University of Belgrade

TECHNICAL REPORT

Co-creation activity #79 - Boosting EOSC readiness:
Creating a scalable model for capacity building in RDM

Serbi𝛂.RDM

Project acronym	**Serbia.RDM**
Period covered	from July 1, 2020 to March 1, 2021 (the Final event was held on March 9, 2021[1])
Project website	https://rdm.open.ac.rs/
Report language	English
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Contents

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[1] We prepared event in February 2021 during action duration, but the date for the final event was agreed after consultations with relevant stakeholders on their availability and in accordance with team disposition.

1 Aims and Scope of the Co-creation Activity

This Co-creation activity aims at closing the infrastructure gap in the uptake of EOSC practices between the EU and the non-EU Western Balkan (WB) countries. The main objective is to create a model for local capacity building in Research Data Management (RDM) that meets the needs of the South Slavic-speaking non-EU WB countries (Serbia, Montenegro, Bosnia and Herzegovina, and the Republic of North Macedonia). EOSC Co-creation activity No. 79 titled "Boosting EOSC readiness: Creating scalable model for capacity building in RDM" is summarized in this report.

2 Introduction

The report presents the replicable and scalable model that gathered a team of experts and incorporates a scalable solution for Dataverse data repository, a web page with relevant materials about RDM in Serbian, and training materials for two types of workshops - general on open research data, FAIR, and RDM and hands-on domain-specific practical approach. We concluded the Co-creation activity with an online full-day event for all relevant parties in WB countries by presenting the results of the project, discussing further actions, and by regional networking.

3 Tasks and Activities

Serbia.RDM Co-creation tasks and activities are grouped into four main activities. The first activity was focused on coordination and management. The project team gathered a wide network of stakeholders and interested parties with whom a series of meetings were organized.

The second, most important activity was dedicated to the dissemination of project outputs and courses organized with stakeholders (e.g., meetings with TONuS (Srb. *Tim za Otvorenu Nauku u Srbiji,* Eng. *Team for Open Science in Serbia*), University of Belgrade UB Rector Prof. Ivanka Popović) and interested partners from the local research community (e.g., librarians, Vice deans for science from the UB, researchers). Dissemination was mostly related to the development and maintenance of created RDM web-portal site that serves as a main communication channel with the scientific and non-scientific community. The web-portal is populated with guidelines, templates, and tutorials about RDM (news feeds, articles, and Twitter feeds). This group of activities also included the development of the visual identity of the project, the creation of the social media profiles, and the management of the content disseminated throughout the social media. Results from dissemination (videos, papers, and presentations - in most cases uploaded on Serbia.RDM Zenodo repository) from conferences, symposiums, and other events including a full-day online event involving stakeholders from targeted countries were made publicly available.

The third activity was the development of the Repository for open research data and software for research data management. The project team conducted an analysis of available software tools for Data Management Plans (DMPs), testing and comparison of relevant data, ARGOS localization, i.e., translation in Serbian language and technical support (JSON file conversion into Google spreadsheet and vice versa), and Dataverse installation, customization, evaluation, and localization.

The fourth group of activities was dedicated to defining policies and guidelines for open research data. Specifically, we created guidelines for archiving data in Dataverse with the manual for DMP creation

in ARGOS for the project call launched by the Serbian Science Fund "IDEAS". Then, the project team worked on defining policies on various levels focusing on open data repositories, institutions, and incorporation of the open research data for the national Open Science (OS) policy (i.e., we drafted amendments to the national OS Platform and institutional OS policies), as well as guidelines for repository and journal policies).

4 Results

The main results of our Co-creation activity are the web portal with guidelines and training materials, Dataverse data repository SERDAR (SErbian Research DAta Repository), localized (translated in Serbian) software application for Research Data Management - Argos with machine-actionable[2] output, and proposal for research data amendments of existing national, institutional, and journal policies on OS. Our results were disseminated openly. Subchapter Dissemination and training summarizes produced outputs with training materials, performed surveys, and other activities, e.g., consultation with the team of researchers, meetings with librarians, and meetings with relevant stakeholders. Overall, the introduced infrastructure and created RDM ecosystem for UB is replicable as it is openly available and scalable for adoption by other institutions in non-EU WB countries. Altogether, we addressed five out of six EOSC Working Groups topics: landscape, FAIR, architecture, skills and training, and sustainability by creating a scalable model at the UB. The topic Rules and Participation is not addressed as it is not applicable.

4.1 Sustainability of the Co-creation Outputs

Except for the SERDAR Dataverse platform that will serve as exemplar and dummy localized (translated in Serbian) data repository with illustrative three datasets:1) from psychology - Irrational beliefs and health-related behaviors during COVID-19 pandemic, 2) biomedical engineering - Three-channel surface electrogastrogram (EGG) dataset recorded during fasting and post-prandial states in 20 healthy individuals, and 3) OS survey - Open Science stakeholders in Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Georgia, Greece, Hungary, Moldova, Montenegro, North Macedonia, Romania, Serbia, and Slovenia). All outputs will be available and if necessary managed (e.g., RDM.Serbia web portal) by the staff at the University of Belgrade.

4.2 RDM.Serbia Web Portal

Web portal in the Serbian language with technical documentation, training materials, policy guidelines is primarily designed to serve as a platform for the dissemination of the information and resources developed throughout the project. It focuses on RDM protocols and procedures, offering a very detailed overview of steps required to develop a high-quality DMP.

Our web portal also offers a wide range of information and resources for researchers interested in OS practices, such as open data and FAIR principles, a brief overview of policies endorsed by different funders, and available incentives for researchers practicing OS. One section is dedicated to meta-data,

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[2] Machine-actionable Data Management Plan (maDMP) is defined as a common standard by the Case Statement published under RDA, https://www.rd-alliance.org/sites/default/files/DMP Common Standards-CaseStatement.pdf.

their adequate use, and benefits for researchers. Finally, a comprehensive set of guidelines related to publishing covers is offered to researchers: elaborate instructions for data anonymization and several examples, copyright issues and an overview of Creative common licenses, commonly used repositories, an overview of scientific journals focused on publishing open datasets, available licenses for sharing research software[3], and GDPR and its relevance for scientific work. This portal will be actively managed by the UB after the Co-creation ends and with the volunteering of team members. The plan is to expand and update existing articles and to create a knowledge base. Therefore, a dedicated Zotero library was created to assemble relevant references and to keep up-to-date with developments. The web portal is licensed under Creative Commons Attribution 4.0 International License supporting reuse and scalability.

4.3 Dataverse Data Repository - SERDAR

An open-source repository for open research data was installed, customized, localized, and tested. The work on the research data repository included also the definition of the sample user guide for end-users with technical guidelines for localization in the Serbian language. Before the installation, we gathered the relevant information on the Dataverse platform and customized available hardware resources accordingly. The customization incorporated: name selection, URL, and hardware requirements, e.g., storage space. The most important step was planning for Dataverse implementation - it included the definition of the purpose for Dataverse installation and determination of the most appropriate software installation method. We defined the implementation plan and identified features necessary for the functioning and additional upgrades.

Certain issues occurred during implementation. For example, during the localization (translation of user interface into Serbian) additional efforts were required as Dataverse does not have support for Serbian Latin script. To decide on a course of action, we explored translations for other languages such as English and French and decided to implement ISO-8859-5. However, translating with ISO-8859-5 translator was not efficient, as characters č, ć, ž, š, đ, Č, Ć, Ž, Š, Đ were not recognized. The solution was found in the Russian Cyrillic translation for the Russian Dataverse repository. Finally, this issue was resolved by mapping characteristic characters with explicit Unicode. Another important issue was related to the import of already existing datasets with Persistent IDentifiers (PIDs) as this is not a straightforward task in Dataverse. For a dataset with PID, it takes an extra effort to make customized Dataverse JSON. The repositories in general provide a new metadata identifier (extra PID) by local Dataverse for imported JSON. To make selected datasets visible without registration i.e., published, we had to generate an URL for each dataset to bypass an extra PID procurement for publishing the dataset. For a presentation of a scalable model for data repository, this was a completely viable solution, but a final Dataverse implementation requires the establishment of a PID procurement procedure. Another issue that affected our implementation was licensing. Dataverse 5.0 provides the opportunity of choosing a CC0 license or none. Two datasets that we wanted to deposit in the Dataverse SERDAR repository were licensed by CC-BY license and to keep the original license from Zenodo, we customized the Dataverse accordingly.

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[3] We use the following definition for research software: "it is software that is employed in the scientific discovery process or a research object itself" by Hasselbring et al.: From FAIR research data toward FAIR and open research software, 2020. doi: 10.1515/itit-2019-0040. The definition of the research software is the subject of an ongoing work of FAIR for Research Software (FAIR4RS) WG of Research Data Alliance (RDA).

