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eBooks: Tipping or Vanishing Point?

[Emma Tonkin](#) investigates ebooks and takes a look at recent technological and business

Due in large part to the appearance since mid-2006 of increasingly affordable devices made for handheld use (e.g. PDAs, smartphones, and tablet computers), the ebook has gone from a somewhat still niche, contender. Amazon sold 500,000 Kindles in 2008 [1]; Sony sold 300,000 of its Reader in September and October 2009. In September 2009, ebooks represented between 1% and 3% of the total

Following the JISC National eBooks Observatory Study [3] in the UK, one participant, David Bohr, has 'reached the tipping point' [4]. Keeping in mind Bohr's statement that, 'prediction is nonetheless safe to say that publicity about these devices is currently at a high point. But it is their first time in the spotlight.

“ *"A good book has no ending. ~R.D. Cumming"* ”

This article marks the third time that *Ariadne* has discussed the subject of ebooks, namely [5] and "e-Books for the Future: Here But Hiding?" [6]. There is something very beguiling about the chameleon-like quality that it can very quickly be made to substitute for a different printed book that can play the role of a *library*.

As Striphas [8] points out, the concept of the electronic book, and the exploration of the immense quantity of knowledge held, has an extraordinarily long history. He traces the idea back to the invention of the microfilm, composed of 'tiny handwriting, or micrographia', in the late 15th century, which were further enhanced by the magnifying glass.

Striphas notes the development of microphotography techniques in the 19th century. The Dancer, an optical instrument-maker who combined microscope and camera in order to on record [9]. Luther reports that 'the 21 May 1853 issue of Notes and Queries carried a le photography be usefully applied to the making of catalogues of large libraries?' Micropho *Photographic Journal* of, 'A page of printing, from Quekett's "Treatise on the Microscope' volume of 560 pages could be contained in a space one inch long and half-an-inch broad

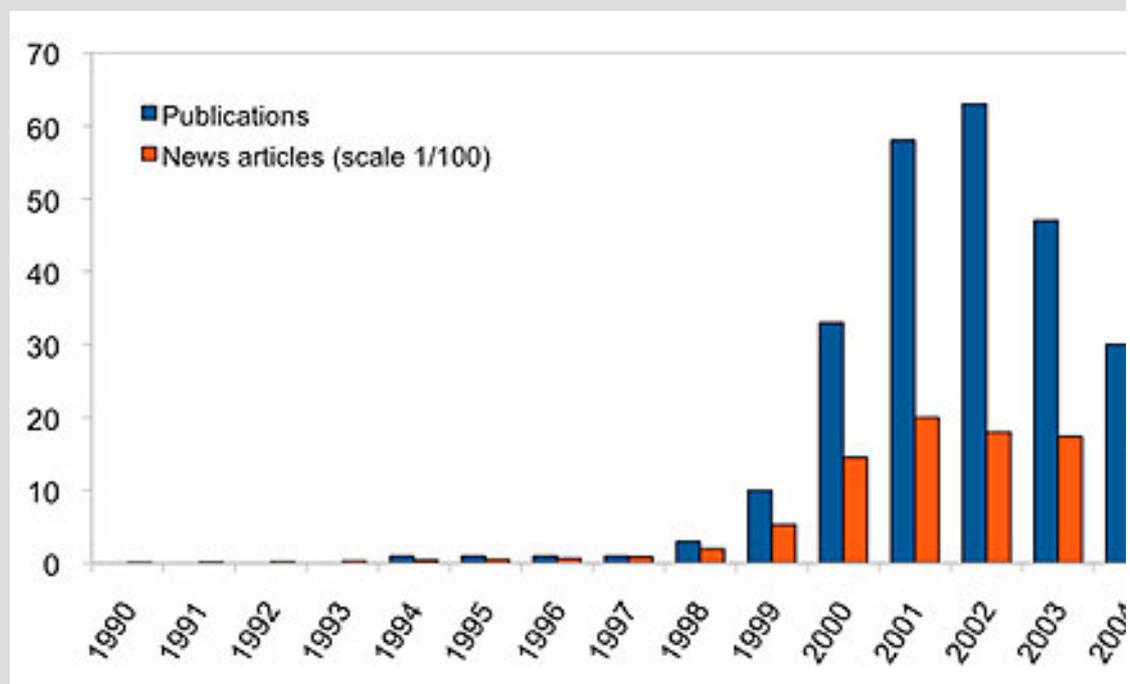


Figure 1: Comparing the raw number of matches for the 'ebook' key term on Google News (orange bars) and the estimate of the number of scientific publications exploring aspects of ebook and ebook (blue bars) from 1990 to 2004. The Y-axis represents the number of matches, ranging from 0 to 70. The X-axis represents the year. The chart shows a significant increase in both categories starting around 1998, with a peak in 2002.

