

# Hard Copy Printing for Long-term Preservation as a Growth Engine for Prints and Photo Books

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## Abstract

*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. Although slightly different in degree, both of these storage modalities also have risk of image loss due to long-term technology changes. In general, consumers are totally unaware of this risk, which could potentially leave a whole generation of picture takers, including Moms who are typically the “chief family photo officer”, without a long-term record of their lifetime events. This paper will provide a brief overview of the history and concerns of technology obsolescence as it relates to the long-term preservation of consumers’ digital image files and show how promotion of hard copy printing provides a simple and cost effective means to the consumer for secure, technology-proof preservation of their precious memories.*

## Introduction

As our world of photographs becomes more and more digital, there is an ever-growing concern over long-term storage and the preservation of these images, especially as it relates to the general public. While the photographic printing industry is certainly aware of this concern, the general public is not. Earlier papers by this author on the subject of long-term preservation [1, 2] have dealt with digital photographic images and the use of film as a technology-independent storage medium while a more recent paper [3] focused on documents of all kinds, including digital files of letters, emails, as well as photographs. The focus of this paper is long-term preservation of the “best of the best” of consumers’ photo images through hard copy output products from the photo fulfillment industry. The goal of this paper is to reinforce to the industry the issues surrounding the long-term preservation of digital photographic images emphasizing the importance of hard copy images to long-term preservation, and to position hard copy printing as a value-adding product category with the means to solve the long-term preservation dilemma facing consumers today.

## Current State

As personal computers, notebook/“tablet” computers, and smartphones continue to grow in use, digital imaging, email, and social media become more and more popular as the primary mode of documenting our lives. This creates an ever-growing concern over long-term storage and the preservation of these memories and documents. While some, perhaps many, of these files do not need to be preserved for the long term, some do. Unfortunately, consumers often do not recognize the importance of many of their images; for example, it may not be until a photograph is “rediscovered” 20 to 30 years later that people

realize how valuable it is. In the digital world, without proper attention now, digital documents of all kinds will simply not be available 100, 50, or perhaps even 30 years in the future.

## Technology Always Advances

For both physical/hardware and software formats, change is driven by ever-advancing technology. The average consumer continues to be generally unaware that there is an underlying risk associated with information storage on computer hard drives, digital devices such as smartphones, optical media, or even storage “in the cloud” and on social media sites. The storage risk 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]. Briefly, formats in the past have changed. 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. JPEG2000 already offers many improvements in compression over JPEG and JPEG XR has further improved compression algorithms, improvements in color reproduction accuracy, and support for High Dynamic Range (HDR) imaging. Will JPEG file formats be readable in 2034? 2034 is only 20 years away.

## Historical Perspectives

In the days of photographic film, it was pretty much a given that a hard copy print would be made. In the world of digital photography and display devices this is not the case. Digital photography has enabled the capture of multitudes more images than with film and industry estimates indicate that nearly 380 billion images were captured in 2012 [5]. While many, if not most, of these images do not need to be preserved, some do.

Preservation of photographs in the home has historically centered on hard copy prints in albums, scrapbooks, and shoeboxes. In photography, there has been significant growth in digitally generated scrapbooks, photo albums and photo books in the last several years, and growth of these products is expected to continue. A hard copy print is human readable and therefore requires no system architecture to be put into use. Longevity of various photographic print media will be discussed later in this paper.

As consumer imaging continues its rapid advance to the digital world, preservation remains erratic or non-existent. There has been little to no thought by consumers for long-term preservation of their images. It seems they are taking for granted the automatic, “built-in” preservation that came with the traditional analog negative and resulting print that was available

for many decades. So how do we preserve for the long-term, for many generations?

## Technology Independent Preservation

Technology independent preservation takes a long-term perspective and eliminates the need for short-cycle migration of digital information. 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 and allows 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 is echoed 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”.

## Hard Copy: The Growth Engine of Preservation

Preservation by the consumer using hard copy prints is the simplest way to preserve their most valuable images, and media of various technologies exist today to provide over 100 years of storage life at room-temperature conditions. But printing is rarely done by the consumer in the digital world today, especially considering the number of digital images captured. This unmet need of consumer preservation becomes the source of growth for printing.

Because consumers are generally unaware of the risks of losing digital images a value-adding opportunity arises for fulfillment labs. This includes all modes of fulfillment – large whole sale labs, large and small professional and school labs, in-store retail fulfillment centers, as well as on-line fulfillment. The key is to get the message out on the need for hard copy preservation. But especially important is how the message is presented: as a positive, value adding approach rather than as a scare tactic. As an example of the positive approach, a message is created about precious digital files of family events and how important it will be to have a record of these events in 20 or 30 years. Producing prints and photo books today will insure the memories will be around for the future. An alternative scare tactic approach would not have the same positive impact: a message imploring that your memories of the family event will be gone in 20 or 30 years unless you make a print or photo book would not be nearly as effective as the positive approach.

A further component to hard copy prints and photo books, adding even more value for the consumer, is that hard copy can come “full circle” in the digital world. A print today was likely “born digital” – that is created from a digitally captured file. Because high quality scans can be created from hard copy prints, a new digital file can be created from the print, should the original file ever need to be replaced. Clearly there is strong value from many perspectives to a hard copy print and the key to unlocking this value is to insure that the consumer recognizes all the benefits the print has to offer.

## Getting the Message Out

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. A key is to precisely target the right demographic. The young mom is the place to start. Historically, although it was often the dad taking the pictures, it was the mom who managed the pictures of the family through photo albums and scrap books. She essentially became the CFPO – Chief Family Photo Officer. 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.

While it may sound odd, a second important demographic is the baby boomer generation that are, and are now becoming, the new generation of grandparents. This demographic made prints of their children when they were young and 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. Since they already recognize the long-term value of hard copy photos from their children’s photos, 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.

## Technology Makes it Easy to Print

We presented a compelling case for why printing and preservation is worth doing. Now we need to convince the millennials that technology makes it easy to do and won’t consume huge amounts of their precious time.

## Organization

Organization is the key to easy retrieval for making prints and photo books but is an often cited barrier to printing. Digital technology can make this quite easy from several positions. Online organizing is available through many social media sites as well as online fulfillment sites. Several online sites have programs that will organize photos for the consumer by date and other key characteristics, and work quite well to provide at least a good start of an organization. Several organizing programs can be used locally on PCs and MACs to do the same. And MAC and Windows operating system software can easily be used to do custom organizing locally. A simple organizing scheme using operating system folders can be created for each important event. Name the folders in the format of “YYYY\_MM\_DD\_Event” will allow events to be easily sorted by date. This will be especially helpful when searching for pictures covering multiple events, for example, family events for the entire year. Specific choice of the words describing the event will also aid in searching and retrieving. Once the

consumer gets into the organization habit, any of these organizing schemes become second nature.

### Ease in making prints

Today, digital printing technology allows for easy access to printing. For small numbers of special prints, printing at home or at retail kiosks is convenient. For larger volumes of prints and photo books, such as a family vacation, on-line ordering and fulfillment is the easy way to go.

### Convenience

Professional, school, and mass portraiture labs provide convenience in documenting growing families. With digital photography, the shooting, viewing, editing and image selection can all happen in the studio at the sitting. And the ongoing tradition from the school photography industry “school photography day” continues to provide an annual documentation for the family archives.

### Materials

Finally, the millennials need to know that print materials will last thus making it worth their efforts to make prints for long-term preservation. This is easy to do as long as high-quality, recognized name-brand materials are used. While a range of technologies offer good bets for long-term preservation,

silver halide paper provides the greatest assurance because it is a long-lived technology that has undergone many time-proven improvements over many decades.

### Materials Technology: Stability of Materials Used For Preservation

The section below provides longevity information on various technologies used for hard copy output. A reflection medium has the advantage of being excellent for human readability but has variable longevity, which depends on the output technology chosen making careful choice by the consumer very important.

Table 1 below discusses the longevity of various reflection technologies and provides specific examples and longevity information for Kodak and Kodak Alaris media [6, 7]. Longevity of similar technology materials from other manufacturers may or may not be as stable so careful comparison, using common test methods and interpretations, is called for. With one noted exception, the lifetime estimates in these tables use a new endpoint criterion that is more conservative than that typically used for consumer images [8, 9]. Because the application is for long-term storage, these predictions are based on dark keeping applications, and they include the effects of heat, humidity, and atmospheric pollutants, but they do not include effects of light.

**Table 1. Stability of reflection media for long-term storage applications.<sup>a</sup>**

Media Type	Media Name	Estimated Longevity	Comments
Thermal Dye Diffusion Transfer	<i>Kodak Professional Ektatherm XtraLife</i> media	80–100 years for 5% dye loss <sup>b</sup>	Virtually no sensitivity to humidity or ozone
Inkjet/Porous Media	<i>Kodak Ultra Premium</i> photo paper	50 to over 75 years	Using high-quality pigmented inks
Silver Halide	<i>Kodak Professional Endura</i> papers	Over 150 years	Virtually no sensitivity to humidity or ozone; greatest longevity of any silver halide paper
Electrophotographic	<i>Kodak NexPress Digital Production Color Presses with Kodak Professional Endura EP-D</i> paper	Over 100 years	Virtually no sensitivity to ozone; physical damage can occur in high humidity environments so storage conditions need to be carefully controlled

<sup>a</sup>Using much tighter dye loss criteria of 15%; room-temperature storage conditions of 23°C and 50% RH and pollutant-free air; lower storage temperatures can provide significantly longer longevity

<sup>b</sup>Time for 15% dye loss has not been determined due to the extremely high thermal stability; actual time will be well beyond 100 years

Table 1 clearly shows there is a wide range of high quality reflection printing technologies that can be used for long-term preservation. Properly stored, hard copy prints are certainly usable for long-term preservation of the consumer's "best of the best" images.

## A Call to Action

With digital now in the mainstream for imaging, much more education is needed to make the general public/consumer aware of the risks of image loss from not having a preservation plan. Memories preservation is important, and consumers have done this historically through photo albums and scrap books. The initiative that was announced in 2007 and supported for several years by the International Imaging Industry Association (I3A) on consumer photo preservation was a start to creating this awareness among retailers and consumers [10]. The "SaveMyMemories.org" website, also launched in 2007, received positive response initially and during its first couple of years, but is no longer available. There needs to be further promotion to a broader audience, especially the consumer, and these efforts need support from the entire photographic industry. This is the value-adding opportunity for the photo fulfillment industry. Photographers and their associated printing labs, along with online photo fulfillment sites, mass portrait and school finishing labs, have the closest connection to the end consumer and therefore have the best chance of driving this message home. Creating the awareness at the consumer level will help create the demand and stimulate the business for various high-volume photo fulfillment systems to address the consumers' need for image preservation.

## Conclusions: Path Forward – Reaching the Consumer

This paper has described the risks associated with storage of digital data and why those risks are so high. We have also presented a value-adding solution using high quality hard copy output to create a long-term solution that will last for multiple generations. Additionally, this paper has reviewed both traditional (silver halide), and newer (inkjet, thermal) media for storage as hard copy prints. Electrophotographic media, such as that used for on-line generation of photo albums, photo books, and scrapbooks is also included and is especially important given the growth in these products. A simple solution, however, does not help if the consumer is not even aware that the storage risks are present. The entire photographic industry needs to positively encourage people to make prints of the "best of their best" images as preservation records so future generations will easily be able to find and enjoy these records of people's lives. Doing so with a positive approach will have the largest benefit. Targeting the right demographic (young-parent millennials and baby boomer new-grandparents), helping them recognize the importance of hard copy preservation, as well as making it easy for them to do is key. Teaching the simple concepts of image file organization and that the fulfillment industry can make printing easy and convenient will allow the industry to create a new growth engine of preservation.

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## 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 25 years and became a member of the American Institute for Conservation in 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.*