South-Eastern European Data Services

D5 – Policy and procedures: Montenegro

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Name	Short Name	Country
Faculty of Humanities and Social Sciences University of Zagreb	FFZG	Croatia
Centre for Monitoring and Research, Podgorica	CeMI	Montenegro
Centre for Political Courage, Pristina	CPC	Kosovo
Institute for Democracy and Mediation, Tirana	IDM	Albania
Institute of Economic Sciences, Belgrade	IES	Serbia
Saints Cyril and Methodius University, Institute for Sociological, Political and Juridical Research, Skopje	ISPJR	Macedonia
Swiss Foundation for Research in Social Sciences, Lausanne	FORS	Switzerland
University of Ljubljana, Social Science Data Archive, Ljubljana	UL	Slovenia

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1. Introduction

There is a growing awareness about data sharing among international organisations, national science organisations, research funding bodies, data services, universities and researchers, on the one hand but also the growing needs for proper tools, mechanisms and instruments aimed at providing trustworthy long-term preservation of research data. Data sharing enables the reuse of data by researchers who did not generate these data themselves, thus leading to greater efficiencies and more research. Data sharing also stimulates the usage of data beyond research in academia. Ultimately, data sharing leads to a higher return on investment. Data sharing furthermore makes science more transparent and facilitates replication of research by others.

A crucial perquisite for any existing or aspiring data service are a set of clearly defined, written down, core policies in order to achieve trust among those stakeholders.

Through their core activities – data preservation and dissemination – data services make long-term access to and wider use of existing data possible in the first place. This means that publicly-funded data are used more effectively, beyond their original purposes (secondary use). It goes without saying, that data services, as a key stakeholder, have to develop a transparent set of policy and procedures that support internal data management procedures across the whole data life-cycle and ensure accountability and allow for external quality control. Accountability and transparency are key factors for creating trust by funders and researchers.

Three main models and guidelines that serve as a foundation for this policy and procedures document are outlined in chapter 2. The following chapters focus on the policies of the future data service. They are represented in a three-layered policy structure: The high-level organisational infrastructure (chapter 3), the descriptions of digital object management procedures as a data lifecycle approach (chapter 4), and the segments on technical infrastructure, security and risk management (chapter 5). The policies are for the time being described in one document. As the future data service starts to take shape, and services start being more distributed, the different policies can be developed further into separate different documents (strategies and programs).

2. Conceptual frameworks

2.1 CESSDA Maturity model

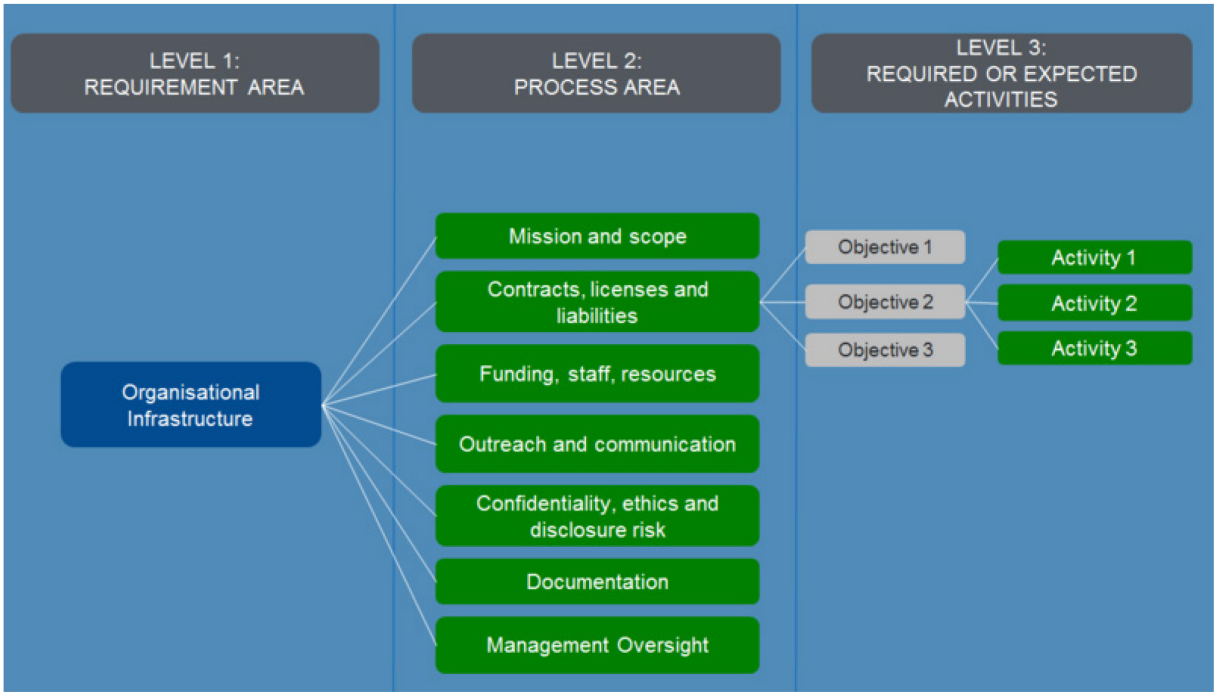
The first model that acts as a makeshift is the CESSDA SaW Capability Development Model (CESSDA-CDM)[1]. It aims to provide a structured view of processes across an organisation (data service or research infrastructure) and it can be used to set process improvement goals and priorities, provide guidance for quality processes and activities, and provide a benchmark for assessing and appraising current practices. The CESSDA-CDM was generated in the realm of the CESSDA SaW[2] project as a tool to evaluate social science data archives and services in European Research Area (ERA) countries, to identify gaps and bottlenecks in existing data services, and to produce national development plans to close the gaps and overcome present barriers.

[1] http://cessdasaw.eu/content/uploads/2016/06/D3.1.pdf.
[2] http://cessdasaw.eu/.

It is a structured collection of elements that identify and describe the characteristics of effective preservation processes and activities. Building on established frameworks for trustworthy data preservation and the CESSDA community's prior experiences, the model provides both a starting point for emerging preservation initiatives and a reference tool for established data services that wants to strengthen their services. It is a model that can be used to appraise and/or improve the capability of a data service to perform and to provide services.

The CESSDA-CDM takes its cue from the Reference Model for an Open Archival Information System (OAIS) (see chapter 2.2) and the European Framework for Audit and Certification (also known as Trusted Digital Repository EU) (see chapter 2.3).

The CESSDA-CDM is hierarchical. On the highest level, the model focuses on three main subject areas, so called Capability Requirement Areas (CRA), which describe on a high-level, the main objectives and principles of a data service. Each CRA is divided in various Capability Process Areas (CPA), which each has its own purpose. Within each CPA there are several activities defined to achieve the objective(s) of that CPA.

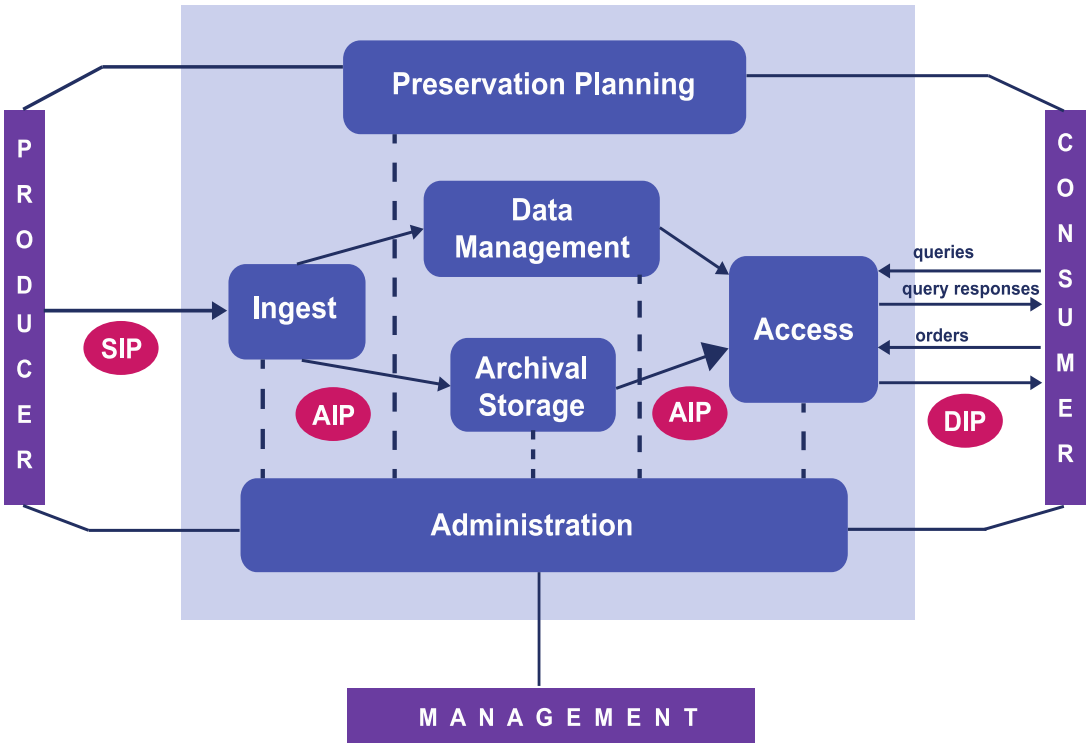


CESSDA SaW Capability Development Model (CESSDA-CDM), in: CESSDA SaW, Deliverable 3.1 Heuristic Maturity Development Model, 2016, p. 11 (http://cessdasaw.eu/content/uploads/2016/06/D3.1.pdf).

2.2 Open Archival Information System Reference Model (OAIS)

The policy domains put forward in this document correspond to functional areas within the Open Archival Information System Reference Model (OAIS). The OAIS model is a conceptual framework for an archival system dedicated to preserve and maintain access to digital information over the long term. The OAIS model specifies how digital material should be preserved for a community of users (Designated Community) from the moment digital material is ingested into the digital storage area, through subsequent preservation strategies, to the dissemination of digital material for the end user.

The OAIS model differentiates three so called Information packages which all are connected and relate to each other. They were developed in order to better describe the different handling and varying activities in digital preservation. The information package that is ingested into the archive is called Submission Information Package (SIP). Once in the archive, the SIP is enriched with metadata and converted into an Archival Information Package (AIP), which represents the form in which the digital information is actually stored for the long term. The AIP's are made accessible through the so called Dissemination Information Packages (DIP), which are generated for a specific user group according to certain legal requirements. Three principal actors, known as Producers, Consumers and the Management are interacting within six functional entities, Ingest, Data Management, Archival Storage, Preservation Planning, Access and Administration.[3]



Reference Model for an Open Archival Information System (OAIS); CCSDS 650.0-M-2; Consultative Committee for Space Data Systems: Washington, DC, 2002, p. 4-1 (https://public.ccsds.org/pubs/650x0m2.pdf).

2.3 DSA and DSA-WDS

The Data Seal of Approval (DSA) was developed in 2008 by DANS (Data Archiving and Networked Services) in the Netherlands. It has been further developed, expanded and internationalized and handed over to an international board in 2009. The DSA involves 16 guidelines for applying and

[3] In addition to the OAIS model that supposes that the ingest procedure starts with SIPs that after some handling become AIPs and can be ingested, we feel that there is a need for an extra stage in the ingest procedure: pre –ingest. In this pre-ingest stage the received material will be checked on various aspects, which are fundamental to make a decision whether the material should be accepted to enter the repository in the first place (see chapter 4.1.2).

verifying quality aspects concerning the creation, storage, use and reuse of digital data. The guidelines serve as the basis for awarding the Data Seal of Approval by the DSA Board.[4]

The DSA is part of the European Framework for Audit and Certification (also known as Trusted Digital Repository EU). The European Framework for Audit and Certification is a collaboration between Data Seal of Approval, the Repository Audit and Certification Working Group of the Consultative Committee for Space Data Systems (CCSDS)[5] and the DIN Working Group "Trustworthy Archives – Certification"[6]. The framework consists of three trust and certification models: the DSA (Data Seal of Approval)[7], the DIN 31644 (the Nestor seal for trustworthy digital archives)[8] and the ISO 16363 (audit and certification for trustworthy digital repositories)[9]. The DSA guidelines can be seen as a minimum set of requirements and as a lightweight approach in this framework.

There are currently just over 60 data services which obtained the Data Seal of Approval by the end of 2016. Through a self-assessment the data service should supply evidence that it meets the 16 DSA guidelines and the relevant level of compliance. After submission, the DSA Board appoints a peer reviewer evaluating the self-assessment.

In 2012, the DSA and the ICSU World Data System (WDS)[10] started a common working group under the umbrella of the Research Data Alliance (RDA)[11] with the objectives of realising efficiencies, simplifying assessment options, stimulating more certifications, and increasing the impact on the community. The DSA and WDS certifications both offer a basic certification standard for trusted digital repositories. Their catalogues of requirements and their review procedures are based on the same principles of openness and transparency. Up to this point, the two standards have evolved and operated independently. The primary focus of DSA has been on data services in the Humanities and Social Sciences. For historical reasons, the focus of WDS has been on Earth and Space Sciences.

At the End of 2016, the ICSU World Data System (WDS) and the Data Seal of Approval (DSA) Board presented a unified catalogue of requirements. The group built on inherent complementarity between the criteria previously established by the two organisations to harmonise unified and universal requirements reflecting the Core Characteristics of Trustworthy Data Repositories. The applicant must indicate a compliance level for each of the requirements which are similar to the structure in the CESSDA-CDM model (see chapter 2.1): Organisational aspects, management of digital objects and technical aspects.[12]

[4] http://www.datasealofapproval.org/media/filer_public/2014/10/03/20141003_dsa_overview_defweb.pdf
[5] https://public.ccsds.org/default.aspx
[6] http://www.din.de/en/getting-involved/standards-committees/nid
[7] http://www.datasealofapproval.org/en/
[8] http://www.langzeitarchivierung.de/Subsites/nestor/EN/Siegel/siegel_node.html
[9] http://www.iso16363.org/standards/iso-16363/
[10] https://www.icsu-wds.org/
[11] https://www.rd-alliance.org
[12] https://drive.google.com/file/d/0B4qnUFYMgSc-eDRSTE53bDUwd28/view

3. Organisational infrastructure

3.1 Mission/Scope/Purpose/Mandate

The Service and Archive of the Primary Data in Social Sciences in Montenegro (in short: Data Service) will be established by the Centre for Monitoring and Research (CeMI) within the Ministry of Science, the Ministry of Education of Montenegro as well as the Montenegrin Academy of Science and Arts.

