Schedule-Based Modeling of Transportation Networks: theory and applications

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Preface

This volume contains a set of papers presented at the Second Workshop on Scheduled Based Modeling of Transportation Networks, which was held in Ischia in May 2005. This conference followed the First Workshop on Schedule Based Dynamic Transit Modeling, which was also held in Ischia in 2002. The focus of both conferences was on the modeling of public transport systems, recognizing the critical role that schedules play in these systems.

In this set of papers several important themes emerge beyond the basic questions of how to model individual vehicle trips, their interconnections, and their impact on aggregate demand and choices made by individuals traveling on the network. Specifically, questions include how vehicle and system capacity affects service quality and behaviour, how continuing advances in information technology affect system performance and individual behaviour as well as our ability to characterize both influences.

As the growth in urban travel demand continues to outpace the increases in public transport capacity being offered, capacity constraints are an ever-stronger influence on both system performance and individual behaviour. In many long-established urban rail networks, for example, it is prohibitively expensive and disruptive to significantly expand the capacity of existing lines, but the demand continues to grow due to increasing urban populations as well as the increased trip-making associated with greater affluence. The result is that the capacity of lines is reduced due to over-crowding of vehicles leading to larger station dwell times, which in turn leads to reduced overall speed and practical capacity. As the capacity constraint is reached during a portion of the peak period, regular travelers change their behaviour to avoid the worst of the crowding and delays. Some will change the timing of their trips, others will change their mode of

travel, while still others will change their paths through the network. If decision-makers are to fully understand the costs imposed on passengers and on society in general by lack of investment in the network, then models must be developed to reflect the impacts of capacity constraints both on system performance and on traveler behaviour.

Advances in information technology are also starting to have profound effects on individual behaviour as well as on our ability to characterize demand and service quality, and hence plan improved services. The main influence on individual behaviour is through advanced traveler information systems through which passengers can get reliable information on services both pre-trip and en route. The quality and ease of access to these systems continues to develop, but to date we do not have solid information on the extent to which traveler behaviour is being affected. Clearly as these systems evolve in the future we will need better models to capture their impact and evaluate the contribution specific systems can make to improved performance.

Information technology is also enabling planners and managers to develop a better and deeper understanding of demand. For example, automated data collection systems facilitate estimation of origin-destination travel patterns on the network as well as modal and path preferences of individual travelers. New fare collection systems incorporating smart card technology offer the prospect of linking individual personal and household attributes with their travel patterns, including how their behaviour changes in response to service changes as well as to temporary service disruptions.

The papers included in this volume build on the foundation laid at the first Ischia conference by developing models addressing the full range of analytic challenges in modelling, planning, and operating scheduled public transport systems, with a strong focus on the capacity and information technology issues identified above.

I would like to express my deep appreciation and recognition to Agostino Nuzzolo for the critical role he played in conceiving, organizing, and conducting the Ischia Workshop, as well as in editing this resulting volume of papers. Without his leadership, imagination and energy, this significant accomplishment would not have been possible.

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