Executive Summary
Dagstuhl Seminar 09261 on
Models and Algorithms for Optimization in Logistics
June 21–26, 2009

Cynthia Barnhart\textsuperscript{1}, Uwe Clausen\textsuperscript{2}, Ulrich Lauther\textsuperscript{3} and Rolf Möhring\textsuperscript{4}

\textsuperscript{1} Massachusetts Institute of Technology, School of Engineering
Cambridge, MA 02139, 77 Massachusetts Avenue, USA
cynthia\_barnhart@mit.edu
\textsuperscript{2} Universität Dortmund, Fakultät Maschinenbau
44225 Dortmund, Leonhard-Euler-Straße 2, Germany
uwe.clausen@iml.fraunhofer.de
\textsuperscript{3} Siemens AG, CT PP 7
81739 München, Otto-Hahn Ring 6, Germany
ulrich.lauther.ext@siemens.com
\textsuperscript{4} Technische Universität Berlin, Institut für Mathematik
10623 Berlin, Straße des 17. Juni 136, Germany
rolf.moehring@tu-berlin.de

Keywords. Logistics, optimization, transport

Summary

Logistics is the cost aware planning, design, and control of material flow and
related information flow (persons, energy, money, information, ...) in production
processes. The notion is often used as a synonym for transportation, distribution,
or warehouse management. The topic is of a rich variety, has great practical im-
portance, and attracts researchers from the computer science (CS), mathematical
programming (MP), and the operations research (OR) communities alike.

Today, problems from logistics are widely studied as parts of the disciplines
of mathematical programming and operations research; algorithmics and theo-
retical computer science; and computer systems. The specific models and meth-
ods, as well as the objectives to be optimized, differ in the various disciplines;
nevertheless, there are remarkable similarities (as well as significant differences)
in the general framework adopted by researchers in logistics in these disparate
disciplines.

The primary objectives of the seminar were to bring together leading and
promising young researchers in the different communities and practitioners to
discuss problems that arise in current and future technology, to expose each
community to the important problems addressed by practice and the different
communities, and to facilitate a transfer of solution techniques from each com-
munity to the others.

There were approximately fifty participants at the seminar, nearly evenly
split between computer science, mathematical programming, and engineering
and industry.
Six special invited presentations served as introductory lectures on important research areas and application domains and created a common understanding. They were given by George Nemhauser on maritime inventory routing, Jens Baudach and Ronny Hansmann on waste disposal logistics, Ozlem Ergun on humanitarian logistics, Alexander Martin on the power of discrete optimization in logistics, Cynthia Barnhart on trends in airline optimization, and by Patrick Jaillet on probabilistic analysis of routing problems.

This was complemented by an industry day on Tuesday, on which participants from industry and industry-near research institutes presented their research, problems and viewpoints for future research in logistics.

In discussion with the different communities, we organized 27 medium length talks on various recent research results. There was a plenary session on Friday morning to discuss interesting directions for future research and future collaborations. The discussion identified and collected specific needs for future topics such as enabling real time decisions in optimization, a better integration of heuristics and integer programming, dealing with non-observable information through better use of statistic methods, and to exploit game-theoretic aspects in logistics networks.

This seminar was essentially a first meeting of practitioners with the mathematical programming and theoretical computer science community. The general consensus was that both communities learned a lot about the other communities and that it is worthwhile and challenging to continue this form of workshop.