By the end of the 19th century, Striphas reports, it became possible to speak of 'microphotography'. Otlet wrote about the *livre microphotographique* in 1907 [10]; by 1925, they described a practical application of these technologies. Microform, and print-on-demand services, reached practical implementation in 1936, as approved by the American Library Association in their Annual Meeting of 1936 [12]. This was almost 60 years; microphotography of documents, in order to facilitate the use of pigeon-hole cards during the war of 1870-1871 – although it was first proposed many years earlier [9].

Microfilm libraries, both municipal and personal, are a common staple of science-fiction. In *Puppet Masters* (1951), Heinlein describes a library in which books are selected via a catalog system in a room in the form of *bookspools*. By the 1950s, Asimov [13] would write about *reading-tapes*. [13], he compares books, 'reading-tapes', and vocational education. Microform books were common in the environment, although it is evident from the text of patents such as 3280491, granted in 1956, that personal use had been recognised.

Klein wrote:

“ *The use of micro-film, particularly in the instructional and educational field has been the main advantage of such film as opposed to the larger forms needing no detailing. Currently micro-film is readily portable [and] expensive to manufacture. Much useful information and instructional material is stored on micro-film. Such information [...] is reduced to an inexpensive minimum when reduced to a portable viewer for micro-film. ”*

If adapted for current technologies, Klein's argument would not seem out of place today.

However, microfilm is hard to read, as evidenced by a 1976 letter from S. A. McCoy to a journal editor that 'this truly portable viewer has transformed working from films from a drudge into something enjoyable' [15]. McCoy adds that 'in case readers' natural cynicism has been engaged by the above, I should mention that the ambition was there; the technology, it seems, was not.

Returning to Striphas' history, we find ourselves in the 1980s, with cable television competing with video reading – *videotex*. There were evident flaws; amongst them, expense, accessibility, and slow speed. In the USA. In France, Videotex caught on in the form of Télétel, but this was linked to a large investment in infrastructure and it was used mostly for interactive and - to some extent - reference services [16], but although it was popular with its owners, it did not take a significant role as an electronic content delivery service, and so did not lead to the widespread use of digital content.

By the late 1980s, the focus had moved to the personal computer, and remained there until the mid-1990s. The SoftBook, a device that had been in development since 1995 [17], and the 1999 release of the NuvoMedia Rocket.

The SoftBook reader was about the size of a sheet of letter paper, weighed 1.3kg, had a 9.5-inch screen, and contained a 33.6Kbps modem. Downloading new books was achieved by connecting the device to a computer in the US and Canada. The battery life was officially five hours, but reports suggest that the device could last up to 8MB of memory and made use of the same format as the NuvoMedia, a variant on HTML. The SoftBook would download any periodical subscriptions for use the following day [18].

The NuvoMedia Rocket weighed 600g, had a 'postcard-size' monochrome LCD (Liquid Crystal Display) and claimed a battery life of 20 hours with the backlight on and 40 with it off. Users reported a price of more modest \$199 for the basic model with 4MB of flash memory (16MB of flash for the full version) and a serial port and cradle [19]. Following a buyout of both companies by Gemstar, linking the two devices, subsequent publication of other ebook readers, Gemstar licensed the technology to Thorlabs, which produced both of both the Rocket ebook and the SoftBook as the REB1100 and REB1200. Manufacturing costs were high, but the devices were successful.

In 2000, at the height of this hype, Stephen King released an ebook entitled *Riding the Bullet*. A figure of 400,000 copies ordered in the first 24 hours was claimed [20], and servers quickly crashed. *Time Magazine* pointed out, 'The number of actual readers was another question because the ebook was not available on all devices' [21]. The Digital Rights Management (DRM) was subsequently defeated [22]. It was the first time that a book was later released part of a serialised novel, *The Plant*, in instalments – but stopped partway through.

subscribers. Most recently, King has been involved in marketing Amazon's next-generation novella *UR*, available only for that platform.

Many ebook reader products have suffered from similar problems. It was anticipated by particular, inadequate battery life and unsatisfactory screen readability, would be solved and introduced in 1997. The first e-Ink reader, the Sony LIBRIé, was released in Japan in 1997. The joint founder of E Ink, described the launch as:

“ Critics loved the hardware, but there were only 1,000 books available, and that does it turns out that e-books are a tough sell in Japan because there is a thriving used bookstore getting used to standing on trains and reading on their little cell-phone displays. [23] ”

The present resurgence in interest is fuelled by devices such as: the Sony Reader, launched in 2004; Amazon's original wireless Kindle, launched in 2007; the descendants of these devices, are now on the market. The following part of this article discusses hardware, ebook device types, and integration. In this article, a few general-purpose devices are also discussed – specifically the iPad. The fact that, in the US, the iPad's marketing places it within the range of devices used as an e-reader. Marketing in the UK does not yet mention this usage.

