FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

Supervisor's statement of a final thesis

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Thesis title:	The evolvability of technologies with the help of robotic process automation (RPA) tools.
Branch of the study:	Software Engineering

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Evaluation criterion:	*The evaluation scale: 1 to 4.*
1. Fulfilment of the assignment	***1 = assignment fulfilled,*** *2 = assignment fulfilled with minor objections,* *3 = assignment fulfilled with major objections,* *4 = assignment not fulfilled*

Criteria description:
Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

Comments:

The submitted FT defines the objectives sufficiently and is in line with the assignment. The goal of this thesis was to investigate the so-called Robotic Process Automation (RPA) that nowadays resonates in industry and that is often emphasized by renowned consulting firms. However, RPA is quite a new technology. It is unclear what role it plays in the context of traditional BPM and whether it may contribute to another technological innovation. Out of the scope of this thesis, the student integrated the prototype with a commercially developed financial system Corima and demonstrated the integration with a neural network, Rossum.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
2. Main written part	*80 (B)*

Criteria description:
Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies? Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 26/2017, Art. 3. Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

Comments:

The thesis is very-well structured, it clearly revisits the goals and evaluates them independently. I highly appreciate the Stated of the Art chapter that is very detailed. The student refers to numerous reports from KPMG, Capgemini, Deloitte, and others, and clearly explains where RPA sits in the area of BPM. The extent of the thesis is appropriate to its topic, the formal notation is correct, the citation ethics are followed, it only contains certain marginal, yet reoccurring, grammatical errors.

My only remark is regarding the term "evolvability" in the title of this thesis. After reading the entire text, one can understand the idea that the evolvability can be improved by creating technologically-dependent RPA agents, integrating them with BPMS, and step-by-step replacing these RPA agents with technologically-independent BPMN activities. However, this idea should be more clearly communicated, so that it will not confuse the reader that the thesis is about inspecting RPA in terms of theories like Normalized Systems that focus on evolvability in terms of combinatorial effects, bunded and unbounded impacts, NS axioms, etc. On the other hand, this evolvability is only present in the title of the thesis and not in the described assignment, therefore, I only consider this to be a marginal shortcoming.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
3. Non-written part, attachments	*80 (B)*

Criteria description:
Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Comments:

The goal of the non-written part was to create a prototype of integration between RPA and BPM. The student introduced a case-study in the area of Finance. She showed how RPA can automate the workflow of an invoice extraction and its confirmation with the help of the neutral network, Rossum, and how all user interaction in this workflow can be handled by BPMS. Although the workflow is rather simple, the student really picked something that is highly demanded on the market and still many big accounting programs do not fully implement it. The student demonstrated the automation using two different RPAs, UIPath and MS Power Automate, and managed to integrate it with Russum and corima.BPM. Even though many edge-cases are not solved in this prototype, and only the "happy path" is implemented, the main challenge was to inspect all the involved systems, conceptually and technically, and to propose their meaningful integration. Although the attached source code is rather decent, it is given by the fact that the focus of the work was on the analysis and integration instead of on the green-field SW development. I appreciate that the student implemented the case-study using even two different RPAs, explained how testing of RPAs can work and demonstrated the complex integration on an attached video.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
4. Evaluation of results, publication outputs and awards	*90 (A)*

Criteria description:
Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Comments:

In the current times, many organisations are trying to automate and optimize their administrative processes and reoccurring tedious work. RPA seems to be a promising way to tackle some of these challenges. However, many renewed consulting firms recommend using it without showing the big picture of where RPA sits in the enterprise infrastructure and in-between the current technologies. This thesis provides a very elaborated review of these consulting reports, existing RPA technologies, and their compatibility with existing BPMS. So, this review may be one of the valuable takeaways from this thesis. Moreover, the presented prototype can be certainly further improved and commercialized.

Evaluation criterion:	*The evaluation scale: 1 to 5.*
5. Activity and self-reliance of the student	*5a:* ***1 = excellent activity,*** *2 = very good activity,* *3 = average activity,* *4 = weaker, but still sufficient activity,* *5 = insufficient activity* *5b:* ***1 = excellent self-reliance,*** *2 = very good self-reliance,* *3 = average self-reliance,* *4 = weaker, but still sufficient self-reliance,* *5 = insufficient self-reliance.*

Criteria description:
From your experience with the course of the work on the thesis and its outcome, review the student's activity while working on the thesis, his/her punctuality when meeting the deadlines and whether he/she consulted you as he/she went along and also, whether he/she was well prepared for these consultations (5a). Assess the student's ability to develop independent creative work (5b).

Comments:

The student was very active and independent. On the other hand, she organized her whole work into tasks and planned them in two-weeks sprints. After each sprint, she demonstrated the results and outlined her next steps. I do really appreciate the choice of this agile processing of diploma thesis since, in this kind of project with that amount of uncertainty and open-questions, the student was able to pivot her next steps very efficiently.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
6. The overall evaluation	*90 (A)*

Criteria description:
Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.

Comments:

The work evaluates quite a new area of RPA in the context of BPM. Overall, the student had to gain quite some conceptual overview regarding RPA and BPM, she had to learn new technologies, UIPath and MS Power Automate, and she had to investigate their integration to existing solutions like Rossum and Corima.BPM. Therefore, she proved her engineering skills to analyse, propose, and implement a solution with the technologies she had not been familiar with. I am very positive about this work as it deals with something very new, often emphasized by consulting firms, and still something to investigate deeper. Despite my only remark regarding the possible confusion with "evolvability", I consider this to be a very good start for future research & development in the area of RPA and BPM.

Signature of the supervisor: