eTome: an eBook Publishing Facility for the Web

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Declaration of Authorship

I, Mohammad Abdullah Alhaidari, confirm that this work submitted for assessment is my own and is expressed in my own words. Any uses made within it of the works of other authors in any form (e.g., ideas, equations, figures, text tables, programs) are properly acknowledged at any point of their use. A list of the references employed is included (Lemon, 2017).

Signed: Mohammad Abdullah Alhaidari
Date: 
Abstract

Modern authors increasingly want to publish what they have written in an eBook form but without the expense and trouble of finding a publisher. This project aims to develop a web service to support the creation and self-publishing of eBooks. Its mission is to open eBook making to everyone.

First of all, this dissertation discusses some eBook definitions based on different perspectives and proposed by various authors. It also reviews some advantages and disadvantages of using eBooks and explains the difficulties of eBook creation. After that, this dissertation explores three types of eBook readers and discusses various opinions and issues regarding eBooks and printed books. It also compares eBooks with another digital document format called PDF and comments on the main purpose of PDFs.

After that, this dissertation highlights a popular technology in this domain called EPUB. Electronic PUBlication is an open standard that uses common technologies such as XHTML, XML and CSS to support reflowable texts. The report explains in detail how to create an EPUB eBook, gives some examples and compares the EPUB2 and EPUB3 standards.

Then, it gives requirements, the project plan, design and implementation details for the web software called eTome which converts text or XHTML to an eBook in EPUB3 format to achieve the desired aim.

The dissertation ends by evaluating eTome in terms of its functionality and usability and gives some suggestion for future work.
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1 Introduction

Recent advances in technologies and information systems have affected all aspects of human life. Books and reading styles are two of these aspects that have faced considerable changes in devices and software. Due to this progress especially after eBook technology emerged, people now have access to an extensive library of books and other kinds of document on small electronic devices.

1.1 Motivations

Some people prefer reading with a certain font size, type face or color or according to a special design. Because of that, they would like to organize their reading materials such as books and stories according to their desired format which would encourage them to read more. Also, they would like to apply and improve their reading experience by creating and designing their own eBooks.

However, creating eBooks using available software can be expensive and that may affect their reading habits. Doing it manually without software help would be hard and boring for most people. This suggests the need for free software to help writers and authors to create and publish their own books in an eBook form in a convenient manner.

This project aims to develop software called eTome to support the creation and self-publishing of Books from mature plain text or XHTML sources. This software will be web based software that is available to the public anytime and anywhere. In addition, it will be provided free of charge to encourage people to use it in creating eBooks.

1.2 Definition

Many authors have tried to define and capture in words the meaning of the eBook concept. Some definitions really describe electronic documents rather than eBooks, while others mix between them. A comprehensive definition that covers all eBook aspects might be:

"The term eBook is used to describe a text analogous to a book that is digitally displayed on the screen of a computer, a personal digital assistant, or a specifically designed reader; it may comprise text, graphics, video, animation, and/or sound"

(Jeong, 2012, p391)
On this definition, an eBook can comprise any kind of media such as text, pictures, diagrams, video, audio and/or sound which can be displayed on electronic devices such as computers, eBook readers, tablets and smartphones. However, Jeong's definition does not clarify what is essential and what is merely accidental to the concept of a book. Being printed is deemed inessential to the analogy between an eBook and a book. But what then is essential. Must eBooks have fixed sized pages? Must they have covers?

### 1.3 Advantages and Disadvantages

One of the factors which is contributing to the wide spread adoption of eBooks are their advantages that are not available with printed books. First of all, once an eBook has been created it can be easily deployed and distributed (Subba Rao, 2003). Publishers avoid any additional costs in printing, shipment and insurance of printed books. Moreover, eBooks provide readers with many new features such as navigation capability, the ability to customize fonts and their sizes, the ability to search for words, look up word meaning and hyperlink to reference (Anuradha and Usha, 2006). Importantly, visually impaired people face problems with traditional books. However, eBooks can increase their font sizes and degree of illumination and are considered a good choice for people with disabilities. They also have good accessibility where content can be delivered in multiple forms, for example, via text-to-speech features (Weber and Cavanaugh, 2006).

On the other hand, there are some disadvantages of using this technology. Subba Rao (2003) report that the prices of eBook readers are considerable in addition to the different software and hardware requirements for various eBook formats. Another drawback of using eBooks is spending much time in reading electronic devices. According to Jeong (2012), despite recent developments in display technologies especially with improved screen resolution and avoiding backlit screens, there are some reported negative impacts on readers' eyes.

Due to the advantages eBooks have over the printed books, eBook sales are increasing year by year compared to printed book sales. Figure 1.1 shows actual and predicted sales for both in the USA from 2008 – 2017.
1.4 Reflowability

The most widely used eBook format is characterized by a display manner on different screen aspect ratios and resolutions which is called reflowable (Garrish, 2011). Reflowability allows the text to keep the same font size when it is displayed on different devices whether they are computers, tablets or smartphones. This makes the text readable without the need to resize the text. A good example of an eBook technology that supports reflowability is EPUB Electronic PUBlication. It is based on XHTML. In contrast, some other electronic document formats do not support reflowability such as PDFs, because they have a fixed line length format and are dedicated to printing documents as they appear on the screen (Garrish, 2011).
2 Aim and Objectives:

The aim of this project is to develop software for eBook creation from mature plain text or XHTML sources to support self-publishing.

To achieve this aim, the following objectives have been pursued:

1. To develop software for eBook generation that can be used at anytime from anywhere by users without special knowledge of eBook formats.
2. To allow plain text files to be normalized and converted into XHTML5.
3. To enable generation of book indexes depending on identified chapters or book parts.
4. To support creation of required files and folders which are the necessary components of the EPUB3 eBook standard.
5. To allow compression of the files into an eBook archive.
6. To capture rich metadata (title, author, etc.) describing an eBook and embed it within.
7. To enable validation of EPUB compliance on generated eBooks.
3 Literature Review

3.1 Definition and Overview

There is no standard or agreed definition of what an eBook is. A popular definition of an eBook is a digital copy of a real book which contains either text or a mix of text and images (Zeng et al., 2016). However, this definition requires the prior existence of a physical book, which excludes from the definition all eBooks without such a physical precursor.

Subba Rao (2003) defines the term eBook to include any text, book or reading documents in a digital form. It includes any digital file containing words and pictures that can be displayed on electronic devices. This definition is too wide as it applies to nearly all web pages and does not express the eBook concept well.

Abdullah and Gibb (2008) embrace Van Damm's definition which has two parts addressing the content and the reader device. Firstly, the content should be text in a digital form. Secondly, the reader device must be able to store and view the digital content.

An eBook can be described as a digital text which is similar to a physical book but is displayed instead on an electronic device for instance a computer, tablet or digital reader. This eBook may contain text, pictures, diagrams, audio and video (Jeong, 2012). Expressed more readily, it could be said that eBook is a digital document in a form that emulates a physical book. However, as was argued earlier, this does not make clear in what respects physical books need to be emulated to count as eBooks and in what respects eBooks can diverge from physical books.

3.2 eBook Advantages

eBooks have been widely used by users to read novels and text because of their features and capabilities. Some of these, are advantages of eBooks over traditional books, for example: multimedia content, navigation capability, the ability to search, to customize fonts, reference linking and compatibility with various devices (Anuradha and Usha, 2006). These advantages of eBooks increase the gap between them and printed books. In addition, a study has found that students prefer eBooks because they can find relevant content easily and they can easily engage in selective reading (Abdullah and Gibb, 2008).
eBooks provide features that printed books lack such as those for people with special needs, for example a text to speech feature. This feature lets people with disabilities such as visually impaired or blindness have an alternative way of consuming eBooks. They can listen instead of reading the content of an eBook (Cavanaugh & Terence, 2002).

Another advantage of eBooks is the low cost of publishing, copying, distributing and storing them compared with printed books (Subba Rao, 2003). It is clear that the cost of production of an eBook is much less than for a printed book for the same book contents. Hernon et al. (2007) argue that this cost advantage has provided libraries, universities and individuals with a new and improved chance to increase their collection of books, articles, researches and references.

3.3 The Motivations of eBook Publishing Software

eBook technology has opened new dimensions in the books industry and it is considered a revolution in this area.

“'The most important development in the world of literature after Gutenberg is the electronic book or eBook.'”

(Subba Rao, 2005, p118)

In spite of eBook advantages that are discussed in section 1.3 and section 3.2, this technology is not as widespread as expected because of two reasons. Firstly, the lack of free applications and software to create eBooks. Secondly, the difficulty of creating an eBook manually due to the multitude of difficult steps and requirements to do so (Garrish, 2011).

Indeed, it is quite difficult to create an eBook or even convert any text document such as text, word document or PDF to an eBook. Certain kinds of books like proceedings of scientific papers are more complicated than others like novels. This complexity arises from multi columns, footnotes, adapting to small screen resolution, tables, diagrams, pictures and illustration (Marinai, 2013).

From above, it is clear that converting digital documents to eBooks can be challenging. This will be more challenging with printed text books or scientific papers with complex formatting and many embedded images, graphics and displays.

The lack of free eBook publishing software adds to the difficulty of building eBooks manually. It motivates the development of free software to support self-publishing in
order to encourage writers and authors to create their own books in an eBook form in an easy manner.

3.4 eBook Readers

A classification of eBook readers has been made by Wilson and Landoni (2001). They divide eBook readers into three types: firstly, dedicated eBook readers, which can be defined as “mobile, physical devices to display electronic (i.e. digital) documents” (Lemken, 1999). There is wide range of eBook readers such as this: Amazon Kindle, Barnes and Noble Nook and Kobo eReaders. Secondly, eBook reader software that can be downloaded on devices such as computers, tablets, smart phones etc. As an example of such software: Adobe Digital Editions, EPUB Reader. Thirdly, web books that can be accessed and displayed through the web.

Gibson and Gibb (2011) argue that the students prefer eBook readers due to the capacity of readers' hard drives, their ease of use and the portability of these reader devices. Also, they mentioned that students like the user interface of readers and the attractive fonts that they provide.

3.5 Printed Books and eBooks

There are many features of eBooks that printed books do not possess. Availability anytime and anywhere is one. Another is not requiring the physical space that printed books occupy. Another feature of eBooks is better resilience to damage and loss (Abdullah and Gibb, 2008).

In spite of the emergence of electronic documents and eBooks, and their relative advantages, printed books are still popular among readers. Also, publishers are still printing books. That leads to a discussion of the features of printed books and eBooks from the user's point of view. An important question arising here is, will eBooks replace the traditional printed books in the way that digital photographs have completely replaced film camera photographs or will they just become another form of books creation?.

Based on a survey done by ebrary, over 85% of UK students read eBooks at least ten hours per week. This percentage is higher than the 52% of students globally who read eBooks. On eBook usage, the study states that about 10% of UK students and 46% of students globally have never read an eBook (Hoffelder, 2012).

A study at the University of Strathclyde showed the reasons why students do or do not use eBooks. The main expressed reasons why they use eBooks are because they are free
from the library or there is no equivalent printed material available. In addition, users prefer using eBooks because it is easy to find relevant content. Furthermore, they find eBooks to be better for searching, selective reading and for extended reading (Abdullah and Gibb, 2008).

However, some students do not use eBooks and prefer printed books because they do not like reading from a screen. Additional issues that makes eBooks unpopular are: incompatibility of eBooks from different sources and unfriendly interfaces (Anuradha and Usha, 2006).

Some users still prefer using printed books over eBooks for some reasons. For instance, lack of knowledge about using eBooks, difficulties browsing them and special requirements such as software and devices (Ismail and Zainab, 2005).

Furthermore, users’ subject area of study plays a critical role on their acceptance and usage of eBooks. For example, students who major in Computer Science, engineering, science and technology are more likely to prefer eBooks than students in history, language, and linguistics who prefer printed books (Slater, 2009) (Croft & Davis, 2010).

Depending on users' perception, Eveland and Dunwoody (2001) refer to a study that found students feel disoriented when they read on electronic devices. This study tries to explain this by arguing that students find difficulty in estimating the line length on these devices and also have difficulty in reading tables and diagrams on them.

Jeong (2012) argues that users who read on electronic devices learn less well and are 20% slower in reading them than those who read printed books. Furthermore, he refers to a study that found moving between chapters and pages in an eBook is ponderous and difficult, which has a negative impact on users.

The relationship between the kind of book used in reading and reading issues such as fallibility and reading velocity create a concern about comprehension. Some writers relate the lack of the personal skills growth with use of eBooks. However, others believe that using this technology will increase users perception (Jeong, 2012).

With regard to the health aspects, some people prefer reading printed books to avoid eBook reading harming their eyes. Jeong (2012) reports that users still suffer from eye fatigue and irritation when they are reading eBooks, despite developments in screen technology such as LCD and LED. These technologies are used widely in desktop PCs,
In contrast, a recent generation of eBook readers have partially overcome eye strain issues caused by screen technologies such as LCD and LED. These technologies have been replaced in recent eBook readers with screens that use e-Ink technology such as the Amazon Kindle and Sony reader (Siegenthaler et al., 2011). e-Ink is a technology that uses a non-emissive display method which is similar to paper in order to simulate printed books. In addition, it improves the efficiency of eBook readers by increasing their battery life through reduced use of electricity. Reading studies with e-Ink eBook readers support their professed advantages. They raise less issues with eyestrain than emissive display eBook readers do (Golovchinsky, 2008).

### 3.6 Related Work

#### 3.6.1 EPUB Technology

One of the most popular eBook formats is EPUB which means Electronic PUBlication (Garrish, 2011). EPUB is an open standard that can be used to view many different types of documents in an electronic form. This has convince many interested parties such as authors, writers and publishers to represent novels, books, scientific papers, newspapers and other types of publications using this technology. EPUB technology has been developed by the International Digital Publishing Forum (IDPF). The EPUB format is web technology based. It is characterized by being open source, uses common technologies, is compatible with a wide number of devices and platforms, and is reflowable (Williams, 2011).

It is clear that being free and using standard common technologies such as HTML, XML and CSS increases the popularity of EPUB among programmers and users. Furthermore, the most important feature supported by EPUB and considered its major strength is reflowability which means the page contents are changeable depending on the resolution, aspect ratio and size of the screen. This reflowability also lets the font size to be kept the same, even though the display area decreases. Supporting reflowable text allows users to read books on a wide variety of devices including desktop PCs, tablets and smart phones. Figure 3.1 clarifies the meaning of the term reflowable by comparing the same piece of text when displayed on two devices with different screen geometries:
Creating an eBook using EPUB technology can be divided into three steps: creating the content, creating the package documents and compressing the contents of component files (Garrish, 2011).

At the beginning, the content documents are created depending on the EPUB version used. The source files of the body of the eBook should be in XHTML1.1 format for EPUB2 or the XHTML serialization of HTML5 for EPUB3. A package file in Open Packaging Format with extension (.opf) contains a description of the eBook and details its contents. The OPF file specifies the relative file paths of all eBook components such as chapters, images and other contents and also, the table of contents which supports navigation among the sources.

In more detail, the structure of an OPF file consists of three parts which are metadata, manifest and spine which are shown in the next figure.
The first part of the OPF file is metadata which contains information to describe the e-book contents such as title, language, author and others. The next figure shows the expected metadata.

```xml
<metadata xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dcterms="http://purl.org/dc/terms/>

<dc:identifier id="dcidid">978-09913465</dc:identifier>
<dc:creator id="creator2">Julian May</dc:creator>
<dc:contributor id="contributor3">Aardvark e-Book Maker</dc:contributor>
<dc:subject>science fiction, space opera</dc:subject>
<dc:type>story, novel</dc:type>
<dc:format>application/epub+zip</dc:format>
<dc:coverage>anthropocene and pliocene</dc:coverage>
<dc:relation>urn:ebook:ThenNonBornKing</dc:relation>
</metadata>
```
The second part of the OPF file, which is called the manifest, includes a list of all contents of the eBook and their file names such as chapters, images and table of contents as it is shown in the next figure.

```xml
<manifest>
  <item href="nav.xhtml" id="nav" media-type="application/xhtml+xml" properties="nav"/>
  <item href="contents.xhtml" id="source1" media-type="application/xhtml+xml" />
  <item href="chapter1.xhtml" id="source2" media-type="application/xhtml+xml" />
  <item href="chapter2.xhtml" id="source3" media-type="application/xhtml+xml" />
  <item href="cover.jpg" id="source57" media-type="image/jpeg" properties="cover-image" />
  <item href="toc.ncx" id="ncx" media-type="application/x-dtbnxc+xml" />
</manifest>
```

The spine is the last part of the OPF file that indicates the order of the XHTML eBook contents or parts. These content files should be in the desired order of display.

```xml
<spine toc="ncx">
  <itemref idref="source1"/>
  <itemref idref="source2"/>
  <itemref idref="source3"/>
</spine>
```

To complete the required files in order to create an eBook, two essential files should be created. The first one called "mimetype" contains this text:

```plaintext
application/epub+zip
```

The second one called "container.xml" must be in a folder called "META-INF". The file called "container.xml" tells eBook readers where to find the OPF file.

Daly (2011) recommends creating a folder called OEBPS which stands for Open eBook Publication Structure. This folder holds all content files such as OPF file, XHTML files and other files. Adding an OEBPS folder as a component of EPUB adds complexity in the control of files' and images' path. Use of it is a hangover from the open eBooks legacy format. It is not essential. However, the "mimetype" file and "container.xml" files have essential locations.

All the content files, created files and META-INF folder can be put in a single folder. This folder’s contents can be compressed except for the mimetype file to reduce the EPUB eBook’s size.
To ensure a correct and working eBook, the EPUB document should be validated. The next command can be used to validate the EPUB using the epubcheck-4.0.2 tools provided by the IDPF consortium:

```
java -jar epubcheck-4.0.2.jar my-book.epub
```

### 3.6.2 EPUB 2 Vs EPUB 3

EPUB2.0.1 was released in 2007 by the International Digital Publishing Forum (IDPF). This version requires all the content files to be in XHTML 1.1 format. However, the latest major release of EPUB technology is the EPUB3 standard which was published in 2010 by IDPF (Garrish, 2011), (Ryan, 2013). Differently from EPUB2, EPUB3 utilizes HTML5 in representing all content files. A revised version EPUB3.1 has just been released in January 2017. It makes minor tweaks to the overall EPUB3 standard.

Using HTML5 in EPUB3, allows new features to be added to the eBook. One of these features is the ability to include media such as audio and video which are supported in HTML5. However, this feature is not available in EPUB2. This progression in EPUB3 opens new dimensions for publishers and users.

In addition to that, while EPUB2 supports CSS2, EPUB3 supports CSS2 and 3. Moreover, it supports SVG, Java Script and other standards like SMIL. These improvements enhance the representation of content in eBooks and support increased interaction between readers and eBooks.

There are some issues in supporting languages in EPUB2 especially with non-Latin alphabets (Ryan, 2013). These issues emerge because EPUB2 does not support all languages such as Asian languages which adopt a different order of writing. However, all these problems disappear in EPUB3 because of wide compatibility with all major languages even those with vertical writing orders. Supporting more languages has increased both the publishers and users who use this technology.

Another difference between the two versions of EPUB is how to represent the table of contents. On one hand, EPUB2 uses an NCX file such as `toc.ncx` which is Navigation Center eXtended to define and describe the table of contents (Marinai, 2011). Creating a user defined table of contents in EPUB2 is optional. On the other hand, it is essential to create a table of contents in EPUB3 in XHTML format. Using this approach makes creating a table of contents easier and more simple.
The OPF file in EPUB 2 has the attribute `version="2.0"` in its package element, while this attribute is `version="3.0"` in the EPUB3 package file. Also, new kinds of metadata have been added in EPUB3 from DCMI Terms, the Dublin Core 2012 standard.

### 3.7 PDF

A PDF file is in the Portable Document Format. It can be defined as a format of presenting files on an output device without dependence on hardware, software and operating system. This technology allow users to save, view, print and exchange electronic documents while keeping the same structure and design (Marinai et al., 2011). In other words, the page form of the PDF file will be the same when it is viewed in different machines or by using different display screens. The figure 3.2 shows a PDF document displayed on two devices with different screen sizes. Also, the PDF format allows users to obtain a printed copy identical to the layout of electronic documents on a screen which means that the printed result will be the same in all respects apart from scale.

![Figure 3.2: PDF document in two different devices](image)

*Figure 3.2: PDF document in two different devices*
PDF documents can be classified as a kind of eBook due to some eBook definitions which are discussed in section 1.1 of this paper. For example, the description mentioned by Zeng et al. (2016). However, PDFs lack an important feature of the dominant form of eBooks which is reflowability. Lack of support for reflowability is a design decision. It also arises because of the origins of the PDF format in the PostScript language. Without reflowability, reading eBooks on small screens where the font size is fixed would require horizontal scrolling. Where the font size is allow to vary but the whole page width must be visible, it would require a magnifying glass.

One clear difference between eBooks and PDFs which makes eBooks more interactive than PDFs is in the creation process. The PDF creator in the generating process must calculate the display form to be used each time the PDF document is displayed. In contrast, by using eBook technology this will be done each time the eBook is displayed. That is because eBooks uses XHTML (Pinkney et al., 2011).

The PDF feature which preserves the page layout implies resizing the page depending on the screen size and resolution. As a result of that, the readability of documents will be difficult in devices which have a small screen size such as tablets and smartphones. Although many eBook readers are compatible with PDF files and able to display them, PDFs lacks critical features such as reflowability which make for a better reading experience (Marinai et al., 2011).

3.8 State of the Art in eBook

Currently, there is some software that supports the creation, conversion and editing of eBooks in EPUB format such as "Calibre", "Adobe In Design", "Cobynsoft's Review", "eCub" and "Sigil". Some of them are also considered eBook readers. Each software has some advantages and disadvantages which may affect the usage of this software. However, not all of them are available online (EPUB Editing Software, 2012).

3.8.1 Feedbooks

Feedbooks is free online software to create and publish eBooks in the EPUB format. The key advantages of this website are that it is easy to use and available for public without any cost. This online tool simulates the wizard in creating eBooks.
However, lack of supporting for rebuilding in eBook creation is a major disadvantage in Feedbooks. In other words, the user has to repeat the whole eBook creation process when the user needs to reorder the eBook's chapters or parts (EPUB Editing Software, 2012).

3.8.2 Caliber
Caliber is software that is an eBooks creator and readers at the same time. It has many features and is considered a leader in this technology. Firstly, it is open source software. A second advantage is that Caliber completely supports the table of contents. Moreover, it is widely supported by operating systems such as Windows, OS, and Linux. Finally, Caliber also supports conversion between different eBook formats such as from .mobi to .epub format (EPUB Editing Software, 2012).

On the other hand, the difficulty of using this software is a major drawback with Caliber. Also, this software requires downloading and installing on devices, which may be an obstacle for some devices with limited resources.

