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# Applications of Agent Technology in Traffic and Transportation

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2000 Mathematics Subject Classification 68T35, 68U35, 94A99, 94C99

A CIP catalogue record for this book is available from the Library of Congress, Washington D.C., USA

Bibliographic information published by Die Deutsche Bibliothek Die Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data is available in the Internet at <http://dnb.ddb.de>.

#### ISBN 3-7643-7258-3 Birkhäuser Verlag, Basel – Boston – Berlin

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© 2005 Birkhäuser Verlag, P.O. Box 133, CH-4010 Basel, Switzerland Part of Springer Science+Business Media Cover design: Micha Lotrovsky, CH-4106 Therwil, Switzerland Printed on acid-free paper produced from chlorine-free pulp. TCF ∞ Printed in Germany

ISBN-10: 3-7643-7258-3 ISBN-13: 978-3-7643-7258-3

987654321

www.birkhauser.ch

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### Preface

Building effective and user-friendly transportation systems is one of the big challenges for engineers in the 21st century. The rapid change of location, enabled by plane, high-speed rail, sea and road travel, has constantly become easier and more natural. These days we travel without any of the difficulties that accompanied taking a trip less than a century ago. All we have to do is to organize and to pick up the transport mode that comes closest to our objectives. In much the same way, many new opportunities for the delivery of goods are being explored and commercially exploited.

So, it is not surprising that there is the intense need to understand, model, and govern transportation systems at both, the individual (micro) and the society (macro) level. Still, this raises significant technical problems, as transportation systems may contain thousands of autonomous, "intelligent" entities that need to be simulated and/or controlled. Therefore, traffic and transportation scenarios are extraordinarily appealing for Distributed Artificial Intelligence, and (multi-)agent technology in particular.

The papers in this book are revised versions of the work presented at the Workshop on Agents in Traffic and Transportation (ATT), at the International Conference on Autonomous Agents and Multiagent Systems (AAMAS), held in New York on July 20, 2004. The workshop brought together researchers and practitioners working on agent-based tools for modelling, simulation, and management of transportation systems, in particular in traffic and logistics scenarios. All papers have been thoroughly reviewed by renowned experts in the field. In addition, this book contains an invited contribution by Klaus Dorer and Monique Calisti from Whitestein Technologies.

The first contribution to this book, by Davidsson et al., provides a survey of existing research on agent-based approaches to transportation and traffic management. Perugini et al. present an provisional agreement protocol that facilitates the planning required in transportation scheduling problems. Dorer and Calisti put forward an agent-based approach to solve dynamic multi-vehicle pickup and delivery problems with soft time windows. The work by Ossowski et al. reports on an abstract architecture for traffic management, and its application to two real world domains. Yin and Griss describe SCATEAgents, an agent-based intelligent, flexible, and context-aware multi-modal traveller information system. Bazzan and Klügl show how the Braess Paradox, a well known phenomenon in transportation

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engineering, can be overcome by means of information manipulation. Yamashita et al. analyse the effect of route information sharing on traffic congestions. Katwijk et al. report on a test bed for multi-agent road traffic management systems. Conde et al. focus on the problem of effective real-time traffic light control using agent technology. Hallé and Chaib-draa present a collaborative driving system using teamwork for platoon formations. Marchal and Nagel propose a simulation model to account for the effect of secondary activities on route choice. Rindsfüser et al. describe a multiagent simulation for the generation of individual activity programs. Rossetti and Liu report on how the abstraction approach of multiagent systems can be used to represent the complexity inherent in the urban traffic domain. Finally, Gloor at al. present a message-based simulation framework for different kinds of mobility simulations.

We are grateful to all these authors for contributing their latest and inspiring work to this book, as well as to the members of the ATT Program Committee, and the external reviewers, for their critical reviews of submissions. Finally, a deep thanks goes to each of the brave members of the AAMAS-2004 local organization team for their hard work in providing (not only) the ATT-2004 event with a modern, comfortable location, and social program.

We hope you will enjoy reading this book and find inspiration for your own work!

October 2004

Ana Bazzan, Franziska Klügl and Sascha Ossowski