

Integrating urban models and theories

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Abstract:

Urban systems are highly multi-dimensional and complex, and thus studied from various perspectives and disciplines. To reach sustainable urban and territorial policies, we suggest that an integrative approach is needed. We propose in that context a theoretical and methodological framework, focused on the coupling and integration of simulation models.

A first application example is then given, developing an urban dynamics model at the macroscopic scale coupling cities population dynamics with innovation diffusion. This simulation model allows investigating trade-offs between sustainable development goals in synthetic systems of cities, in particular emissions and innovation. Work in progress includes further model layers for economic exchanges and infrastructure, increasing the dimension of the SDG space in which Pareto compromises are found.

The second example corresponds to the chapter of the Compendium discussed during this workshop. We review multiple models aiming at explaining regularities of city growth, including Gibrat's law of proportional random growth, Simon's random growth model, and more recent contributions. These models can be benchmarked against empirical evidence for multiple systems of cities, suggesting that a multi-modeling approach is more appropriate to cover the diversity of historical and geographical contexts observed for systems of cities.