Smart city policies: A spatial approach

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ABSTRACT

This paper reviews the factors which differentiate policies for the development of smart cities, in an effort to provide a clear view of the strategic choices that come forth when mapping out such a strategy. The paper commences with a review and categorization of four strategic choices with a spatial reference, on the basis of the recent smart city literature and experience. The advantages and disadvantages of each strategic choice are presented. In the second part of the paper, the previous choices are illustrated through smart city strategy cases from all over the world. The third part of the paper includes recommendations for the development of smart cities based on the combined conclusions of the previous parts. The paper closes with a discussion of the insights that were provided and recommendations for future research areas.

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Introduction

Smart cities represent a conceptual urban development model based on the utilization of human, collective, and technological capital for the enhancement of development and prosperity in urban agglomerations. However, strategic planning for smart city development still remains a rather abstract idea for several reasons, including the fact that it refers to—as yet—largely unexplored and interdisciplinary fields. Stakeholders (local governments, research institutions, grassroots movements, technology vendors, property developers, etc.) are often driven by conflicting interests. The tendency to believe that innovative technological instrumentation automatically transforms a city into a 'smart' one, and a biased use of the buzzword 'smart' in fragmented or superficial ways, actually hinder the clarification of the subject even further. Regarding the above situation, this paper reviews the spatial factors which differentiate smart city policies, in an effort to provide a first and clear view on the strategic choices that should be considered when mapping out a smart city strategy.

The addressed problem is rooted in the fact that there is currently a great misunderstanding about what smart cities actually are, let alone how they can be realized. Despite the extensive discussion, no agreed definition on 'smart' and 'intelligent' cities exists. In the smart cities arena, we encounter a multitude of definitions, and solutions without an existing prevalent or universally acknowledged definition (Allwinkle & Cruickshank, 2011; Chourabi et al., 2012; Hollands, 2008; Komninos, 2011; Lombardi, Giordano, Farouh, & Yousef, 2012; Nam & Pardo, 2011a; Papa, Garguilo, & Galderisi, 2013; Wolfram, 2012). Furthermore, strategic planning for the development of smart cities is still a largely unknown field (ABB, 2012; Abdoullaev, 2011; Chourabi et al., 2012; Gsma & Cisco, 2011; Hollands, 2008; Huber & Mayer, 2012; Komninos, 2011; Nam & Pardo, 2011a) and the terms 'smart' and 'intelligent' are used interchangeably throughout the literature (Hollands, 2008; Pardo, Nam, & Burke, 2012; Wolfram, 2012). This paper makes no distinction between the two expressions. For the purposes of this paper, the working definition of 'smart cities' is the following: smart cities are all urban settlements that make a conscious effort to capitalize on the new Information and Communications Technology (ICT) landscape in a strategic way, seeking to achieve prosperity, effectiveness and competitiveness on multiple socio-economic levels.

This paper commences by reviewing the factors which differentiate policies for the development of smart cities. Four strategic choices with a spatial reference are identified: national versus local strategies, strategies for new versus existing cities, hard versus soft infrastructure-oriented strategies, and sector-based versus geographically-based strategies. The advantages and disadvantages of each strategic choice are presented, again as they emerge from the smart city literature. In the second part of the paper, the previous choices are illustrated though smart city strategy cases from all over the world. The third part of the paper includes recommendations for the development of smart cities based on the combined conclusions of the previous parts. The paper closes with a discussion of the insights that were provided and recommendations for future research areas.

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This paper contributes to the smart city discourse by helping dissolve the confusion about strategic choices regarding smart city development and stating the advantages and disadvantages of these strategic choices. An intensive effort has been made to draw material together on the basis solely of the smart city literature. Furthermore, the paper provides a starting point for the design of smart city strategies, documents differentiating factors via examples of applied strategies in each category, and keeps the smart city conversation ongoing by instigating further research.

A range strategies for smart city development

National versus local strategies

A major differentiating characteristic among smart city strategies is whether they concern an entire country or nation, or they are focused on a more local level, be it a neighborhood, municipality, city, metropolitan area or even a region.

