

TeMA

Journal of
Land Use, Mobility and Environment

This special issue collects a selection of peer-review papers presented at the 8th International Conference INPUT 2014 titled "Smart City: planning for energy, transportation and sustainability of urban systems", held on 4-6 June in Naples, Italy. The issue includes recent developments on the theme of relationship between innovation and city management and planning.

Tema is the Journal of Land use, Mobility and Environment and offers papers with a unified approach to planning and mobility. TeMA Journal has also received the Sparc Europe Seal of Open Access Journals released by Scholarly Publishing and Academic Resources Coalition (SPARC Europe) and the Directory of Open Access Journals (DOAJ).

INPUT 2014

papers selected

Smart City

planning for energy, transportation
and sustainability of the urban system

SMART CITY

PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

Special Issue, June 2014

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Laboratory of Land Use Mobility and Environment
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples "Federico II"
Piazzale Tecchio, 80
80125 Naples
web: www.tema.unina.it
e-mail: redazione.tema@unina.it

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TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science, and complex systems.

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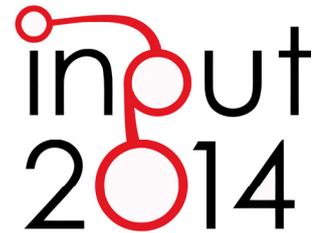
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This special issue of TeMA collects the papers presented at the 8th International Conference INPUT 2014 which will take place in Naples from 4th to 6th June. The Conference focuses on one of the central topics within the urban studies debate and combines, in a new perspective, researches concerning the relationship between innovation and management of city changing.



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EIGHTH INTERNATIONAL CONFERENCE INPUT 2014

SMART CITY. PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM

This special issue of TeMA collects the papers presented at the Eighth International Conference INPUT, 2014, titled "Smart City. Planning for energy, transportation and sustainability of the urban system" that takes place in Naples from 4 to 6 of June 2014.

INPUT (Innovation in Urban Planning and Territorial) consists of an informal group/network of academic researchers Italians and foreigners working in several areas related to urban and territorial planning. Starting from the first conference, held in Venice in 1999, INPUT has represented an opportunity to reflect on the use of Information and Communication Technologies (ICTs) as key planning support tools. The theme of the eighth conference focuses on one of the most topical debate of urban studies that combines , in a new perspective, researches concerning the relationship between innovation (technological, methodological, of process etc..) and the management of the changes of the city. The Smart City is also currently the most investigated subject by TeMA that with this number is intended to provide a broad overview of the research activities currently in place in Italy and a number of European countries. Naples, with its tradition of studies in this particular research field, represents the best place to review progress on what is being done and try to identify some structural elements of a planning approach.

Furthermore the conference has represented the ideal space of mind comparison and ideas exchanging about a number of topics like: planning support systems, models to geo-design, qualitative cognitive models and formal ontologies, smart mobility and urban transport, Visualization and spatial perception in urban planning innovative processes for urban regeneration, smart city and smart citizen, the Smart Energy Master project, urban entropy and evaluation in urban planning, etc..

The conference INPUT Naples 2014 were sent 84 papers, through a computerized procedure using the website www.input2014.it . The papers were subjected to a series of monitoring and control operations. The first fundamental phase saw the submission of the papers to reviewers. To enable a blind procedure the papers have been checked in advance, in order to eliminate any reference to the authors. The review was carried out on a form set up by the local scientific committee. The review forms received were sent to the authors who have adapted the papers, in a more or less extensive way, on the base of the received comments. At this point (third stage), the new version of the paper was subjected to control for to standardize the content to the layout required for the publication within TeMA. In parallel, the Local Scientific Committee, along with the Editorial Board of the magazine, has provided to the technical operation on the site TeMA (insertion of data for the indexing and insertion of pdf version of the papers). In the light of the time's shortness and of the high number of contributions the Local Scientific Committee decided to publish the papers by applying some simplifies compared with the normal procedures used by TeMA. Specifically:

- Each paper was equipped with cover, TeMA Editorial Advisory Board, INPUT Scientific Committee, introductory page of INPUT 2014 and summary;
- Summary and sorting of the papers are in alphabetical order, based on the surname of the first author;
- Each paper is indexed with own DOI codex which can be found in the electronic version on TeMA website (www.tema.unina.it). The codex is not present on the pdf version of the papers.

SMART CITY PLANNING FOR ENERGY, TRANSPORTATION AND SUSTAINABILITY OF THE URBAN SYSTEM Special Issue, June 2014

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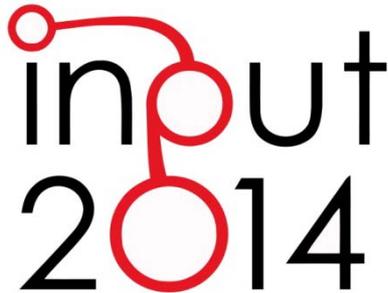
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SPECIAL ISSUE

Eighth International Conference INPUT
Smart City - Planning for Energy, Transportation and Sustainability
of the Urban System

Naples, 4-6 June 2014

The logo for the INPUT 2014 conference. The word 'input' is written in a lowercase, sans-serif font. The 'i' and 'n' are black, while the 'p' is red. The 'u' is black, and the 't' is black. Below 'input' is the year '2014' in a large, bold, sans-serif font. The '0' is red, and the '1', '1', and '4' are black. A red line connects the top of the 'i' to the top of the 'p', and another red line connects the top of the 'p' to the top of the 't'.

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2014

BEYOND DEFINING THE SMART CITY MEETING TOP-DOWN AND BOTTOM-UP APPROACHES IN THE MIDDLE

Jonas Breuer, Nils Walravens, Pieter Ballon

iMinds-SMIT, Vrije Universiteit Brussel
firstname.lastname@vub.ac.be
<http://smit.vub.ac.be>

ABSTRACT

This paper aims to better frame the discussion and the various, divergent operationalisations and interpretations of the Smart City concept. We start by explicating top-down approaches to the Smart City, followed by what purely bottom-up initiatives can look like. We provide a clear overview of stakeholders' different viewpoints on the city of tomorrow. Particularly the consequences and potential impacts of these differing interpretations and approaches should be of specific interest to researchers, policy makers, city administrations, private actors and anyone involved and concerned with life in cities. Therefore the goal of this article is not so much answering the question of what the Smart City is, but rather what the concept can mean for different stakeholders as well as the consequences of their interpretation. We do this by assembling an eclectic overview, bringing together definitions, examples and operationalisations from academia, policy and industry as well as identifying major trends and approaches to realizing the Smart City. We add to the debate by proposing a different approach that starts from the collective, collaboration and context when researching Smart City initiatives.

KEYWORDS

Smart City, Local Innovation, Platforms, Urban Development, Mobility

1 INTRODUCTION

The city is more than ever the axis of humanity. Not only are urban centres the heart of the global economy, generating 70% of global GDP (see e.g. De la Peña, 2013), they are also home to more than 50% of the world's people with a steadily rising tendency; in 2050, according to the United Nations, it is expected that cities will host more than 70% of the world's population. Without any doubt, urbanization is and will be the defining trend of the 21st century (see UN Department of Economic and Social Affairs, 2008). This relatively new imbalance between rural and urban population poses many and diverse challenges for cities, their governments and citizens.

A prerequisite to accommodate this scale of urbanization are without any doubt well-functioning infrastructures for urban areas, ensuring efficient and effective urban processes. As a consequence, investments into urban infrastructure are likely to continue and grow (United Nations Human Settlements Programme, 2012). An accepted idea in this regard is to incorporate modern technology into urban structures. As more citizens (or consumers, depending on the point of view) move to urban areas, actors from the ICT industry naturally become increasingly interested in offering services that are tailored to life in the urban environment. Cities and local governments are at the same time exploring the role that new ICT services and products can play in increasing the quality of life of their citizens or optimizing internal processes. In recent years, this quest is most often captured in the "Smart City" concept (Townsend, 2013). It originates at the crossroad of technological progress and the realization that urbanization up until today cannot accommodate the expected demographic and environmental circumstances of the future. The Smart City concept has become key in bridging academic research, projects and commercial initiatives exploring the role of technology in urban life.

However, given the proliferation of the term, a lot of different operationalisations, approaches and definitions of the Smart City exist today and a lack of overview in thinking about the concept persists. The interest of the public, academics and media has increased in recent years, pushing forward an often almost science-fiction like discourse situated between concerns about control, freedom and privacy, and enthusiastic accounts about increased efficiency, sustainability, and generally a better world and higher quality of life for everyone. However, establishing an all-encompassing, definite definition is as difficult as projects, opinions and initiatives in the field are diverse.

Perhaps the goal then should not be chasing this all-encompassing definition, but rather having a clear overview of what stakeholders are talking about and the different viewpoints on the city of tomorrow (and in some cases today). After all, who would want to live in the rhetorical alternative to the Smart City: a dumb city? Therefore the goal of this paper is not so much answering the question of what the Smart City *is*, but rather what the concept can mean for different stakeholders as well as the consequences of their interpretation. We do this by assembling an eclectic overview, bringing together definitions, examples and operationalisations from academia, policy and industry as well as identifying major trends and approaches to realizing the Smart City.

First, we explore the Smart City as a top-down concept that is dictated by business potential, commercial logic and efficiency thinking, followed by the opposing viewpoint on the Smart City as one that should be predominantly orchestrated from below, by empowered and active citizens. For each of these approaches we provide examples as well as pros and cons and we end on a new view of these opposing approaches in an effort to "meet in the middle" and push the Smart City thinking forward.

2 TOP-DOWN

"A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens" (Hall, 2000). The first approach we assess here adheres to top-down dynamics, often closely related to the technologically deterministic idea of a "control room" for the city. It aims at providing an ICT-based architecture to overview urban activities as well as the tools to (automatically) interact with infrastructures and adjust parameters to predefined optima (IBM, 2009). Hall's definition of a Smart City above illustrates the strong emphasis on optimization through technology. Accordingly, IBM defined the three steps for making cities smarter as instrumentation, interconnection and intelligence.

Apart from gathering the data, a large part of the processes that essentially constitute this approach consists of the calculations, visualizations and predictions based on the gathered metrics: *"[T]he development of smart cities involves the application of [ICT], environmental sensors, digital footprints of the inhabitants, manipulation of the resulting data using statistical techniques, and finally the use of complexity modelling and advanced visualisation in order to make sense of it all."* (Campkin & Ross, 2013, p. 3).

Providing the systems that are capable of working with these vast data sets, referred to under the moniker of "big data", then becomes an interesting business. This way of making cities smarter therefore promises enormous opportunities for large private companies, such as technology vendors, network companies and software industry players. They are able to provide the corresponding tools to this sort of Smart City and can expect potentially enormous revenue from rolling out their proprietary solutions in large and small urban areas. Several cities have already been convinced of these propositions, with Rio De Janeiro serving as an often cited example (Singer, 2012).

In its most extreme manifestation, a top-down approach translates to cities that are planned, designed and built from scratch with the optimization of urban processes through technology in mind. The examples of Songdo and Masdar can be seen as the pinnacle of this particular vision of the Smart City. But both have been heavily criticized for being sterile, overly planned, prohibitively expensive, anonymous, uniform and conformist (Conway, 2013; The Economist, 2013; Sennet, 2013) and the result is that these cities struggle to be completed within the predicted budgets and timeframes and/or do not attract enough economic activity (and thus jobs) so that people want to move there.

Of course in most cases, technology will need to be integrated into existing urban infrastructure. There are large potential benefits tied to having an integrated Smart City solution in a city: many different services and infrastructure systems can be managed from one central hub, keeping oversight on many divergent aspects of life in the city. The focus on integrated infrastructure and technology is reflected in the following description of what the Smart City is: *[A city] "connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city"* (Harrison et al., 2010). The Brazilian city of Rio de Janeiro was amongst the first to implement the integrated Smart City solution developed by IBM; the 'Intelligent Operations Centre'. This solution combines feeds from over 560 cameras and can display over 60 layers of data, gathered from sensors across the city on a map. Installed after a natural disaster that killed almost 70 people, the initial goal of the system was to increase emergency response time, but has evolved into a wider Smart City solution. The mayor of Rio, Eduardo Paes, is one of the biggest proponents of the integrated solution: "I sleep better thanks to it. The worst thing is not having the information, to not have the tools to act. But we do now." (Soffel, 2013)

The huge economic potential is - at least to the same degree as its potential for improving the urban - the main driving force behind this approach and the main reason for its formation. Many major IT companies and municipalities around the world are looking for their slice of the Smart City pie. Market researchers and consultants of PikeResearch have predicted that global investment in Smart City technology infrastructure will reach \$108 billion by 2020 (see Pike Research, 2011).

IBM and Cisco, among others - respectively with their 'Smarter Planet' and their 'Smart+Connected Communities' initiatives - have already established themselves as distinguished players in the field. They are among those large technology vendors, which have realised the potential of the Smart City and are actively seeking out and soliciting local governments to invest in their respective technologies, already rolling out various initiatives. While these companies are competing, they also appear to be specializing in specific aspects of the Smart City, aptly put by Townsend (2013: p.63): "If Siemens and Cisco aim to be the electrician and plumber for the Smart City, IBM's ambition is to be their choreographer, superintendent and oracle rolled into one".

2.1 DISCUSSION

Certain kinds of top-down visions have been heavily criticized with the main argument that they are dictated by commercial interests, and that they entail questions of control and privacy. The "control room" Smart City approach, which aims at monitoring all aspects of urban life might soon result in an ubiquity of data collection, presenting a "set of potentials disturbingly consonant with the exercise of authoritarianism" (Greenfield, 2012, para. 31). Too much monitoring and too many integrated technologies and infrastructures can pose actual threats for freedom and privacy, whether controlled by private actors or ruling bodies.

However, the shortcomings of a top-down Smart City might go further. What has also been referred to as a "city-building industry" (Joroff, 2008) or as the outcomes to "assembly-line cities" (Koolhaas, 2011) might not only hamper the innovation potential inherent to cities, but in some cases even have detrimental effects: *"More damningly still, the big technology companies are selling 'smart city in a box' solutions to cities, walled gardens that prevent scalable local business innovation."* (Hemment & Townsend, 2013, p. 8)

The approach to the Smart City these companies take essentially revolves around efficiency: algorithms, measurements, optimization and so on. This gives rise to the question of what is being measured - and more importantly, what is not - as well as who has access to the measurements, who is being excluded and at what cost? In Rio for example, open hospital beds and enrolments in schools are not monitored by the integrated Smart City system (De La Pena, 2013). As the deputy mayor of Barcelona, Antoni Vives, stated aptly: *"There is nothing more dangerous [for a Smart City] than a stupid mayor and an eager company putting strange stupidities into the heart of the city"* (Smedley, 2013). After all, the Smart City is - alongside its value for commercial operations - to a high degree marked by the marketing and promoting of cities, competitiveness, and by interurban competition. What often results is commodification of public space and governance where non-democratic actors are able to exert too much leverage within complex decision-making structures.

The approach to the Smart City, as assessed above, then becomes an ambiguous one. On the one hand, top technology vendors have resources and knowledge at their disposal, on which the public sector needs to rely while facing urban challenges. Furthermore, the business potential in this context is too high for companies with ambitious commercial targets to resist. On the other hand, cities are about citizens, about the people who live and use them; in terms of for whom they are built, but also in regards of the potential for innovation and finding appropriate solutions. Therefore, this top-down vision is contrasted by the opposite: a purely bottom-up view on the Smart City, which is outlined in what follows.

3 BOTTOM-UP

These architectural, topical, infrastructural or top-down viewpoints are juxtaposed against a more experimental, bottom-up understanding of what a Smart City could be. In this perspective, change and improvement comes only from the people “using” the city. It dismisses any form of top-down urbanization, in particular with the involvement of powerful private companies. The bottom-up Smart City is, foremost, about the *Smart Citizen*; those who live, work, and engage in all kind of activities in the city. Rather than working towards centralization, such a view on the Smart City takes a decidedly distributed approach, supporting and accepting some form of chaos. Greg Lindsay formulates this as follows: *“The bias lurking behind every large-scale smart city is a belief that bottom-up complexity can be bottled and put to use for top-down ends — that a central agency, with the right computer program, could one day manage and even dictate the complex needs of an actual city. The smartest cities are the ones that embrace openness, randomness and serendipity — everything that makes a city great”* (Lindsay, 2011).

Embracing this “chaos” has also been referred to as “the default mode of urban development” (Echanove & Srivastava in De la Peña, 2013). It can be experienced in parts of cities, which central planning and control did not steer, often because of their nature as illegal settlements and slums. These settlements seem chaotic, growing ‘by the default mode’, brimming with networks of social and business relations, which are, however, most often not accounted for by decision-makers. Dharavi for example, the biggest informal settlement in Mumbai, is said to constitute up to 25% of the city’s economy. Still, there are neither maps of its streets nor accounts of its economic activities.

Although these characteristics have positive impact on the local scale, they often conflict objectives of decision-makers, urban-planners, and dynamics of the globalized economy. Chaotic bottom-up processes oppose the idea of a master plan, an ‘ideal’ state of place. Therefore, the top-down approach to Smart City (in fact, to urbanism in general) often intends to control, rather than find ways to enable and employ this default mode. Since the city is a system of systems put together by people who bring it to life, it is complex and cannot be but dynamic and flexible. Consequently, the solution to urban challenges of the future, a real Smart City, is more than just technological, networked and intelligent: it is about people. The Smart City presents an unparalleled opportunity to enable citizens, connect them and make them ‘smarter’. It has the potential to empower them to participate, encourage them to shape urbanization and make it more sustainable together. De la Peña (2013) compares this complexity of the city with the “non-hierarchical complexity” of the internet: as the Internet is open and participatory, a smart city should actively and consciously enable and encourage citizens to shape their own urban experience.

Examples of these purely bottom-up approaches can be found in citizen initiatives and even (semi)-illegal interventions in the public space, such as so-called guerrilla bike lanes where citizens, unhappy with local biking infrastructure, paint bike lanes on the street without authorization (Muños, 2013). These types of initiatives are also referred to as tactical urbanism (Hamdi, 2004). Tactical urbanism tends to consist of “small scale interventions [that] are characterized by their community-focus and realistic goals” (Berg, 2012) and are often short-term or temporary, cheap and aimed at increasing quality of life in a certain way or addressing a specific neighbourhood concern. However, the instigators of these small projects often hope to achieve more and they actually do effect change: *“The goal is not to simply do a cool project that will get cleaned up by the city or thrown away, but to make something – even something temporary – that will change how a place works and is perceived. And once that change has been made, to figure out how it can be made again or made permanent”* (Berg, 2012). In such a perspective, what defines the Smart City is not

the infrastructures or architecture it offers, but the ways in which its citizens interact with these systems as well as each other.

3.1 DISCUSSION

Whereas the idea of a master plan, an ideal, measurable and controllable state often delivers deficient outcomes, relying solely on bottom-up processes also appears unlikely or even infeasible. Citizens are not detached from the wider urban context they live in, with other stakeholders playing - in some cases powerful - roles. Although the examples listed above can be appealing or charming and have in some cases impact and effect some change, they lack a vision on the issue at hand, are often (very) short term, can conflict with some long term goals set out by local policy and in some cases even be illegal. We like to argue for a "Smart Citizen" that uses a variety of tools to interact with and move around the city, and for whom the emphasis lies on his/her citizenship, rather than technology as a primary factor. However, relying purely on bottom-up initiatives remains problematic with regards to scalability, interoperability, barriers and incentives to entry. Thinking about the city of the future then cannot only place any and all responsibility for its success with its citizens.

4 THE SMART CITY AS A LOCAL INNOVATION PLATFORM

While both views and approaches to the Smart City have their merits, we have also illustrated that they each exhibit substantial problems: "Change seldom arises from purely top-down or bottom-up systems and processes." (Shepard & Simeti, 2013) Therefore, we propose a more nuanced interpretation, one that combines top-down and bottom-up approaches, and establishes the Smart City as a *platform* that fosters collective (local) intelligence of all affected stakeholders. After all, cities essentially constitute shared responsibility and resources (Campkin & Ross, 2013), and can be seen as a system of systems (Fistola & La Rocca, 2013). This means looking at the Smart City as a meeting place where the public sector, private interest and citizens can come together to generate new value, to collaborate and innovate together. Smart Cities can only be successful if they act as local innovation platforms that bring together all involved stakeholders. Still, "no one has so far found a way to intelligently bring together the big technology platforms offered by global corporations, with local technology projects and the interests of citizens" (Shepard & Simeti, 2013, p. 10). O'Reilly (2011) embraces such approaches and conceptualizes them, describing how technology can play a role in bridging interests of the public sector, private interests and citizens; he introduces the ideas of *government as a platform* and "government 2.0". The latter refers to "the use of technology - especially the collaborative technologies at the heart of Web 2.0 - to better solve collective problems at a city, state, national, and international level." Regarding the city as platform in this light means that it acts, like the Web, primarily as an intelligent broker, connecting the edges to each other and harnessing the power of the users themselves (see O'Reilly, 2005). The platform is the intermediary, the enabler of interaction of multiple actors who have corresponding interests or needs. The delivery of public services in such a reciprocal relationship between all stakeholders, for instance, is very appealing and promising for developing truly Smart Cities.

4.1 THE ENABLING CITY

As mentioned before, technology is not necessarily the most critical factor for smartening a city. Smartness still fundamentally depends upon people. In fact, one can argue that, due to individual and collective intelligence, "cities have always been 'smart'" (Campkin & Ross, 2013, p. 15). In this light, the concept of

read/write urbanism adds an interesting idea to the discourse. It describes the interplay of people with their urban environment under the influence of networked information. The 'reading' part is obviously about the access to data/information enabled by a smart environment. 'Write' urbanism adds the possibility of exceeding the passive experience of space by being "empowered to inscribe [...] subjectivities in the city itself." (Greenfield & Shepard, 2007, p. 13) In other words, it is the possibility for every user to participate in shaping and improving his/her environment.

Interpreting the smart city as platform is about seeing (and fostering) it as a framework, which enables the 'writing' in addition to the 'reading'. It is also about establishing that collaborative processes, the potential of "everyday experiences" and local intelligence are integral: this enabling city combines the creativity of citizens and experts, politicians and businesses for making cities in collaboration. Even though technology and connectivity is not necessarily the most critical factor in achieving this aim, it has the potential to be the enabler (Hollands, 2008, p. 310). *"In the age of connectivity, it is no surprise that collaboration is increasingly seen as a design principle, a style of thinking and acting that elevates the practice of problem-solving from a managerial tool to a way of thinking about participation itself."* (Camponeschi, 2011, p. 16).

4.2 OPEN DATA

Examples of the city taking up a platform role can be found in the growing trend of open data initiatives and "hackathons", enabling and stimulating developers to create applications based on cities' databases. City governments are "sitting" on a wealth of information related to divergent aspects of life in the city, but this data is either not publicly available or not easily interpretable. This has sparked a movement to encourage the opening of datasets, under the "open data" moniker, which is gaining traction across local and national governments throughout the world. The Open Knowledge Foundation is one of the strong proponents of opening up data in the name of government transparency, increased efficiency and better services for the public as a result. OKFN defines open data simply as "...data that can be freely used, reused and redistributed by anyone – subject only, at most, to the requirement to attribute and share-alike" (OKNF, 2012).

Cities attempting to leverage their datasets as assets can employ different strategies, of which the most popular seems to be the organization of an "Apps for X" event in which developers get access to the data and can win prize money for the best applications or ideas. As these events are increasingly organized around the world, more questions are raised about the sustainability of the apps and ideas that come out of them. While the organization of such events can be a relatively cheap way of promoting the datasets cities opened up and can lead to creative and innovative ideas (also in the context of the operationalisations of the Smart City we saw earlier), actually valorising the results of hackathons or transforming them into sustainable businesses or spin-offs has proven far more difficult and will remain a challenge for cities in the short term.

However, gradually, the results of various open data projects are becoming measurable a few years after the consolidation of the concept and opening up the first data sets. A notable example is Transport for London, the city's public transport agency, which after some initial resistance is now fully supporting an open data strategy. Since the project started, around 500 different mobile, web and other apps have been created that make use of the real-time data provided by the company. Around 5000 people are indirectly employed as a result of opening up and so the return for the city and citizens is high (Stott, 2014). The transport agency evaluated the open data project in the same way it does with all its transport projects, using the same economic and social indicators (including for example time won by commuters because of increased information provision). Where typical projects expect a return on invest of 1.4:1 (for each pound invested, at

least £1.4 should come out), the open data project saw a return on investment of no less than 58:1, leading researchers to double check the evaluation process (Stott, 2014). Perhaps most telling of all, since the launch of the open data portal and the resulting success, Transport for London does not make its own public transport applications anymore. This example shows one way in which the city or local government organizations and administrations can play a platform role, providing the framework wherein new ideas, value and services are created.

4.3 OPEN INNOVATION, CO-DESIGN & LIVING LABS

For our platform approach to the Smart City, the concept of open innovation can be highly relevant. It is about 'public-private-people partnerships', i.e. organized collaboration between all involved stakeholders (governments, businesses, users/citizens etc.). It includes co-creation of services, products and much more, and the availability of open platforms that facilitate the necessary collaborative processes and interaction (DG Communications Networks, Content and Technology, 2013, p. 56). Co-design and co-production approaches emphasize engagement by those responsible for delivery of a service or product with stakeholders in general, and with the end user/customer/citizen in particular (Smart Cities Project, 2011, p. 6). The aim is to establish processes that allow all players to make constructive contributions according to their own role and knowledge without a stakeholder or a need being more important than another. Co-design can be defined as "activity where the users of the planned new system actively collaborate in (a) defining what the system should do (problem definition), (b) the development process and (c) acceptance of the results." (ibid, 2011, p. 6) Co-production then describes the continuing active involvement of citizens as users beyond the completion of the design-stage (ibid, 2011, p. 7). Contrary to implementing the Smart City in a top-down fashion, this approach is based on the theory that relationships between the technical, the social, and the subjective are interdependent; social shaping of technology, controverting technological determinism by arguing that technology is not a given, but what it is chosen to be (see Bakardjieva, 2005). Open innovation is already being practiced, in the form of Living Lab projects that muster the stakeholders required to make an innovative initiative become a success (Schuurman et al., 2012). Living Labs provide the platforms for open innovation, which facilitate productive collaboration and thereby ensure that development complies with real problems and needs.

4.4 DISCUSSION

We have illustrated that a purely bottom-up or top-down view on the Smart City will struggle to be effective and future-proof, and therefore suggest looking at the city as a platform. But also local innovation platforms are not without their potential difficulties. First of all, organizing such an intense collaboration as required by this approach is not easy. And when it is set up, the collaboration could still run into issues of various natures: diverging visions, operational issues, financial inhibitors and so on. It is therefore important to consider who should or could organize and facilitate the collaboration and under which conditions partnerships come to be. Integrating enough resilience into partnerships, so that when one partner is forced to end the collaboration the project may still continue in an adapted form, can also be decisive in this regard. Alongside organizational difficulties, valorisation can be an issue of local innovation platforms as well. This relates back to the scalability question, commonly of particular denotation in a EU context, and should need to increasingly be a point of concern for open innovation and related initiatives. How one transcends the project context and can move a concept or idea into a real application or service that adds value to citizens is one of the major challenges.

A final point of attention for any and all Smart City projects should be the digital divide. Around the world, digital services in many different forms are becoming consolidated as an integral part of daily life. As these services become more integrated into our daily (urban) context, we need to be aware of people that are excluded from these services, or do not have the access or skills to use them in a proper way. Education, in combination with the offering of alternative ways of getting access to public service, needs to be top of mind with involved local policy makers in ensuring that no one is excluded from access and the required skill set to participate. Only then, any approach can honestly be called smart.

