is binders and boxes of analogue photographs arriving at archives with their roll numbers, date-stamped prints, and annotated contact sheets ready to guide archivists back along the path of a creator’s activities.

We now find ourselves firmly planted in the digital era. The market for analogue photography shrinks daily as manufacturers and consumers reject film-based methods for image production, and embrace digital devices for capture, distribution, and display. Client expectations of professional photog-

raphers now include creating images in multiple file formats, mounting digital proof sheets for online browsing, performing edit operations, delivering images as prints and electronically as digital files, and providing images on *compact disc (CD)* and *digital versatile disc (DVD)* for future reference and use. Photographers working with digital technology must now divide their time equally between shooting and storing images. This approach is reinforced by professional photographic associations recommending new pricing schemas for commercial assignments that incorporate time-costs for cataloguing and storing images. In light of emerging responsibilities for photographers to manage digital images and provide ongoing access to digital files from past assignments, it is necessary to rearticulate the role of the photographer as both creator and preserver. In assuming the activities associated with storage and long-term preservation of digital images, creators are shifting their priorities in an effort to learn methods that will ensure ongoing and future access to the digital assets. Information on preservation procedures for photographers creating digital images is becoming more available as research products from multidisciplinary initiatives are released; however, input from those entrusted with preserving digital materials, such as archivists, is paramount to the success of any preservation strategy. Of equal importance is the need for archivists to expand their understanding of how new media (i.e., digital audio, video, and still images) are created and managed, activities that were formerly attributed to the domain of creators. The nature of all electronic records is such that the expertise of archivists as preservers should be brought to bear on the entire life cycle of the records to allow the survival of digital information. This new role for archivists is a difficult one, and they will have to balance between interference with the creative process and support for it in order to ensure that the identity of the images generated will not be altered by their preservation needs. If archivists are familiar with the activities of photographers working with digital technology, they will be more successful in anticipating the types of digital-image files and storage media to be received by archival institutions, which will assist in developing guidelines for submitting digital images to archives, and managing ongoing access to digital images held within archives.

As photographic practice continues to evolve, unique forms of visual representation are created that require new terms to describe them, and the development of new methods for their distribution and preservation. The demand for digital images and their numerous applications has thrust many photographers into a digital practice with little industry support in the form of proven products designed to assist in creating, managing, and preserving their images. The evolution of image-making presents an opportunity for archivists to evaluate the activities of photographers and explore how the concepts of originality, reliability, and authenticity are expressed in regards to photographic representation in the digital era.

This article presents the findings of the general study entitled “Survey on the Record-Keeping Practices of Photographers using Digital Technology,”¹ undertaken by professor Marta Braun (Ryerson University),² research assistant Jessica Bushey (University of British Columbia), and conducted under the auspices of the International Research on Permanent Authentic Records in Electronic Systems (InterPARES) 2 Project: Experiential, Interactive, Dynamic Records.³ The survey contributes to the overall research project goals of investigating the continuing reliability, accuracy, authenticity, accessibility, and the long-term preservation of digital entities produced in the course of artistic, scientific, and e-government activities. The specific focus of the survey was to learn about the practical aspects of how photographers create and manage their digital images as reliable records, and preserve their authenticity over the long term. An analysis of the InterPARES 2 findings will establish the framework in which photographers are approaching digital practice and key factors affecting reliability and authenticity, such as image-file formats, metadata, workflow procedures, and storage media. Of particular importance is an examination of metadata schemas used by professional photographers and supported by vendors to determine their efficacy to ensure born-digital images as reliable and authentic records. One of the analytical instruments used to assess the digital-photographic environment is the “Benchmark Requirements Supporting the Presumption of Authenticity of Electronic Records,”⁴ a research product from the InterPARES 1 Project. Explanation and examination of these issues provide insight for archivists interested in learning more about the principles of digital-image creation, management, and preservation. While direct evidence of the application of these findings to archival practice is beyond the scope of this article, an overview of developments initiated by photographers and the image industry following the “Survey of Record-Keeping Practices of Photographers using Digital Technology,” will be addressed with a focus on how these developments will impact archivists poised to receive digital images in the future. The InterPARES findings reflect the emerging state of digital practice and reveal

- 1 Jessica Bushey, “Survey of Record-Keeping Practices of Photographers using Digital Technology: Final Report for Participants,” *InterPARES 2* (28 August 2005), http://www.interpares.org/display_file.cfm?doc=ip2_digital_photo_recordkeeping_report.pdf (accessed 26 October 2007).
- 2 Marta Braun teaches art history, photographic history, and film theory in the Ryerson School of Image Arts.
- 3 InterPARES 2 Project, “Welcome to the InterPARES 2 Project” (2002-2006), http://www.interpares.org/ip2/ip2_index.cfm (accessed 22 January 2008).
- 4 See: Authenticity Task Force, “Appendix 2: Requirements for Assessing and Maintaining the Authenticity of Electronic Records,” in *The Long-term Preservation of Authentic Electronic Records: Findings of the InterPARES Project*, ed. Luciana Duranti (San Miniato, 2005), pp. 204-19.

the importance of collaboration among photographers, software developers, hardware manufacturers, and cultural stakeholders, such as archives and museums, in the creation and preservation of born-digital images. The study intends to provide the foundation for further research into unstructured (e.g., individual) and structured environments (e.g., institutional) creating born-digital images as by-products of artistic and business activities with the intention of producing guidelines for creators and preservers. Therefore, it is fitting that the third phase of InterP ARES, entitled “Theoretical Elaborations into Archival Management (TEAM): Implementing the Theory of Preservation of Authentic Records in Digital Systems in Small and Medium-Sized Archival Organizations,” launched in January 2008, will provide the opportunity to translate the findings of earlier InterPARES projects into concrete action plans that will be tested in small- and medium-sized archives, and developed into teaching modules and training programs for professionals.⁵

Terminology

To facilitate interdisciplinary communication, a clear understanding of how the concepts and terminology are used within each discipline must be established. Before creating the questionnaire for the survey on photography, an annotated bibliography on digital photography and a review of photographic literature was compiled. Specific to our interests was literature that discussed how methods of image creation and maintenance are being shaped by digital practice, and explored the concepts of authenticity and reliability in the same context. A product of the research undertaken in the InterP ARES 2 case studies and general studies is the *InterPARES 2 Terminology Database*, which contains a Glossary, a Dictionary, and Ontologies.⁶ The IP2 Project Glossary provides an authoritative list of the approved terms and definitions derived from InterPARES 2, for the purpose of supporting researchers in understanding the concepts underpinning the project. The IP2 Project Dictionary contains the terms held in the Glossary, but provides multiple definitions for a single term, which reflect the multidisciplinary nature of the project. Our investigation into existing terminology to describe images in digital format, which contributed to the contents of these InterP ARES tools, revealed a lack of consistency within the photographic community and between photographers and archivists.

5 InterPARES 3, “Welcome,” http://www.interpares.org/ip3/ip3_index.cfm (accessed 24 January 2008).

6 InterPARES 2 Project, *InterPARES 2 Terminology Database*, http://www.interpares.org/ip2/ip2_terminology_db.cfm (accessed 16 January 2008).

It became apparent in the photographic literature that an effort to unite analogue and digital practice has resulted in the commonly-used term, *digital photography*; however, this is not specific enough for our purposes because it does not discriminate between *born digital* and *digitized*. These are not terms commonly used in photographic literature, but they are found in cultural heritage publications aimed at archivists, librarians, and researchers working with visual resources in a digital format, such as digitization program development and cataloguing strategies.⁷ A born-digital image differs from a digitized image in that it has no analogue original. The act of scanning a photographic print creates a digitized image that is an electronic manifestation of the physical medium. In this manner, the digitized image acts as a surrogate to the analogue original. If the digitized image is corrupted or becomes inaccessible due to technological obsolescence there is always an analogue original for reference. A born-digital image refers to an image that is generated entirely from digital hardware and software, and which has no analogue genesis. Maintaining the readability and accurate representation of a born-digital image over time, in which numerous software programs and hardware configurations may be used to access, view, deliver, and store the image file, is a much greater challenge. Thus, the distinction between born digital and digitized clarifies the status of an image and influences the methods used by photographers and archivists to create, manage, and store collections of digital images.

The review of photographic literature also revealed that concepts of reliability and authenticity in relation to analogue photographs and digital images are at the heart of discourse concerned with the veracity of mechanical representation. Regardless of the fact that the computer and the camera are both machines, the conservative view of analogue photography as “objective,” and therefore reliable, is made on the basis of the photographer acting as a passive operator of the mechanized camera, and the correlation between reality and the photographic referent. In contrast, the processing capabilities of digital cameras and imaging software offer edit operations that are far beyond the capabilities of traditional darkroom techniques and camera optics; therefore, the born-digital image is viewed by some as a potential fabrication of reality and “subjective” at best. The nature of digital information, and its close asso-

7 The terms *born digital* and *digitized* are defined in the 2003 revised edition of “Introduction to Imaging,” published by the Getty Research Institute. The instructional manual is aimed at archivists, librarians, and visual resource specialists interested in launching a digitization program. Howard Besser, *Introduction to Imaging*, rev. ed. (Los Angeles, 2003). The Library of Congress explains the application of the term born digital in an online guide for researchers. Library of Congress, “Born Digital Photographs: Cataloging Samples” (June 2004), <http://www.loc.gov/rr/print/tp/Vorn%20Digital%20Photographs.pdf> (accessed 16 January 2008).

ciation with seamless manipulation and endless replication, results in a perceived threat to the reliability and authenticity of a visual source.

The multidisciplinary nature of the InterP ARES 2 Project required researchers to discover how specific disciplines define the concepts of authenticity and reliability, and to place these approaches within the archival-diplomatic framework underpinning InterPARES 2. An overview of archival literature addressing the topic of born-digital images, and the concepts of reliability and authenticity in relation to archival photographs reveals a limited number of sources.⁸ This determined the necessity for further investigation into the area of born-digital images as reliable and authentic records, and prompted the decision to design the survey questions to elicit information about the activities of photographers working with digital technology that would contribute to the creation, use, and preservation of their images as reliable and authentic records; however, the terms “reliable” and “authentic” were omitted from the survey instrument to avoid confusion. The following definitions are found in the InterP ARES 2 Dictionary⁹ and present the conceptual basis for the survey findings. Reliability is defined as “the trustworthiness of a record as a statement of fact. It exists when a record can stand for the fact it is about, and is established by examining the completeness of the record’s form and the amount of control exercised on the process of its creation.” Accuracy, which has a number of specific definitions in the Dictionary, refers to the precision of a record’s content: it contributes to its completeness and is thus a part of reliability. Authenticity is “the trustworthiness of a record as a record.” An authentic record is what it purports to be and has not been altered or corrupted since being set aside, and possesses both identity and integrity. Identity is “the whole of the characteristics of a document or a record that uniquely identify it and distinguish it from any other document or record.” Integrity is “the quality of being complete and unaltered in all essential respects.”

For the purposes of this article, it is important to understand that reliability is determined by the methods employed in the creation of an image. Examination of the controls over the procedure of creation and the authority and competency of the persons involved in these activities determines the reliability of a born-digital image. To ensure authenticity, the integrity and identity of a born-digital image must be established and maintained. Establishing the integrity and identity of a digital image requires specific contextual information to remain linked to the image file; this is achieved through the auto-

8 Joan M. Schwartz, “‘We Make Our Tools and Our Tools Make Us’: Lessons from Photographs for the Practice, Politics, and Poetics of Diplomats,” *Archivaria* 40 (Fall 1995), pp. 40-74. Schwartz does not discuss born-digital images, but she does address analogue photography and the concepts of reliability, accuracy, and authenticity.

9 InterP ARES 2, *InterPARES 2 Terminology Database*, http://www.interpares.org/ip2/ip2_terminology_db.cfm (accessed 4 February 2008).

matic and manual addition of metadata. Metadata specific to digital images assists photographers in creating, managing, and preserving their image collections as reliable and authentic records.

Lastly, the relationship between a born-digital image and a record must be addressed. A record is defined as “a document made or received in the course of a practical activity as an instrument or a by-product of such activity, and set aside for action or reference.”¹⁰ From its beginning, photography has been associated with the act of recording an event. In the context of this approach, the photograph is received as a visual account of something and a memory aid. The process of naming, saving, and setting-aside a digital-image file for long-term storage makes explicit the creator’s intent to carry forward visual information about an event for future use and reference. Additional capture of technical, descriptive, administrative, and preservation metadata about the born-digital image further supports its capacity to function as a record. It is important to recognize the prevalence of born-digital images in the fields of medicine, photojournalism, fine art, and the criminal justice system. In all these contexts images operate as records and efforts to control their creation and reproduction are aimed at ensuring their reliability and authenticity.

Survey on the Record-Keeping Practices of Photographers Using Digital Technology

The “Survey on the Record-Keeping Practices of Photographers Using Digital Technology” was launched as a Web-based questionnaire in Fall 2004. Prevailing assumptions regarding born-digital images as less trustworthy than their analogue counterparts were theoretical in nature and did not rest on actual photographic practice in the digital environment; therefore, the survey targeted photographers who were known to create digital images, and use digital technology to routinely manage and store their images. An invitation to participate was posted to professional, online forums and photographic association websites that foster a community of photographers using digital technology. The Web-based survey method made it possible to contact a large number of professional photographers working in a variety of business contexts and operating within different regulatory frameworks throughout North America, Great Britain, and Ireland.¹¹ The survey questions, formulated by Braun and Bushey, gathered information regarding the principles and procedures that contribute to the creation, use, and preservation of digital images as reliable and authentic records. The questionnaire was designed with thirty-three, multiple-choice questions and boxes for optional additional

¹⁰ Ibid.

¹¹ Four hundred and two photographers participated in the survey.

commentary. The inclusion of these text boxes for each question resulted in a greater understanding of individual work habits and routines. The collected data were migrated to Excel spreadsheets, which were used by Bushey to organize and analyze survey responses. Data analysis was conducted using qualitative techniques, such as tallying the responses to each multiple-choice question, expressing these numbers in percentages, and examining the additional textual responses for categories and themes. A “Final Report for Participants” was made available online and distributed throughout the photographic community in Fall 2005.¹²

Research Questions

The survey addresses the following questions: (1) What kinds of digital images do photographers produce? Of these digital images, which constitutes the “original?” (2) What are the assumptions of photographers about future access to their images? Additionally, what is the intention of photographers for the dissemination and presentation of their digital images? (3) What is the nature and variety of digital materials used by photographers? Specifically, what hardware and software do photographers use, and what methods or materials do they select for long-term storage?

Survey Findings

Results of the survey are presented here in two broad areas that reflect the method in which photographers approach digital-image creation, use, and preservation. The first section addresses the actions and procedures that photographers use to create digital images, such as the selection of capture hardware and software, image-file formats and their characteristics, and the automatic and manual addition of technical, descriptive, and administrative metadata. The choices made by photographers at this stage of their digital practice affect the reliability of the born-digital image. The second section addresses the steps taken by photographers to store and preserve their digital images, such as security measures, procedures for transmission and dissemination, selection of storage media, and the manual addition of administrative and preservation metadata. The choices made by photographers at this stage of their digital practice affect the authenticity of the born-digital image.

The critical role of metadata, and its essential contribution to establishing the reliability and proving the authenticity of a born-digital image, is dealt

12 Jessica Bushey, “InterPARES 2: Survey of Record-Keeping Practices of Photographers using Digital Technology – Final Report for Participants,” *InterPARES 2 Project* (August 2005), http://www.interpares.org/ip2/ip2_general_studies.cfm?study=29 (accessed 18 January 2008).

with in both sections because metadata are automatically generated and manually input throughout the life cycle of a record. There are different types of metadata schemas that provide a variety of information about digital records; however, those currently used by photographers are not recognized by standards regulating bodies, such as the International Standards Organization (ISO). This article is concerned with metadata schemas that are de facto standards promoted within the imaging community and currently available to photographers via camera operating systems and software applications.¹³

File Formats for Creation and Use

The majority of survey respondents identified their practice as “completely digital” and provided additional comments that date their transition to digital within the last eight years. The nature of digital information provides photographers with the ability to extract or format the same image to serve many different creative and business needs. This activity is referred to as *re-purposing* and influences photographers’ choice of image-file formats at the time of digital capture.

ISO recognizes image-file formats created by the *Joint Photographic Experts Group* (JPEG) as a formal standard¹⁴; however, many photographers risk the future usability of their digital images by selecting proprietary file formats, such as *RAW*, for initial capture. RAW refers to the “raw” image data that is captured by the camera’s photosensitive detectors, using either charge-coupled device (CCD) or complementary metal oxide semiconductor (CMOS) technology, and is likened by survey participants to the in-camera analogue negative before chemical development. This raw camera information offers photographers a wider colour gamut, larger file size, and greater bit depth than digital capture in the JPEG file format. Another major difference between RAW and JPEG is the use of compression algorithms; RAW can utilize lossless data compression (i.e., original data is compressed and decompressed as exact, identical data) and JPEG utilizes lossy-data compression (i.e., original data is compressed and then decompressed, permanently removing image information.) Upon capture, JPEG and the de facto standard *Tagged image-file format* (TIFF 6.0) store the image file with the camera or scanner system’s processing parameters already applied; therefore, photographers select RAW format because it offers minimally processed data directly from

13 De facto standards are existing standards that are widely used and recognized by members of the target community, but not adopted by accredited standards organizations such as the American National Standards Institute (ANSI), the European Committee for Standardization (CEN), and the ISO.

14 JPEG – ISO/IEC 10918-1; JPEG 2000 – ISO 15444: 2004.

the camera sensor, which provides them with the greatest creative potential.¹⁵

Unlike the JPEG format, which is widely available in both consumer and professional cameras, the RAW format is limited to *Digital Single Lens Reflex* (DSLR) cameras marketed to professional photographers and a handful of select compact cameras aimed at amateurs.¹⁶ In cases where photographers use RAW format to capture the scene digitally, the RAW file is equated with the “original” image and treated as such throughout subsequent procedures for use and preservation. However, the proprietary nature of the RAW specification means that the format differs between camera makers and each successive camera model from the same manufacturer. Furthermore, the practice of encryption to conceal the RAW specification from users is widespread. The combination of these factors presents an enormous risk to the future usability of born-digital images created and stored in the RAW format. Respondents to the survey added comments about problems accessing early Microsoft Word documents; therefore, the difficulties with proprietary formats are not limited to digital images but apply to electronic records in general. However, by choosing to use publicly-documented formats, the possibility of accurately representing files in the future increases.

Respondents to the survey identified JPEG as the most common file format for in-camera capture. This may be a result of industry-wide support for the JPEG file format; all cameras, regardless of their target audience, offer JPEG.¹⁷ JPEG is cross-platform operable, which means that the image and its metadata should remain intact when they are transmitted across systems and software applications regardless of the operating environment. As stated earlier, the drawback to the format is its use of lossy compression, which enables the file to be transmitted quickly and viewed online, but leads to problems for long-term preservation. Selection of file formats for in-camera capture requires a photographer to anticipate the future uses of the digital image while weighing the format’s advantages and disadvantages. Specific file formats, such as RAW, do offer greater latitude to photographers that want to repurpose an image; however, RAW files are “read-only” and require additional processing software to perform edit operations, and to convert the files into TIFFs and JPEGs. For photographers, the decision to shoot JPEG or RAW files must be weighed against creative requirements, assignment parameters, and available technology.

15 TIFF, Revision 6.0 Final – 3 June 1992 is owned and controlled by Adobe Inc. The Tag Image File Format/Electronic Photography (TIFF/EP) is an image-data format standard, ISO 12234-2 that is based on a subset of the Adobe TIFF.

16 In the last three years Canon, Fuji, and Leica have released compact models that offer RAW format for digital capture.

17 This includes cell phones with built-in cameras.

When mapping the survey findings against InterP ARES 2 research questions, it is clear that photographers produce digital images in a variety of file formats that serve specific end uses. These uses are determined by business needs, client requests, and artistic exploration. Photographers that submit images to news services or work on assignments with short turn-around times select JPEG files for in-camera capture. Photographers select RAW format for capture when the end use of an image is unknown because the technical attributes of this file type offer photographers greater creative control over image settings post-capture. Regrettably, neither JPEG nor RAW formats ensure that digital images will remain easily accessible over time. Responses to survey questions aimed at exploring the concept of the original in the digital environment revealed that photographers recognize the characteristic of primitiveness (i.e., the first instance of the captured image) as designation of the original digital image. Their adoption of a digital workflow that begins with RAW capture presents significant risk to future interoperability and raises concern with designating RAW files as the originals. The future challenges presented to photographers and software developers who wish to access or recover older RAW files, some of which are no longer supported, will include decoding encrypted data and reverse-engineering systems, at the risk of copyright infringement, in an effort to access image files. The impact of these decisions on archival repositories will also be significant. An example of the obstacles archivists face when working with electronic records that have been inactive for a length of time, involve gaining access to obsolete file formats created with discontinued software applications written to inoperable storage media. As archives prepare for accessions of born-digital images, a knowledge of image-file formats and their limitations will assist in the creation of submission guidelines for creators that define the characteristics of acceptable image-file formats, such as publicly-documented or approved standards, and aid in the creation of appraisal procedures for collections of digital images that identify specific record types, and their relation to the record-creation and record-keeping practices of photographers.

Metadata for Creation and Use

Another component to digital photographic practice is the addition of metadata to image files. During the procedure of creation, technical and descriptive metadata are attached to, and embedded within, the image. The image and the metadata are both methods of presenting information and rely on one another to communicate fully the functional context of an image. Technical metadata refer to the settings that are automatically recorded by the capture device (i.e., camera or scanner), such as pixel width and height of the image, colour space, and image compression. Technical metadata are used in determining how the image is constructed and the parameters for its digital representation. Survey

respondents' comments regarding the variety of information they record about their digital images, identified knowledge and use of the Exchangeable Image File Format (Exif) for digital still image metadata.¹⁸ Exif is a specification for the image-file format used by digital cameras, launched by the Japan Electronics Industry Technological Association (JEITA) in 1998 to encourage interoperability between imaging devices. Exif 2.2 is recognized as a de facto standard for metadata and is supported by the majority of leading camera manufacturers.¹⁹ The current version specifies metadata for JPEG, TIFF, and some types of RAW files.²⁰ The schema functions as read-only metadata that documents both the digital-camera system used to capture the image, and the settings that define how the digital image behaves and is represented. The schema is divided into elements that are represented by machine-readable labels assigned to define data (i.e., tags) that are used as shooting notation for photographers (e.g., date and time, image configuration, and conditions for picture taking.)

The drawback to the use of Exif metadata is the fact that not all of the schema's elements are mandatory, which means that compliant imaging hardware and software are not required to write or read the majority of Exif tags. This requires photographers to test the interoperability of their hardware and software components on an ongoing basis to ensure that all critical elements are supported throughout their workflow and storage activities.

Analysis of Exif metadata for archival purposes of assessing the reliability and authenticity of a born-digital image is limited. As read-only metadata generated by operating systems of capture devices, the information can provide technical parameters that define the image and attest to the context of creation. However, until all elements of the schema are mandatory and universally supported by imaging hardware and software applications, critical-system metadata that can assist archivists in uniquely identifying the born-digital image or provide assurance of data integrity in the future may be omitted or stripped from the image during routine procedures over creation and use. If all Exif tags were accurately populated and remained persistently linked to the image throughout activities such as downloading from the camera, editing, transmission, and storage, the information could assist archivists in describing relationships between images and explaining the functions of the creator.

18 The Exif specification was launched in June 1998. Exif Version 2.2 was released in 2002. JEITA, "Exchangeable image file format for digital still cameras Exif Version 2.2" (April 2002), <http://www.exif.org/specifications.html> (accessed 23 January 2008).

19 The list of JEITA members includes: Canon, Casio, Fujifilm, Kodak, Nikon, Olympus, Minolta, Panasonic, Pentax, Ricoh, Sanyo, and Sony. See JEITA, "JEITA Members" (July 2006), <http://www.jeita.or.jp/english/member/list/index.htm> (accessed 26 October 2007).

20 RAW files also include proprietary metadata that is used by conversion software to interpret the raw-sensor data.

The most common types of information that survey respondents record about their digital images are descriptive and administrative. The descriptive information they include about the digital image is manually input and identifies the context of creation (i.e., who created the image, when and where it was taken, and why), and explains the content (i.e., persons, locations, and subject matter represented in the image), for purposes of access and retrieval. The administrative information they include about the digital image is also manually input and explains the rights and licensing agreements of the image. Essentially, descriptive and administrative metadata are explanatory notes that photographers add to active-digital images to identify the persons, actions, and matters related to creation and use. The value of descriptive and administrative metadata for photographers and archivists are their capacity for establishing record identity; however, metadata must remain persistently linked and be managed along with the image to ensure maintenance of authenticity.

