Keynote Speech

(Un)Plugging Smart Cities with Urban Transformations

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1 ABSTRACT

The trouble with modern theories of behaviourism, is not that they are wrong but that they could become true. (Arendt)

We may wish for easier, all-purpose analyses, and for simpler, magical, all-purpose cures, but wishing cannot change these problems into simpler matters than organised complexity, no matter how much we try to evade the realities and to handle them as something different. (Jacobs)

In this paper, the author argues that the development of the so-called smart city concept and its use in planning inner cities are intimately bound up with required current urban transformations. In particular, regarding the notion of urban governance, which encompasses economic transformations, big data, social innovation and urban living labs as some timely key ingredients that should be addressed in contemporary cities (Urban Transformations ESRC portfolio, 2016). By contrast, it is noteworthy that although smart cities are already being built around us, they differ considerably from the simplistic, one-size-fits-all, smart-city-in-the-box mainstream approach (Townsend et al., 2011) that has been hegemonic so far. This idea mostly hearkens back to basic notions of deconstructing the governance interactions that actively require a holistic approach considering urban transformation trends occurring in our cities in a different manner. Based on a previously published Journal of Urban Technology paper entitled 'Unplugging: Deconstructing the Smart City', the authors argue that such reimagining and repositioning need to occur across smart city technologies by avoiding pragmatic approaches that wrongly are assumed to be non-ideological and commonsensical. Hence, the paper is structured in five sections. First, the concept of the smart city as both a buzzword and a fetish term will be presented. Second, the author shows how smart city policy agendas should be unpacked and plugged in again in a wider and inclusive perspective by suggesting the Unplugging framework, which consists of 10 transitions. Third, based on on-going, EU-funded smart city project's interventions, the author underlines the importance of integrating urban transformations and research findings as a strategy that would enable more emancipatory and empowering visions of smart cities beyond simplistic market ambitions of companies or the control desires of states (Kitchin 2015: 30). Finally, five final remarks are presented as the future research agenda of (un)plugging smart cities with urban transformations: urban governance interdependencies, data to decide, metropolitan and regional scaling-up, city-to-city learning and comparing smartness (benchmarking, dashboards and rankings).

2 CONTEXT

'Smart city' (Hollands 2008, Kitchin 2014, Albino 2015, and Batty 2015) has already become a 'fetish' term to simplify complex urban debates in an uneven techno-deterministically-driven, hyper-connected society. Therefore, a mainstream wave of urban standardisation concerning the one-size-fits-all, smart-city-in-the-box paradigm has been dominating policy agendas. Yet, this movement has failed to offer alternative, efficient policy tools to understand better and intervene in our daily urban realities while considering the whole range of stakeholders that determine whether or not a common solution is a 'smart' one for the city. Moreover, it is arguable that the smart city is already happening around us, but not in the way anticipated. Furthermore, the 'smart city' discourse has been shifted by academics in order to make proposals that produce realistic transitions in cities and to avoid a narrowly portrayed approach to governance and urbanisation processes.

Regarding the uneven techno-deterministically-driven society, surprisingly, it's a society that seems to embrace information and communication technologies (ICTs) enthusiastically as the key component of the infrastructure of modern cities and their internal governance strategies.

In academia, urban studies have a long tradition of critically examining the interface between space and digital technologies, and information studies have targeted the city as one of its principal domains of research. However, narratives and practices around notions of smartness have been largely absent.

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Having said that, some could argue that the smart city exists (or is already happening around us), but not in the way it was anticipated. Two deeply researched main paradigmatic examples illustrate the way this trend has been orchestrated as a mainstream wave of urban standardisation: Masdar (Cugurullo 2013) in Abu Dhabi and Songdo (Shwayri 2012) in South Korea.

On the one hand, according to Cugurullo, behind the Masdar City project, there is a much bigger project aimed at capital accumulation, and little attention is paid to what is unrelated to the business plan. At the core of Masdar City lies a powerful mechanism fuelled by technology-driven capital flows pumped directly into the development to become part of it. Thus, there is little space for the social aspects of sustainable development and the social dimension of the city (2013: 34). To sum up, Masdar City is what Augé (2008) calls a non-place: a non-anthropological spatial entity bereft of an organic society.