Our data service will serve to researches, teachers and students and other stakeholders interested in social science research outputs. We will offer a base of well documented quantitative and qualitative data that will be available to researches and a broader public.

Our mission is:

- To provide support in data management by providing the set of services: selection, acquirement, preservation, documentation and dissemination of collected research data in the social sciences produced by researchers in Montenegro;
- To promote the use of data, to make these data and services known, and to promote a research culture of data sharing and secondary analysis for the social sciences in Montenegro;
- To foster cooperation with universities in the country, Montenegrin Academy of Sciences and Arts, Montenegrin Agency of Statistics, Ministry for Information Society and Telecommunications, other government institutions, and other stakeholders.

The key activities of Data Service are:

- Preservation and dissemination of quantitative and qualitative research data;
- Provision of access and technical support for both users and data providers with technical system development and maintenance;
- Permanent monitoring of compliance with the international standards in the field of data management and preservation.

Our additional services and activities include:

- Training in data management and methodology of scientific research for researchers;
- Open Access Initiative promotion;
- International cooperation.

3.2 User Orientation and Designated Community (definition and monitoring)

The Service and Archive of the Primary Data in Social Sciences in Montenegro has two parts: producers and users of research data. The producers of social science research data in Montenegro are firstly the researchers from higher education and research institutions which are part of the national and private universities. Also individual researchers, nongovernmental organizations and think tanks are producers of research data. Our users are domestic registered researchers or foreign researchers. Also, other interested parties are university students, university researchers, university teachers, researchers from other public institutions, researchers from private institutions and policymakers.

In addition to research institutions, our key national stakeholders are representatives of the Ministry of Science, Ministry of Education, the Ministry of Public Administration, The Council for Scientific Research Activity, Montenegrin Academy of Sciences and Arts, all relevant public and private scientific and research institutes, public and private universities, the National Library, libraries of all Montenegrin universities, as well as think tanks and NGOs, which are engaged in social science research activity, and which promote the concept of open data. The Data Service will maintain close contacts and cooperation with academic research institutions in the country and the other stakeholders.

We are going to carry out a number of promotional activities, electronic bulletins, targeted presentations, daily updating of the website, conducting public campaigns, organising meetings, workshops, conferences and round tables in order to attract researchers in the process of data acquisition. By implementing all these activities we expect to provide the necessary support from the national institutions which develop and fund scientific activity in the country.

3.3 Financial sustainability and Resources

The funding for this type of national service is secured trough the Ministry of Science, the Ministry of Education and the Montenegrin Academy of Arts and Sciences regular budgets. In Montenegro there are no other types of national funding body, so additional funds will be provided by domestic and international donor organizations. The budget will provide costs for stuff and technical infrastructure of the new data service.

The key stakeholders will include the Ministry of Science, the Ministry of Education, the Ministry of Public Administration, the Montenegrin Academy for Sciences and Arts, as well as other government agencies, national research institutes, the State Archives, public and private universities, as well as other relevant institutions, governmental and nongovernmental ones.

3.4 Staffing

3.4.1 Roles and responsibilities

The Montenegrin Service and Archive of the Primary Data in Social Sciences (Data Service) will be housed at the premises of the Centre for Monitoring and Research (CeMI).

The internal structure and the number of staff of the Data Service will include the following job positions and formal tasks: Director, Quantitative Data Archivist, Qualitative Data Archivist, Statistician, Data Acquisition Officer, Dissemination and User Management Officer, Legal Officer, Information Technology Specialist, and Systems Librarian. Through internal acts, roles, responsibility and hierarchy between these positions will be defined.

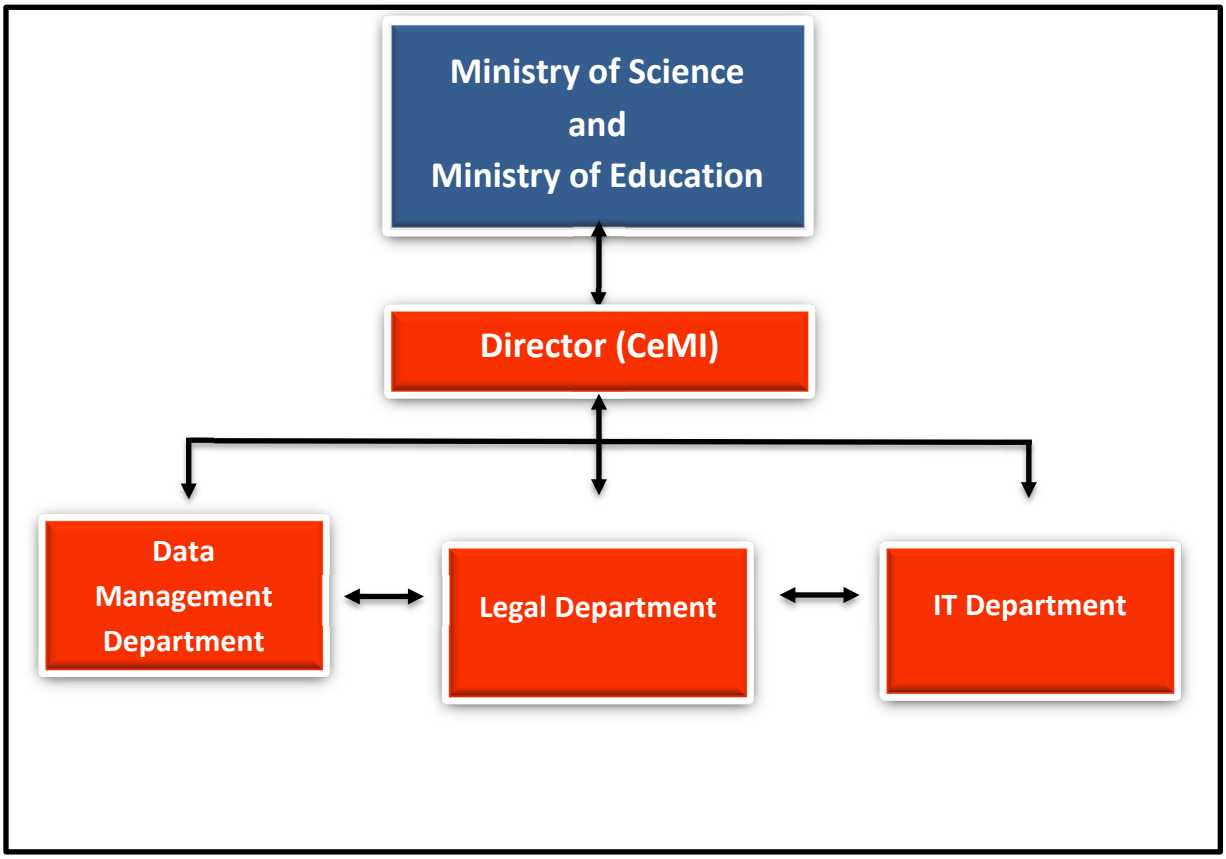
CeMI has six employees who are already trained to work for the Archive as Data Specialists within the SEEDS and RRPP Data Rescue project. In the first phase, all of them will be appointed and if the workload increases, then more of them will be recruited from the trained employees in CeMI.

