



# Transportation Science and Logistics Society

## Outgoing President's Note M. Grazia Speranza



We are rapidly approaching the end of 2014, which implies for me the end of my term as President of the TSL society. I feel grateful to our community for this experience. I

have enjoyed the opportunity to work closely with great officers: Laurie Garrow (Past President), Ann Campbell (Secretary/Treasurer), Mike Hewitt (Communications Chair), and Barry Thomas (President Elect). Laurie's experience has been precious on so many occasions. When I needed information or advice she was there, always informed and responsive. Ann has been a perfect treasurer and controlled our finances so carefully that she even developed a number of scenarios for the cost of drinks and food for the business meeting (costs in San Francisco were much higher than in the past). Mike has efficiently kept our web site updated, organized the election and the survey about the TSL conference, sent out the mail. A lot of work, well done. Barry will be President next year, but already this year has shown enthusiasm and determination to contribute. He has also worked hard to find a great location for next year's workshop. The various issues concerning the TSL activities have been discussed and agreed upon in a collaborative atmosphere. I have also enjoyed the

interactions with the other members of the TSL board, namely the Chairs of the Special Interest Groups: Tom Van Woensel (Freight Transportation and Logistics), Song Gao (Urban Transportation Planning and Modeling), Sadan Kulturel-Konak (Facility Logistics), Steve Boyles (Intelligent Transportation Systems), Thomas Vossen (Air Transportation), and the International Liaisons: Harilaos N. Psaraftis (Europe and Africa), Andres Medaglia (Americas) and Mark Hickman (Asia, Australia, and New Zealand). I wish to warmly thank all, personally and on behalf of our community.

The election for the Secretary/Treasurer for the next two years has confirmed Ann in the role. Her experience will be precious. The result of the election for the President Elect (President in 2016) has been an unlikely perfect tie for our two excellent candidates: Karen Smilowitz and Maciek Nowak. As our bylaws state 'Ties shall be resolved by means of fair



random processes.' A coin, tossed by Michel Gendreau at the business meeting in San Francisco, decided Maciek will be President in 2016. Congratulations to Maciek. He will certainly do a great job. I, and many others,

hope to see Karen run again and win.

The business meeting in San Francisco was very well attended (when there are hundreds of people in a room it is not easy to estimate their number precisely), an excellent sign of the size and level of activity of our community. At the meeting we surveyed all the various 2014 TSL activities. The file that was used at the meeting is available on the TSL web site (<https://www.informs.org/Community/TSL>). It is a collection of slides that were prepared and presented by different authors. Besides the officers, we had talks of the chairs of committees for the Dissertation Prize, Thomas Vossen, and for the Best Paper Award, Rajesh Ganesan. We also listened to the reports of Michel Gendreau, Editor-in-Chief of Transportation Science, and Anton Kleywegt, Transportation Associate Editor of Operations Research. As Michel's term will expire at the end of 2014, the new EIC of TS, Martin Savelsbergh, was announced by Warren Powell, chair of the search committee. Thanks, Michel, for your commitment and hard work. And best wishes to Martin for his new role. Irina Dolinskaya, our cluster chair, emphasized the large number of TSL sessions at the INFORMS Annual Meeting. Justin Goodson, the editor of the TSL newsletter, took photos of award winners and speakers. Thanks, Justin.

TSL, with more than 1000 members, is one of the largest INFORMS societies and in the last years has aimed at organizing workshops dedicated to topics of relevance to our community. After the workshops held in 2011 and 2013 in Asilomar, this year the TSL workshop on 'Handling uncertainty in planning logistics and transportation systems' was held at Loyola University in Chicago, June 30-July 2,

organized by Theo Crainic, Mike Hewitt and Maciek Nowak. The workshop was very successful. The 2015 workshop will be held in Berlin, July 6-8, organized by Catherine Cleophas (RWTH Aachen), Jan Fabian Ehmke (FU Berlin) and Ann Melissa Campbell (University of Iowa). The theme chosen, 'Recent advances in urban transportation through optimization and analytics', looks at the most recent challenges for our community. No doubt this will be another successful workshop.