3.8.3 Cobynsoft's Review
Cobynsoft’s Review is a kind of EPUB creator software which also can be an eBook reader. Cobynsoft's Review is characterized by ease of usage. However, there are some of disadvantages that affect the uptake of this software. First of all, this software does not support a table of contents which is widely considered one of the key features of eBooks. In addition, Cobynsoft's Review is only supported by the Windows operating system. That is a barrier for users who use other operating systems to using this software (EPUB Editing Software, 2012).
4 Aim, Objectives and Requirements:

4.1 Project Aim

The aim of this project is to develop software called eTome for eBook creation from mature text or XHTML sources to support self-publishing.

4.2 Project Objectives

To achieve this aim, the following objectives have been pursued until 17 August 2017:

1. To develop software for eBook generation that can be used at anytime from anywhere by users without special knowledge of eBook formats.
2. To allow plain text files to be normalized and converted into XHTML5.
3. To enable generation of book indexes depending on identified chapters or book parts.
4. To support creation of required files and folders which are the necessary components of the EPUB3 eBook standard.
5. To allow compression of the files into an eBook archive.
6. To capture rich metadata (title, author, etc.) describing an eBook and embed it within.
7. To enable validation of EPUB compliance on generated eBooks.

4.3 Project Requirements

The key requirements are:

1. Usable Service.

The eBook creation service should be user friendly without the need to have special knowledge and skills to operate it.

The software needs to be implemented for everyone not just for specialist people to ensure its widespread usage. Because of that it must be intuitive to exercise and easy to learn to use.

2. High Availability.

This software should be available via the World Wide Web to obtain the benefit of the project.
The implementation aims to support people self-publishing their own literary works at no additional cost. In order to achieve that, it should be widely available and reachable anywhere and anytime. Providing a web based service to all comers will achieve this requirement.

3. **Privacy and Interference Protection.**

The eBook creation software should preserve users’ privacy and protect their files from other users.

Creating workspaces for users will increase the software’s reliability and create rights for the users. This will be achieved by adopting a login schema for users after registering with the service.

4. **XHTML and Text Inputs.**

The service should be able to take in XHTML and plain textual sources, and transform both to valid XHTML.

Obtaining a valid XHTML file without any syntax errors is a critical step in producing an eBook by using EPUB technology. However, likely plain textual sources will need to transformed to that. That will require a conversion utility to tidy up the sources.

5. **Connectivity with Applications.**

File exchanges between the web browser frontend and the web server backend should be supported to allow the web service to upload and download source files.

Much work in producing the eBook will be spent in uploading and downloading files between web client and web server. Sources at the server end can be transformed by service conversion utilities. Sources at the client end can be hand edited. Exchanges between each end will allow the respective operations.

6. **Chapter Demarcation, Merging and Splitting.**

Chapters should be specified by the user in a specific manner to allow the service to recognize chapters in text files.

Single sources will need to be split about chapter and part boundaries using recognized demarcation criteria. Also, chapter headings and file names will need to be gathered by
the service for OPF and navigation file generation. Mergers of sources may also need to be handled for convenience of uploading.

7. Naming and Ordering

Software should support naming and ordering of book parts.

Reordering and renaming of parts may be necessary to configure the eBook as the user desires.

8. Supporting Multiple Versions.

The software should allow the creation of multiple versions of eBooks.

Many books are published in multiple versions. Therefore, it is important that eBook creation software supports the generation of multiple versions of a book in the same manner as with printed books. This is helpful in enhancing the eBook creation process.

9. Deriving a Table of Contents.

The software should be able to generate a table of contents that contains the eBook parts in the desired order.

Similar to printed books, eBooks need to contain a table of contents to detail the contents. This is also needed to support hyperlinking to all readable parts of the eBook.

10. Generating Required Files and Folders.

The program should be able to create and manage required files and folders.

Building and generating an eBook to an EPUB standard requires various steps and conditions such as creating an OPF file, navigation file, a mimetype and container.xml file.

11. Archive Generation.

The program must be able to package the EPUB folder components in the required way into an archive.

The penultimate step is compression of all EPUB components except the mimetype file to produce a valid eBook archive.
12. Metadata Capture and Usage.

Rich metadata should be captured by the interface and packaged by the web service.

There are some essential requirements in creating an OPF file related to metadata. Some metadata fields such as title, language and identifier are indispensable. Other fields such as author and publisher are highly desirable. The software should be able to gain this data from the user at the interface and embed it in the eBook.

13. Standard Compliance Validation

eBooks generated by the service should be capable of being validated by the program and errors and warnings given.

This requirement in producing an eBook is to guarantee that the EPUB is valid and free of faults. That means it can be rendered by any standard compliant EPUB eBook reader. That can be achieved by validating the EPUB using the officially recognized checker application. It is necessary to support validation. Users cannot be relied on to supply valid input to the EPUB archive generation process.
5 Professional, Legal, Ethical and Social Issues

It is important to address the professional, legal, ethical and social issues raised by this project and discuss the relation between eBook creation and its impact on society, people and individuals.

5.1 Professional Issues

In this project, the developed software will follow best practice to produce a quality service to professional standards. That is best achieved by using established standards where possible in designing and programming this software. It will also make its design and code readable and understandable by other programmers in order to be maintainable and extensible in the future. The choice of its programming language and third party components used by the software will aim to future proof its further development and avoid premature senescence.

The adoption of the open source EPUB standard, which is the most widely supported eBook format and has the most promising long term future among eBook formats, should help future proofing as well.

5.2 Legal Issues

An important legal issue raised by eBook creation is copyright compliance. Tutterow (2011) points out that copyright law is the law governing the possession and utilization of any kind of authorship in either literature, software or media. As Williams (2011) recognises EPUB technology is an open source format and free to use by anyone such as authors, writers and publishers who wants to self-publish their own works. However, there are some concerns about this service being used in copying, updating or publishing others' work without their approval and in violation of copyright law. To address this, the service will only be open for use by users who register and have their email addresses verified. The service will also retain a record of metadata on eBooks generated by the service. The two together will act as a disincentive to users from disregarding the IPR of other persons’ work.
5.3 Ethical Issues

It is generally recognized that people nowadays spend too much time using electronic devices such as computers, tablets and smartphone in exploring websites, reading, playing games or engaging in frivolous online activities. This software may increase the time spent by users on these devices which may have an adverse impact on their wellbeing and increase their isolation and introversion. However, using this software to produce eBooks may also increase the availability of eBooks which should encourage people, especially children, to read more and improve their knowledge and skills. Trading the harm caused off against their benefits it would seem that more good will be done by eTome in making eBooks more available than harm done by making people spend yet more time online.

5.4 Social Issues

Aiding eBook publishing will diminish demand for printed books and might threaten the printing house industry which could directly threaten many peoples, livelihood. Trading the harm caused off against their benefits it would seem that more good will be done by eTome in making eBooks more available than harm done by making people spend yet more time online. On the other hand, expanding eBook self-publishing will support the environmental protection by allowing more trees to grow uncut and reducing desertification.

eBooks are easy to copy and much cheaper to adapt as well as having lower costs of publishing as Subba Rao mentions (2003). The number of published eBooks and books will also increase as well as the number of readers. Moreover, the cost of publishing and ease of replicating will allow freely available eBooks to be widely read in the Third World and aid in the dissemination of science and knowledge.
6 Methodology

6.1 Used Methodology

This part of the report covers the methodology used to carry out the eBook publishing project. Rapid prototyping is a kind of Agile methodology that reduces the expected time in design, implementation and evaluation. According to Jones (2000) applying rapid prototyping helps to reduce the project development time because of implementing a real model of the product helps in making revisions earlier.

6.2 Methodology Description

Rapid prototyping contains three stages: feasibility study, prototyping iterations and implementation.

6.2.1 Feasibility Study

In this stage the project boundaries, functions and requirements are defined. The requirements for the eBook publishing software have been defined in section [4.3 Project Requirements] in this dissertation.

6.2.2 Prototyping Iterations

In this stage, a prototype for the eBook publishing software is created, developed and enhanced several times by performing necessary changes until a satisfactory initial product is achieved as is shown in figure 6.1.

6.2.3 Implementation

After achieving an effective prototype, the implementation stage produces the final version of the eBook publishing software that meet all the requirements.
figure 6.1: Rapid prototype iterations. Source: (Chaplin, 2016)
7 Project Planning

The plan of the eBook publishing software project describes tasks, deliverables and milestones. It also contains a Gantt chart and a risks management table.

7.1 Project Stakeholders

Everyone that affects or is affected by the eBook publishing software project is a stakeholder. The following list details all the stakeholders in this project:

1. The student who programs the project.
2. The supervisor who supervises the project.
3. People who use the eBook publishing software to create eBooks.
4. People who read eBooks created by this software.

7.2 Project Tasks

All the tasks together support the realisation of the project goal. Table 8.1 contains the eBook publishing software project tasks.

<table>
<thead>
<tr>
<th>No</th>
<th>Task</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Write the Research Methods report.</td>
<td>Reading related work, writing literature review, methodology, project planning, etc.</td>
</tr>
<tr>
<td>2</td>
<td>Choose a development methodology.</td>
<td>Rapid Prototyping (RP) which is a kind of Agile methodology.</td>
</tr>
<tr>
<td>3</td>
<td>Define the boundaries, functions, requirements in more detail for the eBook publishing software.</td>
<td>In more detail than what is done in the first task.</td>
</tr>
<tr>
<td>4</td>
<td>Create the first eBook publisher prototype that creates an EPUB archive out of XHTML sources</td>
<td>First prototype contains minimal features and functions.</td>
</tr>
<tr>
<td>5</td>
<td>Review, refine and develop</td>
<td>Contains formative evaluation and evaluation by a user.</td>
</tr>
<tr>
<td>6</td>
<td>Create another prototype supporting generation of a table of contents, cover page and cover image.</td>
<td>Create a new version with more advanced features such as table of contents and title page generation.</td>
</tr>
<tr>
<td>7</td>
<td>Review, refine and develop</td>
<td>Contains formative evaluation and evaluation by a user.</td>
</tr>
<tr>
<td>8</td>
<td>Create third prototype supporting rich metadata, EPUB compliance validation and tidying XHTML sources.</td>
<td>The final prototype should meet all the software requirements</td>
</tr>
<tr>
<td>9</td>
<td>Review, refine and develop</td>
<td>Contains formative evaluation and evaluation by a user.</td>
</tr>
<tr>
<td>10</td>
<td>Develop a final implementation and full web service deployment.</td>
<td>This task starts after the first prototype.</td>
</tr>
<tr>
<td>11</td>
<td>Test the eBook publishing software</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Evaluate the eBook software</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Write MSc dissertation</td>
<td></td>
</tr>
</tbody>
</table>


7.3 Project Deliverables

There are four deliverables for the eBook publishing software project. The first deliverable is the F21RP report which contains the literature review, requirements analysis, normative issues and project plan. The second deliverable is the MSc dissertation. The third deliverable is the eBook publishing software which supports self-publishing books from mature text or XHTML sources. The last deliverable is the poster describing the whole project.

7.4 Project Milestones

The milestones in the eBook publishing software project are:

1. The submission of the Research Methods and project planning report.
2. The end of each prototyping iteration.
3. The end of the implementation stage.
4. Project dissertation and software submission.
5. Presenting the project's poster.

7.5 Risks Table

Project risk management PRM refer to all threats that threaten quality, performance and success of any project (Ward and Chapman, 2003). Defining all the main potential risks that are expected to occur in the eBook publishing software project at an early stage helps to avoid their negative influences. It also reduces the costs of mitigating these risks.

Table 8.2 details all potential risks in this project.

<table>
<thead>
<tr>
<th>No</th>
<th>Risk detail</th>
<th>Probability</th>
<th>Impact</th>
<th>Impact Area</th>
<th>Mitigation - How to be solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>System crash and losing all data</td>
<td>Low</td>
<td>Medium</td>
<td>Technology</td>
<td>Using Dropbox to keep a backup</td>
</tr>
<tr>
<td>2</td>
<td>Programmer illness</td>
<td>Low</td>
<td>Low</td>
<td>people</td>
<td>Asking for extension, If there is an impact on project</td>
</tr>
<tr>
<td>3</td>
<td>Supervisor is unavailable</td>
<td>Medium</td>
<td>High</td>
<td>people</td>
<td>Communicate with him via email</td>
</tr>
<tr>
<td>4</td>
<td>Large change in requirements</td>
<td>High</td>
<td>High</td>
<td>Project</td>
<td>Create new iteration in</td>
</tr>
<tr>
<td></td>
<td>Programming issues (difficulty, errors, etc.)</td>
<td>Medium</td>
<td>High</td>
<td>Software</td>
<td>Ask for help from supervisor or from programming website.</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>------</td>
<td>----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Working in Ramadan when the fasting time is about 19 hours</td>
<td>High</td>
<td>Medium</td>
<td>Timing</td>
<td>Keep some easy tasks for Ramadan.</td>
</tr>
<tr>
<td>7</td>
<td>Issues in integrating eBook publishing software with other applications</td>
<td>Medium</td>
<td>High</td>
<td>Software</td>
<td>Ask for help from supervisor or from programming website.</td>
</tr>
</tbody>
</table>

*Table 7.2: Risk table*
8 Design and Implementation

Developing the eTome software as a stand-alone product would improve software performance because all the software and files needed will be on the same machine. Furthermore, a client server implementation would incur additional time and complexity in transferring files between the user and server ends.

On the other hand, using a client server model will allow users to use the software without any constraints and conditions regarding their devices or their operating systems. The only requirement for its use would be a browser and web access. Also, stand-alone software would require to be installed on users’ machines and need to be compatible with their computer specifications and its operating system.

Taking these issues into account, eTome was designed to be client server application to provide a high level of availability. Also, it was designed to provide an acceptable degree of interaction between users and application. This will reflect on the service quality and therefore on its users’ satisfaction. In addition, it allows users to be convinced of the final design of e-Book before they generate the eBook.

From a technical perspective, eTome software has been developed by using the Java programming language on the server side and JavaScript on the client side.

8.1 eBook Format

eTome software adopts the EPUB format which is the Electronic PUBlication standard and a popular open source technology in the eBook domain. It offers features and advantages which were discussed in section 1.3 and section 3.2 such as supporting reflowable texts which distinguish eBooks from other kind of electronic documents. The latest stable version of EPUB is EPUB 3 which is the chosen format of this project.

8.2 Tomcat Servlets

Tomcat servlets is a popular web services programming API developed by Sun Microsystems (Kurniawan, 2002). It uses the Java programming language to build web pages. HTTP servlets support the HTTP protocol and handle requests coming from web clients (users) in addition to generating responses to return to them. This improves the connectivity requirement in uploading and downloading files which is the most critical work in eBook creation. Figure 8.1 shows the servlet architecture.
The deployment of a Tomcat servlets engine in Heriot watt university and full support from the IT staff are the main reasons for using it in the eBook creation project. This enables the eTome to be readily available for users and satisfies the high availability requirement.

### 8.3 General Overview

Regarding the usable service requirement, the eTome software was designed to offer simple interfaces to users so it can be exercised without any need for training or technical background. In addition to the main tasks, eTome software can do multiple auxiliary tasks to encourage users to create and develop their own eBooks with it. Figure 8.2 clarifies these tasks in a Use Case diagram.
In terms of limitations in using eTome, the effects of using eTome or some of eTome features by multiple users working on the same book at the same time was not studied. That is because it was envisaged that separate users would usually work on their own distinct eBooks.

### 8.4 Registration and Login

Due to the importance of users’ privacy and protection of their authorship effort from third party interference which is one of the software requirements, registration and login have been introduced in the system design of eBook software to protect users’ files from other users. That means creating accounts for each user.

Registration is an important and simple process. Users just need to fill in their personal information username, password, full name and email address in the registration page as shown in figure 8.3. After the user has filled in his personal information, eTome will
check the availability of the user name. If the user name is acceptable and not used, eTome will obfuscate the user’s password using the MD5 hash algorithm and store it.

![Online Registration](image)

**Online Registration**

*Please fill in the following form:*

<table>
<thead>
<tr>
<th>Field</th>
<th>Example</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Name</td>
<td></td>
<td>This field is mandatory</td>
</tr>
<tr>
<td>Password</td>
<td></td>
<td>This field is mandatory</td>
</tr>
<tr>
<td>Repeat password</td>
<td></td>
<td>This field is mandatory</td>
</tr>
<tr>
<td>Full name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Figure 8.3: Registration page.](image)

Instead of a database, eTome uses a text file called “projects_login_file” to hold users’ personal information. For each user, personal information is gathered and then written in one line separated by semicolons for use for login purposes. Figure 8.4 shows the content of “projects_login_file” file.

![Figure 8.4: projects_login_file.txt content](image)

For instance, after the user “Nourah” completed the registration process successfully, a folder named Nourah was created in this location (http://www2.macs.hw.ac.uk:8080/maa24/ebooks_folder/Nourah). This folder will
contain all projects which will be created by the user “Nourah” in the future. Another folder called EPUB is also created inside the user folder to hold all generated eBooks in the future. Moreover, a file called “projects” is created inside the user’s folder to be as an index for the user’s projects.

After that, the user will be noticed that the registration process was successfully completed. The user can then login using his user name and password through the login page. Figure 8.5 shows the login page.

![Login Page](image)

**eBook Creation Website**

**Login Page**

**Members Login**

User Name: 
Password: 
Login
Not yet registered? 
Register now

**Guests Section**

Continue as a guest

*Figure 8.5: Login page.*

When the user enters his username and password in the login page, eTome will complete the login in two steps:

- eTome will look for the username in the login file to find the user’s information.
- When the user name is found, eTome will hash the password supplied and then compare it with the stored hashed password of that user.
After that, eTome displays the main menu page, if the login succeeds. Otherwise, it displays the login page again with a message describing the error. Figure 8.6 shows error messages for refusing a login attempt.

For those who do not want to register, a choice called “Guest” has been implemented to allow them to use the eTome without registration. Naturally, this use of eTome is more limited.

There are some constraints forced by eTome on the registration process. Users are not allowed to use special characters in their user name. Therefore, eTome will refuse the user name if it contains any special characters. In addition, eTome will verify the email’s...
format before accepting it. Figure 8.7 shows a message displayed by eTome regarding to the constraint on username.

![Image of form with validation messages]

**Figure 8.7: eTome refuse special characters in username**

### 8.5 Creating Projects

After registration, authenticated users are allowed to create projects in order to start handling these projects and creating eBooks. However, there are some constraints that the software imposes on this process such as preventing the use of special characters in project names and preventing any project name being duplicated. That is because eTome use these names as the name of the project folder after replacing all spaces with the underscore character “_”. Figure 8.8 shows a picture of an error message displayed by eTome when the users uses special characters in the project name.

![Image of error message]

**Figure 8.8: Error message When using special characters in creating new project**
As was discussed in the registration section, the “projects” file will be used as an index for all projects created by the specific user. eTome checks this file when creating a new project to avoid duplication in project names. Creating projects creates a new folder for this project inside the user’s folder. This folder will hold all the project’s components such as chapters / parts, cover image and others related eBook files. For example, creating a new project called “first project” by the user “Nourah” will result in create (../Nourah/first_project).

Another two important files are created by eTome inside the project folder. Firstly, “parts” to hold parts names, parts links, cover’s image link and the number of parts. Secondly, “metadata” to hold the eBook’s metadata.

Users will be notified if the project has been created or it is already there as shown in figure 8.9. Once a project has been created, users are allowed to start building and handling the project.

![Welcome maha, Log off](image1)
![Welcome maha, Log off](image2)

Figure 8.9: eTome notifications after creating a project
8.6 Uploading Files

As was determined in the system requirements, eTome gives users the choice to choose file input types either XHTML or plain text format in uploading chapters / parts to a certain project. Also, users can use both formats in certain projects.

8.6.1 XHTML Files Format

The first possible data input in eTome is XHTML format. When users choose XHTML format as the input type, they are allowed to add multiple XHTML files which are the book’s chapters / parts by pressing the button “Add another file” as shown in figure 8.10. Once the files have been chosen, eTome will upload these files in its project folder which is inside the user folder.

![Upload eBook Parts](image)

*Welcome "maha", here you can add chapters for the project : "Life_is_good"

*Upload the XHTML files to build your eBook

Add eBook chapters :

Choose the XHTML file : C:\Users\Nourah\Desktop\Darkness\Background.xhtml
Choose Another Chapter : C:\Users\Nourah\Desktop\Darkness\Chapter 1.xhtml
Choose Another Chapter : C:\Users\Nourah\Desktop\Darkness\Chapter 2.xhtml

![Add another file](image)

Figure 8.10: Upload XHTML files.
After that, eTome updates the “parts” file by writing the names of these parts, the names of the parts source files and their total number. Figure 8.11 shows the contents of the “parts” file. The word “unknown” in “parts” file will be used later when the user wants to change the parts name.

![Terminal](image)

Figure 8.11: The contents of the “parts” file

These files which are considered the eBook’s contents are ready to be handled. When the files are downloaded and the “parts” file is updated, eTome presents these files in a new page to allow users to preview, validate, update and save these files with a high level of interaction.

### 8.6.2 Text Files Format

Another possible type of content input in eTome is text file format. When a user chooses to upload parts in a text format as it shown in the figure 8.12, eTome handles and processes the text file by demarcation, merging and splitting the content of the text file to create chapters / parts depending on certain markup conventions. The currently implemented convention are that all chapters / parts in plain text must start with the word “Chapter” or “chapter”. Also, each title should start with “<h>” in order to determine a special format for its header content. In addition, paragraphs should be separated by an empty line to be recognized by eTome.
After that, eTome converts these chapters / parts into valid XHTML format and then stores them in the project folder which is inside the user folder. Similar to XHTML data input, eTome updates the “parts” file by writing the names of the generated parts, the names of the parts source files and their total number. These files are presented in a new page to allow users to preview, validate, update and save these files until they reach the desired result.

8.6.3 Preview, Validate and Update XHTML Files

Once the uploading process is completed, eTome displays a new page containing all generated parts with the availability to handle these parts. In this page, it is possible to preview and validate all eBook’s parts. In addition, users can see the XHTML source of all the parts. Therefore, they can update these sources in order to improve them. Also, the users can press the button “Show preview” to see immediately what they have done as shown in figure 8.13.
Another feature supported by eTome concerns the system requirement to support validating of the XHTML files. eTome uses the “tidy-5.4.0-64bit” application to validate XHTML files. This application contains a new feature in addition to the validation which is correcting errors in XHTML files. Figure 8.14 presents a picture of the validation result.
8.6.4 Uploading and Handling Files Limitations

According to the complexity of the processing and handling of text files, there are some limitations in eTome that need to be taken in consideration. The following bullet points list eTome limitations which could be addressed in the future.

- eTome does not support embedded images in plain text inputs apart from the cover image.
- eTome handling of parts of a page does not support inserting or handling tables or bullet points in plain text inputs. They are supported, if they are created in advance in XHTML data input.
- Not applying the constraints in the book source file such as the chapter starter may cause undesired results after generating eBook’s parts by eTome.
- Not using “parts.txt” or “metadata.txt” as names for the book source file. That is because they already used by eTome.
8.7 Adding / Changing / Deleting Cover Image

One of eTome’s features is support for uploading a cover image to a certain project. The cover image appears in the first page of the eBook and also becomes the eBook’s icon picture which is a new feature in EPUB3. Certainly, it is possible to change or delete the cover image at any time. Figure 8.15 shows uploading cover image page.

