What Do You Mean When You Say "Digital Print"?

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How would you define the term *digital print*? Would you say "all items generated from a digital printer"? Or "any print that was 'born digital'"? Or "items printed on light-sensitive photographic papers exposed using a digital photo-printer"?

If you answered "yes" to any or all of the above, you would not be off base. In fact, according to preliminary results of a recent survey, such varied answers appear to be creating a barrier to crafting a common definition for such materials, which has implications for the archives profession.

In June 2008 the Image Permanence Institute (IPI) at the Rochester Institute of Technology (RIT) sent solicitations for an online questionnaire to a variety of cultural heritage institutions, private conservators, and related consultants to quantify field experiences related to caring for modern digitally printed materials. The results of the full survey will be published at a later date on IPI's DP3 Project website. However, the responses to the questions regarding how to best define the term digital print were compelling enough to address in the interim.

Since not everyone may be familiar with the individual printing processes used to create digital prints, the most common are briefly described:

- *Silver-halide Prints (AgX).* This is the technology used to make traditional photographic prints from negatives. In this case, metallic silver or color dyes are formed, during processing, in areas that have been exposed to light. What many people do not know is that a large majority of the prints made from digital images at photolabs or from online services are created using this same time-tested process. The main difference is that instead of using light through a negative to expose the photographic paper, a laser or light-emitting diodes, controlled by the data in the image file, are used to expose the paper.
- *Inkjet Prints (IJ).* This is the technology used by most consumer desktop computer printers, some retail photo kiosks, and wide-format printers. Small droplets of ink are rapidly jetted onto the printing paper. IJ can be used for both documents and images. Several variations of the technology exist, and each produces prints with unique properties. The colorants in inkjet prints may be dyes or pigments. Generally the pigment inks are more stable because of their large particle size, but this is countered by the greater range of colors possible with the dye inks.
- *Electrophotographic Prints (EP).* This process (also referred to as xerography) is used in photocopiers and laser printers. In these systems color toners are transferred to the printing paper by an electrical charge (modulated by a laser, LED array, or by light reflected from the original) and "fixed" by heat or pressure. The toners are usually pigments with the black toner being very stable carbon black. This process is mainly used for printing documents; however, it is commonly used to print images for photobooks.
- *Dye Diffusion Thermal Transfer Prints (D2T2—also called "thermal" or "dye-sub" prints).* In these systems, the printer modulates heat energy to colored donor ribbons to control the amounts of yellow, magenta, and cyan dye that is transferred to the print paper. This technology is often used in snapshot-size home photo printers and in many instant-print photo kiosks.

The Survey

The actual methodology used for this survey will be fully described in the final report. In summary, IPI received 182 responses to a set of 19 questions. No names of individual respondents or institutions will be given.

Two survey questions pertained to defining the term digital print. The first question asked whether a provided definition was adequate or not. The second question asked for corrections or improvements to the definition by those respondents that had considered it to be inadequate.

Question 1: Do you think the following is a suitable definition for "digital print"?

A digital print is any print (photograph or document) that was created by an electronic printing device where the information regarding dye, ink, or toner placement on the paper originated from a digital file.

This definition was developed by IPI for its DP3 Project (see DP3Project.org) where we will be examining the stability and care of digitally printed materials. This definition was not necessarily developed for use by the field as a whole. There needed to be a "scope" to the project such that a context for the results could be created. The results of this survey will be used to improve that definition.

The responses from the field regarding the adequacy of the above definition were as follows:

75% – Yes
13% – No
11% – I'm not sure
1% – Did not answer

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Question 2: What additions or corrections would you apply to the above definition?

Thirty-seven percent of the respondents offered suggestions for improvements or corrections to the provided definition. This is significantly higher than the 13 percent who said they did not agree with the definition. We assume that some of those who answered, "I'm not sure," were attempting to find some clarity for themselves by modifying the provided definition, or that some who answered "Yes" generally agreed with the definition, but wanted to improve its precision.

