REVIEWER'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Smart web components for System-Theoretic Process Analysis**
Author's name:	**Artur Useinov**
Type of thesis:	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Science
Thesis reviewer:	doc. Ing. Andrej Lališ, Ph.D.
Reviewer's department:	Department of Air Transport, Faculty of Transportation Sciences (FTS)

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**ordinarily challenging**

Evaluation of thesis difficulty of assignment.

The thesis assignment aims at developing web components for the System Theoretic Process Analysis (STPA), which is a novel safety engineering method used to analyze hazards in high-risk industries. The work follows previous research, namely the STAMP ontology and the development of STAMP-based Investigation Tool by the CTU in Prague, requiring application of semantic web technologies. Given the assignment and the previous results available, I find it ordinarily challenging for a bachelor's thesis.

Satisfaction of assignment	**fulfilled with minor objections**

Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.

Overall, the thesis assignment has been satisfied, although I am concerned about the degree of meeting the last point, i.e. user testing on at least 3 people. The author is mentioning domain expert consultations in his work, but the thesis does not discuss any testing with other people.

Method of conception	**correct**

Assess that student has chosen correct approach or solution methods.

In general, the thesis conception is correct, the author analyzed the current state, collected requirements, designed the web component, implemented and tested it. In details, however, I am concerned about some important arguments. It is unclear how the author elicited requirements for the tool. In section 2 he mentions requirements, but never specifies where these came from. Tool comparison in the same section is done with different criteria, with unclear link. Section 3 mentions requirements again, for graph libraries, but with no specification what they are and how they were proposed. Section 4 seems based on interviews with domain users, generating another set of requirements. It appears methodologically unsound to have the domain expert elicitation done at the end of the process and avoiding clear links between all the requirements in the thesis. Next, I did not understand how and why the author selected the four STPA-based tools, while there are at least 5 more available. I also did not understand why there couldn't be tested 3 graph libraries, but only 2. Lastly, the evaluation is presented only very briefly. The author reconstructs one STPA analysis, discussing very little about how the tool performed. From Fig. 6.2 if follows that not everything went ideal, e.g. there is process model element depicted probably as a controller, but the tool was not designed to model process models at all.

Technical level	**D - satisfactory.**

Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.

Overall, the technical level is satisfactory, the author uses knowledge gained by study and expert literature, so as sources and data gained by experience. However, the missing arguments make it hard to confirm the author is familiar with all the knowledge needed. Apart from that, the thesis makes no link to the STAMP ontology that it should be based on. There are several terminological mistakes, e.g. confusing safety and security, hazard and risk analysis, control-feedback and feed-forward, claiming that STPA is used by most universities and industrial companies, which is not true, etc. Definition of

unsafe control action in section 1.4.5 is no definition. Some sentences use inadequate terminology, e.g. "More over, CSS allows … other incredible features." where the "incredible" features are never explained.

Formal and language level, scope of thesis	E - sufficient.

Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.

The thesis in general has logical structure and the overall typesetting is well done. However, in details there are numerous issues. The author is frequently discussing the results before they are explained or requirements for them specified, e.g. in the introduction, interrupting logical flow of ideas about them. There are major mistakes in English and numerous typos, some of them prevent understanding sentences (e.g."Which is easily integrates into engineering analysis causal factors, it can be human factors, software, technology, and others."). There are unclear references to requirements in section 4.5. (e.g. requirement 1 or 2 – never specified in the thesis). All references to figures mismatch with their numbering in sections 1 and 2. Many cross-references are just directly put into the text (e.g. "we implemented navigation bars section 5.1 and located them in a way"), some are not functional (e.g. question marks on p. 33). Table in section 2.2.5 has no number or caption, although it is the only content of that section, similarly table in section 3.1.5. Figures are often low quality, Figs. 2.2. and 2.3. are not readable at all. There are abbreviations unexplained, e.g. "CFG". Finally, the author uses plural voice, some sentences make an impression that the work was done in a team rather than by himself (e.g. "We had few problems connecting this library to React…"). Step 2 of installation guide at the end is an example of formatting problems in the thesis.

Selection of sources, citation correctness	B - very good.

Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.

Selection of sources and citation correctness is overall good. I just could not understand why ref. 17-20 are included both as footnotes and listed in the bibliography. In the Bibliography, ref. 11 is ResearchGate, that should be avoided. Ref. 1 and 2 have the same author, but ref. 2 has some apparent formatting issue/typos.

Additional commentary and evaluation

Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

The presented thesis deals with highly relevant issue of using modern, experimental safety engineering methods, such as those based on STAMP accident causality model. The presented web components certainly have potential to be used by domain experts, the author made important steps towards achieving usable solution in practice. The work can be followed and incorporated into the safety engineering.

On the other hand, in the thesis I am missing arguments for many choices the author makes, so as clear track of requirements. For example, I could not understand why functional requirement (4) about persistence of layout was classified as "won't have". The author claims that creating the control structure diagram is not a long process

thus the user needs not to save or reopen. But it frequently is a lengthy process. The whole STPA analysis is done iteratively, domain experts need to return to the diagram and update. Another issue is that the application seems to be evaluated only very briefly, with no domain expert testing. Lastly, I am missing some link to the STAMP ontology, that was declared in the thesis assignment.

Overall, I have an impression that the work was done „last minute", and the author did not even have time to check the numerous formal mistakes. As a result, the thesis reads hard and it is not very easy to follow author's ideas.

Questions for the defense:
1. How was the web component evaluation done? How did the tool performed?
2. Looking at the web component output in Fig. 6.2, I find it a bit messy (compared to the original diagrams in STPA handbook) that the relationships overlap with their labels. How could this be improved in the future? How did you model the "process model" in this figure?
3. In section 3.2.1 you say that Draw2d has an issue of documentation, where code examples are only in JavaScript. Why is this issue in your thesis?

I evaluate handed thesis with classification grade **D - satisfactory.**

Date: **31.5.2021**   Signature: