

REVIEW

on a competition for occupation of the academic position “Professor”

field of higher education	4. Natural sciences, mathematics and informatics
professional field	4.6. Informatics and Computer science
scientific specialty	Informatics (Systems for management of digital cultural content and e-learning)
announced in	State Gazette no. 102 of 01.12.2020 and on the IMI website
for the needs of	Institute of Mathematics and Informatics (IMI) – BAS, Mathematical Linguistics Department

The review was prepared by: Prof. D.Sc. Peter Lubomirov Stanchev from the Institute of Mathematics and Informatics - BAS as a member of the Scientific jury of the competition, according to Order № 12 / 29.01.2021 of the Director of IMI.

One applicant submitted documents for participation in the announced competition:

Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova, IMI-BAS

I. General description of the submitted materials

1. Details of the application

The total number of scientific publications so far of Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova is 133, of which 3 chapters from books or collective monographs. Of all publications - publications with Impact factor and/or Impact rank are 15, and indexed in Web of Science and/or Scopus are 61. Out of all publications 88 are referred to a total of 371 times. Of these publications, 65 are referred 165 times to publications that are indexed in the Web of Science or Scopus. Of all publications, 123 are in English, 20 are in journals, 113 - in conference proceedings, of which 99 publications in proceedings of international conferences. Of all the publications for the competition, 20 articles are presented, in which the first author is the candidate in 9 articles, the second author - in 8 articles, the third author - in 1 article and the sixth author - in 2 articles; 13 articles are with IF and/or SJR.

As a reviewer, I received all 17 documents submitted for participation in the competition.

2. Details about the candidate

Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova graduated from Plovdiv University "Paisii Hilendarski" - Bachelor of Mathematics and Informatics and Veliko Tarnovo University "St. St. Cyril and Methodius" - Master of Informatics. She also defended a dissertation on "Semantic-oriented architecture and models for personalized and adaptive access to knowledge in a multimedia digital library" in 2008. Since 2002 she has worked at the Institute of Mathematics and Informatics - BAS as a mathematician, assistant (since 2007), Assistant Professor (since 2009), and Associate Professor (since 2009). She is Head of the Mathematical Linguistics Department of IMI-BAS (2016 - present), Secretary of the Mathematical Linguistics Section of IMI-BAS (2012-2016), Head of the Digitization Laboratory - Burgas at the Mathematical Linguistics Department of IMI -BAS (2019 - present), member of the Scientific Council of IMI - BAS (14.12.2018 - present), head of the Attestation Commission at the Scientific Council of IMI-BAS (2020 - present), member of the Attestation Commission at the Scientific Council of IMI -BAS (2018 - 2020), Secretary of the Commission for Scientific Policy and Structural Changes at the Scientific Council of IMI-BAS (2020 - present).

3. General characteristics of the scientific works and achievements of the candidate

The scientific works of Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova presented for the competition can be divided into the following groups:

A. Systems for management of digital cultural content – technologies and methods.

A.1. 1. Creation, presentation and content management of digital libraries. Architecture and functionalities of digital libraries - articles with numbers 9, 12, 19, 20;

A.2. Presentation, extraction and processing of knowledge - articles with numbers 3, 4, 5, 10, 16;

A.3. Integration of systems for management of digital cultural content. Creation of digital cultural ecosystems - articles with numbers 2, 3, 6, 13, 14, 15.

B. E-learning - technologies and methods. Application of ICT in education, digital theater, models and tools for teaching mathematics - articles with numbers 1, 7, 8, 11, 17, 18.

The presented scientific publications are related to the implementation of the following projects:

- Bulgarian National Interdisciplinary Research e-Infrastructure for Resources and Technologies in favor of the Bulgarian Language and Cultural Heritage, part of the EU infrastructures CLARIN and DARIAH with the Ministry of Education and Science,

- Concepts and Models for Innovation Ecosystems of Digital Cultural Assets with the National Scientific Fund,
- National Scientific Program "Cultural heritage, national memory and development of society", funded by the Ministry of Education and Science under the Council of Ministers,
- Serious Games as Contemporary Tools for New Educational Applications, activity under the project "Introduction of modern methods in education and work with young talents", funded by the Ministry of Education and Science,
- Creation of New Office for Transfer of Innovative Technologies in the Enterprises of Southeast Region, project under Operational Program "Development of the Competitiveness of the Bulgarian Economy" 2007-2013, financed by the Structural Funds of the European Union, the European Regional Development Fund and the national budget,
- An innovative platform for intelligent adaptive video learning games (APOGEE) with the National Scientific Fund,
- Semantic Technologies for Web Services and Technology Enhanced Learning with the National Scientific Fund,
- Knowledge Technologies for Creation of Digital Presentation and Significant Repositories of Folklore Heritage with the National Scientific Fund,
- EuDML: European Digital Mathematical Library, project under the Competitiveness and Innovation Framework Program of the European Commission,
- LOGOS "Knowledge-on-Demand for Ubiquitous Learning", a project under FP6 of the European Commission.

In group of indicators B there are 104 points, in group of indicators G there are 250 points, in group of indicators D there are 186 points, in group of indicators E there are 225 points. Total number of citations: 371. Number of cited articles in Web of Science and/or Scopus: 64 with number of citing sources: 162; number of citations in other scientific journals - number of cited publications: 65 with number of citing sources: 209.

a) The scientific publications fully correspond to the national requirements (art. 2b, para 2 and 3 of RTCAADOAP) and to all additional requirements of IMI-BAS for taking the academic position of "Professor" in the scientific area and professional field for the competition;

b) The presented scientific publications do not duplicate the presented publications from previous competitions;

c) There is no proven plagiarism in the scientific works of Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova.

4. Characteristics and evaluation of teaching activity, work on projects and other activities

She gives lectures on "XML technologies for the Semantic Web" at Sofia University "St. Kliment Ohridski", on "Fundamentals of Multimedia" at the National Academy of Music "Prof. Pancho Vladigerov", lectures and guided exercises in "Hypertext, multimedia and hypermedia, Interactive systems and environments for e-learning" and "Knowledge-based technologies" in a joint master's program in informatics at University of Veliko Tarnovo "St. St. Cyril and Methodius" and at IMI-BAS.

Created software products by the candidate:

- Multimedia Digital Library "Virtual Encyclopedia of Bulgarian Iconography" (2006 - present)
- Bulgarian Folklore Digital Library (2009 - 2011)
- Multimedia digital library "Encyclopaedia Slavica Sanctorum" (2011 - present)
- Multimedia digital library "Virtual collection with icons", Regional History Museum - Burgas (2014 - 2015)
- Serious educational game "Thracians" (2017 - 2018)
- Serious educational game "Aquae Calidae" (2019 - present).

Other activities of Assoc. Prof. Dr. Desislava Paneva-Marinova in the period 2015 - 2020:

- Present articles at international forums - 34 pcs.
- Present articles of seminars in foreign universities or institutes - 6 pcs.
- Present articles at national forums - 12 pcs.
- Present articles of seminars in our country - 8 pcs.
- Leader or participant in research projects funded by external sources for Bulgaria (EU FP, Erasmus, etc.) - 3 pcs.
- Leader or participant in research projects funded by external sources for BAS (projects under NSF competitions, national programs, etc.) - 8 pcs.
- Leader or participant in a contract/project under the EBRD and bilateral or multilateral scientific cooperation - 4 pcs.
- Creation of online educational products - 2 pcs.
- Leading designer and developer of environments for management of digital cultural content - 4 pcs.
- Editor of a collection of papers from an international scientific conference, indexed in Web of Science and /or Scopus - 1 pc.
- Supervisor/consultant of defended doctoral students - 1 pc.
- Supervisor of doctoral students - 6 pcs.

- Participation in examination commissions - 29 pcs.
- Chairman or scientific secretary of a program or organizing committee of an international/national scientific forums - 10 pcs.
- Member of a program or organizing committee of an international/national forums - 6 pcs.

5. Content analysis of the scientific and scientific-applied achievements of the candidate, contained in the materials for participation in the competition

The main scientific, scientific-applied and educational-methodical contributions of Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova are mainly in the following areas:

In area of **A. Systems for management of digital cultural content – technologies and methods**, three sub-areas can be considered:

A.1. Creation, presentation and content management of digital libraries. Architecture and functionalities of digital libraries