On the other hand, according to Shwayri, Songdo is a clear case of building cities from scratch as a result of a persistent belief by governments that newly constructed cities can set their nations on a fast path to the future. Songdo, however, is built on inherent contradictions (2013: 52): the making of Songdo as eco-city has seen adverse effects by producing significant price contrasts that in effect only allow the affluent class to avail themselves of the newly emerging city.

2.1 Urban buzzwords in the last 30 years

The smart city seems to be the urban buzzword for the 2010s. However, as Jong et al. (2015) suggested in the graph shown in Fig. 1, over the last three decades, metropolitan areas around the world have been engaged in a multitude of initiatives aimed at upgrading urban infrastructure and services, with a view to creating better environmental, social and economic conditions and enhancing cities' attractiveness and competitiveness. As depicted in the graph, many new categories of cities have entered the policy discourse: sustainable cities, green cities, digital cities, smart cities, intelligent cities, information cities, knowledge cities, resilient cities, eco-cities, low carbon cities, liveable cities and even combinations, such as low carbon eco-cities and ubiquitous eco cities. The point is these terms often appear to be used interchangeably by policy makers, planners and developers. However, the question arises whether these categories nevertheless each embody distinct conceptual perspectives, which would have implications for how they are applied in policy.

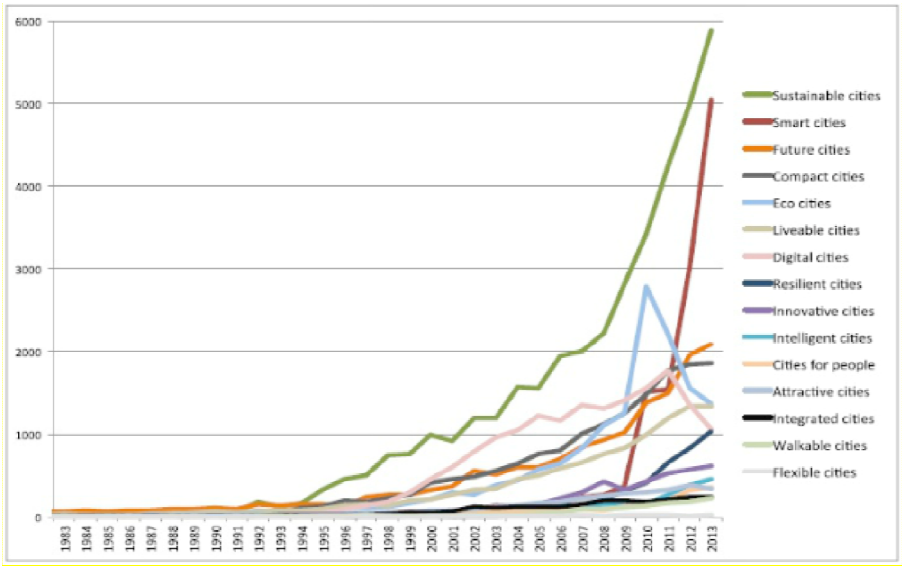

Fig. 1: Urban buzzwords in the last 30 years. Source: De Jong, M., et al., (2015) Sustainable-smart-resilient-low carbon-eco-knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization, Journal of Cleaner Production (2015), http://dx.doi.org/10.1016/j.jclepro.2015.02.004

2.2 Evolution of the Smart City term

Hence, we could argue that this mainstream wave of urban standardisation concerning the smart city paradigm has so far been dominating policy agendas since the mid-1990s:

- As shown in Fig. 2, initially, since the 1960s, the different terms were used as described before.
- Actually, it was in the mid-1990s, when the smart city term emerged in newspapers and media.

- It was just after the recession boosted in 2008 when corporations begin to stake their claims. Back in 2008, when the smart city movement was taking its first steps, Robert G. Hollands (2008) asked for the real smart city to stand up. Since then, there has been an intense debate, as well as a number of projects self-proclaiming their smartness. It should also be said, great steps have been taken in some leading cities to explore how we turn digital innovation into public service improvements and entrepreneurial activities. However, comparative and city-to-city learning urban transformation applied research is required, as this paper will suggest in sections 4 and 5.
- Since 2011, a critical discourse has gained momentum.

Yet, it should be said, this paradigm has failed to offer alternative and efficient policy tools to understand better and intervene in our daily urban realities, while also considering the whole range of stakeholders.

