BOOK REVIEW

INNOVATIONS AND ADVANCES IN ELECTRONIC PUBLISHING: A BRIEF OVERVIEW

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Abstract— **Electronic publishing, specifically electronic books (referred to as ebooks), continues to evolve as reading and learning habits alter. Publishers have innovated their practices and workflows to incorporate the changing technologies in publishing. In doing so, production practices and access to content has undergone advances to keep up with these changes. The result is evident in the final product, and this paper briefly explains the transmission of content, the production process, and how ebooks are accessed.**

Keywords— **XML workflow, ebooks, multimedia, PoD**

I. Introduction

There have been many studies and scholarly articles on electronic publishing expressing opinion and usage statistics. This paper offers a general overview of electronic publishing, ebooks in particular, focusing on what is important for potential authors and readers to note as they produce and consume information. Additionally, how authors send materials, how the production is completed, and hence how the content is then available to the readers will be the primary points covered in this paper.

According to a 2015 editorial from *The Washington Post*, as demand for ebooks rises, libraries are responding; nationwide, spending on ebooks has grown from 1.7 percent of public library budgets in 2010 to 7.6 percent in 2014 [1]. As the demand grows, publishers must innovate and there are some key ways they are doing this.

II. Submitting material

All proposals and manuscripts are submitted in MS Word or LaTeX, the most widely used programs. If possible, it is also requested that PDFs are provided.

Materials can be sent via email but it is often much easier (for manuscripts especially) to utilize file sharing services such as Dropbox or We Transfer. If an author is not familiar with these services, an ftp site can be provided and the files can simply be uploaded to the site.

If it is more convenient, the author can also send in CDs, DVDs, or USB drives containing the content. All figures can be submitted separately as long as it is identified in the manuscript where the figures should be placed.

III. Production

Traditional production processes were centered on the use of Word and In Design, whereas more publishers are now taking the leap into full XML production workflows often supported and integrated with an accompanying content management system for their book production.

The primary advantage of an XML workflow is that it allows the creation of multiple formats from a single source - HTML, PDF and EPUB are all created from the same XML. Using XML also gives publishers the opportunity to do more with the book content in the future such as enhanced searching, enriched content (like embedded multimedia and interactive elements, and MathML: See Fig.1) and greater integration with journals content on a single online platform. All of which, for a publisher of STEM content, needs to be fully embraced to

enhance the reader experience and further the capacity for learning.

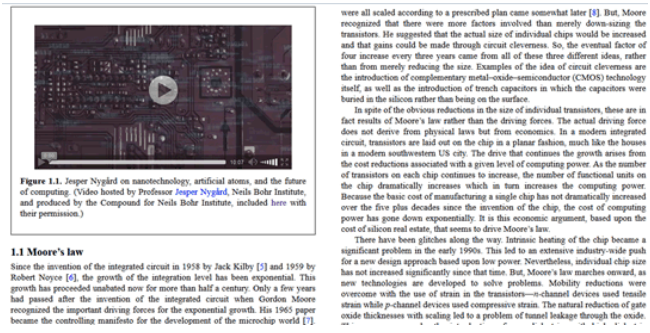

Figure 1.1. Jesper Nygård on nanotechnology, artificial atoms, and the future of computing. (Video hosted by Professor Jesper Nygård, Neils Bohr Institute, and produced by the Compound for Neils Bohr Institute, included here with their permission.)

1.1 Moore's law

Since the invention of the integrated circuit in 1958 by Jack Kilby [5] and 1959 by Robert Noyce [6], the growth of the integration level has been exponential. This growth has proceeded unabated now for more than half a century. Only a few years had passed after the invention of the integrated circuit when Gordon Moore recognized the important driving forces for the exponential growth. His 1965 paper became the controlling manifesto for the development of the microchip world [7].

were all scaled according to a prescribed plan came somewhat later [8]. But, Moore recognized that there were more factors involved than merely down-sizing the transistors. He suggested that the actual size of individual chips would be increased and that gains could be made through circuit cleverness. So, the eventual factor of four increase every three years came from all of these three different ideas, rather than from merely reducing the size. Examples of the idea of circuit cleverness are the introduction of complementary metal–oxide–semiconductor (CMOS) technology itself, as well as the introduction of trench capacitors in which the capacitors were buried in the silicon rather than being on the surface.

In spite of the obvious reductions in the size of individual transistors, these are in fact results of Moore's law rather than the driving forces. The actual driving force does not derive from physical laws but from economics. In a modern integrated circuit, transistors are laid out on the chip in a planar fashion, much like the houses in a modern southwestern US city. The drive that continues the growth arises from the cost reductions associated with a given level of computing power. As the number of transistors on each chip continues to increase, the number of functional units on the chip dramatically increases which in turn increases the computing power. Because the basic cost of manufacturing a single chip has not dramatically increased over the five plus decades since the invention of the chip, the cost of computing power has gone down exponentially. It is this economic argument, based upon the cost of silicon real estate, that seems to drive Moore's law.

