

**Reviewer's opinion
on Ph.D. dissertation authored by**

Dawid Wiśniewski

entitled:

Automating Competency Questions Handling in Ontology Development Processes

1. Problem and its impact

The dissertation deals with the problem of trying to understand the role of ontological requirements in ontology development. The problem is very relevant, since ontological requirements are usually not considered by ontology practitioners mainly due to the lack of research on their different aspects: e.g., how do persons produce them, how can they be formalised, how they can be linked with other artefacts in the development process, etc. Such research problem entails both a scientific perspective and a technological (and practical) one, and the thesis correctly covers both aspects.

2. Contribution

The main goal of the dissertation is automated competency question (i.e., ontology requirement) handling in ontology development processes. In such scope, the dissertation includes different contributions:

- The CQ2SPARQLOWL dataset, that includes 5 ontologies, their competency questions and the translation of such competency questions into SPARQL-OWL in order to support testing.
- Two methods for the automatic extraction of terms from competency questions to build term glossaries (one based in machine learning and another based on natural language processing).
- A method for the automatic construction of competency questions related to SPARQL-OWL queries, along with another synthetic dataset of competency questions based on such method (BigQC).
- A method for recommending SPARQL-OWL queries for competency questions, based in a set of templates, to support testing the competency questions.
- An update of a Test-Driven Development workflow for ontologies that includes presupposition testing.

The number of contributions is high and their quality is supported by the different publications that have been produced for each of them. In my opinion, the main contributions are those related to the methods followed for generating the two competency question datasets and the datasets themselves. Right now there is a lack of competency question datasets that is hindering research not only related to ontological requirements but also to other aspects such as knowledge acquisition or conceptualization. The availability of the datasets produced because of this thesis will clearly support future research in the area.



3. Correctness

The different contributions of the thesis have been properly evaluated. Both the definition of the experiments and the conclusions achieved from them are sound and correct. It is also remarkable that all the artefacts related to the different contributions (datasets, software implementations, evaluation materials, etc.) are openly available.

4. Knowledge of the candidate

The candidate has a very good knowledge of the discipline of Information and Communication Technology and, as presented from chapter 2 to chapter 5, not only in general but also applied to quite specific topics such as semantic web, machine learning, natural language processing, and ontological engineering. The quality of those chapters is very high (for example, the dissertation contains the best historical context of the term ontology I have read, and my main research is in this topic), they are complete, and the list of references shows the good knowledge that the candidate has of the current state of the art in the different topics.

5. Other remarks¹

The dissertation is very well written and is pleasant to read. It presents a lot of good work and covers different aspects of the research problem delving into different research disciplines (e.g., from machine learning to natural language processing) when candidates usually limit their scope to a single discipline.

6. Conclusion

Taking into account what I have presented above, and the requirements imposed by Article 187 of the *Act of 20 July 2018 - The Law on Higher Education and Science (with amendments)*², my evaluation of the dissertation according to the three basic criteria is the following:

A. Does the dissertation present an original solution to a scientific problem? (the selected option is marked with **X**)

Definitely YES

Rather yes

Hard to say

Rather no

Definitely NO

B. After reading the dissertation, would you agree that the candidate has general theoretical knowledge and understanding of the discipline of **Information and Communication Technology**, and particularly the area of **ontological engineering**?

Definitely YES

Rather yes

Hard to say

Rather no

Definitely NO

C. Does the dissertation support the claim that the candidate is able to conduct scientific work?

Definitely YES

Rather yes

Hard to say

Rather no

Definitely NO

¹ Optional

² <http://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20190000276>



Moreover, taking into account my comments above, I **recommend to distinguish** the dissertation for its quality³.


RAÚL GARCÍA CASTRO
Signature

4-04-2022

³ Obviously, this sentence is optional.