

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** YAROSLAV MENSHENIN

**PhD Program:** ENGINEERING SYSTEMS

**Title of Thesis:** MODEL-BASED FRAMEWORK FOR SYSTEM CONCEPT


**Supervisor:** Professor Edward Crawley

**Co-advisor:**

**Chair of PhD defense Jury:**                      **Email:**

**Date of Thesis Defense:**

**Name of the Reviewer:** Prof. Dov Dori

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p><b>Signature:</b></p> <p></p> <p><b>Date: DD-MM-YYYY</b></p>
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*The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.*

*If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.*

### Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

- **Brief evaluation of the thesis quality and overall structure of the dissertation**

The thesis is of very high quality, well written and interesting to read. It has a good structure based on Chakarbarti's DRM. Chapters 1 and 2 are the Research Clarification stage. Chapter 2 is a good overview of the concept in literature, discussing related theories. Chapter 3 proposes the model-based system concept representation framework. It provides the theoretical rationale demonstrated on two alternatives of the aircraft concepts. In Chapter 4 the proposed methodology is validated by surveys of patents, urban architectural patterns, and software patterns. Chapter 5 presents the model-based concept for suborbital human spaceflight systems and Chapter 6 – for space communications systems. Conclusions and summary are in Chapter 7.

- **The relevance of the topic of dissertation work to its actual content**

The content of the research is highly relevant to the topic – concept in systems engineering.

- **The relevance of the methods used in the dissertation**

The dissertation uses a variety of very relevant research methods, including conceptual modeling and comparing multiple examples with OPM and SysML, and use of DSM. It uses surveys of patents, urban architectural patterns, and software patterns.

- **The scientific significance of the results obtained and their compliance with the international level and current state of the art**

The results are very significant and contribute to the body of knowledge on concept generation as a key part of the systems engineering process. The framework developed in the research enables a systems engineer to measure conceptual similarities between alternative concepts and can be reused during the architecture stage.

- **The relevance of the obtained results to applications (if applicable)**

The results can be applied in conceptual modeling frameworks and tools such as OPCloud, guiding systems engineers in the early, most fuzzy and least structured stages.

- **The quality of publications**

Nine publications - seven in excellent conference venues and two in journals is very impressive!

**Provisional Recommendation**

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

*The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*