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From the Guest Editors

# On the relationship between Information and Communication Technologies (ICT) and global urban networks

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Both Sassen (1991) and Castells (1996) have argued that a proper understanding of cities and their relative positions within the current globalized Information Society entails the analysis of the myriad relationships between Information and Communication Technologies (ICT) and urban networks. After all, due to the rise of new information and (tele)communication technologies , the world is experiencing a series of fundamental social, political, economic, and cultural transformations whereby information and knowledge seem to be the prime facilitators of economic productivity and societal change under contemporary capitalism. As these ICTs are key drivers of the current globalization processes, questions around how different types of knowledge flow between cities become central to the study of cities within the global urban hierarchy. While influential theoretical and empirical work such as that by Sassen (1991), Castells (1996), and Smith and Timberlake (2001) has emphasized the need for using these ICTs to approach the global urban system, empirical elaboration has been lacking in diverse ways: the majority of empirical analyses in the 'world city network' (WCN) literature are analyses drawing on the corporate geographies of service firms and air transport-based studies of urban connectivity (Derudder & Witlox, 2008; Van Nuffel et al., 2010; Devriendt et al., 2010). This relative underdevelopment of ICT-based analyses has a number of causes.

A first reason is that analyses based on the tangible infrastructures of urban network-formation (such as airports) or the key agents in the creation of inter-city interactions (such as globalized service firms) seem to have more analytical purchase (Derudder, 2006). A second reason is a scepticism amongst many social and urban scientists about the hype which surrounds ICT, i.e. the popular and, to a surprising extent academic, 'visionary' statements about telecommunications and the concomitant future decline of cities (e.g. 'the end of geography', 'the death of distance', 'the anything-anywhere-anytime dream', etc.) (Graham, 2004). A further cause is the comparative 'invisibility' of ICT flows (Hillis, 1998; Janelle & Hodge, 2000): urban scholars seem to be trapped by what Cosgrove (1984, p. 31) and Lowenthal (1961, p. 241) have respectively called "the argument of the eye" and the intimate relation between "human logic and optics". Put differently: although ICT is no less important than air travel for the (re)production of inter-city flows, the former infrastructure is somewhat less 'visible' so that urban scholars are perhaps less inclined to make use of ICT-based indicators.

Probably the most important reason for this relative neglect, however, has been the lack of suitable data to measure information flows (Grubesic & Murray, 2005). Greenstein (2007, p. 3) puts it as follows:

> "We have marvellous statistical data about thousands of cements and concrete plants throughout the [world], as well as the users in many locales. We know a lot about the price of cement and concrete, productivity improvement in cement and concrete, the contribution of these firms to the tax base of their local economy, and, even, how much they contribute to pollution in a locality. It goes on and on. I would conjecture that (if a policy maker cared to know) we can predict how many plants will enter a local region when the US Congress passes a new highway construction bill. In Internet studies, in contrast, we have little comparable data about the prices, quality, taxes, employment or revenues. The frontier of research is still at a descriptive level because we do not have the data."

Actual Internet traffic data are, for instance, not publicly available because of security reasons and commercial confidentiality (Dodge & Kitchin, 2002). Furthermore, the fast-evolving nature of ICT implies that data that are sometimes out-dated almost as soon as they actually appear (Rutherford et al., 2005; Grubesic, 2008). In order to address the notable gap in the urban literature on the issue of how the political, economic, and social effects of these ICTs relate to measuring and conceptualizing the global urban hierarchy, additional research is needed. The present focus issue wants to open the conversation on this 'urban technology' topic by bringing together conceptual and empirical papers dealing with the close relationships between ICT and urban networks.

This special issues is made up of seven papers in total. The paper by Wilson and Corey introduces a number of global trends and issues in ICT access and use, making use of data stemming from nineteen city states and highly urban, densely populated locations. In their analysis, they distinguish between four realms of ICT characteristics – i.e., device, access, culture and governance – to express the scale and scope of ICT use. This categorization can be used in order to examine how different places (cities, regions, and countries) are experiencing recent and new information technologies, and how attention is drawn to the importance of the local, as well as the global, when analysing ICT.

