Deliverable 1.2.3
Final educational eBook delivery report

Coordinator: Alexander Mikroyannidis
With contributions from: John Domingue, Maria Maleshkova
Quality Assessor: Elena Simperl

---

<table>
<thead>
<tr>
<th>Editor:</th>
<th>Alexander Mikroyannidis, The Open University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliverable nature:</td>
<td>Report (R)</td>
</tr>
<tr>
<td>Dissemination level:</td>
<td>Public (PU)</td>
</tr>
<tr>
<td>(Confidentiality)</td>
<td></td>
</tr>
<tr>
<td>Contractual delivery date:</td>
<td>April 30, 2014</td>
</tr>
<tr>
<td>Actual delivery date:</td>
<td></td>
</tr>
<tr>
<td>Version:</td>
<td>1.0</td>
</tr>
<tr>
<td>Total number of pages:</td>
<td>25</td>
</tr>
<tr>
<td>Keywords:</td>
<td>Module production and delivery, curriculum, learning material, webinar, screencast, exercise, online course, interactive eBook.</td>
</tr>
</tbody>
</table>
Executive summary

This deliverable reports the overall outcomes of WP1: “Course production and delivery”. WP1 focuses on the production of educational and training content and its delivery over the most effective and relevant channels.

This deliverable describes the EUCLID educational eBook, in terms of its production methodology, i.e. the EUCLID curriculum and module production process, as well as its building blocks, i.e. the different types of EUCLID learning materials, such as presentations, webinars, screencasts, exercises and online courses.

The EUCLID educational eBook encompasses all the content of the EUCLID learning materials in a structured and interactive way. The eBook contains several multimedia and interactive elements, such as clips from the webinars, screencasts, as well as self-assessment quizzes and exercises. In order to maximise its impact on the community, the eBook has been made available for a variety of platforms and formats, most notably for the iPad as an iBook, for other tablets as ePUB, as well as for all web browsers as HTML.

Section 1 of this deliverable presents the finalised EUCLID curriculum and the module production process. Section 2 describes the learning materials produced by the project. We present in detail all different types of the EUCLID learning materials and how these materials are connected with each other and integrated into an interactive eBook. Section 3 presents the EUCLID eBook, the formats in which it is available, the tools used to author it, its structure, as well as some statistical data about its downloads. Finally, Section 4 presents the lessons learned from the design and implementation of the production process, as well as our best practices for the design and delivery of learning materials for Linked Data.
Document Information

<table>
<thead>
<tr>
<th>IST Project Number</th>
<th>FP7 - 296229</th>
<th>Acronym</th>
<th>EUCLID</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Full Title</th>
<th>Educational curriculum for the usage of Linked Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project URL</td>
<td><a href="http://www.euclid-project.eu/">http://www.euclid-project.eu/</a></td>
</tr>
<tr>
<td>Document URL</td>
<td>Martina Eydner</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deliverable Number</th>
<th>1.2.3</th>
<th>Title</th>
<th>Final educational eBook delivery report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Package Number</td>
<td>1</td>
<td>Title</td>
<td>Course production and delivery</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of Delivery</th>
<th>Contractual</th>
<th>Actual</th>
<th>M24</th>
<th>M24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>version 1.0</td>
<td>final X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>prototype □ report X dissemination □</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissemination level</td>
<td>public X consortium □</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authors (Partner)</th>
<th>Alexander Mikroyannidis (OU), John Domingue (OU), Maria Maleshkova (KIT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible Author</td>
<td>Name</td>
</tr>
<tr>
<td>Partner</td>
<td>The Open University</td>
</tr>
</tbody>
</table>

| Abstract (for dissemination) | This deliverable describes the EUCLID educational eBook, in terms of its production methodology, i.e. the EUCLID curriculum and module production process, as well as its building blocks, i.e. the different types of EUCLID learning materials, such as presentations, webinars, screencasts, exercises and online courses. Section 1 of this deliverable presents the finalised EUCLID curriculum and the module production process. Section 2 describes the learning materials produced by the project. We present in detail all different types of the EUCLID learning materials and how these materials are connected with each other and integrated into an interactive eBook. Section 3 presents the EUCLID eBook, the formats in which it is available, the tools used to author it, its structure, as well as some statistical data about its downloads. Finally, Section 4 presents the lessons learned from the design and implementation of the production process, as well as our best practices for the design and delivery of learning materials for Linked Data. |

| Keywords | Module production and delivery, curriculum, learning material, webinar, screencast, exercise, online course, interactive eBook |

