

Printing to Preserve – How Are We Doing Today?

Joseph E. LaBarca, Pixel Preservation International, 60 Briar Wood Lane, Rochester, New York, 14626, USA

Abstract

Much has changed in the digital imaging industry in the last five years. This includes advances in cameras and optics and especially the continued tremendous growth in the use of smartphones. With smartphone in hand more people than ever have a camera ready to shoot at a moment's notice. Yet printing for long term preservation has not followed in this growth. While the number of hard copy prints, including prints and photo books, has increased, the rate of increase has not kept pace with the growth in capture. This means there is a bigger opportunity than ever for photo fulfillment through the production of prints and photo books. There have been positive signs in the industry in terms of photo organization, software for easier layout and design of photo books, and apps to make prints and photo books from the smartphone. But the awareness by end consumers on the risks of technology change and how to access their digital images 10 to 20 years from now is still very low. There have been positive signs on the web addressing this topic but uptake by social media remains low. This paper will discuss the positive trends seen on the web, ongoing trends in hard copy output from the last several years, and ways to further energize the digital photo fulfillment industry on the potential for printing for long term preservation.

Introduction

Driven by advances in the image quality and ease of use of smartphones, the growth of digital capture by the end consumer in the last five years has been vast. Between the smartphone, digital imaging technology, the Internet and social media, the enablement of the general consumer as “official family photographer” has been tremendous. Consumers today love the immediacy, ease of storage and ease of sharing of digital images. Storage of images “in the cloud” allows for anywhere/anytime access. Storage of images on their smartphone has similar benefits. Any digital storage modality, however, includes a risk of image loss due to long-term technology changes if a long term migration plan is not strictly adhered to. In general, consumers are totally unaware of this risk, which could potentially leave a whole generation of picture takers, without a long-term record of their lifetime events. The “technology-proof” nature of hard copy prints, photo books, and photo keepsakes is the logical means to protect against the risk of digital image file loss. This segment of the industry is growing but is not keeping pace with the growth of capture. This means the photo fulfillment industry continues to have an ongoing opportunity for growth in this category. The goal of this paper is to provide further knowledge to the industry on ever-advancing technology, the importance of long term preservation, and the value proposition that hard copy brings to the industry. If properly channeled, the long-term preservation of digital photographic images via hard copy of all kinds provides a value-adding product with the means to solve the

long-term preservation dilemma that continues to face consumers today.

Digital Dark Age Coming?

As we continue to accelerate the growth of digital images we continue to accelerate the concern over the long-term storage and the preservation of these images. Previous papers by this author on the subject of long-term preservation [1, 2] have dealt with digital photographic images and the need for technology-independent storage media, and a paper presented in 2011 dealt with digital files of all kinds. This included the substitution of digital documents for the things where we used to put pen to paper: letters, post cards, journals, etc. [3]. In 2015, Vint Cerf, an executive at Google and one of the “fathers of the Internet”, made a bold statement and raised a strong concern about the coming “digital dark ages”. This took place at the February 2015 American Association for the Advancement of Science conference in San Jose. Cerf warned that a second dark age may be looming on the horizon, due to the fact that so much of our information these days is kept in digital formats. This statement created a bit of a stir on the Internet and social media but has not really caught hold and made connections in the photo fulfillment industry. A recent paper by this author tried to make this connection in 2014 [4]. As Cerf says, one of the best options for ensuring the long term survival of important photos is to print them out physically, with materials designed for longevity, and to keep the prints in a safe place.

Technology Continues to Advance

For both physical/hardware and software formats, change is driven by ever-advancing technology. New technology comes along offering benefits, and the older technology is eventually replaced. A very recent and perfect example of this is the advancement of the “flash hard drive” now becoming more common in laptop and desktop computers. Instead of the mechanical spinning magnetic hard drive that has been with us in personal computers for about 30 years, the flash hard drive has no moving parts, resulting in faster access for reading and writing data. That's the advantage; the disadvantages are they are still expensive and limited in storage capacity. However time has proven again and again that both of these limitations will be short lived. Along with the growth of flash drives is a decrease in the availability of optical drives. With the availability of software in the cloud there is a diminishing need to read optical disks to load software. The result? Desktops and laptops are now commonly sold without optical drives. The advancement of flash hard drives and the resulting elimination of on-board optical drives are perfect illustrations of the typical 20-30 year technology cycle where hardware (or software, operating systems, architecture, etc.) are replaced by a new advantaged technology. The key question for digital imaging

and photo fulfillment: what will happen to all the digital image files stored on optical and magnetic disks?