Working hours per month will be distributed evenly among staff members and compensations will be determined according to job position and according to hours worked on a monthly basis.

3.4.2 Units and departments

The management structure will be organised within three departments: Data Management department, Legal department and IT department. The data Management department consists of a Quantitative Data Archivist, a Qualitative Data Archivist, a Statistician, a Data Acquisition Officer, Dissemination and User Management Officer, and a System Librarian. A Legal Officer belongs to the Legal department and the Information Technology Specialist belongs to the IT department.
All department/task employees will report directly to the Director. Also, employees will work as a team and there will be close collaboration between different units/tasks. An organisation chart is developed that shows the division of tasks; responsibilities, reporting relationships and hierarchy.

CeMI (Data Service) Organisational chart



3.4.3 Job descriptions

The Director is responsible for the implementation of a quality data service and impeccable functioning of the Data Service. He/She is responsible for the implementation of its strategic goals and development of skills and abilities of the employees. Also, he/she should establish and maintain good relationships with the key stakeholders and partner institutions by organising periodical

meetings with all partner and stakeholders representatives. He/She is responsible for the successful presentation of the Data Service and its mission outside the organisation.
The Director should be able to communicate in a positive manner in order to promote the need for open access to research data while emphasising the benefits that this approach provides, to underline the importance of transparency in scientific research in the social sciences research community, and its importance in a wider social context.

The Data Management Department has duties and responsibilities related to the entire process of data archiving - solicitation, curation and dissemination of research data.

The IT Department is responsible for the overall technical support of the system and ensures the appropriate functioning of the Data Service in its storage, preservation and dissemination activities. The IT Specialist who will work as a representative of the IT Department will be responsible for maintaining the website of the new Data Service.

Director:
Responsibilities and duties:

- Achieves defined strategic mission and goals of the organisation.
- Prepares strategic and operational plan for the next three years.
- Assures financial viability; Planning, allocating and controlling financial resources.
- Makes decisions; Organising, coordinating and supervising daily activities according to international standards for data management and data preservation.
- Develops plans for continuous improvement of the quality of work; Ensures employee training and development through participation at conferences, workshops, seminars, and trainings on data management, metadata documentation, data preservation, and other fields relevant for the work of the Data Service.
- Reports about the Data Service's activities to the Ministry of Science and Ministry of Education or to other relevant stakeholders.
- Establishes relations and collaboration with designated communities, stakeholders and partner institutions/organisations.
- Initiates international cooperation.
- Manages the application processes for both national and international projects.

Required knowledge, skills and abilities:

- PhD in the field of social science.
- Specific knowledge in data preservation and data management.
- English language proficiency.
- Experience and knowledge in international projects and project management.
- Reference in the field of data management and data archiving.
- Good management skills and communication skills, skills for team leader.
- Excellent social networking skills.

Reports to: The Ministry of Science, Ministry of Education, Montenegrin Academy for Sciences and Arts or to other relevant stakeholders.

Supervises: Data Management Department, IT Department and Legal Department.

Works with: All Institute sectors, units, centres, and labs.

Outside the Data Service: Establishing and maintaining good external relations, which means close collaboration with stakeholders and clients, as well as partnership with other related national and international data services or corresponding regional and international organisations.

System Librarian

Responsibilities and duties:

- Responsiveness for the day-to-day operation, maintenance and data integrity of core library systems including the library management system and resource discovery systems.
- Responsiveness for the development of these systems to improve library processes and services to users.
- Providing training and support to members of the library team in the use of the core library systems to manage library workflows.
- Responsiveness for the collection, collation and reporting of management information and statistics.
- Overseeing the maintenance of an accurate library catalogue including setting standards for cataloguing and classification.
- Liaising with the technical support departments of online service providers and maintaining appropriate access routes for users.
- Responsiveness for planning and administering updates to the content and structure of the Online Library
- Maintenance of an awareness of current developments in relevant areas, including library systems administration.

Knowledge, skills and abilities:

- Educated to degree level or equivalent experience.
- A professional qualification in library or information science (essential).
- Expert knowledge of one or more specialist library system.
- High levels of IT literacy including Microsoft Office Programmes (Word, Excel Outlook), Library Management Systems and Virtual Learning Environments.
- Excellent communication skills including an ability to explain concepts, ideas and technologies to technical and non-technical colleagues.
- The ability to produce clear and concise written and oral reports.
- Awareness of developments in library services in higher education and developments in higher education more broadly.
- Awareness of regulatory and legal issues relating to the provision of library services in higher education.

Reports to: Data Acquisition Officer

Works with: IT specialist and all Institute sectors, units, centres, and labs.

Outside the Data Service: communication and close collaboration with data depositors and data users.

Quantitative Data Archivist

Responsibilities and duties:

- Prepares submitted quantitative datasets for archiving.
- Organises data sets to appropriate standardised digital formats for long-term storage.
- Prepares and organises quantitative data sets for secondary use.
- Manages data conversions to different standardized formats and migrating files into the archival formats.
- Implements processes of data quality control.
- Follows up and prepares metadata regarding quantitative data sets.
- Conducts processes needed for long-term preservation of data sets.
- Follows up on updating formats of archived datasets.
- Check if all necessary metadata and related materials are provided and correctly inserted.

Knowledge, skills and abilities:

- Minimum of bachelor degree in the social sciences.
- Knowledge in social sciences research.
- Knowledge in quantitative research methodology.
- Knowledge in statistics and statistical software packages.
- Basic knowledge in computer technologies.
- English language proficiency.
- Good communication skills.

Reports to: Librarian

Works with: Statistician and IT Specialist

Qualitative Data Archivist

Responsibilities and duties:

- Prepares submitted qualitative datasets for archiving.
- Organises data sets to appropriate standardised digital formats for long-term storage.
- Prepares and organises qualitative data sets for secondary use.
- Manages data conversions to different standardized formats.
- Implements processes of data quality control.
- Follows up and prepares metadata regarding qualitative data sets.
- Conducts processes needed for long-term preservation of data sets.
- Follows up on updating formats of archived qualitative datasets.
- Anonymisation.
- Checks if all necessary metadata and related materials are provided and correctly inserted.

