

# Multimedia im Netz

## Online Multimedia

Wintersemester 2015/2016

### 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 III:  
Multimedia  
Distribution 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:

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

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

*triplecanopy* Issue 9, July 2010, <http://canopycanopycanopy.com/>

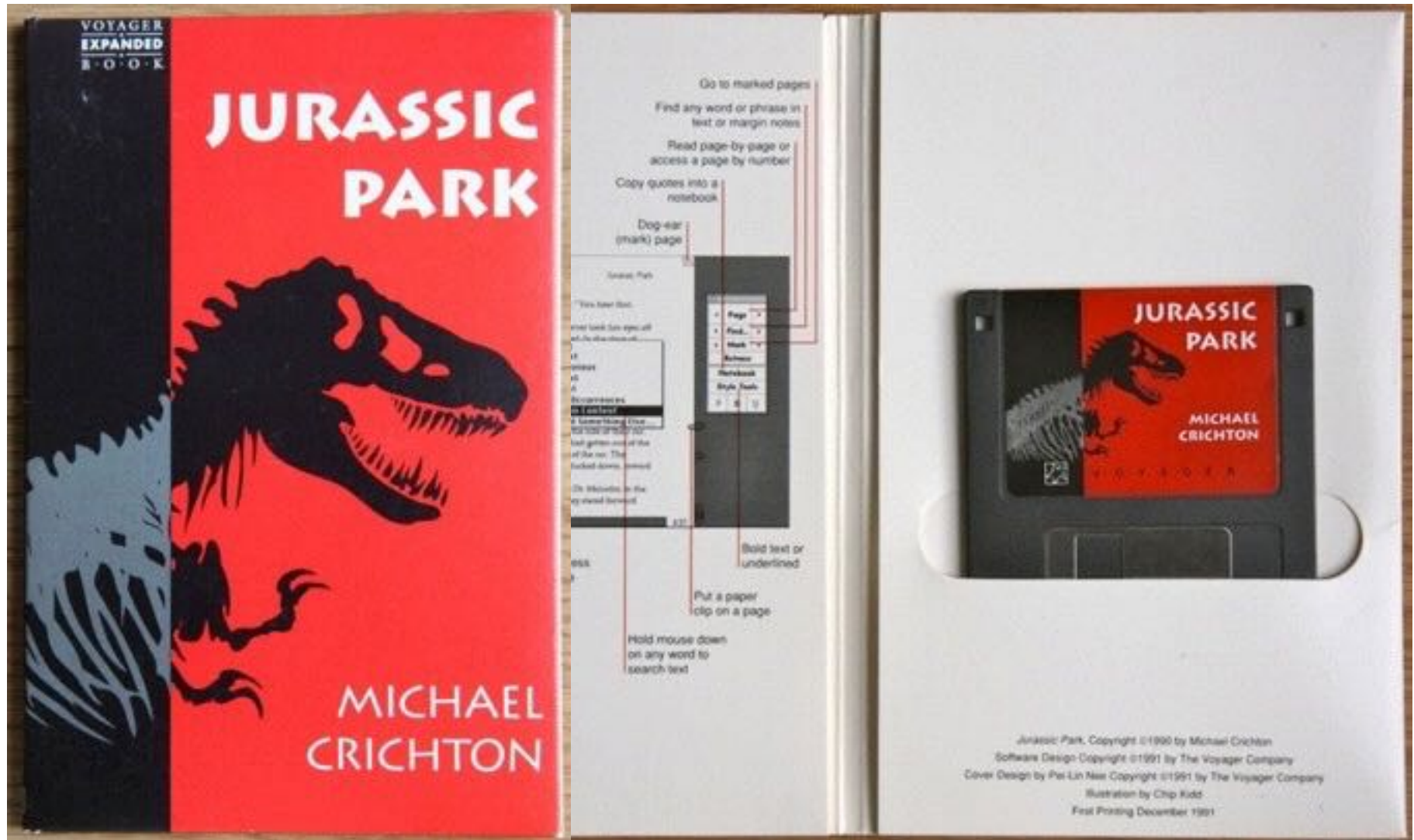
# Douglas Adams: The Book Invented Properly

<https://www.youtube.com/watch?v=Tk4ERwnV-Yw>



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

# Voyager Expanded Books 1992



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

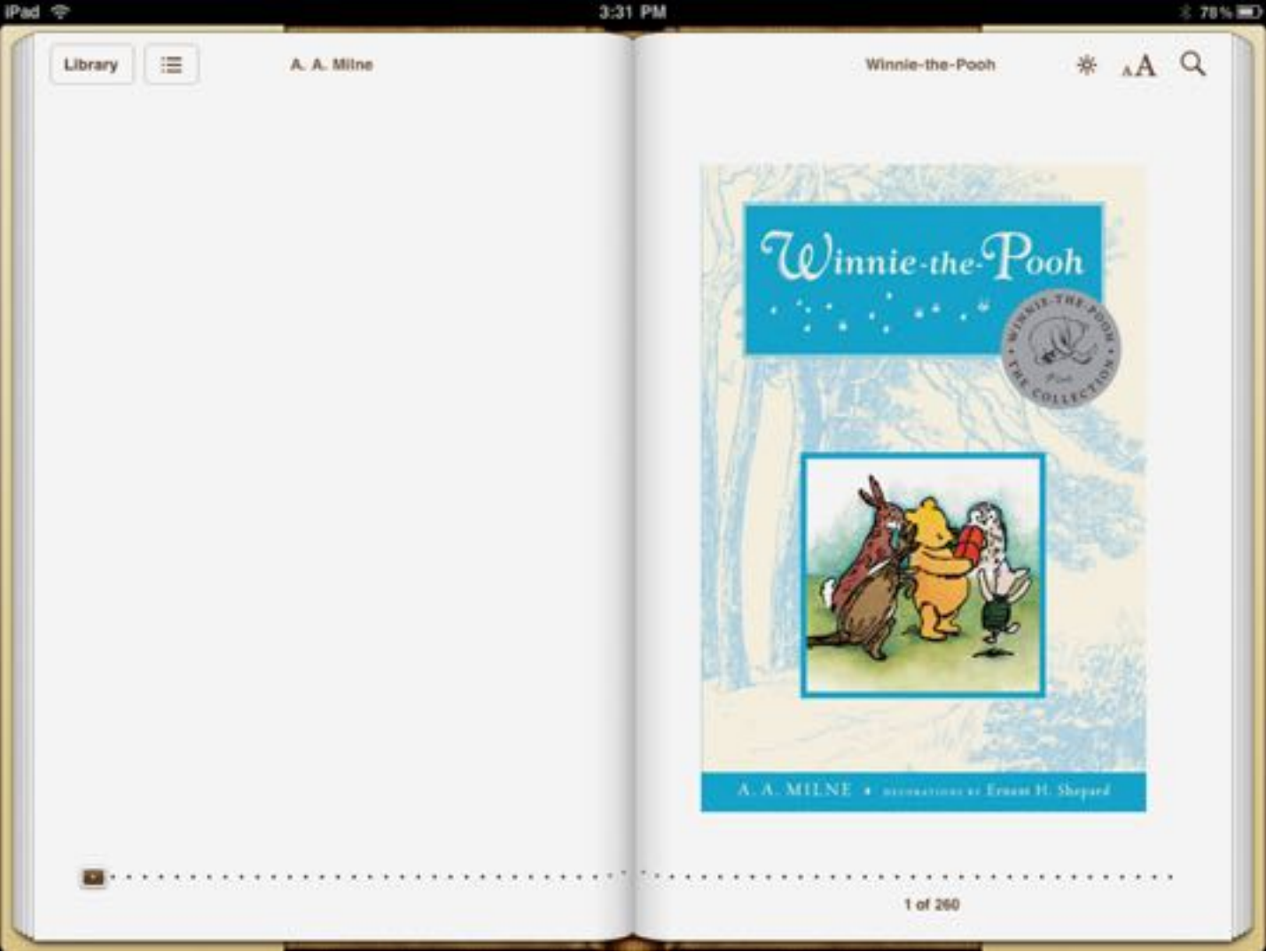
# Electronic Book

- 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.



