

## Report for Guiding the Development of Educational Materials

### WP2.1.2

Author(s)	Anna Maria Tamaro, Stefano Caselli
Document status	Final
Document version and date	June 15th, 2017
Dissemination level	Internal

1	Introduction	3
1.1	Parma Workshop	3
2	What is Research Data Management (RDM) for ROMOR?	4
3	Who are the stakeholders of ROMOR RDM?	5
3.1	ROMOR stakeholders	5
3.2	PS HE Needs Results from WP1	6
3.2.1	PS HE Educational needs results	7
4	What are key competencies in the ROMOR RDM process?	8
4.1	Competencies in RDM	8
4.2	Edison Data Management Competencies matched with PS HE operational staff needs	9
4.3	EDISON Data Engineering Competencies matched with PS HE technical staff needs	12
5	ROMOR RDM Curriculum	14
5.1	Vocational training curriculum	14
5.1.1	Creation and reuse of existing freely available training materials	17
5.1.2	Quality evaluation of learning material	18
5.1.3	Planned training events	18
5.2	Academic curriculum planning	20
5.2.1	ROMOR Mobility Strand	20
5.3	References	21
5.3.1	Open Education Courses:	21
	APPENDIX 1 ROMOR training curriculum	22
	Training topics proposed by EU partners	22
	Topics for the basic training (Parma 6-8 September 2017)	22
	Topics for the intermediate training (West Bank 15-16 January 2018)	22
	Topics for the advanced training (TUWIEN 18-20 June 2018)	22
	The mapping of ROMOR topics to knowledge areas	23
	The mapping of ROMOR topics to skills (outcomes)	24
	General template is used when planning curriculum	27

## 1 Introduction

This report lists the ROMOR WP2 activities made until now (June 2017), and planned, together with a set of progress indicators of achievement.

The WP2 objectives are:

- developing tailored training to increase capacity among PS research support staff for designing, implementing, operating, populating, and sustaining OAIRs;
- equipping PS research support staff to deliver training on research output management to researchers at their own institutions.

WP2 started at the Preparation Phase of the ROMOR project, immediately following on from the deliverables of WP1 on User Requirements.

In the WP1 “needs assessment work package”, the weaknesses in the current practice and capacities of Research Output Management in PS HEIs are identified.

In WP3, the Training will be delivered in 3 Workshops. There will be intensive collaboration between WP2 and WP3: WP2 defines the requirements for shared educational materials.

All ROMOR partners were involved and/or will contribute to WP2. Partner PS HEIs together with IUG and TUWIEN will be the main assistant partners to facilitate this work package.

Activities planned are:

Year 1: The vocational training and the academic education curricula will be submitted officially for acceptance by partner PS HEIs by the end of year 1.

Finally, a leaflet on the developed courses both for academic as well as vocational training will be published.

Year 2 & 3: The education material will be revised in year two and three based on feedback obtained during the first iteration of courses held.

### 1.1 Parma Workshop

(May 15-17, 2017)

#### **Aim of the Parma Workshop**

To familiarise partners with Open Access and Open Science Agenda and concepts.

#### **Objectives of the Parma Workshop**

Strong integration with the PS HE existing workflow

Allowing customisation and discipline-based focus for:

- Vocational training materials for technical capacity building
- Vocational training materials for operational capacity building (content management)

- Material for academic courses in digital curation and preservation/digital library/information science

The Parma Workshop has discussed and defined:

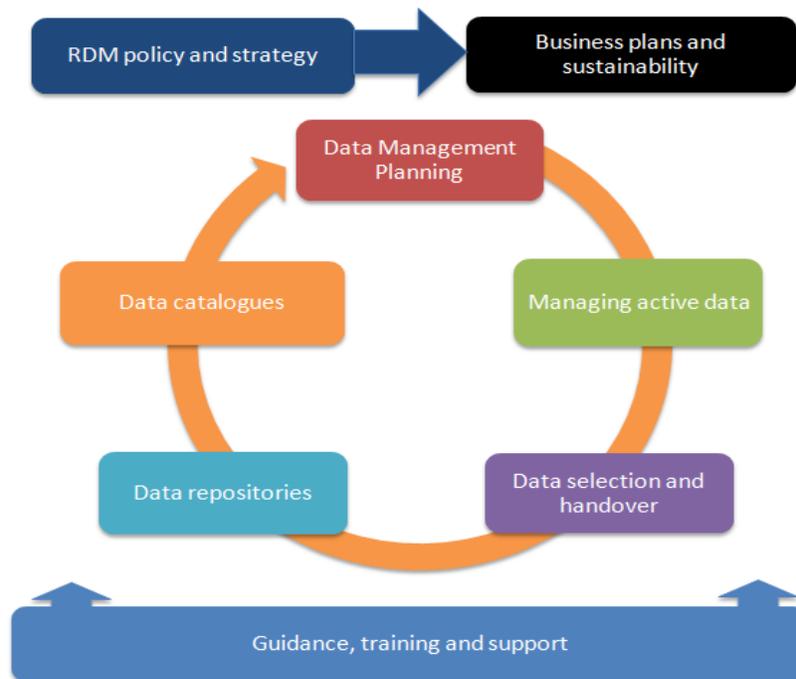
- what is the context of Research Data Management (RDM)?
- what are the stakeholders of ROMOR RDM?
- what are the key competencies in the ROMOR RDM process?