The monograph [20] examines the management and processing of data in digital cultural content management systems such as digital libraries. These systems, as a structural unit of ecosystems for digital cultural assets, are undergoing transformation and constructive development. Innovative tools for accessing cultural assets, applications and services for their improved, sustainable and creative use/reusability, intelligent arrangement, discovery, selection, grouping and management are presented. Formal structures describing the semantics of the objects, a tree-like semantic annotation template, methods and algorithms for automatic filling, detection of dependencies and multiple use of metadata, multilingual data filling and automatic protection of digital objects with a watermark, a unique algorithm for checking for matching of digital objects with those available in the digital storage of the library, algorithm for automatic inclusion of a new object in already existing collections, etc. are studied. Of interest is the developed software solution of a digital library, allowing fast transfer and implementation for new areas and different types of objects. A key element is the guaranteed interoperability at various levels with other digital libraries and repositories. An in-depth study and analysis of the needs, preferences and cognitive goals of the target users in order to specify the architecture and functionality of the environment are presented. The work represents a significant contribution to the organization of cultural heritage data. In [12] an additional functionality of a digital library for management of complex, heterogeneous and multilayered structures of folklore knowledge have been developed. The Bulgarian folklore ontology, was created for the first time in our country. It is of considerable interest. [9] is related to the design of the first in Bulgaria system for management of digital fashion objects with application in education. The system has a great

future. In [19], the personal manipulation of digital library content in a learning context have been proposed, which provides the user with different ways of learning and creative use. Personalization is a significant part of the candidate's work, which has been developed in accordance with the latest trends.

A.2. Presentation, extraction and processing of knowledge

In [10], an approach to improve the user experience in a digital library by implementing innovative services for analysis and synthesis of data and knowledge in it is proposed. For this purpose, the research focuses on content analysis and synthesis activities. Such an interpretation of analyzing and synthesizing services in digital libraries leads to a new direction in research. In [5] an algorithm was created to prevent duplication of records for digital objects. In this way, greater accuracy of the extracted knowledge and optimized operation of the system is guaranteed. The algorithm can be applied in many other places. [16] discusses the architecture of a virtual museum and models of functionality for visualization of content for educational purposes. The study follows the latest trends in this area. An approach for analyzing and improving the use of digital cultural assets for non-formal learning purposes in digital cultural ecosystems has been developed in [3]. The study can also be used for reuse of objects. In [4] a formal model for monitoring and management of transport processes for collection, processing and analysis of large volumes of data is presented. The model includes the application of optimization algorithms to extract knowledge from data and predict future results based on convergence methods widely used for recommendation systems. The model can also be used for other types of systems.

A.3. Integration of systems for management of digital cultural content. Creation of digital cultural ecosystems

In [6], a functionality for implementing interoperability at the content level between digital libraries is proposed, ensuring the transfer of information objects and content between the systems. The study is of great interest due to the availability of multiple systems with similar functionality. In [2] a scheme for semantic association of three subject fields is developed and the realization of interoperability at content level between three digital libraries is shown. The work has practical applicability.

B. E-learning – technologies and methods

[1], [8] and [11] presents developed model for semantic-based relation between digital multimedia resources from the Thracian history and culture field and the proposed game models, “telling the story” of the Thracian civilization in an attractive way with a serious game. In [11] a model of a serious game in a panoramically photographed ancient architectural archeological complex is presented. For the goals of the e-learning, a framework for creation and support of

digital tools, like eShadow, for learning and creativity, is proposed in [18]. It is created models and tools for education in mathematics via integration of pedagogical methods, arts and innovative technological platforms. In [17] an approach for creative integration of the Fine arts with the Western and Eastern pedagogical methods in a 3D virtual museum “Mathematics and Arts” is developed.

6. Critical remarks and recommendations

I recommend Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova to continue in the same way in her future research.

7. Personal impressions of the candidate

I have known the candidate for many years. She is characterized by exceptional precision, diligence, and excellent results. Her progress in scientific publications is remarkable.

8. Conclusion on the application

After being acquainted with the materials and scientific publications, and on the basis of the analysis of their significance and their scientific and applied scientific contributions, I confirm that the academic achievements of the candidate Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova meet the requirements of the ADAPRB, the Regulations for its implementation and the corresponding Regulations of IMI-BAS for the occupation of the academic position of “Professor” in the professional field “Informatics and Computer Science”. In particular, the applicant meets the minimum national requirements in the professional field and no plagiarism has been detected in her scientific papers submitted at the competition.

I give a **positive assessment** of the application of Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova.

II. Overall conclusion

Based on the above, I **recommend with confidence** to the scientific jury to vote on a proposal to the Research Council of the Institute of Mathematics and Informatics – BAS to select Assoc. Prof. Dr. Desislava Ivanova Paneva-Marinova for the academic position of “Professor” in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.6. Informatics and computer science, scientific specialty Informatics (Systems for management of digital cultural content and e-learning).

1.03.2021

Prepared the review: (Prof. Dr. Petar Stanchev)