

Institutional repository of the Mathematical Institute SANU

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ABSTRACT: The Mathematical Institute SANU joined the world of institutional repositories by establishing a digital database of scientific research papers of the Institute's associates, which was built on the open source platform DSpace-CRIS, a combination of classic repository functionalities and advanced options offered by the CRIS information system. The aim of this paper is to present these functionalities through all phases of successful establishment and maintenance of the repository. Since the beginning of March 2020, over 3000 works have been deposited in the repository, and in that way everyone has been able to see the results of research in various fields of mathematics, mechanics and computer science.

KEYWORDS: institutional repository, MISANU, DSpace-CRIS, scientific research production, open access.

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1 Introduction

Since the adoption of the *Budapest Open Access Initiative*¹ on February 14, 2002, there has been talk of establishing digital archives on the standards defined by the *Open Archives Initiative*. The Initiative recommends depositing the papers by self-archiving² in digital archives so that the results of the research are accessible to everyone, without any compensation, except the one that includes access to the Internet. Digital archives later grew into digital

¹ Budapest Open Access Initiative, accessed 20. September 2020.

² Self-archiving means that authors themselves archive the papers in the repository.

repositories, which are mainly divided into *institutional* (multidisciplinary, most often used at universities and institutes), *thematic* (dedicated to one area) and *national* (Брзуловић-Станисављевић, 2012, 254).

However, Abby Colbridge (Colbridge, 2010, 7) distinguishes between digital and institutional repositories, noting that institutional repositories are "libraries of digital objects and associated metadata" created within a single institution. She further emphasizes that the term *institutional repository* is used to differentiate between systems and services for collecting and disseminating scientific research content (peer-reviewed articles, dissertations) from those that support other types of digital objects (audio, video, digitized photographs or images of artwork).

The advantages of institutional repositories are undoubtedly great. They increase the visibility of the institution on a global level, enabling open access to scientific research, and are also suitable for storing other institutional content. From a technical point of view, as databases, "repositories go beyond the function of storage and provide quality mechanisms for finding, exchanging and reusing materials" (Брзуловић-Станисављевић, 2012, 255).

The University of Belgrade signed the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* (Берлинска декларација, 2011) in 2011, and with implementation of the Tempus project 2010-2011 "New Library Services at Western Balkan universities", whose coordinator is the University library "Svetozar Marković", the Digital repository PHAIDRA³ was established on the software platform *Fedora*, which stores production of the University of Belgrade. In 2012, it became mandatory to deposit doctoral dissertations defended in universities in Belgrade, Niš and Kragujevac, which are searchable in e-Theses⁴ section and in the repository. At the end of 2015, the Ministry of Education, Science and Technological Development established the National Repository of Dissertations in Serbia - NaRDuS,⁵ which provides open access to doctoral dissertations and evaluation reports of commissions from all universities in Serbia.

It took five years from the establishment of the first repository at the level of the University - PHAIDRA to the introduction of principles of Open Science in Serbia. In 2016, the University of Novi Sad became the coordinator of the BE-OPEN project⁶ (Boosting Engagement of Serbian Universities in Open Science) which is funded under the Erasmus+ (Capacity Build-

³ Digital repository PHAIDRA

⁴ e-Theses

⁵ NaRDuS

⁶ BE-OPEN

ing in Higher Education action) of the EU program. The main goal of the BE-OPEN project was to implement the principles of Open Science at universities in Serbia. Within this project, repositories have been established for five state universities: University of Novi Sad, University of Niš, University of Kragujevac, State University of Novi Pazar and University of Arts in Belgrade⁷.

In the same year, 2016, in the journal *Scientific Data* requirements for adequate treatment of research data, better known as FAIR (**F**indable, **A**ccessible, **I**nteroperable, **R**eusable) principles⁸ were published. According to FAIR principles, in order for data to be findable, they must be equipped with a unique identifier, to be described by detailed metadata that are searchable in repositories. Accessibility of data implies that they can be retrieved via identifiers with a standardized communication protocol. Metadata interoperability is achieved by using a language that is globally understandable and in line with the FAIR vocabulary, and by referring to other metadata, all with the aim of better information exchange. Adequate and relevant description of metadata achieves reusability. These principles apply to data, metadata and infrastructure and imply that open access repositories comply with them.

