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The importance of persistent identifiers in implementing FAIRness principles of dissertations in Serbia

Abstract. In this paper the persistent identifiers (PIDs) are introduced as mechanism for implementing FAIRness principles across the National repository of dissertation in Serbia (NaRDuS). The main issue with dissertations is their lack of visibility and source trustworthy. Dissertations are not used to be recognisable with common identifiers that could be apply within journal articles. PIDs are represented as available alternative of more popular, but less accessible, identifiers that could support technical requirements for implementing FAIRness principles.

1 Introduction

Since 01.10.2014. Universities and faculties in Serbia are obliged to deposit basic information about the dissertation in NaRDuS. Also, they are obliged to deposit with the thesis evaluation report and dissertation itself to NaRDuS within three months' period, starting from the date of PhD dissertation defence [1]. The basic information deposited within thesis does not contain any identifier that could provide, at least some, necessary requirements for adopting FAIRness principles [2].

FAIRness principles improve overall quality of deposited record. By adopting those principles NaRDus becomes trustworthy and significant source for end-users. On the other hand, data providers, in this case graduated doctoral students due to FAIRness principles, gain benefits without any need to take part in process of obtaining PID. The benefits are seen over the following characteristics of thesis:

1. Findability – simplified process of discovery for machines and humans
2. Accessibility – improving openness of data and repository
3. Interoperability – extending scope of possibilities for other users
4. Reusability – basis for evaluating upcoming results

2 The issues of thesis without PID

Theses are recognised as category in registry of scientific results, by competent ministry [3]. Beside basic information, that are common for other categories, thesis does not have unique metadata fields. Certain basic metadata such as author, mentor and committee members are unique information. For obtaining those information, there is no need for vesting the functionalities of NaRDuS [4]. The repository provides enough technical solutions. On the other hand, metadata that are unique for other scientific results, like identifiers, were not supported in case of theses. The issue could be seen from technical perspective as well as from policy level.

The lack of identifiers opens new problems. Those problems are real challenges for NaRDuS because it has to find way to overcome the absent of necessary technical functionalities and to provide knowledge of "how to use" to different types of repository users.

The first issue is seen in difficulty to identify certain thesis and recognise when the thesis is distributed over network. Defining function for identifying records based on metadata or thesis itself could be one solution. But technically implementation would be too much expensive in every way and it probably would not be absolutely trustworthy. Having in mind that NaRDuS follows international suggestions and adopts them, it is necessary to find solution which is more standardised.

The lack of identifiers is seen as the second problem. Comparing to some journal articles, thesis is not provided with DOI numbers which is accepted by science community in Serbia. Even thought that it is possible, at the moment, DOI numbers are not seen as possible solution. It would require spending extra financial and human resources to support DOI numbers.

Considering described issues, it is imposed that adopted solution has to be some sort of identifier that follows international standardisation, support record identification and are cost efficient. PID fulfilled those requirements. Before final decision of adopting PIDs was made, one characteristic was taken into count. Beside all benefits, PIDs are seen as technical solution for adopting FAIRness principles in NaRDuS.

3 PIDs integration within NaRDuS

The common identifiers, like DOI numbers, are defined with standardised format [5]. PIDs are more flexible. They belong to group of handle system providers which allows less strict assigning rules. The process of implementation, gave us the opportunity to define how the PIDs would be assigned to theses and possibility to adopt good practise that are in relation with standardised identifiers. Fig 1 shows the example of assigned PID.
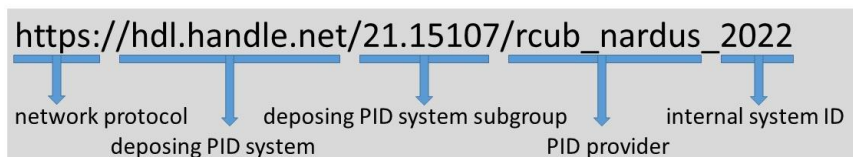

Fig. 1. PID structure in NaRDuS.

Figure 1 shows that PID depends on different data source. Based on the assigned ID from internal system, in this case NaRDus handle system, PID gains the last segment of identifier. The other segments are static and comes from, local system, network protocol, PID provider, deposing PID system and internal system.

System for deposing assigned PIDs is provided to NaRDuS due to cooperation of University of Belgrade with GRnet through the National Initiative for Open Science (NI4OS) project. Thank to result of this cooperation, NaRDuS is in position of assigning identifiers that poses qualities equal to DOI but for no charge at all.

PID integration provided to institutional repository that collect data from NaRDuS to have mechanise for easy following of dissertations and theses that are distributed to their repository. Also, NaRDuS repository managers have extended their monitor services and now are in position to observe progress of defended theses and dissertations. The same principle of assigning PID could be applied on institutional repositories for their unidentifiable records.

4 Results

Results are seen as improvements of long-term practise of having unidentifiable objects. Improvements gave thesis the mechanism to be recognisable in the same way as that could be other scientific work such as journal articles

Achieved results shows that NaRDuS has developed successful model of assigning PIDs to records. This move made basis for further implementing of FAIRness principles. Some institutional repositories have already implemented similar model.

Graduated doctoral student are satisfied because their thesis gains more visibility due to assigned PID. The thesis with PID has chance to be recognisable in wider science community. Also, this improvement gives to thesis the opportunity to be seen by international society.

5 Conclusion

Implementing PIDs in NaRDuS changed how graduated doctoral student sees their thesis. Achieved results shows that this implementation brings benefits to every user type of NaRDuS. Achieved integration opens new opportunities for further upgrading of the system. In the further, this integration could be used for implementing citation stats and adopting additional recommendations of FAIRness principles.

References

Online references will be linked to their original source, only if possible. To enable this linking extra care should be taken when preparing reference lists.

References should be cited in the text by placing sequential numbers in brackets (for example, [1], [2, 5, 7], [8-10]). They should be numbered in the order in which they are cited. A complete reference should provide enough information to locate the article and should be presented in the APA citation style format. Here are some examples:

1. *Zakon o visokom obrazovanju: 88/2017-41, 27/2018-3 (dr. zakon), 73/2018-7, 67/2019-3, 6/2020-3 (dr. zakon), 6/2020-20 (dr. zakon), 11/2021-3, 67/2021-3 (dr. zakon), 67/2021-7*. (2014). Pravno Informacioni Sistem. https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2017/88/2/reg

2. GO FAIR initiative. (2022, January 21). *FAIR Principles*. GO FAIR. https://www.go-fair.org/fair-principles/

3. *Pravilnik o postupku, načinu vrednovanja i kvantitativnom iskazivanju naučnoistraživačkih rezultata istraživača*: 24/2016-15, 21/2017-12, 38/2017-47. (2017). Pravno Informacioni Sistem. https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/ministarstva/pravilnik/2016/24/1/reg

4. *Metadata and Bitstream Format Registries - DSpace 5.x Documentation - LYRASIS Wiki*. (2016). Metadata and Bitstream Format Registries. https://wiki.lyrasis.org/display/DSDOC5x/Metadata+and+Bitstream+Format+Registries#MetadataandBitstreamFormatRegistries-DefaultDublinCoreMetadataRegistry(DC)

5. Hakala, J. (2010). Persistent identifiers: an overview. *KIM Technology Watch Report*.