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DEPARTMENT OF ECONOMICS

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Advanced Brainstorm Carrefour (ABC)

The City 2.0:
smart People, Places, Planning

***The Regional Science Academy* (TRSA)**
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Host:
Edward Glaeser

Organizers:
Peter Nijkamp
Karima Kourtit
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Place of venue:
Harvard Kennedy School -
Harvard University

Room:
Thompson Room

Barker Ctr, 12 Quincy St, Cambridge, USA

The City 2.0:
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1. Intelligent Cities in the '*New Urban World*'

Demographic dynamics and urban growth are one of the most salient developments on our planet. The world population is – despite ageing processes in many developed countries − still rapidly increasing in size. To accommodate several billions of additional inhabitants in the decades to come calls for new settlement systems and creative ways of living for the human habitat. Persistent urbanization is one of the most obvious responses to cope with the global population rise. At present, already more than one half of the world population lives in urban areas (with a share of up to 70 to 80% in OECD countries), and this trend is expected to continue in the decades to come. The emerging '*urban century*' puts a high stress on the economic, social, technological, cultural, health, safety and environmental capabilities of large cities and will dramatically affect urban morphology. Urban vitality and sustainable urban living is one of the great challenges of the '*New Urban World*' (Kourtit 2019).

Against this background, the New Urban Agenda formulated at the HABITAT III conference in Quito (October 2016) states: "*This New Urban Agenda acknowledges that culture and cultural diversity are sources of enrichment for humankind and provides an important contribution to the sustainable development of cities, human settlements, and citizens, empowering them to play an active and unique role in development initiatives; and further recognizes that culture should be taken into account in the promotion and implementation of new sustainable consumption and production patterns that contribute to the responsible use of resources and address the adverse impact of climate change*" (p.2).

In the light of the critical importance of urban areas for a sustainable and healthy development, a new fashion word has in the past years been introduced, viz. 'smart' (or 'intelligent') cities. A smart city aims to improve its performance (social, economic, environmental, technological, etc.) – relative to other cities –by using advanced knowledge and information ingredients – mainly through access to and use of digital technology – for strategic urban policy and city management. A smart city is not an endpoint in itself: it is a learning and inclusive city, with the involvement of stakeholders and citizens, in which education empowerment and employability are cornerstones with the aim to improve its performance (the XXQ-principle based on a maximization of urban quality; Nijkamp 2008). In the '*urban century*', smart cities are seen as the spearheads of balanced and competitive development of our world, mainly through the presence and effective exploitation of agglomeration advantages of all kind (scale benefits, economies of density, proximity and connectivity advantages). But 'big size' is not necessary compatible with the human scale. Normally, the action radius of people in urban agglomerations is rather small and limited in scope: daily activity and interaction patterns among people in a city are not extraordinary large and to focus more on 'villages' in the city. This microcosmic perspective on city life calls for new ways of analyzing

urban behavior and activity patterns of people, as well as on conceptualizing the public space in a city from a human perspective. What makes the city a real city?

2. Scope and Aim

Cities are new magnets and house nowadays the majority of the people in many countries. They face many challenges (e.g., transport, energy, amenities, land use, climate change, poverty, housing) which call for appropriate and informed policy responses. There is a great variety of interest groups and stakeholders, with a broad diversity of objectives and information needs. Large cities are not a random potpourri of daily interaction patterns of people; they are composed of rather systematically organized micro-units. This microcosmic image of a decomposed city calls for new data analytics at a disaggregated scale. Data systems may vary from individual to aggregate information, with different degrees of accuracy. There is however, no systematic architecture for transforming unstructured urban data into a coherent and measurable data system that is suitable for policy making and policy analysis. The current wave of 'big data' (e.g., from personal mobile devices, social media, camera's, sensorization of urban space) offers not only a challenge, but also an unprecedented and innovative opportunity for balanced and effective city governance. To meet this new challenging opportunity, modern cities need to develop advanced expertise on complex city dynamics, urban informatics and analytics, smart urbanity and cyber civil participation (see Batty 2013).