Knowledge, skills and abilities:

- Minimum of bachelor degree in social sciences.
- Knowledge in social sciences research.
- Knowledge in qualitative research methodology.
- Basic knowledge in computer technologies.

- English language proficiency.
- Good communication skills.

Reports to: Librarian

Works with: Statistician and IT Specialist

Statistician

Responsibilities and duties:

- Checks reliability and validity of submitted data sets.
- Advices on data sets potential for secondary use, both qualitative and quantitative data sets.
- Determines the quality of methods for collecting data.
- Follows up on metadata information.
- Presents information in variety of formats using statistical software.
- Follows up on the archive ratings and number of users.

Knowledge, skills and abilities:

- Minimum of bachelor degree in statistics/mathematics or physics.
- Analytic skills.
- Knowledge in social sciences research.
- Knowledge in research methodology.
- Good knowledge in computer technologies.
- English language proficiency.
- Good communication skills.

Data Acquisition Officer

Responsibilities and duties:

- Communication with data providers (depositors).
- Contacts and cooperation with stakeholders.
- Responsiveness to data depositors.
- Provides all necessary information on depositing process.
- Provides news on national archive on the website.
- Responsiveness to data depositors.

Knowledge, skills and abilities:

Dissemination and User Management Officer

Responsibilities and duties:

- Manages and controls access to research data.
- Applies controls to limit access to specially protected information.

Legal Officer

Responsibilities and duties:

- Developing and implementing concrete data protection practices.
- Directing and overseeing all data protection activities within the Data Service.
- Keeping management informed regarding their obligations under the regulation and being the primary contact point for supervisory authorities.
- Draft and/or review legal letters, contracts and agreements and monitor legal obligations under agreements to ensure compliance, as requested.
- Making contracts to the researcher or the institution that is submitting the request for deposit.
- Making Policies on data sharing and archiving, where will be included the information on certain limitations or conditions of use.

Knowledge, skills and abilities:

- An Attorney-at-Law with at least five years of experience in handling legal matters.
- Excellent interpersonal communication at all levels (verbal and written).
- Problem solving and analytical skills.
- English language proficiency.
- Ability to multi-task and meet deadlines.
- Ability to cope with high levels of responsibility and with confidential matters.
- Ability to work well within the team.
- A high level of professionalism which is required on the job at all times

Reports to: Director

Works with: IT specialist and all Institute sectors, units, centres, and labs.

Outside the Data Service: All Institute sectors, units, centres and labs.

IT specialist

Responsibilities and duties:

- Manages the servers, hardware and software used for storage and distribution of data.
- Performs regular backup and system recovery.
- Maintains and updates the website of the Data Service.

Knowledge, skills and abilities:

- Bachelor degree in computer science and engineering.
- Knowledge of server and network protocols.
- English language proficiency.
- Knowledge and skills in adaptation of new or different technologies.
- Good communication skills.
- Ability to work in team.

Reports to: Director

Works with: Data specialist

3.5 Legal framework

3.5.1 Legal status and legal responsibility

The "Service and Archive of the Primary Data in Social Sciences in Montenegro" (in short: Data Service) will be established by the Centre for Monitoring and Research (CeMI) within the Ministry of Science, the Ministry of Education of Montenegro as well as the Montenegrin Academy of Science and Arts, therefore its legal status and legal responsibility will be subject to the internal legal acts of the Ministries and Academy.

3.5.2 National laws

The scientific-research activity in Montenegro is primarily regulated and coordinated by the Ministry of Science and the Ministry of Education. The Ministry of Science and its Sector for Scientific Research Activity perform administrative tasks related to this field while the Ministry of Education is responsible for the development of higher education system in Montenegro. The legal framework encompasses The Law on Scientific Research Activity, The Law on Archival Activity, The Law on Personal Data Protection, The Law on Copyright and Related Rights, The Strategy of Scientific Research Activity of Montenegro (2008 - 2016), The Strategy for Development and Funding of Higher Education (2011 - 2020).

The Law on Scientific Research Activity[13] regulates archiving data in the field of scientific research activity and is in the competence of the Ministry of Science, but the law does not regulate the issue of establishing research data archives.

The Law on Archival Activity[14] stipulates that archival activity includes: registration, collection, maintenance, processing, protection, selection, use and publication of archival materials, as well as operations and other activities in accordance with the law (Article 2). Archival activity is activity of public interest, which is performed by creators and holders of current records and archival materials and archives. Archival material includes the original and/or reproduced documentary material of permanent significance for science, culture, legal and evidentiary and other needs of individuals and legal entities, which originated from the work or activities of bodies and organisations, legal entities and individuals, regardless of time, place and form of occurrence and the media in which it is contained.

The Law on Personal Data Protection[15] regulates the protection of personal data of individuals and the control over the collection, processing and the use of personal data in Montenegro.

The Law on Copyright and Related Rights[16] regulates the copyright and related rights, their implementation and protection. Article 1 stipulates that this law establishes the right of authors of

[13] Law on Scientific Research Activity, Official Gazette of Montenegro No. 80/10
[14] Law on Archival Activity, Official Gazett of Montenegro No. 49/10
[15] Law on Personal Data Protection, Official Gazette of Montenegro No. 79/08

literary, scientific and artistic works (copyright), rights of performers, phonogram producers, film producers, broadcasting organisations, publishers and producers of databases (related rights). Article 7 stipulates that independent works are collections of works or other material, including databases, whereby the database is considered a collection of independent works, data or other materials in any form, which is matched in a systematic or methodical way and individually accessible. Protecting the collection by this law does not include protection of its content and does not limit the right to the contents.

The Strategy of Scientific Research Activity of Montenegro (2008 - 2016) recognizes as one of the weaknesses when it comes to research in Montenegro bad transfer of research data to the market. Also, the issue of intellectual property protection, according to this strategy, is becoming one of the main issues that must be addressed on both an institutional and legal level.

The Strategy for Development and Funding of Higher Education (2011 - 2020) recognizes the need of strengthening the research capacities in Montenegro through improving the infrastructure for conducting research, directing professors and teaching assistants towards research activity, and intensifying relations with research centres outside the university and within certain companies.

In the Progress Report for Montenegro, in November 2015, The European Commission noted that a new Law on innovative activities should be adopted. Because of that, in November 2015, The Government has issued a draft Law on Innovation Activity aimed at boosting efficient cooperation between universities, research institutions and business and ensuring steady transfer of know-how and its' implementation in the business sector. Innovation activities are an important cornerstone for the development of a dynamic environment for research and science and this law will make space for active engagement of public and private enterprises in research and transfer of technology. The Law would also set out the legal framework for establishing new innovative organisations, such as a centre for transfer of technologies, science and technology parks, and a centre for innovation and entrepreneurship. This Law should provide that innovations become a pillar of the development of a dynamic and relevant environment for the development of science and research; that scientific institutions and public and private companies use their active role in research and development, as well as opportunities for technology transfer; as well as to encourage the quality and significance of research and innovation in Montenegro.