<table>
<thead>
<tr>
<th>Version Log</th>
<th>Issue Date</th>
<th>Rev. No.</th>
<th>Author</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.04.2014</td>
<td>0.1</td>
<td>Alexander Mikroyannidis (OU)</td>
<td>Version for internal review</td>
<td></td>
</tr>
<tr>
<td>28.04.2014</td>
<td>1.0</td>
<td>Alexander Mikroyannidis (OU)</td>
<td>Version aligned to the comments from the internal review</td>
<td></td>
</tr>
</tbody>
</table>
Table of Contents

EXECUTIVE SUMMARY .................................................................................................................. 2

DOCUMENT INFORMATION .......................................................................................................... 3

TABLE OF CONTENTS .................................................................................................................. 4

LIST OF FIGURES AND/OR LIST OF TABLES .............................................................................. 5

ABBREVIATIONS .......................................................................................................................... 6

1  INTRODUCTION ...................................................................................................................... 7
   1.1  THE EUCLID CURRICULUM ................................................................................................. 7
   1.2  THE MODULE PRODUCTION PROCESS ............................................................................ 8

2  THE EUCLID LEARNING MATERIALS ..................................................................................... 9
   2.1  PRESENTATION SLIDES ..................................................................................................... 9
   2.2  WEBINARS .......................................................................................................................... 9
   2.3  SCREENCASTS .................................................................................................................... 10
   2.4  EXERCISES AND QUIZZES .............................................................................................. 11
   2.5  ONLINE COURSES ............................................................................................................ 13

3  THE EUCLID EBOOK .............................................................................................................. 15
   3.1  AUTHORING THE eBook .................................................................................................. 16
   3.2  eBook STRUCTURE ............................................................................................................ 19
   3.3  eBook DOWNLOAD STATISTICS ..................................................................................... 20

4  LESSONS LEARNED AND BEST PRACTICES ....................................................................... 23
   4.1  BEST PRACTICES FOR THE DESIGN OF LEARNING MATERIALS .................................. 23
   4.2  BEST PRACTICES FOR THE DELIVERY OF LEARNING MATERIALS .............................. 24

5  CONCLUSIONS .......................................................................................................................... 25
List of figures and/or list of tables

Figure 1: The final EUCLID curriculum ........................................................................................................................................7
Figure 2: The final module production process ..................................................................................................................................8
Figure 3: The EUCLID presentation pack ...........................................................................................................................................9
Figure 4: Still from a EUCLID webinar broadcasted via Livestream ..................................................................................................10
Figure 5: Still from a EUCLID screencast demonstrating the Information Workbench ...............................................................11
Figure 6: A multiple-choice question of a EUCLID quiz ....................................................................................................................12
Figure 7: A EUCLID exercise for visualizing the MusicBrainz dataset using the Information Workbench .................................13
Figure 8: A EUCLID course in iTunes U ...............................................................................................................................................14
Figure 9: The EUCLID learning pathways matrix ............................................................................................................................14
Figure 10: The EUCLID eBook on the iPad ........................................................................................................................................15
Figure 11: The EUCLID eBook in HTML format for web browsers ....................................................................................................16
Figure 12: The iBooks Author application used for authoring the eBook in the iBook format .........................................................17
Figure 13: The Calibre tool used to produce the eBook in the ePUB and MOBI formats ................................................................18
Figure 14: The Drupal editor used for authoring the eBook in the HTML format ........................................................................19
Figure 15: Number of downloads of the eBook per week ..................................................................................................................21
Figure 16: Number of downloads of the eBook per week and per region ..........................................................................................21
Figure 17: Statistics of visitors to the eBook download page ........................................................................................................22
Abbreviations

