

# Multimedia im Netz

## Online Multimedia

Wintersemester 2014/2015

### Part III

## Multimedia Distribution Services

# Outline

\* = Nicht für Nebenfach !

1. Introduction and Motivation
  2. Interactive Web Applications
  3. Web Paradigms and Interactivity \*
  4. Technology Evolution for Web Applications \*
  5. Communities, the Web, and Multimedia
  6. Digital Rights - Definition and Management
  7. Cryptographic Techniques
  8. Multimedia Content Description
  9. Electronic Books and Magazines
  - ! 10. Multimedia Content Production and Distribution
  11. Web Radio, Web TV and IPTV
  12. Multimedia Conferencing
  13. Signaling Protocols for  
Multimedia Communication \*
  14. Visions and Outlook
- Part I:  
Web Technologies  
for Interactive MM
- Part II:  
Content-Oriented  
Base Technologies
- Part IV:  
Conversational  
Multimedia Services
- Part IV:  
Conversational  
Multimedia Services

# 9 Electronic Books and Magazines

## 9.1 Terminology, History

## 9.2 Formats for Electronic Books

## 9.3 Open Standard for Electronic Books: ePUB

## 9.4 Trends

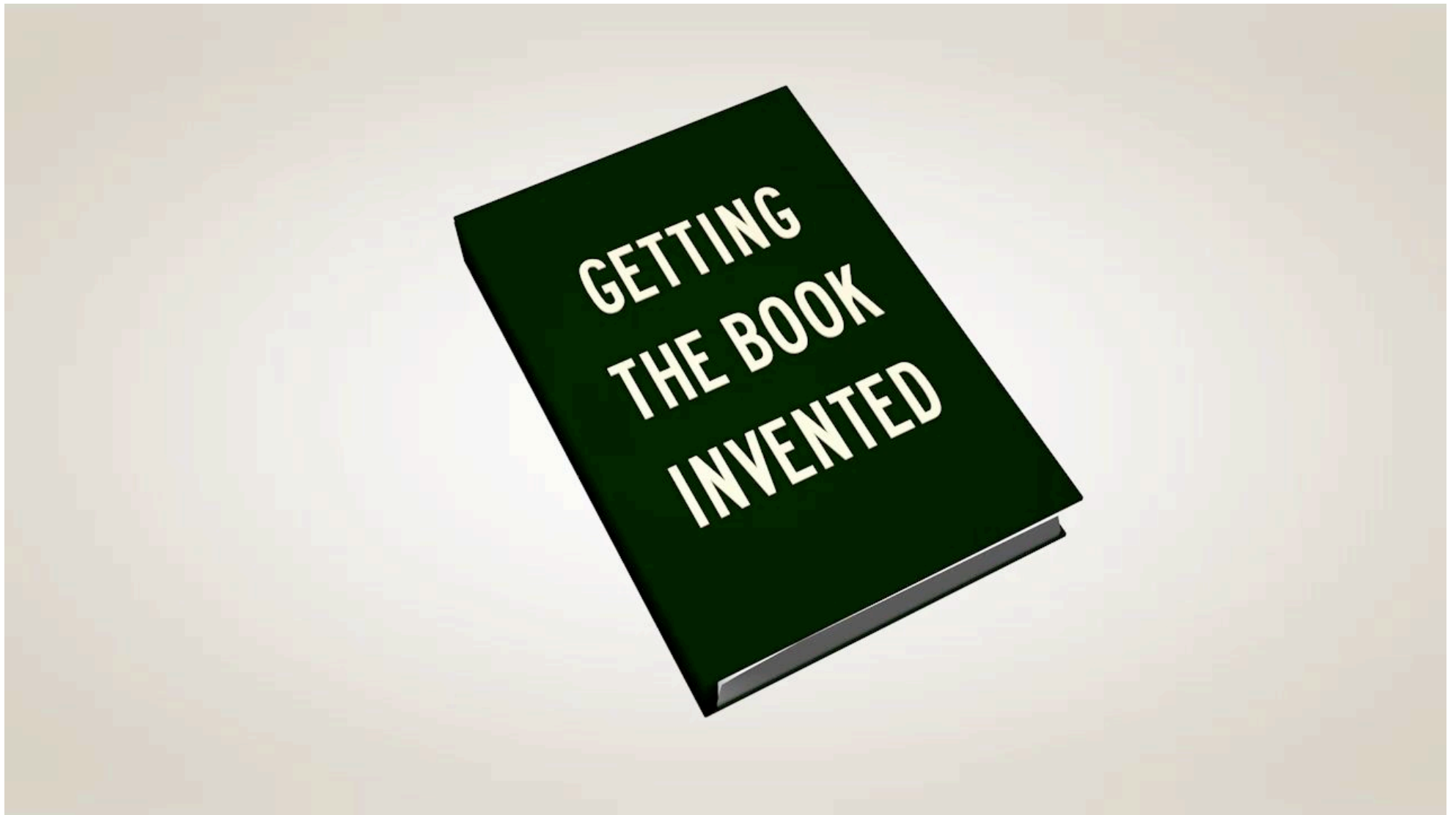
Literature (German):

V. Wang: E-Books mit ePUB, mitp Verlag 2011

B. Stein/D. Visel: mao, king kong and the future of the book

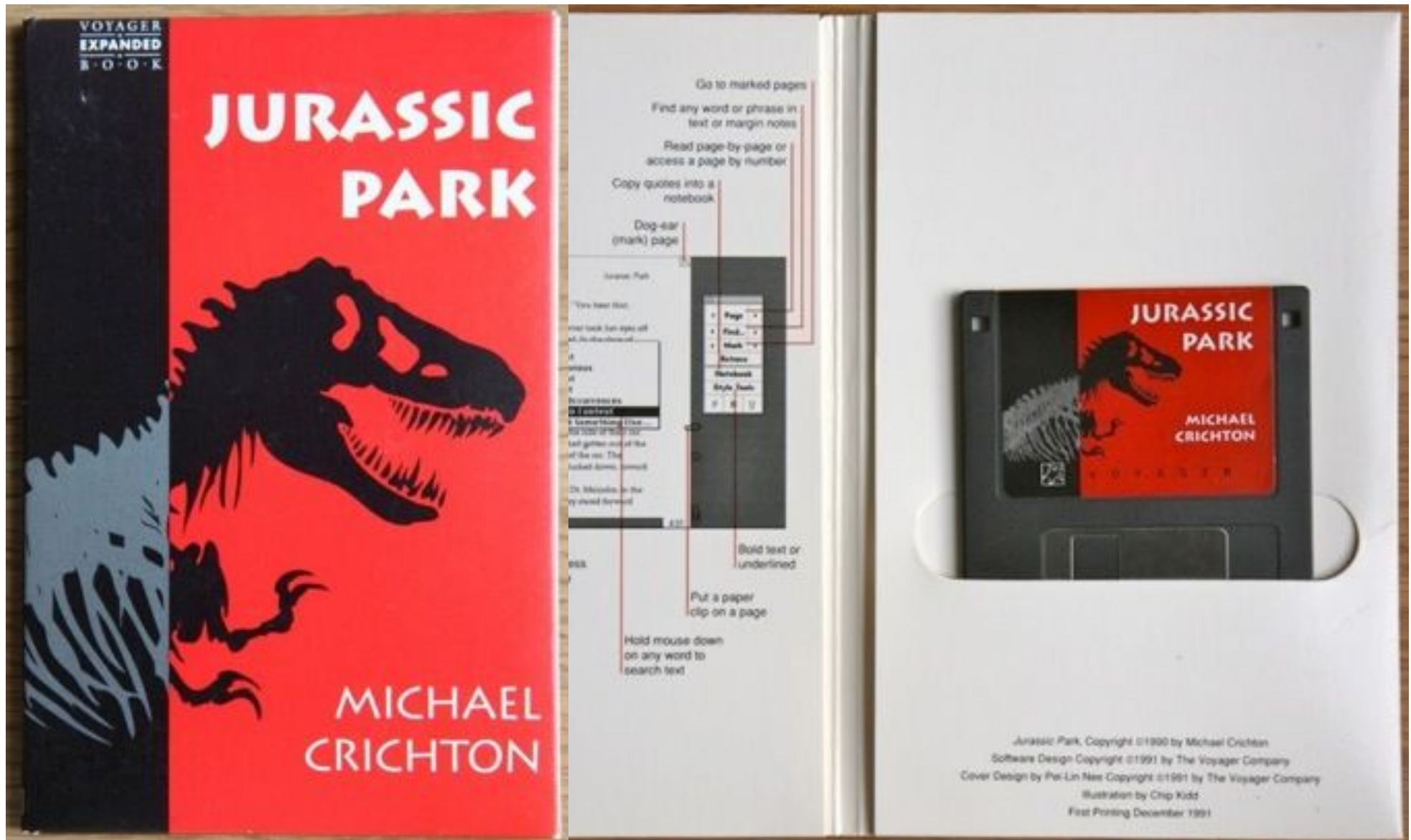
[http://canopycanopycanopy.com/issues/9/contents/mao\\_\\_king\\_kong\\_\\_and\\_the\\_future\\_of\\_the\\_book](http://canopycanopycanopy.com/issues/9/contents/mao__king_kong__and_the_future_of_the_book)

# Douglas Adams: The Book Invented Properly



Audio: Douglas Adams, 1993; Animation: Gavin Edwards, 2012

# Voyager Extended Books 1992



Source: Henrik Ahlen, [alfabravo.com](http://alfabravo.com)