The most important innovation of this Law is the introduction of new instruments in the scientific system of Montenegro, such as the Center for Technology Transfer; Science and Technology Park and Innovation-Entrepreneurial Center. These three new instruments, in addition to the existing scientific institutions, centres of excellence and institutions of higher education, will enable further raising the level and quality of the overall research community in Montenegro.

The draft Law on Innovation Activity has required the adoption of the Strategy of innovative activities for a period of 5 years. In May 2016, a draft version of the Strategy of innovative activities (2016-2020) was proposed by the Council for Scientific Research Activity, and it regulates the specific objectives of innovative activities; priority programs and projects of common interest; monitoring of the implementation of programs and projects; methods of financing programs and projects; and infrastructure to support innovations.

[16] Law on Copyright and Related Rights, Official Gazette of Montenegro No. 37/11

3.5.3 Data protection and licenses

The user contracts will be based upon principles of open access and relevant national legislation.

4. Digital Object Management

4.1 Pre-Ingest

4.1.1 Data collection *(collection policy)*

Data selection and appraisal play an important role in the acquisition of data in any archival setting. The collection policy indicates the principles and criteria by which the data service develops its data collection in order to serve the Designated Community. The collection development policy of the Service and Archive of the Primary Data in Social Sciences in Montenegro will be flexible and respond to future developments and shifting requirements that will influence the archive's data collections (technology, scientific standards, etc.).

The focus of the Data Service will be on both quantitative and qualitative data in the Social Sciences. The archiving will include data in sociology, psychology, law, political science, economics, business and management and similar social science disciplines.

We will only accept quantitative and qualitative data from researchers who:

- understand Montenegrin society;
- make comparison or continuous research (panel data, longitudinal surveys, and time series that allow examination of trends);
- have good methodological quality or excellence;
- have general interest for social science research.

The Data Service reserves the right to refuse to accept material under the following conditions:

- Data do not match the criteria of the collection development policy and would be better dealt with at another institution (also legal conditions);
- Insufficient or poor quality documentation;
- Depositor and the Data Service do not agree on access and dissemination conditions;
- If the data are of a nature or volume which may make it difficult or impossible to process given the resources, staff, facilities, or capacities of the Data Service.

Researches who are eligible could be members of research institutions, think-tanks, NGOs and government departments. Depositors have to sign an agreement which will provide them with the possibility to send their data to our Data Service.

4.1.2 Data deposit at pre-ingest

It is of big importance to inform and to explain to the designated community which data formats will be accepted and which metadata standards will be applied.

In the functional entity Preservation Planning, the composition and attributes of the information package are defined. This includes the selection of file formats for the SIP, the AIP and the DIP. The decisions of the Data Service on which file formats are acceptable as archival and distribution formats are linked to the significant properties of the files (what aspects of the digital material we want to preserve).

There are a number of tools on the market for migrating a file format into a more reliable and sustainable file format:

- *Native Java Image library* for most image formats;
- *Imagemagick* for most image formats, esp. Raster;
- *FFMPEG* for various AV formats;
- *Readpst* for email;
- *Ghostscript* for PDF;
- *LibreOffice* for Office Open XML, and word processor files – also shifts various office formats to PDF and PDF/A;
- *Inkscape* for Vector images.

When selecting target formats, the following criteria should be considered:

- Ubiquity;
- Support;
- Disclosure;
- Documentation quality;
- Stability;
- Ease of identification and validation;
- Intellectual Property Rights;
- Metadata Support;
- Complexity;
- Interoperability;
- Viability;
- Re-usability.

File formats considered as appropriate for SIPs:

- Tabular data: SPSS portable format (.por), SPSS (.sav), Stata (.dta), Excel or other spreadsheet format files, which can be converted to tab- or comma-delimited text), R (.txt);
- Text: Adobe Portable Document Format (PDF/A, PDF) (.pdf), plain text data, ASCII (.txt), Rich Text Format (RTF) (.rtf), Microsoft Office and OpenOffice documents;
- Audio: Waveform Audio Format (WAV) (.wav) from Microsoft, Audio Interchange File Format (AIFF) (.aif) from Apple, FLAC (.flac);
- Raster (bitmap) images: TIFF (.tif) ideally version 6 uncompressed, JPEG (.jpeg, .jpg), PNG (.png), GIF (.gif) and BMP (.bmp) only when created in this format, Adobe Portable Document Format (PDF/A, PDF) (.pdf);
- Vector images: DFX (.dfx), SVG (.svg);
- Video: MPEG-2 (.mpg2), MPEG-4 (.mpg4), motion JPEG 2000 (.mj2).

Compressed files are accepted as long as they can be uncompressed by using open and freely

available software.

File formats considered as appropriate for the AIP:

- Tabular data: Microsoft Excel File Format (XLS) (.xls), ASCII, Comma Separated Values (CSV) (.csv; .txt);
- Text: Adobe Portable Document Format (PDF/A) (.pdf), XML (.xml), Standard Generalised Markup Language (SGML) (.sgml);
- Audio: Waveform Audio File Format (.wav);
- Raster (bitmap) images: TIFF (.tif);
- Vector images: DFX (.dfx), SVG (.svg);
- Video: MPEG-2 (.mpg2).

File formats considered as appropriate for the DIP:

- Tabular data: SPSS portable format (.por), SPSS (.sav), Stata (.dta), R (.txt);
- Text: Adobe Portable Document Format (.pdf), Rich Text Format (.rtf);
- Audio: MP3 (.mp3);
- Raster (bitmap) images: JPEG (.jpg)
- Vector images: DFX (.dfx), SVG (.svg);
- Video: MPEG-4 (.mpg4).

In addition, file format registries are a way of helping to identify file formats and looking up format specifications.

4.2 Ingest

4.2.1 Data deposit at ingest

In this section, the standards that the data and the documentation of the data deposited should measure up to are explained in more detail. Data documentation explains how data were collected (context of data collection), what they mean, what are their content and structure, and specifies any manipulations that may have taken place. It consists of any useful information about the project and its results (e.g. research proposals, publications) or of any relevant information that may help to understand the data and their production, thus increasing the re-use potential (e.g. questionnaires, codebooks, methodology reports, user guides). The quality of the documentation can be significantly improved if its creation and collation is planned at the beginning of the data life cycle, during the project conception phase (see chapter 4.5).

With each data deposited at the data service, a deposit contract is signed with the data producer. It is a legal agreement between the depositor and the Data Service that covers arrangements regarding usage rights, authenticity, data protection responsibilities, and disposal (see chapter 3.5.3).

Ingest provides the services and functions to accept SIPs from the Producer and prepare the content for Archival Storage and Data Management within the Data Service. Upon a request regarding archiving process, the Data Service will provide the researcher with all necessary information on the deposit process and with related checklist. This information will also be available on the web site of the Data Service.[17]

[17] https://me.seedsproject.ffzg.hr/

Researchers will be encouraged to independently use our online deposit system to deposit data, metadata, reports and publications, but without permission to publish their inputs publicly. Alternatively, researchers will be able to submit data and other materials via e-mail.

