ADVANCED DECISION SUPPORT in SOFTWARE ENGINEERING – METHODOLOGY AND APPLICATIONS

Günther Ruhe
University of Calgary, Canada
ruhe@ucalgary.ca
www.seng-decisionsupport.ucalgary.ca

EXTENDED ABSTRACT

The process of software development and evolution is an ambitious undertaking involving a huge number of variables under dynamically changing requirements, processes, tools and techniques. Very often, this is combined with incomplete, fuzzy or inconsistent information about all the involved artefacts. The challenge is to provide sound methodological support for enabling good decisions about processes and products, risks and bottlenecks as well as for selection of tools, methods and techniques.

The object of study is the complete software lifecycle with all its inherent artefacts (i.e., processes, products, resources, methods and tools). According to the un-preciseness of the problem, we are often looking for a good compromise solution as opposed to searching for an optimal one. Good compromise solutions are characterized by the feature that they satisfy most of the inherent objectives and constraints, that they are reasonable to implement, cost-effective and that, in addition, they provide a way for post-mortem impact analysis. Typically, these solutions are hard to find.

Advanced Decision Support in Software Engineering is based on innovative techniques for decision making under incomplete, contradicting and fuzzy information. This is based on modelling of products, processes and quality aspects of software development and is combined with enabling techniques such as measurement, experimentation and simulation.

The invited talk will give a more detailed description of a methodological framework for Advanced Software Engineering Decision Support. Out of the large range of application areas, two problems are discussed in further detail:

- Decision support for the incremental selection of requirements under budget constraints and different stakeholder interest. The main difference to the more qualitative and group-ware based negotiation process as conducted in the in the win-win requirements approach is that quantitative analysis using the analytical hierarchy process AHP, system dynamics, and iterative problem refinement is used to support requirements selection. The results of the approach can be used to select a subset of requirements ensuring maximum business value of the final system and satisfying overall effort constraints.
- Identification of critical components in the context of software maintenance. The goal is to predict module fault-proneness and to use this information for better allocation of effort in software quality assurance such as for testing and inspections. The results obtained with two complementary analysis techniques (Logistic regression and rough set analysis) are discussed and compared. A hybrid approach is built, by integrating different and complementary knowledge obtained from either approach on the fault-proneness of modules..

An outlook is presented on future research in this area.