5 CONCLUSION AND OUTLOOK

In spite of the many attempts at definitions, the Smart City concept remains elusive. However, it is an indication of the increasing need to develop new ways of looking at the city of the future and to think about structured approaches to provide answers for the diverse and complex questions companies, citizens and governments face there. Rather than attempting a holistic and general definition of what a Smart City is we prefer to clarify our perspective on the concept after having assembled this overview. It should be clear we consider cases that are linked to the urban space and the interactions between the physical and the virtual, which are mediated by ICTs (be they social media, innovative wireless networks, mobile devices, cloud technology etc.) or developed using innovative methods (such as co-creation, living labs research, PPPP business models etc.), and that involve or engage citizens in innovative experiences with the goal of increasing their quality of life in meaningful ways. Smart Cities then, should capture and foster creative and collaborative innovation through (direct) interactions between public bodies, private actors and citizens in:

- Dealing with the next **data** flood (emerging from linked open data, big data, the internet of things, sensor data etc.);
- Identifying and tackling new **relational complexities** between actors;
- Facing **grand societal challenges** in a local context (e.g. green mobility, security, new forms of local and participatory governance etc.);
- While offering innovative and **engaging experiences** to citizens.

These are the emphases we would like to make in the on-going discussion and operationalization of the Smart City concept. We argue that collaboration between the public sector, private actors and citizens, and all those players amongst themselves, is the key for making cities smarter. It is working together, especially in dealing with the vast amounts of information and data that will increasingly arise of modern cities, allowing us to tackle some of the major urban challenges ahead of us, and here today.

At the basis of the Smart City, we see the interaction of the three concepts below as being the constituting elements of a future looking, "Smart" City that is serious about innovation. Such a place should be collaborative, collective and contextual.

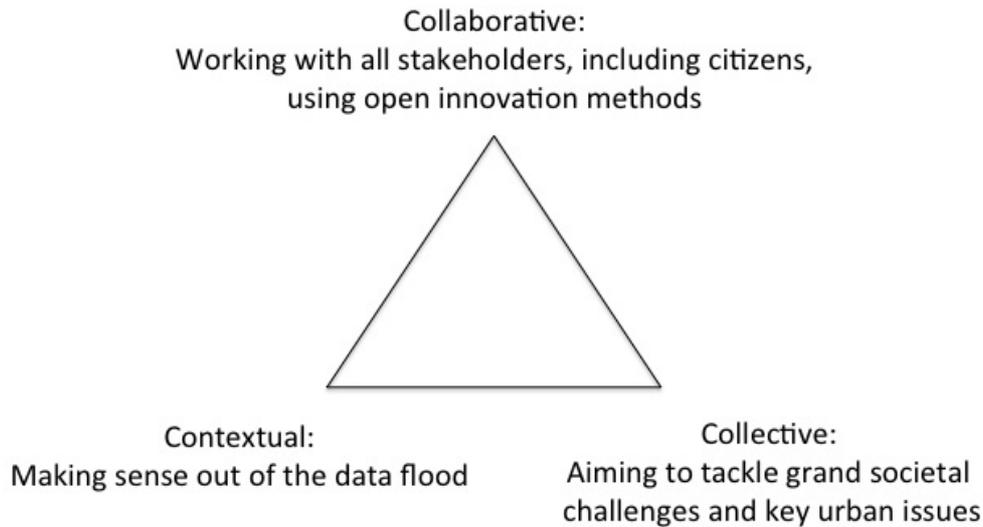


Fig. 1 Three elements constituting a Smart City

As we have illustrated and argued above, a purely top-down view on the Smart City carries a danger of authoritarianism with it, while a bottom-up-only approach leans towards chaos and lack of long-term vision. We argue that rather than trying to find the perfect definition for what the Smart City is or should be, closely looking at who is making claims about the Smart City, with which motivations and consequences, is at least equally important. Approaching the concept using the three elements presented above is one way of trying to keep this holistic perspective.

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AUTHORS' PROFILES

Jonas Breuer

Jonas Breuer has been at iMinds-SMIT since August 2013, within the Market Innovation and Sector Transitions unit. During this international Master program at the Vrije Universiteit Brussel, Belgium, he concentrated on the political economy of new media and ICT, focussing in particular on the Smart City and open data.

Nils Walravens

Nils Walravens started working for iMinds-SMIT in August of 2007 as a researcher in the Market Innovation and Sector Transitions unit. His main expertise is in the field of business modelling research in both the mobile and media industries and he has experience in the mobile services domain, Smart Cities and platformisation in the media and mobile industry.

Pieter Ballon

Pieter Ballon holds a PhD in Communication Sciences and a MA in Modern History. He is a senior researcher at iMinds-SMIT and leads the Market, Innovation and Sector Transitions unit.