DL – Description Logic
FOAF – Friend of a Friend
HTTP – Hypertext Transfer Protocol
KIT – Karlsruhe Institute of Technology
KMi – Knowledge Media Institute
LD - Linked Data
OA – Ontotext AD
ONTO – Ontotext
OU – Open University
OWL – Ontology Web Language
OWL-S – OWL for Services/ OWL-based Web Service Ontology (formerly DAML-S)
RDF/S – Resource Description Framework / Schema
SPARQL – SPARQL Protocol and RDF Query Language
URI – Uniform Resource Identifier
URL – Uniform Resource Locator
WP – Work Package
XML - Extensible Markup Language
1 Introduction

The EUCLID project has developed a series of learning materials, including presentations, webinars, screencasts, exercises, and online courses, all of them integrated as an interactive eBook targeting Linked Data practitioners. The structure and the content of the learning materials have been guided by the project’s curriculum and the feedback received from the Linked Data community. The primary target audiences of these learning materials are data practitioners who, as part of their daily jobs, are interested in using Linked Data technologies for facilitating integration and easy access, technology enthusiasts who plan to broaden their expertise in using Linked Data technologies for Big Data management and analytics, as well as Computer Science researchers who intend to gain a basic understanding of proven and tested Linked Data usage concepts.

Additionally, EUCLID has had a strong focus on the community and has encouraged community engagement in the course production process through, for example, collecting user feedback via Twitter, webinars, and more. The project has combined online and real-world presence, and integrated with on-going activities in each sphere such as mailing lists, wikis. The project has engaged with the Linked Data community, developers and academics, through the community engagement activities described in WP2 deliverables, which have collected user requirements, as well as provided feedback to the materials so that the course can be tailored to what the learner really needs and the course production process can be improved for effectiveness.

This deliverable reports on the outcomes and lessons learned from the production and delivery of the EUCLID educational eBook. The work described in this deliverable consists of the development of the project’s curriculum, and then, guided by the curriculum, the production of learning materials as presentations, webinars, screencasts, exercises, online courses, and finally their integration and delivery as an interactive eBook.

1.1 The EUCLID Curriculum

The EUCLID curriculum has been designed to gradually build up trainee’s knowledge. It enables trainees with previous knowledge on a specific area of interest to only briefly go over the introductory materials and directly dig into one of the more advanced modules.

In an effort to provide high-quality training, suitable for the data practitioner’s needs, the EUCLID curriculum has been through several revisions on structure, arrangement and content after presenting it to a number of experts and gathering their feedback. Details about these revisions have been provided in D1.1.3. As a result of these revisions, the curriculum was refined and developed in more detail in order to include a number of expected outcome competencies, as well as more exercises and examples. The content of the updated modules has also been redesigned to be better aligned and support a smoother process of skills built-up and development. While having an individual objective, each module contributes to further developing the skills and knowledge gained by the previous one thus aiding to acquiring an overall understanding and expertise in the field.

The final EUCLID curriculum is shown in Figure 1, organized in the order of 3 expertise levels (top: introductory, middle: advanced, bottom: expert).

| 1. Introduction and Application Scenarios |
| 2. Querying Linked Data |
| 3. Providing Linked Data |
| 4. Interaction with Linked Data |
| 5. Creating Linked Data Applications |
| 6. Scaling up |

Figure 1: The final EUCLID curriculum
1.2 The Module Production Process

The module production process defines the sequence of steps for the production of the EUCLID learning materials. This process defines a series of iterations in the production of learning materials, with multiple revisions from internal and external stakeholders, in order to ensure high quality in the produced materials.

Throughout the project’s duration and based on the lessons learned from the production of the EUCLID modules, this production process was continuously revised and improved. One thing that became obvious during these revisions was the instrumental role of the preparation and delivery of the webinar in the production process. It was therefore decided that the first recording of the webinar would precede the production of the initial version of the HTML content of a module. It was also decided that additional material in the form of an online course would accompany the final eBook chapter and would be part of the training programme offered to the community. Figure 2 shows the final module production process.

Figure 2: The final module production process
2 The EUCLID Learning Materials

Based on the curriculum and following the module production process, the EUCLID learning materials have been produced in various forms, in accordance with the targeted means of delivery. All the EUCLID learning materials can be accessed from the EUCLID web site\(^1\). Additionally, all the materials have been made available under a Creative Commons Attribution 3.0 Unported License\(^2\). This means that they can be shared, remixed, republished, as well as used for commercial purposes.

