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School of Computer Science
Professor Simon Dobson BSc MA DPhil CEng FBCS

3 March 2015

Dear sir,

Re: Danilo Pianini

I have had the opportunity to exam the thesis titled "Engineering complex computational ecosystems" and submitted by the above-named candidate for the degree of PhD.

The thesis addresses a question of pressing current importance: what techniques best support developers when creating open, scaleable software for modern computing infrastructures? The challenges posed by these systems differ from those we have encountered in the past, and require significant advances – both in terms of theoretical understanding and practical engineering frameworks – in order that we may continue to make the gains in performance and usability needed by the next generation of software systems.

The candidate makes a number of scientific contributions. He thoroughly reviews the state-of-the-art in his chosen area, with particular emphasis on biologically- and chemically-inspired models of computation. He then develops a number of languages that can express problems in his chosen domain using these metaphors, and evaluates them both in simulation (using a simulator of his own devising), in practice (on a computational testbed developed as part of an EU project in which he was a key member), and in theory (in terms of the systems' properties and limitations). Both the mathematical and practical aspects of the thesis have been conducted to the highest scientific standards and demonstrate a number of novel insights and techniques that, taken together, form a valuable contribution to our understanding of this style of language.

The candidate's thesis is supported by an exceptional number of publications that indicate that his work has received significant review from his scientific peers. I would also like to note that much of this work was conducted as part of international collaborations with colleagues in Europe (including myself) and the US. This both strengthens the work and demonstrates the candidate's integration into the wider international scientific community.

The thesis is extremely readable, and I have made some minor suggestions to the candidate that will, I believe, improve its presentation. These are mainly typographical and stylistic in nature rather than relating to the substance of the research being

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presented. The candidate has clearly taken pains to present his work in a clear fashion: he has equally clearly received excellent supervision over the course of his research, which is a credit to his supervisory team.

In conclusion, I believe this is an excellent thesis making a significant contribution to knowledge. I am satisfied that it meets the criteria set down in your regulations for the degree of PhD, as well as for the title *Doctor Europaeus*. I look forward to exploring the work with the candidate at the scheduled examination later this year, and to seeing he and his work develop over the coming years.

Yours faithfully,

Simon Dobson

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