Particularly in the European Commission H2020 Framework Programme, the urban smartness is simplified, assuming that the technical system is an efficient interdependent bubble made up of three factors: mobility, energy, and ICTs.

As it has been pointed out before, this approach is known as the one-size-fits-all, smart-city-in-the-box paradigm. This paradigm is creating a new lexicon through which the development of cities is being forged with elements like urban apps, big data, intelligent infrastructure, city sensors, urban dashboards, Internet of Things (IoT), connected homes, smart meters, smart buildings and smart grids (Calzada 2016).

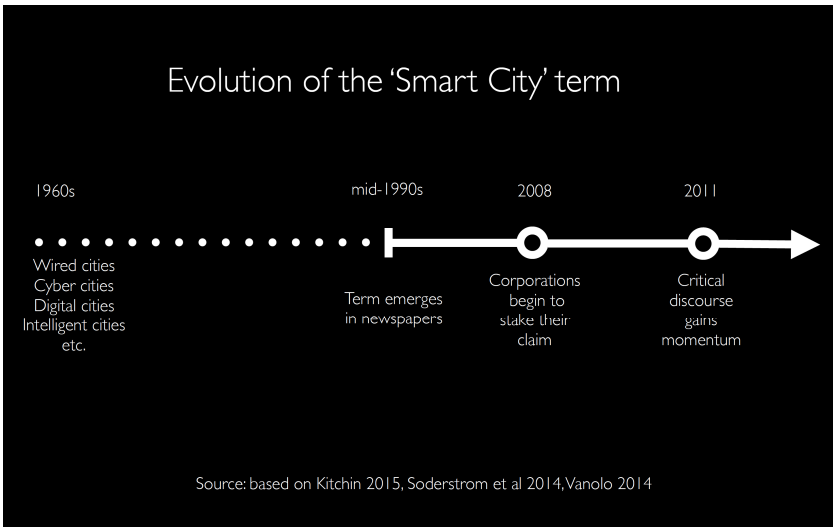

Fig. 2: Evolution of the 'Smart City' term. Source: Karvonen, A. (2016), From the Sustainable to the Smart City: Complementary or Contradictory Urban Visions? Paper given in April 2016 at VuB.

The world's 100 economies

Nevertheless, in this paper, a less dystopic and rather more constructive perspective will be provided in order to strike a balance between self-promotional examples by stressing the underlying pro-business bias and those biases underpinning sustainability and social innovation in a more democratic way. Actually, there is a wrong assumption that the smart city's economy should be increasingly driven by technology-inspired innovation and entrepreneurship that, in turn, will attract businesses and jobs, create efficiencies and save and raise the productivity and competitiveness of government and businesses (Caragliu 2009).

In a broader picture, nonetheless, we are aware that at the moment, cities generate 80% of the world's GDP. As shown in Table 1, according to the World Bank, the World's Top 100 Economies are represented not only by countries and companies but also by cities. Thus, the way smart cities are designed and implemented will mean having more efficient but also more sustainable urban settlements by reaching economic and social prosperity.

Smartness that is just in line with techno-economic growth will not develop further itself, provoking potential boomerang side-effect to the cause that has not been systemically anticipated before 2008 crisis (Calzada 2013). According to the Urban Transformations research portfolio funded by the ESRC (2016), the changing geographies of urban studies reflect the reordering of the global economy. The sheer scale of urbanisation in the global south, the tiger economy's maturity in Asia and the growth of the BRICs undermines a conventional urban studies narrative that focuses on the metropolitan experiences of the global

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north. Thus, geo-economics is already requiring a systemically smart response to the geo-politics and geo-democratics. Considering cities as isolated technical systems is clearly insufficient for the urban challenges that they are already facing. Cities are complex adaptive systems, combining spatiotemporal and behavioural structures that are affected by and affect individual and collective agents.

The World's Top 100 Economies

	Country/City/Company	GDP/Revenues		Country/City/Company	GDP/Revenues		Country/City/Company	GDP/Revenues
1	United States	14,204	35	ExxonMobil	426	69	Chevron	255
2	China	7,903	36	Osaka/Kobe, Japan	417	70	Toronto, Canada	253
3	Japan	4,354	37	Wal-Mart Stores	406	71	Detroit, USA	253
4	India	3,388	38	Colombia	395	72	Peru	245
5	Germany	2,925	39	Mexico City, Mexico	390	73	Portugal	245
6	Russian Federation	2,288	40	Philadelphia, USA	388	74	Chile	242
7	United Kingdom	2,176	41	Sao Paulo, Brazil	388	75	Vietnam	240
8	France	2,112	42	Malaysia	383	76	Seattle, USA	235
9	Brazil	1,976	43	Washington, DC, USA	375	77	Shangai, China	233
10	Italy	1,840	44	Belgium	369	78	Madrid, Spain	230
11	Mexico	1,541	45	Boston, USA	363	79	Total	223
12	Tokyo, Japan	1,479	46	Buenos Aires, Argentina	362	80	Singapore, Singapore	215
13	Spain	1,456	47	BP	361	81	Sydney, Australia	213
14	New York, USA	1,406	48	Venezuela	357	82	Bangladesh	213
15	Korea, Republic of	1,358	49	Sweden	344	83	Mumbai, India	209
16	Canada	1,213	50	Dallas/Forth Worth, USA	338	84	Rio de Janeiro, Brazil	201
17	Turkey	1,028	51	Ukraine	336	85	Denmark	201
18	Indonesia	907	52	Greece	329	86	Israel	201
19	Iran, Islamic Rep	839	53	Switzerland	324	87	Ireland	197
20	Los Angeles, USA	792	54	Moscow, Russian Federation	321	88	Hungary	194
21	Australia	762	55	Hong Kong, China	320	89	Finland	188
22	Taiwan	710	56	Austria	318	90	General Electric	183
23	Netherlands	671	57	Philippines	317	91	Kazakhstan	177
24	Poland	671	58	Nigeria	315	92	Volkswagen Group	158
25	Saudi Arabia	589	59	Atlanta, USA	304	93	ENI	158
26	Chicago, USA	574	60	Romania	302	94	AXA Group	157
27	Argentina	571	61	San Francisco/Oakland, USA	301	95	Phoenix, USA	156
28	London, UK	565	62	Houston, USA	297	96	Minneapolis, USA	155
29	Paris, France	564	63	Miami, USA	292	97	Sinopec-China Petroleum	154
30	Thailand	519	64	Seoul, South Korea	291	98	San Diego, USA	153
31	South Africa	492	65	Norway	277	99	HSBC Holdings	142
32	Royal Dutch Shell	458	66	Algeria	276	100	Barcelona, Spain	140
33	Egypt, Arab Rep	441	67	Toyota Motor	263		Country City Company	
34	Pakistan	439	68	Czech Republic	257		GDP/Revenues in $ billions PPP, 2008	

Data sources: Country data: GDP-PPP from the Development Data Platform time series, World Bank; City data: PricewaterhouseCoopers (PwC). 2009. *Which are the largest city economies in the world and how might this change by 2025?* Economic Outlook; Companies: Data retrieved from http://www.forbes.com/lists/2008/18/biz_2000global08_The-Global-2000_Rank.html (accessed November, 2009)

Cite as: Hoornweg, D., P. Bhada, M. Freire, C.L. Trejos Gómez, R. Dave. 2010. *Cities and Climate Change: An Urgent Agenda.* World Bank.

Table 1: The World's Top 100 Economies (World Bank 2010).

3 (UN)PLUGGING THE SMART CITY

Thus, this paper goes beyond the trend of hyper-connected societies. As such, while the creation of smart cities has many supporters, most notably governments that hope to address and manage the many issues cities face using ICT-based solutions and businesses that seek to profit from selling new smart city technologies and services, smart urbanism has not been universally welcomed (Kitchin 2015). As Vanolo (2016) argued recently, the reasons why the smart city is so popular in Europe are based mainly on a mix of various forces, to be found, first, in the availability of substantial European financial resources to fund the eco-restructuring of cities; second, in the tendency of the major private companies to invest in urban digitisation projects; third, in the construction of a persuasive rhetoric including salvation visions of technology; and finally, in the image of clean, liveable, technologically advanced cities far removed from the economic crisis.