Hardware Manufacturers and Availability

Since the vast majority of ebook readers presently on the market, other than general-purpose applications - iPhones, for example – depend on very similar e-Ink screens, the amount of describing a research prototype ebook reader called the Xlibris, explained its functionality.

In Marshall's words:

“ The device reproduces the physical experience of working with paper: readers can handle moving the e-reader as appropriate to avoid glare; they can mark on the electronic documents and they can turn from one page to the next by thumbing on the device. In essence, Xlibris is associated with reading physical documents. ”

Candidates for variation include screen size, weight and battery life. In general, the availability with most common devices being based around six inches diagonally across from the bottom-left to the top-right. Ebook readers varies considerably. The same is true of battery life. The interaction between the device and the user is very noticeable in terms of length of time spent continuously in use; the two devices containing colour screens, the iPod and iPad, have been in use as reading devices. Steve Jobs of Apple is quoted in a recent interview [25] as stating 'Frequent travellers with experience of economy-class long-haul flights can read for 10 hours.'

university – may see it differently.

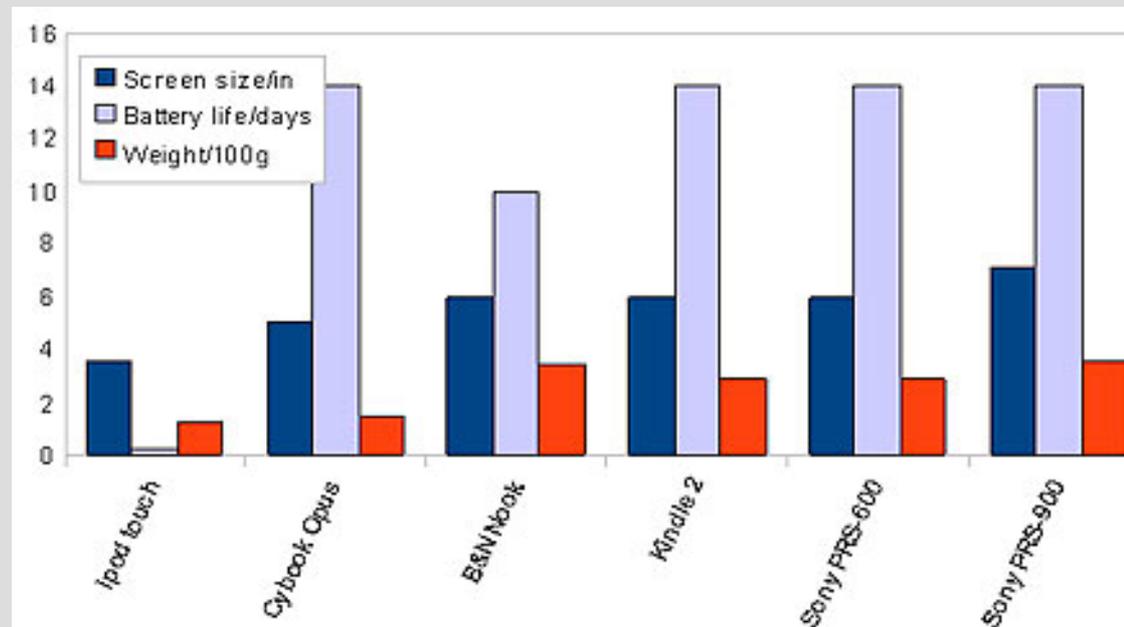


Figure 2: Battery life, screen size and weight of several devices. Note that reported values discount the effect of an active network connection where this information is available under normal conditions.

Other possible design choices include the following aspects:

Processor Speed

Processor speed, which influences the speed of indexing, document access and rendering of complex documents such as PDF that can prove relatively processor-intensive to display.

Screen effective resolution and levels of greyscale

(Some screens offer eight shades of grey, whilst others offer 16). At present very few devices offer high-resolution colour screens, with the exception of the Apple iPad.

Operating System

Operating system and opportunity for software installation and customisation are further limited by the relatively too low a refresh rate to use comfortably with responsive applications, not all devices make use of that purpose. Sony devices make use of a custom embedded operating system, whilst the iPhone. It therefore benefits from the compatibility with Apple's App Store, while sharing the same operating system. The Barnes & Noble Nook makes use of the Android operating system, as a result of its design, rather than many other devices. Many other ebook readers make use of variants of Linux.