The following sections provide more details about the various forms of EUCLID learning materials, their scope, as well as how they have been produced.

2.1 Presentation Slides

The EUCLID presentations slides are the first learning materials produced for each module. They provide an overview of the main concepts covered in each module and contain an extensive set of examples, so that the concepts of the module are explained to practitioners more effectively. The EUCLID presentations are available via a dedicated SlideShare channel\(^3\) and via the EUCLID web site. Figure 3 shows the EUCLID presentation pack in SlideShare. In total, the EUCLID channel in SlideShare features 16 presentations, which include both the module presentations, as well as the presentations delivered in the various EUCLID training events.

![Figure 3: The EUCLID presentation pack](http://www.slideshare.net/EUCLIDproject)

2.2 Webinars

The EUCLID webinars have been conducted based on the slides for each module. They were broadcasted live from the Podium facility of the Open University\(^4\), using the Livestream broadcasting service\(^5\). Livestream was selected for the following two reasons:

---

\(^1\) http://www.euclid-project.eu
\(^2\) http://creativecommons.org/licenses/by/3.0
\(^3\) http://www.slideshare.net/EUCLIDproject
\(^4\) http://stadium.open.ac.uk/podium
1. It offers scalability, as it is a cloud service. This means that there were no limits on how many viewers could connect and watch the live webinars.

2. It offers a chat facility alongside the broadcast. Through this facility, viewers could interact with each other and with the presenter, in order to ask and answer questions and provide feedback about the webinar’s content.

Figure 4 shows a still from a webinar broadcasted via Livestream. Recordings of all the webinars have also been made available via the EUCLID channel in Vimeo⁶ and SlideShare⁷, and short clips have been included in the eBook. Details about the community engagement and feedback received from the delivery of the EUCLID webinars are documented in D2.2.3 “Final webinar report” (M24).

![Figure 4: Still from a EUCLID webinar broadcasted via Livestream](image)

2.3 Screencasts

The EUCLID screencasts consist of short clips (2-3 minutes) that provide a quick overview and a walkthrough of a representative set of tools and platforms related with the EUCLID modules. The screencasts explain in a short and effective way the tools and platforms in question.

The screencasts are made available in the EUCLID Vimeo channel⁸ and are also included in the eBook. Figure 5 shows a still from a screencast about the Information Workbench. In total, we have produced 13 screencasts, namely screencasts for the following Linked Data platforms and tools:

- Sig.ma
- Data.gov.uk
- BBC Music

---

⁵ http://new.livestream.com
⁶ https://vimeo.com/album/2369897
⁷ http://www.slideshare.net/EUCLIDproject
⁸ https://vimeo.com/album/2369900
• Seevl
• MusicBrainz
• Sesame
• OpenRefine
• Interacting with Linked Data using the Information Workbench
• Search Capabilities of the Information Workbench
• Visualizing SPARQL Query Results with the Information Workbench
• How to use R2RML
• Overview of the Information Workbench
• Linked Data API (LDA)

![Screenshot of the Information Workbench](image)

*Figure 5: Still from a EUCLID screencast demonstrating the Information Workbench*

### 2.4 Exercises and Quizzes

The EUCLID modules feature a number of self-assessment exercises and quizzes that allow learners to self-monitor their progress. The quizzes are multiple-choice questions that test the knowledge acquired in each EUCLID module (see Figure 6). The exercises allow learners to practice what they have learned by using real tools and datasets. In particular, we have developed the following bespoke exercises enabling learners to perform specific activities within the EUCLID modules:

1. **Exercise 1:** [http://purl.org/euclid/exercise1](http://purl.org/euclid/exercise1). In this exercise, learners use a customised SPARQL endpoint in order to try their SPARQL queries.

2. **Exercise 2:** [http://purl.org/euclid/exercise2](http://purl.org/euclid/exercise2). This exercise enables learners to run SPARQL queries over the MusicBrainz dataset (username and password is “exercise2”).
3. **Exercise 3:** [http://purl.org/euclid/exercise3](http://purl.org/euclid/exercise3). This exercise allows learners to execute a set of sample queries in order to visualise the MusicBrainz dataset using the Information Workbench (see Figure 7).