3.1 Beyond hyper-connected socities

There is a wrong belief that complex open systems can be disassembled into neatly defined problems that can be solved or optimised through computation. This is what Morozov calls solutionism as the expansion of technological development, which includes reductions in the cost of connectivity, has increased the deployment of information-centric schemes (Ahlgren et al. 2012). Thus, smart cities represent a set of hyper-connected societies that enthusiastically embrace ICTs as a key component of the infrastructure of modern cities. However, the social adoption of technology and technological evolution occur at highly dissimilar rates, suggesting significant socio-technical misalignment (Calzada 2015).

3.2 Being digitally connected/plugged in is no guarantee of being smart

Albeit, the notion of unplugging lies in two notions:

- The first notion means the fact of being digitally connected or plugged in is no guarantee of being smart as Evans suggested in 2002 (Calzada 2015: 36). In urban planning, there is a well-established notion of wicked problems. They aren't solvable due to technical limits or a lack of data; rather, they aren't solvable because they are big and complex and so wracked with political conflicts that stakeholders can't even agree what success looks like or how to measure it. Yet the smart city promised that, given enough data and enough processing power, we could directly compute solutions to any problem (Rae 2015). This shows a lack of understanding of how cities work, and, at worst, it was a disaster in the making.
- The second notion is a consequence of the first one; as Williams noted in 1983, technology is never neutral, and it has the potential and capacity to be used socially and politically for quite different purposes. This idea is explicitly advocated by Kitchin when he refers to data (2015: 17) by arguing that the data within these systems are not neutral and objective in nature. Instead, they are situated, contingent and relational, framed by the ideas, techniques, technologies, people and contexts that conceive, produce, process, manage, analyse and store them.

3.3 (Un)plugging the Smart City: 10 transitions

In order to overcome the reductionist mainstream smart city direction from a critical urban transformational perspective, the author of this paper suggested in an previous article, which ranks as the seventh most-read article in the Journal of Urban Technology, to use of a 10-transition-based framework entitled Unplugging. With Unplugging, instead of merely accepting the technology or refusing it totally, it suggests implementing a transition in 10 different dimensions, as shown in Table 2.

	1 WHO	2 HOW	3 SYSTEMS	4 GOVERNANCE	5 INFORMATION	6 FOCUS	7 SPACE	8 DESIGN	9 SOCIO-POLITICAL PROCESSES	10 POLITICAL ECONOMY
UNPLUGGING the SMART CITY	Social & Digital Divide	Individualism vs Collectivism	Socio-Technical Systems	Master Planning vs. Emergent Plan and Top Down vs. Bottom Up	Overload vs Scarcity	Social Netking vs Social Capital	Context Collapse	Ambient Commons	Control & Normative vs Free & Emergent	Profitable vs Non-Profitable

Table 2: Unplugging: Deconstructing the Smart City. 10 Transitions/Dimensions

Unplugging is defined (Calzada et al. 2015) as a subtle notion of contestation of the dominant mode of urban governance that demands some transitions to overcome the social tensions and misalignments caused by hyper-connected societies. Nevertheless, this methodological proposal presents another virtuality: instead of aligning with dystopian and techno-sceptic pure visions of the smart cities, it lies in the constructive notion of the social innovation by identifying real cases that firmly embrace this novel trend—a novel trend that offers a corrective to the smart city mainstream in favour of a transition towards the judicious use of digital technologies, thus enabling the construction of a more economically and socially sustainable democratic citizenship. Here in a nutshell are the 10 transitions/dimensions that could be foreseen regarding the smart city projects:

(1) [The Who Dimension] Will the smart city evolve into an urban sphere in which dwellers have the right to decide whether to be connected? Will unplugging be a right or a privilege? To what extent is it possible to foresee a transition of smart cities from the high to the low social and digital divides towards more democratic, participatory and equal smart cities?

(2) [The How Dimension] How will the transition between individual and collective entities be organised? Will we witness new hybrid configurations by experimenting with unplugging? Can the function of the smart city be understood as a proxy for a community? Is the city a social interface in which the citizens will be able to self-design their social, everyday, life needs?

(3) [The System Dimension] To what extent is it possible that dwellers can be less passive in deciding the role of urban technology systems? Will these devices serve the citizens more than the citizens serve the devices? Will the transition from an artificial system to an embedded system be understood as an opportunity for adding value to citizens' experiences?

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(4) [The Governance Dimension] How will the smart city avoid technocratic, dominant, top-down governance? Are there experimental governance schemes that embrace bottom-up, emergent strategic planning and are considered to be real possibilities? Is the bottom-up innovation perspective simply wishful thinking?