In 2018, the Ministry of Education, Science and Technological Development adopted the Platform for Open Science (Платформа, 2018) which prescribes the mandatory depositing of metadata of scientific research publications in the appropriate institutional, thematic or national repository, and applies to all institutions involved in scientific research.⁹ In accordance with the guidelines of this Platform, University of Belgrade Computer Center - RCUB¹⁰ has adapted software platform DSpace (Rajović, Kosanović and Ševkušić, 2018) and developed additional external applications to facilitate establishment and maintenance of repositories, and offers them as services to all institutions that have accepted cooperation with them.

At the beginning of March 2020, Mathematical Institute SANU (MIS-ANU) started establishing a digital database of scientific research papers.

⁷ University of Novi Sad Repository, University of Niš Repository, University of Kragujevac Digital Archive, State University of Novi Pazar Repository) and University of Arts in Belgrade Repository

⁸ FAIR principles, accessed 20. Sept. 2020.

⁹ For more information on the Platform and BE-OPEN project see Адабић and Гордић (2018)

¹⁰ RCUB repozitorizacija

The MISANU repository,¹¹ as an institutional repository, collects, stores and disseminates results of scientific research of employees. It was established with the desire of the institution that these researches become more accessible and visible to the scientific-research community. Papers that are deposited are of different content: journal articles, conference papers and contributions, editorials, monographs and chapters in monographs, patents, technical reports, master's and doctoral theses in all fields of mathematics, mechanics and computer science. Unlike the most similar institutional repositories, the MISANU repository was established independently within the institution. The repository can be accessed by anyone, without restrictions, and the records of the papers contain metadata. Access to the full text of the papers is provided through the publisher's website, via DOI numbers, for papers published in Open Access, or through the Academic Network of Serbia via KoBSON. Papers that are not equipped with a DOI number, and are published in open access or in public domain, are assigned URL links to the full text.

2 Technical aspect of building the repository

In the Registry of Open Access Repositories¹² there are slightly more than 4.300 repositories from all over the world. Most of them are based on DSpace platform (48%), followed by EPrints (16%) and Bepress (11%). DSpace is the most common platform and according to data available from the Directory of Open Access Repositories,¹³ where the share of DSpace in total number, of about 5.500 repositories, is 39%.

In the process of selecting software for the MISANU repository, several criteria have been set for the software solution to meet, and these are: that the software is free and open source, that development is still active, that the software has been in use long enough and that there is evidence of successful implementation. DSpace meets all the above requirements, and the team of the Mathematical institute in charge of establishing repository, also had positive experiences with DSpace in building and maintaining the digital library of the Faculty of Mathematics¹⁴. The MISANU repository is based

¹¹ The MISANU repository

¹² ROAR - Registry of Open Access Repositories, accessed on 20 September 2020.

¹³ OpenDOAR - Directory of Open Access Repositories, accessed on 20 September 2020.

¹⁴ Digital library of the Faculty of Mathematics

on the DSpace-CRIS platform,¹⁵ which is an upgrade of the DSpace solution. The upgrade includes CRIS (Current Research Information System) module related to research activity, so that in addition to data on publications, it is possible to keep records of other entities: projects, researcher profiles, organizations, etc.

Figure 1. shows the architecture of the DSpace-CRIS system.¹⁶ System components can be organized in three layers. The highest, application layer consists of components that enable adequate communication with the system. These include: web user interface (WebUI-JSPUI), OAI-PMH and Solr interfaces. The WebUI-JSPUI allows users to access the content of the repository and its administration. The OAI-PMH interface allows access and retrieval of metadata about publications. The Solr web interface is only available to the administrators who can only access it on the same machine on which it is installed. It provides insight into the details of the configuration of the Solr index, and allows you to run queries and analyze the results in order to adequately adjust the Solr configuration.¹⁷

The business logic layer contains components that deal with managing the content of the repository, users (e-people), authorization and workflow. It consists of several logical units related to the main functions of the system, namely: management of entered metadata, management of the import process, management of user accounts, user authentication and authorization, management of the system for assigning unique item identifiers Handle,¹⁸ Lucene search and managing Solr search indexes.

The lowest layer is the storage layer related to data storage, where metadata about publications and other entities (researchers, projects, etc.) are stored in a relational database PostgreSQL, and the digital versions of documents are stored in the appropriate location on the server. Regarding the database model, the tables can be grouped into several units: tables related to hierarchical organization of the repository (tables for communities, collections, and community-community, community-collection and collection-item relations), tables with data about users and user groups, tables in which metadata about publications are stored, tables containing data on digital documents, tables with data on Handle and DOI identifiers, as well as a group of tables related to CRIS entities (researcher profiles, projects, etc.).