A report plan has been prepared including time, location, trainers, trainees, etc. for conducting "Training of Trainers" sessions using the vocational training materials to be developed.

## 2 What is Research Data Management (RDM) for ROMOR?

RDM and curation is “the active management and appraisal of data over the lifecycle of scholarly and scientific interest” (as defined by the Digital Curation Centre, UK). ROMOR partners have agreed to employ the DCC’s RDM service model to structure our training including an emphasis on:

- softer infrastructure aspects including policies, business planning and training;
- more technical infrastructure requirements which are based around the data lifecycle



<http://www.dcc.ac.uk/resources/developing-rdm-services>

WP2 will look at each of the model components in more detail, considering aspects of EU HEIs good practices along with PS HEIs specific needs and expectations.

SOURCE: DAVIDSON J. (First ROMOR WS 2017) Good practice in establishing research data management (RDM) services – lessons learned in the UK

Following the DCC services model, three areas of training and education can be highlighted in the ROMOR RDM process in PS HEIs: Data governance, data management, data literacy.

#### **Data Governance**

Data governance can be considered as a set of activities including strategic planning, supervision, and enforcement that governs the process and methodologies that are carried out to ensure and improve the quality of RDM, including organizational structure and business planning, policy, and advocacy awareness to data stakeholders.

#### **Data Management**

Data management is considered from the perspective of the DCC data life-cycle services, which consists of data selection and handover, data storage in repositories, data catalogues, data sharing, data reuse and data appreciation. The Data management, as a data management practice aimed at improving the level of data reuse, needs to follow a certain governance framework and guidance strategy.

#### **Data literacy**

Data literacy is embedded in R&D data flow and related to research data life-cycle; R&D management and data utilization are main perspectives in data literacy; practical skills such as data analysis, data description (metadata and methods) and tools would be the main focus in data literacy.

## 3 Who are the stakeholders of ROMOR RDM?

### 3.1 ROMOR stakeholders

The ROMOR RDM groups of stakeholders are the following:

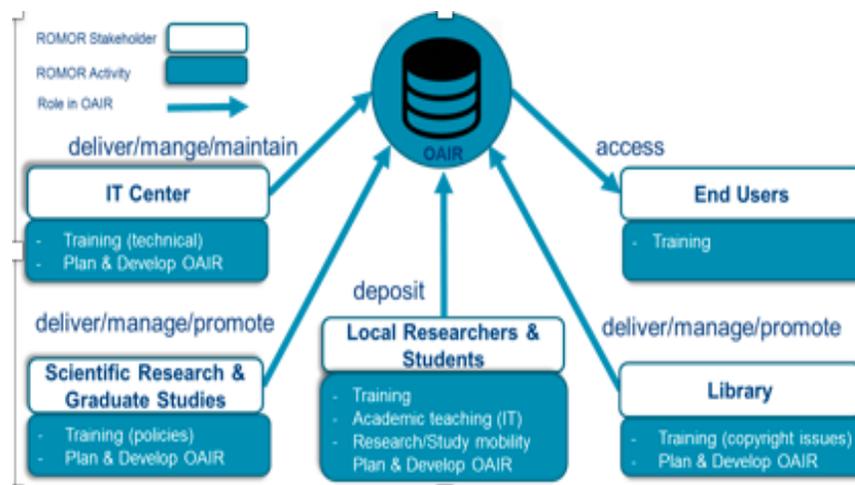
**Contributors** (local researchers and students): they allow content to be made available to others.

**End User:** This could be anyone with an interest in the subject area or that comes across the repository and wishes to use or contact it.

**Managerial Staff** including:

- IT Centre: IT specialists must be involved in the decision as to which repository software(s) should be used or evaluated. Once installed it must be easy for IT specialists to maintain, so that it can run alongside other systems that are

- currently being looked after. They also include department-based, technical authors and tutors.
- **Library:** they play a very important role in the development of repositories. They are positioned to facilitate and promote the IR. They need to be involved with the design and implementation of the repository as they have experience in working very closely with academics to provide support for them.
  - **Scientific research office:** they are responsible for Research Output Management within their institutions. It is necessary to keep them aware of the developments of the repository, and to carefully introduce ideas that have an effect on any policies or areas with which they are involved to help assist academics when it comes to actually creating and making the research content available. Therefore they need to be considered when designing a repository of research output. They need to be involved with the design and implementation of the repository as they have experience in working very closely with academics to provide support for them.
  - **Support staff:** these assisting staff are crucial to the repository so that content can successfully reach the repository



Rawia Awadallah (2016) Appendix A PS HEIs Research Output Management Requirements

In the ROMOR RDM process, the collaboration between data creators and researchers, administrators, managers and users has been highlighted.

### 3.2 PS HE Needs Results from WP1

Of note from the results of PS HE survey of WP1 (Delve, WS Parma 2017):

Lack of awareness of existing RDM policies and strategies in PS HEIs:

- 65% of researchers think they do not have an RDM policy at their institution
- Most Palestinian HEIs do have ad-hoc policies currently in place

Support for Data Management Planning in PS HEIs

- 5% of researchers have access to dedicated data management planning support
- Most HEIs indicated that this as an area they were keen to address

Active Data Storage in PS HEIs

- 3% of researchers store their data on institutional servers
- 23% of researchers have lost data

Data Selection and Handover in PS HEIs

- HEIs with repositories find it difficult to motivate researchers to deposit materials

Data Repositories in PS HEIs

- 85% of researchers feel they are responsible for archiving data
- 72% of researchers are not aware of discipline-specific repositories
- Most PS HEIs will provide storage on request

Data Catalogues in PS HEIs

- 64% of researchers do describe their data
- Some HEIs use Dublin Core as their metadata standard
- Most HEIs do not use any formal metadata standards

Guidance, training and support in PS HEIs

- 18% of researchers wanted RDM guidance and support
- 12% of researchers wanted RDM in the curricula
- Most HEIs stated that RDM training, and support were key priorities

Lack of business and sustainability plans for data repositories and RDM services in PS HEIs. This is not unique to PS HEIs - most EU HEIs are struggling with this aspect as well as the DCC's annual RDM survey indicated (<http://www.dcc.ac.uk/survey2015>).

### 3.2.1 PS HE Educational needs results

At the end of WP1, the PS HE training needs were investigated by working groups and described in the WS report in the A5 and A6 tables and in Appendix A in detail, describing knowledge and technical and managerial skills of operational and technical staff involved in ROMOR RDM process (Rawia Awadallah & Iyad Alagha D.1.3.1 Needs Assessment Workshop Report April 2017).

This WP2 report has taken into account these vocational training needs, compared to the good practices of EU HE and in particular compared to the Edison Project's skills levels (see 4.2 and 4.3 below).

## 4 What are key competencies in the ROMOR RDM process?

The European approach to education and training is based on the concepts of competencies and learning outcomes.

The glossary used in Europe on which ROMOR must be based includes:

**Qualification:** reference tool for the comparison of qualification levels (1-8)

**Profile:** a particular work function that includes the elements deemed necessary

**Competencies:** ability in applying knowledge and ability in doing something successfully or efficiently

**Knowledge** in the context of competence definition is treated as something to know, to be aware of, familiar with, and obtained as a part of education.

**Skills** is treated as provable ability to do something and relies on the person's experience.

**Learning outcomes:** statements that describe significant and essential learning that learners have achieved, and can be demonstrated at the end of a course or program.

The emphasis on competencies and learning outcomes moves the criteria for quality from the input (discipline, what staff teach) to the outcome (what learners will be able to do).

### 4.1 Competencies in RDM

There have been projects to develop competency models in a number of critical or highly dynamic areas such as e-CF (European Commission, 2009), digital curation (DigiCurV), data science (Edison, <http://edison-project.eu/>), and linked data (Linked Data for Professional Educators:

<http://explore.dublincore.net/theory/briefing-papers/ld4peoverview/> ).

A central aspect of all these projects and competencies list was identifying tasks that were entry level, from **core** and **specialist** activities.

