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Symposium “Towards integrated modelling of urban systems”

Guest Editorial



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This special issue proposes a selection of papers presented at the symposium “Toward integrated modelling of urban systems” organized in Lyon on October 15-17, 2014 by the Laboratory of Transport Economics (LET, University of Lyon) on behalf of the French Scientific Network “Urban Modelling”.

The French Scientific Network “Urban Modelling” gathers stakeholders of the sustainable city, from upstream research to practitioners, with an objective of removing barriers between disciplines and stakeholders. The scope of urban modeling includes, without claiming any exhaustiveness, the built environment and the physical phenomena, the urban morphologies and the spatial and temporal dynamics, the nature and life in town. This scope mobilizes human and social sciences, sciences of the environment and engineering sciences.

The main theme of the 2014 symposium was the integrated modeling of urban systems. The majority of the world lives now in urban areas which are quickly extending. This phenomenon raises issues in several dimensions: the economic one (efficiency of the city and costs for its stakeholders), the social one (cohesion, segregation and disparities of access to the amenities) and the environmental one (energy consumption, greenhouse gas emissions, loss of biodiversity, creation of man-made landscapes). The simultaneity of these problems calls up for an integrated approach into urban policies, their evaluation and consequently the modelling of urban processes.

These processes involve spatial and temporal dynamics on various scales, whether short-term (less than an hour in transport networks) or long-term ones (several decades); unpredictable breaks or smooth urban transitions during one or two decades; the transformations of one district or whole urban areas. A first issue relates to the characterization of the relevant spatial and temporal scales to handle urban phenomena.

A second issue focuses on linking of various spatial and temporal scales between models (aggregate / disaggregate, micro / macro, static / dynamic). It is now a commonplace to say that a city is a complex system and sciences of the complexity contribute today to the modelling of parts of this system by a bottom-up approach.

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However, how to reconcile the bottom-up models (which make emerge collective behavior as in the case of multi-agents models) with the top-down models which are relevant to represent certain macroscopic processes? Besides, architectures of models become more and more complex by combining an important number of components. How to ensure a consistent calibration of the whole?

The third issue follows the emergence of “big data”, as for example GPS data allowing to locate mobile items (vehicles or human beings equipped with smartphones), and more generally various data of consumption possibly made available in the near future (for instance the intelligent meters of electricity, e-ticketing and e-money). How does this phenomenon contribute to the renewal of urban data collection? How can these data complete the richer data traditionally collected during heavy cross-section surveys?

Finally, these new data may be available real time, modifying the managerial organization of cities and challenging the traditional models of planning. Besides, with to the injunction for real time, the models also have to lose their black box aspect and improve their legibility in order to present the results in a way which can be communicated to the decision-makers, even to the citizens, and, why not, turning them out into tools of interactive exploration placed at the heart of the public debate.

The call was widely open to a truly international audience. A hundred of proposals were received, of which sixty were selected by the scientific committee for oral presentation. After the symposium authors have been proposed to submit a paper and following a rigorous peer-review process, nine papers were selected for this issue.

We thank the members of scientific committee of the symposium and the reviewers of the papers. We also acknowledge the help of Cécile Chèze, PhD student at LET, for her assistance in managing and editing this issue.

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