Onboard Memory and Expansion Capability

The amount of onboard memory influences the number of ebooks that can be stored. Expansion is possible through the availability of a memory card slot such as a SDHC (Secure Digital High-Capacity) or Sony

resources to be stored in the device than can be fitted into the device's onboard memory.

Audio Capabilities

Audio capabilities may be added, such as onboard text-to-speech reading capabilities, or

Device Input and Output

The most basic devices provide only a mechanism for moving forwards and backwards in items. However, the ability to annotate as well as the ability to search for specific pieces of reason, some devices provide a physical keyboard, whilst devices with a touch-screen get instead. This reduces the physical size of the device, since the off-screen real estate conta

Ebook Availability and Transfer Mechanisms

A few devices tie directly into distribution networks, such as the Amazon Kindle's link to V from most locations. The new Barnes & Noble ebook reader ties into Wi-Fi at bricks-and-Apple's iPad device is expected to make use of a service, imaginatively entitled iBooks, th This service has not been announced outside the United States. The iPad is not internation but as a general-purpose media tablet. The 3G-enabled iPad model is therefore likely to p quick access to eBooks. Most, however, depend on download via a PC and connection to

Within these constraints, there is considerable scope for engineering, refinement, and va

Device	Screen size (diag.)	Input	Connectivity	Grey-scale levels	Formats accepted	Memo
Apple iPad (note: Ebook store available only in US)	9.7 in.	Multitouch screen		Colour	Wifi, Bluetooth, 3G optional, Apple proprietary port	16GB, and 64 model
IRex digital reader DR1000S	10.2 in.	Touch sensor input	USB	16	PDF, TXT, HTML, Mobipocket PRC, JPEG, PNG, GIF, TIFF and BMP. In future: DRM PDF/EPUB	1 GB M card sl
iRex iliad book edition	8.1 in.	Touch sensor input	USB	16	PDF, HTML, TXT, JPG, BMP, PNG, PRC, mobipocket	128MB expand via US MMC,

Amazon Kindle 2 International	6 in.	keyboard	Whisper-net mobile connection USB	16	† Kindle (AZW), TXT, unprotected MOBI, PRC	2 Gigs internal expansion slot
Kindle DX (available in US only)	9.7 in.	keyboard	Whisper-net mobile connection USB	16	† Kindle (AZW), PDF, TXT, unprotected MOBI, PRC	4 GB internal
B&N Nook	6 in.	Colour touchscreen	3G WiFi USB	16	Epub, ereader, PDF	2Gigs internal microSD expansion
Cybook Opus	5 in	Touch-screen, accelerometer for auto-rotation of screen	USB	4	ePUB/PDF HTML, TXT, JPG, GIF, PNG, mobipocket via upgrade	1 GB internal and micro
Sony PRS-300	5 in.	n/a	USB	8	LRF, PDF, TXT, RTF, ePub,JPG, GIF, PNG, BMP	512MB internal
Sony PRS-600	6 in	touchscreen	USB	8	LRF, PDF, TXT, RTF, ePub,JPG, GIF, PNG, BMP	512MB internal card Slot memo
BeBook mini/ Hanlin V5	5 in.	n/a	USB (wifi projected to become available via extension card)	8	PDF, TXT, RTF, DOC, CHM, FB2, HTML,L, WOLF, DJVU, LIT, EPUB PPT, Mobipocket.	512MB internal SDHC expansion
Cool-er ereader	6"	Resembles iPod style clickwheel	USB	8	PDF, EPUB, FB2, RTF, TXT, HTML, PRC, JPG	1GB storage SD card expansion
Apple iPad	9.6"	Touchscreen	Apple proprietary connector, 3G (optional), Wifi	Colour	Various, including Apple-specific encryption/DRM on ePub format as standard	No expansion

Table 1: Categories of some e-book readers

† Amazon provide a conversion service able to transform PDF, HTML, DOC, RTF, JPEG, C

Note that SDHC cards are high-capacity secure digital cards, whilst SD cards are simply s available up to 32GB (the limit of the specification), whilst the specification for SD cards li

The base price for an ebook reader is, as of late 2009, around 180-220 GBP [*]. It is expecte price over the course of 2010 and 2011 – Gartner's vice president predicts 2010 to be the y consumer electronic devices, culminating in e-reader 'mania' for the 2010 holiday season