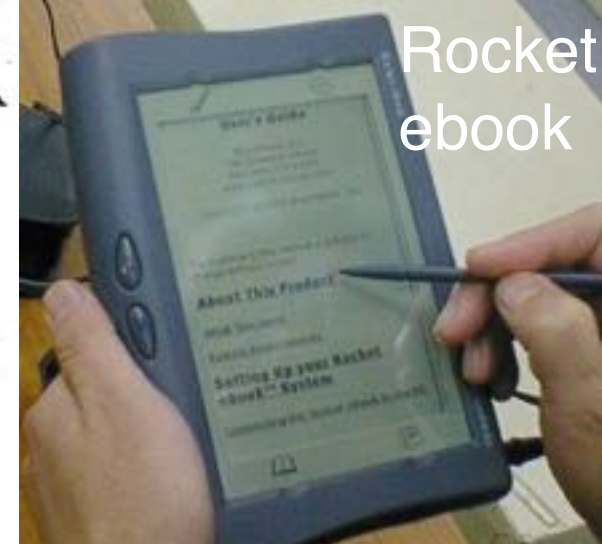
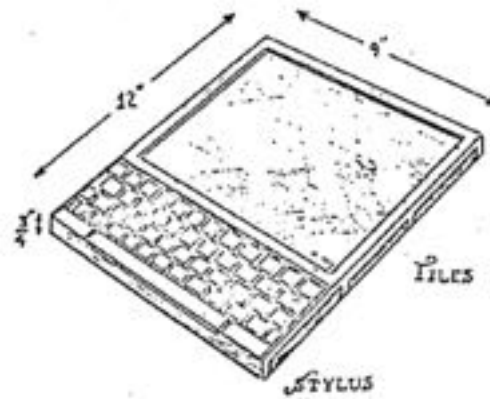
“Actually, Gutenberg didn't invent the printing press; he just added one element: moveable type. I didn't invent the Internet; I just added one element: books that can be copied at the speed of light. Like Gutenberg I made books so much easier for the masses to get, and so much cheaper.” Michael Hart

# History of Electronic Books

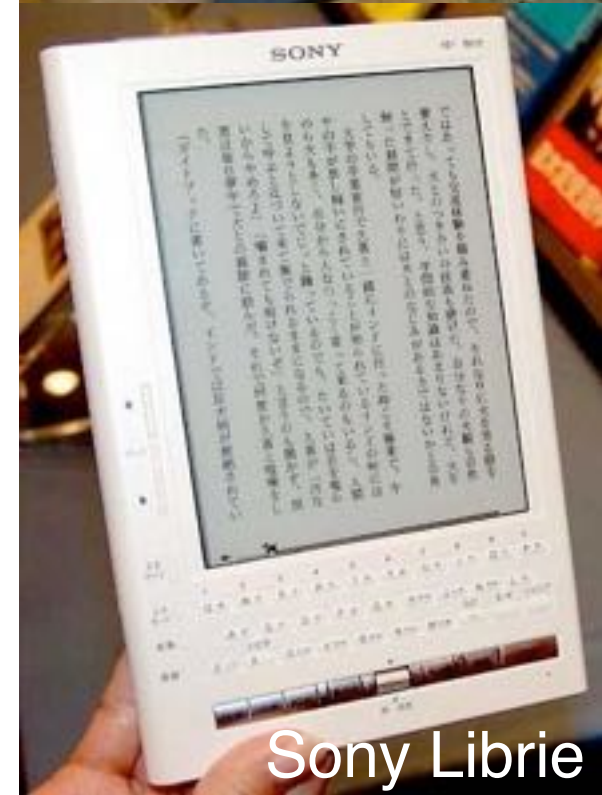
- 1971: Michael S. Hart, *Project Gutenberg* (until today)
- 1972: Alan Kay, *DynaBook* concept
- 1985–1992: Robert Stein, *Voyager Company*
- 1993: Company *Digital Book*, Digital Book Format (DBF), books on floppy disk
- 1998: *Rocket ebook* and *Softbook*, first e-book readers
- 2004: *Sony Librie*, 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



Rocket ebook



Sony Librie

# 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)



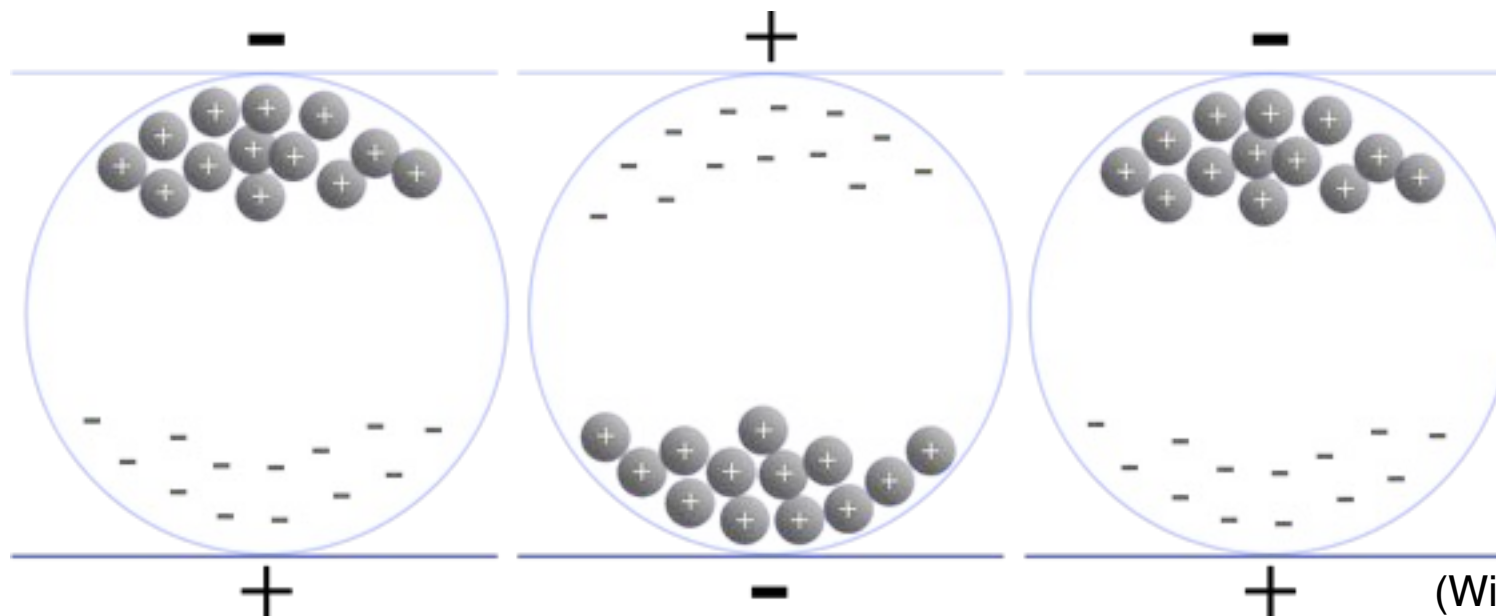
Various readers  
(Wikimedia)