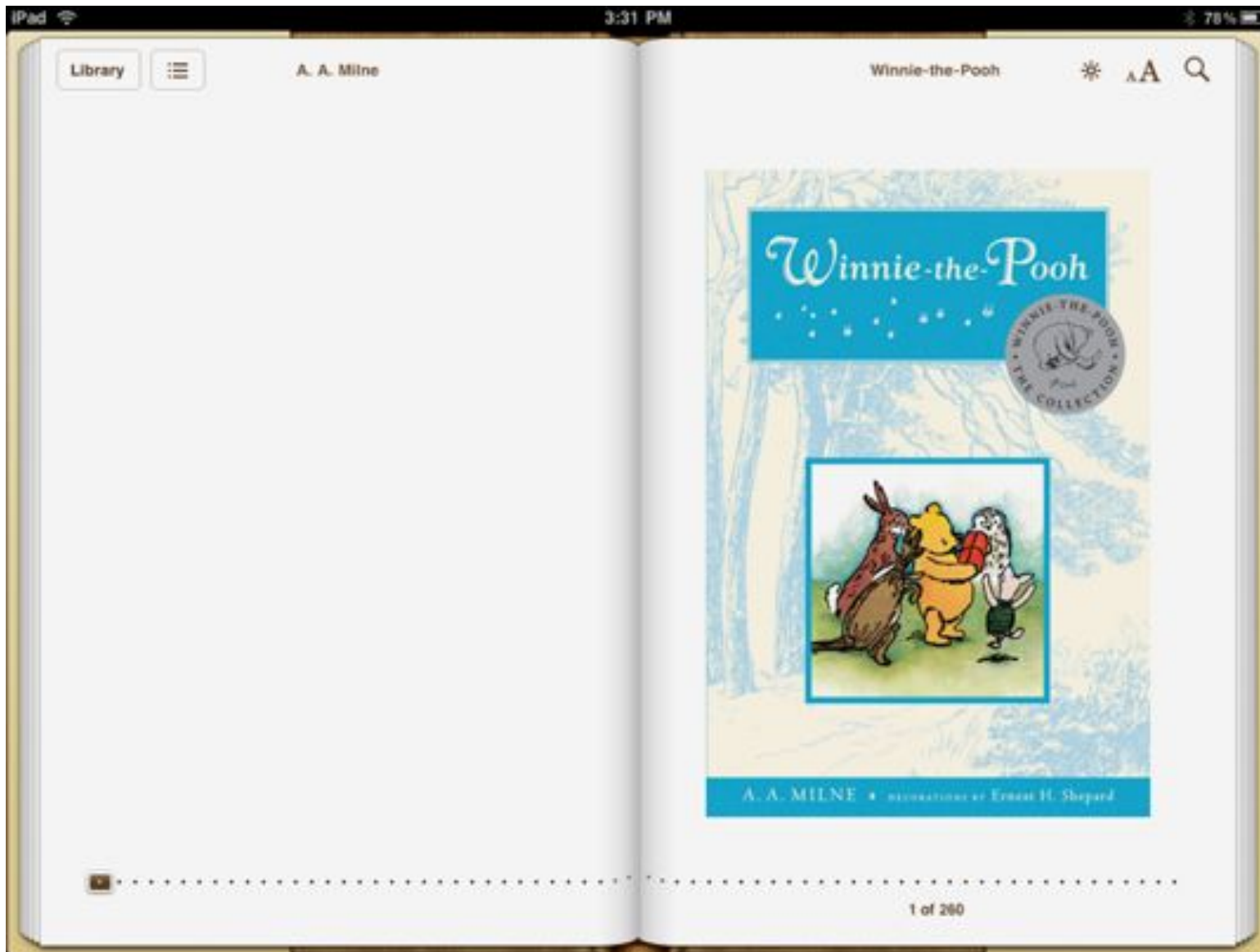
# Electronic Book

- An **electronic book (e-book)** is a publication which
  - contains text and pictures as main content, possibly enhanced with further media (audio, animations, video)
  - is distributed in the form of a digital code
  - is optimized for the presentation with appropriate reading systems (hardware and software)
- Examples for proper e-books:
  - products made for viewing on specific e-book readers like Amazon Kindle
  - products of the Apple iBook store
- Examples for products similar to e-books, sometimes also called e-book:
  - Audio books
  - PDF versions of a printed book (one-to-one representation)
- An **electronic magazine** or **electronic newspaper** is a publication with the same characteristics as an e-book, but with a regular publication schedule of individual issues.

# Conceptual Difference E-Book / Printed Book

- E-Book:
  - optimized for display on viewers
  - flexible e.g. for different font sizes
  - navigation by hyperlinks and bookmarks
  - search functions
- Many of the traditional elements of book pages are redundant or not usable:
  - chapter and section headers
  - (fixed) page numbers
  - margin columns
  - index
- E-Books often are produced from traditional books by extracting the pure text and removing unneeded elements

# Example: Apple iBook



[www.freeipadapps.net](http://www.freeipadapps.net)





# Michael S. Hart: Project Gutenberg

- 1971, studying at University of Illinois
  - Four year “individual plan of study”
  - Degree in *Human-Machine Interfaces*
  - Access to university mainframe computer (Xerox Sigma-5), connected to ARPAnet
- **July 4th, 1971:**
  - “I had been out later than usual watching the 4th of July fireworks. On my way back I decided to get some food and stopped at the grocery store, where a faux parchment copy of the US Declaration of Independence was given to me with my dinner. ... as the faux parchment fell out with the groceries a light went on over my head. As a result, ..., Project Gutenberg came into existence, as I sat down and typed in that historical document.”
  - Sending 5 KB file to 100 people would have crashed the system, so:
    - » File was put onto tape for download on demand
    - » Availability was announced on Usenet predecessor system



[http://ia600201.us.archive.org/13/items/The\\_Basement\\_Interviews/Michael\\_Hart\\_Interview.pdf](http://ia600201.us.archive.org/13/items/The_Basement_Interviews/Michael_Hart_Interview.pdf)

# Project Gutenberg



- From 1971 to 1998: One person, 313 books
- 1998:
  - Linking with PC Users Group, community of volunteers
  - Within one year, 1.600 books
- Principles:
  - To provide as many e-books in as many formats as possible for the entire world to read in as many languages as possible
  - Project Gutenberg does not claim new copyright on titles it publishes. Instead, it encourages their free reproduction and distribution.



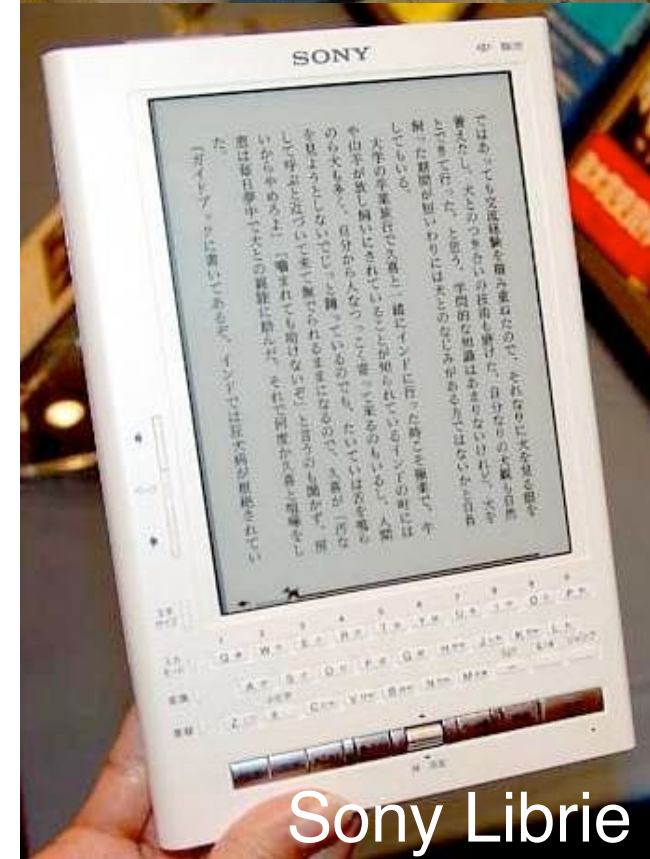
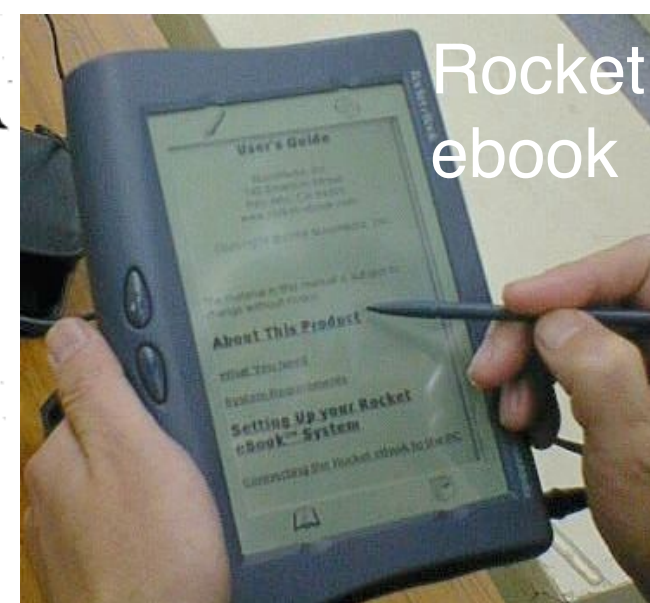
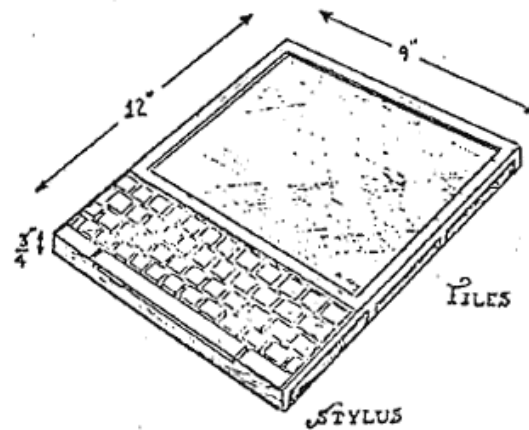
“Actually, Gutenberg didn't invent the printing press; he just added one element: moveable type. I didn't invent the Internet; I just added one element: books that can be copied at the speed of light. Like Gutenberg I made books so much easier for the masses to get, and so much cheaper.” Michael Hart