¹⁵ DSpace-CRIS

¹⁶ For details on system organization see [DSpace-CRIS system](#)

¹⁷ Overview of the Solr Admin UI [Overview of the Solr Admin UI](#)

¹⁸ [Handle system](#)

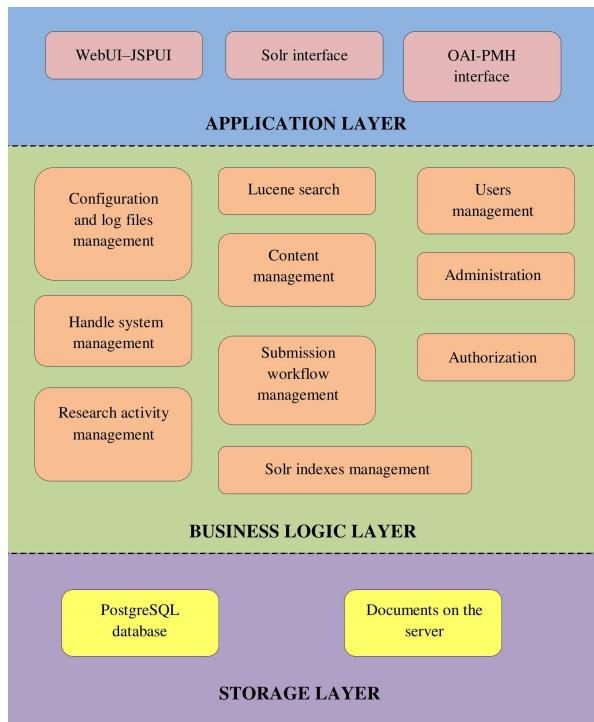


Figure 1. Three-layer architecture of the DSpace-CRIS platform

A detailed description of database model is available in the official documentation of DSpace platform.¹⁹

The first step in setting up the repository involved installing DSpace-CRIS version 5.10 and making some adjustments and changes to the software itself. The changes were related to the design itself and certain functional adjustments: new search filters were added, a new search type was defined and the way of displaying search results was changed. The design is in line with the visual appearance of the official website of the institution²⁰, where it was important that the choice of color palette, font and logo clearly indicates that it is an institutional repository. Search filters have been updated and it is possible to search publications by DOI number, rank of scientific publication (M10, M20, M30, etc.), department²¹ and projects. The tabular presentation of search results is updated by column containing detailed data about journal/monograph/proceedings in which the paper was published, as well as a column containing the publication rank. This presentation, in addition to being more informative, can also be useful for export of papers data. The display of publications in search results has been changed so the publications are sorted by issue date, and the most recent ones are displayed first. As the default search singles out only papers in journals, the search for all publications in repository is defined instead, regardless of the type (journal article, conference paper presentation, patent, thesis, etc.). As there was restriction that the project coordinator could only be researcher of the Institute, a new field was added for the name and surname of the project coordinator, in addition to the already existing field for the researcher identifier. The source code has been changed so that non-researcher project coordinator is listed in the table showing all projects.

After the above changes and system customization, the OAI-PMH server and web interface for communication with it were configured. In addition to metadata compliant with Dublin core, it is possible to acquire data compliant with several other schemes, e.g. METS, MODS и MARCXML. This meets technical standards that ensure interoperability and creates opportunities for the repository to be integrated into the existing international infrastructure.

¹⁹ The description is available at the link [DSpace Database Structure](#)

²⁰ [MISANU website](#)

²¹ Departments are organization units of the institute in which research is conducted in related areas. There are three departments at the Mathematical institute: the mathematics department, the mechanics department and the computer science department.

DSpace-CRIS allows, using special program scripts run by the administrator, to update data such as: number of Scopus citations for papers from repository, view statistics, collaboration networks for researcher, etc. In order to keep this data as up-to-date as possible, services are set up and have been configured to run update scripts periodically (once a day).

