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Transportation and Information

Trends in Technology and Policy

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To the memory of our fathers
Bhabesh Chandra Thakuria
Donald Leslie Geers

Preface

In this book, we review recent developments at the intersection (no pun intended) of Information and Communications Technology (ICT) and surface transportation, and the technical, social and institutional challenges stimulated by these trends. Developments in pervasive sensing and widespread proliferation of vast numbers of mobile and static sensors promise to bring a sea-change in the way transportation information can be designed and used, particularly with Machine-to-Machine communications and by information generated by people-centric sensors. Methods to manage and analyze such data have led to novel mobility services which may have the potential to lead to sustainable and socially interesting travel. The use of such information stimulates numerous social, institutional, ethical, and legal challenges, some of which we have attempted to bring together in this book.

The book is aimed at researchers, graduate students, industry professionals, and decision-makers considering problems in surface transportation and approaches and limitations of ICT in understanding and addressing these problems. The use of the word transportation throughout the book refers to surface transportation, unless explicitly noted otherwise. Contributions from a number of academic disciplines have made these myriad developments possible. We take a broad-based view of policy and the underlying organizing theme is one of economic, environmental, and social sustainability. It is our hope that we have been able to bring together this broad spectrum of knowledge in this brief volume, albeit in a limited way. Our eventual goal is awareness-building about a wide range of problems in ICT and transportation, thereby stimulating research approaches that address multiple concerns and perspectives. The book is broad and non-technical in nature, with an emphasis on being a survey as opposed to an exhaustive treatment of a small set of topics. It may be read as part of an introduction to a graduate course on transportation and technology offered in transportation planning, transportation engineering, computer science, geography, or public administration.

The book begins, in [Chap. 1](#), with an overview of the many facets of ICT in transportation, including Intelligent Transportation Systems (ITS), Location-Based Services (LBS), relevant aspects of smart and connected cities, dynamic resource management, mobile health, and assistive technologies. We also discuss environmental, economic, and social sustainability outcomes which an information-centered mobility environment can potentially address. In [Chap. 2](#) we present an

overview of the major existing and emerging sensor and communications technologies and describe the types of information they generate. [Chapter 3](#) follows with a range of systems and services that utilize these sources of information. [Chapter 4](#) addresses institutional, legal, and coordination issues as well as issues of behavioral effects and societal preparedness to handle the information-centered mobility environment. Conclusions and possible future directions are given in [Chap. 5](#).

Whereas ITS and LBS have been very active research areas in transportation, the contributions of ICT have been greater than solutions and services developed under such banner. Examples include strategies for mobility-on-demand, mobility assistance for persons with disabilities, smart cities and ubiquitous information environment, community and urban informatics, resource management and asset condition monitoring. Although we try to devote space to many different types of ICT examples in transportation, we had to be selective, thereby making greater discussions of certain concepts than others and the book is far from an exhaustive survey of all that has been done on this vast topic. By a survey, we also mean that we do not go into detailed discussion of any one topic and attempt to merely provide an overview of what has been done in an area. Moreover, the emphasis is on the transportation system and service aspects and not on the details of the technology and methodological aspects.

The book was stimulated by our involvement in many research projects that are too numerous to list. However, virtually each of these projects gave us the ability to explore and appreciate the technical, social, and management challenges associated with the emerging information-centered mobility environment.

The book would not have been possible without the strong support of our spouses, Claude Hanhart and Nicole Geers, and Glenn's daughter, Céline. We would like to acknowledge the contribution of Dr. Caitlin Cottrill, University of Aberdeen, UK and John Laird, NICTA and University of New South Wales, who helped with reading through and editing the book. The book was written while the first author worked in Chicago and we would also like to thank ICT for making the 9,300-mile collaboration possible.

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Piyushimita (Vonu) Thakuriah
D. Glenn Geers

Contents

- 1 Introduction 1**
 - 1.1 Trends in ICT-Based Surface Transportation. 1
 - 1.2 Overview of the State of Information-Based Mobility Environment 2
 - 1.3 Key Trends Motivating ICT Use in Transportation 5
 - 1.4 Mobility Technology Areas 7
 - 1.5 Mobility Policy Areas 10
 - 1.6 Organization of the Book 12
- 2 Data Sources and Management 15**
 - 2.1 Introduction 15
 - 2.2 Traffic Detection and Surveillance Systems 15
 - 2.2.1 Sensors for Traffic Monitoring 15
 - 2.2.2 In-Vehicle Sensors 20
 - 2.2.3 Some New Sensing Modalities 21
 - 2.3 Transportation-Oriented Communications Systems. 23
 - 2.3.1 Communications Access for Land Mobiles. 23
 - 2.3.2 Machine-to-Machine (M2M) 25
 - 2.3.3 Application Programming Interface 26
 - 2.3.4 Positioning Systems 26
 - 2.4 Methods to Add Intelligence to Sensor Data 28
 - 2.5 Initiatives and Programs Through Technology Integration 31
 - 2.5.1 What Happens to All that Data? 31
 - 2.6 Privacy, Trust and Security. 32
- 3 Technology Systems for Transportation System Management and Personal Use 35**
 - 3.1 Introduction 35
 - 3.2 Transportation System Management, Operations and Safety 35
 - 3.2.1 Transportation System Management 36
 - 3.2.2 Safety 43
 - 3.2.3 Dynamic Resource Management 47

3.3	User-Generated Content: Involving People in Mobility Management	55
3.3.1	Proactive User-Generated Content	55
3.3.2	Retroactive User-Generated Content	59
3.3.3	Issues to Consider in Designing Sensing Programs	60
3.4	Technologies for Personal Mobility and Accessibility	61
3.4.1	Travel Information and Location Services	61
3.4.2	Mobile Health and Wellness Technologies	66
3.4.3	Technologies to Meet Special Mobility Needs	69
4	Institutional and Policy Factors in ICT-Based	
	Mobility Services	73
4.1	Introduction	73
4.2	Institutional Challenges	73
4.2.1	Funding and Revenues	73
4.2.2	Policy and Regulatory Environment	77
4.2.3	Policies Towards Data	80
4.2.4	Management and Governance	82
4.2.5	Legal and Ethical Issues	85
4.3	Societal Preparedness	88
4.3.1	Digital Citizenship	88
4.3.2	Digital Divide	89
4.4	Coordination of ICT with Transportation Services and Plans . . .	90
4.4.1	Coordination with Transportation Services	91
4.4.2	Coordination with Transportation Planning Efforts	94
4.4.3	ICT-Based Mobility Strategy Design for User-Centeredness and Sustainable Outcomes	95
5	Conclusions	97
5.1	Ubiquitous Information-Centered Mobility Environment	97
5.2	Major Trends	98
5.3	Conclusions	100
	References	103
	Index	125