Photographers that work in the news-services industry capture images as JPEGs and attach descriptive and administrative information that identifies both the context and the content of the digital image via the International Press Telecommunications Council (IPTC) metadata schema.²¹ The Information Interchange Model (IIM) released in 1991 by the IPTC and the Newspaper Association of America (NAA) is the metadata schema used to transfer a data object, which may be an image file or a combination of text and image, along with its pertinent information, such as creator's name, location, subject matter, and copyright/usage notice between systems. Upgraded to *IPTC Core* in 2001, the schema is now based on Adobe Systems Incorporated's technical Extensible Metadata Platform (XMP) framework and is read/write compatible with any Extensible Markup Language (XML) compliant device.²² XMP is a World Wide Web (W3C) compliant method of tagging files with metadata and can be added to file types such as JPEG, TIFF, and other file formats like PDF.²³ Adobe makes the IPTC Core schema

21 The International Press Telecommunications Council was established in 1965 as a consortium to develop and publish industry standards for the interchange of news data. Members include: World Association of Newspapers, European Alliance of News Agencies, Canadian Press, The Associated Press, and Reuters. International Press Telecommunications Council (2008), <http://www.iptc.org/pages/index.php> (accessed 20 January 2008).

22 XML is a cross-platform and Internet-enabled implementation language. It is a non-proprietary standard recommended by the World Wide Web Consortium (W3C) for creating special markup languages to describe data. The Adobe XMP specification uses the W3C XML-based Resource Description Framework (RDF) standard to represent the metadata properties associated with image files. See David Riecks, "IPTC Core Schema for XMP, V1.0: Supplemental Documentation," *IPTC Standards* (2005), <http://www.iptc.org> (accessed 27 January 2007).

23 W3C develops interoperable technologies, such as specifications and software. The majority of products are open-source or publicly documented. W3C, "Leading the Web to Its Full Potential," <http://www.w3.org> (accessed 25 January 2008).

available via custom panels (e.g., IPTC contact, IPTC content, IPTC image, and IPTC status) in Adobe's imaging software and related products, such as *Photoshop*, *Bridge*, and *Lightroom*, yet photographers do not have to rely on Adobe products alone since there are currently more than two dozen software programs that support XMP and IPTC, and synchronize IIM/Core values.²⁴ The majority of survey respondents use *commercial-off-the-shelf* (COTS) imaging software to create and manage their images collections, including in their workflow the addition of IPTC Core metadata to their image files after downloading. The functionality of *image management software* (IMS) ranges from simple browser programs to fully loaded databases of performing batch actions for renaming image files, attaching IPTC Core metadata, and creating user-defined cataloguing sets. This type of integration has provided photographers working in areas other than photojournalism, such as fine art and commercial photography, the opportunity to utilize elements of the IPTC Core schema to manage their images collections in a routine manner with established procedures over capture, edit operations, delivery, and storage.²⁵ The IPTC Core panels structure the metadata elements according to their function and present the information in automated profiles ready for data entry. The panels make explicit the link between image and metadata, and make explicit the documentary and business contexts in which the image participates.²⁶

Unlike the Exif schema, the IPTC-Core schema is not read-only, but has dynamic fields of information that may be changed throughout the life cycle of the image, depending upon the management and use of the image. This does raise concerns regarding the integrity of the data and its ability to attest to the authenticity of a digital-image file; however, this disadvantage must be weighed against the fact that the IPTC Core panels offer the most efficient and comprehensive metadata profile for born-digital images that is commercially available without customization. The information captured within the metadata profile can provide archivists with the majority of attributes that convey the identity of a digital image and lay the foundation for demonstrating its integrity as a record. Combined with additional knowledge about the procedural controls over record creation, handling, and maintenance, the archivist can ascertain an assumption of integrity.²⁷

24 IPTC, "IPTC Photo Metadata: software support list" (2007), <http://www.iptc.org/photometadata/software-support-list1.php> (accessed 23 October 2007).

25 In November 2005 a major contribution was made towards establishing workflow procedures. See Peter Krogh, *The DAM Book: Digital Asset Management for Photographers* (Sebastopol, CA, 2005).

26 Attributes such as name of persons concurring in the formation of the record, name of action, date of creation, etc. See Authenticity Task Force, "Appendix 2: Requirements for Assessing and Maintaining the Authenticity of Electronic Records," pp. 204-19.

27 Ibid.

Survey findings that address the actions and procedures taken by photographers during the creation and use of their born-digital images reveal individual work environments that are shaped by established procedures and commercially-available software products. Most rely on a systemized approach to file naming and version control, and attach metadata to uniquely identify digital-image files and make evident the contextual relationships between them. The findings also demonstrated that photographers intend for their images to be accurately presented and properly accredited to them regardless of how the images are disseminated. They routinely capture technical, descriptive, and administrative metadata to define the parameters of image use and presentation, and to ensure the identity and integrity of their images. The fact that image metadata are not consistently supported across hardware and software components impedes the creation and maintenance of digital images as reliable and authentic records over the long term. If all the image's attributes are not expressed in the metadata, it cannot be considered complete and trustworthy. The current image metadata schemas are useful for ensuring image identity; however, their ability to contribute to the maintenance and determination of the integrity of an image is limited.

Preservation and Transmission

The majority of survey respondents are concerned with the longevity of their digital images and incorporate a procedure for long-term storage into their workflow. Image preservation activities include (in order of frequency): selecting storage media (i.e., CD-R, DVD-R, and external drives); designating file format for originals and surrogates (i.e., RAW, TIFF, and JPEG); unique file naming that identifies relationships between originals and surrogates; and using software and capture hardware with specific attributes (i.e., batch metadata capabilities and cataloguing of fine CDs.) Survey respondents described procedures for transferring and copying in-camera images (i.e., originals) to CDs and DVDs immediately following a shoot and then creating digital surrogates to function as working files that undergo edit operations. The "shoot and store" approach contributes to individual photographers' growing collections; instead of accumulating an archives in which selection and weeding-out of unwanted images aids in decreasing numbers, photographers are storing all the images from a photographic assignment "as is" (i.e., directly from the camera.) These actions are resulting in vast amounts of image files held on endless spools of CDs. As a result, most survey respondents are concerned with the longevity of optical storage and seek advice regarding the best brand of "archival" CD and DVD, a choice that encourages inactive file storage on physical media that is vulnerable to substrate deterioration and device inoperability.

Analysis of the survey findings revealed that photographers assume that

future access to their digital images will require a degree of intervention to maintain access and readability; however, the fact that very few photographers have experienced loss of valuable image files due to technological obsolescence or media fragility means that the majority of their actions are limited to short-term access. The issue of digital-image files becoming obsolete, outdated, and irretrievable was not as important to respondents, which in part may be due to the relative nascence of digital practice. The survey findings show that the measures photographers currently take to protect their image files involve making backups and refreshing storage media by making read-only copies of CDs and DVDs on a regular basis. The practice of migrating older image-file formats is less common. As image collections continue to increase, the prospect of maintaining control over vulnerable media is daunting to individual photographers and will require additional resources to address properly.