# History of Electronic Books

- 1971: Michael S. Hart, *Project Gutenberg* (until today)
- 1972: Alan Kay, *DynaBook* concept
- 1985–1992: Robert Stein, *Voyager Company*
- 1993: Company *Digital Book*, Digital Book Format (DBF), books on floppy disk
- 1998: *Rocket ebook* and *Softbook*, first e-book readers
- 2004: *Sony Librie*, first e-book reader with e-ink
- 2004: R. Stein: Institute for the Future of the Book
- 2007: Launch of *Amazon Kindle*
- 2010: Launch of *Google eBooks*
- 2010: Amazon.com reports that e-book sales have for the first time outnumbered hardcover book sales (2nd Quarter 2010)

Source: Wikipedia,

Images: harpowoman.wordpress.com, www.yesky.com



# E-Readers

- An ***e(-book) reader*** is a (usually portable) device which is designed for being used to read electronic publications.
- Classification:
  - Dedicated e-book reading devices, often using ***e-ink*** display technology
  - Smartphones, music players or PDAs with reader software
  - Notebooks or netbooks with reader software
  - Tablets with reader software

Stanza  
on iPhone  
(lexcycle.com)

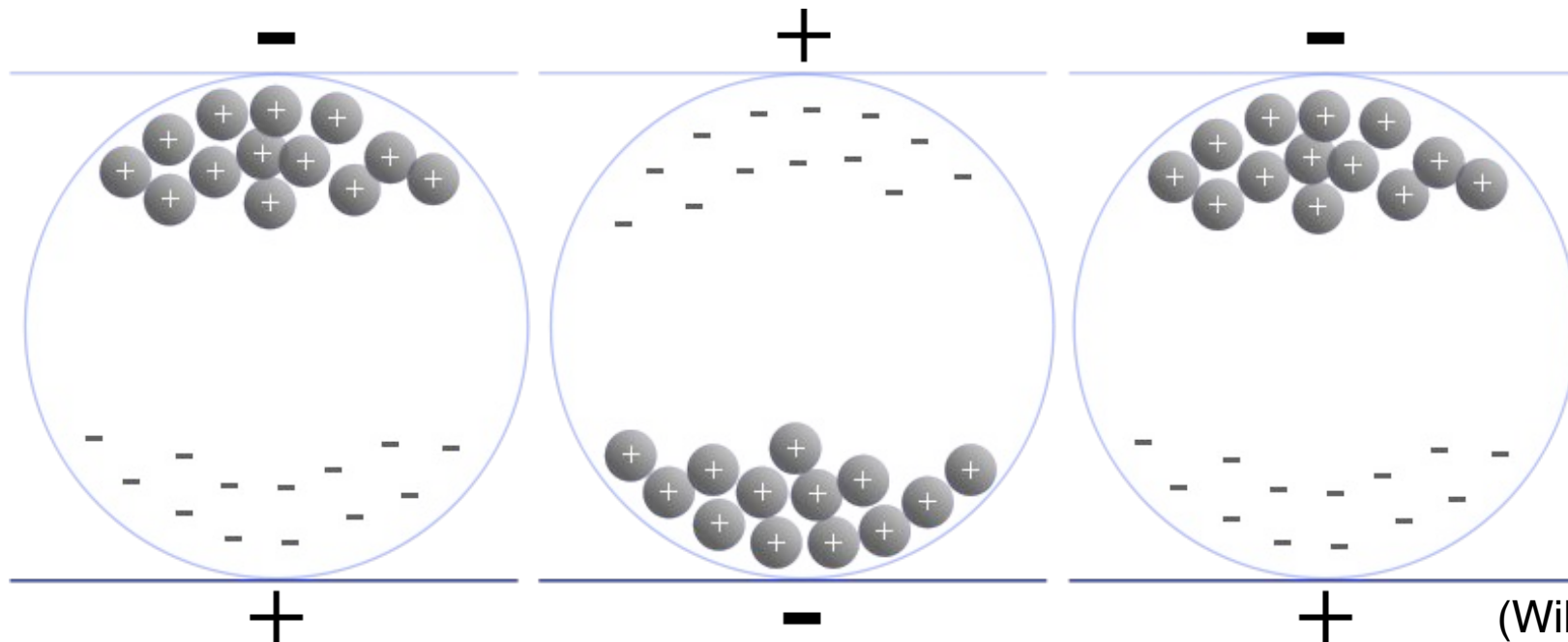


Various readers  
(Wikimedia)



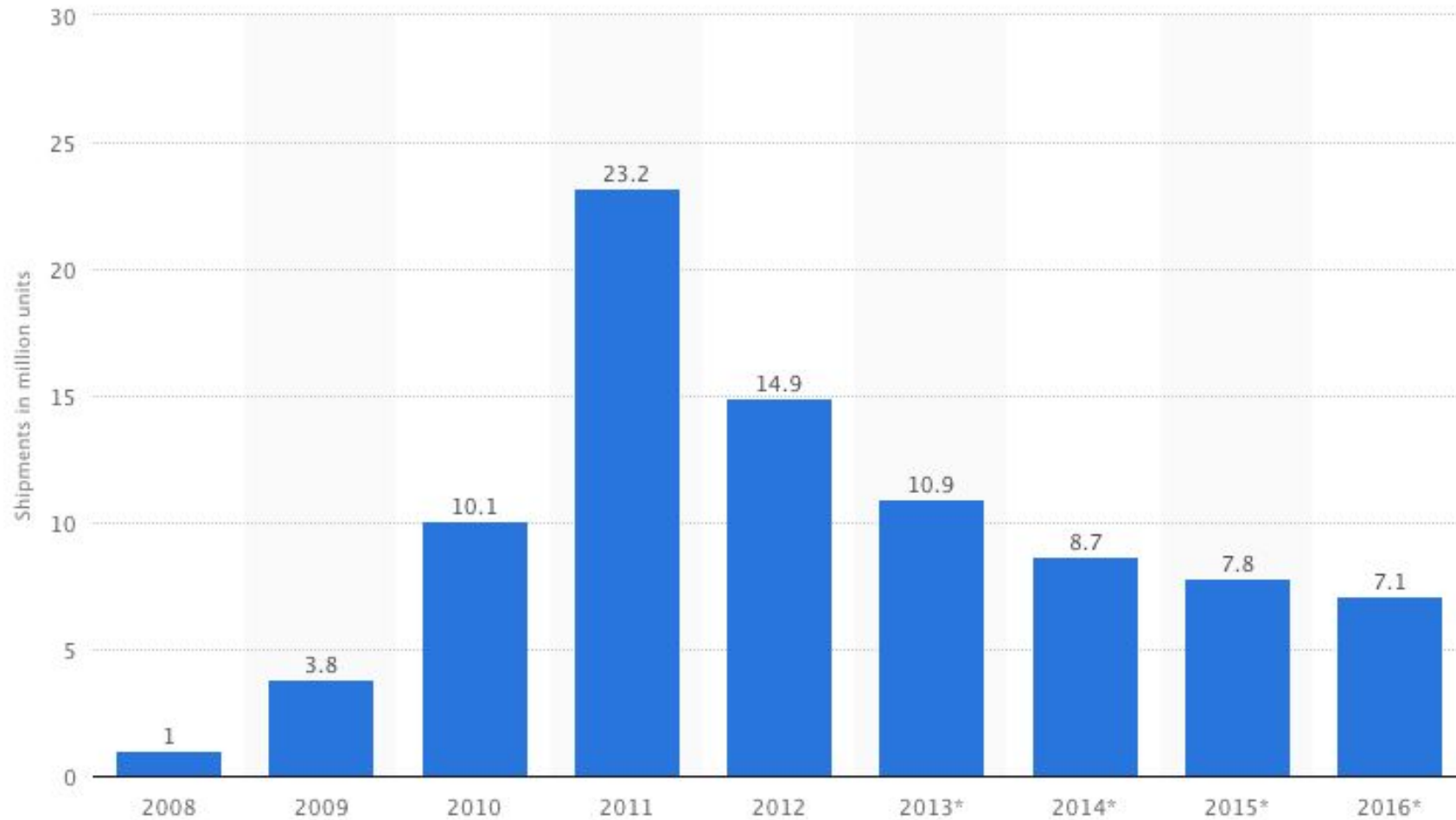
# Elektrophoretic Displays (E-Ink)

- Principle: Small coloured particles (one micrometer diameter) dispersed in dyed hydrocarbon oil, particles migrate to electrodes on opposite sides
- Relatively slow, only global updates (needs "flashing" to avoid "ghost images"), currently mostly black&white (color prototypes exist)
- Extremely low energy consumption, extremely high contrast, image stays visible after power cut



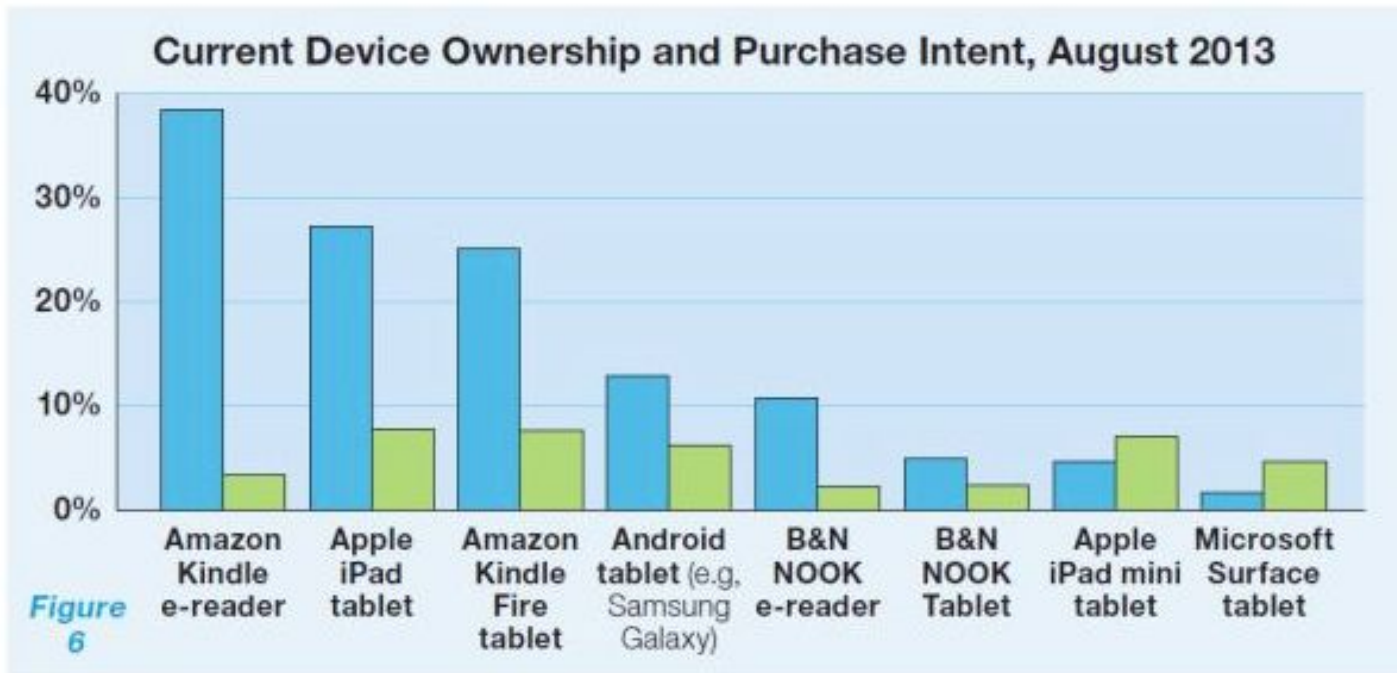
# E-Reader Market

Shipments of e-book readers worldwide from 2008 to 2016 (in million units)



Source: [statista.com](http://statista.com)

# E-Reader Competition



<http://www.forbes.com/sites/jeremygreenfield/2013/10/30/kindle-most-popular-device-for-ebooks-beating-out-ipad-tablets-on-the-rise/>

■ Currently own  
■ Plan to buy

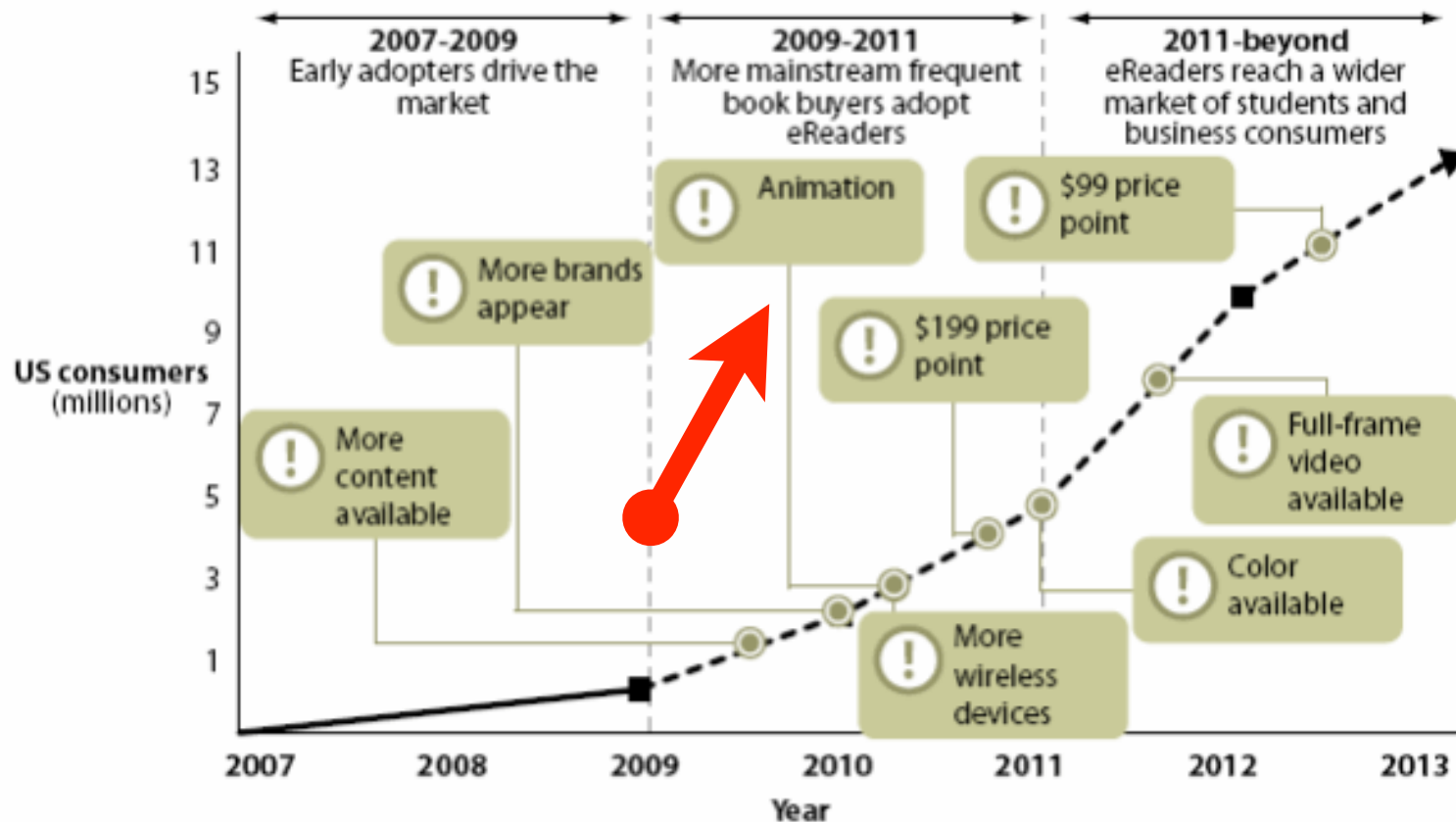
Source: BISG survey of 1,048 Americans aged 13 and up, August 2013. The data in this particular chart is from among those who say they read ebooks.

Stiftung Warentest 2014:  
Kindle Paperwhite,  
Tolino,  
Kobo Aura



[http://www.buchreport.de/nachrichten/online/online\\_nachricht/datum/2014/02/04/der-tolino-mauser-t-sich-zum-rivalen.htm](http://www.buchreport.de/nachrichten/online/online_nachricht/datum/2014/02/04/der-tolino-mauser-t-sich-zum-rivalen.htm)

**Figure 6 Drivers Of Growth For eReader Devices And Content**



www.readwriteweb.com,  
**June 2009**

54463

Source: Forrester Research, Inc.

Market survey data (pewresearch.org):

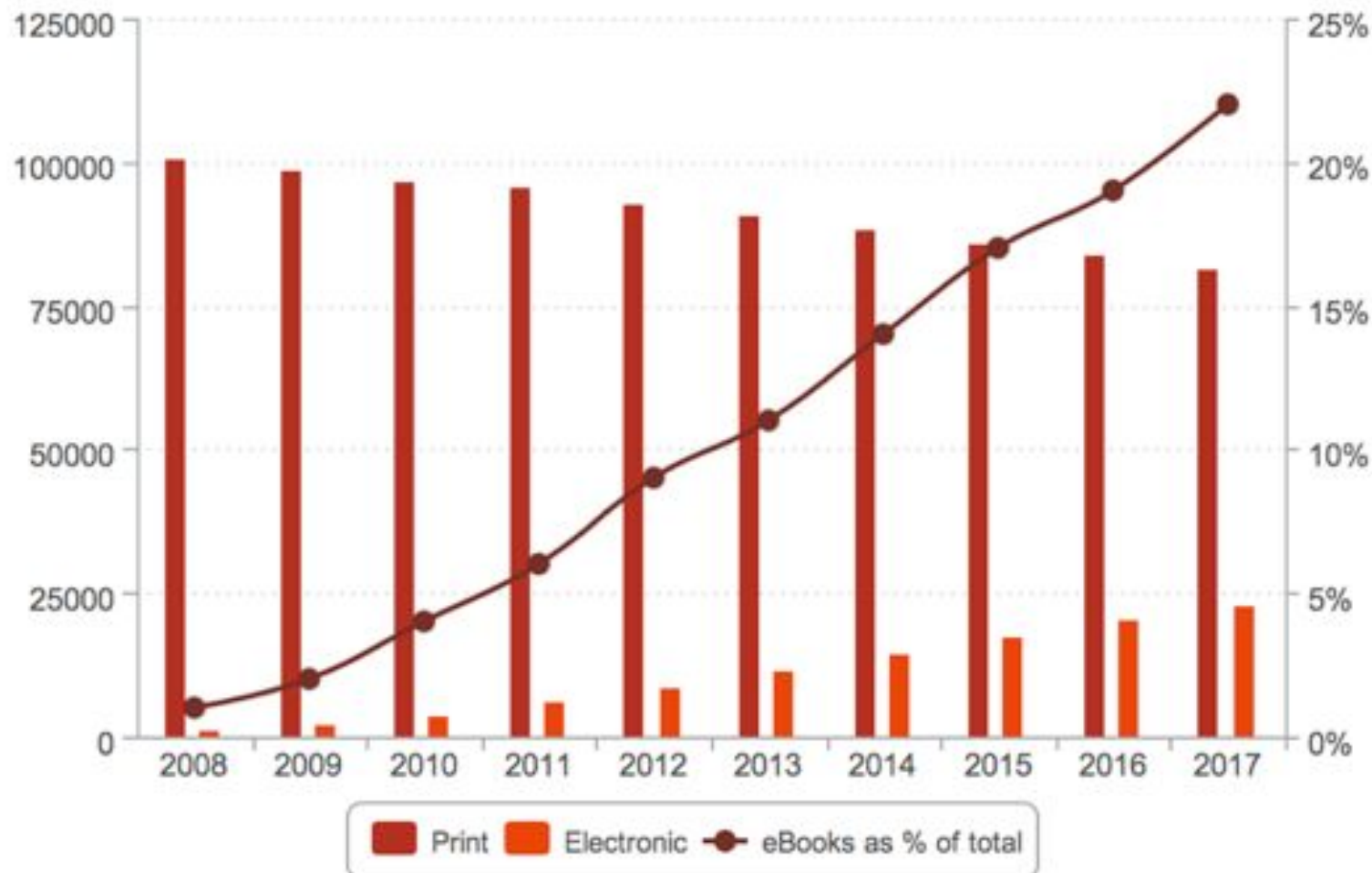
- 2009: 2% (US adults), approx. 4.5 mio users
- 2011: 12%, approx. 28 mio users
- 2013: 26%, approx. 65 mio users



# Electronic Books on the Rise

 **pwc** *Global entertainment and media outlook: 2013-2017*

*Global consumer and educational book publishing revenues (US\$ mn) and e-books share of the market (%) 2008-2017*



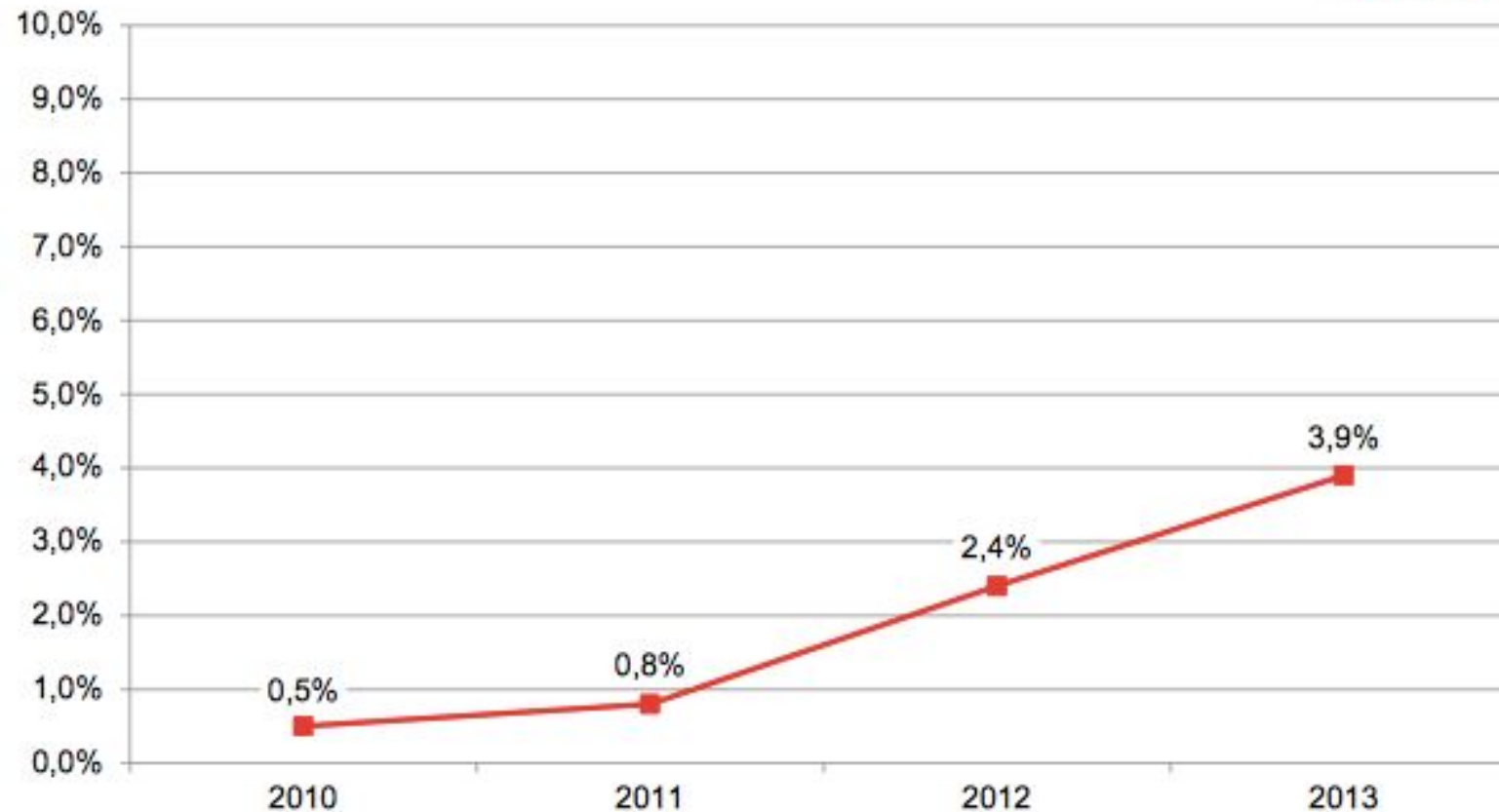
[www.pwc.com](http://www.pwc.com)

# E-Book Market in Germany

## Umsatzanteil von E-Books am Buchmarkt\*

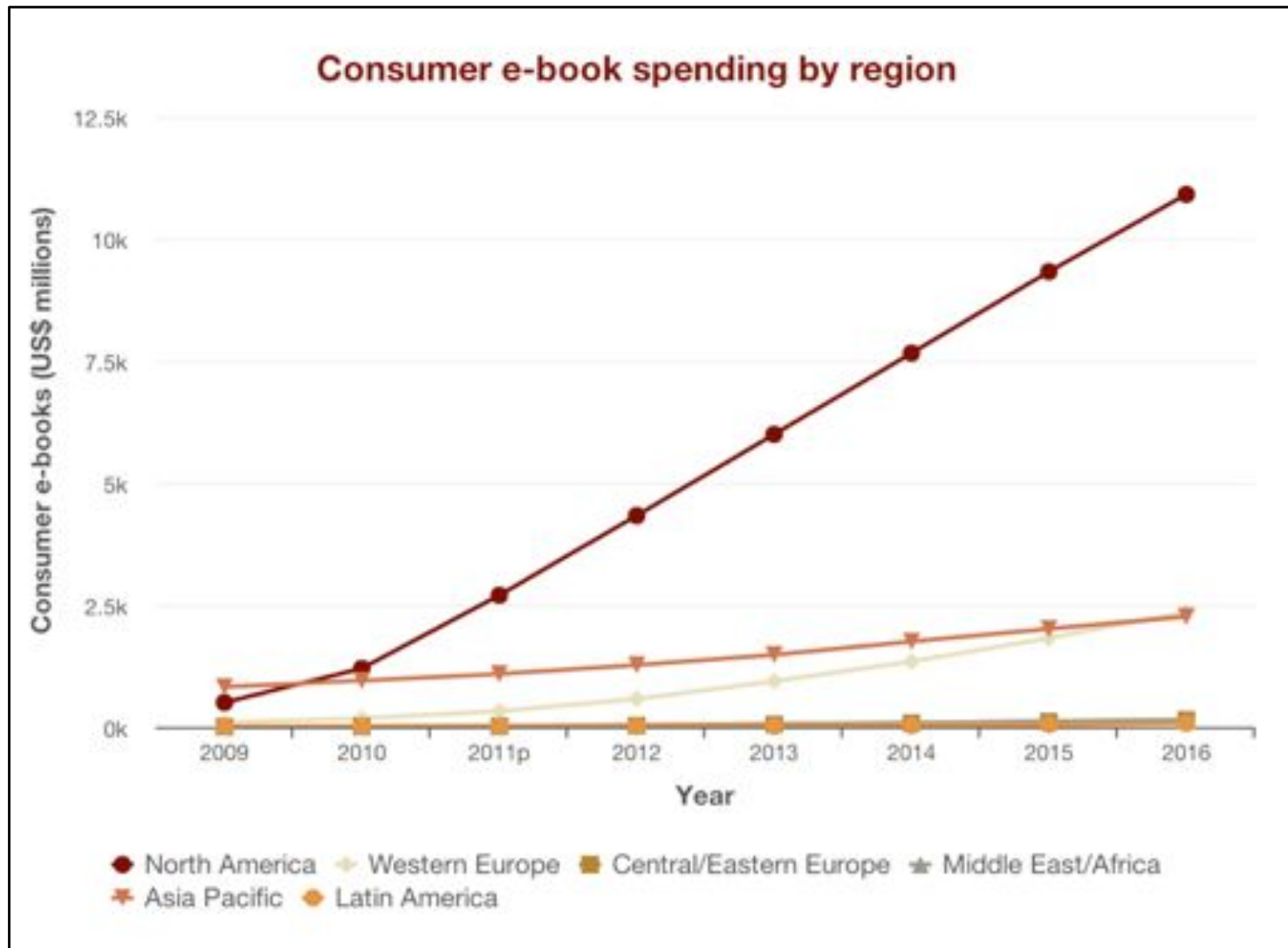
2010-2013 (in Prozent)