Opportunity: Consumer Education

The average consumer continues to be generally unaware that there is an underlying risk associated with information storage, and this becomes the opportunity for hard copy digital image fulfillment: consumer education. The facts are fairly complicated. The storage risk using hard drives, digital devices such as smartphones, optical media, or even storage “in the cloud” and on social media sites is actually fourfold: 1) format obsolescence of the storage media; 2) interface obsolescence to a modern computer; 3) file format obsolescence; 4) data integrity. Detailed discussions of the risk of formats were presented in recent papers by this author [3, 4]. But simple illustrations can be used to help in the education process. Music CDs are now under direct challenge from flash memory in MP3 players and smartphones. VHS tape, made popular by the motion picture industry, was made obsolete by DVD technology, driven by the same industry. Going a little deeper, JPEG2000 already offers many improvements in compression over JPEG, and JPEG XR has further improved compression algorithms, with improvements in color reproduction accuracy and support for High Dynamic Range (HDR) imaging. The JPEG file format is already quite old (the current version was published in 1992), and is near the middle of the 20-30 year technology cycle. How readable will JPEG files be 20 or 30 years from now? Same question for all those files on optical disks and magnetic hard drives.

Print to Preserve

Print to preserve takes a long-term perspective and transforms the digital file into a “future proof” state. The digital information (images, documents, email) is rendered to a hard copy, human readable output. Once done, a computer (today or in the future) is no longer needed to access and use the information, allowing for a preservation system that needs infrequent attention other than maintaining proper environmental storage conditions. The key is to move from a digital storage format to a human-readable format using media that are very stable. This was brought to the industry’s attention back in 2013 by industry analyst InfoTrends, which, in their publication “Road Map 2013: Photo Printing Trends”, believe that “...strong growth in printing will take place because it is the best way to insure that important photos will be easily accessible and viewable well into the future” [5].

Historically, preservation of photographs in the home has centered on hard copy prints in albums, scrapbooks, and shoeboxes. In photography, there has been growth in digitally generated scrapbooks and photo books in the last several years, and growth of these products is continuing, albeit slowly. A hard copy print is human readable and therefore requires no system architecture to be put into use, but the longevity of various photographic print media is very important.

Media Longevity

With a variety of digital print technology available for prints and photo books there is also a range of image longevity

performance so careful media selection is very important to maximize the print to preserve benefit. Since dark storage is the norm for long term preservation, heat, humidity, and atmospheric pollutants are the critical environmental factors to consider. When these three factors are considered, long term stability can be quite poor with certain digital print technologies that have humidity and pollutant sensitivity. Alternatively, high quality silver halide photographic paper, high quality thermal dye transfer media, and, with the proper substrate media, electrophotographic systems from high quality suppliers provide longevity performance well beyond 100 years with very little change to the image in that time. These are the print technologies of choice for the greatest print to preserve impact. Much more detail on media longevity can be found in the previous paper [4] and in the trade [6, 7, 8, 9, 10]

Demographics

There are two key demographics for the print to preserve message. With the prevalence of the web and social media sites today, spreading the word on the value of printing for long-term preservation should be easy. The young mom is the place to start. She manages the pictures of the family through photo albums and scrap books, probably online, but perhaps in hard copy as well. Once they start to have children, the Gen Xs and millennials will easily identify with the preservation message for two main reasons: 1) they observe first-hand how quickly their babies are changing and growing up; 2) their parents likely had hard copy photos of themselves as children and they will recognize the importance and value of seeing these images of themselves from 25 or 30 years ago. This is true even though they may never have taken a film photograph or made a digital print in their entire lives. In their latest printing trends study, InfoTrends Roadmap 2016 found that the younger age groups have “a surprisingly high level of interest in printing photos”. The print is “often viewed as a cool, retro way to share photos”. The study goes on to say they believe the appreciation for print will grow as they get older and have families [11].

The second important demographic is the baby boomer generation. While it may sound odd, they are now becoming the new generation of grandparents. This demographic made prints of their children when they were young and can immediately recognize the value of pulling those photo albums and scrap books out to show their children who are new parents. This will reinforce the value of printing to the new moms and dads. In addition, the boomer demographic is photo active and will be taking their own digital pictures of their new grandchildren (and their vacations and other family events). Since they already recognize the long-term value of hard copy photos from the pictures of their children, it should not take much encouragement for them to realize their digital photos are important and need hard copy as a means of long-term preservation as well.

File Restoration

One final preservation comment in the print to preserve message is the value of an analog print to re-create a lost digital file. Digital files lost because of data integrity errors, and physically damaged media can be extremely hard (or at least

very expensive) to recover. Because high quality scans can be created from hard copy prints, a new digital file can be created from the analog print, should the original file ever need to be replaced. Even faded or damaged prints can be recovered fairly reliably with simple software. This makes analog print media a far more reliable storage medium, even beyond its other preservation attributes. Clearly there is strong value from many perspectives to a hard copy print and photo book, and the key to unlocking this value is to insure that the consumer recognizes all the benefits the print and photo book have to offer.

