

REVIEW

Of the doctoral dissertation prepared by M. Arch. Virginia MIELE

„*Ontology-based semantic database for parametric modeling of complex architecture in their enhancement proces. The case of the fortified system along the ancient border between the Kingdom of Two Sicilies and the Papal State, in Italy.*”

**under the guidance of Prof. dr hab. inż. arch. Magdalena Żmudzińska-Nowak
co-guided by Prof. arch. Assunta Pelliccio**

**as a result of the double doctorate agreement between the Silesian University of
Technology and the University of Cassino and Southern Latium**

1. Basis for the review

- 1.1. Commission of the Chairwoman of the Board of the Architecture and Urban Planning Discipline of the Silesian University of Technology, dr hab. inż. arch. Aliny Pancewicz, prof. SUT , for preparation of the review of the doctoral dissertation elaborated by M. Arch. Virginia Miele: letter no RD. AiU 512. 6. 2024 z dnia 16.10.2024 (received 28.10.2024)
- 1.2. Ustawa Prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r., art. 187 (Dz. U. z 2023 r. poz. 742) z późniejszymi zmianami
- 1.3. Doctoral dissertation: Virginia Miele „*Ontology-based semantic database for parametric modeling of complex architecture in their enhancement proces. The case of the fortified system along the ancient border between the Kingdom of Two Sicilies and the Papal State, in Italy.*” (bound double-sided computer printout in A4 format), Silesian University of Technology - University of Cassino and Southern Latium, Gliwice, Cassino 2024 (received 28.10.2024)

2. Assessment of the formal part of the dissertation

Doctoral dissertation elaborated by M. Arch. Virginia Miele entitled „*Ontology-based semantic database for parametric modeling of complex architecture in their enhancement proces. The case of the fortified system along the ancient border between the Kingdom of Two Sicilies*

and the Papal State, in Italy.” is a one-volume illustrated study in the form of a double-sided A4 computer printout with 303 numbered pages. The dissertation was prepared in English and submitted for assessment in the discipline of *architecture and urban planning*. In her research, the doctoral student also skillfully uses the achievements, latest research and publications from other disciplines, which is worth emphasizing.

The formal structure of the doctoral dissertation is correct, introducing certain individual modifications to the generally accepted (though not binding or codified anywhere) scheme, to which all doctoral dissertations in the discipline of architecture and urban planning in Poland approach. The author divided her work into nine parts - chapters numbered with Roman numerals (I-IX), of which the first seven are the substantive part of the doctoral dissertation. They are as follows: I *Introduction – Characteristics of the problematic and subject matter of the work* (pp. 18-44); II *State of knowledge of Italian fortifications* (pp. 46-62); III *General research* (pp. 64-83), after which two very well supplementing appendices were placed: Appendix I is a somewhat achronological tabular list of treatises and codified rules concerning Italian fortresses published from the Middle Ages to the 19th century (pp. 84-85) and Appendix II containing a tabular list of Italian terms concerning fortress architecture together with their explanations in English (pp. 86-95); IV *Ontology-based semantic database procedure for parametric modeling of complex architecture* (pp. 99-134); V. *Detailed studies. Cases of Study* (pp. 136-161); VI. *Cases of Study* (pp. 163-246) and VII. *Conclusions and Recommendations- Discussion and final reflection* (pp. 248-260). Two last parts-chapters : VIII *Bibliography* (pp. 262-297) as well as IX *List of Figures* (pp. 298-303) belong to its necessary editorial setting. The substantive chapters are divided into subchapters of the first and sometimes also of the second degree, numbered with Arabic numerals. It seems that for substantive reasons, in the event of a possible intention to publish, the chapters-parts I and II as well as chapters-parts V and VI should be combined. In terms of the substance, the title of the current chapter II is of course incorrect, because it refers to the state of knowledge concerning both Italian fortifications and contemporary conservation and architectural-archaeological research techniques, which is correctly indicated by the titles of the subchapters.

Between the chapters, there are double-sided, navy blue title pages with white lettering. The graphic editorial setting of the doctoral dissertation, including the layout of the print on the page, the aforementioned dividers, and the fonts used do not raise the slightest objections. The volume begins with three exhaustive information title pages, on which, in addition to the title of the dissertation and the names of the Author and Supervisors, there are also the names and logos of partner universities and detailed information about the double doctorate program held from 2020-2024. Then, there is a three-page table of contents (*Index*), *Scientific Acknowledgments* in which the Author thanks to people and institutions that helped during the

research and development of the dissertation, and the legally required summaries of the dissertation in English and Polish, as well as a motto in Italian, taken from Sandor Marai, illustrated with a reproduction of a 15th-century tarot card depicting a tower by Bonifacio Bembo. In total, there are a dozen or so such unnumbered pages, since part I, titled either: *Introduction – Characteristics of the problematic and subject matter of the work* (in accordance with the table of contents and the title on the first page of the chapter-part), or: *Topic Justification of the theme/ Subject/ Structure of the work* (in accordance with the above-mentioned navy blue title page preceding the chapter), begins on page 18.