The past workshops have been highly appreciated by the participants and represent a fantastic opportunity to focus on a theme, to network and share ideas. At the same time, the idea of having TSL conferences, that is conferences of interest to all the TSL members has been around for some time. In the last months we have collected through a survey the opinion of the TSL community and it turned out that a large majority of the respondents (83%) agreed or strongly agreed on the concept of a TSL conference (200-250 people, primarily held in North America). After a careful evaluation of the existing conferences, it was decided to maintain the TSL workshops, two every three years, and to have once every three years (in the years Tristan and Odysseus conferences are not held) a TSL conference. The first TSL conference will be held in 2017. This combination of focused workshops and general conferences looks extremely attractive and promising. I feel that identifying and approving this scheme has been my main contribution to TSL.

TSL is a fantastic, lively, energetic community. The advent of Internet and the globalization of the economy keep raising new challenges to research in transportation and logistics. Our ability to model reality, capture

the essential features of a problem, and design solution methods remain vital.

It has been a honor for me to represent the

TSL community this year. Warm wishes for a happy and fruitful 2015!

## Incoming President's Note Barrett Thomas



I am looking forward to the opportunity to serve the community as President next year. I am fortunate to take over the position with TSL in a position of strength. Over the last two years, Presidents Laurie Garrow and Grazia Speranza along with their dedicated Boards have done a great job shoring up TSL's finances and putting TSL on a path to having its own conference. These two initiatives were vital to giving TSL the foundation it needs to maintain its long-run viability and to remain the premier organization for transportation science and logistics professionals.

TSL also has the opportunity to create even more for its members. Importantly, the results of the INFORMS Membership Survey consistently show that people join INFORMS' subdivisions for three key reasons:

1. To keep up with the state of the art,
2. To network with people of similar interests, and
3. To gain visibility throughout the profession.

I am proposing three initiatives for 2015 that, when completed, will provide TSL members with more of what they want from our community. I propose:

- 1. TSL Solver Challenge.** Challenges are a

proven way to engage the community, advance the state of the art, and gain recognition. I envision a challenge that offers a new and challenging real-world problem. My hope is that the finalists present their work at either the new TSL Conference or the INFORMS Annual Meeting and that we are able to offer the winner a cash prize and the opportunity to publish in a prestigious journal.

**2. TSL Best Applied Paper Award.** Our long run relevance requires that our work ultimately solve the problems that companies and organizations have. A TSL Best Applied Paper Award will recognize those who are making the largest direct contributions to practice and bring attention to the important problems that are being solved.

**3. TSL Working Paper Repository.** While many of us post our working or submitted papers to our own or our Universities' websites, even Google Scholar only sporadically indexes them and their availability often does not get "pushed" to the most interested users. Well crafted, a TSL Working Paper Repository could help solve this problem. It would help us stay engaged with the very latest research and offer the chance to get citations long before a paper is ever accepted for journal publication.

Successful execution of these initiatives requires the volunteer help of TSL members. If you are interested in working on any of these initiatives, please email me at **barrett-thomas@uiowa.edu**. I also welcome your comments and questions.

## TSL Dissertation Prize

The 2014 TSL dissertation prize faced a difficult decision this year. A total of 24 dissertations spanning 10 countries were submitted to the competition. Dissertation chair Thomas Vossen, along with committee members Elisabeth Cherchi, Guglielmo Lulli, and

Megan Ryerson selected a winner and honorable mention. Congratulations to Samiul Hasan of Purdue University (advisor Satish Ukkusuri) and Frank Fischer of Chemnitz University of Technology (advisor Christoph Helmberg)!