3 Depositing data into the repository

The inventory of scientific research papers of MISANU researchers began in the second half of 2019 for the purposes of accreditation of the Institute. Seven types of papers are defined based on the set of metadata that describes them: journal article, monograph, book chapter, conference paper, thesis (master and doctoral), technical report and patent. When defining the set of metadata for describing each of the listed type of papers, the BibTeX²² format served as a starting point. Each researcher submitted a list of his/her papers in the form of a Microsoft Excel spreadsheet. Since the researchers of the Institute have numerous co-authored papers, and in order to form a single list of papers, it was necessary to perform entity resolution with the aim of identifying and removing duplicate papers. The basis of entity resolution is to determine the distance or similarity between strings, for which some standard functions, i.e. distance measures, were used (Jaro-Winkler, Jaccard index). In this way, CSV files with a single list containing information about the papers were created and later used for batch import into the repository. Although the DSpace-CRIS platform has a built-in functionality for direct import from the Scopus²³ bibliographic and citation database, such a list of papers proved to be necessary, because a significant number of the papers is not indexed in Scopus. These are primarily conference papers and presentations, but also journal articles, as well as technical reports, patents and theses. There are several possible reasons why a journal article is not recorded in Scopus. The most common reason is that the journal itself is not referenced in this database. In addition, even when an article is published in a journal referenced in Scopus, it may be published in a period not covered by the database. This was the case with many articles published at the beginning of the 21st century and earlier. Several articles published in referenced journals and in the period covered in Scopus were erroneously missing. For each such article, a request for adding it was created, by filling in the appropriate form on the Scopus website.

²² BibTeX

²³ Scopus citation database

The process of adding data into the repository began by creating a researcher profile for each researcher and linking it with his/her Scopus identifier. This made it possible to easily import researcher's papers indexed in the Scopus database. The remaining papers were added using the DSpace-CRIS option for metadata batch import from CSV files. In addition to these two options, the DSpace-CRIS platform enables to add data for individual papers by: (a) manually filling out the form, (b) searching and retrieving information about the paper using one of the identifiers: PubMed ID, DOI, arXiv ID, Scopus ID, WOS ID (see Figure 2) or (c) importing data from a file of the appropriate format (BibTex, RIS, XML, etc.), which was created using bibliographic tools such as Zotero, Mendeley and EndNote, and containing information about the paper obtained from one of the citation databases. Each of the options described above is quite comfortable to use, but we believe that the average user would need a short training to be able to independently use it. Having this in mind, as well as the number of papers published, which in the last few years amounts to between 200 and 250 papers per year, the data entry task is assigned to the administrators.

The administrator of the repository can edit existing data about the publications. In this way, for example, a category is subsequently assigned to each paper. The data available through the KoBSON service (EleČas) were used, as well as the categorization of the national journals available on the website of the Ministry of Education, Science and Technological Development. Information about the categorization of other types of publications was provided by the researchers. In addition to the category of paper, information about the publisher, conference title, book series and project which funded the research published in the paper were added.

The MISANU repository contains data on more than 3000 publications authored by the researchers from the Institute. Most papers were published in scientific journals (over 2200 papers), followed by conference papers (over 900), books and book chapters (about 120), technical reports (59) and patents (10). In addition, the repository also contains data about magister's and master's theses and doctoral dissertations. Figure 3 shows the distribution of the publications by years (as of August 2020). The oldest paper in the repository was published in 1975 in the journal *Discrete Mathematics*.

In order to keep the data in the repository up-to-date and to continuously record newly published papers, the administrator is subscribed for Scopus alerts. The administrator receives, via e-mail, notifications containing information about newly indexed papers authored by the Institute's researchers. In order not to omit the papers published in the journals that are not indexed

▼ Search for identifier

Fill in publication identifiers (DOI is preferable) and then press "Search". A list of all matching publications will be shown to you to select in order to proceed with the submission process.

PubMed ID: PubMed SCOPUS

e.g. 20524090

DOI (Digital Object Identifier) : PubMed CrossRef arXiv.org SCOPUS

e.g. 10.1007/s00012-020-00673-7

ORCID ID: ORCID

e.g. 0000-0002-9029-1854

arXiv ID: arXiv.org

e.g. arXiv:1302.1497

CiNii NAID: CiNii

e.g. 110004744915

ISBN: BVB LIBRARY OF CONGRESS

e.g. 9781680502879, 0471578053

SCOPUS ID: SCOPUS

e.g. 2-s2.0-00000000117

WOS ID: e.g. WOS:000270372400005

Publication details

SCOPUS CrossRef

Title On geometric posets and partial matroids

Author(s) Šešelja, Branimir
Slivkova, Anna
Tepavčević, Andreja

Publication date 2020-08-01

Abstract © 2020, Springer Nature Switzerland AG. The aim of this paper is to extend the notions of geometric lattices, semimodularity and matroids in the framework of finite posets and related systems of sets. We define a geometric poset as one which is atomistic and which satisfies particular conditions connecting elements to atoms. Next, by using a suitable partial closure operator and the corresponding partial closure system, we define a partial matroid. We prove that the range of a partial matroid is a geometric poset under inclusion, and conversely, that every finite geometric poset is isomorphic to the range of a particular partial matroid. Finally, by introducing a new generalization of semimodularity from lattices to posets, we prove that a poset is geometric if and only if it is atomistic and semimodular.

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Keywords Centralized system | Geometric posets | Partial closure operator | Partial closure system | Semimodularity

Type Article

Figure 2. Data import using a publication identifier.

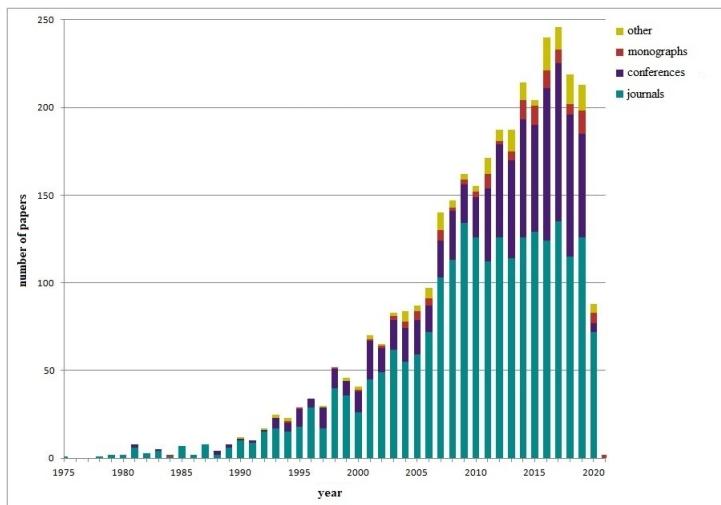


Figure 3. The number of papers in the MISANU repository by type and publication year (as of August 2020).

in the Scopus database, each researcher is obliged to periodically submit a list of new papers, which the administrator then enters into the repository.

4 Searching and browsing data in the repository

The DSpace-CRIS platform enables extensive search and browse of the imported data through the options available from the main menu: home page (*Home*), searching and browsing publications (*Research Outputs*), searching and browsing researchers' profiles (*Researchers*), searching and browsing the Institute departments (*Departments*), searching and browsing projects (*Projects*), and help page (*Help*).

The home page contains: the search box, basic information about recent submissions, and basic information about the repository papers most cited in the Scopus database (see Figure 4.).

Research Outputs option (see Figure 5.) enables searching and browsing papers by: department, author, title, type (journal article, conference paper, monograph, etc.), publication date and keywords. It is also possible to define more complex queries, i.e. different combinations of search queries by:

The screenshot shows the MISANU repository homepage. At the top, there are navigation links for Home, Research Outputs, Researchers, Departments, Projects, and Help. Below the navigation bar is a search bar with a placeholder 'Search term...' and a dropdown menu set to 'All'. The main content area is divided into two sections:

- Recent Submissions** (left):
 - Design of Asymmetrical Scalar Quantizer with Extended Huffman Coding for Gaussian Source** by Veličković, Lazar; Perić, Zoran; Stanković, Miomir; Nikolić, Jelena. Type: Conference Paper.
 - Construction of the Variable-Length and Small Bitrate Quantizer for the Laplacian Source** by Perić, Zoran; Veličković, Lazar; Lukić, Jelena; Jocić, Aleksandar; Denić, Dragan. Type: Conference Paper.
 - Improved Linearization of the Optimal Compression Function with the Hierarchical Coding** by Perić, Zoran; Veličković, Lazar; Đinčić, Milan. Type: Conference Paper.
 - A Novel Method for the Design of Piecewise Linear Compressor Function based on the First Derivative Approximation of Optimal Compressor**.
- Most Cited** (right):
 - Variable neighborhood search** by Mladenović, Nenad; Hansen, Pierre. Type: Article. Citation count: 2,226.
 - Variable neighborhood search: Principles and applications** by Hansen, Pierre; Mladenović, Nenad. Type: Article. Citation count: 1,202.
 - Reduced complexity iterative decoding of low-density parity check codes based on belief propagation** by Fossorier, Marc P. C.; Mihaljević, Miodrag J.; Imai, Hideki. Type: Article. Citation count: 669.
 - Dominating sets and neighbor elimination-based broadcasting algorithms in wireless networks** by Stojmenović, Ivan; Seddighi, Mahtab; Žunić, Jorđi. Type: Article. Citation count: 566.

Figure 4. Home page.

title, author, journal in which a paper was published, keywords, publication date, type, DOI, category (according to the categorization of the Ministry of Education, Science and Technological Development), project and department. The third type of search provides a quick access via predefined filters (*Discover*) for authors, keywords, publication year, paper type and category.

When one of the available papers is selected, a page with information about that paper is displayed, which contains information about the authors, title of the paper, source in which the paper was published (journal, monograph, proceedings), publication date, category of the paper, DOI, abstract and keywords, publisher, project funding information. In addition to the basic information about the paper, bibliometrics data (citation count) is retrieved from the Scopus database. Also, the Dimensions and Altmetric services, as well as one of the largest, freely available bibliographic database – Google Scholar are integrated with the MISANU repository. Altmetric²⁴ offers a different approach to the analysis of the impact of scientific research, complementary to the traditional one, which implies the impact factor, h-index etc. Namely, in addition to tracking citations in the Web of Science,

²⁴ Altmetric

The screenshot displays the 'Search Research Outputs' section of the platform. At the top right, there is a search bar with dropdown menus for 'All' (Title, Author, Journal, Subject, Date issued, Type, DOI, Rank, Project, Department) and 'AND' (with a '+' button). Below the search bar are 'Reset' and 'Search' buttons.

Browse: On the left, there are filters for Department, Author, Title, Type, Issue Date, and Subject. The 'Subject' filter is expanded, showing categories like All, Title, Author, Journal, Subject, Date issued, Type, DOI, Rank, Project, and Department.

Recent Submissions: A list of recent publications including 'Design of Asymmetrical Scalar Quantizer with Extended Huffman Coding for Gaussian Source' by Velimirović, Lazar, Pešić, Zoran, Stanković, Miomir, Nikolić, Jelena (Type: Conference Paper).

Top Cited: A list of highly cited papers including 'Variable neighborhood search' by Mladenović, Nenad, Hansen, Pierre (Type: Article, 2,226 citations) and 'Variable neighborhood search: Principles and applications' by Hansen, Pierre; Mladenović, Nenad (Type: Article, 1,282 citations).

Discover: This section includes three tables: 'Author' (Stević, Stevo; Ognjanović, Zoran; Mladenović, Nenad; Stanković, Radomir; Mihaljević, Miodrag J.; Todorčević, Stevo; Tepavčević, Andreja; Inuostrov, Rnžitor), 'Subject' (Product-type system | Solvable in...; Early vision | Image processing |...; Almost geodesic mapping | General...; Asymptotic periodicity | Boundedn...; Axiomatization | Completeness the...; Boundedness | Difference equation...; Boundedness | Difference equation...; Roundness | Difference equation...), and 'Date issued' (2020 - 2021; 2010 - 2019; 2000 - 2009; 1990 - 1999; 1980 - 1989; 1975 - 1979).

Figure 5. *Research Outputs* option for searching and browsing papers.

Scopus and CrossRef databases, Altmetric provides insight into citations in patents, using data from IIFI CLAIMS®,²⁵ in Wikipedia articles (currently only the English version), in Pubpeer и Publons platforms,²⁶ as well as mentions on social networks, media, blogs and platforms such as YouTube, Reddit and Stack Overflow. In order for the Altmetric statistics for a paper to be available, it is necessary that the paper be equipped with some of the persistent identifiers such as DOI or PubMed ID. Dimensions²⁷ on the other hand, focuses on the traditional metric principles used for scientific papers, i.e. on citation count. A paper must be assigned a DOI number in order for the citation information to be available. An illustrative example of displaying the information about a paper in the repository is given in Figure 6.

