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OPINION

by Assoc. Prof. Dr. Eng. Veselina [redacted] Gospodinova
at the University of Mining and Geology "St. Ivan Rilski"

on the materials submitted for the award of the educational and scientific degree "Doctor" in: field of higher education 5. Technical Sciences, professional field 5.7. Architecture, Civil Engineering and Geodesy, doctoral program "Cartography and GIS" at the Department of Photogrammetry and Cartography.

Author of the dissertation thesis:
M. Eng. Nikoleta [redacted] Nikolova, full-time PhD student at the Department of Photogrammetry and Cartography at the University of Architecture, Civil Engineering and Geodesy

Title of the dissertation thesis: "Analysis of the Symbol System and Content of WEB Maps"

Member of the Scientific Jury: Assoc. Prof. Dr. Eng. Veselina [redacted] Gospodinova, University of Mining and Geology "St. Ivan Rilski" (field of higher education - 5. Technical Sciences, professional field - 5.7. Architecture, Civil Engineering and Geodesy, scientific specialty "General, Higher and Applied Geodesy"), appointed as a member of the Scientific Jury by Order No. 299 / 27.03.2026 issued by the Rector of UACEG.

Brief biographical information about the PhD candidate
M.Sc. Eng. Nikoleta [redacted] Nikolova graduated in the specialty "Geodesy, Cartography and Cadastre" in the full-time form of education during the period 2017–2022 at the University of Architecture, Civil Engineering and Geodesy, Sofia. The topic of her diploma thesis, "Development of Maps and a Symbol System for Spatial Planning of Temporary Camping Sites for Tents, Campers and Caravans", directs our attention to her future research interests related to Cartography, Geoinformation Technologies, Geographic Databases, Geovisualizations, Topology, and Web Design.
From the submitted curriculum vitae, it is evident that the PhD candidate has acquired practical experience in the field of cartography and geographic information systems. The completed short-term mobility under the "Erasmus+" programme in the Czech Republic contributed to improving her qualification, broadening her scientific outlook, and familiarizing her with good international practices and scientific approaches in the respective field.

General description of the submitted publications
The main developments and achievements of the dissertation of M.Sc. Eng. Nikoleta [redacted] Nikolova are presented in five publications published in established specialized scientific editions. Three of them are in English and two in Bulgarian, with two of them published in a journal indexed in a world-renowned scientific database. All articles are the author's independent work. The PhD candidate has also participated in two scientific forums.
The submitted synopsis objectively reflects the structure and content of the dissertation thesis.
I have no joint publications with the candidate, and I am not a related person to her within the meaning of § 1, item 5 of the supplementary provisions of the Academic Staff Development Act in the Republic of Bulgaria.

Citation Record of the Candidate's Scientific Publications
As of April 2026, no citations of the publications related to the dissertation entitled "Analysis of the Symbol System and Content of Web Maps" have been identified.

Relevance of the problem
The topic of the dissertation thesis is relevant and significant from both scientific and applied perspectives. In recent years, web maps have established themselves as a primary means for visualization, analysis, and dissemination of geospatial information. Their widespread application in various fields of science and practice, combined with the dynamic development of web technologies, places increasingly higher demands on the quality, functionality, and effectiveness of cartographic products.
Particularly important in this context are the issues related to the design of cartographic symbols, the use of visual variables, the organization of legends, and navigation elements in web maps. Their proper implementation determines the user's ability to quickly and correctly perceive, interpret, and use the presented spatial information. Inappropriate solutions in the construction of symbol systems may lead to difficulties in the perception of cartographic content and its incorrect interpretation.
The relevance of the dissertation thesis is also determined by the research focused on the analysis of Bulgarian geoportals and the cartographic solutions used in them. In this regard, the study contributes to enriching knowledge regarding the principles for creating effective symbol systems, legends, and navigation elements in web maps and provides practical guidelines for improving the quality of contemporary cartographic products.

Contributions of the dissertation (scientific, scientific-applied, applied)
The contributions presented in the dissertation thesis are clearly formulated and cover the main directions of the research – methodological, experimental, and applied. They reflect a consistent scientific research approach aimed at the analysis and improvement of web cartographic systems.
Methods for evaluating the quality of web maps are presented, as well as a combined approach for studying user behaviour, integrating objective and subjective indicators. Significant contributions are also represented by the experimental studies on visual variables, legend structure, and perception of cartographic information, including through the use of eye-tracking technologies.
Additionally, new or improved classifications and typologies related to web cartography and the analysis of Bulgarian geoportals are proposed, enriching the existing theoretical foundations. On this basis, scientifically substantiated recommendations are formulated for increasing the effectiveness of web maps, also supported by practical implementation through a developed and experimentally tested web cartographic design for an existing Bulgarian GIS platform.
The stated contributions correspond to the achieved results of the work of the M.Sc. Eng. Nikoleta [redacted] Nikolova. I acknowledge the contributions indicated in the dissertation, which have scientific, scientific-applied, and applied character. In my opinion, some of the contributions could be thematically combined, as they describe different aspects of a unified research line (evaluation, analysis, and improvement of web cartographic systems).
In conclusion, the presented contributions are of substantial importance for the development of research and practical applications in the field of web cartography and geographic information systems, reflecting contemporary trends in this area.

Opinions and recommendations

The objectives set in the dissertation thesis have been fulfilled and the main goal of the research has been achieved. The obtained results are presented in a clear and logically consistent manner, and the formulated contributions are well-founded and derive directly from the conducted theoretical, experimental, and applied studies.

Of particular importance is the applied contribution related to the development and experimental validation of a new web cartographic design for an existing Bulgarian GIS platform, which demonstrates higher efficiency and better user interaction compared to the original version.

As a remark, the text contains technical inaccuracies, such as inconsistencies between the abstract and the dissertation regarding the object and subject of the research.

Conclusion

In conclusion, I consider that the dissertation thesis represents a completed scientific study with original scientific, scientific-applied, and applied results that are significant for the development of contemporary cartographic science and practice. The topic of the dissertation thesis is relevant and significant, as it focuses on the evaluation and improvement of web maps and geoportals amid their growing use in science, administration, and public life.

In this regard, I recommend that M.Sc. Eng. Nikoleta [redacted] Nikolova continues her scientific research activity in the field of cartography, geographic information systems, and web cartographic technologies.

Considering the above, I propose that the Scientific Jury award M.Sc. Eng. Nikoleta [redacted] Nikolova holds the educational and scientific degree "Doctor" in the scientific specialty "Cartography and GIS".

11.06.2026 Prepared the opinion: ..... [redacted]

Sofia (Assoc. Prof. Dr. Eng. Veselina Gospodinova)