Finally, we customized the SERDAR home page with co-creation activity information with EOSC acknowledgment, link to the RDM.Serbia web portal, and with the list of deposited research data. The SERDAR is licensed under the Creative Commons Attribution 4.0 International License and lessons learned from the process of employment were presented during the Final event on March 9, 2021. We introduced the sustainability issue to the MESTD (Ministry of Education, Science, and Technological Development in the Republic of Serbia) representatives during the TONuS meeting and decided to leave the dummy based SERDAR repository active with the support from the UB Computer Centre, but for a completely active repository, a sustainable financial solution is required. Technology readiness level in an internal report was assessed at T6 out of T-9 (Technology demonstrated in relevant environment).

4.4 Machine-actionable RDM

DMPs are documents accompanying research proposals. They represent awareness tools for assisting researchers to manage their data and to ensure high quality, accessibility, and reusability of research results after the project has ended. Despite their role and impact on conducting responsible RDM, the whole process of writing traditional DMPs (as free-form text documents) can be perceived as an administrative burden by the researchers.

The solution can be in a machine-actionable DMP (maDMP) - a concept that aims to make the DMPs interoperable, automated, and increasingly standardized. With maDMPs, all stakeholders in the research process (researchers, funders, IT support, repository managers, data librarians, etc.) are involved in the exchange of information. As a recommendation for the researchers in Serbia, two services were considered for generating maDMPs: ARGOS (a joint effort of OpenAIRE and EUDAT) and Data Stewardship Wizard (developed through ELIXIR initiative). The main criteria for the selection of the services were solutions that rely on open-source software, provide interoperability and straightforward exchange among other infrastructures, capable of designing DMP templates, and can be localized in other languages (in our case in Serbian). After initial meetings with the developer and maintenance teams of these services, we concluded that Argos would be the most suitable solution for creating research data management plans for researchers in Serbia. Argos applies the RDA DMP Common Standard for interoperability, which enables users to exchange DMPs with other machine-actionable platforms without losing vital information. Argos is an open-source code and can be integrated institutionally with a Dataverse repository, hence making it easier to publish DMPs, assign DOIs and licenses, thus making it open, adaptable for versioning, and in compliance with the FAIR principles.

Our project team set the task of adapting Argos for the researchers in Serbia. The first task was to contribute to Argos localization in Serbian and the contribution was acknowledged. Dataset template and a guideline in Serbian for maDMP creation for Program IDEAS of The Science Fund of the Republic of Serbia, the main national research funder, were created as well, but for now, they will be available only in beta (developers) version[4]. Localization of Argos web application in Serbian will be available to researchers in Serbia and researchers from non-EU WB countries after the Co-creation activity ends. Additionally, the guideline for Program IDEAS is available on Zenodo (doi: 10.5281/zenodo.4496934).

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[4] The direct link to the Argos beta version is available on request.

4.5 Open Research Data Policies

We suggested changes in the form of policy amendments of the existing national (MESTD) and institutional policies (UB). The National Platform for OS mentions research data and recommends depositing in repositories and open access to datasets. However, FAIR principles are not mentioned. The purpose of the proposed amendments is to mandate adherence to the FAIR principles, data management plans, and data archiving. Suggested changes include the definition of open research data, introduce the FAIR principles, and set requirements for researchers (to open their data or metadata in a case when data cannot be shared due to legal or other constraints) and institutions (to provide appropriate infrastructure for depositing research results). In addition, one amendment relates to the mandatory and accredited training programs for librarians and students of master and doctoral academic studies.

Proposed policy amendments in the Serbian language are published on Zenodo (doi: 10.5281/zenodo.4587388) and will be used in future meetings of Serbia.RDM team with stakeholders in Serbia and presented to the TONuS and MESTD for further discussion and adoption. Keeping in mind that most WB countries are in the process of establishing national initiatives for OS and drafting OS policies, the proposed policy amendments are potentially useful beyond the local context.

4.6 Dissemination and Training

Subchapter Dissemination and Training summarizes produced outputs with training materials, performed surveys, and other activities, e.g., consultation with the team of researchers, meeting with librarians, and consultation with the MESTD. For the dissemination of project results, we used online events, news section on Serbia.RDM website, Zenodo with EOSC.Secretariat and Serbia.RDM communities, Twitter, EOSC Liaison Platform, and other relevant websites of the events or projects. In addition, a paper on free software and open hardware licenses was presented at the PSSOH conference as a result of this project. A Serbia.RDM logo was designed to strengthen the visual identity of the project. It was consistently used on the website, on the Twitter account, and in presentations.

The project team managed to reach out to the organizers of the most important local events dedicated to OS: OS Days in Serbia III, OS Pioneers, and meeting of the TONuS with MESTD, due to which the presentations of the project had a prominent place in the program of these events. During the OS Days in Serbia event, a whole session was dedicated to the project. At OS Days, we presented the results of the survey for librarians that helped us in shaping and directing our activities. The results of the survey were disseminated at the LIBER conference, too.

The project team collaborated closely with the local team of the Infra-EOSC 5b project NI4OS-Europe, due to which regular updates about project activities were provided to the NI4OS-Europe community during project meetings. NI4OS-Europe team members from Bosnia and Herzegovina, Croatia, Montenegro, Northern Macedonia, and Slovenia facilitated the organization of the final event and took part in it.

An official Twitter account of the project team was used to disseminate information about project activities and outputs, as well as to share information about the activities of the EOSC Secretariat, RDM-related webinars, and relevant documents on OS, etc. The decision to use Twitter rather than other social media was based on an initial assessment that the international audience relevant to the project mostly used Twitter. The main channel with regional stakeholders was directly by email to inform them about the project and to organize meetings with them, e.g., consultation with MESTD during the TONuS meeting. In

the news section of the RDM.Serbia website we announced important events about the project, public presentations of project activities (e.g., EOSC Symposium 2020), and relevant local and international events and initiatives. Also, we have sent announcements for a presentation on other websites, e.g., a Co-creation activity presentation during OS Days in Serbia was announced on the EOSC.Secretariat website, on the OpenAIRE and NI4OS-Europe websites, and Final Event was announced on the EOSC Liaison.

We delivered dedicated training for Vice deans at the UB on RDM practices and available resources i.e., outputs of our Co-creation activity with a focus on good research practices and maDMP. Also, during the final event Institutional infrastructure and support for research data management practices, we delivered educative presentations on available tools, principles, and roles in the RDM ecosystem, and more specifically we covered a topic related to data anonymization. All outputs, including the survey for librarians, are available under CC licenses for further exploration and adoption.

5 Conclusions and Outlook

Results of the presented Co-creation activity contributed to the overall EOSC awareness and readiness in the Republic of Serbia by founding a firm ground for cultural change related to the scientific practices in the research community. Applied bottom-up approach in building a model with the core team of professionals, scalable Dataverse data repository, relevant materials on RDM, FAIR, and open research data, with openly published materials for general and hands-on courses efficiently decreased the gap between EU and non-EU WB countries.

The project team managed to establish a fruitful collaboration with two EOSC-related Horizon 2020 projects: OpenAIRE and NI4OS-Europe, demonstrating that local initiatives can effectively build upon the results of major European projects, thereby avoiding duplication of effort and unsustainable resource management. This collaboration is all the more important if we keep in mind the limited knowledge base and human (professional) and financial resources in Serbia. The overall model and the materials created during the project were presented to the NI4OS-Europe team members from Bosnia and Herzegovina, Montenegro, and Northern Macedonia (WB), as well as to relevant stakeholders from Slovenia and Croatia (EU countries). The overall organization of the research sector and the research community in these countries are similar to those in Serbia, due to which the solutions devised during the project are applicable in these environments as well. The materials on the website are accessible to research communities in these countries (due to similarities between languages in the WB region). Furthermore, the website is under the CC BY license, which means that all texts can be adapted to local needs and reused. The same applies to the translation of the Dataverse and Argos interfaces into Serbian: the translations may serve as the basis for translations into Croatian, Macedonian, Bosnian, Montenegrin, and Slovenian[5]. Keeping in mind that the Serbian translation of Dataverse and Argos are ready and available for use will significantly save the time and effort of colleagues in the region. Another important point is the consistent reliance on open-source software in developing the RDM infrastructure and tools (Dataverse and Argos), as well as dissemination tools (the project website is powered by Joomla). In these terms, the project sets a model for future initiatives. All prerequisites are set up for further adoption of EOSC practices.

The proposed policy amendments are expected to play an important role in the activities of the TONuS. Keeping in mind similar local contexts, we believe that the proposed solutions will be directly

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[5]Slovanian translation relates only to Argos, as Dataverse has already been translated into Slovenian.

applicable in all Slavic-speaking WB countries. Relevant stakeholders in Slavic-speaking countries in the region can adopt and reuse the proposed policy amendments as most of these countries are in the process of establishing national OS initiatives and drafting OS policies.