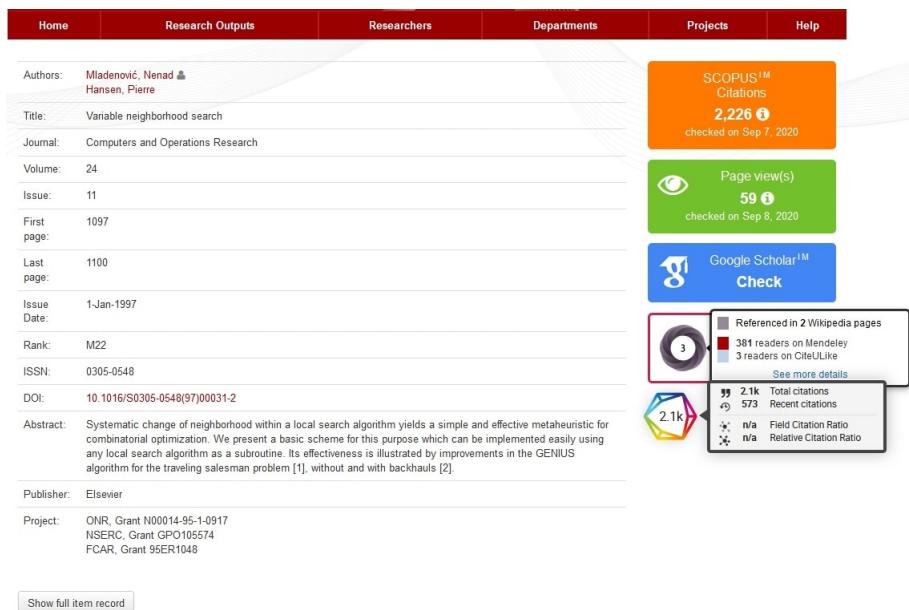


Figure 6. Primary information about a selected paper and related data obtained via integrated services: Scopus, Google Scholar, Altmetric and Dimensions.

²⁵ IIFI CLAIMS®

²⁶ Pubpeer and Publons platforms

²⁷ Dimensions

In addition to metadata search, the DSpace-CRIS platform allows, with some additional setting, to search the full text of the papers. Pre-defined filters for transformation of the stored documents are used to extract full text and create search indexes. It is possible to search Adobe PDF (OCR-ed or text based), Microsoft Word, PowerPoint, PowerPoint XML or plain text documents. There are two filters for transforming PDF documents, one uses the Apache PDFBox processing library²⁸ and requires no additional settings, while the other requires the installation of external software XPDF Tools²⁹ and additional Java libraries. The advantage of the second option is better quality and faster document processing. As only metadata about publications is currently available in the repository, and not the full text, this functionality has not been used.

The DSpace-CRIS platform supports creation of researchers profiles (see Figure 7). The profile page provides information about: the papers authored by the selected researcher, the total number of citations and papers indexed in Scopus, as well as the projects the researcher has participated in. Researchers profiles are connected with Scopus Author IDs and ORCID numbers, and can also be linked to Web of Science ResearcherID. By editing a profile, it is possible to include information such as affiliation, title and research interests. The platform offers the possibility of importing photos and contact information, and there is a special section for biography. For each researcher, a collaboration network can be examined using the *Network Lab* option, which includes information about co-authored papers and research activities. All authors names are recorded in the form *Last name, First name* so that the system automatically recognizes as a single author even those authors for whom there is no associated researcher profile.

In addition to the data search and preview functionalities described above, which are available to all users, DSpace-CRIS also contains the administrators' module. The logged-in users with admin privileges have access to this module via the *Administer* option from the main menu. It is possible to edit the content of the repository (add/delete/modify collections and items, import metadata, batch import metadata, perform deduplication,³⁰ audit withdrawn and private records), work with the CRIS module (set the

²⁸ The Apache PDFBox library

²⁹ External software XPDF Tools

³⁰ Data deduplication is a technique for eliminating multiple copies of repeating data. The DSpace-CRIS platform has this functionality built-in, and the mechanism for duplicate detection is based on metadata (sub)fields matching. For more details, please see [DSpace Deduplication](#)