There have been glitches along the way. Intrinsic heating of the chip became a significant problem in the early 1990s. This led to an extensive industry-wide push for a new design approach based upon low power. Nevertheless, individual chip size has not increased significantly since that time. But, Moore's law marches onward, as new technologies are developed to solve problems. Mobility reductions were overcome with the use of strain in the transistors—*n*-channel devices used tensile strain while *p*-channel devices used compressive strain. The natural reduction of gate oxide thicknesses with scaling led to a problem of tunnel leakage through the oxide.

Fig. 1 Screenshot of embedded ePub video

There now seems to be a movement towards a 'Digital First' publication model, allowing publishers to actively commission books that take advantage of and feature these new technologies, like the embedded multimedia and reflowable content display in ePub3 for example, and enhanced mathematical equation rendering using the MathML feature across all formats. However, having books produced in XML also means that future developments that are implemented (content enrichment, integration, etc.) can be applied to books that are already published, and not just new books, allowing for maximum flexibility in published output. This, however, seems to be where many publishers differ on the definition of an ebook – with some prepared to consider a digitized print PDF as fulfilling this brief, whereas others taking the next step considering the ePub as the true, modern ebook format, with all its value-adding inbuilt features and technical possibilities for enrichment and user interaction.

Physical book printing has evolved as well with many publishers now choosing to operate on a PoD (Print-on-demand) basis instead of printing vast quantities and storing for distribution and sale as done previously. This arrangement increases the production flexibility further, allowing books to be produced not only with a digital first audience in mind, but producing print PDF files for those who still require a physical book (on an 'on demand' basis). It also chimes nicely with the model of 'Digital First', where e-formats take precedence and print is very much a secondary offering.

It's also worth noting that the above mentioned processes, when done right, can all contribute significantly to reducing the overall time to market, from traditional production times of anywhere between 6-12 months down to as little 12 weeks in some publishing companies.

IV. Access

Ebooks have traditionally tended to be produced and considered as digitized web PDFs (with somewhat limited functionality beyond making the PDF viewable in electronic form). However, it is now becoming more standard to produce ebooks in HTML, ePub, and even Mobi format (which is what Amazon uses for their readers) to better serve the needs of the readers as noted above. These formats offer the publisher distinct opportunities to enhance technical and display elements of the book and its contents, and generally enrich reader experience across the widest variety of e-readers. Modern ebooks tend to be produced in HTML, ePub3, Mobi, and PDF formats (or combinations thereof by different publishers), and these are most commonly created at chapter level only; however, some publishers now create these files at whole book level for reader download.

In terms of accessing ebooks' content, institutional subscribers have a number of access options to read ebooks from long standing, industry standard methods like username & password and IP address authentication, to federated search login authentication like Shibboleth and ATHENS. Individual users still tend to access ebooks by individual purchase and order print-on-demand copies direct from a publisher or through a retailer site, or choose to download in their preferred e-format (where available by publisher) to their e-reader device. Digital formats (individually purchased) are usually bound by DRM on the ebook and would be unable to share across devices, however some publishers choose not to impose this restriction and operate a 'DRM Free' policy, allowing the purchaser to use the content as they wish post-purchase. Many of these books also carry digital watermarking, which restricts the amount of text available to copy to clipboard, but again, some choose not to impose this.

In terms of book types, some publishers offer individual purchase at both whole book and chapter specific levels, however at present the whole book print purchase option is still most common across many publishers and retailers.

V. Conclusions

In order for publishers to be successful and serve the needs of their readers, attention must be paid to the ever-evolving capabilities of electronic publishing. Ebooks in particular offer a way to showcase advances in epublishing and will continue to innovate with the changing technologies. It would be easy to imagine as formats become ever more sophisticated in what they offer, that publishers will choose to take advantage of these possibilities, and that the ebook will become as much interactive and sensory as it will be informative and educational. As these technologies develop, it's

foreseeable that user behavior may too change to take advantage of these new features and ways of learning, but it's as yet unclear whether reader demand for new ways of learning and flexible reading will influence publishers to produce the ebook as a primary format, or whether publishers following this path will actually change user behavior.

Good reference articles for ebook production:

- JEP - XML Production Workflows? Start with the Web... http://quod.lib.umich.edu/j/jep/3336451.0013.106?view=text;rgn=main

- O'Reilly ToC - The Agile Upside of XML http://toc.oreilly.com/2011/10/xml-publisher-workflow-ebook-design.html

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