Conclusion

Digital image preservation by the consumer using hard copy prints is the simplest way to preserve their most valuable images, but considering the growing number of images captured, printing is still but a very small fraction of what it should be in a “print to preserve” environment. We have discussed the concerns of near total reliance on the digital file, the always-advancing technology changes that create the digital file storage risk, and how this is starting to get some recognition in the digital ecosystem. But reaching the end consumer continues to be a priority whose urgency is lacking in the photo fulfillment industry. In this paper we have provided information on consumer education, the concept of “print to preserve” and the value-adding benefits it brings to hard copy prints and photo books, as well as the key demographics and how to reach them. We have briefly discussed the importance of media selection to maximize print longevity. The “print to preserve” message needs to be positively embraced by the industry and communicated to the end consumer because the long-term preservation of digital photographic images via hard copy is the means to solve the long-term preservation dilemma that continues to face consumers today and more so tomorrow. Creating the awareness at the consumer level will help create the demand and stimulate the business for professional and retail photo fulfillment labs to address the consumers’ need for image preservation. This unmet need of consumer preservation is the growth opportunity for the photo fulfillment industry.

Acknowledgments

The author would like to thank his family for their stewardship of the family history through photography. He would also like to thank Dr. Jon Kapecki for his technical and editorial support and encouragement over many years.

References

- [1] LaBarca J. 2010 Image Storage and Permanence Considerations in the Long-Term Preservation of Photographic Images – Update 2010, *Journal of Physics: Conference Series*, Vol. 231 No. 1, Proc. 4th International on Preservation and Conservation Issues in Digital Printing and Digital Photography May 27, 2010, Institute of Physics, London, UK
- [2] LaBarca, J. 2013 Preservation of Photographic Images for Future Generations: New Opportunities for Prints and Photo Books with a

- Conservator’s Perspective; *Proceedings of the AIC & ICOM-CC Photographs Conservation Meeting, Wellington, New Zealand*
- [3] LaBarca J. 2011 Preservation of Documents and Photographic Images: Long Term Strategies for Future Generations *Proc. IS&T Archiving Conf.* pp 136-143
- [4] LaBarca J. 2014 Hard Copy Printing for Long-term Preservation as a Growth Engine for Prints and Photo Books *Proc. IS&T Technologies for Digital Photo Fulfillment Conf. e-Proceedings*
- [5] InfoTrends Analysis January 2013, Consumer and Professional Imaging, Road Map 2013: Photo Printing Trends
- [6] Eastman Kodak Technical Publication, 2013; Defining Print Life: The Critical Balance of Light and Thermal Stability
- [7] Bugner D E, Romano C, Campbel G A, Oakland M M, Kapusniak R, Aquino L and Maskasky K 2004 The Technology Behind the New Kodak Ultima Picture Paper – Beautiful Inkjet Prints that Last for Over 100 Years *Proc. IS&T 13th Int. Symp. Of Photofinishing Technologies* pp 38–43
- [8] Oldfield D and Segur R 2004 Assessment of Current Light-Fade Endpoint Metrics Used in the Determination of Print Life – Part I *J. Imaging Sci. Technol.* Vol. 48-6 pp 495–501
- [9] Oldfield R and Twist J 2004 Assessment of Current Light-Fade Endpoint Metrics Used in the Determination of Print Life – Part II *Proc. IS&T Archiving Conf.* pp 36–41
- [10] Image Permanence Institute at the Rochester Institute of Technology: “A Consumer Guide to Understanding Permanence Testing”; December 2009
- [11] InfoTrends Analysis January 2016, Consumer and Professional Imaging, Road Map 2016: Photo Printing Trends

Author Biography

Joseph LaBarca formed JEL Imaging Services in 2010 and Pixel Preservation International in early 2011, to provide consulting services to the imaging industry on image preservation, ISO standards, and image quality, after retiring from Eastman Kodak Company with over 34 years of continuous service. He graduated from Bucknell University in 1976 with a Bachelor’s of Science Degree in Chemical Engineering and spent a large part of his career at Kodak in the research, development, and commercialization processes for Kodak Ektacolor papers and processing chemistry. This included extensive involvement in the image stability of color papers beginning in the early 1980s and continuing for the remainder of his career at Kodak. In 1997, Joe was appointed Senior Research Lab Manager, directing a laboratory with systems responsibility for professional color negative films and papers. In 2004 Joe assumed the role of Technical Director, Image Permanence with responsibilities that included silver halide, inkjet, thermal dye transfer, and electrophotographic imaging systems. During this time Joe began extensive research in the use of film and hard copy print as preservation media for digital files and this effort continues today with Pixel Preservation International. In 2008, he assumed the additional responsibilities of retail imaging systems quality. Joe has been a member of IS&T for over 27 years and was awarded Senior Membership in 2012. He has also been a member of the American Institute for Conservation since 2008. In mid-2011 he was appointed to the position of Visiting Scholar in the College of Imaging Arts and Sciences at Rochester Institute of Technology. Joe is also a member of the ISO Technical Committee on Photography and is directly involved in the ANSI/IT-9 and ISO Working Group 5 Committees on color print stability and physical properties.