Variable Data Printing (VDP): New Applications of IT & Communications Technology

David GORE
School of Technology Studies, Eastern Michigan University
Ypsilanti, Michigan 48197, USA

and

Marie LEE
School of Technology Studies, Eastern Michigan University
Ypsilanti, Michigan 48197, USA

and

Kenny WASSUS
School of Technology Studies, Eastern Michigan University
Ypsilanti, Michigan 48197, USA

ABSTRACT

Information Technology, printing, and fulfillment industries are converging to create a new paradigm, variable data printing. The merging of databases and design allow for individualized output, complete with mail fulfillment, creating new roles for printers, and new collaborations in education. New technologies allow all parts of the printing process to be digital. This new format must be incorporated in the education of current and future students in this field. Information Technology, design, print and fulfillment will merge to lead us into a new age of image creation and delivery.

Keywords: Variable Data Printing, Databases, Telecommunications, Digital Presses, Communication, Pedagogy, Fulfillment.

Introduction

Today, we are surrounded by a multi-level convergent media world where all modes of communication and information are continually reforming to adapt to the enduring demands of technologies, "changing the way we create, consume, learn and interact with each other (Jenkins).

Less than a decade ago the discussion of information technology, printing, and fulfillment industries would hardly have been in the same sentence, much less taught by the same person. However, technology has changed the world. Information technology databases, laser (digital) printing technology, and advertising/marketing/public relations mail services are becoming a part of the same technology classes. This convergence of technologies is known as variable data printing.

Convergence in this instance is defined as the interlinking of computing and other information technologies, media content and communication networks that have arisen as the result of the evolution and popularisation of the Internet as well as the activities, products and services that have emerged in the digital media space (Wikipedia).

Documents designed to be populated with data, and images from a database that also includes mail fulfillment, are rapidly becoming subject matter for the curriculum in many classrooms. The intent here is to show the interdisciplinary link between these different areas of education and how they fit together for the purpose of teaching variable data printing.

Hewlett Packard has long been a leader in the production of copiers, scanners, printers and various other devices utilized in the reproduction of printed documents. In October of 2007, Hewlett Packard helped to usher in a new revolution in the printing industry. When they filed application number 11/932,659 for a patent for variable data printing (USPTO).

According to Cope and Kalantzis,
The key difference between this technology and all preceding printing technologies is variability. Rapidly printed consecutive pages can be different from each other just as easily as they can be the same, and with no fluctuation in speed and printing functionality. The implications of this technology are revolutionary… In the case of fully variable, digital print:

- Every print is an original;
- Economics of scale are flat
- Niche markets can be viable as mass markets and small cultures can thrive alongside large.

In 1962, Thomas Kuhn wrote <u>The Structure of Scientific Revolution</u>, and fathered, defined, and popularized the concept of "paradigm shift" (p.10). Kuhn argues that scientific advancement is not evolutionary, but rather is a "series of peaceful interludes punctuated by intellectually violent revolutions," and in those revolutions "one conceptual world view is replaced by another."

This VDP Paradigm Shift is a change from one way of thinking to another; a revolution, a transformation, a sort of metamorphosis. This shift just does not happen, but rather is driven by agents of change. In this instance, the change agent is the teacher, not just of print media, but along with those teaching information technology, design, as well as other aspects associated with the complete process. Each area must embrace the knowledge base of the other, whether or not they are active participants in the delivery of that information. In other words, teachers must understand the broad ranging implications of technology in order to be optimally effective within their own domain, and to deliver their piece of instruction that makes up the whole.

In order to move to a variable data platform, there are four key criteria that need to be taught. Unlike the traditional print program that focused solely on the mechanics of layout, design, and ink on paper, the new era of print requires an understanding of the interrelated areas of:

         • Information Technology (IT)
         • Document Design and Layout
         • Digital Production Printing
   • Fulfillment

Information Technology

Use of XML requires only a basic understanding of the technology. This involves the ability to recognize a document or data file structure, express the structure as a simple DTD (document type definition), and then properly tag the document or data file (Barzelay, 2009, September 2).

