

## ***Annex 6: Habilitation thesis reader's report***

Applicant: Dr. Jiří Barnat, Ph.D.

Reader: Dr. Gerard J. Holzmann

### ***Report***

I have read Dr. Barnat's habilitation's thesis and evaluated the work that is reported.

There are two main parts to the thesis. The first part, pages 1-18, provide an overview and introduction to the work that is reported on (p. 1-12), and outlines the main contributions made (p. 13-18). It is followed by a biography (p. 19-30). The second part of the thesis, covering pages 31-244, contains reprints of a total of 19 research papers authored or co-authored by Dr. Barnat since the completion of his PhD work in 2004.

One obstacle in this evaluation is that the majority of the papers included have appeared in conference proceedings only and not in archival journals, which generally follow a more thorough and reliable peer review process. Only two of the papers have appeared in traditional journals [12],[27]. The best way to evaluate or demonstrate the quality of a research contribution in an academic environment is to show that it can pass the more rigorous peer review process of an archival journal. Without this measure it becomes more difficult to do a thorough evaluation of the published work. Within the context of this evaluation it is not possible to perform a journal-standard review of each paper that is included in the habilitation's thesis.

Among the conferences where Dr. Barnat's work has appeared, CAV and TACAS are generally recognized as among the leading conferences in this domain (as evidenced by their acceptance rates). Two of Dr. Barnat's papers have been accepted at CAV conferences (one as a tool paper), and one at a TACAS conference.

All of Dr. Barnat's papers list co-authors, which is a positive characteristic of the work (providing the desirable characteristic of team work), but this also makes it a little harder for an outside evaluator to determine what the research contribution of the different authors to each paper was. Fortunately, Dr. Barnat's contributions do become evident from the totality of the published work – providing the one constant in the overall research direction and approach to the problem domain.

Dr. Barnat's research has been focused on a key current problem in the application of logic model checking techniques: the problem of scaling the search to multiple computers and/or multiple cores on a single computer. By scaling the search it can become possible to either tackle larger problem sizes, or to tackle the same problems as before in significantly reduced time. Barnat is one of only a fairly small number of researchers in this domain who can be credited with a consistent pattern of improvements, which is reflected in his contributions to one of the leading research systems for distributed model checking: the DiVine suite of tools. Many of Dr. Barnat's papers focus on the central problems in this domain, with in almost all cases theoretical insights carefully verified by empirical evidence. He and his

colleagues have developed and investigated the properties of a range of interesting new algorithms and data structures, especially for the verification of liveness properties – a class that is traditionally the most complex to handle efficiently. Each algorithm is explained clearly, and its relative performance documented carefully – in the process setting an example to other researchers. The DiVine group, with Dr. Barnat as a main driving force, is currently one of the most productive research groups in this domain.

As a peer researcher I can argue with Dr. Barnat on some of the details of the work performed or of metrics collection, but none of this takes away from my overall impression of the quality of this work, and the research directions taken, which can only be positive.

I consider Dr. Barnat to be a leading researcher in the area of software verification and distributed logic model checking techniques, and greatly value his consistent contributions to this field over the last decade. I therefore consider Dr. Barnat to have more than proven his qualifications for habilitation. In my professional opinion Dr. Jiří Barnat is richly deserving of this distinction.

### **Conclusion**

In my opinion, Dr. Jiří Barnat's habilitation thesis of "Platform-Dependent Verification" meets the standard requirements for a habilitation thesis in the field of Informatics.

A handwritten signature in black ink, reading "Gerard J. Holzmann". The signature is written in a cursive style with a long horizontal stroke at the end.

Dr. Gerard J. Holzmann  
Arcadia, January 30, 2011