### Winner: Samiul Hasan

#### Modeling Urban Mobility Dynamics using Geo-location Data



The widespread use of social media provides extraordinary amounts of user-generated data every day. The recent introduction of the location-based services in smartphone-based social media applications allows people to share their activity related choices at the level of specific geo-referenced location and time. The overarching goal of this dissertation is to develop data analytics to understand urban dynamics and user behavior using geo-located social media data. It develops novel statistical estimation techniques for understanding the spatiotemporal patterns of urban activities.

This dissertation has demonstrated the significant potential of using geo-location data from social media to understand fundamental questions in urban mobility modeling. It has several important contributions related to discovering individual-level patterns and thus modeling urban dynamics from geo-location data. First, the measurement of the long-term spatio-temporal variations in individual mobility patterns and modeling these properties through a simple location choice process.

Second, developing novel methodologies, motivated from advanced machine learning techniques, to discover individual-level activity patterns and life-style choices. Third, developing a novel semi-Markov stochastic process model to reconstruct individual activity sequences from incomplete data. A dynamic mobility simulator, based on the activity sequence model, is developed for predicting traffic congestion in a network. Finally, collection of a location-based social network to analyze the role of social influence in user activity location choices. It measures the relationships between the similarity of the individuals in terms of their activity location choices and the friendship levels.

This thesis makes a major contribution towards developing novel methodologies to analyze longitudinal geo-location data for both long-term human mobility patterns and short-term spatio-temporal correlations in activity patterns. To the best of our knowledge, this is one of the first studies in the field of transportation analysis developing methods based on large-scale geo-location data for modeling urban mobility dynamics. In addition to transportation analysis, it has wide spread applications in various problems such as personalized marketing, emergency evacuation, urban planning, and public health.



## Honorable Mention: Frank Fischer, Dynamic Graph Generation and an Asynchronous Parallel Bundle Method Motivated by Train Timetabling



Time dependent planning problems in transportation and logistics are often modelled using time expanded networks with coupling constraints. For large scale instances these models grow quickly and become computationally intractable by state-of-the-art solvers. Typical solutions approaches are based on Lagrangian relaxation of the coupling constraints, which leads to large nonsmooth convex optimisation problems (NSCOP). In this thesis we focus on one specific application, the train timetabling problem (TTP), which searches conflict-free schedules for several trains in a railway network while minimising delays. We present two techniques improving the solution approach for large instances.

In the TTP the Lagrangian relaxation approach requires the solution of one shortest path problem (SPP) in each time expanded network in each iteration. However, the enormous size of the time expanded networks

makes this computationally challenging. The first new technique, Dynamic Graph Generation (DGG), focuses on the solution of the SPP. Because trains should run without delays only small parts of the expanded networks need to be stored to preserve the correctness of each evaluation. DGG automatically detects if the stored part is too small and increases it dynamically if needed. This also admits infinite time horizons.

The second new technique is an Asynchronous Parallel Bundle Method (APBM), which improves the solution of the NSCOP. Only subproblems of trains competing for the same resources interact directly. This is exploited by selecting dual subspaces corresponding to strongly violated constraints. Only schedules of involved trains are reoptimised. Several subspaces are optimised in parallel. The algorithm automatically detects dependencies between subspaces in order to guarantee convergence. APBM reduces the number of subproblem evaluations significantly improving the efficiency of the overall solution process. We demonstrate the effectiveness on real-world instances of the German railway company Deutsche Bahn.



*Chicago skyline from Lake Michigan during the 2014 TSL Workshop at Loyola University.*

## TSL Best Paper Award

The 2014 TSL Best Paper Award committee consisted of Rajesh Ganesan (chair), Markos

Papageorgiou, Marielle Christiansen, Milind Gajanan Sohoni, and Akshay Belle.