As demonstrated in the InterP ARES 1 *Benchmark Authenticity Requirements*, in addition to a record profile expressing attributes of identity and integrity, the creator must implement access privileges, protective procedures over the loss and corruption of records, and protective procedures over media and technology. Protecting digital images from loss and corruption due to technological obsolescence and media fragility is only one part of a long-term preservation strategy. Activities aimed at protecting digital images from unauthorized access and destruction assist in ensuring integrity. The survey findings regarding security measures to protect digital images held within systems and stored on removable storage media show that less than half of respondents apply any type of security measures. Within the minority that does, these procedures are limited to storing digital copies of files and on-site, and storing images on personal computers with password protection. In most cases, the lack of security is a direct reflection of an individual's operating environment. Additionally, individual photographers do not document their preservation activities with manuals or procedural policies; therefore, inactive images stored for the long-term can only be proven authentic by a declaration of the photographer responsible for their creation and use.²⁸ Respondents that work as part of an institution describe controls over access to image files, published procedures for designating originals and surrogates, and rules guiding the transmission of images outside the personal workspace. These procedural controls over preservation can be presented for third-party scrutiny to determine whether or not there is evidence to support a presumption of authenticity of the images.

The transmission of born-digital images outside the personal workspace to

²⁸ In cases where a photographer is responsible for creating and preserving his or her digital images, identity and integrity can be proven through a simple attestation of authenticity.

facilitate client review, assignment submission, and personal promotion present an opportunity for unauthorized access. The transmission of images between photographer and client is regulated by contractual parameters, but the mounting of images online via websites and user -driven portals requires additional measures to protect images from unauthorized use. More than half of survey respondents present their images on the Web, and of that group, the majority manages access using a custom-built database or a vendor management package. Exploration into the available image management software for making image collections available on the Web reveals systems with rudimentary security controls built into them. Respondents provided additional information about protecting images online through the use of low-resolution files, embedding watermarks, and explicitly stating usage parameters and copyright in IPTC metadata.²⁹

The survey informed InterPARES 2 researchers on the nature and variety of digital materials used by photographers. It also provided evidence of the actions and methods photographers use to create, manage, and preserve their born-digital images. We now know that they use a system of hardware and software that fulfills their artistic and business needs, which in many cases involves an established workflow streamlined by commercial off-the-shelf image-management software to produce specific digital products. Photographers are beginning to understand that proprietary digital systems will present challenges to continued access and long-term preservation of reliable and authentic digital images, but they are reliant on the efficiency offered by IMS. The increasing functionality of proprietary IMS offers photographers an advantage, but at a cost. In an industry driven by innovation and profit, the constant versioning of hardware and software components presents a real challenge to future interoperability. Additionally, the growing trend in commercial products to claim “archival quality,” such as CDs and DVDs, offers photographers a false sense of security that threatens to undermine the development and maintenance of procedures for the long-term preservation of their collections of digital images.

New Developments

The survey provided an opportunity for the participating members of InterPARES 2 to learn the record-creating and record-keeping practices of photographers using digital technology, and generated discussions in both the photographic and archival communities regarding methods and procedures for

29 A random selection of images mounted online by professional photographers revealed no copyright information in the designated IPTC field when the digital-image “file information” was viewed using Adobe Photoshop.

creating and preserving born-digital images as reliable and authentic records. The following is an overview of some recent developments that stem from initiatives driven by the needs of photographers that may contribute to ensuring the identity and integrity of born-digital images for the long term.³⁰ These initiatives reveal the growing concern shared by photographers, the imaging industry, and cultural institutions that create and preserve digital images regarding the standardization of procedures for creating, managing, and storing born-digital images and the development of image metadata to further improve existing profiles. Their combined efforts to encourage the adoption of non-proprietary file formats, standardization of metadata schemas, and routine backups will have a profound impact on the quality and quantity of visual records in digital format received by archival institutions in the future. The majority of these initiatives do not have the support or participation of archivists and archival institutions, which is why it is important to introduce their research goals and products to the archival community. The nature of archival work equips archivists with a unique perspective and valuable insight into the longevity of electronic records; therefore, advice or guidance from the archival community for current initiatives would serve the needs of creators and inevitably those of preservers.

In early 2005, Adobe Systems Inc. publicly released the *Digital Negative (DNG) Specification*, which describes an image-file format for storing raw camera information.³¹ The DNG format is an attempt to address concerns regarding the sustainability of proprietary RAW files as digital originals, and the interoperability issues presented by RAW file reliance on proprietary conversion software. The DNG specification provides photographers with the option of converting their proprietary RAW files into the publicly-documented

30 Initiatives aimed at digital-image preservation stemming from the library and archival community, but currently not available to photographers via hardware and software functionality, or published guidelines circulated within photographer forums, were omitted from this article. In December 2006, the National Information Standards Organization (NISO) approved the *Data Dictionary – Technical Metadata for Digital Still Images* as a standard set of metadata elements for digital images produced by scanners and digital cameras. The immediate audience for this standard is cultural heritage workers responsible for creating digitized materials for large repositories and archivists responsible for migration of digital-image files; however, it is the author's opinion that elements captured by the schema would be useful for photographers and should be made available to them via image management software. As creators assume the duties of preservers it will be helpful to have as much technical information about digital images as possible to ensure accurate representation and reproduction in the future. Integration of the schema into templates made available through IMS would be a welcome development. See ANSI/NISO, "Z39.87-2006 Data Dictionary – Technical Metadata for Digital Still Images," *NISO Standards*, <http://www.niso.org/standards/index.html> (accessed 26 October 2007).

31 DNG V1.0.0.0 was launched privately in 2004. See Adobe Systems Incorporated, "Digital Negative (DNG) Specification V1.1.0.0" (February 2005), http://www.adobe.com/products/dng/pdfs/dng_spec.pdf (accessed 26 October 2007).

