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WP1	**Mapping the Current Open Science Potentials at Serbian Universities**

P2: Report on the current open science practice in Serbia and the registry of institutional open science repositories and related information infrastructures

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The aim of the task P.2

The aim of this task was to provide a comprehensive overview of the existing open science practice, technical resources and information infrastructure at Serbian universities. This analysis was required in order to understand the current practice and include it in the design of the technical guidelines and solutions that will be provided as the results of the BE-OPEN project.

This Report is divided into two parts. The first one analyses the current open science practice at each Serbian university. The second one presents an integrated overview of the current state of the art of open science practice at Serbian universities.

PART I

ANALYSIS OF OPEN SCIENCE PRACTICE AT SERBIAN UNIVERSITIES

Resources at the National Level

NaRDUS

Available at: http://nardus.mpn.gov.rs/

NaRDUS (National Repository of Dissertation in Serbia) is a nation-wide central repository of doctoral dissertations. It was developed within the project RODOS (Restructuring of Doctoral Studies in Serbia), in accordance with the principles of openness of science and knowledge to the public and citizens. This result is fully in line with the guidelines of the framework program of the European Union for research and innovation (Horizon 2020) and will encourage the participation of our higher education institutions in the European repository of doctoral dissertations. There are two persons at each university in Serbia who are authorized for depositing dissertations. The existence of a institutional repository at a particular university does not relieve the university of the obligation of depositing all university theses (with supporting documents) in a central repository. Information available on NaRDuS portal allows the establishment of links to the specific university repositories.

DoiSerbia

Available at: http://www.doiserbia.nb.rs/

DOISerbia was started as a project to improve the visibility of a local journal in the international community. The idea was to make article clickable and (more) visible. It is a journal repository which provides technical support for electronic publishing and archiving, and depositing metadata about articles into CrossRef.

DOI (Digital Object Identifier) is an alpha-numerical identifier associated with a unique digital object (e.g., article, book, chapter, etc). A DOI is also mapped to a URL that will provide the given digital content. CrossRef (http://www.crossref.org) is a service that maintains this mapping. Usually, publishers of scientific journals communicate with CrossRef for supplying mapping information. That is feasible when a publisher releases a significant number of titles. Since the most scientific journals in Serbia are being published by associations or institutions, it is reasonable that DOI number assignment and preparing metadata is handled by a single entity. In the past few years, the whole DOI implementation was tested in National library of Serbia, and cooperation with CrossRef has been established. The Ministry of Science funded assigning DOI numbers for 54 Serbian scientific journals.
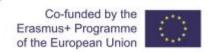
SCIndeks

Available at: http://scindeks.ceon.rs/

SCIndeks is covering locally published journals classified as publications of scientific character. All of the journals listed are indexed on cover-to-cover basis. In addition to articles' titles and abstracts, SCIndeks metadata incorporate all cited references. The vast majority of articles are

available at the level of full texts. The metadata are given in OAI PMH, Dublin Core format to increase their interoperability and accordingly articles' Web visibility.

The journals are submitted to permanent evaluation in terms of their impact, both within the database itself and additionally in WoS. Apart from this, various measures of so called bibliometric quality of journals are also monitored and assessed quantitatively. For the most part, these are derived from the WoS criteria for journals admission. The best quality SCIndeks journals, selected by special criteria (for internationality) are monitored more closely and possibly recommended for inclusion to the publishers of the international citation databases.

Prior to publishing, SCIndeks references are completely parsed in order to make them formattable in different citation styles, linked to primary documents when available on the Web, corrected for omissions and errors, and finally normalized. The purpose of normalization is to enhance cited papers' Web visibility and to provide metric suitable for calculating impact of various research entities: individuals, institutions, projects, journals, academic publishers, and conferences.

The references in journals subscribed to basic and extended package are not parsed, nor visible in the application. Consequently, indicators of bibliometric qualty that are based on references features cannot be generated, while some functionalities such as "related records" cannot be operational. For the same reason, such journals do not participate in counting citations to other SCIndeks journals.

Resources at the Regional Level

KNR
Available at: http://knr.uns.ac.rs/

The Researcher's File (Karton naučnog radnika, KNR) is an information system operated by the Secretariat for Higher Education and Science of the Government of the Autonomous Province of Vojvodina. It contains information about research results for all researchers employed in institutions on the territory of the Autonomous Province of Vojvodina. The researchers themselves are responsible for maintaining the information about their own work in this system. There is no central body that is responsible for the quality control of the data managed by the system.

University of Novi Sad (UNS)

CRIS UNS
Available at: http://www.cris.uns.ac.rs/index.jsf

Faculty of Science and Faculty of Technology of University of Novi Sad actively use and a CRIS (Current Research Information System) system. This system is developed at UNS and is a CERIF-compliant information system that handles data about scientific production (people, projects, publications, etc). This system also features reporting functions that can be directly used for evaluation purposes and election procedures which are mandated at the national level. Faculty of

Science and Faculty of Technology at UNS employ staff that actively reviews the information hosted in CRIS UNS and is engaged in quality assurance of the data provided.

Faculty of Law of University of Novi Sad maintains completely updated lists of works of its teaching staff, mostly thanks to library staff. They generate all information available from the publication that Faculty receives. If a work is published in a publication that is not available in Library, then each author has an obligation to inform person in charge about relevant work.

University of Novi Sad is a member of euroCRIS, a European consortium devoted to developing CRIS standards, practice, and systems.

One of the key requirements for the development of CRIS UNS is the support for open protocols for metadata harvesting, namely OAI-PMH. The UNS open science initiative will provide support for this protocol in order to ensure interoperability at national and international level.

Repository of doctoral dissertations
Available at: http://www.cris.uns.ac.rs/etheses.jsf

The CRIS UNS system also features an up-to-date repository of doctoral dissertations defended at UNS. All dissertations are available in full text. This system provides information to NaRDUS central repository, as well as NDLTD (Networked Digital Library of Theses and Dissertations, http://www.ndltd.org) being a global repository.

Scientific Journals
Available at: http://www.uns.ac.rs/index.php/c-nauka/nauka-na-uns-c/naucni-casopisi-c

Scientific journals published by University of Novi Sad or its member Faculties are listed at the given web address. Each journal has its own web site that provides open access to its articles and metadata.

Institutional Repository of Institute of Food Technology
Available at: http://www.fins.uns.ac.rs/oa/

Institute of Food Technology, a member of UNS, has recently launched its own institutional repository. Its implementation is based on DSpace open source platform. The Institute is committed to integrating or disseminating its repository data with UNS institutional repository once it is launched.
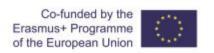
University of Belgrade (UB)

UviDok
Available at: http://uvidok.rcub.bg.ac.rs/

UviDok is the common portal of all doctoral theses and defense board reports that are publicly available before its defense at the UB faculties. Theses are sorted in relation to specific

scientific fields. The portal allows searching by author title and institution at which the dissertation is defended.

Phaidra
Available at: http://eteze.bg.ac.rs/

"E-theses" system is created to enable search and retrieval of doctoral dissertations from a local repository or from the central database of doctoral dissertations of the University of Belgrade, University of Niš and University of Kragujevac. Local repositories and the joint repository of doctoral dissertations are an integral part of the digital repositories PHAIDRA – a system for indexing and archiving of scientific and professional papers authored by academic staff from the University of Belgrade, University of Niš and University of Kragujevac. According to the copyright policy a repository contains dissertations with signed statements in which a candidate authorizes a University to upload their dissertation into the digital repository and defines license conditions. Dissertations are searchable within "E-theses" or within PHAIDRA. The Repository contains a number of older dissertations defended at the University of Belgrade from 1905 to 1941. Some dissertations are not available in open access due to the copyright policy. Users who want to access those works are obliged to send a request to info@phaidrabg.rs.

RADaR - Repository Sinisa Stankovic
Available at: http://ibiss-r.rcub.bg.ac.rs/

Institute for Biological Research "Siniša Stanković" maintains its own institutional repository. Its implementation is based on DSpace and is ready to be integrated in a wider framework based on the standard interoperability protocols.

University of Arts in Belgrade (UAB)

Repository of Doctoral Dissertations
Available at: http://eteze.arts.bg.ac.rs/

The University of Arts in Belgrade (UAB) maintains its own repository of doctoral dissertations. It was developed within the Tempus Project RODOS as a collaborative activity of all Serbian universities. It was launched in 2016. The system is designed to collect and archive the final dissertations as a text-based PDF file. It is also integrated with NaRDUS.
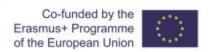
University of Kragujevac (UK)

Phaidra.KG
Available at: https://phaidrakg.kg.ac.rs/

University of Kragujevac has an established digital repository - PHAIDRA.KG, with a permanent archive, unique for universities in Belgrade, Kragujevac and Nis. All employees of the University can get a user account to archive the results of their work and teaching materials, and also to limit their availability. All the objects entered in the system are described by standardized metadata and are searchable through

all fields. The metadata can be changed, but not the object itself. Each facility receives a permanent link (PI), allowing its citation. The system model was taken from the University of Vienna, and as such has been used at 14 Universities in Italy, Austria and in the region. Unlike other repositories in Serbia, PHAIDRA.KG repository is not registered in OpenDOAR portal.

The University Library administers the system and assigns the user accounts. Server that is used to operate the system is common for universities of Belgrade, Nis and Kragujevac and is located in the University Library "Svetozar Markovic" in Belgrade.

PHAIDRA system is based on the Oracle and MySQL database, and the Fedora Linux operating system as open source software. It uses OAI-PMH protocol for metadata harvesting. It is used for the replication of metadata from the local repository of dissertations in the national repository - NaRDUS. The system supports the metadata transfer from other systems; that includes replicating the local bibliographic catalog COBISS into the e-thesis repository.

University of Niš (UN)

Repository of Doctoral Dissertations
Available at: http://eteze.ni.ac.rs/

During the Tempus project "New Library Services at the Western Balkan Universities" (158764-TEMPUS-RS-TEMPUS-JPGR, 2010-2013), local digital repositories were established at partner universities, based on the software PHAIDRA provided by the University of Wien. The Senate od University of Niš passed the resolution of establishing the local repository and made the University Library responsible for its maintenance in 2012.

All university researchers were called to give permission (in standard written form) for their works to be made accessible in public domain. All sorts of relevant scientific text can be published and preserved digitally. After that, the University produced the Instructions for shaping, publishing and delivering doctoral dissertations for the local digital repository.

In addition, the University Library and a half of faculty libraries are using the COBISS library software for producing electronic catalogues. The software allows the bibliographic description to be linked to the electronic forms of the texts. That way, the library catalogues are connected to the local digital repository.
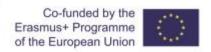
Scientific Publication Database
Available at: https://www.npao.ni.ac.rs/

UN has recently developed a website with lists of scientific publications and artistic references of all academic staff. This database is used to verify the competences of the PhD candidates, as well as PhD defense board members. It is also used for for election procedures at UN.

Scientific Journals
Available at: http://casopisi.junis.ni.ac.rs/

All journals published by the University of Niš are managed by an Open Journal System (OJS) implementation and fully support open access. The policy of UN obligates the academic staff to publish at least one paper as the first author in the last five years in one of the journals published by the University of Niš. Several journals of the University of Niš benefited from this obligation by becoming referenced in SCIe or SCI lists published by Thomson Reuters.

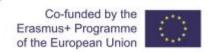## State University of Novi Pazar (SUNP)

Available at: http://www.np.ac.rs/

The State University of Novi Pazar publishes doctoral dissertations and defense board reports on its web site.

It also publishes a journal Scientific Publications of the State University of Novi Pazar in an open access form. It is available directly from the university web site at http://www.np.ac.rs/yu/publications.

PART II

AN ASSESMENT OF OPEN SCIENCE INFRASTRUCTURE AT SERBIAN UNIVERSITIES

Analysis

Serbian state universities have already begun adopting open science principles and putting them into practice. Each university has some form of open access publishing available. In this section we will provide a review of open access services already available, and outline directions for further development.

The universities being analysed are all state universities in Serbia, namely:

- University of Novi Sad (UNS),
- University of Belgrade (UB),
- University of Arts in Belgrade (UAB),
- University of Kragujevac (UK),
- University of Niš (UN), and
- State University of Novi Pazar (SUNP).

All universities are analyzed for the implementation of the following systems:

- a repository of doctoral dissertations,
- a CRIS system,
- a list or repository of open access journals,
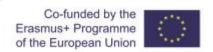- an institutional repository, and
- an open data repository.

Each university is evaluated for the presence of all systems and given the following status:

- fully implemented (F),
- partially implemented (P), and
- not implemented (N).

The following table summarises the current state of supporting open access policies with implemented systems across all state universities in Serbia.

	UNS	UB	UAB	UK	UN	SUNP
repository of doctoral dissertations	F	F	F	F	F	P
CRIS system	P			P	P	
list or repository of open access journals	F				F	F
institutional repository	P			P	P	
open data repository						

Conclusion

The infrastructural support for open science in Serbian state universities varies by domain and level of implementation.

The most comprehensive support is provided for open access publishing of doctoral dissertations defended at universities. The national repository of doctoral dissertations, NaRDUS, integrates all universities' repositories via the standard OAI-PMH protocol. There are adequate organisational and human resources to support the framework of repositories for doctoral dissertations.

The implementation of CRIS systems varies by university. A fully functional, CERIF-compliant and comprehensive CRIS system that covers the whole university is not implemented at any Serbian university. Partial implementation, either in functionality or coverage across faculties, is implemented at Universities of Novi Sad, Kragujevac, and Niš.

Lists of open access journals published by universities or their member institutions are available at Universities of Novi Sad, Niš, and Novi Pazar. University of Niš uses an OJS implementation to host all of its journals in a single web site. State University of Novi Pazar hosts its open access journal at its main web site.

Support for institutional repositories is relatively weak. Universities of Kragujevac and Niš provide means for depositing scientific publications as a part of their Phaidra implementation. University of Novi Sad's Institute for Food Technology, and University of Belgrade's Institute for Biological Research "Siniša Stanković" maintain their own institutional repositories implemented with DSpace.

Repositories providing publishing of open data are not implemented in any of Serbian universities.

The state of infrastructural support for open access in Serbian state universities varies by domain and by university, but each university has already made significant steps towards implementing open science principles. This will provide a solid foundation for further development within the BE-OPEN project.