4. **Exercise 4:** [http://purl.org/euclid/exercise4](http://purl.org/euclid/exercise4). In this exercise, learners execute a set of sample queries in order to develop Linked Data applications based on the music data example using the Information Workbench.

Additionally, we have collected from various summer schools a number of exercises around Linked Data and semantic technologies. These exercises are available in the EUCLID web site⁹.

---

⁹ [http://www.euclid-project.eu/resources/exercises](http://www.euclid-project.eu/resources/exercises)
2.5 Online Courses

The EUCLID online courses are learning pathways (or syllabi) that are based on the EUCLID learning materials. Learners can study these courses at their own pace, as there is no predetermined start or end date. The online courses have a focus on learning outcomes, which drive the organisation of the content. This means that the ultimate purpose of the online courses is to help the learner achieve the specified learning outcomes. Consequently, the EUCLID online courses differ from the EUCLID eBook in that they are shorter and targeted towards a smaller set of learning outcomes compared to the eBook, which covers a broader spectrum of Linked Data skills.

The EUCLID courses are available for the following platforms:

- Web browsers (HTML format)
- iTunes U on the iPad

Figure 8 shows a EUCLID online course in iTunes U. In order to address the needs of particular Data Science professions, we have devised the learning pathways matrix shown in Figure 9. These learning pathways combine the EUCLID modules towards acquiring the skills that are required by different Data Science professions in an Introductory, Intermediate and Advanced level.

---

*Figure 7: A EUCLID exercise for visualizing the MusicBrainz dataset using the Information Workbench*
Figure 8: A EUCLID course in iTunes U

<table>
<thead>
<tr>
<th>Data Architect</th>
<th>Data Manager</th>
<th>Data Analyst</th>
<th>Data Application Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introductory Level</strong></td>
<td>Module 1: Introduction</td>
<td>Module 1: Introduction</td>
<td>Module 1: Introduction</td>
</tr>
<tr>
<td></td>
<td>and Application Scenarios</td>
<td>and Application Scenarios</td>
<td>and Application Scenarios</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate Level</strong></td>
<td>Module 2: Querying Linked</td>
<td>Module 2: Querying Linked</td>
<td>Module 2: Querying Linked</td>
</tr>
<tr>
<td></td>
<td>Data</td>
<td>Data</td>
<td>Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Advanced Level</strong></td>
<td>Module 3: Providing Linked</td>
<td>Module 3: Providing Linked</td>
<td>Module 3: Providing Linked</td>
</tr>
<tr>
<td></td>
<td>Data</td>
<td>Data</td>
<td>Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module 4</strong>:</td>
<td>Module 4: Interaction with</td>
<td>Module 4: Interaction with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Linked Data</td>
<td>Linked Data</td>
<td>Linked Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module 5</strong>:</td>
<td>Creating Linked Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 9: The EUCLID learning pathways matrix
3  The EUCLID eBook

The EUCLID eBook encompasses all the content for each module in a structured and interactive way. The eBook serves as the basis for self-learning, as well as for revisiting certain topics after a training is completed, e.g. as part of a EUCLID training event. For each module, the feedback gathered after the delivery of the presentation slides and the webinar is used to restructure the module content for final delivery as an eBook chapter. The EUCLID eBook, therefore, represents the final outcome of the learning materials revising process.

The eBook integrates all the learning materials produced by the project. In particular, it contains multimedia and interactive elements, such as clips from the EUCLID webinars, screencasts, as well as self-assessment quizzes and exercises. In order to maximise the impact of the EUCLID learning materials on the community and bring them closer to as many people as possible, the EUCLID eBook has been made available for a variety of platforms and formats:

- Web browsers (HTML format)
- Apple iPad and MacOS (iBook format)
- eReaders (ePUB format)
- Amazon Kindle devices (MOBI format)

The eBook is available to download from the EUCLID web site, as well as the Apple iBook Store.10

Figure 10: The EUCLID eBook on the iPad

Authoring the eBook

As the EUCLID eBook has been produced in a variety of formats, a number of tools have been employed in order to author the eBook in each format. In particular, the following tools are used to produce the eBook:

- iBooks Author (iBook format)
- Calibre (ePUB and MOBI formats)
- Drupal editor (HTML format)

The iBooks Author (shown in Figure 12) is an application for MacOS, available to download for free\(^\text{11}\). It allows users to produce interactive eBooks in the iBook format. Unlike the ePUB format, which is universal and plays in

---

\(^{11}\) https://www.apple.com/uk/ibooks-author
almost every device, the iBook format is only available to read on an iPad or MacOS 10.9 (Mavericks). However, the iBook format is more powerful when it comes to the design of the eBook and its interactive elements.

