

*Málaga, December 2014*

Executive Summary

TITLE: **D4.6.3: Analysis and evaluation of different metaheuristics using the SPS problem generator.**

PAPERS RELATED:

- F. Luna, D. L. González-Álvarez, F. Chicano, M. A. Vega-Rodríguez, The Software Project Scheduling Problem: A Scalability Analysis of Multi-objective Metaheuristics, *Applied Soft Computing* 15 : 136-148

ABSTRACT: Computer aided techniques for scheduling software projects is a crucial step in the software development process within the highly competitive software industry. The Software Project Scheduling (SPS) problem relates to the decision of who does what during a software project lifetime, thus involving mainly both people-intensive activities and human resources. Two major, conflicting goals arise when scheduling a software project: reducing both its cost and duration. A multi-objective approach is therefore the natural way of facing the SPS problem. As companies are getting involved in larger and larger software projects, there is an actual need of algorithms that are able to deal with the tremendous search spaces imposed. In this paper we analyze the scalability of eight multi-objective algorithms when they are applied to the SPS problem using instances of increasing size. The algorithms are classical algorithms from the literature (NSGA-II, PAES, and SPEA2) and recent proposals (DEPT, MOCeLL, MOABC, MO-FA, and GDE3). From the experimentation conducted, the results suggest that PAES is the algorithm with the best scalability features.

GOALS:

1. We analyze the scalability of eight multi-objective algorithms when they are applied to the SPS problem using instances of increasing size.

CONCLUSIONS:

1. We have performed an experimental evaluation using a benchmark of 36 automatically generated instances with increasing size and both, the hypervolume indicator and the attainment surfaces, have been used in order to evaluate the quality of the approximated fronts.
2. PAES has shown to be not only the algorithm that scales the best but also the one with the best solution quality (in terms of HV).
3. The attainment surfaces have allowed us to refine this outstanding behavior by graphically displaying the reason of these high HV values: PAES is able to reach projects with low cost and long durations, but it is outperformed by other algorithms in a narrow region of the objective space related to high-cost short-duration schedules.
4. We have also gone one step further by analyzing the properties of the obtained solutions by computing the correlations between objectives, the assigned dedication of the employees, and the tasks.

RELATION WITH PAST DELIVERABLES:

OTHERS: