R E P O R T

by Assoc. Prof. Dr. Maya Georgieva Bozhilova

Bulgarian Defence Institute "Professor Tsvetan Lazarov"

on a Thesis for awarding the educational and scientific degree 'Doctor'

Field of higher education 4. Natural Sciences, Mathematics, and Informatics
Professional field: 4.6. Informatics and Computer Science
Doctoral program: "Informatics"

Title: **"Smart Contract Platforms"**

Author: **Jivko Steftchev Jeliazkov**

According to Order No. 91 dated November 18, 2025, issued by the Director of the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences (BAS), I have been appointed as an external member of the Scientific jury for the defence of the Thesis.

In accordance with a decision taken at the first meeting of the Scientific jury, I have been designated to prepare a report.

The evaluation has been prepared in compliance with the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and the regulations thereto.

The candidate has submitted all required documents in accordance with the ADASRB, its Implementing Regulations, and the Regulations on the conditions and procedures for awarding academic degrees and holding academic positions at the Bulgarian Academy of Sciences and at the Institute of Mathematics and Informatics of BAS (IMI–BAS). The submitted documents show that the candidate meets the minimum national requirements under Article 2b, paragraphs 2 and 3 of the ADASRB.

There is no proven plagiarism, established in accordance with the legally prescribed procedure, in the candidate's scientific works.

1. General characteristics of the Thesis

The presented Thesis is written in English and comprises 135 pages. Its structure includes a table of contents, an introduction, six chapters, a bibliography with 56 cited references, a list of figures, a list of tables, and two appendices containing a glossary of the abbreviations used and a glossary of the terms used.

The fifth and sixth chapters contain, respectively, the approbation of the obtained results and the conclusion, which includes the scientific contributions of the Thesis.

This structure complies with the established requirements for a Thesis for awarding the educational and scientific degree 'Doctor'. By its nature, the research has a scientific and applied character. The bibliography demonstrates the doctoral candidate's good familiarity with the state of the art in the relevant scientific field.

2. Biographical data of the candidate

Jivko Steftchev Jeliazkov obtained a Master's degree in Mathematics (Probability and Statistics) from the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" in 1998.

As of 01 July 2019, he was enrolled as a part-time doctoral student in the PhD programme "Informatics" at the Section "Mathematical Foundations of Informatics" at IMI–BAS. By Order No. 5 of 02 January 2024 of the Director of IMI–BAS, he was approved for defence.

Since 2003 to the present, Jivko Jelyazkov has been a software architect and cybersecurity expert at SAP SE.

3. Major scientific and scientific-applied achievements

The Thesis proposes research and solutions implemented through a distributed blockchain-based architecture that meets modern requirements for the development, delivery, and deployment of business software, addressing key challenges related to the incentivization of scientific research, the deployment and ongoing maintenance of business software systems in real-world environments, as well as the generation of provably random numbers.

The first chapter presents an analytical review of distributed ledger technologies, communication security mechanisms and consensus achievement, as well as the main concepts and terminology used in the Thesis. On the basis of the literature analysis, functional requirements for the proposed solutions are formulated and the choice of blockchain platform is justified.

The second chapter is devoted to the description of a distributed system for incentivization scientific research and development, based on the EOSIO technology. A detailed blockchain architecture is defined, aimed at addressing

the problems related to the formulation of and incentives for achieving specific scientific results.

The third chapter proposes a blockchain-based design of the Systems Development Life Cycle (SDLC), derived from an analysis of the challenges faced by existing SDLC systems.

The fourth chapter defines a prototype used to test and validate the proposed architecture for generating provably random numbers, which includes modules, communication protocols, and interactions among distributed components. The development environment and the implementation of decentralized applications (DApps) in EOSIO are also described.

The fifth chapter presents the scientific reports and publications related to the Thesis.

The sixth chapter contains the conclusion, including the scientific contributions of the Thesis.

I accept the scientific and applied contributions formulated by the candidate in the statement of contributions, which essentially enhance existing knowledge in the scientific field, as well as apply theory to solve specific practical problems.

4. Approbation of the results

The results of the research presented in the Thesis have been reported by the doctoral candidate, in co-authorship with his supervisor, at two international scientific forums and published in the following two scientific papers:

- Jeliazkov J., Kostadinov H., Using EOSIO Technology for Publicly Verifiable Randomness, Studies in Computational Intelligence, Vol. 641, pp. 87 – 96, 2025, Springer, Scopus, SJR: 0.190, ISBN: 978 3 031 76785 2.
- Jeliazkov J., Kostadinov H., Decentralized Research Incentivization System, Studies in Computational Intelligence, Vol. 641, pp. 97 – 103, 2025, Springer, Scopus, SJR: 0.190, ISBN: 978 3 031 76785 2.

The two publications meet the minimum national requirements (under Article 2b, paragraphs 2 and 3 of the Act for the Development of the Academic Staff in the Republic of Bulgaria) as well as the additional requirements of IMI and BAS for the award of the educational and scientific degree "Doctor" in the professional field 4.6 Informatics and Computer Science.

The results presented by the candidate in the Thesis and in the related scientific publications do not duplicate results from previous procedures for the acquisition of an academic degree or academic position.

5. Qualities of the Thesis summary

The summary in Bulgarian consists of 39 pages and accurately reflects the content and the main results of the Thesis.

6. Critical notes

I have no critical notes.

7. Conclusion

I believe that the Thesis titled "Platforms for Smart Contracts" represents a complete scientific study. The candidate for the educational and scientific degree "Doctor" demonstrates deep knowledge of the subject area, as well as the knowledge and skills required to implement the solutions he proposes in working applications.

The analysis provided in the previous sections shows that the Thesis fully meets the requirements for awarding the educational and scientific degree "Doctor", as set out in the Act for the Development of the Academic Staff in the Republic of Bulgaria, its Implementing Regulations, and the Regulations on the conditions and procedures for awarding scientific degrees and holding academic positions at the Bulgarian Academy of Sciences and at the Institute of Mathematics and Informatics.

All of the above gives me a good reason to give a positive evaluation of the Thesis "Platforms for Smart Contracts" and to recommend that the Scientific Jury award the educational and scientific degree "Doctor" to Jivko Steftchev Jelyazkov in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 Informatics and Computer Science.

Date: 28/12/2025

Member of the Scientific Jury:

(Assoc. Prof. Dr. Maya Bozhilova)