Some of the main features of the iBooks Author are:

- A variety of templates to use for the design of the iBook.
- The ability to specify the layout of pages.
- The ability to create accessible iBooks for people with disabilities.
- The ability to embed interactive elements as HTML5 widgets. The application contains templates for galleries, quizzes, Keynote presentations, interactive images, and more. Alternatively, users can create and embed their own HTML5 widgets.
- The ability to export as an iBook, PDF, or plain text.
- The ability to submit the iBook to the Apple iBooks Store\textsuperscript{12}.

![Figure 12: The iBooks Author application used for authoring the eBook in the iBook format](image)

Calibre is a free and open source eBook library management application available for Windows, Linux and MacOS\textsuperscript{13}. It is a powerful application with a variety of features. It enables users to organize their eBook libraries, synchronize their eBook libraries with their eReader devices and also functions as a desktop eBook reader. In the context of EUCLID, we have employed Calibre in order to produce the EUCLID eBook in the ePUB and MOBI

\textsuperscript{12} \url{http://www.apple.com/uk/ibooks/}

\textsuperscript{13} \url{http://calibre-ebook.com/}
formats. In order to do this, we produce the HTML version first, then import it in Calibre, which converts it to the ePUB and MOBI formats. Calibre offers some additional customization features, such as selecting the cover page, as well as customizing the look and feel of the eBook (see Figure 13).

![Calibre tool](image)

*Figure 13: The Calibre tool used to produce the eBook in the ePUB and MOBI formats*

Finally, Drupal is a free and open source Content Management System (CMS)\(^{14}\). It enables users to setup and maintain a web site without requiring much technical knowledge, as it offers a comprehensive web dashboard through which the user can perform administration operations on the web site. In EUCLID, we have used Drupal to setup and update the project’s web site throughout the duration of the project. All the modules are available in HTML format in the project’s web site and authored via Drupal’s HTML editor (see Figure 14).

\(^{14}\) [https://drupal.org/](https://drupal.org/)
3.2 eBook structure

The chapters of the EUCLID eBook have been structured to cover the following range of topics:

Chapter 1: Introduction and Application Scenarios

This chapter introduces the main principles of Linked Data, the underlying technologies and background standards. It provides basic knowledge for how data can be published over the Web, how it can be queried, and what are the possible use cases and benefits. As an example, we use the development of a music portal (based on the MusicBrainz dataset), which facilitates access to a wide range of information and multimedia resources relating to music. The chapter also includes some multiple-choice questions in the form of a quiz, screencasts of popular tools and embedded videos.

Chapter 2: Querying Linked Data

This chapter looks in detail at SPARQL (SPARQL Protocol and RDF Query Language) and introduces approaches for querying and updating semantic data. It covers the SPARQL algebra, the SPARQL protocol, and provides
examples for reasoning over Linked Data. The chapter uses examples from the music domain, which can be directly tried out and ran over the MusicBrainz dataset. This includes gaining some familiarity with the RDF and OWL languages, which allow developers to formulate generic and conceptual knowledge that can be exploited by automatic reasoning services in order to enhance the power of querying.

**Chapter 3: Providing Linked Data**

This chapter covers the whole spectrum of Linked Data production and exposure. After a grounding in the Linked Data principles and best practices, with special emphasis on the VoID vocabulary, we cover R2RML, operating on relational databases, Open Refine, operating on spreadsheets, and GATECloud, operating on natural language. Finally we describe the means to increase interlinkage between datasets, especially the use of tools like Silk.

**Chapter 4: Interaction with Linked Data**

This chapter focuses on providing means for exploring Linked Data. In particular, it gives an overview of current visualization tools and techniques, looking at semantic browsers and applications for presenting the data to the end user. We also describe existing search options, including faceted search, concept-based search and hybrid search, based on a mix of using semantic information and text processing. Finally, we conclude with approaches for Linked Data analysis, describing how available data can be synthesized and processed in order to draw conclusions. The chapter includes a number of practical examples with available tools as well as an extensive demo based on analysing, visualizing and searching data from the music domain.

**Chapter 5: Creating Linked Data Applications**

This chapter gives details on technologies and approaches towards exploiting Linked Data by building LD applications. In particular, it gives an overview of popular existing applications and introduces the main technologies that support implementation and development. Furthermore, it illustrates how data exposed through common Web APIs can be integrated with Linked Data in order to create mashups.

**Chapter 6: Scaling up**

This module addresses the main issues of Linked Data and scalability. In particular, it provides details on approaches and technologies for clustering, distributing, sharing, and caching data. Furthermore, it addresses the means for publishing data and the relationship between Big Data and Linked Data, exploring how some of the solutions can be transferred in the context of Linked Data.

### 3.3 eBook download statistics

In order to measure the impact of the EUCLID eBook on the community, we have been gathering download statistics since the eBook was made available online. The following figures show detailed views of the statistics we have gathered from the Apple iBooks Store.

More specifically, Figure 15 shows a graph of the downloads of the eBook per week. We can see that there is a peak of downloads on January 2014, when the eBook was first made available in the Apple iBook Store. Figure 16 shows the number of downloads per week and per region. It can be seen that the majority of downloads originate from North and South America, with European downloads following closely.

We are also monitoring the visits to the eBook download page via the Bitly online service. Bitly offers a free service of online bookmarking, allowing users to save, search, and organize web links, group them into bundles, and share them with friends. We have used this service to bookmark the download page of the EUCLID eBook and monitor its visitor statistics. Figure 17 shows the statistics we have gathered, regarding the number of visits to the page, the sites and social networks where the link was shared, as well as the geographic distribution of visitors. The up-to-date statistics are publicly available online.

---

15 [https://bitly.com/]
16 [https://bitly.com/L6eOdv+]
**Figure 15:** Number of downloads of the eBook per week

**Figure 16:** Number of downloads of the eBook per week and per region
Figure 17: Statistics of visitors to the eBook download page
4 Lessons Learned and Best Practices

As outlined at the beginning of this deliverable, the EUCLID project has actively sought the input and feedback of Linked Data experts and the wider Linked Data community throughout the production of the learning materials and the educational eBook. In particular, we have collected feedback from comments submitted from community members to Twitter, Linked Data and Semantic Web mailing lists, as well as to the EUCLID channels on Vimeo and SlideShare. We have used the professional social network LinkedIn in order to form a dedicated EUCLID group and carry out discussions with the community members. We have also collected feedback from interacting with audiences synchronously during the broadcasting of a webinar via Livestream, as described in an earlier section of this deliverable.

Additionally, we have had a number of opportunities to interact face-to-face with various audiences via training events and dedicated workshops and tutorials, such as the ones organized by EUCLID partners at the European Data Forum (EDF) in 2013, at John Wiley & Sons Inc. in 2013, at the Future Internet Assembly (FIA) in 2014, as well as at the World Wide Web (WWW) conference for two years in a row: 2013 and 2014. More details about the methods used to engage the community and the outcomes of the project’s community engagement activities are available in D2.3.3.

Overall, the feedback received from the community regarding the quality of the produced learning materials and the eBook has been positive. Linked Data experts and the broader community have appreciated the effort that was dedicated by the project partners for the production of the materials, as well as the fact that these materials cover a wide range of skills and learning objectives. Additionally, the fact that the EUCLID interactive eBook has been made available for a variety of emerging educational platforms, such as the iPad and other tablets, has also been seen as a significant advantage of the project, regarding the potential impact of the eBook on data science practitioners and therefore its sustainability and its future uptake by the community.

Throughout the duration of the project, we have experimented with different approaches for the design and delivery of the EUCLID learning materials. The lessons we have learned have led us to finalise our curriculum and our module production process, which were presented in earlier sections of this deliverable. We have also acquired a valuable insight into the various challenges associated with the design and delivery of learning materials specifically for Linked Data. We have thus distilled our experiences and lessons learned into a set of best practices, which is outlined in the following sections.

4.1 Best practices for the design of learning materials

1. **Industrial Relevance** – our curriculum takes into account the needs of industry related to Open Data and Linked Data. Future work aims to automatically mine and analyse relevant job adverts to gain desired competencies for the sector. This is supported by the following best practice.

2. **Team Curriculum Design** – where the team is composed of a number of roles to fully capture industrial, academic and pedagogical requirements. Our team comprises of industrial partners (Ontotext, FluidOps), who have extensive experience with professional training, industrial requirements and scalable tools, academic partners (KIT, STI International), who have research expertise in Linked Data and pedagogical experts (The Open University).

3. **External Collaboration** – to gain world-class curriculum expertise where necessary and to facilitate course delivery and dissemination.

---

17 [https://www.linkedin.com/groups?gid=4917016]
18 [http://www.euclid-project.eu/events/edf-2013]
20 [http://www.euclid-project.eu/events/beyond-moocs-future-learning-future-internet]
21 [http://www.euclid-project.eu/events/online-learning-and-linked-data-tutorial]
4. **Explicit learning goals** – to which all learning materials (slides, webinars, eBook) are developed. Learners are guided through the learning goals by learning pathways – a sequence of learning resources to achieve a learning goal.

5. **Show realistic solutions** – rather than mock examples we utilize systems that are deployed and used for real.

6. **Use real data** – we use a number of large datasets including for example, the MusicBrainz dataset that contains 100Ms of triples.

7. **Use real tools** – our collection of tools are used in real life, including for example Seevl, Sesame, Open Refine and GateCloud.

8. **Show scalable solutions** – based upon industrial-strength repositories and automatic translations, for example using the W3C standard R2RML for generating RDF from large data contained in standard databases.

9. **Eating our own dog food** – we monitor communication and engagement with the Linked Data community through W3C email lists, in the social network channels LinkedIn and Twitter, as well as content dissemination channels such as Vimeo and SlideShare. We transform the monitoring results into RDF and make these available at a SPARQL endpoint. In this respect we use Linked Data to support Learning Analytics.

### 4.2 Best practices for the delivery of learning materials

1. **Open to Format** – our learning materials are available in a variety of formats including: HTML, iBook (iPad and MacOS), ePUB (other tablets), MOBI (Amazon Kindle).

2. **Addressability** – every concept in our curriculum is URI-identified so that HTML and RDF(a) machine-readable content is available.

3. **Integrated** – to ease navigation for learners the main textual content, relevant webinar clips, screencasts and interactive components are placed into one coherent space.

4. **High Quality** – we have a formalised process where all materials go through several iterations to ensure quality. For example, for each module we run both a practice and a full webinars facilitating critique and commentary.

5. **Self-testing and reflection** – in every module we include inline quizzes and exercises formulated against learning goals enabling students to self-monitor their progress.
5 Conclusions

This deliverable reports on the production and delivery of the EUCLID learning materials and their integration into an educational interactive eBook. This deliverable describes the EUCLID educational eBook, in terms of its production methodology, i.e. the EUCLID curriculum and module production process, as well as its building blocks, i.e. the different types of EUCLID learning materials, such as presentations, webinars, screencasts, exercises and online courses.

The EUCLID eBook encompasses all the content of the EUCLID learning materials in a structured and interactive way. The eBook contains several multimedia and interactive elements, such as clips from the webinars, screencasts, as well as self-assessment quizzes and exercises. In order to maximise its impact on the community, the eBook has been made available for a variety of platforms and formats, most notably for the iPad as an iBook, for other tablets as ePUB, as well as for all web browsers as HTML.

The EUCLID project has established a rigorous process for the production and delivery of learning materials about Linked Data. This process defines a series of iterations in the production of learning materials, with multiple revisions from internal and external stakeholders, in order to ensure high quality in the produced materials. Based on our experiences and lessons learned throughout the project in designing and implementing the production process, we have also established a set of best practices for the design and delivery of learning materials specifically for Linked Data.

It is important that all the EUCLID learning materials described in this deliverable, including the EUCLID eBook will be sustainable and will remain available even after the end of the project. In particular, audiences will continue to be able to access all the learning materials via the EUCLID web site, as well as the dedicated EUCLID channels on Vimeo and SlideShare. Additionally, the eBook will continue to be available to download both from the EUCLID web site and the Apple iBook Store.