Modeling, learning and solving dynamic problems by meta- and hyper- heuristics in maintenance.

Meta-heuristics offer flexibility and fast algorithm development for versatile problem solving. Machine learning allows adapting the solver as well as the model to fast changing environments. Hyper-heuristics promise flexible incorporation of expert knowledge without requiring explicit formulations. Application of this methodology to maintenance is a promising line of research. We review existing solutions and speculate on possible new approaches. Data collection and processing in is essential in this context. We argue that the optimisation aimed at can only proceed without suitable data science technology, making the link between data science and optimisation unavoidable.

CV:

Patrick De Causmaecker is a full professor at the Faculty of Engineering Science of KU Leuven in Belgium. He is a member of the department of computer science at the KULAK campus of the university. He leads the research group CODeS on combinatorial optimisation and decision support.

Patrick De Causmaecker got his PhD in 1983 from the University of Leuven in the domain of elementary particle physics. In his PhD, he introduced the helicity method for computing cross sections in particle collisions at very high energies. The technique is presently widely used in high experiments as well as in theoretical considerations on the smallest constituents of matter.
After he switched to the then booming field of information processing in 1984, he has educated students at various levels in computer science. From 1994 on he has successfully conducted research in heuristic optimization and constraint solving, especially in scheduling and rostering when human time spending was involved. This research was in close cooperation with a multitude of small and medium sized companies specialized in planning and scheduling for production, transport, education and medical care. Since 2005, he started working on optimization in a variety of additional application domains such as bio-informatics, e-learning and astro-physics. At present he is especially interested in structures and quantitative methods to gauge the performance of optimization algorithms, especially of metaheuristics and hyperheuristics, based on the data describing the operational environment.