Barriers to Creating a Common Definition

While a variety of helpful comments were received, three particular issues arose that appear to create a barrier to crafting a common definition for these materials. These are described below:

1. Some respondents believed that digital prints only referred to those that resembled traditional photographic prints while others believed that digital prints included all items printed with a digital printing device (photos, documents, and graphics).
2. Some respondents believed that digital prints included those printed on light-sensitive photographic papers if they were exposed using a digital photo-printer while others believed that any print on a light-sensitive photographic paper was not a digital print.
3. Some respondents believed that any print that was "born digital" (e.g., captured by a digital camera or produced through software on a computer) regardless of how it was ultimately printed was a digital print while others believed that it was the printer that determined whether the print was digital no matter how the document or image was originally created.

The difference between the terms *digital print* and *digital printing* might be part of the problem. *Digital printing* refers to a process, while *digital print* refers to an object. Most people would refer to digital printing as a process that utilizes digital data to control certain electronic printing devices such as laser printers or inkjet printers. While it would seem an obvious extrapolation that anything printed using a digital printing device would be a digital print and anything not printed using a digital printing device would not, that assumption is not commonly shared by the field. This split mindset could have a curious effect on collection care. Materials printed by the exact same technology could be cared for very differently. If an object looked like a photo it might be placed in cold storage, but if it looked like a document it might be left in room conditions. In other words, objects could be cared for based on what they look like rather than what they are.

The next issue arises from the fact that, today, light-sensitive papers are used in digital, wet-process systems. In the early 1990s many photolabs switched to equipment that scanned a customer's negative and then printed the data to traditional silver-halide paper using LED or laser exposure. Today, photo labs print directly from the data captured by

their customer's digital cameras. The step of scanning a negative has been mostly eliminated. The camera is digital and the printer is digital; only the paper is the same as that used for analog prints. Some respondents to the questionnaire believed that it is the final paper used that determines whether a print is digital or not, and so any print on silver-halide paper is analog. Others felt strongly the other way. They believed that the printing process determines whether the print is digital or analog. The field is thus split on whether to consider these digitally printed images as "digital prints" or "traditional photos."

While not mentioned in responses to the survey, there is a similar problem for laser-printed documents which are made using the same basic principles and materials as those used with analog photocopiers. A document copied decades ago on a photo-copier is similar to that made today on a laser printer. Of course, toner and paper qualities have advanced over time, but the printing technology is generally the same. So, as with silver-halide prints exposed using either negatives or laser, we have an older technology that was co-opted for a new purpose as output for digital data from computers, and that creates confusion.

Finally, some respondents believed that only those prints that originate from digital sources such as digital cameras or computer software could be considered digital prints, regardless of how they were eventually printed. This could, theoretically, include a digital image scanned to a negative and then printed via the platinotype process. The use of the term digital print to describe an object would be meaningless at this point.

Potential Solution

As a potential solution, one survey respondent suggested disregarding the term digital print altogether and simply referring to prints by their specific technology:

- Silver-halide print
- Inkjet print
- D2T2 ("dye sub") print
- Electrophotographic print

There is obviously precedent for this as historic mechanical printing processes are specified individually (engraving, lithograph, etching, etc.). This is also done for traditional photography, where we separate prints into specific types (albumen, silver-gelatin, platinotype, etc). In light of this, dropping the term "digital print" may be the best solution when speaking of specific objects or classes of objects.

Of course, to move to a nomenclature where processes are identified on a more specific level, archivists would need to be able to accurately identify these materials in their collections. Tools like those found at the following sites may be helpful:

- www.graphicsatlas.org
- http://aic.stanford.edu/sg/emg/juergens/

In summary, the following points can be made:

- Currently the term *digital print* means different things to different people.
- Often an object is labeled *digital print* based on what it looks like rather than on its chemical composition and physical structure.
- Not all digital prints need the same care, so lumping them into one category may put some prints in danger.

As a result, the following can be recommended for now:

1. Download IPI consumer guides from "Downloads" at DP3Project.org.
2. Explore the print ID sites listed above.
3. Spend some time looking at your own digitally printed materials.
4. Start referring to prints using more specific terms than "digital" or "traditional."
5. Treat materials based on their physical structures and chemical compositions and not on what they look like or on the technology used to print them.

While it may not be harmful in casual conversation to lump all modern prints into the meta-category of "digital prints," the truth is that preservation-minded care and handling of these objects will necessitate a set of more specific, clear, and common definitions. These objects are not all the same; they have different sensitivities to their environments and in their use. As Confucius once said, "The beginning of wisdom is to call things by their right names." ❖