# Electrophoretic 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

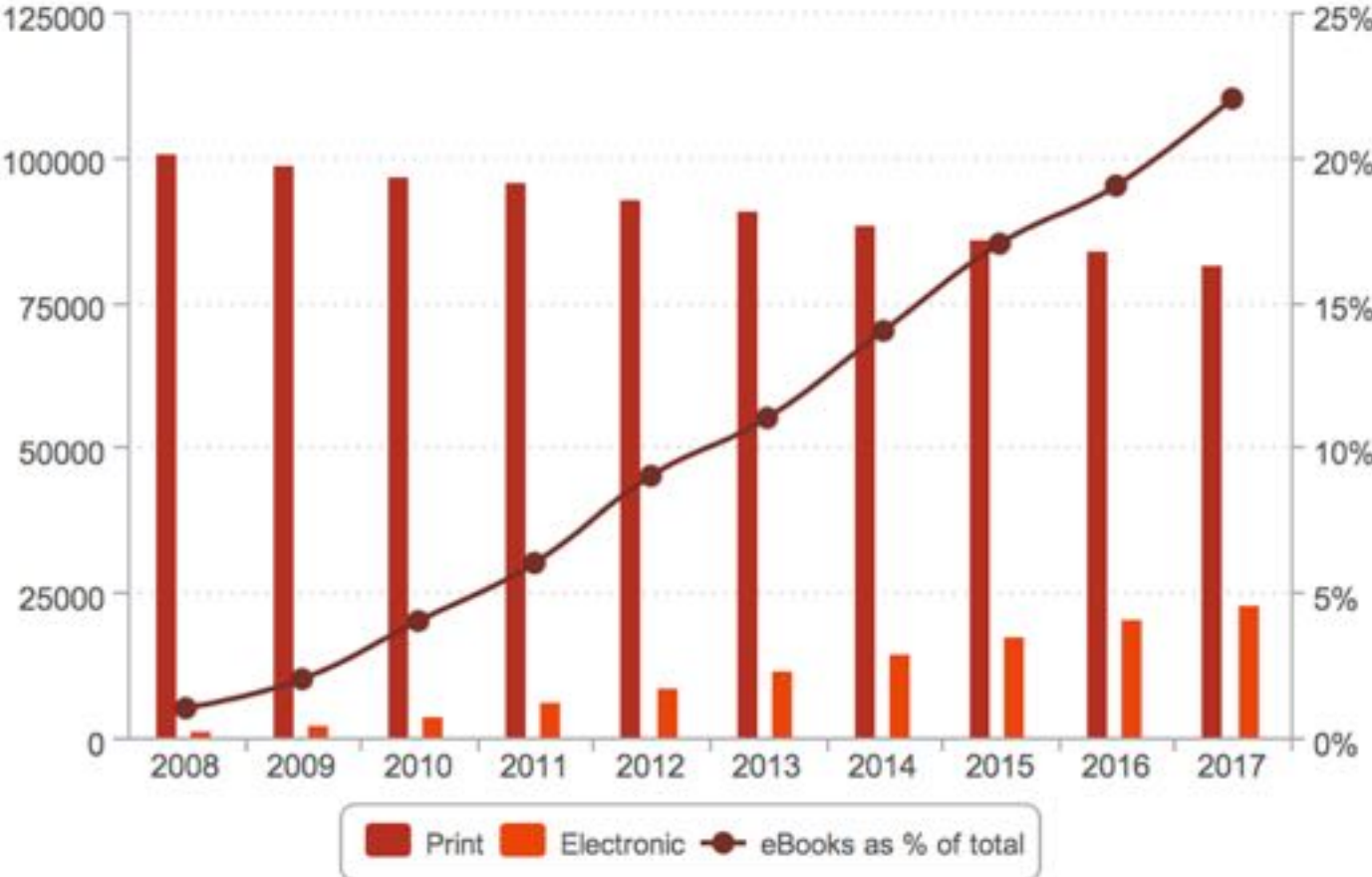


# Electronic Books on the Rise



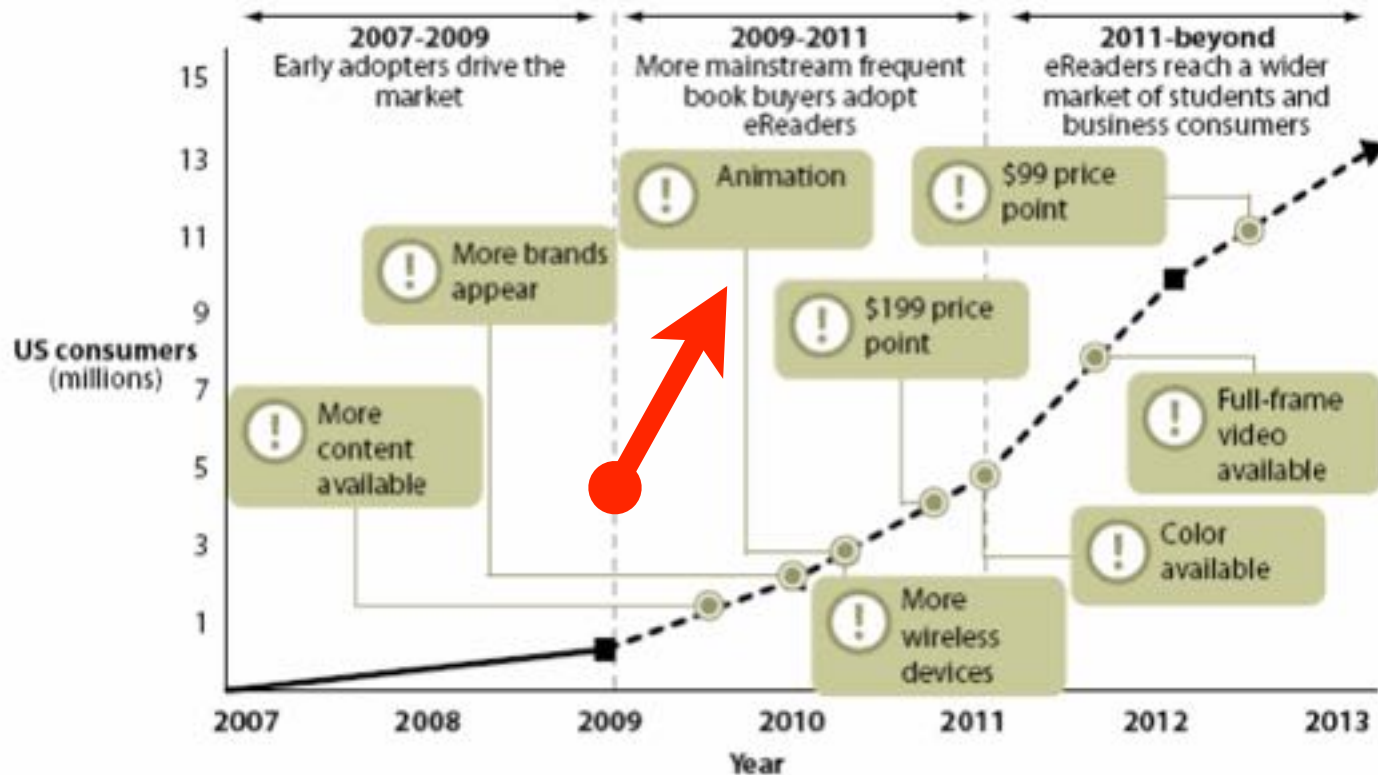
*Global entertainment and media outlook: 2013-2017*

*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)

**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

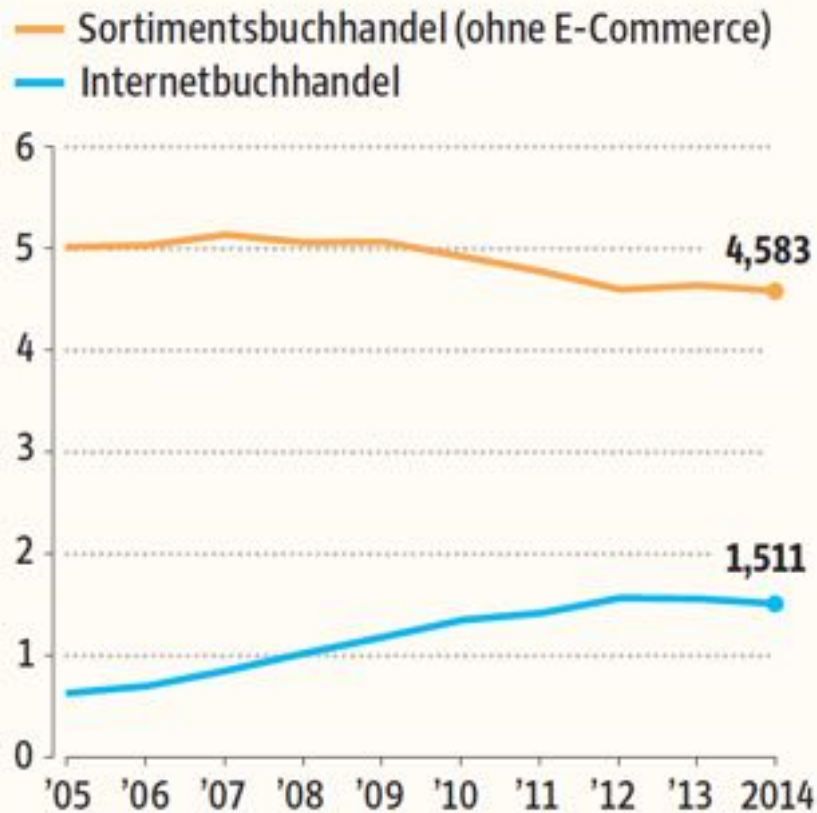
2011: 12%, approx. 28 mio users

2013: 26%, approx. 65 mio users

# Ebook Market in Germany

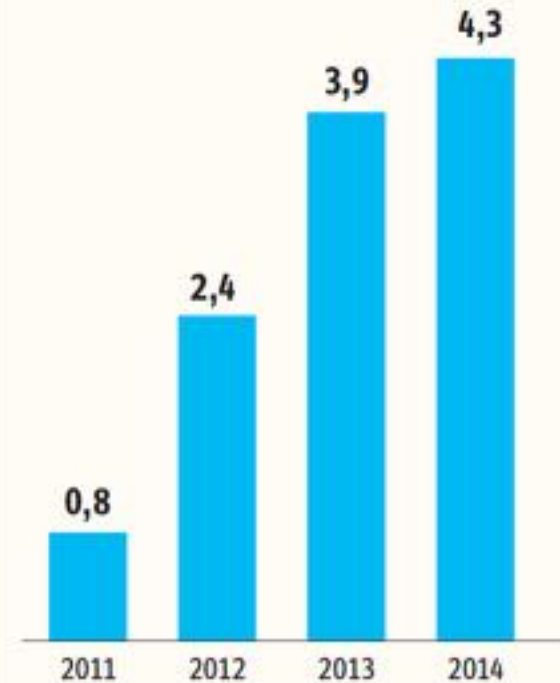
## Entwicklung des Online-Buchhandels

Angaben in Milliarden Euro



## Umsatzanteil von E-Books am Buchmarkt

Angaben in Prozent

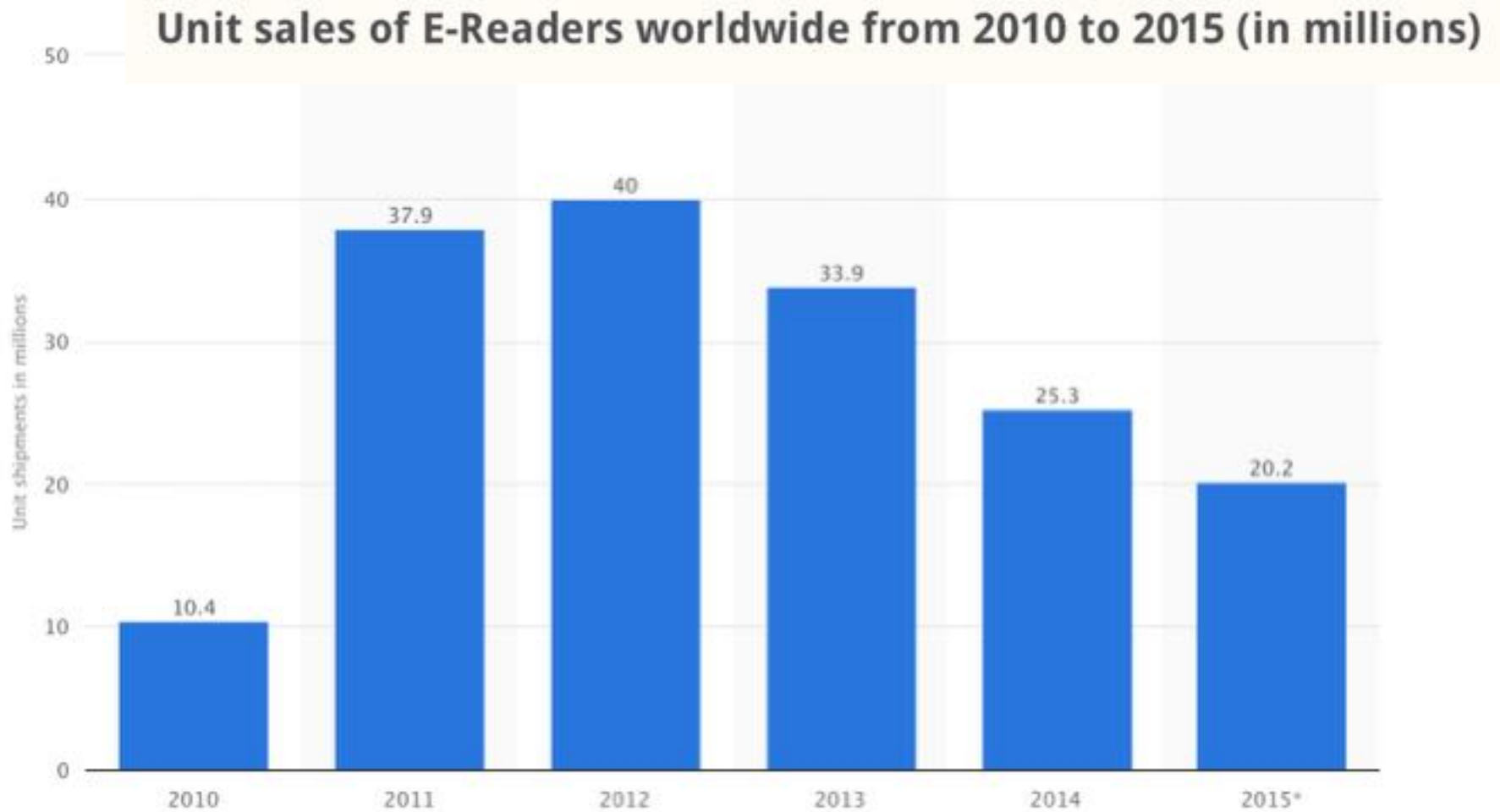


SZ-Grafiken: Sarah Unterhitzberger;  
Quelle: Börsenverein des deutschen Buchhandels

Source: Süddeutsche Zeitung, 04. Januar 2016, p. 2



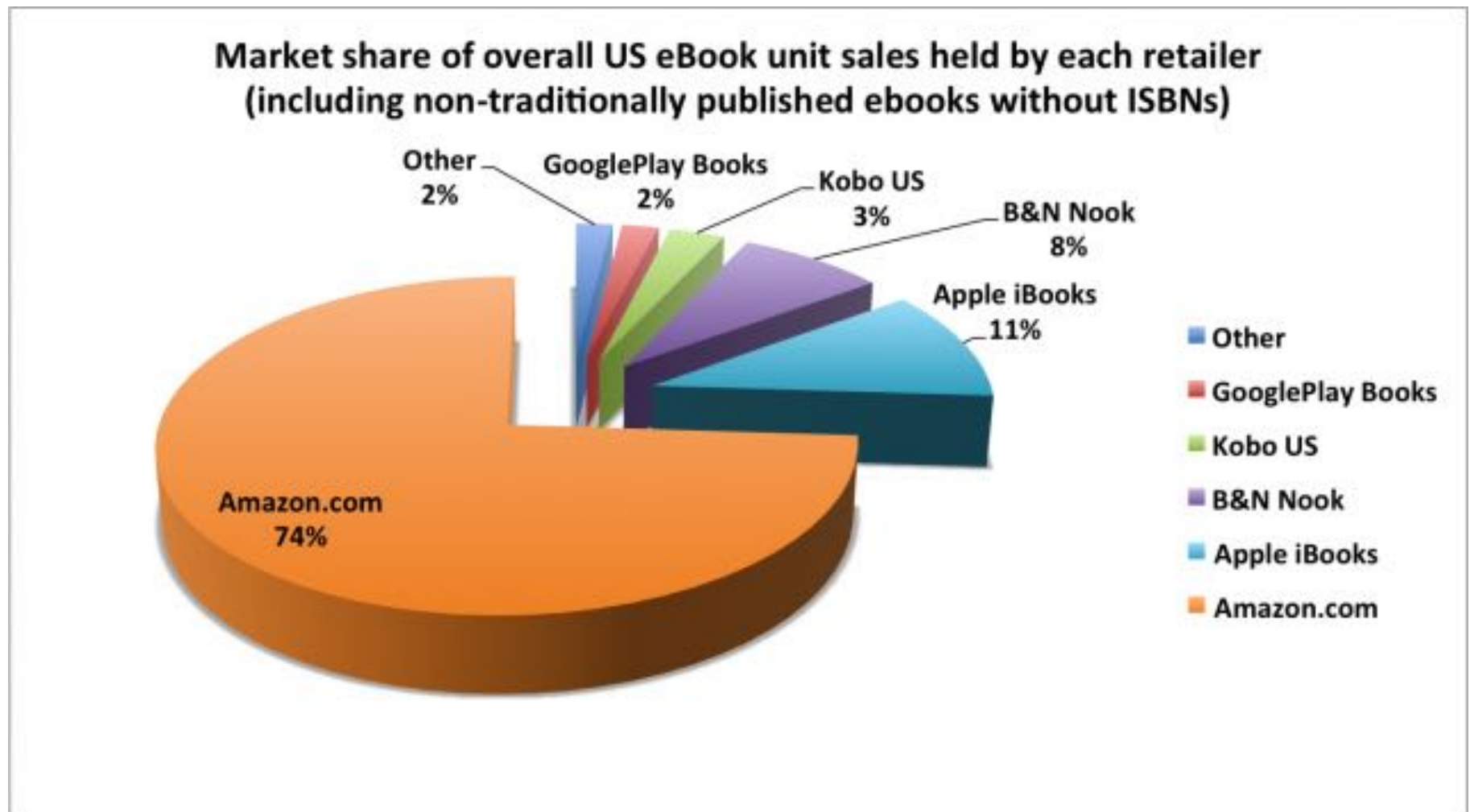
# E-Reader Market



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

© Statista 2016

# E-Reader Competition



Source: [goodreader.com](http://goodreader.com), Michael Kozlowski, Oct 2015

# Germany: Kindle vs. Tolino



mytolino.de

Source: [de.statista.com](http://de.statista.com), Data: GfK

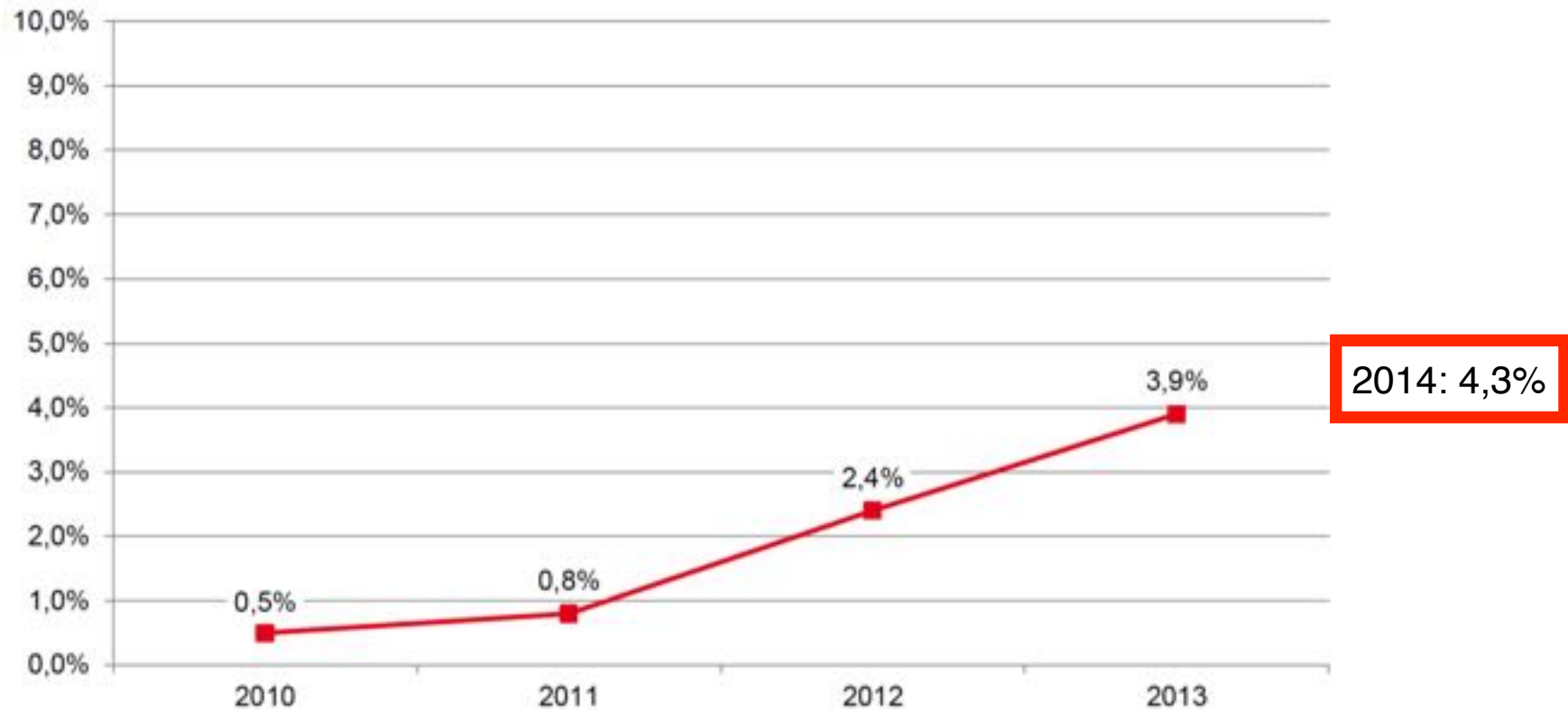
© Statista 2016

# E-Book Market in Germany

## Umsatzanteil von E-Books am Buchmarkt\*

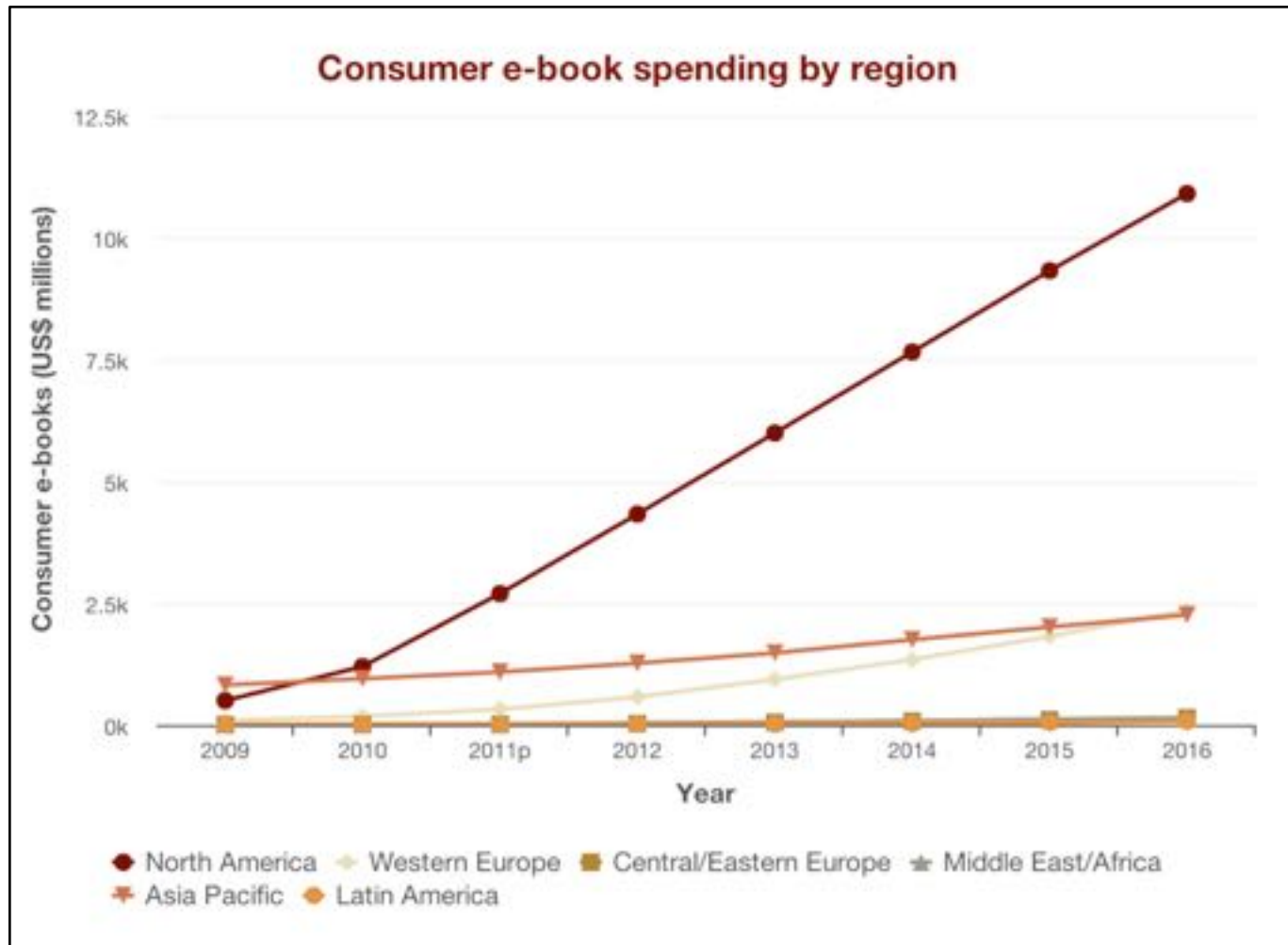
2010-2013 (in Prozent)

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 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 visually 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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Literature (German):

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

# 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)

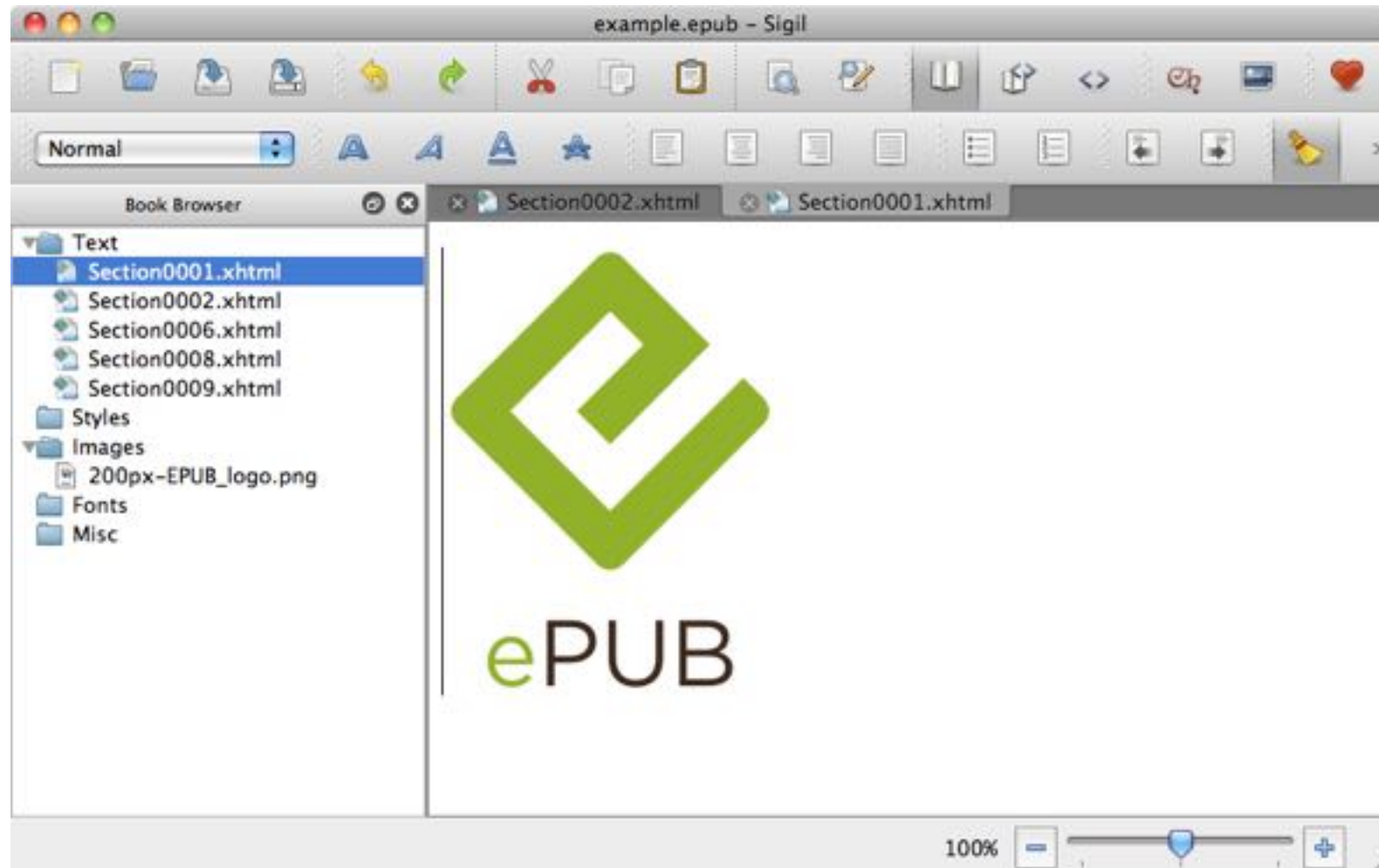
- XML file in Open Publication Format file (.opf)
  - Navigation Document
    - » Until ePUB 2: NCX standard (from DAISY)
    - » ePUB 3: HTML5 `.nav` element
- Contents of OPF file:
  - `<package>` element containing:
    - » `<metadata>` based on Dublin Core Standard
    - » `<manifest>`: list of files
    - » `<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)