DNG specification or shooting directly into DNG format.³² An additional Adobe Photoshop plug-in, *Adobe Camera Raw (ACR)*, can be used to convert native DNG and proprietary RAW into DNG. Although owned by Adobe Systems Inc., the DNG format is defined as non-proprietary, which in this case refers to the public documentation of the specification and its conversion software (e.g., ACR). Adobe offers the DNG specification and the *DNG Software Development Kit (SDK)* free for download to provide support for read/write and conversion of DNG files. It is available in both operating platforms as a non-exclusive, worldwide, royalty-free license.³³ DNG is currently marketed to photographers as an “archival” image-file format with greater device and application operability than existing RAW formats, thus offering photographers a greater assurance of accessing inactive files in the future. Claims of archival assurance are supported by the fact that the DNG specification is an extension of the TIFF 6.0 and TIFF/EP (ISO 12234-2) formats recognized by the archival community and therefore providing a reasonable expectation of future readability. The construction of the DNG header allows EXIF, IPTC, XMP, and TIFF-EP metadata tags to be embedded, which provides photographers with the ability to persistently link technical, descriptive, and administrative metadata to the image file. Since the release of DNG, hardware and software support (not including Adobe products), continues to grow.³⁴ The option for in-camera capture of the DNG format is available in specific camera models produced by Hasselblad, Leica, Ricoh, and Samsung.³⁵ In the interim, the majority of photographers will continue to shoot in proprietary RAW, specific to their camera make and model, and then convert these files into DNG using ACR for long-term storage purposes. Providing support and functionality with DNG files via capture devices and imaging applications, increases the likelihood that more photographers will incorporate DNG into their workflows; however, questions concerning the designation of original image files may become more difficult to answer as photographers save both RAW and DNG files of the same image.

32 There are currently eight cameras and four digital backs that offer direct capture in DNG format. Analogue medium and large-format cameras utilize a separate device to house roll film (120mm and 220mm.) Unlike 35mm film, which is loaded inside the camera body, a film back is attached to the back of the camera body. A digital back houses the image sensor and capture software for medium- and large-format cameras.

33 Adobe Systems Incorporated, “Adobe DNG Software Development Kit,” http://www.adobe.com/support/downloads/dng/dng_sdk.html (accessed 24 January 2008).

34 The list of hardware and software applications that offer DNG format for capture, or facilitate DNG conversion, management, and editing operations numbered over 190 at the time of this article. See Barry Pearson, “Products that Support DNG in Some Way” (May 2006; updated January 2008), <http://www.barrypearson.co.uk/articles/dng/products.htm> (accessed 26 October 2007).

35 Adobe Systems Inc., “Digital Camera Raw File Support” (2007), <http://www.adobe.com/products/photoshop/cameraraw.html> (accessed 26 October 2007).

The *Open RAW* initiative launched an online survey in January 2006 to explore the use of RAW-image files by photographers. *OpenRAW* defines itself as a “Working Group of photographers and other people interested in advocating the open documentation of digital camera RAW files.”³⁶ One of their stated aims is to ensure digital-image preservation through open documentation. The results of their 2006 Raw Survey are available to the public and offer a comprehensive overview of how and why photographers (both professional and amateur), use raw-image data.³⁷ Analysis of the initial results of the Raw Survey supports InterPARES 2 findings regarding record-creation and record-keeping practices of photographers, such as the reasons why photographers favour raw-image data, and how workflow incorporates a system of hardware and software components that shape file selection, metadata input, designation of originals and surrogates, and the ability to manage access to inactive, of fine digital images. OpenRaw acknowledges the challenges that the proprietary RAW format presents to photographers and archivists responsible for the preservation of digital images; however, a discussion of preservation strategies is outside the scope of the Raw Survey findings.³⁸ Through publication and outreach, OpenRaw plans to engage with manufacturers of image-capture devices and software developers, to raise awareness of the threat to image longevity presented by proprietary-image files and conversion software.

The *Universal Photographic Digital Imaging Guidelines* (UPDIG) is the by-product of a “working group of digital imaging professionals and allied trade groups and manufacturers, dedicated to promoting worldwide standards in the commercial application of digital imaging.”³⁹ The most recent version titled *Guidelines for Image Creators, Version 3.0*, was released in October 2007 and highlights the key issues affecting the accurate reproduction and management of digital-image files.⁴⁰ Presented in twelve sections, UPDIG addresses the technological and procedural context in which digital images are created, managed, and preserved. Each section provides photographers with a basic overview of the topic and suggests actions to be taken. Of partic-

36 OpenRAW Initiative, “Homepage” (2006), <http://www.openraw.org/about> (accessed 26 October 2007).

37 OpenRaw Initiative, “2006 Raw Survey Initial Results – Introduction” (2006), <http://www.openraw.org/2006rawsurvey> (accessed 26 October 2007).

38 There is a link on the OpenRaw website to an initiative entitled “RAWpository” that aims to collect samples of RAW-format images and related camera firmware to enable software developers to analyze and use in testing of their software. See Glass Lantern, LLC., “RAWpository – The Images” (28 February 2006), <http://www.glasslantern.com/RAWpository/> (accessed 26 October 2007).

39 UPDIG, “Welcome” (22 October 2006), <http://www.updig.org/published/Updig.AboutUPDIG.html> (accessed 26 October 2007).

40 UPDIG Working Group, “Universal Photographic Digital Imaging Guidelines V3.0” (October 2007), <http://www.updig.org/guidelines/index.php> (accessed 26 October 2007).

ular relevance to InterP ARES 2 findings are the sections on file formats, naming files, metadata, and archiving, in which public documentation and cross-platform operability are encouraged. UPDIG's overview of metadata is limited to a discussion of IPTC Core; however, it emphasizes the importance of metadata for ensuring accurate and efficient retrieval of digital images held within collections, providing descriptive information regarding the content and context of the image, and persistently linking the image and its information, such as creator name.⁴¹ In the section on "archiving," UPDIG raises important questions, such as who is responsible for storing digital-image files, and how will images be archived in a manner that protects them from failure due to media fragility and technological obsolescence. These questions reflect the new role of the photographer as both creator and preserver, and point toward the need for a digital-image preservation strategy at the outset of creation. The *Guidelines for Image Creators* offer individual photographers a published set of simple procedures (including sample workflows for particular operating environments) that can be used and later relied upon as evidence of controls over creation, use, and preservation. This formalization of activities is an important step in educating photographers about the concepts and methods at the foundation of a responsible digital practice.