Upon receiving the submission, the Data Service will check the inputs to ensure that data are prepared for archiving and dissemination. The Data Service will check thoroughly whether or not the data are anonymised and readable, if their format is supported by the database, if all necessary codes are submitted and if codes correspond to the actual materials. The Data Service will also check if all necessary metadata and related materials are provided and correctly inserted.

As data submission is received, datasets will be reviewed in details in order to determine the sensitivity and utility potentials of the data and its readiness to be openly accessible after publishing. Before the final archiving of the datasets, the restriction level will be assessed in cooperation with the depositor and the archiving service team.

Researchers will be requested to submit the following metadata:

Citation Metadata: Title, author name, contact e-mail, subject, keyword term, language, production date and deposit date will be required information, while other information on metadata such as subtitle, author affiliation, description, topic classification, notes and more will be optional, as they are part of Dataverse.

Social Science and Humanities Metadata: sampling procedure, target sample size, type of research instrument and estimates of sampling error will be required, while other option existing in Dataverse will be available to insert.

Journal Metadata: Information on design type, factor type and measurement type will be required.

Upon assuring the quality of a submission and before its final deposit, the Data Service will send a deposit contract to the researcher or the institution that is submitting the request for deposit. The contract is to be signed between the data copyright holder and the repository. The contract will specify the data accessibility level, which could be the following:

open access, everyone will be able to see and use datasets, without registration and all related materials and inserted metadata will be publicly available. Users will be provided with the citation instructions in order to respect copyrights of the copyrights holders;

open access, upon registration to the archive, certain sections of metadata will be publicly available, while, everyone will be able to see and use datasets, after registration with name, full name and affiliated institution, when all related materials and inserted metadata will become available. Copyright holders will be provided with the information on the access to their data (Guestbook within Dataverse which includes name, affiliation and e-mail after download of the dataset);

restricted access, certain sections of metadata will be publicly available, while the data can be used only by researchers who receive permission by the holder of the copyright related to the data, through the Data Service.

For accessing restricted data, users will be required to sign a contract with the Data Service, in order to declare the responsibility to use the data accordingly to national and international policies and

standards as well as any special requests from researchers indicated in their contract for deposition of datasets.

Policies on data sharing will be offered by the Data Service and taken in consideration during the data deposit process. In this way, archived data will include the information on certain limitations or conditions of use.

4.2.2 Data authenticity

The Data Service will set up a process of checks that will be integrated in our ingest tool. Through these activities the information and data from research projects will be processed and accepted:

- Scan and check for viruses;
- Identify and validate file format of the SIP: make sure that the files are what they pretend to be;
- Create checksums for each data and document file in order to guarantee data integrity during the transfer process;
- Generate Unique Identifiers (UI): Make sure that each study, dataset and file is assigned a reference number that is permanent and unique;
- Quality assurance routine checks should be carried out for completeness, integrity and validation of the data files, the submitted documentation and metadata:
    - *Labels in the data file should match the question text in the questionnaire;*
    - *In the data file there can only be more variables than in the questionnaire, not less;*
    - *Run frequencies on the data and match it with publication;*
    - *Be careful with weighting.*

4.2.3 Data protection

The Data Service is aware of the conflicting gap between the tendency to provide open and easy access to research data and at the same time to protect the confidentiality of research participants and the rights of the data depositors. In order to ensure confidentiality, we rely on a combination of anonymization measures, specific user contract conditions (restricted access) and informed consent among study participants. Our practices are in accordance with The Law on Personal Data Protection.[18] The deposit contract will make sure that the depositor has collected the data in conformity with existing national legislation on data protection. Access to data will be determined in a contract made between the depositor and the Data Service, depending on data sensitivity and other specifics, as well as requests of depositors. The contract will also contain metadata and information on accessibility of all materials deposited, including datasets, codes, transcripts, syntaxes, questionnaires, and reports.

[18] Law on Personal Data Protection, Official Gazette of Montenegro No. 79/08.

4.3 Data preservation *(preservation policy)*

4.3.1 Data management and Persistent Identifiers

The data that is now stored within the Data Service's archive should be attributed an ID and its metadata safely stored in the corresponding data base. Persistent identifiers are long-lasting references to a digital resource and objects. It has typically two components: a unique identifier; and a service that locates the resource over time even when it's location changes. The first helps to ensure the provenance of a digital resource, whilst the second ensures that the identifier resolves to the correct current location. There are several persistent identifier schemes for research materials currently in use.[19]

Preservation Planning provides the services and functions for monitoring the environment of the archive and making recommendations to ensure that the information stored in the archive remain accessible over a long-term, even if the original computing environment becomes obsolete. Preservation Planning functions include evaluating the contents of the archive and periodically recommending archival information updates to migrate current archive holdings, developing recommendations for archive standards and policies, and monitoring changes in the technology environment and in the user's service requirements. Preservation Planning also develops detailed migration plans, software prototypes, and test plans to enable implementation of Administration migration goals.

The Data Service will have an active role in all phases of archiving and will provide continuous monitoring of the archiving process, in order to ensure that defined standards of data archiving are applied and to ensure that those standards provide sustainable data accessibility. The Data Service will have access to the inventory reports created once per month and will carefully review all submitted comments of archive users. Evaluation of practicality and easiness of data accessibility will be regularly carried out, in favour of improving the standards of the archiving process, especially regarding its technical development. The Preservation Plan will also include recommendations on improvements that will come from our users. The monitoring of the international community, especially the CESSDA member data archives in partner countries, will be performed in order to be in line with the development and best practices in similar organisations. This process is strengthened with the fact that other data services and archives in the Region have chosen the same archiving tool (Dataverse).

4.3.2 Archival storage

Archival Storage provides the services and functions for the storage maintenance and retrieval of AIPs. Archival Storage functions include receiving AIPs from Ingest and adding them to permanent storage, managing the storage hierarchy, refreshing the media on which archive holdings are stored,

[19] Digital Object Identifier (DOI), Handle, Persistent Uniform Resource Locator (PURL), Universal Resource Name (URN). For more information see: http://www.dpconline.org/handbook/technical-solutions-and-tools/persistent-identifiers

migrating files into the archival formats, performing routine and special error checking and providing disaster recovery capabilities.

The Data Service will be using Dataverse for its archival storage. The template for social sciences required metadata for deposit is already included in the default Database installation. It also supports the entry of main data formats, performs automatic error checking and has an integrated backup system in case of disaster recovery. Default Dataverse metadata options will be used, and if there is need to adapt additional options in Dataverse, changes will be incorporated in the future. Depositors will be requested to submit the required citation metadata and if needed optional citation metadata, social science and humanities metadata and journal metadata. The monitoring and evaluation of archiving processes will be conducted on a monthly basis, in order to determine the effectiveness of the archiving processes and the data availability. Therefore, analysis will show if there is need to adapt the existing technical support related to Dataverse.

4.3.3 Preservation Planning

The functional entity "Preservation Planning" encompasses tasks such as development of preservation strategies and standards, development of packaging designs and migration plans, and monitoring of technology (innovations in storage and access technologies) and the designated community (shifts in scope or expectations). The data service monitors the technical fitness of its archive, does regular risk assessments of the stored digital objects (which includes technology monitoring for the different object types), and plans for preservation actions.

