Preface

**Karl F. Doerner¹ · Juan-José Salazar-González² ·
Christian Stummer³**

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Young researchers in the field of operations research from all of Europe met at the Johannes Kepler University Linz from July 16th to July 20th, 2012. The ORP3 conference series was founded in 2001 from the EURO Association of European Operational Research Societies. It is financed by the EURO association and it is an event for Ph.D. students and young post-docs to present their work and discuss their research activities with other young researchers and outstanding scholars in the field of operations research. The conference has no specific topics or themes. The earlier conferences were located in Paris, France (2001); Lambrecht, Germany (2003); Valencia, Spain (2005); Guimaraes, Portugal (2007); and Cadiz, Spain (2011). In Linz there were 32 participants from 17 different countries. The following nine papers are expanded versions of a selection of the best papers presented during the conference. Two are survey papers and seven are regular papers.

1 Papers in the Special Issue

Flight delays have become a frequent disturbance for airlines and travelers alike. Bad weather conditions, unscheduled maintenance requirements, and/or congestions at airports force air-

ORP3 –Operations Research Peripatetic Postgraduate Program Conference at the Johannes Kepler University in Linz, Austria.

✉ Karl F. Doerner
karl.doerner@univie.ac.at

Juan-José Salazar-González
jjsalaza@ull.es

Christian Stummer
christian.stummer@uni-bielefeld.de

¹ University of Vienna, Vienna, Austria

² Universidad de La Laguna, Tenerife, Spain

³ Bielefeld University, Bielefeld, Germany

line operations controllers to delay departure times of flights, or to cancel flights, swap aircrafts, etc. Usually, recovery plans focus on the aircrafts and only afterwards take into account passengers. *Uğur Arikan, Sinan Gürel, and M. Selim Aktürk* suggest the superimposition of aircraft and passenger networks in order to create an integrated plan that minimizes both routing-related and passenger-related costs. To this end, they also include cruise speed control in the alternative courses of recovery actions. They reformulate the resulting mixed integer nonlinear programming model and solve it with CPLEX for a realistic problem setting in less than one minute on average.

Prostate cancer is a common type of cancer often treated with high dose-rate (HDR) brachytherapy, in which a radioactive source is moved through catheters implanted into the prostate. An individual treatment plan then determines catheter positions as well as dwell time distribution. In their paper, *Åsa Holm, Åsa Carlsson Tedgren, and Torbjörn Larsson* describe an integrated optimization model that takes into account both decisions. In order to find promising solutions within limited runtime, they have applied three meta-heuristic solution procedures: tabu search, variable neighborhood search, and a genetic algorithm. It turns out that the variable neighborhood search algorithm outperforms the two others and produces good solutions considerably quicker than by resorting to CPLEX.

Dial-a-ride problems appear in different planning contexts, such as planning the transportation of elderly and handicapped people. Solutions need to satisfy transportation requests with specified pickup and delivery locations and times. The aim is to minimize the total travel times respecting the given time windows, the maximum user ride times, and the vehicle restrictions. To address this problem, *Ulrike Ritzinger, Jakob Puchinger and Richard F. Hartl* introduce an exact dynamic programming algorithm and a dynamic programming based meta-heuristic approach in their paper. They also propose a hybrid metaheuristic algorithm that integrates the dynamic programming based algorithms into a large neighborhood framework. The algorithms are tested on benchmark instances from the literature.

Solutions to pickup and delivery problems have numerous applications in practice such as in parcel delivery and passenger transportation. In the dynamic variant of the problem, not all information is available in advance but is revealed during the planning process. Thus, it is crucial to anticipate future events in order to generate high-quality solutions. The article by *Stefan Volfen and Michael Affenzeller* proposes heuristic algorithms for the pickup and delivery problem with time windows. The performance of these heuristics is evaluated on benchmark instances containing various instance classes that differ in terms of spatial and temporal properties. The article also analyzes the influence of spatial and temporal instance properties, as well as the degree of dynamism to the potential savings that can be achieved by anticipatory waiting and the incorporation of knowledge about future requests.

Many applications in logistics combine loading and vehicle routing problems. This is the case, for example, when transporting voluminous items where two-dimensional packing restrictions have to be considered. The article by *Oscar Dominguez, Angel A. Juan, Barry Barrios, Javier Faulin and Alba Agustin* addresses the so-called Two-dimensional Loading Capacitated Vehicle Routing Problem (2L-CVRP) with a heterogeneous fleet of vehicles. After describing and motivating the problem, the article presents a literature review on related works. It also proposes a multi-start algorithm based on biased randomization of routing and packing heuristics. The performance of the algorithm is computationally analyzed.

Personal Rapid Transit is an emerging urban transport mode. It operates like a conventional hackney taxi system, except that the vehicles are driven by computer (no human driver) between stations in a dedicated network of guide ways. Passengers request immediate service, without booking ahead. Perfect information about future requests is therefore not available, but statistical information about future requests is available from historical data. To potentially

reduce waiting times of passengers, it is convenient to use this statistical information to position empty vehicles in anticipation of future requests. The article by *John D. Lees-Miller* develops three lower bounds on achievable mean passenger waiting time. One bound is based on queuing theory. Another bound is based on the static problem, in which it is assumed that perfect information is available. The third bound is based on a Markov Decision Process model.

In the real world classical vehicle routing problems have mainly stochastic demand and/or dynamic requests. Stochastic demands are only revealed when the vehicle arrives at the customer location; dynamic requests mean that new orders from previously unknown customers can be received and scheduled over time. In the article by *Briseida Sarasola, Karl F. Doerner, Verena Schmid and Enrique Alba*, a variable neighborhood search algorithm that is extended by sampling for stochastic scenarios and adapted for the dynamic setting is presented. With this adapted algorithm improved results compared to the classical variable neighborhood search can be obtained. New best results on standard benchmark instances can also be improved.

The survey article by *Gilbert Laporte* describes several examples of vehicle routing problems in which time and scheduling play an important role. These examples arise in the dial-a-ride problem, speed optimization in routing problems, the pollution-routing problem, long-haul vehicle routing and scheduling with working hour rules, and synchronization in arc routing.

The survey article by *Walter Gutjahr and Alois Pichler* addresses the research field that intersects stochastic optimization and multi-objective optimization, namely, stochastic multi-objective optimization. This field not only is of methodological interest from an operations research point of view, it also is of high practical interest since these methods can be applied to numerous managerial decision problems. In contrast to a recent review by Ben Abdelaziz that focused on scalarization methods aiming at reducing a given multi-objective problem to a single-objective one, Gutjahr and Pichler give an overview of methods that preserve the multi-objective nature of the problem during the computational analysis.

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