This inconsistency in the naming of almost all the main chapters-parts of the assessed doctoral dissertation (with the exception of Chapter VIII - *Bibliography*), between the table of contents and the substantive part of the work (where these titles are identical, although sometimes they seem inappropriate), and the decorative title pages is probably a deliberate action. It seems that it was supposed to introduce variety and short information about the content of the chapters. However, in the reviewer's opinion, this intention did not succeed and, by introducing unnecessary information chaos into the scientific work, it remains one of many editorial shortcomings of the assessed dissertation. They testify to the Author's carelessness during the final stage of developing and presenting the research results. They require explanation during the defense. These also include quite a few typos (which are understandable and often found in doctoral theses), too small illustrations in the descriptive parts of the thesis, most of which border on illegibility (e.g. on pages 121, 137, 147, 150, 181, 214, 215, but not only). This note does not apply to the boards of examples included in chapter VI. Some illustrations, including the author's sketches concerning the selected five examples of fortresses examined in detail and their drone photos beginning each of the descriptions in chapter VI, although legible, do not have any numbering at all, and in one case, the description was additionally mistaken (the caption under the view - drone photo - of the fortress in Gaeta on page 229 is incorrect - the author copied there the caption from page 163 concerning the fortress of San Casto in Sora). Sometimes in the text the Author refers to non-existent illustrations or confuses their numbers (e.g. pp. 230-231).

The most difficult task for the PhD candidate, which she could not handle editorially, turned out to be the development of a bibliography. In the dissertation, apart from Chapter VIII *Bibliography*, divided into 2 parts: items on historical fortifications and contemporary conservation techniques and research, there are also fragmentary bibliographic lists (*References*) after most subchapters. Unfortunately, not all items from these lists (and from footnotes in individual chapters) can be found in the "collective" by definition Chapter VIII (e.g. Arnheim, 2020 cited on p. 119 and many others). The bibliography in Chapter VIII is not numbered, which makes it difficult to browse, while in the subchapters this numbering has been introduced. In addition, the vast

majority of non-Italian language items are inserted into Chapter VIII of the Bibliography several times, which is at least intriguing (e.g. Mallet M.E., Hale J.R. (1984) – 3 times on page 271; Pierce D. (2015) - 2 times on page 272; Pollak M. (1991) – 2 times on page 273; or e.g. Wickham C. (2015) – 2 times on page 275 and many others). The doctoral student also sometimes seems to care whether the bibliographic item begins with the surname, first name or initial of the author or editor. The way of citing the bibliographic item authored by the Supervisors and their team on page 283 is curious here : „Magdalena, Z., Pelliccio, A., Saccucci, M., & Karolina, C. (2020). Phenomenon of augmented space-physical and virtual space analysis of wall paintings: st. Francis Xavier Jesuit church in Piotrków Trybunalski, Poland. In *L'architettura dipinta: storia, conservazione e rappresentazione digitale* (pp. 387-398)”. Unfortunately, this does not indicate that the PhD student has mastered the scientific craft well. The reviewer, however, places the blame on the editing of the volume of the dissertation, for which, due to the lack of a publishing house processing the doctoral dissertation, the Author is unfortunately still responsible.

Despite the fact that the work was constructed in accordance with good practice in doctoral dissertations, the editorial errors mentioned above had an impact on its formal reception. The doctoral student correctly and efficiently uses the scientific workshop (using footnotes, references to the literature of the subject and source materials), and the language of the work is mostly understandable to a wide range of recipients, despite a number of specialist terms from several disciplines, which is an advantage of the work. The reviewer is convinced that these, quite serious in his opinion, editorial imperfections should be eliminated in the future during professional editing of the dissertation in a scientific publishing house before its possible publication. I hereby state that, in formal terms, the doctoral dissertation of Ms. Arch. Virginia Miele meets the criteria set for such studies in the discipline of *architecture and urban planning* in Poland to a sufficient extent to allow its Author to defend it.

3. Assessment of the substantive part of the dissertation

The evaluated doctoral dissertation of M. Arch. Virginia Miele entitled : „*Ontology-based semantic database for parametric modeling of complex architecture in their enhancement proces. The case of the fortified system along the ancient border between the Kingdom of Two Sicilies and the Papal State, in Italy*” is another doctoral dissertation developed under a double doctoral agreement between the Silesian University of Technology and the University of Southern Latium, devoted to the issue of research on historical castles and fortifications. As the PhD candidate notes, the topic of former border castles and fortresses in southern Latium is poorly developed in scientific work, which means that it fits into the research gap, both in Italy and in Poland. One of the reasons for this small amount of contemporary research is certainly

the difficult location of the studied structures. Modern research methods, using drones, scanners and the latest computer software, applied to the research by the PhD candidate, allow this situation to be changed. In addition to empirical research, the Author also used a number of methods related to traditional office research, including literature and archival research.