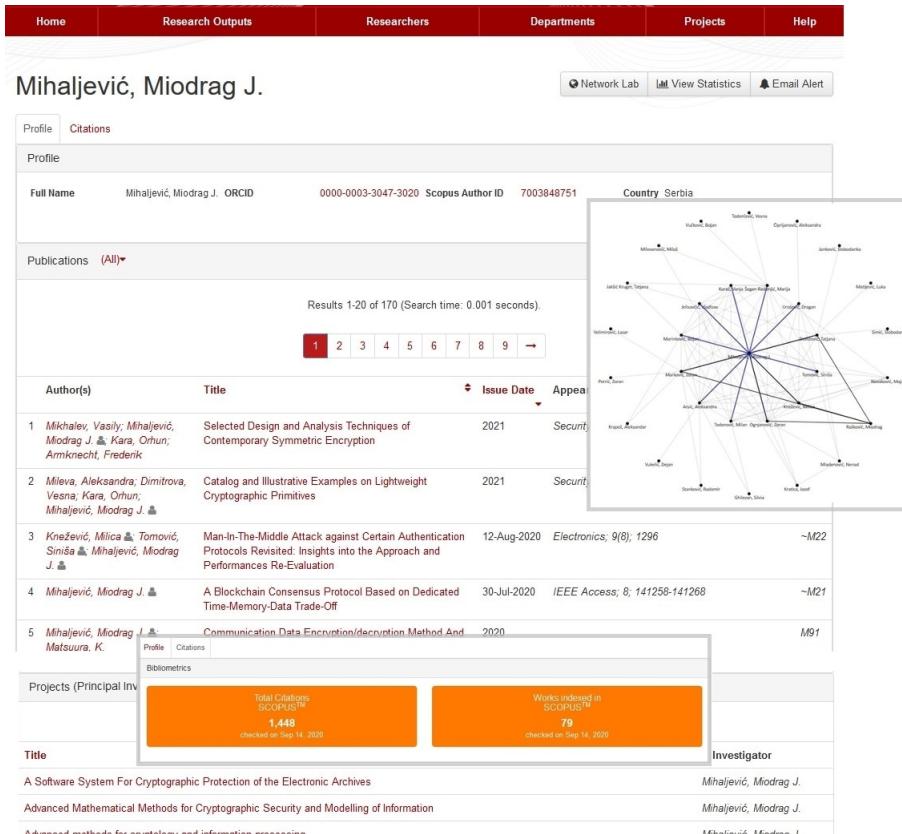


Figure 7. Preview of main information about a researcher, his/her cooperation network (co-authorship) using the *Network Lab* option and Scopus citations.

form layout for all entity types, add/delete/modify entities, as well as import and export data in the XLS format), control access rights (manage users and users groups, manage access to collections and items), view statistics (item view count, item download count, login statistics) and manage the main settings (metadata scheme, document upload format, license text).

5 Lessons learned and plans for further work

The work on the repository showed that repositories can be considered as special bibliographies in new, e-environment, while continuous data import enables insight into the activities of researchers and the impact of their works, and researchers profiles can be viewed as representative bio-bibliographies. Also, adding DOI numbers, links to full text and using tools for finding open access is crucial. Open access enables efficiency and effectiveness in research, and at the same time increases visibility, utilization and impact of the research.

DSpace-CRIS provides great options to customize the software for user requirements. Some of them aren't documented in detail, and it was necessary to study the source code of the application, and sometimes change the settings and observe how the change affects the behaviour of the application. In that process we learned more about the details of how the software solution works.

Plans for further work include the expansion of the system related to the data export adapted to the needs of both the Institute (for the purposes of the accreditation, project reports, etc.) and the researchers themselves (e.g. for the purposes of the title election). Another idea is to use the application to review the personnel data, which would be achieved by defining special fields in the data about researchers and other research entities for the purposes of keeping detailed records of research activities (such as contracts). By supplementing data in the researchers profiles, projects and departments, as well as by importing data on the Institutes's publications, it is planned to complete the repository.

6 Conclusion

The MISANU repository was established with the intention of gathering the scientific research activities of the Institute in one place, and presenting and promoting it to the interested public. Thanks to the engagement

of researchers employed at the Institute, the necessary information was collected, the repository was supplemented and in that way a quality retrospective presentation of the research results of the employees was achieved. By maintaining and improving the repository, an excellent basis is created for monitoring the future scientific production of the Institute, which is significantly increasing with online publishing and digitization.

The establishment of repositories usually takes place within the library, which is not surprising, since the libraries have always been considered a storage of relevant information. However, this also changes the role of librarians, which in a broader context means that they now also appear in a role of the information specialist. The increase of information available through the Internet due to mass growth of online publishing for librarianship implies additional education in the field of information literacy, and especially on the principles of Open Science³¹ and its aspects and practises, and this applies to both librarians and library users.

Attention should be drawn to the fact that regardless of the new functions of libraries and librarians brought by digitization process, the primary, traditional functions of collecting, storing, processing and making available analog publications should not be neglected.

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³¹ More information on Open Science, its principles and implementation can be found at Smederevac, Pajić, Radovanović, Gilezan, Čolović et al. (2020).

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