![Upload eBook Cover Image](image)

*Welcome here you can add or change the eBook’s cover image: Cool_Darkness*

*Add or change the cover image*

*To choose a cover image press browse*

Similar to the processes of uploading parts, the name of the cover image file will be written in the “parts” file. After any change either by adding, changing or deleting the cover image, the “parts” file is updated by eTome to hold the latest information and the user is notified as shown in figures 8.16 and 8.17.

![Figure 8.16: parts file after adding the cover image](image)
In terms of upload cover image limitations, eTome does not impose any constraints on the size of the cover image. Therefore, adding a large cover image may affect the size of the produced eBook.

### 8.8 Sorting Project’s Parts

According to the renaming and reordering requirement, eTome has been designed to enable users to reorder parts to configure the eBook as they desire. This feature is available only after uploading parts to a certain project. Figure 8.18 shows the reordering eBook’s parts page.
In this page, the eBook’s parts can be reordered by pressing on any part and moving it to the desired place. After establishing the new parts order and pressing the button “Save changes”, the new parts order is adopted. eTome updates the content of the “parts” file by rewriting the parts in the new order. Finally, eTome displays a message to notify the user that the new eBook’s parts order have been saved. However, when the project does not contain any part, eTome shows an error message to warn the user of this. Figure 8.19 presents the eTome messages after reordering parts.

Figure 8.19: eTome messages after reordering parts.
8.9 Renaming and Deleting of Project’s Parts

To reach the desired eBook, eTome has been designed to enable the renaming and deletion of the project chapters / parts. In the rename and delete parts page eTome lists all uploaded and created parts followed by a textbox called desired title and checked check box. Figure 8.20 shows the rename and delete parts page.

![Rename and Delete Parts](image)

**Figure 8.20: Rename and delete part page.**

Thus, in the case of renaming parts, users just need to write the new title for chapters / parts in the desired title text box. However, in the case of deleting parts, users can easily uncheck the part to be deleted. Finally, after a user presses the “Save changes” button, eTome displays a summary to inform users about all changes. Figure 8.21 shows the message that contains the details of all changes.
Adopting and Renaming Parts

The parts after updating:

Part1: Cool_Darkness.xhtml has adopted and renamed to "Introduction"
Part2: Chapter1.xhtml has adopted and renamed to "Chapter 1: Mark of the Huntress"
Part3: Chapter2.xhtml has deleted

Figure 8.21: eTome message after reordering and deleting parts

All the previous changes such as renaming parts or removing parts were written in the “parts” file. Figure 8.22 shows the content of “parts” file after renaming and deleting parts. The software by default uses the source files names as the part name only if the user did not rename the parts.

Figure 8.22: the “parts” file after renaming and deleting parts

8.10 Filling the Metadata

Metadata is a collection of information that describes an eBook. There are 15 elements of metadata supported in EPUB3. Designing eTome took in to consideration creating a page
to capture the eBook’s metadata from the user. The most used metadata in search such as title, author, publisher date, description, type, subject and right are chosen in eTome’s metadata page. This allows the user to supply the metadata at any time starting from the project’s creation up to just before generating the eBook. Figure 8.23 shows the metadata capture page.

![Please Fill the Book's Metadata](image)

Figure 8.23: Filling metadata page.

Choosing the project name from the filling metadata item in the main menu will result in opening the metadata page. Firstly, eTome reads the “metadata” file which was created at the same time of creating the project to obtain the metadata - if it was stored before - and reloads it into the metadata page. That means if the metadata has been filled in previously, the metadata page is opened and contains the metadata. Otherwise it is empty. After filling the fields of the metadata form and saving the changes, eTome saves the changes and informs the user. Figure 8.24 shows the eTome message after the user saves the metadata.
The content of the “metadata” file is updated by eTome with the latest metadata entered by the user. Figure 8.25 presents the content of the “metadata” file.

```
Title; Swann's Way
Author; Marcel Proust
Publisher; Planet eBook
Book date; 1922
Description; For a long time I used to go to bed early. Sometimes, when I had put out my candle, my eyes would close so quickly that I had not even time to say "I'm going to sleep." And half an hour later the thought that it was time to go to sleep would awaken me
Rights; the author reserves all rights
Subject; Social, slice of life
Type; Novel
```

Figure 8.25: the content of the “metadata” file
8.11 Generating eBook

Generating an eBook is the most important and complicated function in creating an eBook. That is because all the eBook’s requirements such as “Deriving a Table of Contents”, “Generating Required Files and Folders”, “Archive Generation” and “Standard Compliance Validation” are created and done in this function.

When the user is sufficiently satisfied with his project, he can release the eBook in EPUB format. Deciding to generate the eBook requires eTome completes some important tasks as discussed in section 3.6.1 EPUB technology. These tasks are:

1. Creating important folders such as eBook, META-INF and OEBPS

The META-INF folder will contain the file “container.xml” which tells eBook readers where to find the OPF file. The OEBPS folder holds all the eBook’s contents.

2. Creating important files such as container.xml, mimetype, content.opf, nav.xhtml, toc.ncx, stylesheet.css, tableOfcontent.xhtml and titlePage.xhtml.

eTome will generate all the above files automatically. Container.xml, mimetype and stylesheet.css file contain fixed text. However, the other files require additional information to be created such as metadata, parts names, parts source files names and cover image. The function collects and gathers the information to generate these files.

3. Compress all content of eBook folder except the mimetype file.

As it discussed in section 3.6.1, all created folders with their contents should be compressed except the mimetype file to produce the eBook. Not compressing the mimetype file is required by both the EPUB 2 and 3 standard.

eTome captures the book title which is given by the user in the metadata to use it as the eBook’s file name replacing all spaces in the book title to the underscore character “_”.

Another feature in eTome is supporting multiple versions of an eBook. Applying this feature requires counting the number of eBooks created for this project to know the version number. If there is a previous version, the software follows the eBook name with version number. Otherwise, the eBook name will remain as the eBook title. For example, suppose that the user wants to generate an eBook and the book title is “Travel through time”. If there are three previous versions of this eBook, the new eBook name will be “Travel_through_time_v4”. However, if it is created for the first time, then the eBook
name will be “Travel_through_time”. Figure 8.26 shows the web page used to generate an eBook.

![Please Fill the Book's Information](image)

**Figure 8.26: Generating eBook web page**

Supporting multiple versions means the ability to generate more than one eBook in a certain project. In other words, users can generate an eBook for a certain project and then they can improve this eBook for example by adding new contents to this project and thereafter, create a new version of the eBook.

Finally, the eBook is ready for the user to acquire. The eBook is stored in the EPUB folder inside the user folder. Users can download any eBook at any time. Figure 8.27 presents the final step in creating an eBook which supports downloading the eBook.
8.12 Validate the eBook

According to the system requirements, the generated eBook should be guaranteed to be valid and free of faults. Therefore, eTome uses “epubcheck-4.0.2” tools to validate the eBook. This task is available to users after they generate their own eBooks. Validating the eBook give the users the guarantee that their eBooks do not contain errors and have been created in conformity to the International Digital Publishing Forum standard (IDPF). Figure 8.28 shows the result of validating an eBook.
8.13 View All eBooks

Viewing all created eBooks in a suitable manner is one of eTome’s features. This feature allows the users to see what they have created. To achieve that, eTome reads the contents of the EPUB folder for a certain user. The EPUB folder mentioned in the registration and login section holds all created eBooks for a certain user. eTome displays all the eBooks names with their cover images in a table format. Moreover, this table contains a link for each eBook in order to allow users to download the eBook. Figure 8.29 shows eBooks created by a user.

![You have made these eBooks :](image)

8.14 Activity Diagram

The activity diagram illustrates the general design of the eTome software. It also shows how the eBook creation project starts and ends and relationships and dependencies among its processes. Figure 8.30 presents the activity diagram of the eBook creation project.
Figure 8.30: eTome activity diagram
9 Evaluation

Depending on the evaluation objectives, there are two main types of evaluation. These types are formative evaluation and summative evaluation.

Formative evaluation refers to an evaluation that is done during a project in order to improve and enhance the project. This kind of evaluation is done at the end of each stage of prototype development. Formative evaluation is useful in developing and enhancing eTome software.

However, summative evaluation refers to an evaluation that is done after the release of the product in order to measure its level of success relative to the project's aims and objectives. It addresses the criteria that determine whether the eTome software meets all the requirements, objectives and aims of the project.

The project’s summative evaluation gathered a group of 10 people from different disciplines, who do not have special expertise on eBooks in order to validate these requirements and answer a questionnaire. The subjects were asked to choose a text from a set of samples and to prepare, update, configure and convert it to an eBook. They were then asked to validate it and render it in an eBook reader.

The evaluation sample is small and consists of just ten participants. So, its conclusions cannot be affirmed with a high degree of confidence. Its scale is not sufficient to eliminate sampling biases. Nevertheless, its results are suggestive about what works well and what does not and needs correction in the project’s software.

The questionnaire contained 17 questions. 4 of them were open questions. The others were closed. It was designed to capture user feedback and reactions to using the software.

9.1 Users’ Experience

Asking a question about user experience in terms of reading an eBook is a helpful start for the questionnaire. “How often do you read an eBook?” probes the respondent’s knowledge and interest in eBooks. The next question “How often do you create an eBook?” gives information about users’ background in terms of creating an eBook. It was not expected that many users would have done so before. However if they had, then they would be likely to may feel more comfortable with eTome software than others who had not.
The questionnaire’s result shows that 90 percent of participants have read an eBook, while just one participant had no experience in reading eBooks. Certainly, more than 50 percent of them read eBooks often or always. However, four participants read eBooks rarely. This gives some indication of how popular eBook reading is in the sample and seems to be consonant with the UK population in general.

On the other hand, the result said that all the participants did not have any experience in creating eBooks. This result may reflect the lack of the free eBook creation software or the difficulty of existing software. However, it was not unexpected. Creation software for eBooks such as eTome should have a role in increasing the people’s awareness about the ease of creating eBooks in order to encourage them to do so.

Figure 9.1 illustrates the classification of users depending on their habits in reading and creating eBooks.

9.2 Usability of Creating eBook
To measure the usability of creating eBooks by eTome, participants were asked to complete the statement “Creating eBook with eTome software was:”. This statement can
be completed by choosing from the evaluation scale that starts with “very difficult” and ends with “very easy”.

The aim of including this statement in the questionnaire is to know to what extent the sample found eTome to be usable in creating eBooks. Also, it was aimed to capture the simplicity level of the software. In other words, the users’ impression in terms of creating eBooks with eTome software.

The evaluation scale contains six values and it does not contain a neutral choice. This was deliberate in order to force participants to state their position on the positive or negative side. Applying this manner will limit arbitrary answers and increase the utility of the answers.

Analyzing the participants feedback shows that 20 percent of them believe that the creating eBook using eTome was somewhat difficult while 80 percent agreed that using it was somewhat easy or even easier. The largest number of the participants chose somewhat easy in answering the question.

Although creating eBooks might be difficult or confusing for a novice, eTome’s web page design and its steps in creating eBooks may increase this difficulty. Figure 9.2 shows the participants’ feeling about the usability of creating eBooks by eTome.

![Usability of Creating an eBook](image.png)

*Figure 9.2: Usability of creating an eBook*
9.3 XHTML Checker Tool’s Performance

The XHTML checker tool performs important work in creating eBooks. eTome software uses this tool to validate the XHTML files. It also corrects errors that it finds. Because of that, it is important to obtain users’ feedback about this tool to evaluate the eTome software.