Information on a city can be extremely diverse, ranging from aggregate indicators (number of people, length of streets, size of urban parks) to detailed or disaggregate indicators (number and nature of individual accidents or crimes on a given day, detailed air quality near urban ring roads, influx of specific groups of illegal immigrants in certain districts). Some information may be structurally available, but other types of information are present only on an ad-hoc or unstructured basis. Some data may be based on empirically verified information, other data may be uncoordinated and unverified (e.g. social media data), even though the contents of such data may be highly interesting. In a smart city, some data may thus be used for strategic urban performance management regarding long-range critical urban domains (e.g., environmental quality, labour market, mobility, education) or for specific policy fields belonging to the competence of institutional divisions in the city government (e.g., land use, traffic, social security).

However, city governance does not only need a long-term horizon, but also a short-term response mechanism (e.g., crowd management in case of big manifestations). Such data have to be instantly available and the policy response or management intervention should be immediate and on the spot (e.g., traffic management, crowd control, security control). The previous observations have also far-reaching implications for advanced decision support systems, such as urban dashboards; there is however not a one-size-fits-all dashboard. On the contrary, there are multiple fit-for-purpose dashboards in the complex urban democratic society. Thus, professional data management is essential for any '*computable intelligent city*' or 'brain-city'.

3. Urban Policy in Motion

Cities all over the world – in both developing and developed countries – display complex evolutionary patterns. Some cities show wave-like fluctuations, others show a steady rise. Over the past decades, we have observed a particularly rapid increase in population size of large urban agglomerations (e.g. Mumbai, Sao Paulo, Shanghai), with far-reaching socio-economic implications. In the '*urban century*', cities are both sources of hope and despair; they are faced with both positive and negative challenges.

The urban policy responses to such challenges are varied and show different degrees of success. The performance of cities does not only depend on economic and geographical factors, but also on institutional and cultural backgrounds. Cities have turned into open, complex and multilevel organisms, with a great diversity among stakeholders with different aspirations.

The governance of such complex urban entities is fraught with many problems, and has not always led to satisfactory outcomes. As mentioned, in recent years, a new concept, coined 'smart city', has come to the fore. This concept regards the city as a multi-faceted material and immaterial phenomenon, which is increasingly determined by access to and use of digital technology. The city tends to become a 'cognitive engine' (Batty 2013), in which an intelligent use of big amounts of relevant – often individual – data is key for a satisfactory performance.

In the past years, we have seen interesting smart initiatives e.g. in transportation and mobility planning, service provision in the public sector, safety management etc. In this context, 'big data' supported by digital technology turn cities into powerful cognitive machines, which most likely will be able to cope effectively with energy scarcity, high mobility, environmental sustainability, and safety in public spaces. Consequently, urban structures and spacial interaction patterns will drastically change, leading to new urban systems connected by virtual and physical infrastructures which form the backbone of smart or intelligent cities.

In this so-called *i*-city a fusion of heterogeneous information from different policy domains is a key for governance success. For instance, mobility, environment, safety and poverty would have to be looked at simultaneously from the perspective of integrated data treatment. The pervasive use of modern ICT is promising and allows in principle to produce holistic synergy in a 'big data' environment at any spatial level of an urban systems network (see also Kourtit and Nijkamp 2017).

Introduction of such 'big data' systems will have far-reaching impacts on traditional ways of urban modelling, in the form of equilibrium models, activity-based models, space syntax, discrete choice models, complex spatial systems analyses, BIM models and agent-based models. In the new stream of 'big data' analysis in a microcosmic city, there is more scope for a wealth of spatially and temporally disaggregated longitudinal, statistical data with a high degree of granularity, which will need sophisticated data science techniques.

This new approach calls also for new decision support tools in a multi-stakeholder setting, for both strategic urban policy and daily management of a complex city system. We observe recent tendencies

towards more participatory or interactive modes of urban planning, while on the other hand there is also a new emerging trend to design operational navigation tools for urban policy. A recent phenomenon in this field is the emergence of the above mentioned *urban dashboards*.

4. Characteristics/Design Principles of Smart City Policy

The rising complexity of modern urban agglomerations – which abandon their island position and move into strategic hubs in an open network society and in a globalizing space-economy – and the unprecedented and pervasive use of ICT (see Neal 2012) – which turns cities into complex data machines with an ever increasing information wealth – prompt unforeseen challenges to urban policy-making bodies and stakeholders. To cope with the new emerging tasks of modern city governance, due attention has to be given in particular to the following elements of and tasks involved with smart city planning:

- The new interpretation of the city as a shared public space for all, with sufficient focus on local image, functionalities and connectivity, in which the 'urban village' is a microcosmic map of a decomposed complex city system.
- Geographic representation of *city morphology*, characterized by spatial and socio-economic externalities from density, proximity and connectivity in the urban space, ranging from 'street-level' attributes (e.g., space syntax) to collective data representations at the meso-level of a city (e.g. 'geoscience').
- Focus on *smart people and smart specialization*, driven by hierarchical 'cognitive ladder' principles (from education and training via knowledge and expertise to creativity and innovation in urban areas for all actors in the city area) ('smartness').
- Stimulation of an ICT habitus, in particular *digital technology access and use*, including fine-grained geo-science statistical information and accessible software for decision support and city management ('intelligence').
- Involvement of local actors/agents though the use of *multi-modal social media platforms*, collecting and storing the avalanche of publicly available personal information from many modalities and sources, and leading to systematics in the acquisition of and transmission of big data, which allows the use of sophisticated urban analytics and data metrics ('urban informatics').
- Development of an open-access *data warehouse* at city level, based on sound digital data infrastructure principles and public access conditions for data providers and users in a participatory city democracy ('warehousing').
- Design of an *interactive*, spatially disaggregated, *multi-temporal* and *open-access 3-D/4-D dashboard* – or a user-oriented decision support system – for a '*computable intelligent city*', to be used by urban stakeholders employing tailor-made city KPIs (Key Performance Indicators).

It goes without saying that urban data systems are not only heterogeneous, but also show a high variability in accuracy and reliability. 'Perfect information' does not exist, and therefore strict data management and analysis is a *sine qua non* for information to be used in a city dashboard or decision support system.

5. The Urban Arena

The modern city is not an oasis of relaxation and social tranquillity, but an arena of socio-economic and political forces in which maximization of urban performance, sustainability, competitiveness and citizens' satisfaction ('happiness' or 'çity love') play a key role. Depending on local conditions in cities and priorities of stakeholders and inhabitants, the following – illustrative and non-exhaustive – policy domains or themes may be mentioned in the management and strategic development of a computable intelligent city, composed of decomposed, but interconnected microcosmic units:

1. *Urban metabolism*: circular economy, climate neutrality, bio-based economy, smart energy grids, etc., as a support for urban sustainability;
2. *Smart virtual mobility*: substitution or reduction of physical flows, virtual connectivity, cyber behaviour, ICT education etc., as a vehicle for environmentally-benigh mobility;
3. *Cultural heritage* and *urban ambiance*: e-tourism, tele-visits, electronic appreciation platforms (e.g., TripAdvisor, Foursquare, Twitter, Spotify), smart communication devices, digital information equipment etc., as a means for supporting urban culture;
4. *Health and well-being*: tele-medical services, urban happiness initiatives and research, cognitive and perceptional GIS (3-D/4-D) images, city gaming with target group, etc., as a contributor to human health;
5. *Social and human capital*: virtual interaction, cognitive communication, opinion formation, social mobilisation including political participation scenarios, digital training center, etc., as tools for a social network city.

The ABC to be organized in Boston in **November 11-12, 2019** will address the above challenging questions from a research and policy angle. The emphasis will be on unconventional thinking – from a microcosmic perspective – on the complex organisation and future of urban systems. The aim is not to deliver standard conference papers, but to present new ways of thinking (conceptual, theoretical, strategic, operational or planning) that would be signposts or eye-openers for the city of the future. The focus should in all cases be on **The City 2.0: *smart* People, Places, Planning**.