REVIEW

of the thesis "***Research Information System Services for the Open Science Cloud***"
for obtaining the educational and scientific degree "Doctor", the field of higher
education: *4. Natural sciences, mathematics and informatics*, professional field: *4.6
Informatics and Computer Science, Doctoral Program "Information Technologies"-
Computer Networking,* the department of "Information Technologies" at FMI SU "St.
Kliment Ohridski"

Author: Silvester Hassani, part-time doctoral student, Department of Information
Technologies
Supervisor: Prof. Eliza Stefanova, FMI, Sofia University
Reviewer: Prof. Ana Proykova, PhD, Doctor Habil, Sofia University

This review is presented based on the order of the Rector of Sofia University
"St. Kliment Ohridski" With No. RD 38-173 / 31.03.2022 for the defense of a
dissertation. It has been prepared based on the Law and its implementation; the
Regulations for its implementation; and the Regulations for the conditions and
procedure for acquiring and holding academic positions at Sofia University "St.
Kliment Ohridski".

As a member of the scientific jury I received all the required administrative
and scientific documents for the candidate:
● dissertation in English,
● abstract in English and Bulgarian to the main dissertation,
● diplomas of higher education (Bachelor's and Master's degrees),
● CV of the candidate
● order for enrollment in the doctoral program,
● passed exams in the curriculum,
● report from the supervisor on readiness for defence of the dissertation,
● declaration of authorship of the dissertation,
● protocol and opinion of the supervisor on the verification of the originality of
the dissertation,
● reference to the minimum national requirements as well as documents providing
the declared points.
● list of the articles attainted conference of the Ph.D. student and scientific papers
related to the dissertation.
● minutes of the first meeting of the scientific jury appointed by order of the
Rector No. RD 38-173 / 31.03.2022 for the defense of the dissertation.

The candidate meets the criteria of the Sofia University "St. Kliment Ohridski"
for the defence of the dissertation.

1. Personal data

Silvester Mustafa Hasani was born in 1992. He graduated with honors from Harry T. Fultz Technical High School in 2011 for Electronic Engineering, a Bachelor's Degree from the Faculty of Information Technology, the Polytechnic University of Tirana in Albania for Telecommunications Engineering. He graduated with distinction from the Master's program in Computer Science with a specialization in Networking at the University of New York Tirana in Albania. He has worked full-time for four years at the University of New York in Tirana as an assistant lecturer and invited lecturer to several other universities in Albania. He also kept close connections to the industry in Albania by working as a full-stack web developer and lately as a technical consultant in SAP. He is now a technical consultant in an international team in SAP and a lecturer at Barleti University in Albania. In 2019, he was enrolled as a part-time Ph.D. student at FMI at Sofia University "St. Kliment Ohridski" in the doctoral program Information Technologies. The dissertation field is a deviation from the usual field of study he researches. However, he found the topic of interest and got involved in it. During the Ph.D. program, he has participated in 6 international scientific conferences, of which four are closely connected to the dissertation work.

I know Mr. Hasani from his remote participation in the conferences organised by the Research Data Alliance Node in Bulgaria. Excellent interaction with the other participants despite the difficulties generated by the technology, which is less efficient than in-person meetings.

2. General Description of the Thesis

The thesis consists of five chapters, 20 tables, 12 figures, Appendix with a survey developed for investigating the status of the Open Science in Albania, 44 references to articles and web-pages. The thesis is written in English. Four publications are included with Mr. Hassani being the first author. Declarations of co-authorship for each article state that all authors contributed equally to the corresponding publication

The author has studied and used appropriate number of bibliography sources for the needs of the thesis. This is evidence of a broad background knowledge and a very good orientation in the problem discussed in the thesis.

The word processing of the thesis is adequate. The using of different fonts and structure of the text is proper and helps reading.

The thesis fulfils the formal requests at a good level.

3. The topicality of the thesis

Open science has been a hot topic recently. There is no a unique definition of open science - it varies in the different disciplines. However in STEM, the term is more or less used in a coherent way. The researchers in STEM agreed on understanding that open science is the broad dissemination of scientific data in a way to be freely accessible for reanalysing and reusing.

The author demonstrates in his thesis good orientation and knowledge of the stages of modern development of Open science in Europe.

The full description of the Albanian Open-Source Digital Library is provided in the thesis to show that the developed Open-Source Digital Library is fully compliant with the metadata standards of OpenAIRE and supported by EOSC.

The topic of thesis is relevant in the context of up-to-date research in the current status of the Open Science.

4. **Objectives and the structure of the thesis**

The main goal of the research is to analyze the status and propose relevant measures to support the introduction of Open Science in Balkan universities.

The chapter 1 (Introduction) provides background information on Open Science, Open Access, Open Data, FAIR data, Open Source.

The chapter 2 "State of Open Science in Europe" presents the view point of Open Science that led to introduction of the European Open Science cloud to the stakeholders by the Commission, 2016-2017. In this chapter, digital repositories for research data management are illustrated and compared. Based on the analysis, a solution is proposed for the selection of a repository for the development of the Open Science Digital Repository.

The chapter 3 identifies the stages in the transition to Open Science in Albania and Bulgaria. The chapter 4 is the core of the research part of the thesis: it presents the prototype and explains in detail the main characteristics of the Albanian Repository.

The chapter 5 lists the contributions of the research and discusses future works.

Appendix A presents the questionnaire distributed in Albania.

The objectives of the research are clearly described:

- to analyse Open Science development in Europe;
- to explore the European view on Open Science: European Open Science Cloud;
- to identifying the stages in the transition to Open Science and main problems faced by Balkan universities;
- to develop an Open-Science Policy to be implemented in Albania;
- to describe the next steps for implementing and deploying Open Science in Albania;
- to develop a prototype of open science repository, following the European standards set by European Open Science Cloud;
- to deploy this prototype to support such transition to open science in Albania.

A detailed questionnaire was developed (Appendix A) and distributed to all relevant Balkan institutions. After a careful analysis, all main key findings were identified and used to plan the next steps for the transition to Open Science of Balkan institutions (Chapter 5).

The objectives were achieved.

5. Results of thesis and their benefit

From what was said above, it is clear that is able to organize and realize the significant
research work. The background analysis and the active research work performed in the thesis of is benefit to existing materials and ideas in the research of Open Science.

The author demonstrates knowledge and a good background for developing this important research in the future as well.

Scientific papers published by the doctoral student in direct connection with the dissertation

- S. Hasani, E. Stefanova, K. Stefanov, A. Georgiev, ARE WE READY FOR OPEN SCIENCE - THE ANSWER OF THE BALKAN UNIVERSITIES, ICERI2020 Proceedings, Publisher: IATED, 2020, pages: 1947-1953, ISSN (print): 2340-1095, ISBN: 978-84-09-24232-0, doi: 10.21125 / iceri.2020.0481, International   2020.
- S. Hasani, E. Stefanova, A. Georgiev, K. Stefanov, Current State of Open Science in Balkan Universities, Proceedings of the International Conference Automatics and Informatics (ICAI2020), Publisher: IEEE, 2020, pages: 1-6, ISBN: 978-1-7281-9309-0, doi: 10.1109 / ICAI50593.2020.9311337, Ref, IEEE Xplore, International, PhD.
- S. Hasani, E. Stefanova, A. Georgiev, K. Stefanov, OPEN SCIENCE IN ALBANIA: FIRST OPEN-SCIENCE POLICY IMPLEMENTED IN ALBANIA, EDULEARN21 Proceedings, Conference name: 13th International Conference on Education and New Learning Technologies, Dates: 5-6 July, 2021, Pages: 12267-12271, ISBN: 978-84-09-31267-2, ISSN: 2340-1117, doi: 10.21125/edulearn.2021.2575.
- S. Hasani, E. Stefanova, A. Georgiev and K. Stefanov, "First Steps towards Open Science in Albania" 2021 International Conference Automatics and Informatics (ICAI), Varna, Bulgaria, 2021, pp. 235-238, doi: 10.1109/ICAI50593.2020.9311337, ISBN: 978-1-6654-2662-6, e-ISBN: 978-1-6654-2661-9, 10.1109/ICAI52893.2021.9639622.

The publications related to the dissertation thesis fulfil the minimum national requirements (under Art. 2b, para. 2 and 3 of ZRASRB) since two of them are indexed in SCOPUS, and respectively the additional requirements of Sofia University "St. Kliment Ohridski" for obtaining a Ph.D. degree in the scientific field and professional direction of the procedure.

6. Questions for the defence:

1. What is your vision for the time necessary to implement the Open Science Policy in the Balkans?
2. Would you tell which are the most effective incentives (in your view) that could speed up the adoption of the Open Science in Balkan Universities?
3. Did you find large differences between the West European Universities and Balkan Universities in thinking of Open Science as an important development of the collection and distribution of knowledge?

7. Conclusion

Based on the presented materials quality, scientific papers, their significance, and the scientific and applied contributions, my opinion is that the candidate *Silvester Mustafa Hasani* **meets all** requirements for acquiring the educational and scientific degree "Doctor" at the Sofia University "St. Kliment Ohridski" in the professional field 4.6 Informatics and Computer Science.

I recommend to the esteemed Scientific Jury to award Silvester Mustafa Hasani the scientific degree of Doctor in Professional Field 4.6. "Informatics and Computer Science" at Sofia University "St. Kliment Ohridski".

Sofia, 26.06.2022   Prof. Dr. Ana Proykova, Doctor Habil