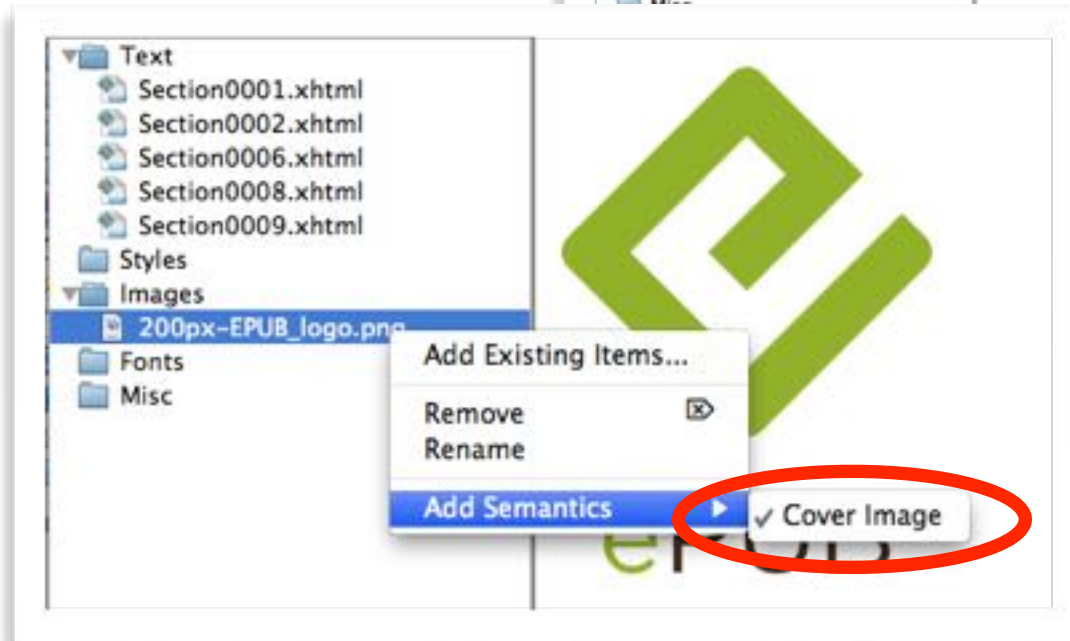
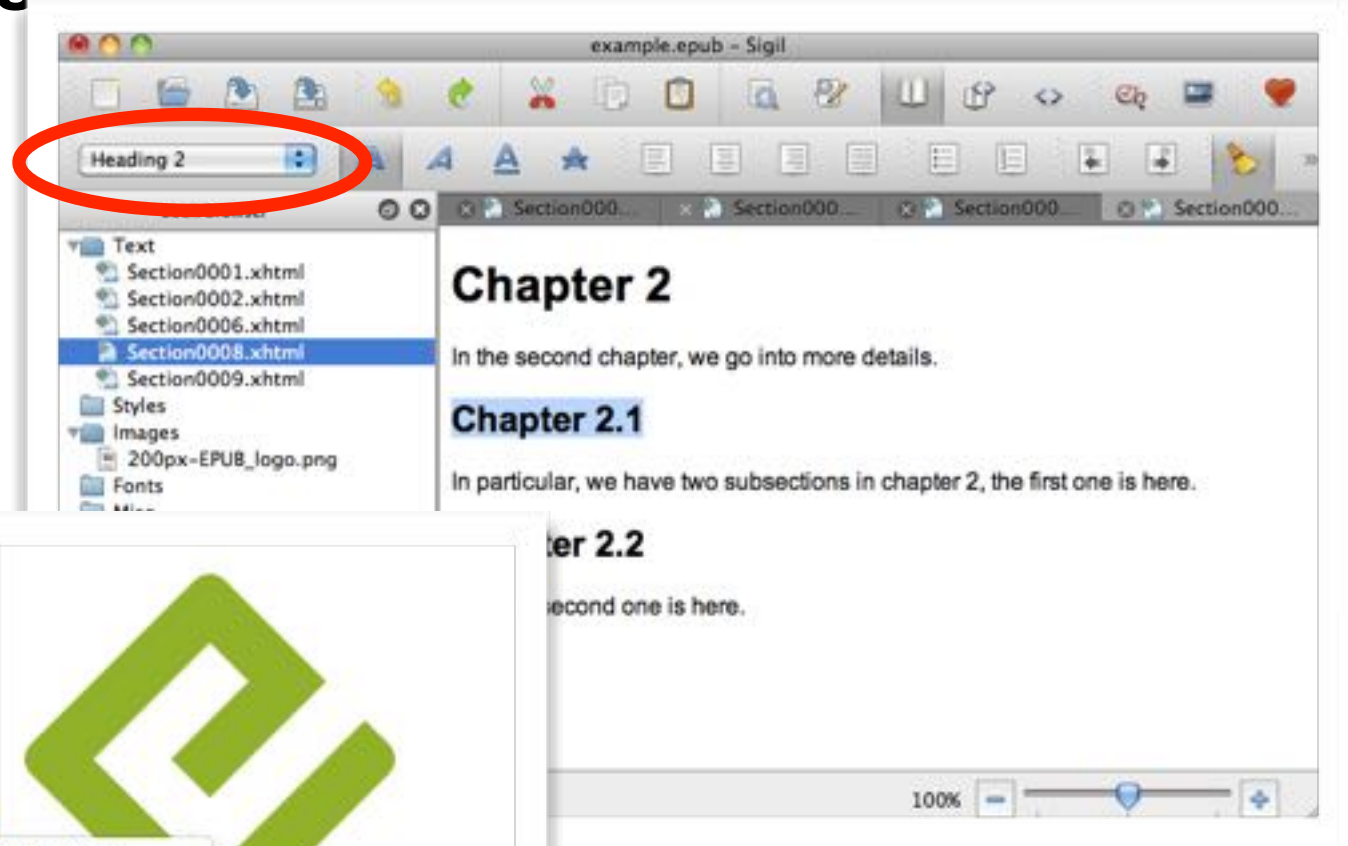
# Example Using ePUB Editor (1)

