REVIEW

from

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for awarding of the educational and scientific degree "Doctor of Philosophy"

Professional field:
4.6 Informatics and Computer Sciences,

with a candidate
Todor Velev Velev

PhD thesis title
"Modeling and Automation of Standardized Information Security Management Systems"

1. Relevance of the problem developed in the PhD thesis in scientific and scientific-applied terms.

The relevance of standardized Information Security Management Systems (ISMS), such as ISO/IEC 27001, is critical due to the increasing and complex cyber threats, which demand a systematic and proactive approach to protect the confidentiality, integrity, and availability of information. Implementing an ISMS is vital for achieving regulatory compliance with key laws like GDPR and the NIS 2 Directive, while simultaneously minimizing the risk of massive fines and financial losses. The system provides a competitive advantage, increasing the trust of clients and partners who seek proof of due diligence in data management. Furthermore, ISMS ensures business continuity through incident management plans and introduces structured processes for the continuous improvement of security. Ultimately, the standardized approach integrates security into the overall organizational strategy, transforming it from an incidental measure into a core business priority.

It is indisputable that the goal of the PhD thesis – to develop and test a platform model that manages and automates standardized Information Security Management Systems – is relevant from both a scientific and applied scientific perspective.

The PhD student aims to standardize Information Security Management Systems (ISMS) and explore the possibilities for automating their functionalities and management.

To achieve this goal, three tasks were defined:

1. Research and analysis of the theoretical foundations of standardized Information Security Management Systems, focusing on:
    1.1. Information Security;
    1.2. Information Security Standards;
    1.3. Information Security Management Systems;
    1.4. Software applications for IS.
2. Analysis of the processes, requirements, and characteristics of the platform for managing and automating standardized Information Security Management Systems.
    2.1. Research and analysis of business processes subject to automation and their corresponding information flows;
    2.2. Determining the functional and non-functional requirements of the platform by researching and analyzing data, user groups, and information security standards;
    2.3. Identifying the general characteristics of the system.
3. Designing an optimal platform model for modeling and automation of standardized Information Security Management Systems and their associated architecture.

2. Degree of knowledge of the state of the problem and creative interpretation of the literature

The PhD thesis is based on a bibliography containing 80 references, demonstrating thorough research work. Within the scope of the research, the PhD student presents a comprehensive and systematic analysis of the key aspects of information security. This analysis covers methods, available technologies, and tools for information protection, as well as current challenges in the field. Special attention is paid to information security standards and the theoretical foundations upon which modern ISMS are built.

In conclusion, the work of the PhD student Todor Velev shows a deep understanding of both the current state of the researched problem and the most appropriate approaches and tools for effectively solving the set tasks and achieving the main goal of the PhD thesis.

3. General analytical characteristics of the PhD thesis

The PhD thesis is well-structured and logically consistent according to the tasks set for resolution. The thesis is 197 pages long and includes: an Introduction, three chapters with basic theoretical statements and scientific research results, a fourth chapter for conclusion, a list of publications related to the PhD thesis, participation in conferences and projects, a declaration of originality of results, appendices (59 pages), and a bibliography listing 80 references.

Chapter 1: Standardized Information Security Management Systems

The theoretical research focuses on the fundamental concepts that serve as the basis for building the Platform for automated management of standardized ISMS. This chapter contains an in-depth theoretical analysis of key elements such as: the principles of information security, applicable standards in the field (e.g., ISO/IEC 27001), the nature and goals of ISMS themselves, and the functionalities of software tools for IS management. Terminology and security aspects are defined, protection methods and technologies are studied, and the challenges that motivated the research are outlined. Standardization processes, ISMS architecture, and the scope of related software solutions are examined in detail.

Chapter 2: Modeling of a Platform for Management and Automation of Standardized Information Security Management Systems

The second chapter presents the methodology used for research and modeling of the automated platform. Based on this methodology, an analysis of the business processes that the platform must automate and an identification of the corresponding information flows were performed. Functional and non-functional requirements for the system are defined through the analysis of data, the needs of user groups, and the requirements of information security standards. The general characteristics of the platform are derived from best practices for user behavior, security, and productivity. UML™ (Unified Modeling Language) and BPMN (Business Process Model and Notation) were used for visual representation of business processes and system modeling.

Chapter 3: Platform Model for Modeling and Automation of Standardized Information Security Management Systems

The third chapter introduces the author's concept of the "document matrix" as the primary tool for operational management of the organization. The modeling methodology is described in detail, and the conceptual model of the Platform itself is presented. At the end of the chapter, a logical and physical architecture is proposed for the practical implementation of this platform. The sequence of the research is clearly visible: theoretical foundations and analysis (Chapter 1) → methodology and system modeling (Chapter 2) → conceptual model and architecture (Chapter 3).

Chapter 4: Main Findings and Conclusions

The scientific and applied scientific contributions are presented in the fourth chapter. The formulation of concrete guidelines for future work at the end of the PhD thesis also makes a good impression.

4. Evaluation of contributions of the PhD thesis and their significance

I accept the contributions formulated in the PhD thesis with minor clarifications, specifically:

Scientific contributions

- An algorithm and methodology for researching and modeling an automated standardized platform for information security management have been proposed.

- The author's theory of the document matrix is presented as a basis for the operational management of an organization and company.

Applied scientific contributions

- Business processes and flows that are subject to automation through the developed platform have been identified, defined, and analyzed. Functional and non-functional requirements were defined after research and analysis of data, user groups, and information security standards. The general characteristics of the system were identified using heuristic methods.
- A model of a complex platform for modeling and automation of standardized Information Security Management Systems has been developed. The model is based on monitoring, analysis, and management of the document matrix, business processes, information flows, and assets of the organization.
- An architecture for the platform is proposed, which aligns with modern requirements for modularity, automation, and compatibility with standards.

5. Assessment of PhD thesis publications

The scientific contributions from the PhD thesis have received significant recognition in the academic community. These results are reflected in a total of three publications. Two of them were presented in proceedings from international conferences, one of which was published in the reputable Springer series, Studies in Big Data, distinguished by an Impact Rank (SJR = 0.257, Q3 for 2021). Both publications are indexed in the Scopus database. The third work is an article in the journal Information & Security: An International Journal, vol. 43, no. 1 (2019), which already has one registered citation in Scopus.

The PhD student, Todor Velev, is the main (first) author of all three publications, and the sole author in one of them. These achievements categorically prove both the independence and active participation of the PhD student in the realization of the set tasks, as well as the high quality and international significance of the obtained scientific results.

6. Assessment of the compliance of the autoreferate with the requirements for its preparation, as well as the adequacy of reflecting the main points and contributions of the PhD thesis

The autoreferate accurately and adequately conveys the content of the PhD thesis, providing a clear overview of both the problems discussed and the key contributions of the research.

7. Critical notes on the PhD thesis

The PhD student Todor Velev has taken into account the previously made comments and recommendations, and I believe that all major remarks have been addressed in the final version of the PhD thesis.

Nevertheless, I would like to draw attention to Chapter 4, entitled "Main Findings and Conclusions". This chapter does not contain clearly formulated key findings that logically

follow from the work on the topic and the results achieved. Before proceeding to define the contributions, the PhD student should have presented an overall perspective on the entire research.

Despite this, since the essential chapters presenting the results conclude with their own findings, this remark is not considered critical and does not diminish the overall high level of the PhD thesis.

8. Conclusion with a clear positive or negative assessment of the PhD thesis

Based on the scientific research conducted, which demonstrates a systematic and comprehensive analysis of the fundamental foundations of ISMS, and the achieved results, which lead to the author's theory of the "document matrix" and the developed conceptual model of the Management and Automation Platform, I give a high evaluation of Todor Velev's PhD thesis.

The PhD thesis meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Internal Regulations for its application, as well as the Regulations for the terms and conditions for acquiring scientific degrees and occupying academic positions at the IICT – BAS. The achieved scientific and scientific-applied results give me reason to propose to the respected Scientific Jury to award the educational and scientific degree "Doctor of Philosophy" to Todor Velev in the professional field 4.6 Informatics and Computer Sciences.

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05.11.2025 Scientific Jury me

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