The project also helped raise awareness of the importance of having dedicated human resources. During the project, one person at the UB (Miloš Bojičić) was appointed as an RDM contact person for researchers and librarians. Opportunities for further OS engagement such as the International Network of Open Science Scholarship Communities (INOSC) will be considered. Also, during the activity, we launched a call for volunteers and 11 volunteers were engaged. All volunteers were trained in RDM and some of them will continue to work in setting up local open research data landscapes together with the majority of our team and with established contacts in the region. A group of local research librarians is trained and supplied with relevant resources to support RDM activities in their institutions. The project contributed to a better understanding among academic and research librarians of their new roles related to RDM and OS. Due to the great interest expressed in this community, the project team will organize an additional workshop for librarians after the end of the project and will remain available for individual consultations. What is even more important, Vice deans and other decision-makers have become more aware of librarians' roles and importance in RDM that will affect the future recruiting process.

5.1 Fulfillment of Key Performance Indicators

Key performance indicators as stated in the Co-creation project application:

1. RDM web portal established in Serbian - https://rdm.open.ac.rs/ (from November 2020 to March 2021, the number of new visitors is >900 assessed by Google web Analytics)
2. The number of participants in the regional online event - 263 registered participants (176 were present at Zoom during the event[6]). A result of a Poll applied during the Zoom webinar with 57 answers from attendees related to the most interesting topic is presented at[7]:

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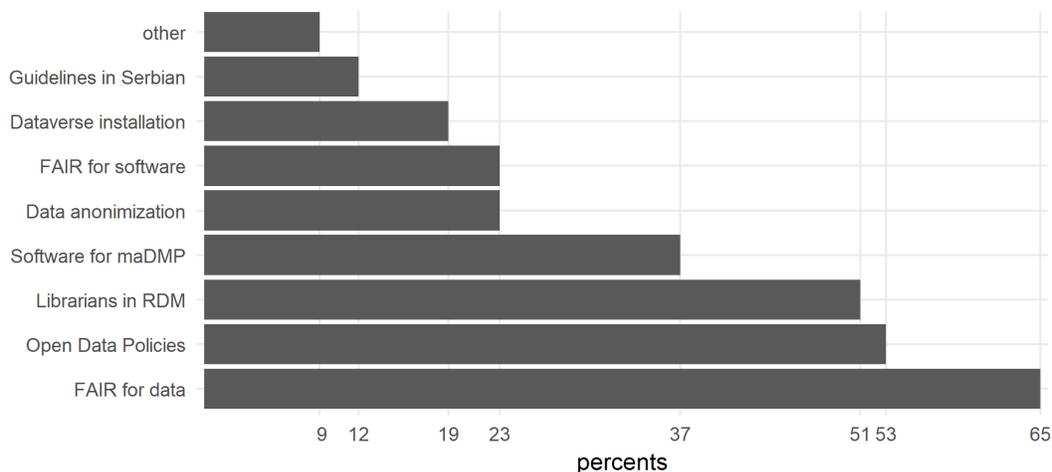
[6] We could not count for the attendees that were present on YouTube during direct streaming.
[7] For the presented bar graph, we used the R programming language and the Poll results from the Zoom application. Also, a post-webinar survey was sent to attendees. In addition, on March 12, overall 59 attendees responded to our survey and from 1 (bad) to 5 (excellent), our webinar was rated with 5 (by 54.2 %), 4 (39 %), and 3 (6.8 %) with an average rate of 4.47 ± 0.63 (out of 5).

Registered participants were from Serbia (Faculties, Institutes, MESTD, Libraries, Computer and Innovation Centers from Belgrade, Kragujevac, Bor, Niš, Leskovac, Užice, Smederevo, Gornji Milanovac, Subotica, Čačak, Jagodina, and Lapovo), Bosnia and Herzegovina, Croatia, Slovenia, and North Macedonia. Although the webinar was held in Serbian, several registered participants were from Cyprus, Germany, Lithuania, Netherlands, New Zealand, and the UK.

3. Model Dataverse repository established - http://dataverse.rcub.bg.ac.rs/
4. Data repository documentation (technical guidelines, user manuals, etc.) in Serbian[8]
5. Data policy guidelines published in Serbian - doi: 10.5281/zenodo.4587388

Annex 1 - Deliverables

The deliverables of RDM.Serbia are described in detail under Results. Here, we provide a list of the deliverables:

D1. Web portal with guidelines, templates, and tutorials about RDM (news feeds, articles, also include Twitter feeds)

D2. Designing and testing two types of training adjusted to local research communities (general training on RDM, FAIR, and open data and Hands-on training on practical data-related skills, designing and conducting surveys - for librarians and post-event)

D3. Results from dissemination (YouTube videos, papers, and presentations - in most cases uploaded on Zenodo repository) from conferences, symposiums, and other events including a full-day online event involving stakeholders from targeted countries

D4. Localized, interoperable, and scalable Dataverse data repository

D5. Data management procedures and guidelines

D6. Devising data research policies/recommendations on various levels

Other subsidiary outputs (SO) used for the organization of work includeSO1 - Meeting minutes and SO2 - Attending meetings.

Annex 2 - Dissemination

A list of attended events is provided here:

1. Open Science Days in Serbia III:
   a. Announcements: http://open.ac.rs/don2020, https://rdm.open.ac.rs/index.php/vesti/17-vesti/46-dani-otovorene-nauke-2020, https://www.openaire.eu/blogs/open-science-days-in-serbia-iii, https://ni4os.eu/2020/11/02/ni4os-europe-national-capacity-building-training-in-serbia/, and https://www.eoscsecretariat.eu/events/eosc-open-science-days-serbia
   b. Presentations: http://doi.org/10.5281/zenodo.4534725, http://doi.org/10.5281/zenodo.4534687, http://doi.org/10.5281/zenodo.4534673, and http://doi.org/10.5281/zenodo.4534605

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[8] The report in Serbian language was delivered by email to the EOSC Secretariat with this report. The project team agreed that a number of technical issues are still open and that this version of the report should remain confidential.

2. EOSC symposium 2020:
    a. Announcements: https://rdm.open.ac.rs/index.php/vesti/17-vesti/44-eosc-symposium-2020, https://eosc-portal.eu/events/eosc-symposium-2020, and https://www.eoscsecretariat.eu/eosc-symposium-2020-1
    b. YouTube session recording with the presentation on the EOSCSecretariat.eu repository
3. NI4OS Europe capacity building training 2020: blog post
4. LIBER 2021 (Research Libraries, Researchers & the EOSC: Southern European Landscape)
    a. Presentation: http://doi.org/10.5281/zenodo.4534456
5. PSSOH conference (Application of Free Software and Open Hardware Conference)
    a. Presentation & paper, http://doi.org/10.5281/zenodo.4210352
6. Open Science Pioneers Meeting in Serbia - presentation http://doi.org/10.5281/zenodo.4534540
7. Workshop for Vice deans at University of Belgrade
    a. Announcements: https://events.ni4os.eu/event/37/, https://rdm.open.ac.rs/index.php/vesti/17-vesti/54-radinica-o-upravljanju-istrazivackim-podacima-za-prodekane-univerziteta-u-beogradu, and http://www.bg.ac.rs/sr/vest.php?id=1544
    b. Presentations: https://zenodo.org/record/4560354, https://zenodo.org/record/4560369, https://zenodo.org/record/4560394, and https://zenodo.org/record/4560420
8. Meeting with TONuS – National team for Open Science in Serbia and with the representatives from the Ministry of Education, Science, and Technological Development (MESTD)
    a. Announcement: https://rdm.open.ac.rs/index.php/vesti/17-vesti/56-predstavljanje-projekta-na-sastanku-tima-za-otvorenu-nauku-u-srbiji
    b. Presentation, https://zenodo.org/record/4569926
9. Final event Serbia.RDM
    a. Announcements: http://open.ac.rs/vesti?id=4b32b9e63299818373b668fa5518188a, https://rdm.open.ac.rs/index.php/vesti/17-vesti/57-serbia-rdm-vebinar, Facebook link, EOSC Liaison Platform: https://www.eoscsecretariat.eu/eosc-liaison-platform/post/webinar-institutional-infrastructure-and-support-research-data-management, ETF website: https://www.etf.bg.ac.rs/sr/najave/2021/03/rdm-u-srbiji-vebinar
    b. Presentations and webinar recordings: https://rdm.open.ac.rs/index.php/vesti/17-vesti/58-prezentacije-serbia-rdm-vebinar, http://media.rcub.bg.ac.rs/?p=7674, https://zenodo.org/record/4593647, https://zenodo.org/record/4593869, https://zenodo.org/record/4593838, https://zenodo.org/record/4593828, https://zenodo.org/record/4593764, https://zenodo.org/record/4593871