The full methodology of the work, which should be highly assessed, has been presented on the work sheets, especially in its first part (chapter I. 5), both in descriptive form and in the form of clear diagrams. In the same part, M. Arch. Virginia Miele formulates the subject and purpose of the work, the hypothesis and asks research questions. The reviewer does not make any comments on these elements of the dissertation.

The state of research has been unnecessarily separated as another chapter II, while in doctoral theses it is usually an integral part of the introduction to the subject. In her research, the doctoral candidate focuses on the fortress architecture of southern Latium, which currently includes about 60 objects in various degrees of preservation. Therefore, the interdisciplinary literature on the subject referred to in chapter II concerns two issues: Italian castles and fortresses and contemporary research techniques and methods in the history of architecture and conservation. It seems that the first part lacks a broader, European perspective, which was possible, if only because the doctoral dissertation was carried out in an "international mode", simultaneously at universities in Italy and Poland. It is a pity that the fortresses and castles discussed in detail in parts V and VI were not presented against the background of similar European objects, especially since in the Kingdom of the Two Sicilies Spanish and French influences were very strong, and several centuries earlier – the Norman influences.

However, the vast majority of the studies cited in the state of research (chapter II), in *References* under individual subchapters and in *Bibliography* (chapter VIII) are works in Italian or authored by Italian scholars. Works by Polish authors or concerning castles and fortresses in Poland or countries other than Italy appear marginally. And that is a pity, because the Italian art of building fortresses and castles had a very large influence on buildings also on the northern side of the Carpathians, especially during the Renaissance and later. The Author's familiarization with the works by B. Guerquin, J. Zachwatowicz, J. Salm, M. Chorowska, O. Czerner, A. Kadłuczka, G. Bukal, K. Stala, D. Przygodzki, K. Wielgus, J. Janczykowski or J. Sroczyńska would have allowed the PhD candidate to add interesting references and threads, especially to Chapter III, but also to the issues of contemporary techniques of digitizing the heritage of defense architecture. The reviewer regrets that the PhD candidate did not use this opportunity. The lack of reference in the bibliography to Magdalena Wałek's doctoral dissertation defended in 2024, entitled.: „*Cultural Landscape of the jurassic belt of defensive architecture- a digital model of representation in the process of heritage conservation and popularisation*” prepared as part of the same double doctoral program under the supervision of the same Supervisors is

particular surprising. Both works use similar research methods and techniques and are complementary to each other in many places.

As a result, on the 303 pages of the dissertation, many pieces of information and issues are repeated in subsequent chapters, which undoubtedly serves to increase its volume, but not necessarily to enrich its substance. This is the case, for example, with the discussed region of southern Latium, and especially its geographical features and historical and political significance. This information is repeated with varying intensity in chapters I, III, V and VI. The combination of chapters V and VI suggested by the reviewer would certainly eliminate some of the repetitions. At the same time, the entire dissertation lacks a larger map (or even several historical maps) of the entire Apennine Peninsula, which would show the political and defensive significance of the discussed fragment of the border over the centuries. As the PhD candidate repeatedly points out in the text of the dissertation, with which the reviewer agrees, the history of Italy is fascinating and full of wars and political conflicts unknown to a wider group of foreign readers (note - the dissertation is a Polish-Italian doctoral dissertation, which the Author seems to forget all too often). It seems, therefore, that it should also be enriched with wider and more legible maps and diagrams. Those included in the work (too small and illegible - see above) usually cover only a fragment of southern Latium, or even individual mountain valleys with a few fortresses. They are necessary due to the narrative conducted in the work, but certainly not sufficient to bring closer the discussed historical problems.

The main objective of the doctoral dissertation, as the Author herself repeatedly points out, (and its basic innovative element in comparison to similar studies - reviewer's note) seems to be the creation of a procedure based on a semantic database, called FORTdigiTALE, which integrates various forms and data sets into one parametric model. These data are obtained using both traditional research methods (e.g. literature, iconographic and archival research), as well as modern techniques, programs and tools that are part of contemporary methods of historical-conservation and archaeological research (e.g. GIS, BIM, SfM, use of drones or georadars). It is a pity that the dissertation, apart from detailed and exhaustive descriptions of research methods and the effects of their application for five cases of fortresses in southern Lazio, selected on the basis of well-formulated criteria, does not include links or QR codes enabling closer familiarization with the database being created. The boards concerning individual cases in Chapter VI, which are partly "screenshots" of a computer, show that the databases for individual objects seem to be broader than presented in the printed form of the dissertation. After all, they encompass both geographical and landscape relations, through the state of preservation of the object's form, to the state of preservation of architectural details and

masonry threads. And all this is supplemented with iconography, written historical sources and contemporary scientific research.