Most applied strategies are built on the local level. The advantages of local-level smart city strategies, as they have been recently cited in the smart city literature, include that:

- Innovation has a geographical locus and knowledge has a geographical 'stickiness' – therefore their advancement on a local level is more effective in making cities smart (Auci & Mundula, 2012; Bria, 2012; Coe, Paquet, & Roy, 2001; Hodgkinson, 2011; Nam & Pardo, 2011a; Townsend, Pang, & Weddle, 2009).
- Becoming smart includes fostering a competitive economy; competition and competitiveness are clearly a matter of the urban scale, as currently local characteristics are the ones that differentiate cities among each other (Cosgrave & Tryfonas, 2012; Giffinger & Gudrun, 2010; Giffinger, Haindlmaier, & Kramar, 2010; Hodgkinson, 2011).
- Cities are capable of engaging various constituents in the innovation process on a much broader range of activities, fostering citizen-centric governance; the result is well established smart city ecosystems (Bria, 2012; Hodgkinson, 2011; Paskaleva, 2011; Streitz, 2011).
- Cities are more flexible in exploring and adjusting a variety of business and governance models to their own profit. Their experience, agility and proximity provide them the necessary knowledge and ability to set up a favorable climate for the purposes of becoming smart (Hodgkinson, 2011; Misuraca, Reid, & Deakin, 2011).
- Urban problems are of manageable size and known nature, and respond to locally selected goals, which make them less effort-intensive (Caragliu & Del Bo, 2012; Hodgkinson, 2011).
- Cities have peers (i.e. other cities with similar characteristics), from which they can pool insights on how to become smarter (Hodgkinson, 2011; Tranos & Gertner, 2012).

On the other hand, the disadvantages of local-level smart city strategies include the following:

- Small and medium sized cities compete for resources against larger and better-equipped cities; therefore they are less likely to be able to receive or afford the necessary funds for smart city projects (Giffinger et al., 2010).
- Cities will have to find a way to align their smart city strategy with the complex web of policy agendas already operating at the government level (Hodgkinson, 2011; Nam & Pardo, 2011a).
- Innovative pilot projects and small-scale developments do not necessarily guarantee an effective uptake on city-wide level (Pike Research, 2011).

Furthermore, it is worth mentioning that even within the 'local strategy' spectrum there is a variety of views about the most suitable implementation level. At one end of the local scale, it has been advocated that strategic regional planning has a significant impact in smart city development, as its role is to harmonize and coordinate top-level with low-level policies (Walters, 2011). At the other end, however, small-scale smart city pilot programs allow the accomplishment of short term achievable goals and provide a platform to assess the viability of specific smart city solutions and services in real-life contexts (Bria, 2012; Carter, Rojas, & Sahni, 2011; González & Rossi, 2012).

Considerably far fewer researchers advocate the implementation of smart city strategies on a national level (i.e. to become a 'smart country'). National-level strategies enjoy state backing; they allow for a broader view and firmer control over related policies and coordinated resource pooling, and by doing so they provide a very strong point of reference for smart city strategies. The advantages of national-level smart city strategies, as they have been recently cited in the smart city literature, include the following:

- Top-level coordination and resource allocation encourages the assignment of clear roles and responsibilities to the institutional authorities involved, enhancing the effectiveness of the strategy (ABB & European House-Ambrosetti, 2012).
- The operational continuity of basic choices at all levels is guaranteed and a common platform can be implemented (ABB & European House-Ambrosetti, 2012).
- Complementarity in weak and strong points and joint addressing of challenges can be foreseen (Hodgkinson, 2011; Tranos & Gertner, 2012).

The disadvantages of national-level smart city strategies include:

- Possibility to fail in capitalizing on the sum of local resources effectively, and ignoring local needs and priorities (Paskaleva, 2011; Caragliu & del Bo, 2012; Giffinger et al., 2010; Walters, 2011).
- Horizontal measures may falsely assume that barriers and opportunities are the same in all of a country's cities (Copenhagen Cleantech Cluster, 2012; Liugailaitė-radzvickienė & jucevičius, 2012).

Urban development stage: new versus existing cities

Another significant qualitative characteristic of a smart city strategy is the urban development stage of the city they involve, i.e. existing or new cities (greenfield cities or 'cities from scratch' or 'planned cities').

On the one hand, and mostly in the Western world, urban planners endorse the belief that there is no need for new cities. Our long-lived cities are already big and complex enough to accommodate the current population and its activities. Emphasis should be placed on regenerating degraded urban areas, rather than developing new cities. Mostly in developing countries, on the other hand, several initiatives have been taken to develop entirely new smart cities, such as PlanIT Valley (Portugal), Skolkovo Innovation Center (Russia), Cyberport Hong Kong (China), Songdo International Business District (South Korea), Cyberjaya (Malaysia), Masdar City (Abu Dhabi-UAE). These new cities are designed and built from scratch, showcasing leading edge 'smart' technology and certifications of green physical planning. They are highly ambitious projects, encompassing tremendous investments for acquiring land, building infrastructure and erecting large scale settlements. It is impressive that in China alone, as many as 154 proposals have been