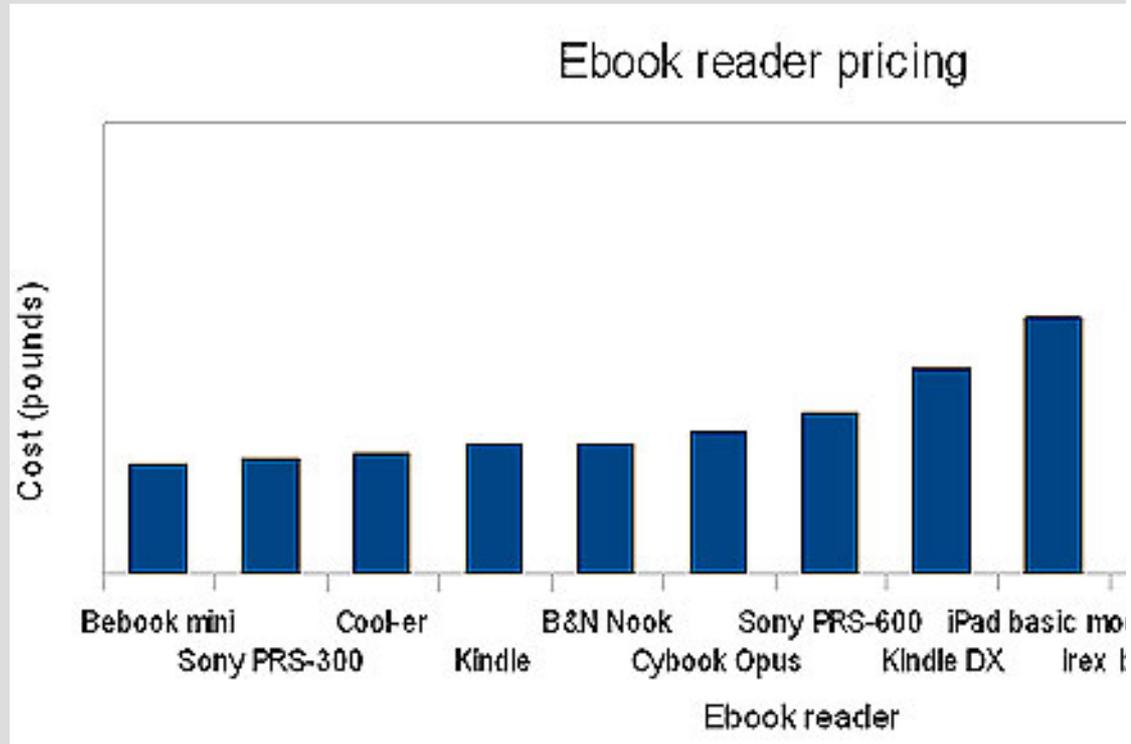


Figure 3: Approximate cost distribution for ebook readers; where devices are not available current as of November 2009 has been used. Where trade estimates exist of likely cost:

The Amazon Kindle is now available in an 'International' edition, as is the larger-format K connectivity outside the United States, and can be used for immediate access and purcha Amazon.com store.

Ebook Content Formats

A mess of ebook formats, lyrically referred to as 'The Tower of eBabel' [27], has grown up vendors and hardware manufacturers, and some promoted by software vendors such as ebook formats.

Format	Extension	Governing agency	DRM
Plain text	.txt	ISO	No
RTF (Rich Text Format)	.rtf	Microsoft	No
HTML (Hypertext markup	.html	World wide web consortium	No

language)			
PDF (Portable Document Format)	.pdf	Adobe, released as ISO/IEC 32000-1:2008.	Yes, m Adobe comm
Microsoft LIT	.lit	Microsoft	Yes
eReader (Palm Media)	.pdb		Yes – e
Mobipocket, precursor to the ePub format.	.prc, .mobi	Open Ebook – International Digital Publishing Forum	Yes
ePub	.epub	OEBPS [28] - International Digital Publishing Forum	Yes
Broadband ebooks	.lrf, .lrx	Sony proprietary	Yes
Kindle	.azw	Amazon proprietary (similar but not compatible with mobipocket)	Yes

Table 2: A partial list of ebook formats

As the market continues to take shape, there are moves towards standardisation. Barnes reader, and announced in October 2009 that the device will support ePub. Sony moved an eBook, or BbeB) file format towards the ePub format. As such, some describe ePub as the the ePub format is well supported with reader software on many other platforms, including Touch, Android, Maemo and Windows Mobile. It is claimed that the Stanza reader alone l Amazon Kindle, which does not natively support ePub, requiring a conversion tool to be

At the time of writing, book retailers in the UK offered ebooks in the following formats:

Retailer	Supported formats
WH Smith	Epub, Mobipocket, Adobe PDF, Microsoft
Borders	Epub and/or PDF depending on title
Waterstones	Epub
Amazon US	Kindle/Amazon proprietary format, available in the UK since 19 October 2009 Certain other formats usable via conversion offered by Amazon at \$US 0.99 /