The paper by Rutherford starts with a reflection on some of the limits to an 'inter-city' approach to urban ICT developments and flows. His aim is not so much to take issue with this approach which remains a valuable entry point into understanding how ICTs both reconfigure and are reconfigured by economic exchanges between cities and between urban actors under fast-moving conditions of globalization, but the objective is more focused on highlighting some of the tensions, contradictions and issues that are brought to the surface when we think through the shifting co-evolution of cities and communications technologies. The result is an alternative conceptual viewpoint on the relationship between ICTs and urban networks which, while aware of the (in part digitally-mediated) relationality of cities, develops an understanding of the urban as an assembled space of parts of other places. From this view, urban information flows are constructed, maintained and experienced through an inherently socio-technical process based on the day-to-day activities and practices of a diverse set of actors, the contested relations they

create and sustain with other actors, and the variety of tools and instruments they make use of in their work.

The next two papers deal with some of the geographical characteristics of Internet flows. Both papers can be considered as examples of the so-called 'cyberplace (CP) approach' in the analysis of urban networks (Devriendt et al., 2008). This approach analyses the characteristics of the 'hard' ICT transportation network and therefore makes use of a tangible infrastructure to analyse the "virtual" transnational linkages of cities located in absolute space. It thus starts from the assumption that the extent and quality of digital telecommunications infrastructure through which the virtual exchange and transactions occur, has to and can be used to measure digital intercity relationships. The access to new technology is of prime importance in large cities where the largest markets are found and is of secondary importance in smaller places (Malecki, 2002). Most CP-based studies make use of this tangible infrastructure: they assess the transnational urban network through a spatial analysis of 'the network of networks', i.e. the Internet backbone bandwidth networks. In the paper by Grubesic et al., the focus is on the United States and the analysis of the data for the Internet2 network. This network is an advanced hybrid optical and packet network designed and implemented to facilitate collaborative research on emerging network technologies. The results suggest that asymmetries exist between ingress and egress connectivity and flows throughout the United States. The paper by Tranos and Gillespie, on the other hand, focuses on the European situation. Their paper provides a relational understanding of the European urban network based on the cities' connectivities within the Internet backbone network. To this end, network analysis techniques are utilized and four different centrality measures are introduced, which are then summarized with the use of cluster analysis. The analysis provides important insights for the significance of European cities within the emergent global and European economic system, which can be explained both from long-established economic and political geographies, but also from the new roles that some cities perform in this global network.

The three remaining papers (Devriendt et al., Graham & Zook; Zook et al.) can be categorised as examples of the so-called 'cyberspace (CS) approach' in the analysis of urban networks. This approach is less concerned with the materiality of the enabling infrastructure than with the material effects of information that takes on myriad, intangible forms as it is produced, disseminated, translated and consumed between and within places. The CS approach is based on the structure of the Worldwide Web as exemplified by hyperlinks and the structure of search engines. In the paper by Devriendt et al., informational rankings of the world's 100 largest cities is derived using a quantitative and qualitative hyperlink analysis in respect of two prominent current issues global in scope: the global financial crisis, and global climate change. They find that the traditional, developed Western cities are most prominent in terms of the environmental measures while, in terms of the financial criteria, "new" Asian financial centres are ranked more highly. Zook et al. analyse how distances between a sample of a hundred major world cities varies when measured in cyberspace. The paper develops a novel spatial statistical model based upon the number of user-generated placemarks and keywords indexed by Google Maps. The comparison of this digital measure with the material movement of people and other relevant descriptive variables provides a cogent model that seeks to explain why certain city pairs (especially those that are physically distant) exhibit strong informational linkages. Finally, Graham and Zook focuses on the representation of physical places on the Internet or what they term 'cyberscape'. While there is a wide range of online place-related information available, this paper uses the metric of the number of user generated Google Maps placemarks containing

specific keywords in locations worldwide. The paper provides a cartographic analysis of these cyberscapes and examines how they inform us about the material world.

It should be clear that ICT-based analyses for studies on urban networks are important, and that this type of research is also mounting. We hope that this themed issue will contribute to and also further advance the attention-grabbing debate on the connections between ICT and urban networks.

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