### Winners: Asvin Goel and Thibaut Vidal, *Hours of Service Regulations in Road Freight Transport: An Optimization-Based International Assessment*



Driver fatigue is internationally recognized as a significant factor in approximately 15%–20% of commercial road transport crashes. In their efforts to increase road safety and improve working conditions of truck drivers, governments worldwide are enforcing stricter limits on the amount of working and driving time without rest. This paper describes an effective optimization algorithm for minimizing transportation costs for a fleet of vehicles considering business hours of customers and hours of service regulations. The algorithm combines the exploration capacities of population-based metaheuristics, the quick improvement abilit-

ies of local search, with forward labeling procedures for checking compliance with complex hours of service regulations. Several speed-up techniques are proposed to achieve an overall efficient approach. The proposed approach is used to assess the impact of different hours of service regulations from a carrier-centric point of view. Extensive computational experiments for various sets of regulations in the United States, Canada, the European Union, and Australia are conducted to provide an international assessment of the impact of different rules on transportation costs and accident risks. Our experiments demonstrate that European Union rules lead to the highest safety, whereas Canadian regulations are the most competitive in terms of economic efficiency. Australian regulations appear to have unnecessarily high risk rates with respect to operating costs. The recent rule change in the United States reduces accident risk rates with a moderate increase in operating costs.

*Moon rise over the Bay Bridge during the 2014 INFORMS conference in San Francisco, CA.*



## Upcoming Conferences

### Vehicle Routing and Logistics Optimization (VeRoLog). Hosted at the University of Vienna, Vienna, Austria, June 8-10, 2015.

The conference is the regular meeting of the large community of researchers and practitioners interested in Vehicle Routing optimization and its relations with Logistics. The conference is open to high quality methodological contributions and relevant, real-world applications from the industry and services.

Vienna has a rich cultural scene and many opportunities for recreation and outdoor life. Many tourist attractions and several hotels are within easy walking distance of the conference location. Vienna is a safe city and has consistently been named as a top-three

conference city in the world.

For more information visit [verolog2015.univie.ac.at/](http://verolog2015.univie.ac.at/).



### TSL Workshop: Recent Advances in Urban Transportation through Optimization and Analytics. Hosted at Freie Universität, Berlin, Germany, July 6-8, 2015.

Planning of urban transportation services is challenging due to crowded traffic infrastructures, increasing customer expectations, and rules set by municipalities. We aim to bring together researchers from the often distinct fields of urban transportation and analytics to discuss recent optimization approaches and how they can benefit from the increasing data availability.

The 2015 TSL Workshop will consist of talks surrounding recent applications of urban transportation such as home delivery planning, shared mobility services, environmental-friendly deliveries, and city logistics. This includes state-of-the-art approaches from network design, dynamic and stochastic vehicle routing, and transportation planning. We are also interested in analytics to forecast

customer demand, travel times, and emissions, and how to incorporate that information into optimization models.

For more information visit [www.informs.org/Community/TSL/TSL-Workshop](http://www.informs.org/Community/TSL/TSL-Workshop).





## Odysseus: Sixth International Workshop on Freight Transportation and Logistics. Ajaccio, France, May 31-June 6, 2015.

Odysseus provides a high quality forum for recent developments, trends, and advances in the theory, practice, and application of mathematical models, methodologies, and decision support systems in the field of freight transportation and logistics.

The hometown of Napoleon Bonaparte, Ajaccio is located between the Mediterranean Sea and the mountains of Corsica. For more information visit [odysseus2015.sciencesconf.org](http://odysseus2015.sciencesconf.org)



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## News and Notes

**Carolina Osorio** received a CAREER Award from the National Science Foundation for her proposal entitled "Simulation-Based Optimization Techniques for Urban Transportation Problems."

**David Boyce and Huh Williams** are in the final stages of publishing a book entitled "Forecasting Urban Travel: Past, Present, and Future." The book presents, in a non-mathematical way the evolution of methods, models and theories underpinning travel forecasts and policy analysis, from the urban transportation studies of the 1950s to current applications throughout the urbanized world. From original documents, correspondence and interviews, especially from the United States and the United Kingdom, the authors seek to capture the spirit and problems faced in different eras, as changing information requirements, computing technology and planning objectives conditioned the nature of forecasts.

**Yifei Zhao** received the Kingsman Prize for best Ph.D. thesis in 2014 at The Department of Management Science at Lancaster University Management School for her thesis on "Stochastic Facility Layout." She was supervised by **Stein W. Wallace** (now at the Norwegian School of Economics).

**Leandros Maglaras** was interviewed by IET Electronics Letters: [www.theiet.org/resources/journals/eletters/5025/leandros-maglaras-interview.cfm](http://www.theiet.org/resources/journals/eletters/5025/leandros-maglaras-interview.cfm).

**Laurie Garrow** was elected President of the Airline Group of the International Federation of Operational Research Societies (AGIFORS).

**Elise Miller-Hooks** is Program Director of the Civil Infrastructure Systems Program and is co-leading a second program on resilience for the U.S. National Science Foundation as a rotator (on loan from the University of Maryland).



**Kevin Gue** has moved to the University of Louisville, where he holds the Duthie Chair of Engineering Logistics and serves as Director of the Logistics and Distribution Institute (LoDI).

The University of Catania in Italy awarded its Medal of the University to **Anna Nagurney**, the John F. Smith Memorial Professor of Operations Management at the Isenberg School of Management, on June 13, 2014. The medal recognizes Anna's contributions to network models and applications, and her support of operations researchers. Professor Giuseppe Mulone, Head of the Department of Mathematics and Computer Science at Catania, presented the award after Anna's invited lecture, "Equilibria and Dynamics of Supply Chain Competition with Information Asymmetry in Quality and Minimum Quality Standards." She was also given a book on the history of the university, which was founded in 1434.

**VeRoLog Doctoral Dissertation Prize 2015** will be launched for outstanding Ph.D. dissertations in Vehicle Routing and Logistics Optimization discussed in 2014. Submission Deadline Feb 5, 2015 (see [www.verolog.eu](http://www.verolog.eu) for the forthcoming details).

**VeRoLog Solver Challenge 2015**, will be organized in collaboration with PTV. Team Pre-registration Submission Deadline Dec. 31, 2014 (see [www.verolog.eu](http://www.verolog.eu) for the forthcoming details).

SIAM has just published the second edition of the book edited by **Paolo Toth and Daniele Vigo** on Vehicle Routing. This time the book,

titled "Vehicle Routing: Problems, Methods and Applications, second edition," is coupled with a companion book edited by **Angel Corberan and Gilbert Laporte** titled "Arc Routing: Problems, Methods and Applications."

We are glad to announce the launch of **VRP-REP: the vehicle routing problem repository**. As a result of the ever-increasing interest in vehicle routing problems, today VRP data (test instances and solutions) is being produced faster than ever. Since the community lacks a centralized open-to-everybody data repository, researchers typically share their data through their personal or institutional websites. As a result, VRP data is spread all over the Internet in tens (maybe hundreds) of different formats. In the past, some important efforts have been made to centralized VRP data (e.g., the TSPLib or the VRP web), but the resulting repositories are "closed" and depend on a single person for maintenance and updating. The VRP-REP project aims to provide the community with a contributive platform for sharing VRP data and with a number of services and tools to make data browsing and processing easier. VRP-REP services include: uploading/downloading datasets (i.e., set of instances); reporting solutions for datasets registered in the platform; linking datasets to problem variants and bibliographical references; browsing best known solutions for registered datasets; and, browsing references per dataset or problem variant. VRP-REP tools include: a universal xml format for data files and open-source code for data reading/writing and solution checking. The success of the VRP-REP initiative depends on everyone's contributions. We invite

TSL members to join the VRP-REP at [www.vrp-rep.org](http://www.vrp-rep.org) and to start contributing.

**Jorge Mendoza on behalf of the VRP-REP Steering Committee.**

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To suggest items for future newsletters, contact Justin Goodson at [goodson@slu.edu](mailto:goodson@slu.edu) or Mike Hewitt at [mhewitt3@luc.edu](mailto:mhewitt3@luc.edu).