At the root of variable data printing lies a simple yet exceedingly scalable file format known as .XML. To the untrained eye, .XML is yet another markup language pertinent to web development in some way shape or form. However, in addition to being germane to web formatting, .XML has become a de facto standard in word processing and office productivity encoding. Albeit .XML isn't as rich as Perl or Ruby in terms of functionality, it still provides a hierarchal and structured way of formulating a simple flat database into design applications to create personalized content. So now the question is, how exactly does such a scalable, flexible platform like .XML impact variable data printing?

.XML is incorporated into applications such as InDesign which are built around open standards. Open standards empower third-party software developers to create applications that get rid of the flat, rudimentary print processes of yesteryear and replace them with multi-leveled personalized directly printed content.

For example, in June of 2004 *Reasons* magazine published an issue that was a brilliant epitomization of variable data printing. Of the 40,000 June issues of *Reasons* sent out, each one was personalized per subscriber and had a satellite photo of each readers' house on the cover. A feat like this doesn't come easy and requires a degree of flexibility on the designer's part and a savvy IT team formulating the .XML precisely. For example:
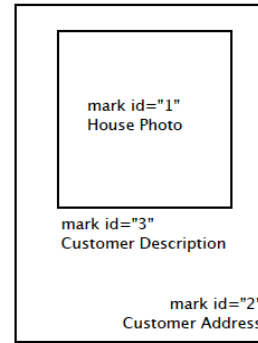