Following the Edison Framework, the European Data Science Project, the highlighted profiles and related areas of expertise are the following:

Data Science Competence groups	Data Science Professional Profiles				
	Managers ; DSP01-DS03	Professionals: DSP04-DS09	Professionals (data handling/management: DSP10-13	Professionals (database): DSP14-DS16	Technician and associate profession: DSP17-DS19
Data analytics	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
Data Science Engineering	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
Data Management	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
Scientific research & method	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
Business process	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■
Domain Knowledge	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■

SOURCE Edison (2016) Professional Profiles and Area of competencies

The areas of competencies related to Data Management and Data Engineering are particularly interesting for the objectives of the ROMOR Project. Below, the competencies of these two areas have been compared with the educational and training needs declared by the PS HEIs for technical and operational staff.

Three levels of mastery (or proficiency) are defined for each of the competencies to allow flexible curriculum development and the definition of the professional profiles: Familiarity (entry), Usage (core), Assessment (expert).

#### 4.2 Edison Data Management Competencies matched with PS HE operational staff needs

Data Management	Competencies Indicator	Familiarity	Usage	Assessment	PS-HE educational needs
DSDM-DM -	Develop and implement data management strategy for data collection, storage, preservation, and availability for further processing.	Execute data strategy in a form of Data Management Plan and illustrate how available software can help to promote data quality and accessibility.	Develop components of data strategy and methods that improve quality, accessibility and publications of data.	Create Data Management Plan aligned with the organizational needs, evaluate IPR and ethical issues.	Ability to engage in strategic planning  Ability to liaise one-on-one with internal clients e.g. faculty; researchers

<b>DSDM01 -</b>	Develop and implement data strategy, in particular, in a form of Data Management Plan (DMP).	Explain and execute data strategy in a form of Data Management Plan.	Develop components of data strategy in a form of Data Management Plan.	Assess various data strategies and create strategy, in a form of Data Management Plan, aligned with organizational needs.	Ability to develop and monitor workflows
<b>DSDM02 -</b>	Develop and implement relevant data models, including metadata.	Operate data models including metadata.	Experiment with data models and model relevant metadata.	Evaluate and design data models, including metadata.	Ability to select and use metadata sets Ability to monitor metadata quality
<b>DSDM03 -</b>	Collect and integrate different data sources and provide them for further analysis.	Collect different data sources.	Survey and visualize connection between different data sources.	Compose different data sources to enable further analysis.	Ability to plan and develop the repository collection
<b>DSDM04 -</b>	Develop and maintain a historical data repository of analysis results (data provenance).	Operate a historical data repository.	Construct a historical data repository.	Improve or design a historical data repository.	Ability to ensure government reporting requirements are met

DSDM05 -	Ensure data quality, accessibility, publications (data curation).	Illustrate how available software can help to promote data quality, accessibility and publications.	Develop methods that improve quality, accessibility and publications of data.	Improve quality, accessibility and publications of data.	<p>Ability to assess and evaluate repository performance as a service</p> <p>Ability to promote the repository to external stakeholders e.g. students; open access community</p>
DSDM06 -	Manage IPR and ethical issues in data management.	Configure data management software to manage IPR and ethical issues.	Identify IPR and ethical issues in data repository.	Evaluate IPR and ethical issues in data repository.	Ability to ensure digital rights management issues are resolved

### 4.3 EDISON Data Engineering Competencies matched with PS HE technical staff needs

Data Engineering	Competence Indicator	Familiarity	Usage	Assessment	PS HE educational needs
	Use engineering principles to research, design, develop and implement new instruments and applications for data collection, analysis and management.	Identify and operate instruments and applications for data collection, analysis and management	Model problems and develop new instruments and applications for data collection, analysis and management following established engineering principles.	Evaluate instruments and applications to optimize data collection, analysis and management.	Ability to evaluate a new version of repository software e.g. to make a recommendation on whether to upgrade or not
<b>DSENG01</b>	Use engineering principles to research, design, prototype data analytics applications, or develop structures, instruments, machines, experiments, processes, systems.	Choose potential technologies to develop, structure, instrument, machines, experiments, processes, and systems.	Model data analytics application to better develop suitable instruments, machines, experiments, processes, and systems.	Create innovative solutions to research and design data analytics	<p>Ability to design and develop repository interface and tools</p> <p>Ability to customize repository software</p> <p>Ability to identify and develop value added services to the repository software</p>

<b>DSENG02 -</b>	Develop and apply computational solutions to domain related problems using wide range of data	Name computational solution and identify potential data analytics platform	Apply existing computational solutions to data analytic platform.	Adapt and optimize existing computational solutions to better fit to a given data analytics	Ability to identify and develop value added services to the repository software
<b>DSENG03 -</b>	Develops specialized data analysis tools to support executive decision making.	Identify a set of potential data analytics tools to fit specification.	Survey various specialized data analytics tools and identify the best option.	Evaluate and recommend optimal data analytics tools to influence decision making	Ability to analyze and solve problems related to repository software
<b>DSENG04</b>	Design, build, operate database technologies.	Find possible database solutions including both relational and non-relational databases.	Model the problem to apply database technology.	Predict the difference in term of performance between relational and non-relational databases and recommend a solution.	Ability to perform software upgrades
<b>DSENG05</b>	Develop solutions for secure and reliable data access.	Identify security issues related to reliable data access.	Analyze security threats and solve them using known techniques.	Evaluate security threats and recommend adequate solutions	Ability to implement software patches and bug fixes

