# IEEE CIS Seminar

## Prof. Kaisa Miettinen
## University of Jyvaskyla, Finland

**Venue: LT05, Bldg 30 (LT South), UNSW Canberra**
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## Some Interactive Multiobjective Optimization Methods with Elements of Evolutionary Approaches

In multiobjective optimization, the goal is to find the best possible solution in the presence of several, conflicting objectives. We can define a set of Pareto optimal solutions where none of the objective function values can be improved without impairing at least one of the others. To be able to find the most preferred Pareto optimal solution to be implemented, we need some preference information from an expert in the problem domain to be called a decision maker.

Multiobjective optimization methods can be classified according to the role of the decision maker in the solution process. We review different classes, their strengths and weaknesses. We pay most attention to interactive methods, where the decision maker takes actively part in the solution process and directs the search according to her/his preferences. This enables the decision maker to gain insight about the interdependencies of the conflicting objectives and learn about one's own preferences. In this way, we support her/him in concentrating on such solutions that seem most promising and in finding the most preferred solution. An example of interactive methods is NIMBUS.

We can combine elements of different methods in order to benefit from their strengths and overcome their weaknesses. As evolutionary algorithms can be applied in various types of optimization problems, hybridizing them with interactive methods has potential. In this talk, some interactive multiobjective optimization methods are presented that utilize evolutionary approaches. Among the methods considered are Pareto Navigator as well as E-NAUTILUS and NAUTILUS Navigator which enables decision making without trading-off. They are well suited for computationally expensive problems. Finally, we collect some experiences in solving real problems.

**Kaisa Miettinen** is Professor of Industrial Optimization and vice-rector of the University of Jyvaskyla. Her research interests include theory, methods, applications and software of nonlinear multiobjective optimization including interactive and evolutionary approaches and she heads the Research Group on Industrial Optimization. She has authored over 150 refereed journal, proceedings and collection papers, edited 13 proceedings, collections and special issues and written a monograph Nonlinear Multiobjective Optimization. She is a member of the Finnish Academy of Science and Letters, Section of Science and the Immediate-Past President of the International Society on Multiple Criteria Decision Making. She belongs to the editorial boards of five international journals and the Steering Committee of Evolutionary Multi-Criterion Optimization. She has worked at IIASA, International Institute for Applied Systems Analysis in Austria, KTH Royal Institute of Technology in Stockholm, Sweden and at Helsinki School of Economics in Finland. In July 2017, she received the Georg Cantor Award of the International Society on Multiple Criteria Decision Making for independent inquiry in developing innovative ideas in the theory and methodology of MCDM.