Round Table

Complexity and Knowledge of Complex Systems

Medium 2017 Conference

Spatio-temporal Behavior in Complex Urban Systems

17th June 2017

medium
New pathways for sustainable urban development in China's medium-sized cities

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Contextualization

- **S. Zhou :** Patterns, Spatio-temporal Correlations and Processes as principal research questions, which understanding is enhanced by new Big Data and models.
- **D. Pumain :** SimpopLocal, an achievement of the evolutive Urban Theory strongly coupling empirical stylized facts with modeling experiments.
- **Q. Zhan :** Coupling of heterogeneous models and data, application as tool for Urban Planning.
- **M. Bida, C. Rozenblat and E. Swerts :** A model based on geographical and economic theories and stylized facts.
- **S. Wang :** An analysis of the low-carbon approach to sustainability ; proposition of a broader methodology and tools.
- **F. Pfaender :** Data as traces that need to be collected with elaborated tools and specific methods, used to elaborate multi-scalar empirical analyses and theoretical considerations.
- **Y. Yue :** Big Data on mobility used to learn stylized facts on intra-urban migration, theoretical implications for district strategies.
- **J. Raimbault :** A model based on theory and empirical facts.

Knowledge Framework

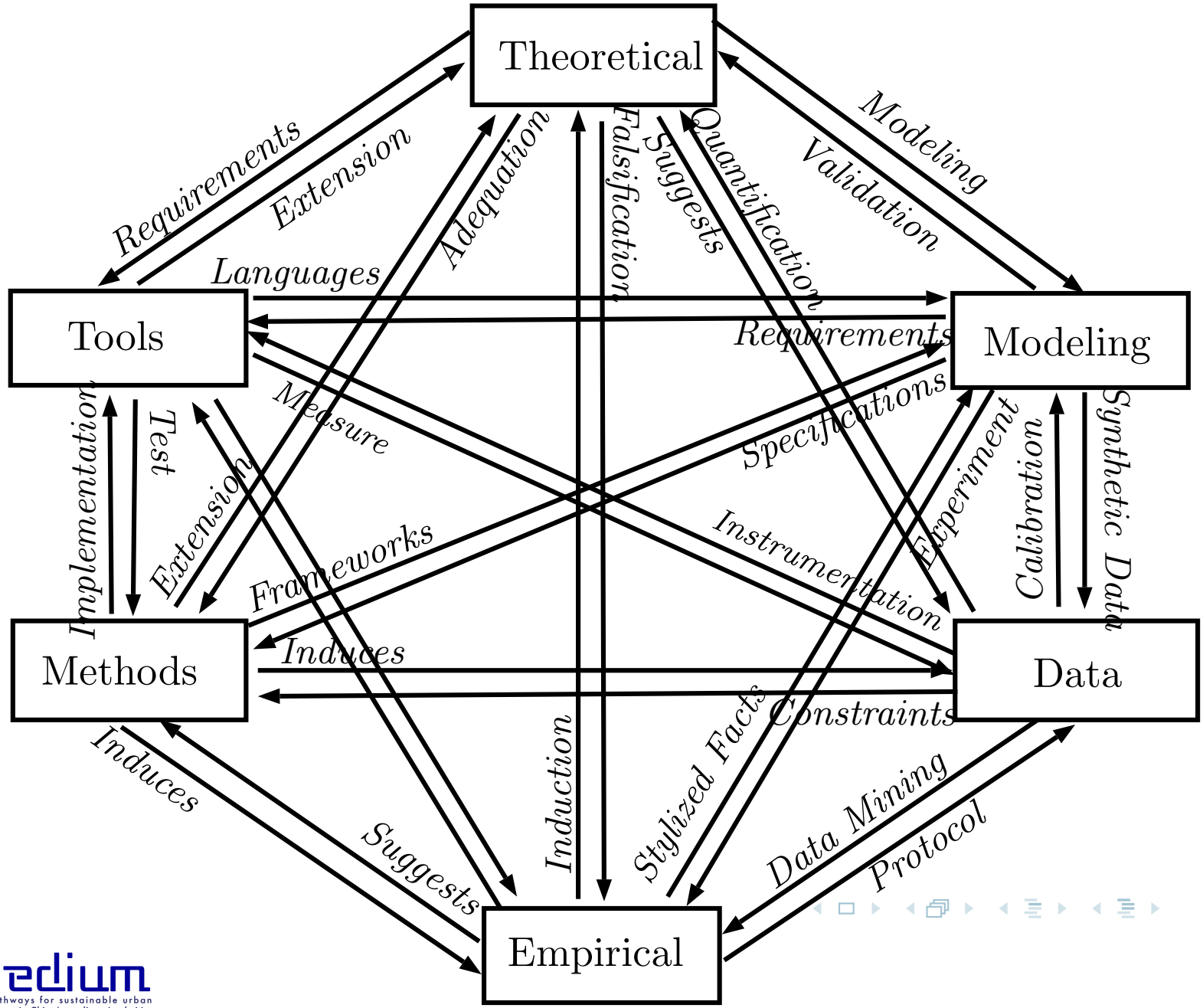
Knowledge Framework specification

Any scientific knowledge construction on a complex system is a perspective in the sens of Giere [Giere, 2010], which is composed of knowledge contents belonging at least to necessary domains, that *co-evolve* [Holland, 2012] between themselves and with the other elements of the perspective, in particular the cognitive agents.

Necessary Knowledge Domains :

- **Empirical.** Empirical knowledge of real world objects.
- **Theoretical.** More general conceptual knowledge, implying cognitive constructions.
- **Modeling.** The model is the formalized *medium* of the scientific perspective, as diverse as Varenne's classifications of models functions [Varenne, 2010].
- **Data.** Raw information that has been collected.
- **Methods.** Generic structures of knowledge production.
- **Tools.** Proto-methods (implementation of methods) and supports of others domains.

Knowledge Framework : illustration



Questions

Main direction :
What are the interplays between Empirical, Theories, Models, Methods, Tools and Data in your research ? What concrete benefits can be drawn/do you draw from the levels of interdependencies (high or low) ?

Corollaries : *or discuss why it shouldn't be*

- Role of interdisciplinarity and merging "quantitative" and "qualitative" ; difficulties to achieve these.
- Role and nature of complexity(ies) ; difficulty to tackle it.
- *Bonus/Poll : Is Complex Knowledge intrinsically reflexive, and is it linked to the combination of the different natures of Complexity ?*

References I


Giere, R. N. (2010).
Scientific perspectivism.
University of Chicago Press.


Holland, J. H. (2012).
Signals and boundaries: Building blocks for complex adaptive systems.
Mit Press.


Varenne, F. (2010).
Les simulations computationnelles dans les sciences sociales.
Nouvelles Perspectives en Sciences Sociales, 5(2):17–49.