**Börsenverein des  
Deutschen Buchhandels** 



[http://www.boersenverein.de/sixcms/media.php/976/Kurzversion\\_E-Book-Studie2014.pdf](http://www.boersenverein.de/sixcms/media.php/976/Kurzversion_E-Book-Studie2014.pdf)

# Strong Regional Differences in E-Book Usage



Source: [paidcontent.org](http://paidcontent.org) based on PwC data

# 9 Electronic Books and Magazines

9.1 Terminology, History

9.2 Formats for Electronic Books

9.3 Open Standard for Electronic Books: ePUB

9.4 Trends

Literature (German):

V. Wang: E-Books mit ePUB, mitp Verlag 2011

H. Reibold: E-Books selbst gemacht, bomots Verlag 2010

# HTML

- HTML is platform-independent and browsers exist for many platforms
- HTML can be used for simple e-books
- HTML is the basis for the chapter content in most current e-book formats
- HTML is not memory-efficient
  - HTML code needs to be compressed, eg. using ZIP

# Open E-Book

- 1998: First e-book conference in the US (NIST)
- Working group "Open eBook Authoring Group" founded
  - 25 representatives of international companies and organisations
  - Developed Open eBook Publication Structure (OEBPS, OeB), 1999
- OEBPS:
  - Based on HTML 4 and XML
  - Uses subset of Cascading Style Sheets (CSS)
  - Package file with metadata (in Open Package Format OPF)
  - Chapters in HTML
- 1999: Open eBook Forum founded to maintain the standard
  - 2005 renamed to "International Digital Publishing Forum" (IDPF)
- OEBPS 1.01 (2001):
  - Fully compatible with XHTML 1.1
  - Works only with external style sheets
- Impact mainly indirectly through other formats

# Microsoft LIT Format (.lit)

- DRM-protected proprietary format, since 2000
  - Originally developed for PocketPC
- Readable with
  - Microsoft Reader (protected files)
  - Lexstyle Stanza and other tools (unprotected files)
- Compressed form of Microsoft Help Module Format (CHM)
  - Essentially based on OEBPS and HTML
- Uses patented *ClearType* technology for improving readability on LCD screens
- Supports user annotations
- "Verbosity functions" enable speech output

# Mobipocket-Format (.prc)

- French company Mobipocket, 2000:
  - develops e-book reader software for PDAs, in particular for Palm devices
  - eBook Technology award 2001 (Frankfurter Buchmesse)
  - Has been ported to many operating systems (including Windows, Windows Mobile, Blackberry, Symbian OS)
- File extension .prc just for compatibility with PalmOS
- Based on OEBPS and HTML
- Development tool *Mobipocket Creator*
  - Compiles into binary and compressed file format



# Amazon Kindle Format (.azw)

- 2005: Amazon buys Mobipocket
  - Kindle devices on the market starting 2007
- "AZW" probably relates to "Amazon Whispernet"
  - Amazon network for wireless distribution of content
- Amazon-specific DRM, but otherwise compatible with Mobipocket format
- Conversion tool (command line) *Amazon KindleGen*
  - from HTML, XHTML, XML (OPF/IDPF), ePUB
- Kindle Direct Publishing Platform (KDP) for authors
  - integration of publisher, distributor, bookseller
- Topaz:
  - Proprietary format used by Amazon/Kindle, not many details known

# More E-Book Formats

- Examples:
  - DAISY
    - » Digital Accessible Information System
    - » Mainly oriented towards accessibility for challenged people
    - » Used e.g. for audio books for the visibly impaired
    - » Being harmonized with ePUB
  - FictionBook (.fb2)
    - » Russian book format, used in particular for Russian literature
    - » XML-based
  - LRF
    - » Proprietary format by Sony
  - ...

# Format Incompatibilities

- Market split:
  - ePUB:
    - » Open standard, many stores
    - » e.g. many titles in German language
  - Amazon Kindle
  - PDF and other formats
- Various DRM systems
  - Adobe Adept for ePUB and PDF
    - » readable with Adobe Digital Editions and many e-readers
  - Marlin DRM for ePUB
  - Apple Fairplay for iBooks
  - Amazon Mobipocket DRM
- Example problem:
  - Found a book in ePUB format, with DRM
  - Want to read on Kindle

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# Why ePUB?

- ePUB is the most likely candidate for a long-lasting e-book standard
  - based on open standards
  - itself open standard
  - supported by major industry players
- Strong market forces:
  - iBook store on iPad/iPod/iPhone by Apple is based on ePUB
  - German main booksellers focus on ePUB format (and Tolino reader)

# OPF/OPS and ePUB

- 2005: IDPF tries to harmonize the various similar but divergent formats
  - Single final format for e-books
  - Creation of a single flexible container format (Open Container Format OCF)
  - Compatibility with latest versions of related standards (e.g. XML, CSS)
  - Integration of accessibility aspects based on DAISY
- 2007: Definition of "ePUB" (.epub)
- 2011: ePUB 3.0 (Final Recommended Spec of IDPF):
  - XHTML/HTML5
  - Embedded still images, SVG vector graphics, math equations
  - Embedded audio and video
  - Interactivity with JavaScript (optional for e-readers)

# ePUB 3: Four Parts of the Standard

- EPUB Publications
  - Publication-level semantics
  - Conformance requirements
  - Packaging, metadata
- EPUB Content Documents
  - Profiles for XHTML/HTML5, SVG, CSS
    - » Navigation
- EPUB OCF (Open Container Format)
  - Single file for publication
  - Logical file system within the (compressed) single file
  - DRM, watermarking
- EPUB Media Overlays
  - Synchronization video/audio
  - Based on SMIL



# Open Publication Format (OPF)



- XML file in Open Publication Format file (.opf)
  - Navigation Document
    - » Until ePUB 2: NCX standard (from DAISY)
    - » ePUB 3: HTML5 `.nav` element
- Contents of OPF file:
  - `<package>` element containing:
    - » `<metadata>` based on Dublin Core Standard
    - » `<manifest>`: list of files
    - » `<spine>`: order of documents (serialization)
    - » `<tours>` (optional, deprecated): Alternative sequences
    - » `<guide>` (optional): Entrance point to overview parts of publication

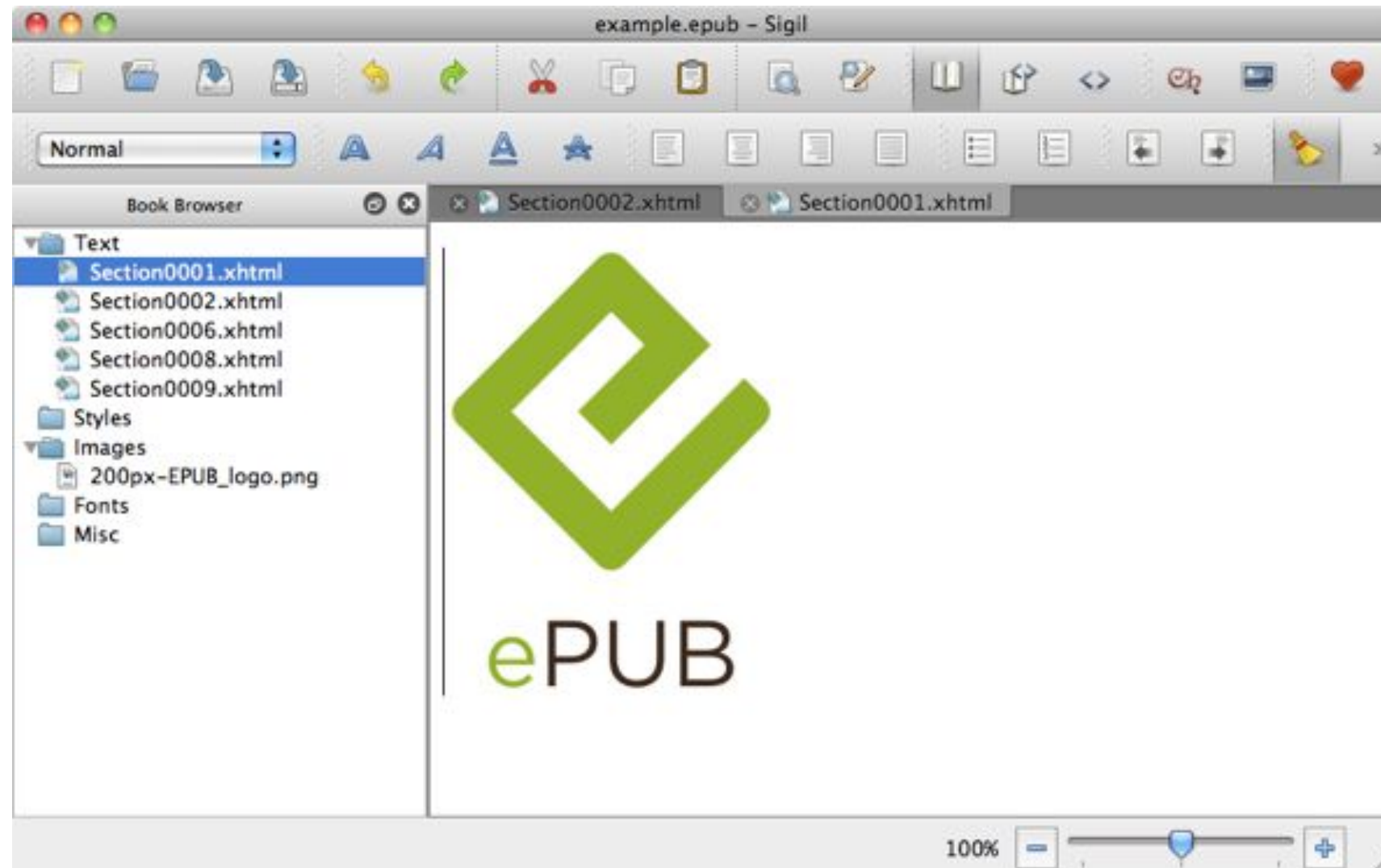


# Open Container Format OCF

- OCF defines the structure of the ePUB file
- File is a ZIP file containing a file system (similar to e.g. jar files)
- META-INF folder:
  - container.xml: defines root directory and OPF file of publication
  - manifest.xml (optional), metadata.xml: required only for non-OPS contents
  - signatures.xml, encryption.xml, rights.xml (all optional): DRM info
- mimetype file:
  - Defines MIME type of file, usually "application/epub+zip"
- OEBPS folder:
  - Contains actual content files (XHTML)

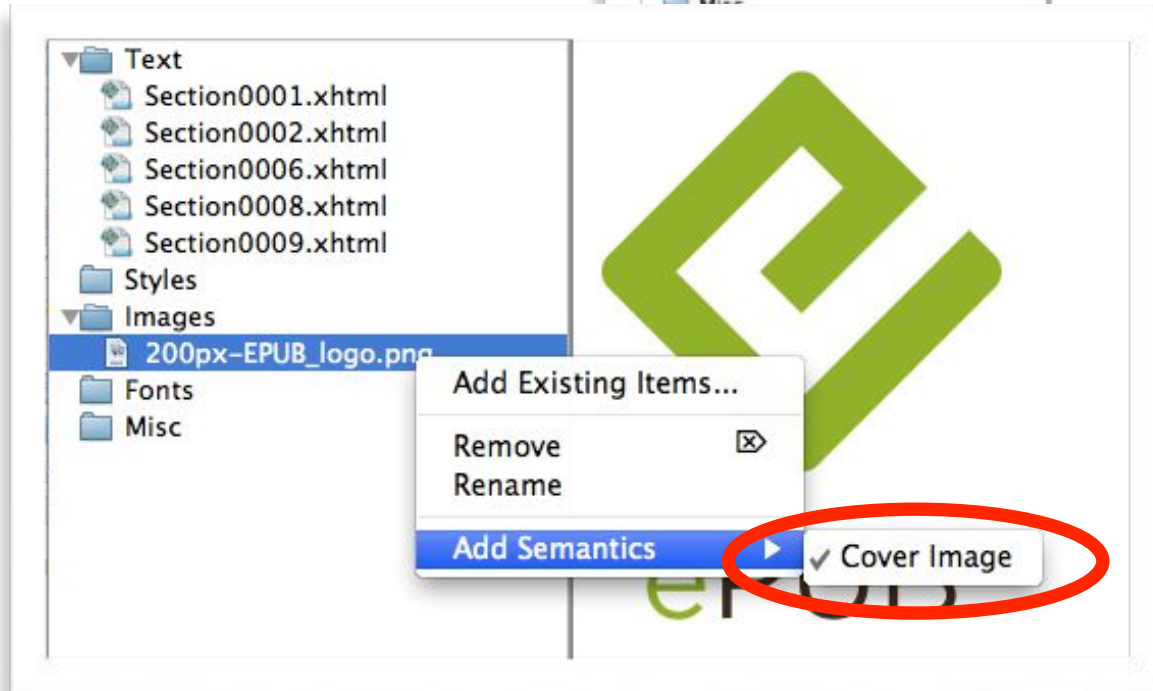
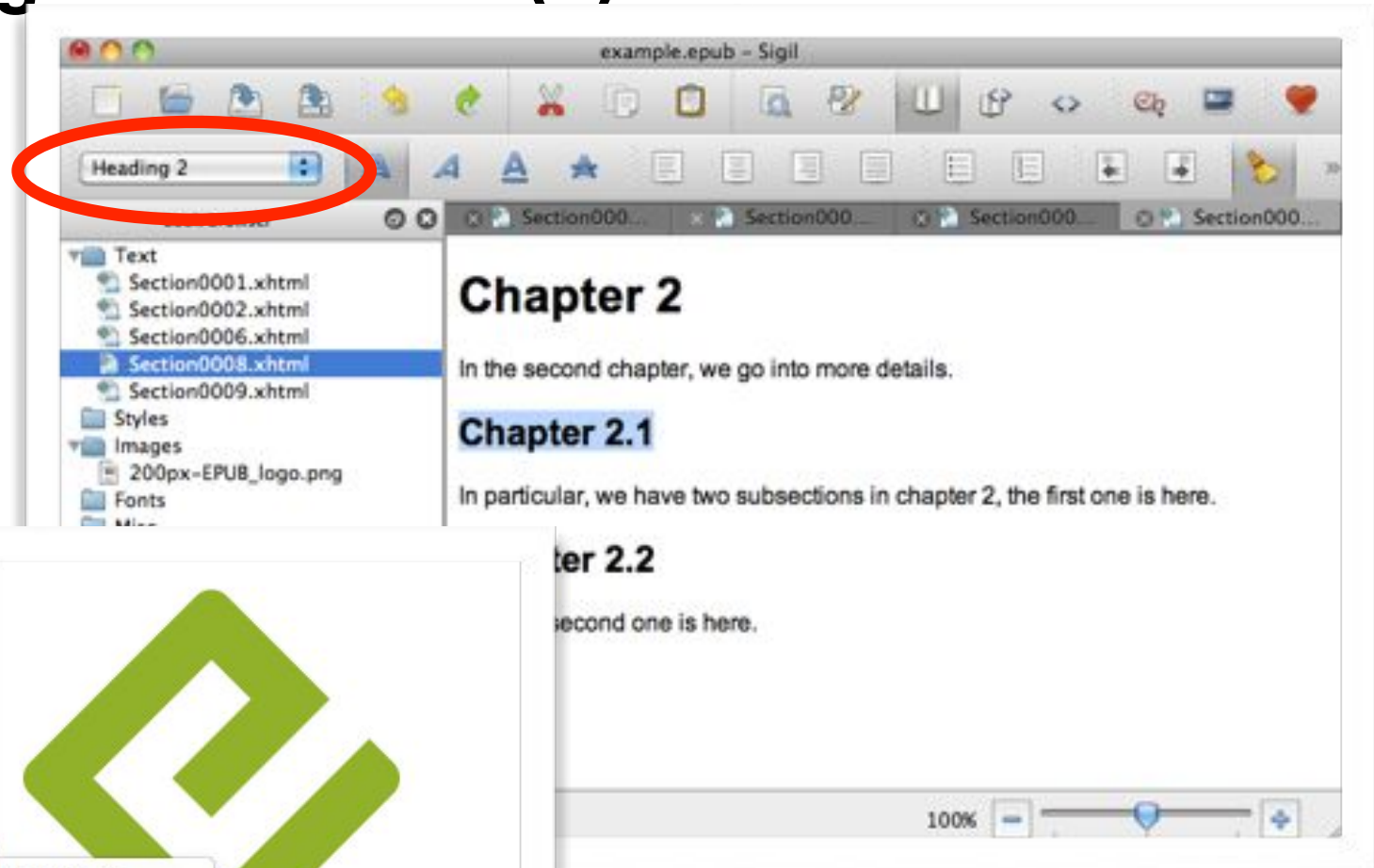
# Example Using ePUB Editor (1)

- Tool used for the example: "Sigil" editor (<http://code.google.com/p/sigil/>)



# Example Using ePUB Editor (2)

Declaring semantic attributes



# Example Using ePUB Editor: Archive Structure

▼	Folder	META-INF	--	Folder
	File	container.xml	4 KB	Text document
	File	mimetype	4 KB	Document
▼	Folder	OEBPS	--	Folder
	File	content.opf	4 KB	Document
▼	Folder	Images	--	Folder
	Image	200px-Epub_logo.png	8 KB	Portable image
▼	Folder	Text	--	Folder
	Text document	Section0001.xhtml	4 KB	TextW...ument
	Text document	Section0002.xhtml	4 KB	TextW...ument
	Text document	Section0006.xhtml	4 KB	TextW...ument
	Text document	Section0008.xhtml	4 KB	TextW...ument
	Text document	Section0009.xhtml	4 KB	TextW...ument
	File	toc.ncx	4 KB	Document

# Example Using ePUB Editor: container.xml

```
<?xml version="1.0"?>
<container version="1.0"
xmlns="urn:oasis:names:tc:opendocument:xmlns:container"
>
    <rootfiles>
        <rootfile full-path="OEBPS/content.opf"
            media-type="application/oebps-package+xml" />
    </rootfiles>
</container>
```

# Example Using ePUB Editor: content.opf (1)

```
<?xml version="1.0" encoding="UTF-8"?>
<package xmlns="http://www.idpf.org/2007/opf" unique-identifier="BookID"
version="2.0">
  <metadata xmlns:dc="http://purl.org/dc/elements/1.1/"
_____xmlns:opf="http://www.idpf.org/2007/opf">
    <dc:title>An example e-book</dc:title>
    <dc:creator opf:role="aut">Heinrich Hussmann</dc:creator>
    <dc:language>en</dc:language>
    <dc:identifier id="BookID" opf:scheme="UUID"> ... </dc:identifier>
    <meta name="cover" content="x200px-EPUB_logo.png"/>
    <meta name="Sigil version" content="0.3.4"/>
  </metadata>
  <manifest>
    <item id="ncx" href="toc.ncx" media-type="application/x-dtbnex+xml"/>
    <item id="x200px-EPUB_logo.png" href="Images/200px-EPUB_logo.png"
media-type="image/png"/>
    <item id="Section0001.xhtml" href="Text/Section0001.xhtml"
media-type="application/xhtml+xml"/>
    <item id="Section0002.xhtml" href="Text/Section0002.xhtml"
media-type="application/xhtml+xml"/>
    ...
  </manifest>
  ...
</package>
```

# Example Using ePUB Editor: content.opf (2)

...

```
<spine toc="ncx">
  <itemref idref="Section0001.xhtml"/>
  <itemref idref="Section0002.xhtml"/>
  <itemref idref="Section0006.xhtml"/>
  <itemref idref="Section0008.xhtml"/>
  <itemref idref="Section0009.xhtml"/>
</spine>
<guide>
  <reference type="cover" title="Cover" href="Text/Section0001.xhtml"/>
</guide>
</package>
```

# Example Using ePUB Editor: Content file

```
<?xml version="1.0" encoding="utf-8" standalone="no"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
  "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">
<head>
  <title></title>
</head>

<body>
  <h1 id="heading_id_2">Chapter 2</h1>

  <p>In the second chapter, we go into more details.</p>

  <h2 id="heading_id_3">Chapter 2.1</h2>

  <p>In particular, we have two subsections in chapter 2,
    the first one is here.</p>

  <h2 id="heading_id_4">Chapter 2.2</h2>

  <p>And the second one is here.</p>
</body>
</html>
```



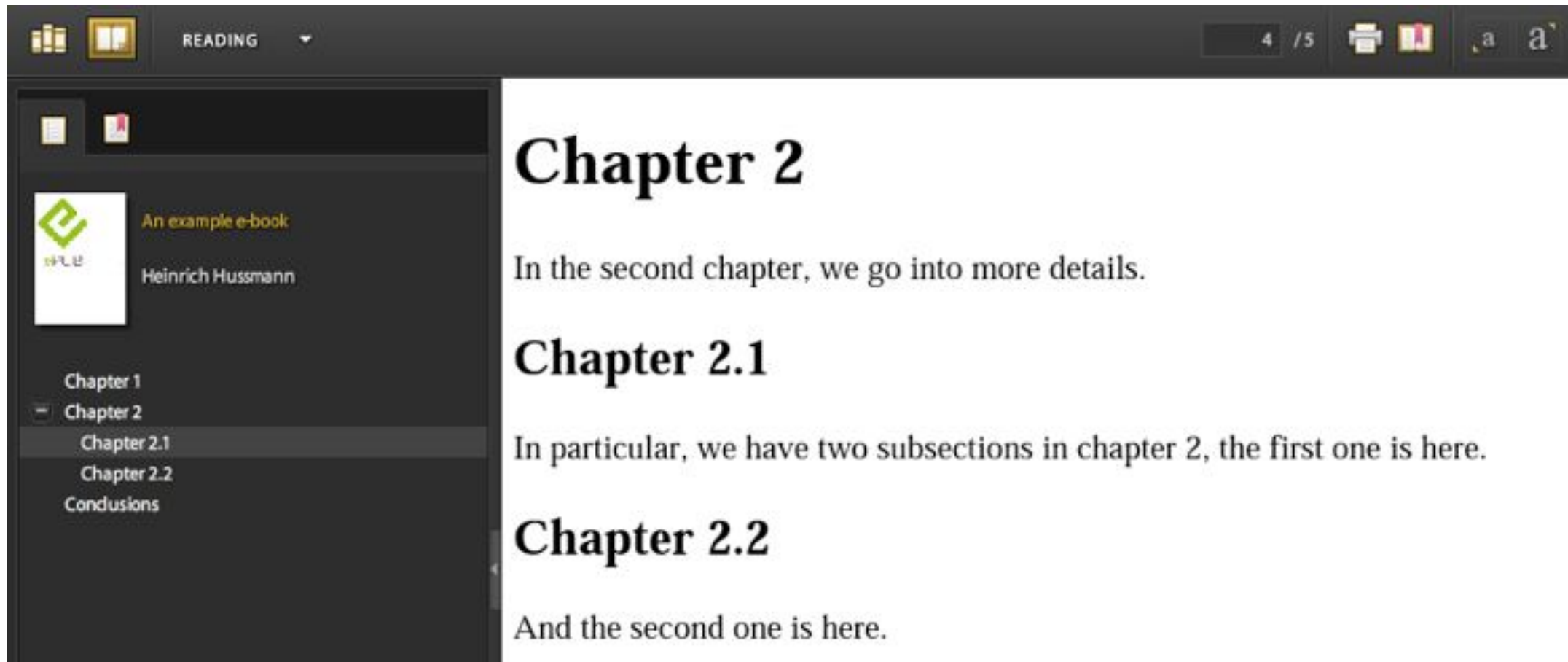
# Example Using ePUB Editor: toc.ncx

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE ncx PUBLIC "-//NISO//DTD ncx 2005-1//EN"
    "http://www.daisy.org/z3986/2005/ncx-2005-1.dtd">

<ncx xmlns="http://www.daisy.org/z3986/2005/ncx/" version="2005-1">
  <head>
    <meta name="dtb:uid" content="47e865c1-81d2-42f6-ace6-de4953f3f222"/>
    <meta name="dtb:depth" content="2"/>
    <meta name="dtb:totalPageCount" content="0"/>
    <meta name="dtb:maxPageNumber" content="0"/>
  </head>
  <docTitle>
    <text>An example e-book</text>
  </docTitle>
  <navMap>
    <navPoint id="navPoint-1" playOrder="1">
      <navLabel>
        <text>Chapter 1</text>
      </navLabel>
      <content src="Text/Section0006.xhtml"/>
    </navPoint>
    <navPoint id="navPoint-2" playOrder="2">
      <navLabel>
        <text>Chapter 2</text>
      </navLabel>
      <content src="Text/Section0008.xhtml"/>
      <navPoint id="navPoint-3" playOrder="3">
        <navLabel>
          <text>Chapter 2.1</text>
        </navLabel>
        <content src="Text/Section0008.xhtml#heading_id_3"/>
      </navPoint>
    ...
  </navMap>
</ncx>
```

# Example Viewed in E-Book Reader

Using *Adobe Digital Editions*:



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9.4 Trends

# Unclear Trends

- Tablets vs E-Readers
  - E-Readers with LCD display (e.g. Nook Color, Kindle Fire)
  - E-Book applications on tablets (like iPad)
- Unstable tablet market
  - iOS vs. Android vs. MS Surface
- E-Book formats: market split
  - Proprietary (e.g. Amazon) vs. open (e.g. ePUB, PDF)
- ***Lending of e-books from libraries:***  
Increasingly popular in the U.S.
- ***Self-published (user produced) e-Books:***  
e.g. Amazon kindle direct publishing



# Multimedia E-Books: Example iBooks Author

- Authoring software for Apple iBooks (ePUB 3 format)



Apple

# Social Books

- <http://futureofthebook.org/blog/2013/08/18/socialbook-in-action/>

The screenshot displays a digital reading environment. On the left, a sidebar contains a 'Library' section with 'My Groups' and 'Collin's section - Oronoko'. Below this, there are 'Inline: 20' and 'General: 0' indicators, followed by a grid of user profile pictures. The main content area shows a text passage from 'The Indian Queen' by Aphra Behn, with several lines highlighted in yellow. The text describes the appearance and customs of the Indian people. On the right, an 'Inline Comments Scanner' window is open, showing three comments from users Dan Chen, oddercohen, and RubiMang, each with a 'reply' button. The interface includes navigation arrows at the bottom of the text area and a '100%' zoom indicator.

## E-Book Piracy

- Driven by various forces:
  - High prices for e-books
  - Platform, format incompatibilities
  - Low data volume of e-books
- Forms:
  - DRM circumvention
  - File sharing
  - OCR of printed/displayed books
- Strong efforts by publishers against piracy sites/forums
  - Main “hubs” under attack
  - Situation similar to digital music market?
- Roughly one third of e-book readers uses pirated content
  - Wiggin study 2011



# Buchhandel und Raubkopien



“Wercke der Finsternis”  
Daniel Chodowiecki  
1781

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