The most recent development from the UPDIG consortium aimed at bridging the gap between photographers, and the organizations and industries that receive images is the *Digital Image Submission Guidelines* and the *Submission Guidelines for Fine Art Reproduction*.⁴² The working documents present a checklist to assist end users of digital images in the creation of standardized submission guidelines that promote interoperability, useability, and readability. The topics addressed reflect many of the key factors raised in the guidelines for image creators, with one exception. The final topic offers a submission guidelines form (work in progress) that utilizes a text-generator interface (i.e., drop-down boxes and populated help columns) to assist users in customizing their own guidelines for creators submitting images.⁴³ The possible adaptation and application of such a template for archives grappling with accessioning digital-image files is worthy of further consideration; however, current UPDIG membership does not include archival institutions or archivists. The *Submission Guidelines for Fine Art Reproduction* developed out of the efforts of museum-imaging and publishing professionals; members hail from institutions such as the J. Paul Gerry Museum, the National Gallery of Canada and the National Gallery of Art, Washington, DC, and operate

41 Ibid., <http://www.updig.org/guidelines/metadata.php> (accessed 21 February 2008).

42 Ibid., *Submission Guidelines*, <http://www.updig.org/dig/index.php> (accessed 24 January 2008). *Guidelines for Fine Art*, <http://www.updig.org/dig/fineart.php> (accessed 24 January 2008).

43 Ibid., <http://www.updig.org/dig/generator.php> (accessed 21 February 2008).

under the name “ImageMuse.”⁴⁴ The goals set forth in their “ImageMuse Draft Agenda for 2008–2009” include testing the UPDIG guidelines with picture libraries to assess implementation support for technically appropriate digital files in real world scenarios.

The Picture Licensing Universal System (PLUS), *Image Licensing Standards* were approved on 1 November 2006 for worldwide use by industries involved in the creation, use, and distribution of images.⁴⁵ PLUS is the product of an international coalition of experts from the fields of photography, design and advertising, software development, and museums. The non-profit organization is focused upon developing and implementing a three-part system to define and categorize image usage worldwide. The system they propose includes a *Glossary* of licensing terms and agreements, a *Media Matrix* of media categories and billing codes, and a machine-readable *License Format* that is populated with information captured in the other two parts of the system. The PLUS coalition recognizes the importance of the standardization of image-file formats and metadata schemas to ensure the long-term preservation of both image content and context across platforms and throughout future systems; therefore, they aim to provide a central repository for rights metadata and a registry system for images and licenses by the beginning of 2009. PLUS informs creators that a lack of descriptive and administrative metadata embedded within an image file is an obstacle to identifying the copyright holder and terms of usage, which will limit the ability to distribute and use the image.⁴⁶ PLUS intends to cultivate exchange between the image market, photographers, and cultural heritage institutions such as libraries, museums, and archives to facilitate the use of robust image formats with standardized metadata and persistent identifiers. At this time there are no archivists represented on the board of PLUS, but there are individuals from the Museum Computer Network and Research Libraries Group.

Summary

The aims of this article were to introduce readers to the changing role of the photographer as both creator and preserver; to discuss the issues shaping photographic practice in the digital environment; and to provide insight into the direction toward which the photographic community is heading as it grapples with the transformation of image creation and preservation brought

44 ImageMuse, “Home,” <http://www.imagemuse.org> (accessed 24 January 2008).

45 Picture Licensing Universal System, “The System: What is PLUS” (2006), <http://www.useplus.com/aboutplus/system.asp> (accessed 26 October 2007).

46 PLUS, “Preservation of Digital Content” (2006), http://www.useplus.com/aboutplus/about_coalition_detail.asp?cid=131348356398 (accessed 26 October 2007).

about by the digital environment. The InterPARES 2 research into the record-keeping practices of photographers working with digital technology positioned itself at the forefront of inquiry into the way photographers are changing their approaches to creating and preserving born-digital images. The survey findings were circulated to a wide audience of professional photographers working in the fields of journalism, geospatial data, law enforcement, medical imaging, and the fine arts, which prompted additional requests for the survey results from visual resource professionals working with digital images.⁴⁷ The survey findings were also presented to archivists and records managers at the joint meeting of the Society of American Archivists (SAA), the Council of State Archivists (CoSA), and the National Association of Government Archives and Records Administrators (NAGARA) in 2006; the response was very encouraging. Archivists and records managers who attended the presentation expressed interest in the findings as a first step towards dealing with born-digital images as reliable and authentic records. For many attendees, the presentation was an introduction to born-digital images as a new record format, and they were eager to learn about common file formats and storage media utilized by professional photographers. As a result, Bushey is involved in the SAA-driven initiative to create a “Best Practices for Collecting Digital Photographs” as the outcome of a “wiki” (i.e., a collective website that is authored by its contributors) and working-group session at the 2008 SAA conference in San Francisco.⁴⁸ It is evident that collaborative research is indeed an effective method for creating dialogue and providing the opportunity to test theories and implement practices in real-world scenarios.⁴⁹

As digital images become an increasingly integral part of how people perform business transactions and participate in cultural forums, it is necessary for archivists to further their understanding of risks posed to creators using new technologies. Disseminating these findings within the archival community provides archivists with an introduction to the key factors determining the creation, management, and preservation of born-digital images. Both the InterPARES survey findings and the emerging efforts of imaging coalitions offer valuable insight into the practical challenges posed by the digital environment. Archivists responsible for acquiring born-digital images

47 In most cases photographers working within institutions and organizations discussed the findings with colleagues responsible for managing analogue and born-digital images, such as picture libraries, special collections, and archives, which prompted email requests for the report.

48 SAA members Stephen Fletcher, Photographic Archivist, University of North Carolina at Chapel Hill and Tim Hawkins, Projects Manager, Pulse of the Planet, are leading the project with Bushey.

49 The third phase of InterPARES, InterPARES 3, received the green light to proceed with translating the theory and methods developed in earlier IP projects into concrete action plans for records held in archives with limited resources.

will benefit from knowing where to find image metadata that provides characteristics of identity and integrity, and which file formats are typically used for originals, draft derivatives, and finals, to establish context and determine authenticity. Limited funding opportunities and minimal staffing at archival repositories are common obstacles to implementing adequate preservation practices for new media records, such as images, audio, and video in digital format. Therefore, creative solutions to these problems can be found through exposing archivists to the research products of multidisciplinary projects, such as the findings of InterP ARES 2 and other initiatives aimed at developing instruments to assist in digital access and preservation. The opportunities presented by interdisciplinary studies are invaluable to archivists interested in expanding their understanding of new record types and new record-keeping systems. In turn, the participation of archivists in working groups aimed at developing standards for the creation, management, and preservation of born-digital images would ensure the adoption of guidelines based on sound archival principles.