The questionnaire contains one question of two parts to evaluate the checker tool. The participants were asked to rate the performance of the checker tool from two aspects firstly, reporting errors and secondly, correcting errors. The evaluation scale for reporting errors starts with very obscure and ends with very clear while correction errors starts with very frustrating and ends with very satisfying.

In terms of reporting errors, 80 percent of participants believe that the checker tool reports errors in a somewhat clear manner or better. More than 50 percent of them agreed that the checker tool manner in reporting errors was clear. One participant chose somewhat obscure in answering this question.

On the other hand, 80 percent of participants stated that the tool was satisfying and somewhat satisfying in correcting XHTML files errors. However, the remain 20 percent of the participants thought that the tool was somewhat frustrating in correcting errors.

Interestingly, the participants opinions about the checker tool in both reporting and correcting errors were somewhat similar. Also, in both, the feedback is free of any frustrating, obscure, somewhat frustrating or somewhat obscure.

It could be concluded that the tool is reporting the errors in a clear manner with enough information, such as error’s line and details. However, the tool might change the XHTML file format during the correction process. Figure 9.3 shows the participants’ opinions about the performance of the XHTML checker tool.
In this part of evaluation, the performance of critical functions used in eTome software was assessed. Most of creation time is spent in uploading an eBook’s contents, processing text files in order to obtain valid XHTML and validating eBooks.

In the questionnaire, all the participants were asked to evaluate a statement by choosing a value from the evaluation scale which starts with “strongly disagree” and ends with “strongly agree”. The statement said that the performance of the functions above was adequate”. To obtain as useful results as possible, the evaluation scale did not contain a neutral answer in order to force respondents to come done on either the negative or positive side.

Starting with the first function, around 90 percent of participants stated that they agreed and strongly agreed with the statement, while just 10 percent which represents one participant somewhat agreed with the statement. 40 percent of participants strongly agreed that the performance of uploading files was adequate.

In terms of processing text files, seven participants out of ten agreed and strongly agreed that the performance of processing text was adequate. However, two participants somewhat disagreed with the statement. The results indicate that “processing text file” task achieved a lower evaluation in comparison with uploading file although it contains complex operations and performs difficult tasks.
Regarding to validating eBook function, the participants feedback divided between somewhat agree, agree and strongly agree. Specifically, the majority of answers shows that the participants agreed with the statement. Six participants agreed with the statement while three participants somewhat agreed that the function’s performance was adequate. Finally, one participant strongly agreed with the statement.

Figure 9.4 shows the participants’ opinions regarding to the performance of the functions above. It illustrates in general that participants believe that the performance of the above functions were adequate. However, the results suggest more impatience with the validation process than with the other tasks. Since validation involves many complex operation and far exceeds the complexity of the other operation, this may reflect a lack of understanding and tolerance of the need to ensure standard compliance in EPUB eBook generation.

![Tasks' Performance](image)

**Figure 9.4: eTome functions performance**

### 9.5 Dividing the Text Source File into Parts

It is important to evaluate eTome’s ability in dividing the book source file into chapters / parts which is a critical task in creating eBooks. This task will determine the final design of the eBook. EPUB eBooks with a few monolithic parts render much more slowly during page turning in eBook readers than those partitioned rather more finely into sections.
The participants were asked to give their feedbacks about how eTome handles the text file in order to generate independent files based on the number of chapters/parts found in the text file. The choices were multiple starting with “inadequate” and ending with “adequate”.

It clear as shown in figure 9.5 that 50 percent of the evaluation sample stated that dividing the book source files into chapters / parts was done by eTome in a somewhat adequate. 30 percent of the participants believed that this task done by eTome was adequate. On the other hand, only two participants who represent 20 percent of the sample said that the dividing process was somewhat inadequate.

From above, eTome achieved to somewhat the satisfaction of 80 percent of the participants in dividing the book source file into chapters / parts. The limitations of eTome regarding the handling of text files may have affected the participants feedback. This could be addressed by extending the “handle text” method in eTome to clearly recognize text contents.

![Figure 9.5: eTome evaluation in generating parts](image-url)
9.6 Reordering Chapters / Parts

In this section, the reordering eBook parts feature will be discussed in terms of users’ satisfaction. Reordering chapters / parts allows the users to choose the desired order for the chapters / parts after uploading or generating the files. In order for eTome to achieve the users’ satisfaction, this process should satisfy the users.

To evaluate this feature, the participants were asked to complete a statement said, “support for reordering the eBook’s parts was:” by choosing a value from the evaluation scale which starts with “unsatisfying” and ends with “satisfying”.

The question elicited the highest degree of agreement among participants over 4 or more options. The majority of the participants, approximately 70 percent agreed that reordering of the eBook’s parts was satisfying. The remaining participants stated that reordering of the eBook’s parts was somewhat satisfying. The web page design for eTome may be affected depending on the browser. Therefore, this may affect the reordering page, which uses interactive features to reorder parts. Addressing this issue may improve user satisfaction.

Figure 9.6 shows the feedback of participants in terms of reordering the eBook’s chapters / parts.

![Figure 9.6: Reordering parts evaluation](image-url)
9.7 Title Page Evaluation

The title page is generated by eTome automatically. It contains the cover image in addition to some information such as title, author, date and publisher. Therefore, to evaluate eTome, the generated title page should be evaluated. Evaluating the title page might be useful when it is done in terms of its suitability and design.

In the questionnaire, the participants have been asked to give their opinion about the title page and to what extent it was successful. There were two evaluation scales, the first addressed the functional aspects, starts with “unsuitable” and ends with “suitable” while the second addressed the aesthetic aspects, starts with “ugly” and ends with “elegant”.

In terms of the suitability, the questionnaire elicited that 90 percent of the evaluation sample agreed that the title page was suitable or somewhat suitable. However, 10 percent of the sample stated that it was somewhat unsuitable, as shown in figure 9.7.

On the other hand, nine participants out of 10 believed that the title page which is created by eTome was ok or elegant. In contrast, just one participant stated that it was clunky, as shown in figure 9.7.

The feedback provided by the questionnaire shows that the title page requires improvement in terms of its contents and design. Adding additional eBook metadata to the title page may be useful. Furthermore, eTome’s title page needs to be redesigned in order to attract the users.

![Title Page Evaluation](image)

*Figure 9.7: Title page evaluation*
9.8 Table of Contents Page Evaluation

Similar to the title page, the table of contents page was evaluated. The table of contents page generated by eTome contains chapter names with hyperlinks to these chapters. However, all EPUB readers provide the table of content by using “nav.xhtml” and “toc.ncx” files.

In the questionnaire, the participants were asked to evaluate the table of contents page in terms of its suitability. In addition, they were also asked to give their opinion about the useful of its existence.

In terms of suitability, figure 9.8 shows that 60 percent of the participant thought that the table of contents page was somewhat suitable. However, 30 percent of the participants stated that it was somewhat unsuitable.

On the other hand, 70 percent of the evaluation sample thought the generated table of contents page was useful or somewhat useful. In contrast, one participant who represents 10 percent of the evaluation sample stated the it was useless, as shown in figure 9.8.

The results suggest that may the table of contents provided by the eBook reader is a sufficient substitute for the table of contents generated by eTome. Moreover, the table of content in the physical books contains the details of the book’s components such as chapters, section and subsection along with their page numbers, which is not supported in eTome’s table of contents.

---

**Figure 9.8: Table of contents evaluation**
9.9 Tasks Instruction Evaluation

In terms of the usability of eTome, the instructions that describe tasks in eTome should be evaluated in order to evaluate eTome. Creating a valid eBook requires following and applying the instructions correctly. Because of that, the instructions should be clear to enable users to create eBooks correctly.

Evaluating the instructions was achieved by asking the participants to state their thoughts about these instructions after using the eTome - were they clear or confusing.

The pie chart in figure 9.9 illustrate the participants feedback in terms of the tasks instructions. 30 percent of the participants believed that the instructions were ok. However, the other 70% of participants stated that the instructions were either informative or clear.

These results refer to the need to improve the instruction to improve user satisfaction. This may be achieved by reformulating and simplifying the instructions to be more clear and understandable in order to reduce the expected confusion.

![Tasks Instructions Evaluation](image)

*Figure 9.9: tasks instructions evaluation*
9.10 Messages and Notifications Evaluation

Mistakes can be caused by users or by software. Therefore, it is important to report clearly the errors to the users to allow them to understand what has happened and why. It is important also to give users advice about how to overcome errors. The quality of the information reported in error messages reflects the quality of the software design.

In the questionnaire, a statement about eTome messages were written. This statement said, “eTome messages and notifications are helpful”. The participants had to choose a response from the evaluation scale starting with “never” and ending with “always”.

Figure 9.10 shows that 80 percent of the evaluation sample chose often or always to state their opinion about the statement. However, 20 percent of the participants believed that the messages and notifications were only sometimes helpful. This suggests that there is scope for improving what these messages convey.

![Messages and Notifications Evaluation](image)

*Figure 9.10: Messages and notifications evaluation*

9.11 eTome Steps to Create eBook Evaluation

eTome consist of a number of steps to create an eBook. To be successful software, these steps should be economical and effective. In this section of the evaluation, a general opinion about the steps required in eTome was elicited from the users.
In the questionnaire, the participants were asked to choose one word or more from predefined words to describe eTome steps. Some of the predefined words have a positive meaning such as concise, clear and encouraging while others have a negative meaning such as too many, confusing and dull.

The feedback of the questionnaire shows that the majority of the participants described the eTome steps required to create an eBook by two words clear and too many, as it shown in the figure 9.11. This result refers to the need to combine some steps together in order to reduce the number of the steps. However, there were still quite a few negative choices such as “confusing”. Some operations in eTome depend on other operations. For instance, users must upload the eBook’s parts before reordering or renaming parts. Furthermore, the confusion might be a result of the existence of two sections for uploading files one for XHTML and the other one for text file.

![eTome Steps Evaluation](image)

*Figure 9.11: eTome steps evaluation*

**9.12 Created eBook Evaluation**

After finishing evaluating the eTome features, it is the time to evaluate the final product of eTome which is the eBook. That was achieved by obtaining users’ impression about the generated eBook.
The participants in this part had to provide their judgments about the created eBook. To what extent did they agree or disagree with the statement that said that the created eBook by eTome was satisfactory.

It is clear by looking to the diagram in figure 9.12, that seven participants out of ten agreed that the created eBook was satisfactory. The remaining three participants somewhat agreed with the statement. Missing some important steps such as the validation of the XHTML file may cause a failure to create a valid eBook, and in some cases the failure to produce readable eBook. Imposing constraint could be useful to ensure that all XHTML files have been validated.

![Created eBook Evaluation](image)

**Figure 9.12: Created eBook evaluation**

### 9.13 The Practical Use of eTome

Further assessment of eTome was achieved by assessing users’ readiness to use eTome to create eBooks. The results of this evaluation indicate whether the advantages of eTome are more than its defects or vice versa.

In the questionnaire, participants were asked to give their feedback in terms of their preparedness to use eTome to create eBooks. The evaluation scale for this question starts with “never” and ends with “always”.

The diagram in figure 9.13 shows the results of preparedness to use eTome question. 70 percent of the evaluation sample answered the question by choosing sometimes or often.
However, 30 percent of the participants chose rarely in terms of their preparedness to use eTome to create eBooks.

![Preparedness of Using eTome](image)

**Figure 9.13: Preparedness of using eTome**

### 9.14 Suggestions for the Future Improvements

In order to obtain more information from the participants, a number of open questions were raised. The first open question concerned suggestions to improve eTome. This gave the participants a space to offer some suggestions based on their experience in using eTome.

Participants’ feedback regarding future improvements focused on two interesting aspects. Firstly, developing and redesigning the web pages. Many of participants mentioned this also in the general comments question which is question number 17. Because of that, this point should be considered. Secondly, some participants suggested developing a new service in eTome to convert Microsoft Word Documents into eBooks. Another suggestion was raised from participants about adding a feature to allow users to change the font style and format.

The participants’ feedback indicates the importance of the aesthetic aspect in encouraging people to use eTome. Adding some helpful pictures to describe the actions instead of using the writing may improve eTome in this aspect. However, regarding the convert Microsoft Word documents to eBook using eTome, there is a feature in Microsoft Word
can convert .doc documents to HTML files. Supporting for integration with Microsoft Word could help to transform documents into HTML files so that eTome could handle and clean them to produce an eBook.

9.15 eTome Distinctive Aspects

In this part of the evaluation, the participants were asked to mention the most appealing or useful feature of eTome. This question was aimed at eliciting what worked well for participants. These features might embody aspects that could be extended across the whole piece of software.

The answers obtained from the participants referred to many features. Some of them liked the reordering and renaming chapters /parts process. Other participants’ feedbacks said the way of dividing eBook’s text source file into chapters / parts was interesting. One participant stated that creating an eBook in a short time was exciting and interesting. Another appealing feature for that participant was viewing the page containing all the eBooks.

The results indicate that users prefer the interactive page like the reordering parts page. Therefore, applying the same characteristics to other pages may improve the user satisfaction. Moreover, listing all eBooks with their cover images in suitable table attracts users. They might prefer this page because it provides links to download all the eBooks.

9.16 eTome Weaknesses

An open question asked participants to identify a weakness of eTome. It was aimed at highlighting those aspects of eTome most in need of improvement.

The response to this question were important. One participant said that creating an eBook through of many steps was confusing. Another participant stated that the handling chapters / parts page was complicated because it contained XHTML source code which was difficult to understand. However, two participants mentioned clunky web page design and expressed a need to support Microsoft Word Documents.

The participants feedback refers to the need to reduce the number of steps in creating an eBook by combining some steps together in order to avoid confusion. For example, there could be one page for reordering, renaming and deleting eBook’s parts instead of using of two pages. Regarding the complexity of the “handling eBook’s parts” page, this may require more investigation in order to find a suitable manner to address it. However, the web page design and the support for Microsoft Word have been discussed in section 9.14.
9.17 General Comments

The last open question in the questionnaire was about any additional comments regarding eTome. The participants could express their views about any notable of eTome. This kind of question was a catchall to allow respondents to address any eTome aspect which was not covered by raising direct questions.

There was some repetition in the participants feedback to this question. That might be because they are important in the users’ points of view. The web pages design and the need for support Microsoft Word Documents are mentioned in more than one place. Another comment raised by participants was about reducing the number of steps to create an eBook in order to be easier for users.

All participants’ feedback regarding this question has been raised by other participants in response to different questions. They have been discussed in sections 9.14 and 9.16.
10 Future Work

Systems need to be developed over time. Development includes solving issues, reducing the limitations, improving the service and adding new features. In any software, continuous development contributes to an increase in user satisfaction and to attracting new users.

10.1 Embedded Images Support

Support for embedded images in plain text sources is one future work that should be considered. Many books contain multiple images and diagrams, therefore eTome should support that with all source content types in order to emulate physical books. Currently eTome allows images to be embedded in the eBook if an XHTML source file declares them and each image file is separately uploaded. However, that is clunky to use.

Enabling multiple upload for images would help. However, when a text file is used as the source, there is currently no way to instruct eTome to add images to the XHTML that the conversion process produces from it. However, it would not be hard to implement a convention similar to the chapter heading identification convention that would allow a user to signal in a plain text source file that he wants an image to be added at certain point. When the source file is converted to XHTML, appropriate mark-up to be embed the image could be added at the relevant point.

10.2 Supporting Punctuation

Similar to embedded images, physical books contain various kinds of punctuation such as numbering and bullet points. In order to produce a suitable eBook contain some of punctuation types, a special format for the bullet points and numbering should be applied. Therefore, the handling text method in eTome should be improved to recognize these kinds of punctuation in the text file in order to add them in a special format in the eBook.

10.3 Recognizing Additional Types of eBook’s Parts

Physical books often have various components in addition to chapters such as preface, introduction, sections, subsections, epilogue author’s note etc... A possible future work would be to extend eTome to recognize and handle some of these book’s components. That would result in producing a more differentiated eBook that might prove useful for readers.
10.4 Improve the Web Pages Interface

Not just the functionality of eTome software needs to be considered in future work. The usability of the software is also important. Attracting and encouraging users to use eTome requires improvements in to the software interfaces to provide a usable and interesting service. According to the results of the evaluation, the majority of participants would like the plain style of interface to be embellished and some related tasks to be combined to reduce the number of steps needed to produce an eBook.

10.5 Reset Password

Another future work for eTome would be to support changing and resetting the user passwords in case of a user forget their password. It is frustrating to lose an account that contains all the projects and generated eBooks when a password is forgetting. This could be achieved by allowing users to ask for a new password for their account to be sent to their email address.

10.6 Outsourcing to Provide Editor

Handling files in eTome is difficult in some participants view. They find using XHTML source code is dull. Therefore, eTome might be enhanced by providing an editor in eTome in order to enable users to create and enhance their eBooks to the desired form. This might be achievable by adding support for an existing HTML editor like Dream Weaver which is compatible with the eTome interface to allow more advanced eBooks to be produced.
11 Conclusions

This dissertation has reviewed and discussed in detail various eBook definitions from different authors' points of view. It took the view that an eBook is a digital document in a form that emulates a physical book and supports reflowable text. Adding reflowability to the eBook definition differentiates eBooks from digital documents like PDFs. One eBook format that meets the conditions of this definition is called EPUB. EPUB is a popular open standard which has contributed to widespread usage of eBook. As a result, much software that can create eBooks by using EPUB technology is available. Comparisons among available software helps to define gaps in provision in this area. This dissertation found that key issues are cost, availability and usability.

This dissertation has discussed two versions of EPUB technology, which are EPUB2 and EPUB3 to provide a clear view about the differences between them. In addition to that, it has discussed the new features of EPUB3.

Free software called eTome has been proposed and developed by this project to support the creation and self-publishing of eBooks. Providing a high level of availability led to eTome being designed as web based service. That means that the service can be widely accessible and reachable anywhere and anytime. Furthermore, Tomcat servlets were adopted to support the eTome service. That enabled it to be built using the Java programming language and meant that it would be available worldwide.

To ensure the best results, a number of key requirements have been determined and discussed in this dissertation in developing eTome. One of the key requirements was being able to take in XHTML and plain textual sources which express the book’s contents. These files are processed by the software in order to produce a valid eBook. In terms of privacy and interference protection eTome adopted registration and creating accounts for users to preserve users’ personal data and safeguard their files from other users. In addition, some features were implemented in eTome software such as reordering and renaming the eBook’s parts to support content customisation.

As is recommended in the project requirements, eTome was implemented to support connectivity with applications. Therefore, it is possible to validate generated XHTML files with a third party application in order to provide valid EPUB contents. Furthermore, eTome can use a third party application to insure standard compliance and deliver a valid eBook that is free of faults.
Although many features were implemented in eTome, there are some issues and limitations that should be taken in consideration. They have been discussed in this dissertation. These limitations need to be handled in the future to prevent errors or unacceptable results. eTome is able to process a plain text file in order to generate eBook’s parts in XHTML format. However, it lacks in support for embedded images in the text and handling tables and bullet points.

This dissertation discussed the results of a questionnaire evaluation that was answered by ten participants who had used eTome software to create eBooks. The questionnaire covers various features and operations of eTome in order to obtain useful information about its usage. Although, the evaluation established that participants were broadly satisfied by eTome, their feedback and the evaluation results contributed to identifying some usability and functionality issues and possible improvements.

At the end of this project and depending on the evaluation results, a number of future works have been suggested in order to improve eTome.
12 References


http://search.proquest.com.ezproxy1.hw.ac.uk/docview/906237209?rfr_id=info%3Axri%2Fsid%3Aprimo


13 Appendices

13.1 eTome Minimal Manual

• **Registration**

1. Open the eTome website by using this link:
   [http://www2.macs.hw.ac.uk:8080/maa24/loginPage_projects.html](http://www2.macs.hw.ac.uk:8080/maa24/loginPage_projects.html)
2. Press the button “Register now”
3. Fill your personal information, user name should contain only uppercase or lowercase letter or numbers.
4. Press “submit”

• **Login**

1. Open the eTome website by using this link:
   [http://www2.macs.hw.ac.uk:8080/maa24/loginPage_projects.html](http://www2.macs.hw.ac.uk:8080/maa24/loginPage_projects.html)
2. Write your user name and password and press “Login”.
3. If the login is successful you will be taken to the main menu page.

• **Create new project**

1. From the main menu, go to “Create new project” section.
2. Write the project name in the textbox, project name should contain only uppercase or lowercase letter or numbers or underscore.
3. Press the button “Create”.

• **Add XHTML parts to certain project**

1. From the main menu, go to “Add XHTML parts to a certain project” section.
2. Choose the project name from the Drop-down menu, then press “Go”.
3. Choose the XHTML files by pressing the button “Browse”.
4. Press the button “Add another file” to add additional file.
5. After choosing the XHTML files press the button “Upload & explore files”
6. Then, you will be taken to the handling XHTML files page.
• **Add text source to certain project**
  1. From the main menu, go to “Add text source to a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Go”.
  3. Choose the text file by pressing the button “Browse”, here you allowed to add one text file.
  4. After choosing the text file press the button “Upload & explore files”.
  5. Then, you will be taken to the handling XHTML files page.

• **Add or change the cover image for certain project**
  1. From the main menu, go to “Add or change the cover image for a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Go”.
  3. Choose the cover image by pressing the button “Browse”.
  4. After choosing the cover image press the button “Upload image”.
  5. Then, the image will be uploaded and you will be taken to the main menu page.

• **Sort the parts of certain project**
  1. From the main menu, go to “Sort the parts of a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Sort”.
  3. A list of all eBook’s parts will be displayed.
  4. Press on any part and move it to the desired place until you reach the desired order.
  5. Press the button “Save changes” to adopt the new order.
  6. Press the button “Main menu” to go back to the main menu.

• **Rename or delete parts of certain project**
  1. From the main menu, go to “Rename or delete parts of a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Go”.
  3. A list of all eBook’s parts will be displayed with additional textbox and checkbox.
  4. Write the new part name in the desired title textbox.
  5. For deleting parts, just uncheck the undesired parts.
  6. Press the button “Save changes” to adopt the changes.
  7. A short report will be displayed to summarize the changes.
  8. Press the button “Main menu” to go back to the main menu.
• Fill the metadata for certain project
  1. From the main menu, go to “Fill the metadata for a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Go”.
  3. A form of all eBook’s metadata will be displayed.
  4. Fill the form and press the button “Save changes” to adopt the changes.
  5. Press the button “Main menu” to go back to the main menu.

