

## Habilitation thesis reviewer's report

<b>Masaryk University</b>	
<b>Faculty</b>	Faculty of Informatics
<b>Field of study</b>	Informatics
<b>Applicant</b>	RNDr. David Svoboda, Ph.D.
<b>Unit</b>	Faculty of Informatics
<b>Habilitation thesis (title)</b>	Virtual Cell Imaging (methods and techniques)
<b>Reviewer</b>	Prof Olli Yli-Harja, PhD
<b>Unit</b>	Tampere University of Technology, Finland

### Reviewer's report

Dr Svoboda's Habilitation thesis concerns virtual cell imaging. The topic touches method development for image processing and analysis. In his Dr Svoboda covers a large area of biological imaging, e.g. cell cultures and tissue, and imaging modalities, such as 3D imaging.

The thesis is written in excellent English and I find it scientifically sound. It has important applications in development of automated image analysis in the new frontier of high-throughput imaging. In the future, I expect Dr Svoboda's line of research to make important contributions to larger scale simulation efforts in biomedicine, e.g. virtual organs.

### Reviewer's questions for the habilitation thesis defence

I have some questions as follows, to which I myself don't have an answer, and to which I would like to get the Dr Svoboda's opinion:

Considering method development for image analysis based on virtual image material, e.g. a cell counting algorithm, the quality of the virtual images is obviously assessed by observing the success of the tested method. Is there a possibility that this approach could lead to unanticipated and wrong results? In this assessment, how important is the visual similarity between real and virtual images? Can details that escape visual inspection be decisive in automated analysis? Can they lead to better results, or can they be completely misleading? If we consider visual similarity as a form of normalization, could there be a broader, more formal class of normalization that might make the concept clearer?

### Conclusion

The habilitation thesis submitted by David Svoboda entitled "Virtual Cell Imaging (methods and techniques)" *meets* the requirements applicable to habilitation theses in the field of Informatics.

In Tampere on 28.8.2017