<b>DSENG06</b>	Prototype new data analytics applications.	Define technical requirements for new data analytics application for a given high-level design	Apply existing techniques to develop new data analytics applications.	Combine several techniques and optimize them to design new data analytic applications.	Ability to communicate technical issues to management and team members  Ability to liaise with clients regarding technical problems
----------------	--	--	---	--	---

## 5 ROMOR RDM Curriculum

Two different ROMOR training and education curricula are planned:

- 1) a vocational training delivery plan,
- 2) an academic education plan.

Aspects of ROMOR training good practice

- Appropriate training should be provided for different stakeholder groups and different levels (introductory intermediate, advanced/expert);  
 Reuse of existing freely available training materials and competencies framework (such as FOSTER (<https://www.fosteropenscience.eu/>) content, DigCurV (<http://www.digcurv.gla.ac.uk/curriculumGuide.html>) and Edison project frameworks, and Vitae’s Researcher Development Framework with Information Literacy Lens is a good idea rather than starting from scratch; Discipline specific training may be required. (<https://www.vitae.ac.uk/vitae-publications/rdf-related/information-literacy-lens-on-the-vitae-researcher-development-framework-rdf-apr-2012.pdf>)

### 5.1 Vocational training curriculum

The main goal of this vocational curriculum is to build capacity in implementing institutional repositories, and in technically and operationally managing these repositories.

Vocational training curriculum is based on DDC RDM services models, matched with PS HE educational needs and following EDISON Competencies framework for the 3 different levels of proficiency: Introductory (Familiarity), Intermediate (Usage), Advanced (Assess).

Vocational training will be produced to reflect the findings of EU HE good practice and the PS HE needs assessment workpackage (WP1).

## **RDM policy and strategy**

### *Knowledge of:*

- Research practices and workflows
- Data sharing options, open access, IPR, licenses
- Where to find information about data structures, types, formats, vocabularies, ontologies and metadata.

### *Ability to:*

- Articulate benefits of data sharing and re-use
- Undertake data audit and assessment tools.

### *Aspects of good practice:*

- Being clear on what constitutes research and research data
- Equating RDM to good research
- Clearly stated roles and responsibilities
- Stressing a 'proportionate' amount of effort

## **Data Management Planning**

### *Knowledge of:*

Data management plans and DMP tools

### *Aspects of good practice:*

- Linking data management planning to related policies and processes (avoid duplication of effort, conflicts)
- Location of data management support information on research staff pages
- Briefing Grants and Contracts staff about processes
- Considering the costs of RDM
- Linking to external resources where necessary

## **Managing active data**

### *Knowledge of:*

- Metadata standards and schemas for repository, data formats, identifiers, data citation, data licensing.
- Domain ontologies, taxonomies, knowledge of the semantic web and linked data; skills in RDF
- Discovery tools

### *Ability to:*

- Actively manage research data

- Undertake digital preservation activities
- Apply forensic procedures in digital curation

*Aspects of good practice:*

Understanding your storage needs

Reviewing internal systems and processes to optimise RDM services and efficiencies

Being aware of services from external providers (risks, benefits)

Choosing flexible solutions that scale

**Data selection and handover**

*Ability to:*

- Select and appraise datasets

*Aspects of good practice:*

Being clear on what data might need to be retained and why (reproducibility, validation)

Being clear about how long the data needs to be retained

Helping researchers to be clear about any restrictions on access

Being clear on who to contact to help with selection and appraisal (consider how and when re-appraisal may need to happen)

**Data repositories**

*Knowledge of:*

- Database design types and structures
- Data linking and data integration techniques
- Data repository and storage platforms

*Aspects of good practice:*

Clear policy on acquisition (limits on size, formats, sensitivity)

Provision of a unique digital identifier (DOI)

Provide advice on external, discipline specific repositories (re3data.org)

Being clear about any normalisation processes that may occur upon ingest (can affect usability of deposited data)

Advising on how to link data to related publications

Guidance on how to cite data that has been deposited (generated on deposit where feasible)

### **Data catalogues**

*Knowledge of:*

- Existing data centres, repositories and collections and data discovery mechanisms
- Data manipulation and analysis techniques and tools
- The way data are organized and structured within collections

*Aspects of good practice:*

Ability to register and describe data sets

Ability to link to related publications in OAIRs, journals or external repositories

Encouraging researchers to register for ORCIDs

Making use of internal grant IDs when describing research outputs

Making use of data held in other systems to reduce burden by automating description (CRIS systems, institutional publications repository)

#### 5.1.1 Creation and reuse of existing freely available training materials

A template has been provided to record information for each of the topics proposed by EU HE partners, matched to PS HE evidenced needs ([Appendix 1](#)).

Vocational training materials will be prepared in Arabic language by partner PS HEIs based on the training materials prepared by EU partners

The educational materials should be deposited for public access and reuse in the ROMOR Zenodo collection and on the project Website (Wiki pages). All educational material produced by ROMOR will be open and made available as OER.

The quantity of RDM resources now available (online tutorials, training courses, websites) makes it possible to speak of an RDM curriculum, albeit an “unofficial” one. Continuing education and training is a necessity and there are a range of data management training programs positioned in this space, for example, RDMRose (Cox et al., 2012), immersive Informatics (Shadbolt, Konstantelos, Lyon, & Guy, 2014), and the MANTRA DIY Kit (MANTRA, n.d.). A Research Data Management MOOC (Massively Open Online Course) was run on Coursera by UNC-Chapel Hill and University of Edinburgh in 2016. A comprehensive list of Open Educational Resources and MOOC showing the current status has been described in Google spreadsheets:

[https://docs.google.com/spreadsheets/d/1k\\_1qxujwBUkPmR6ZJNHNvDEVG5sPVZSPq9v\\_kDwwtpoQ/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1k_1qxujwBUkPmR6ZJNHNvDEVG5sPVZSPq9v_kDwwtpoQ/edit?usp=sharing)

The complexity and importance of these tables were not considered to be simple ways of organizing data, but real heuristic instruments for the WP2 members to think and answer complex questions of learners.

### 5.1.2 Quality evaluation of learning material

ROMOR EU HE partners will liaise closely with PS HE partners as materials are developed to ensure that they target user needs as defined in WP1. External QA reviews will be sought from ROMOR's associate partners (asking EIFL, OpenMed, OpenAire, AQAC). Ad-hoc meetings will be scheduled by the QA Panel as needed to facilitate review discussions with external reviewers.

### 5.1.3 Planned training events

Three training events of WP3 are planned about intended audience, level of capability and intended learning outcomes for each set of educational materials.

Following the ROMOR planned "training of trainers" sessions using the vocational training materials to be developed.

Courses	Time	Location	Trainers	Trainees
Intensive Basic training Data literacy	6-8 Sept 2017	Parma	TUWIEN, PARMA, GLA (including teacher from Brighton)	Introductory Level
Advance training and evaluation	15-16 January 2018	West Bank	TUWIEN, PARMA, GLA (including teachers from Brighton)	Intermediate Level
Summer School	May 2-8 2018?	TUWIEN/ Glasgow	TUWIEN, PARMA, GLA (including teacher from Brighton)	Advanced Level

The success of training may be gauged in terms of attainment of learning objectives; but this implies longer-term follow-up, beyond immediate post-training evaluation. As part of this, two questionnaire will be distributed: before and after the training sessions.

Participants might be asked what they see have achieved in practice on the basis of training needs that they themselves have.

Prior to each training event, a detailed course description booklet (Training delivery Plan) will be drafted including clear learning outcomes for participants and practical activities planned.

Following each training session, feedback will be sought using a standard online form to ensure consistency across the life of the project. Feedback will be used to improve the materials and approaches for future training events.

A short summary of event feedback will be produced as a report and will be used to help refine training events that are run at later stages of the project.

The first Course will be in Parma, 6-8 September 2017. The purpose of the intensive basic training is to understand the issues involved in RDM, access and re-use and suggested ways of enhancing support services with a focus on the PS HE partners' needs

### **Learning Outcomes**

Here are the learning outcomes we tend to use for our introductory course on RDM.

- Understand international drivers for data management and sharing
- Learn how research data management and curation can facilitate data sharing and increase citations
- Understand what infrastructure and support services are required
- Be aware of some of the free tools and support services available

### **Pedagogy**

Case studies about data repositories, as they are currently done in Europe

Work Group: Looking at Business Model Canvas (BMC) for developing RDM service. See an example of a course JISC ran for developing services at:

<http://www.dcc.ac.uk/events/workshops/developing-research-data-management-services>

### **Programme Content Structure**

Develop and implement data management strategy for data collection, storage, preservation, and availability for further processing.

Begin work to develop a business and sustainability plan for RDM services (this will be revisited at various points in the project and updated).

Collect and integrate different data sources and provide them for further analysis.

Develop and maintain a historical data repository of analysis results (data provenance).

Ensure data quality, accessibility, publications (data curation).

Manage IPR and ethical issues in data management.

## 5.2 Academic curriculum planning

As a result of the Bologna Process objective of enhancement of European Higher Education Area, EU HEIs adopt the following criteria:

- a learning outcomes orientation,
- the selection of appropriate teaching strategies for improving learning,
- the development of suitable assessment techniques.

The adoption of a learning outcomes approach focuses on the learner achievements and not on the discipline. A general template is used when planning curriculum ([Appendix 1](#)). Laboratories and practical exercises accompany the theoretical lessons and the independent study constitutes 2/3 of the workload.

The ROMOR academic curriculum is based on the offerings of the courses of the EU HE and on partner's competencies and knowledge. A list of EU HE academic courses related to the objectives of ROMOR are described here:

[https://docs.google.com/spreadsheets/d/1gew-ngzLerb7pzS1Qx6sUmrPIddrn70QMBUw7gMN\\_Hw/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1gew-ngzLerb7pzS1Qx6sUmrPIddrn70QMBUw7gMN_Hw/edit?usp=sharing)

### 5.2.1 ROMOR Mobility Strand

The ROMOR Mobility Strand manages the mobility and participation of teaching and staff students at EU HEIs. Each EU HEI will prepare a call for the offered courses of interest for the objectives of ROMOR, and will be selected based on agreed criteria.

Following the Bologna Process, all EU HEIs offer structured courses on three levels: Bachelor, Master and PhD, linked to credits (and not to study years) and the ROMOR Project will adapt to this rule.

An important aspect of the ROMOR curriculum will be the recognition and certification of qualifications using ECTS (and ECVET) Transfer credit system (60 credits per year)

1 ECTS=25 h workload; 1/3 lectures in presence.

Other European tools which will be used are: European Qualification Framework, EUROPASS and Portfolio.

### 5.3 References

European Commission (2016) A common European framework for ICT Professionals in all industry sectors

<http://www.ecompetences.eu/it/>

DigiCurV (2013) A Curriculum Framework for Digital Curation

<http://www.digcurv.gla.ac.uk>

Edison Project (2015) Data Science Competencies Framework

<http://edison-project.eu/>

Linked Data for Professional Educators (2015)

<http://explore.dublincore.net/theory/briefing-papers/ld4peoverview/>

DCC Institutional Survey results (2015)

<http://www.dcc.ac.uk/survey2015>

Rawia Awadallah & Ilyad Alagha D.1.3.1 Needs Assessment Workshop Report April 2017

Cox et al. (2012) Upskilling Liaison Librarians for Research Data Management, "Ariadne"

<http://www.ariadne.ac.uk/issue70/cox-et-al>

Shadbolt, Konstantelos, Lyon, & Guy (2014) Delivering innovative RDM training: the immersive Informatics pilot programme

<https://minerva->

[access.unimelb.edu.au/bitstream/handle/11343/40985/Shadbolt\\_Konstantelos\\_Lyon\\_Guy.pdf?sequence=2](https://minerva-access.unimelb.edu.au/bitstream/handle/11343/40985/Shadbolt_Konstantelos_Lyon_Guy.pdf?sequence=2)

#### 5.3.1 Open Education Courses:

MANTRA, University of Edinburgh

<http://mantra.edina.ac.uk>

MANTRA DIY Kit for librarians, University of Edinburgh

<http://mantra.edina.ac.uk/libtraining.html>

RDMRose Lite, University of Sheffield

<http://rdmrose.group.shef.ac.uk>

MOOC (Massively Open Online Course) Research Data Management Coursera by UNC-Chapel Hill and University of Edinburgh (2016)

<https://www.coursera.org/learn/data-management>

## APPENDIX 1 ROMOR training curriculum

### Training topics proposed by EU partners

Topics for the basic training (Parma 6-8 September 2017)

Topic	Title	Level
ROMOR1	RDM policies and strategy	1
ROMOR2	Data Management Planning	1
ROMOR3	Managing Active Data	1
ROMOR4	Data selection and handover	1
ROMOR5	Data repositories	1
ROMOR6	Data catalogues	1

Topics for the intermediate training (West Bank 15-16 January 2018)

Topic	Title	Level
ROMOR1	RDM policies and strategy	2
ROMOR2	Data Management Planning	2
ROMOR3	Managing Active Data	2
ROMOR4	Data selection and handover	2
ROMOR5	Data repositories	2
ROMOR6	Data catalogues	2

Topics for the advanced training (TUWIEN 18-20 June 2018)

Topic	Title	Level
ROMOR1	RDM policies and strategy	
ROMOR2	Data Management Planning	

<b>ROMOR3</b>	<b>Managing Active Data</b>	
<b>ROMOR4</b>	<b>Data selection and handover</b>	
<b>ROMOR5</b>	<b>Data repositories</b>	
<b>ROMOR6</b>	<b>Data catalogues</b>	

### The mapping of ROMOR topics to knowledge areas

knowledge sets	ROMOR 1	ROMOR 2	ROMOR 3	ROMOR 4	ROMOR 5	ROMOR 6
Knowledge of managing, archiving and sharing their research data			✓			✓
Knowledge of specific repository software e.g. DSpace; Eprints					✓	
Knowledge of metadata standards e.g. Dublin Core			✓			
Knowledge interoperability standards and protocols e.g. OAIPMH					✓	
Knowledge of copyright legislation	✓					
Knowledge of file preservation formats e.g. JPEG 2000					✓	
Knowledge of university reporting requirements	✓					
Knowledge of taxonomies			✓			✓
Knowledge of library cataloguing			✓			✓
Knowledge of the digital repository environment	✓				✓	
Knowledge of open access issues	✓					
Knowledge of the scholarly environment	✓					✓
knowledge of the semantic web and linked data; skills in RDF			✓			✓

Knowledge of website monitoring tools e.g. Google Analytics			✓			✓
Knowledge of Digital preservation technologies					✓	
knowledge of metadata standards and data exchange protocols for repository					✓	✓
Dublin Core						
OAI-PMH						
RIF-CS						
MARC						
METS						
MODS						
OAI-ORE						
LOM						
PREMIS						
Knowledge of Management skills for repository job	✓					

The mapping of ROMOR topics to skills (outcomes)

Technical skills	ROMO R1	ROMO R2	ROMO R3	ROMO R4	ROMO R5	ROMO R6
Ability to evaluate a new version of repository software e.g. to make a recommendation on whether to upgrade or not					✓	
Ability to design and develop repository interface and tools					✓	
Ability to customize repository software					✓	
Ability to identify and develop value added services to the repository software					✓	
Ability to analyze and solve problems related to repository software					✓	

Ability to communicate technical issues to management and team members	✓					
Ability to perform software upgrades					✓	
Ability to implement software patches and bug fixes					✓	
Ability to liaise with clients regarding technical problems	✓					
Ability to understand and implement interoperability standards and protocols					✓	
Ability to liaise with software vendors	✓				✓	
Ability to liaise with IT support staff	✓					
<b>Managerial and librarian skills</b>	<b>ROMO R1</b>	<b>ROMO R2</b>	<b>ROMO R3</b>	<b>ROMO R4</b>	<b>ROMO R5</b>	<b>ROMO R6</b>
Ability to select and use metadata sets			✓	✓		✓
Ability to monitor metadata quality			✓	✓		✓
Ability to select appropriate file format e.g. for use or preservation				✓	✓	
Ability to use reporting tools	✓					✓
Ability to use statistical analysis skills			✓			✓
Ability to liaise with clients	✓					
Ability to identify and manage copyright issues	✓					
Ability to develop Research Output Management Services (RDM service Model)					✓	
Ability to plan and develop a repository advocacy program	✓					
Ability to promote the repository to internal stakeholders e.g. faculty; research communities; senior management	✓					

<b>Ability to promote the repository to external stakeholders e.g. students; open access community</b>	✓					✓
<b>Ability to manage the repository budget</b>	✓					
<b>Ability to develop and monitor workflows</b>					✓	✓
<b>Ability to engage in strategic planning</b>	✓					
<b>Ability to plan and develop the repository collection</b>					✓	✓
<b>Ability to lead and manage staff</b>	✓					
<b>Ability to ensure government reporting requirements are met</b>	✓					
<b>Ability to liaise one-on-one with internal clients e.g. faculty; researchers</b>	✓			✓		
<b>Ability to ensure digital rights management issues are resolved</b>	✓					
<b>Ability to negotiate with software vendors</b>	✓					
<b>Ability to assess and evaluate repository performance as a service</b>	✓					

General template is used when planning curriculum

**PROJECT ROMOR**

**RESEARCH DATA MANAGEMENT STUDY SCHOOL**

**Topic**

**Location, Date**

1. **Introduction**
2. **Aim**
3. **Learning Outcomes**
4. **Pedagogy**
5. Programme