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Abo Akademi University

Dear Members of Assessment Committee:

I am delighted to write this letter of support for the application of the Optimization and Systems Engineering (OSE) group for a second period, 2015-18, as an Center of Excellence at Abo University. The OSE Group is a unique interdisciplinary group that focuses its research in optimization theory and methods and systems analysis, while dealing with challenging applications in science and engineering.

The OSE group is led by Prof. Tapio Weaterlund, who is a world leader in the area of mixed-integer nonlinear programming (MINLP). He is best known for his 1995 paper on the extended cutting plane for convex MINLP which has over 250 Google Scholar citations. In recognition to his standing in the MINLP area, he was one of the three plenary speakers at the MINLP 2014 meeting that took place at Carnegie Mellon on June 2-5, 2014 http://minlp.cheme.cmu.edu/2014/index.html. His presentation was the best one compared to the other two plenary speakers (Sanjay Mehrotra-Northwestern University, Robert Weismantel-ETH). Therefore, it is very clear that the OSE group is being led by a world class research leader,

The rest of the OSE tem is also very impressive. Prof. Henrik Saxén, the Vice-Director is a research leader in mathematical modeling and simulation of chemical and metallurgical systems. The other members of the steering committee, Profs. Paavo Salminen and Mikael Lindström, provide fundamental knowledge in Mathematics. In this way the OSE group involves Process Design and Systems Engineering and Thermal and Flow Engineering in the Department of Chemical Engineering, and Mathematics and Statistics from the Department of Natural Sciences, providing a unique interdisciplinary group of strong international standing.

The OSE group has shown in the past that it is capable of producing very high quality research, as well as methods that are both strongly grounded in theory and of practical relevance. Of particular significance have been methods for MINLP optimization, and several successful applications in complex engineering design and operation. Moreover, OSE has also been able to attract and produce truly outstanding Ph.D. students. Specific examples are Dr. Iiro Harjunkoski, Corporate Research Fellow at ABB, and Ph.D. candidate Axel Nyberg.

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The OSE group plans to have two major thrusts for the Center of Excellence for the period 2015-18: 1. Optimization theory and applications; 2. Systems engineering and analysis. The former thrust will deal with the development of new methods for large-scale optimization, and applications to process and production optimization, including life-cycle assessments, sustainability and economic analysis of energy-intensive plants such as in iron and steelmaking. The latter thrust will deal with stochastic models and analysis for describing and understanding financial, ecological and industrial phenomena, as well as dynamical systems defined by iteration of functions, and convex analysis.

In summary, it is very clear that the OSE group has been recognized as an international leader in optimization theory and methods and in systems analysis, and that has also has produced outstanding research outstanding graduates. The plans for the 2015-18 period are very exciting, and promise to continue world class excellence in research, and outstanding contributions as the OSE group has made in the past. Therefore, I very strongly and enthusiastically support the continuation of the OSE group as a Center of Excellence at Abo Akademi University.

Yours sincerely



Ignacio E. Grossmann