In Chapter V, the author attempts to construct a typology of about 60 fortresses and castles found in the region of southern Latium, dividing them into 8 types, of which 3 (C, E, G) seem quite similar to each other. Ultimately, she states that each of the objects, due to repeated destruction (whether as a result of warfare or earthquakes very frequent in the region) and reconstruction over the centuries, is highly individualized. However, it is possible to find certain common features for individual types and historical periods. This very valuable study, which was created somewhat "on the sidelines" of the mainstream research presented in the dissertation, is certainly an interesting and innovative attempt to introduce elements of new knowledge to the discipline of *architecture and urban planning* in Europe.

In the last substantive part of the dissertation (chapter VII), based on the scientific argument presented in the work and the described application experiments, the PhD candidate answers the research questions posed at the beginning of the book, proves the thesis and demonstrates the realization of the work's objectives, which she additionally demonstrated many times on the previous pages of the dissertation. This part lacks elements summarizing the research that would not repeat information that the Author has already provided many times on the pages of the dissertation. As a result, the conclusions, formulated correctly and to which the reviewer raises no objections, sound too unconvincing. While the great contribution of the dissertation to the discipline of *architecture and urban planning* is precisely the proposed method of creating semantic databases, discussed in detail in chapter IV and successfully applied in the author's research presented in chapters V and VI (which, as noted earlier in the review, should be integrated in order to facilitate the reception of their narrative). Another contribution is the application of ontological analysis in the study of fortifications – especially those that are difficult to access, have significant losses and transformations in relation to their original form, or those for which little direct historical data has been preserved, and we know them primarily from descriptions and accounts that indirectly concern their architectural form or the art of war.

4. Remarks

The reviewer's comments on the assessed doctoral dissertation were included in the previous parts of the review. A large part of them is more of an organizing and editorial nature than a polemic one. As for the comments of a substantive nature, they have also been specified above. The most important of them include:

- lack of a broader European background that should be included in an "international" doctoral thesis developed at two universities (otherwise it could have been developed solely in Italy).

- Too small illustrations - especially maps, as well as the failure to show the discussed fragment of the Lazio region on contemporary, and especially historical, maps in a broader geopolitical context.
- lack of access to the interactive database created by the PhD candidate (as part of the research method presented in the thesis) – at least for five selected cases of fortresses (Sora, Gaeta, Roca Janula, Alvito, Viclavi). In its current form, the reviewer (and other readers) only have selected case cards (boards) printed in the thesis, enriched with a description. While looking through them, it is clear that much more data has been collected. A link or QR codes would be needed (as was the case in M. Walek's doctoral thesis on Polish castles and fortresses). Presenting a selection of printouts contradicts the modernity and innovation of the adopted research method.
- too general nature of the final conclusions, only repeating statements that were repeatedly announced in the thesis in subsequent chapters and subchapters.

5. Summary and conclusion

The reviewer positively evaluates most of the substantive and some of the structural aspects of the doctoral dissertation. The doctoral student has achieved the research and application goals in the dissertation. She also provided satisfactory answers to the research questions. The adopted methodology of the scientific work is correct and has some innovative features (above all, adding a broad narrative element to the HBIM model). The comments submitted in the review may prove helpful in the event of a potential publication of the work as a scientific monograph.

In conclusion, the reviewer would like to emphasize that the doctoral student has mastered the scientific workshop in a way sufficient for this stage of career development and has demonstrated general theoretical knowledge in the scientific discipline of *architecture and urban planning*. The subject of the work is current, and there is still little research and experimentation related to modern methods of presenting and documenting historical heritage, especially Italian castles, fortresses and fortifications, in Polish literature of the subject. By choosing a topic in central Italy, the doctoral student filled a research gap, broadening the scope of knowledge in the scientific discipline of *architecture and urban planning* in Poland and Europe.

The reviewer hereby certifies that Ms. Virginia Miele, M. Arch., has sufficiently fulfilled the substantive criteria and requirements resulting from Article 187 of the Law on Higher Education and Science of 20 July 2018, (Journal of Laws of 2023, item 742) with subsequent additions, presenting her doctoral dissertation entitled: „*Ontology-based semantic database for parametric modeling of complex architecture in their enhancement proces. The case of the fortified system along the ancient border between the*

Kingdom of Two Sicilies and the Papal State, in Italy. ". Thus, he requests the Chairwoman of the Council of the Discipline Architecture and Urban Planning at the Silesian University of Technology to continue the procedure, accept the dissertation and admit M. Arch. Virginia Miele to the public presentation of her dissertation.

Prof. dr hab.inż.arch. Mateusz Gyurkovich



Kraków, 28th December.2024