Introduction

This festschrift contains 20 chapters addressing issues from regional science, travel forecasting, transportation planning, transportation network modeling, intelligent transportation systems and so on. This collection reflects the breadth of Professor Boyce's involvement and research interests in these areas.

Chapter 1, contributed by Huw Williams, examines and illustrates – from a British perspective – four themes in travel behavior and transport modeling: the practical modeling alternatives; the contribution of theory to practical model development; the balance between theoretical sophistication and simplification in practical model design; and issues in the specification and solution of equilibrium models associated with substantive policy issues.

Chapter 2, written by K.I. Wong, S.C. Wong, J.H. Wu, Hai Yang and William Lam, presents a combined distribution, hierarchical mode choice, and assignment network model with multiple user and mode classes. In their chapter, Evans's partial linearization algorithm is proposed to solve the problem. The strategic transportation network in Hong Kong is used as a case study to illustrate the potential applicability of the proposed methodology for solving complex transportation planning problems.

In Chapter 3, Hillel Bar-Gera and David Boyce propose a fixed point formulation to formulate general combined models mathematically, including most models used in practice. The origin-based algorithm is adopted and is proved as a more efficient solution approach than prevailing alternatives in which faster convergence is achieved.

In Chapter 4, Michael Wegener outlines a methodology to model activity patterns, trips and trip chains, destination, mode and route choice of individual travelers in urban regions by time of day, including within-day and period-to-period adjustment of behavior, by microsimulation without iteration, which assigns the individual trips generated in a microscopic activity-based travel forecasting model to a multimodal transport network. It is found that the iteration-free nature of the approach makes it particularly suitable for integrated models of urban land use, transport and environment (LTE).

In Chapter 5, Sven Erlander and Jan T. Lundgren focus their attention on a new notion of cost minimizing behavior by expressing it in terms of the decisions taken by a group of decision makers, and this is introduced in discrete choice modeling. The probability distribution of the log linear form for an individual's choice between the alternatives is derived. It is shown that all standard discrete choice models of log linear type satisfy the conditions for this newly introduced cost minimizing behavior.

Equilibrium traffic signal setting (ETSS) is the problem of determining a joint equilibrium of link flows and signal settings in a road network that operates under traffic-responsive signal control. Claudio Meneguzzer in Chapter 6 proposes a heuristic to imitate the real-world interaction between signal control decisions and route choices. In addition, a new step in Meneguzzer's approach is added to the 'classical' version of the iterative scheme, so as to incorporate the partial driver response feature into the flow-updating

rule. This leads to a more general framework for the analysis of ETSS, in which the 'level of responsiveness' of the network users can be explicitly accounted for.

Lars-Göran Mattsson and Lina Sjölin (Chapter 7) present a stylized model of a generic symmetric city for the simulation policies of road investment and road pricing. The authors consider these two policies as two possible options to relieve congestion problems. It will not only affect the demand for transport in various respects, but may also, in the long run, change the location of activities. This model evaluates transport and land-use effects of congestion pricing and of inner and outer toll rings in the road network.

The study presented in Chapter 8 by Hai Yang, Qiang Meng and Timothy D. Hau investigates the relationships between trans-modal transport pricing and subsidy policy for optimal modal split, and presents optimization models on a bi-modal transportation network. Transport pricing and transit subsidy in the chapter are sought for optimal modal split under the assumption of a transit budget constraint.

In Chapter 9, Hong K. Lo and W.Y. Szeto extend the traditional continuous network design problem by incorporating the time dimension, which enables one to be able to design for the optimal project initiation time, phasing, and financial arrangements over the planning horizon. A single-level optimization program is formulated and two simple numerical examples are set up to compare the performances between the traditional and the proposed approaches. Numerical results show that this extended formulation outperforms greatly the traditional formulation.

There are nine chapters in this festschrift about dynamic network modeling, vehicle routing and navigation, travel time and traffic delay estimation and so on. This reminds us of Professor Boyce's pioneering efforts in developing the vehicle route guidance system (the well-known ADVANCE Project) and dynamic transportation network modeling. The first chapter of this kind is from Professor Boyce's collaborators in the ADVANCE Project, Elliott A. Torres, Peter C. Nelson, Nagui M. Rouphail and Joseph Raj. In Chapter 10, they explore and contrast the use of artificial intelligence techniques against traditional methods in order to improve the efficiency and accuracy of delay estimates for arterial streets. They found that the neural network approach provided additional flexibility that could not be matched by the statistical approach.