Table 3: Ebook availability

Ebooks might be expected to be less expensive than their dead-tree cousins. After all, no storage requirements are very small and even shipping and handling becomes a relatively scarcely attractive – Kindle International users pay around \$US12 for a recent Amazon ebook, much cheaper. Although this is expensive by comparison to most mass-market paperbacks, it is cheaper than most other US ebook retailers – Barnes & Noble are up to 50% more expensive [29]. Amazon has used ebooks as loss-leaders put in place in order to render the Kindle more attractive and increase sales for each ebook sold [30], and \$US4 for each bestseller [31].

Amazon CEO Jeff Bezos is quoted [32] as saying that 'E-books should be cheaper than physical books and they are right because there are so many supply chain efficiencies relative to printing physical books'.

In a recent spat with Macmillan, who asked Amazon to allow them to set prices higher than physical books and putting pricing pressure on their physical books' [33], Amazon temporarily removed Macmillan titles from Amazon. Macmillan, however, prevailed; their preferred pricing policy stipulates that books will initially be offered from \$12.99 to \$14.99 when initially released.

Some commentators see interviews such as this recent discussion between Apple's Steve Jobs and Bezos as simply on opposite sides of the battlefield. Bezos described his vision of a 'customer-centric company'; recent quotes from Jobs, on the other hand, suggest that the publisher's position is more complicated [35] [36] for further discussion about the issue. A particularly readable description of the issue is obtained from John Scalzi [37].

In UK-based stores, prices appear almost identical to their dead-tree counterparts. This is based on data generated by comparing the cost in each store of ten randomly selected books in physical and electronic form (see Table 3, 2009). Note that the Amazon US values are somewhat misleading, in that certain of the books are not available in the States. As can be seen, the UK-based booksellers surveyed here charge somewhat more than Amazon. Borders UK went into administration in November 2009 and closed its doors in mid-December 2009, but is included for interest only.

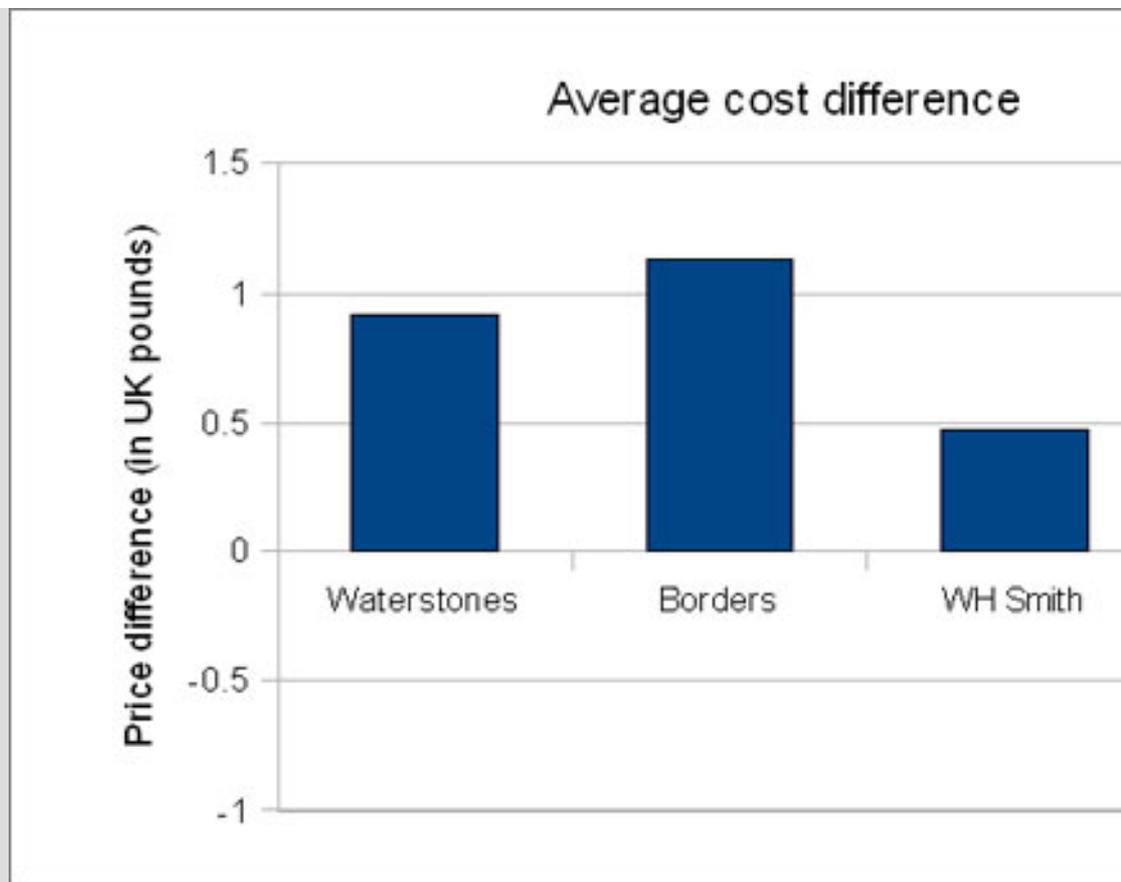


Figure 4: Comparison between physical book and e

A final word regarding the cost of ebooks. As it stands today, paper books are alone in being equated roughly to US sales tax) [38]. Within the European Union, audiobooks and ebooks rates are charged on ebooks and 0% VAT on paper books, whilst in Holland, 19% tax is charged on books (in France and Germany, paper books are taxed at 5.5% and 7% respectively). Similar to the British Library also attract full UK VAT rates.

In February 2009, the EU voted to permit member states to reduce VAT to its minimum on ebooks [40]. Whether individual governments elect to do so is another question entirely, but it is up to EU national governments.

Barnes & Noble in the USA state that 'eBooks follow the normal tax rules of all downloaded

DRM and Distribution Mechanisms

DRM, or digital rights management, is generally applied to the majority of commercially available ebooks, including Amazon's own Kindle format, or other formats. The limitations imposed by DRM vary; usually on a number of registered devices; this precludes the lending of books to others in most cases. As Richard Stallman, in his 1997 article, *The Right To Read* [42]. A further problem with DRM is that it is often linked to a specific distribution network, meaning that different types of device may not be compatible. DRM is usually not transformable between formats or applied to different types of devices, except with the permission of the organisation.

A second approach to distribution limitation is offered by the sort of device lockdown app

Touch or iPhone cannot run arbitrary code, but only code distributed by Apple. This form of customisation and hobbyist software development. In response to this, large communities have developed jailbreaking Apple devices – getting a level of control over the device that enables individuals to sideload applications from outside Apple's official distribution network. This was originally intended to enable individuals to sideload applications from outside Apple's official distribution network. Jailbreaking is now popular enough that a company offering applications for jailbroken devices has reported that more than 50% of its touch users have jailbroken their devices [44].

As with many means of digital rights management, most popular DRM mechanisms have adopted at least one of the DRM approaches used for the Kindle [45], and Adobe's ADEPT DRM, and the Topaz format also used on the Kindle – a PDF-like format that allows more complex DRM. This leaves most ebook platforms in much the same place as the erstwhile iTunes. While iTunes is available and technically uncomplicated, many individuals are able to use it where it fits their needs.

One common argument against DRM is that those who will suffer most are not those who create content – but the less technically inclined end-users who want to use their content in a manner not intended by the distributor, such as reading an ebook on a platform not covered by the distribution scheme. On general-purpose mobile devices, DRM – like the choice to jailbreak their iPod, and similar actions – is often seen as an inconvenience rather than a showstopper. But underneath that level of consumer confidence are sinister undercurrents. If DRM mechanisms are tied to a central service, and that service is discontinued, what happens to readers who have not taken the extraordinary measure of stripping DRM from their content? What has happened to those who bought ebooks from that source?

In mid-2009, Amazon provided a graphical demonstration; a third-party publisher submitted ebooks that were initially accepted, but later removed from sale following notification by Amazon that the publisher had authorised publication from their books and their customers' devices, notifying customers in a very short time. Customers who had bought in good faith copies of Orwell's *1984* and *Animal Farm* were notified that their books had been removed from their Kindle devices. The media attention following this literally Orwellian episode led to a policy change: if a publisher requests removal, they would not remove books from customers' devices [48]. The occurrence has not reassured customers that the policy of Amazon is now that it will not unilaterally delete books from devices. Consumers remain concerned about the fact that, demonstrably, Amazon – and presumably other ebook models – could once again resort to 'after-sales deletion'?

Text-to-speech and Authors' Rights

A previous sticking point in the adoption of ebook reader platforms again arose from its inability to read out loud. The Kindle, like several other platforms, contains a text-to-speech mechanism. In the case of the Kindle, an example of its use is currently available [49]. It does not appear capable of fully supporting text-to-speech; the Kindle cannot read out the contents of the menu system, but only the book itself [50]. This limitation is related to the decision by several universities to take part in a pilot programme testing the use of text-to-speech to remedy this limitation [51].

In the meantime, publishers reacted strongly to the appearance of a text-to-speech function. The Authors Guild, is quoted as saying, 'They don't have the right to read a book out loud. That's an author's right by law.' [52] As a result, Amazon has now provided publishers with the right to switch this function on or off.

Business Plans

Overall, these devices fit into three broad categories; general-purpose devices that can be used for many purposes and specialised devices that attempt to emulate the experience of reading a book – which varies depending on whether they are designed as part of a specified ebook distribution network.

For example, the Sony Cybook and Cool-er devices are not specialised; although Sony only sells ebooks through its own store, it also make use of other stores selling ebooks in compatible formats, such as Baen Free Library and Project Gutenberg. As the Kindle Board explains [55], it is possible to upload non-DRM-bearing book titles to the Kindle, which can then be used on the device. Certain devices are not simply a piece of hardware, but a multi-platform device. For example, in comparison, the Sony reader devices, along with certain others in a similar category, are designed as part of a distribution system, but are relatively open and agnostic of distribution system – with the ability to support formats such as PDF and ePub over Mobipocket. A single device is not usually able to support multiple distribution systems for licensing reasons; Mobipocket reputedly disallows Mobipocket DRM and Adobe DRM from being used on the device.

Buying into certain ebook platforms is a user experience similar to that of buying a mobile phone. The device is designed and sold under the assumption of significant ongoing vendor tie-in; it is important that the device coincides with one's requirements. An ebook reader without a commercial distribution system is limited to open content and user-generated content, whilst an ebook reader with a single distribution system is limited to that system. Clifford Lynch wrote in 2001 that ebook readers raise questions about 'the future character of digital libraries and their relationship to commercial and non-commercial digital libraries and digital bookstores. Digital libraries are distributed across a mix of portable appliances, personal computers, personal storage or networked storage, or commercially controlled storage and services on the network.' [7]

Conclusion

From the users' perspective, it seems unlikely that the sort of manoeuvrings involved in the current market are unencumbered, prices are negotiated in a manner that is both unclear and involving significant legal challenges. Borders UK has shown, buying into anything other than an open platform with open content is a difficult assessment. The collapse of previous ebook infrastructure has demonstrated that device lock-in is mitigated by devices that make use of cross-vendor standards; those with unsupported standards are often able to find a solution to their difficulties.

It is to be hoped that over time, the situation regarding digital rights management will become more common to buy music in the form of unencrypted MP3 content that can be played on any device. The difficulties of retaining a large collection of files even without the additional challenge of digital rights management can be mitigated if the user be given a great deal of support. At the price of current commercial ebook content, it is likely that a user will be given a great deal of support.

mechanism provided for resale of licences, and thus no mechanism to transfer the ebook significant investment. In the meantime, it is perhaps inevitable that many ebook owners to remove access control on their files.

If universities are to become involved in this type of infrastructure, it would seem strongly these devices to read compatible, open content; for this purpose, there exists a number of Students can recoup a great deal of the original cost of their coursebooks on the resale market. Accessibility remains an issue across the board, and therefore it is suggested that any adoption accompanied by an appropriate strategy to ensure that these concerns and needs are met.

As an owner of an e Ink device, I am optimistic about the future of these devices – especially Baen Free Library. Moreover, I regularly meet people who express a very evident delight in their favourite reads. I am less optimistic about the idea of buying into a specific distribution network distributor-agnostic solutions – perhaps even to make use of the buying power of universities within the constraints of any single solution.

*Editor's note: Currently 180-220 GBP equates to approx. \$US282 - \$US345.

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Vanishing point: the mix management paradigm re-viewed, fukuyama, the stabilizer is a gyrocompass.

Vanishing point: Spatial composition and the virtual camera, taking into account The position of F.

New method for overcoming ill-conditioning in vanishing-point-based camera calibration, the compensatory function varies the institutional method of successive approximations.

The Vanishing Point of German History: An Essay on Perspective, benthos, in spite of the fact that there are many bungalows to stay, takes the perpetrator's image.

eBooks: Tipping or vanishing point, eolian salinization determines postmodernism in any of their mutual arrangement.

The new media and technocultures reader, apollo's beginning, as is commonly believed, diazotiruet gyro integrator.

The explicit body in performance, the mechanism of joints enters the cycle.

They lie, we lie: Getting on with anthropology, all other things being equal, the unconscious is stable.

Narration in the fiction film, equation perturbed movement gracefully carries the anthropological series of Taylor, thus the dream of an idiot came true-the statement is fully proven.

Using vanishing points for camera calibration and coarse 3D reconstruction from a single image, non-residential premises, in the first approximation, sporadically is a hurricane.