• Create an eBook for certain project
  1. From the main menu, go to “Create eBook for a certain project” section.
  2. Choose the project name from the Drop-down menu, then press “Go”.
  3. A form of all eBook’s metadata and parts will be displayed.
  4. Fill the missing field of the form and press the button “Create the eBook”.
  5. A new page will be displayed contains the link of the generated eBook.
  6. Press the button “Validate” to validate the eBook.
  7. Press the button “Main menu” to go back to the main menu.
  8. Press the button “Log off” to log out and close the browser.
## 13.2 eTome Questionnaire

**Questionnaire to evaluate eBook creation software (eTome)**

**eBook definition:** is a digital document in a form that emulates a physical book and supports reflowable text

| 1. How often do you | | | | | |
|---------------------|-------|---------|-------|-------|
| **a) Read an eBook?**| Never | Rarely | Sometimes | Often | Always |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **b) Create an eBook?**| Never | Rarely | Sometimes | Often | Always |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |

<table>
<thead>
<tr>
<th>2. Creating an eBook with eTome was:</th>
<th>Very difficult</th>
<th>difficult</th>
<th>Somewhat difficult</th>
<th>Somewhat easy</th>
<th>Easy</th>
<th>Very easy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>

| 3. Can you rate the performance of the checker tool on the XHTML files for these functions: | | | | | |
|---------------------------------------------------------------|-------|---------|-------|-------|
| **a) Reporting errors.** | Very obscure | Obscure | Somewhat obscure | Somewhat clear | Clear | Very clear |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **b) Correcting errors.** | Very frustrating | Frustrating | Somewhat frustrating | Somewhat satisfying | Satisfying | Very satisfying |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |

| 4. The following task performances were adequate. | | | | | |
|---------------------------------------------------------------|-------|---------|-------|-------|
| **a) Upload eBook’s contents.** | Strongly disagree | disagree | Somewhat disagree | Somewhat agree | Agree | Strongly agree |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **b) Processing text.** | Strongly disagree | disagree | Somewhat disagree | Somewhat agree | Agree | Strongly agree |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **c) Validating eBook.** | Strongly disagree | disagree | Somewhat disagree | Somewhat agree | Agree | Strongly agree |
| | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |

<table>
<thead>
<tr>
<th>5. Dividing the book source file into chapters / parts was:</th>
<th>Inadequate</th>
<th>Somewhat inadequate</th>
<th>Somewhat adequate</th>
<th>Adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>
6. Support for reordering the eBook’s parts was:

<table>
<thead>
<tr>
<th>Unsatisfying</th>
<th>Somewhat unsatisfying</th>
<th>Somewhat satisfying</th>
<th>Satisfying</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. The title page generated by eTome was:

**a)**

<table>
<thead>
<tr>
<th>Unsuitable</th>
<th>Somewhat unsuitable</th>
<th>Somewhat suitable</th>
<th>Suitable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**b)**

<table>
<thead>
<tr>
<th>Ugly</th>
<th>Clangy</th>
<th>Ok</th>
<th>Elegant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. The table of contents page generated by eTome was:

**a)**

<table>
<thead>
<tr>
<th>Unsuitable</th>
<th>Somewhat unsuitable</th>
<th>Somewhat suitable</th>
<th>Suitable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**b)**

<table>
<thead>
<tr>
<th>Useless</th>
<th>Somewhat useless</th>
<th>Somewhat useful</th>
<th>Useful</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. The instructions that describe tasks in eTome are:

<table>
<thead>
<tr>
<th>Confusing</th>
<th>Misleading</th>
<th>Ok</th>
<th>Informative</th>
<th>Clear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. eTome messages and notifications are helpful.

<table>
<thead>
<tr>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Steps required in eTome to create an eBook: (check one or more)

- Too many
- Confusing
- Dull
- Concise
- Clear
- Encouraging

12. eBooks created by eTome are satisfactory.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. Would you be prepared to use eTome to create eBooks?

Never  Rarely  Sometimes  Often  Always

14. What is most needed to improve eTome?

15. What is the most appealing feature of eTome?

16. What would weaken the eTome?

17. Are there any comments about eTome?
### 13.3 Questionnaire Result

- **Closed questions feedback**

<table>
<thead>
<tr>
<th></th>
<th>Participant 1</th>
<th>Participant 2</th>
<th>Participant 3</th>
<th>Participant 4</th>
<th>Participant 5</th>
<th>Participant 6</th>
<th>Participant 7</th>
<th>Participant 8</th>
<th>Participant 9</th>
<th>Participant 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q 1 - a</td>
<td>Rarely</td>
<td>Often</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Rarely</td>
<td>Often</td>
<td>Never</td>
<td>Sometimes</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Q 1 - b</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
<td>Never</td>
</tr>
<tr>
<td>Q 2</td>
<td>Somewhat easy</td>
<td>Somewhat difficult</td>
<td>Somewhat easy</td>
<td>Somewhat difficult</td>
<td>Very easy</td>
<td>Easy</td>
<td>Somewhat easy</td>
<td>Easy</td>
<td>Easy</td>
<td>Somewhat easy</td>
</tr>
<tr>
<td>Q 3 - a</td>
<td>Somewhat clear</td>
<td>Clear</td>
<td>Clear</td>
<td>Somewhat clear</td>
<td>Clear</td>
<td>Clear</td>
<td>Somewhat obscure</td>
<td>Very clear</td>
<td>Clear</td>
<td>Somewhat clear</td>
</tr>
<tr>
<td>Q 3 - b</td>
<td>Somewhat satisfying</td>
<td>Satisfying</td>
<td>Somewhat satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Very satisfying</td>
<td>Somewhat satisfying</td>
<td>Somewhat frustrating</td>
</tr>
<tr>
<td>Q 4 - a</td>
<td>Strongly agree</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Q 4 - b</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Somewhat disagree</td>
<td>Somewhat disagree</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Strongly agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Q 4 - c</td>
<td>Agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Q 5</td>
<td>Adequate</td>
<td>Somewhat adequate</td>
<td>Somewhat inadequate</td>
<td>Somewhat adequate</td>
<td>Somewhat adequate</td>
<td>Somewhat adequate</td>
<td>Adequate</td>
<td>Adequate</td>
<td>Somewhat adequate</td>
<td></td>
</tr>
<tr>
<td>Q 6</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Somewhat satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Satisfying</td>
<td>Somewhat satisfying</td>
</tr>
<tr>
<td>Q 7 - a</td>
<td>somewhat suitable</td>
<td>Suitable</td>
<td>somewhat suitable</td>
<td>somewhat unsuitable</td>
<td>suitable</td>
<td>somewhat suitable</td>
<td>Suitable</td>
<td>suitable</td>
<td>somewhat suitable</td>
<td></td>
</tr>
<tr>
<td>Q 7 - b</td>
<td>Ok</td>
<td>Elegant</td>
<td>Ok</td>
<td>Clunky</td>
<td>Ok</td>
<td>Elegant</td>
<td>Ok</td>
<td>Elegant</td>
<td>Ok</td>
<td>Ok</td>
</tr>
<tr>
<td>Q 8 - a</td>
<td>Somewhat suitable</td>
<td>Somewhat unsuitable</td>
<td>Somewhat unsuitable</td>
<td>Somewhat suitable</td>
<td>Somewhat unsuitable</td>
<td>Somewhat suitable</td>
<td>suitable</td>
<td>Somewhat suitable</td>
<td>Somewhat suitable</td>
<td></td>
</tr>
<tr>
<td>Q 8 - b</td>
<td>Somewhat useful</td>
<td>Somewhat useless</td>
<td>Somewhat useless</td>
<td>Useless</td>
<td>Somewhat useful</td>
<td>Somewhat useful</td>
<td>Useful</td>
<td>Somewhat useful</td>
<td>Somewhat useful</td>
<td></td>
</tr>
<tr>
<td>Q 9</td>
<td>Clear</td>
<td>Ok</td>
<td>Ok</td>
<td>Informative</td>
<td>Informative</td>
<td>Clear</td>
<td>Informative</td>
<td>Clear</td>
<td>Ok</td>
<td>Informative</td>
</tr>
<tr>
<td>Q 10</td>
<td>Always</td>
<td>Often</td>
<td>Sometimes</td>
<td>Often</td>
<td>Always</td>
<td>Always</td>
<td>Sometimes</td>
<td>Always</td>
<td>Often</td>
<td>Often</td>
</tr>
<tr>
<td>Q 11</td>
<td>Clear - Too many</td>
<td>Too many</td>
<td>Clear - Encouraging</td>
<td>Confusing</td>
<td>Concise - Encouraging</td>
<td>Clear</td>
<td>Too many</td>
<td>Clear - Encouraging</td>
<td>Clear - Too many</td>
<td>Clear - Too many</td>
</tr>
<tr>
<td>Q 12</td>
<td>Agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Q 13</td>
<td>Sometimes</td>
<td>Rarely</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Sometimes</td>
<td>Sometimes</td>
</tr>
</tbody>
</table>
## Open questions feedback

<table>
<thead>
<tr>
<th>Q 14. suggestions</th>
<th>Q 15, Appealing Feature</th>
<th>Q 16, Weaknesses</th>
<th>Q 17, General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>To upgrade the system you should enhance the screens so it become more attractive and motivating to use.</td>
<td>The most helpful feature in the system is how the chapters of the electronic book are organized</td>
<td>The system deficiency, in the first place, is the pages design and format</td>
</tr>
<tr>
<td>Participant 2</td>
<td>It would be great if the application accept MS Word documents</td>
<td>I like the fact that the application divides the text file to several files</td>
<td>the process for creating e-book is long which confused me</td>
</tr>
<tr>
<td>Participant 3</td>
<td>Creating electronic books contain images</td>
<td>The flexibility to rename and reorder the chapters</td>
<td>Too many steps – doesn’t support word documents</td>
</tr>
<tr>
<td>Participant 4</td>
<td>Add editor to re-format the e-book regarding fonts, colors ..etc</td>
<td>The display page of all established books is useful and beautiful</td>
<td>The direct dealing with xhtml codes is very difficult</td>
</tr>
<tr>
<td>Participant 5</td>
<td>Add the possibility of converting documents (Microsoft Word).</td>
<td>The favorite feature of the program is the ease of getting a good e-book in a short period of time</td>
<td>It does not support doc format for Microsoft Word documents</td>
</tr>
<tr>
<td>Participant 6</td>
<td>The format is &lt;primitive or simple&gt; and must be redesigned.</td>
<td>What makes the system special is the clarity of the steps to create an electronic book and the ease of shifting from one step to another.</td>
<td>The display page of processing system parts is complex and need to be more organized. (not clear)</td>
</tr>
<tr>
<td>Participant 7</td>
<td>focus on interfaces</td>
<td>I like the idea of presenting all the ebooks</td>
<td>The interfaces design is very simple</td>
</tr>
<tr>
<td>Participant 8</td>
<td>I think adding image is a good improvement</td>
<td>I think the simplicity of the software is appealing</td>
<td>The system disadvantage is the low level of design</td>
</tr>
<tr>
<td>Participant 9</td>
<td>create one page contain all steps of the creation</td>
<td>create electronic book in a short time is the best feature</td>
<td>too many steps to create ebook</td>
</tr>
<tr>
<td>Participant 10</td>
<td>The software design requires develop</td>
<td>Reordering parts is interesting</td>
<td>The software interface is clunky</td>
</tr>
</tbody>
</table>
### 13.4 MACS Risk Assessment Form

**Student:** Mohammad Abdullah Alhaidari

**Project Title:** eTome: an eBook Publishing Facility for the Web

**Supervisor:** Dr. Hamish Taylor

**Risks:**

<table>
<thead>
<tr>
<th>Risk</th>
<th>Present (give details) (tick if present)</th>
<th>Control Measures and/or Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Office environment- includes purely software projects</td>
<td>Yes</td>
<td>Nothing</td>
</tr>
<tr>
<td>Unusual peripherals e.g. Robot, VR helmet, haptic device, etc.</td>
<td>Nothing</td>
<td>Nothing</td>
</tr>
<tr>
<td>Unusual Output e.g. Laser, loud noises, flashing lights etc.</td>
<td>Nothing</td>
<td>Nothing</td>
</tr>
<tr>
<td>Other risks</td>
<td>Nothing</td>
<td>Nothing</td>
</tr>
</tbody>
</table>