Migration planning, archive standards and policies and technology watch report are usually gathered in the preservation policy of a data service. Digital objects may become unreadable or obsolete after a certain number of years. The need might arise to migrate file formats that have come close to obsolescence to new file formats that are more sustainable and guarantee future usability. After migration the original manifestation of the data file will be maintained and all subsequently generated manifestations of the original files. In this case, we adhere to the principle of reversibility: being able to revert to an earlier version of a digital file after migration. We also fully document the migration process in the form of a detailed migration history as part of the metadata associated with the data file.

4.4 Access and data provision

4.4.1 Data discoverability and accessibility

Access to data will be determined in a contract made between the depositor and the Data Service, depending on data sensitivity and other specifics, as well as requests of depositors. The contract will also contain metadata and information on accessibility of all materials deposited, including datasets, codes, transcripts, syntaxes, questionnaires, and reports.

Researchers will be requested to submit the following metadata:

Citation Metadata: Title, author name, contact e-mail, subject, keyword term, language, production date and deposit date will be required information, while other information on metadata such as subtitle, author affiliation, description, topic classification, notes and more will be optional, as they are part of Dataverse.

Social Science and Humanities Metadata: sampling procedure, target sample size, type of research instrument and estimates of sampling error will be required, while other option existing in Dataverse will be available to insert.

Journal Metadata: Information on design type, factor type and measurement type will be required.

Upon assuring the quality of a submission and before its final deposit, CeMI will send a deposit contract to the researcher or the institution that is submitting the request for deposit. The contract is to be signed between the data copyright holder and the repository.

4.4.2 Access control

Datasets deposited to the Data Service will be available following a set of policies determined for each specific dataset, such as its sensitivity and conditions determined by the depositor. Through the detailed process of data archiving, certain data sharing policies will need to be determined in cooperation with depositors. Therefore, the data will be available to users under different licences:

- Open access: Datasets accessible to all users, everyone will be able to see and use datasets, without registration and all related materials and inserted metadata will be available publicly.
- Open access, upon registration to the archive: Certain sections of metadata will be publicly available, while, everyone will be able to see and use datasets, after registration with name, full name and affiliated institution, when all related materials and inserted metadata will become available.
- Restricted access: Certain sections of metadata will be publicly available, while data could be used only by researchers who receive permission by the holder of the copyright related to the data, through the data archive.

Users will be able to download, or access required data in accordance with the agreement/contract with the Data Service. All accessibility protocols will be monitored, controlled and evaluated at least once per month.

4.5 Outreach

Data management is a set of skills needed for handling data throughout the life cycle of a research project. Good data management practices mean more efficient research and a higher quality research product. A data management plan (DMP) is a written document that describes the data a researcher expects to acquire or generate during the course of a research project, how they will manage, describe, analyse, and store those data, and what mechanisms they will use at the end of a

project to share and preserve the data. It is also intended to meet funder requirements, and help others to use the data if shared. Our data service offers training courses regarding DMP and other workshops and help for data depositors and users equally.

Promotional activities are very important for raising visibility. Because of that, promotional activities will be of great importance for the new Data Service. Promotion activities will consist of the daily updating of the website, conducting public campaigns, organising meetings, workshops, conferences and round tables.

5. Technical infrastructure and risk management

5.1 Technical infrastructure

The archive will use Dataverse software as a tool for archiving the research data. Dataverse takes in account all basic elements of the OAIS reference model (more information on the tool selection process can be found in D9).[20]

The Data Service will hire IT staff to provide detailed technical specification on Dataverse characteristics and elaborate on its full potentials for the data archive.

6. Resources

Audit and certification of trustworthy digital repositories (ISO 16363) - http://www.iso16363.org/standards/iso-16363/

CESSDA – http://cessda.net/

CESSDA SaW – http://cessdasaw.eu/

- D3.1 – Heuristic Maturity Development Model (CESSDA-CDM) http://cessdasaw.eu/content/uploads/2016/06/D3.1.pdf
- Guide for Developing National Data Service Plans - https://cessda.net/eng/CESSDA-Services/Projects/CESSDA-SaW/Work-Packages/WP3/Guide-for-Developing-National-Data-Service-Plans

Consultative Committee for Space Data Systems (CCSDS) - https://public.ccsds.org/default.aspx

Data Seal of Approval (DSA) - http://www.datasealofapproval.org/en/

DIN 31644 – Nestor seal for trustworthy digital archives - http://www.langzeitarchivierung.de/Subsites/nestor/EN/Siegel/siegel_node.html

DIN Working Group "Trustworthy Archives – Certification" - http://www.din.de/en/getting-involved/standards-committees/nid

FORS - http://forscenter.ch/en/

[20] http://seedsproject.ch/wp-content/uploads/2015/06/D9_FINAL.pdf

- Deposit contract FORS: https://forsbase.unil.ch/media/general_documentation/en/deposit_contract_FORS_en.pdf
- User contract FORS: https://forsbase.unil.ch/media/general_documentation/en/download_contract_en.pdf
- Collections Policy FORS: http://forscenter.ch/wp-content/uploads/2015/09/Collections-Policy_E_v2.pdf
- Preservation Policy FORS: http://forscenter.ch/wp-content/uploads/2015/05/Preservation-Policy1.pdf

ISO 16363 - http://www.iso16363.org/standards/iso-16363/

KRDS (Keeping Research Data Save) Activity Model – User Guide: http://www.beagrie.com/static/resource/KeepingResearchDataSafe_UserGuide_v2.pdf

OAIS – Reference Model for an Open Archival Information System, CCSDS 650.0-M-2, Consultative Committee for Space Data Systems: Washington, DC, 2002 https://public.ccsds.org/pubs/650x0m2.pdf

Research Data Alliance (RDA) - https://www.rd-alliance.org

SEEDS - http://seedsproject.ch/

- D4 – Establishment plan: http://seedsproject.ch/wp-content/uploads/2015/06/Establishment-Plan_Montenegro.pdf; http://seedsproject.ch/wp-content/uploads/2015/06/Establishment-Plan_Kosovo.pdf; http://seedsproject.ch/wp-content/uploads/2015/06/Establishment-Plan-ALBANIA_FINAL.pdf; http://seedsproject.ch/wp-content/uploads/2015/06/Establishment-plan-Macedonia.pdf
- D9 – Report on technical improvements: (unpublished document, at the time being)

SERSCIDA – http://serscida.eu/

- D4.2 – Data Service Training Manual: http://www.serscida.eu/images/deliverables/SERSCIDA_D_4_2_Training_Materials_V1_2.pdf
- D5.1 – Documents and Materials for Social Science Digital Data Archives: http://www.serscida.eu/images/deliverables/D5.1_FINAL.pdf
- D5.3 – Report on Prototype Database: http://www.serscida.eu/images/deliverables/D5.3_FINAL.pdf

World Data System (ICSU/WDS) - https://www.icsu-wds.org