Data elements in XML are identified by start and end tags,which reflect the content of the element, for instance "<last_name>Smithers</last_name>". An XML file of repeating data isessentially a set of records where the tagged elements occur in a set sequence (Barzelay, 2009, July 28).

```
<XML Document>
<Page id=covermag>
<mark id="1", x="a", y="b", w="c", h="d">
<external-data="http://magazine.com/house1.jpg">
</external-data>
<mark id="2", x="e", y="f", w="g", h="I">
<external-data="http://magazine.com/customeraddress">
</external-data>
<mark id="3", x="j", y="k", w="l", h="m">
<external-data="http://magazine.com/descriptioncustomer">
</external data>
</mark>
</Page id="covermag>
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Although this is an extremely elementary depiction of the work involved, it is a prime example of the flexibility and personalization provided by variable data printing and streaming content into design and directly into print.

Document Design and Layout

The design of documents today must have a degree of flexibility. This flexibility is quite easily obtained using a powerful page layout software program such as InDesign by Adobe. Through the use of styles in the style palette, the formatting of various elements of a page can be tailored to suit the mood of the document. The advantage to variable data printing is that multiple styles can be created for the same text placeholder. For example, the word 'headline' can be used to identify the location for the document headline. Styles can then be created that will establish as many different treatments to the text as needed. The example below shows a very casual style, a bold style, and a fancy style. The style is applied to each individual document by establishing a link, through the XML code, back to the database. This may be completed by the programmer or through a software link that makes the coding transparent to the user with a product like DesignMerge by Meadows Publishing Solutions. Figures 1 and 2 demonstrate the placeholder text and the resultant text in the linked documents.
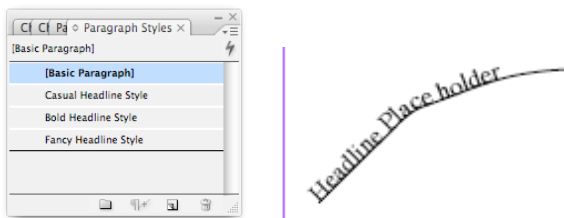

Figure 1. *The InDesign Style Palette showing the three separate headline styles: Casual, Bold and Fancy and the placeholder for the headline that has been tagged to work with the information in the database..*

Figure 2. *The result from applying the style to the placeholder for the tagged headline.*

Mail merge capabilities are not new. Word processing programs have incorporated this type of operation for many years. However, this has been limited in its scope to text only. The power behind variable data printing operations is that it extends to graphics as well. In the document, just as the text frame is identified, so is the graphics frame. Once identified, the specific graphic that populates the space at the time of imaging is determined by the link back to the database. This allows a specific picture or graphic to be associated with a particular individual or group, and then printed only onto the page, or pages, that are linked to that individual, or group, in the database. Figures 3 and 4 below illustrate the process.
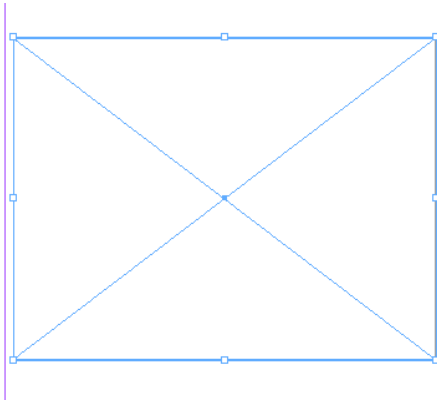
Figure 3. The InDesign graphic frame is tagged by the software and identified as the location to place the .jpg image identified in the database.

Figure 4. The InDesign images of Washington DC (2590.jpg), Vancouver (2844.jpg), and Chicago

(2704.jpg) will appear in the graphic frame corresponding to person they are associated with.

Digital Production Printing

The digital print production process has undergone a drastic transformation over the past several years due to the advances in technology. In the simplest terms, digital printing is laser printing. However, it is accomplished with high quality, color, fast delivery and duplex output. In fact, the digital 'presses' of today rival offset printing presses in both volume and quality.

In addition to speed and quality, many of the digital presses today include finishing and binding as part of the process. When these features are incorporated into a press, a finished document emerges. At this point, with the entire process being digital, it is conceivable to produce a one-of-a-kind document without incurring the traditional costs of production. In the same sense, variable content documents can be produced in way not feasible by any other traditional print process.

A variable data press looks very similar to a traditional copy machine as seen below.

Figure 3. The Canon ImagePRESS (L) and the H P Indigo 7000 series (R) digital presses

While the equipment may resemble a copy machine and it does, in fact, use toner as opposed to printing ink, that is where the similarity ends. The digital press contains a great deal of sophistication. The press has the ability to process the variable data that is streaming into it and, depending on the processor, can deliver finished pages at speeds of several thousand per hour. Finishing operations such as applying covers, binding, and trimming, may also be available depending on the size, quality, and options available for the particular press model.

Fulfillment

Fulfillment has not traditionally been a concern of the printing company. Once a job was complete, it was merely boxed and delivered to the client or to a mail services provider. The printing company is now capable, thanks to variable data, to organize the database according to state, postal code, region, or whatever sorting is necessary for the post office to process the mailing of the documents most efficiently. Similarly, if the documents are not to be mailed individually, the database may be tailored to a distribution by company, divisions, or some other unit. The database can be made more sophisticated by the addition of supplemental units to add other variable data such as PostNet, United States Postal Service zip codes, Codebar, ISBN, Code-39, EAN-13, etc. This not only streamlines the printing process, but adds data that would ordinarily require time after the completion of the print step. While this creates a new function for the print shop, namely that of storage and delivery by sorted groups, this process is definitely offset by the increased volume of printed material that the print shop will be requested to provide based on the diversity of services.

Conclusion

The influence of IT on the print industry, and the ability of many people to recreate documents and images in their own home using a 'printer' (Cope and Kalantzis), has pushed the entire publishing process to be digital in format. Merging databases, using new design programs with the ability to format variable data, has created the ability to 'publish' where it was previously very cost prohibitive. As stated by Romano,

The rise of digital-only print services by a generation of entrepreneurs is a phenomenon. Some are new services and some are spin-offs from existing businesses…There will be a growth in small digital printing businesses on a worldwide basis as copy shops upgrade, photo shops expand, and sign shops extend their offerings.

As the traditional, ink-based printing declines, digital printing will begin to dominate the industry (Romano), creating a host of new applications for published materials. These trends will also present opportunities for those who are able to harness the power of IT applications and pair it with creative design.

> As print providers change their approach to the evolving business they must take into consideration that past processes must change. This evolution requires that they re-assess their infrastructure and add services such as document management, web access to document repositories, electronic document distribution, data mining, variable data printing, distributed printing, fulfillment, and kitting services. This

provides "one-stop shopping" for printing and related services. Print service providers must make these changes to assure their future success (Gilboa).

This new era of converged technologies is both exciting and uneasy. There are few who understand all of the pieces and, therefore, very few schools who are teaching students how to become a part of this emerging industry. It is clear that IT, design, print, and fulfillment have a new relationship that will lead us into the next age of image creation and delivery. As industry is changing and adapting to new technologies and new demands in the marketplace, so must education reach across disciplines to best prepare students for these new realities in the workplace.

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