Andrew P. Tarko and Gopalakrishnan Rajaraman in Chapter 11 propose a new concept of expected cumulative counts (L curves) that are more suitable for traffic modeling than cumulative counts. The use of L curves is considered for non-FIFO and non-conserved traffic, and the conditions for unbiased estimates of expected travel times of individual vehicles are determined. A method of modeling travel times between two signalized intersections is proposed and tested on three street segments.

In Chapter 12, William H.K. Lam, K.S. Chan and B.F. Si propose a bi-level programming model to investigate under what circumstances the traffic authority should encourage or discourage the implementation of the Advanced Traveler Information Systems (ATIS). A sensitivity-analysis-based solution algorithm is proposed for solving the problem and an example is illustrated.

The contribution from Hongyu Sun, Heng Xiao and Bin Ran (Chapter 13) addresses short-term traffic predictions by using data mining. Traffic data on neighboring links are incorporated into inputs of the local linear model to predict traffic conditions on the individual link of interest.

In Chapter 14, Pitu Mirchandani, Rohit Syal, David Lucas and Yang He focus on on-

line traffic assignment and network loading. In this chapter, an accelerated version of the method of successive averages (MSA) for predicting traffic patterns undergoing network interventions is proposed. Rather than volume-delay functions like the conventional BPR (Bureau of Public Roads) function, route attributes experienced by the travelers are used to track the resulting effect of infrastructure changes. The model is evaluated by a route-based simulation.

Chapter 15 by Tschangho John Kim is about multi-modal routing and navigation cost functions for location-based services (LBS). This chapter focuses on developing functional forms for costs for providing multi-modal routing and navigation services and on searching for feasible directions to solve the functions heuristically, and presents a feasible set of functional forms. The author presents the idea of developing heuristic solution algorithms by developing a node–node adjacency matrix and estimating spatiotemporal link travel time.

June Dong, Ding Zhang and Anna Nagurney (Chapter 16) propose a supply chain network model in the form of a super-network, in which both physical and electronic transactions are allowed and the demands associated with the retail outlets are considered as random. They model the optimizing behavior of the various decision makers, derive the equilibrium conditions, and establish the finite-dimensional variational inequality formulation.

In Chapter 17, Huey-Kuo Chen, Hsiao-Chi Peng and Cheng-Yi Chou, study the dynamics of the joint entropy distribution/assignment (JEDA) problem by developing the dynamic user equilibrium problem with doubly constrained origin–destination/departure time/route choice. A path-based algorithm is proposed and compared with the dynamic version of the modified Evans algorithm in terms of computational efficiency. Their results show that the proposed algorithm is more efficient and thus has great potential for solving large network problems.

In Chapter 18, Torbjörn Larsson, Jan T. Lundgren, Michael Patriksson and Clas Rydergren provide numerical examples of a decision support methodology for strategic traffic management. The decision support methodology is based on an equilibrium model for route choice in a congested urban traffic network. The authors show how the management methodology can be applied to some traffic management scenarios. The traffic networks of Sioux Falls and Linköping are used for computational examples.

In Chapter 19, Paulo Resende, Joaquim J.M. Guilhoto and Geoffrey J.D. Hewings study the free trade and transportation infrastructure in Brazil. Potential limitations imposed by transportation infrastructure are big issues in the development of models analysing the impacts of free trade agreements between countries or regions within countries. In this chapter, an illustration of a potential approach to this problem is illustrated with reference to Brazil in the case of MERCOSUL in South America.

Finally, in Chapter 20, Åke E. Andersson and David E. Andersson study the accessibility and site rents in the C-economy. Note that the C in 'C-economy' stands for several typical features of the post-industrial economy, such as creative, cognitive and computer capacities, culture, and communications. Their empirical analysis by a simplified growth model indicates that regions that are accessible by road transportation and that have an initial advantage in terms of the availability of knowledge capital tend to have both higher income growth and higher expected returns to real estate investments, reinforcing the agglomerative tendencies of the C-economy.