- 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	Portab...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-dtbncx+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>
```

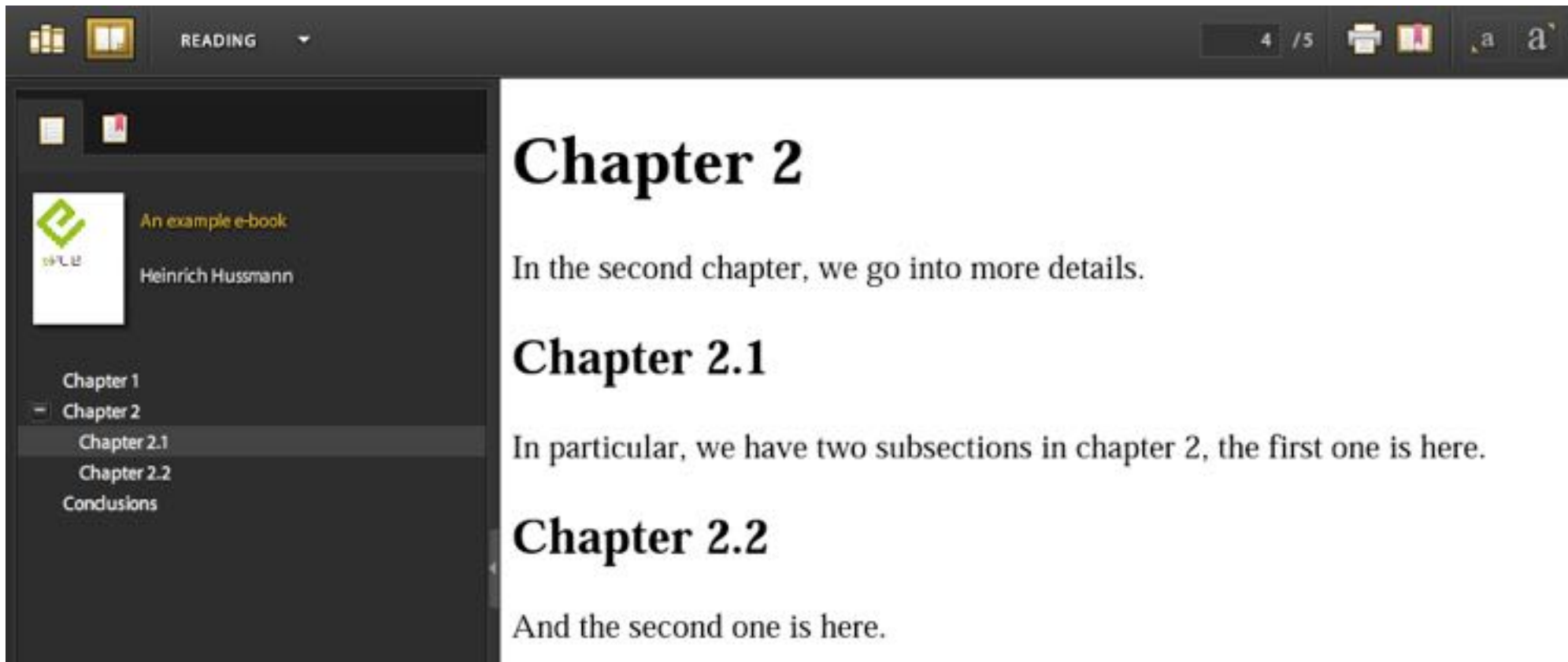
# Example Using ePUB Editor: toc.ncx

```
<?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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9.2 Formats for Electronic Books

9.3 Open Standard for Electronic Books: ePUB

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.
- **Bundled content subscriptions:**  
Access to large library of content
- **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: Readmill

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

The screenshot displays the Readmill social reading interface. On the left, there is a sidebar with a 'Library' section, 'My Groups' (including 'Collin's section' and 'Oroonoko'), and 'Community' with a grid of user avatars. The main content area shows a text passage from 'Robinson Crusoe' with several lines highlighted in yellow. On the right, an 'Inline Comments Scanner' window is open, showing three comments from users Dan Chen, addercohen, and RubMora, each with a 'reply' button. The text passage reads: 'presented to me, and I gave 'em to the King's Theatre; it was the Dress of the Indian Queen, infinitely admir'd by Persons of Quality; and was inimitable. Besides these, a thousand little Knacks, and Rarities in Nature; and some of Art, as their Baskets, Weapons, Aprons, &c. We dealt with 'em with Beads of all Colours, Knives, Axes, Pins and Needles, which they us'd only as Tools to drill Holes with in their Ears, Noses and Lips, where they hang a great many little Things; as long Beads, Bits of Tin, Brass or Silver beat thin, and any shining Trinket. The Beads they weave into Aprons about a Quarter of an Ell long, and of the same Breadth; working them very prettily in Flowers of several Colours; which Apron they wear just before 'em, as Adam and Eve did the Fig-leaves; the Men wearing a long Stripe of Linen, which they deal with us for. They thread these Beads also on long Cotton-threads, and make Girdles to tie their Aprons to, which come twenty times, or more, about the Waste, and then cross, like a Shoulder-belt, both Ways, and round their Necks, Arms and Legs. This Adornment, with their long Black Hair, and the Face painted in little Specks or Flowers here and there, makes 'em a wonderful Figure to behold. Some of the Beauties, which indeed are finely shap'd, as almost all are, and who have pretty Features, are charming and novel; for they have all that is called Beauty, except the Colour, which is a reddish Yellow; or after a new Oiling, which they often use to themselves, they are of the Colour of a new Brick, but smooth, soft and sleek. They are extreme modest and bashful, very shy, and nice of being touch'd. And tho' they are all thus naked, if one lives for ever among 'em, there is not to be seen an indecent Action, or Glance; and being continually us'd to see one another so unadorn'd, so like our first Parents before the Fall, it seems as if they had no Wishes, there being nothing to heighten Curiosity; but all you can see, you see at once, and every Moment see; and where there is no Novelty, there can be no Curiosity. Not but I have seen a handsome young Indian, dying for Love of a very beautiful young Indian Maid; but all his Courtship was, to fold his Arms, pursue her with his Eyes, and Sighs were all his Language: While she, as if no such Lover were present, or rather as if she desired none such, carefully guarded her Eyes from beholding him; and never approach'd him, but she looked down with all the blushing Modesty I have seen in the most Severe and Cautious of our World. And these People represented to me an absolute Idea of the first State of Innocence, before Man knew how to sin; And 'tis most evident and plain, that simple Nature is the most harmless, inoffensive and virtuous Mistress. 'Tis she alone, if she were permitted, that better instructs the World, than all the Inventions of Man: Religion would here but destroy that Tranquillity they possess by Ignorance; and Laws would but teach 'em to know Offences, of which now they have no Notion; They once made Mourning and Fasting for the Death of the English Governor, who had given his Hand to come on such a Day to 'em, and



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