(5) [The Information Dimension] How realistic is it to combine open access, civilian, deliberative systems within a confidential, espionage-obsessed paradigm? In the big data era, is it possible to transition from controlled to open data-driven models?

(6) [The Focus Dimension] Are open, democratic communities of individuals facing a transition from a business-led and techno-deterministic approach to socially innovative, community-driven cities? Do we notice the difference between simple social interactions and trusting human ties?

(7) [The Space Dimension] Will we observe changes in which context-collapsed information will be contextualized to enhance social interactions? To what extent can context collapse enable new opportunities for social capital?

(8) [The Design Dimension] Will technological devices be designed based on people's needs rather than on corporate or infrastructure interests? How can design and user interactions be improved to anticipate an ambient commons for citizens?

(9) [The Socio-Political Processes Dimension] Will the socio-political establishment experience a shift towards free and community-driven processes? What are the boundaries for establishing these processes in the urban arena?

(10) [The Political Economy Dimension] Finally, will the political economy of the smart city be altered as a consequence of changes in stakeholder power relationships?

The main aim of the paper is to present a way in which we could unfold the real practices and consequences of the smart city initiatives (Calzada et al. 2015) rather than providing a taxonomy of definitions (Albino et al. 2015, Caragliu et al. 2009, ARUP 2011 and 2014). According to some widely spread critical perspective about smart cities (Buck & While 2015, Campbell 2012, Gabrys 2014, Glasmeier & Christopherson 2015, Greenfield 2013, Hajer & Dassen 2014, Hollands 2008 and 2014, Kitchin 2015, Luque-Ayala and Marvin 2015, Marvin et al. 2015, Shelton et al. 2015, Soderström et al. 2014, Townsend 2015, Vanolo 2014, and Vitanen et al. 2014), despite the significant political, economic and social consequences, research on smart technologies to date has focused on their technical components. Albeit, there has been limited discussions of the social and geographical dimensions of urban processes.

In this context, smart city discourse, at least in the EU (Caragliu 2011 and European Parliament 2014), has changed for the better since 2008. City leaders around the world have a much more informed understanding of what smart technologies can do. But little can be said about smart interventions by considering holistic frameworks. It is why this paper advocates deconstructing, from the policy perspective, which are the interactions among stakeholders while unpacking processes driven by smart technologies. It is just after unplugging when we could certainly build the smartness in cities—not just by adding another layer more by adapting the hardware to the software (Calzada et al. 2016), rather than vice versa. It is after that when joint smart and sustainable policy agendas could make complete sense of the particular smart urban challenges with relevant transformative consequences.

In the next section, an analysis of the on-going smart city EU projects in which the author is already or has been involved will be presented. The author's participation has proceeded in different levels: as a member of advisory boards, lecturer, WP leader and PI.

4 PRELIMINARY FINDINGS FROM ON-GOING SMART CITY EU PROJECTS

Here some findings after working in the projects detailed in Table 3:

- It is obvious that the smart city concept has rapidly risen to prominence within the policy and governance discourses of urban development and is on its way to becoming the leading driver of urban sustainability and regeneration initiatives (de Jong et al. 2014: 12).
- However, as we have seen in the so-called one-size-fits-all, smart-city-in-the-box paradigm with Masdar and Songdo, rather than being constructed on tabula rasa according to the centralised plans of multinational technology corporations, smart city interventions are always the outcomes of, and

awkwardly integrated into, the existing social and spatial constellations of urban governance and the built environment (Shelton et al. 2015: 14).

- In the case of the two projects funded by the European Commission 7th FP, STEEP and STEP UP, interdependencies have been the unresolved issue so far.
    - In the case of STEEP (Systems Thinking for Efficient Energy Planning), partners spent months utilising the STEEP open-source methodology. As part of this process, a list of 50 KPIs was identified, against which the plan will be measured. Nonetheless, along the development of the Energy Master Plan for districts for the three partner cities, St Sebastián (Spain), Florence (Italy) and Bristol (UK), the adoption of the system-thinking methodology in combination with open-data sourcing to achieve carbon reduction targets and overcome the barriers to energy efficiency has shown the lack of vision and the urgent requirement for further interdependent actions among the stakeholders. This fact should remind us that the actions of citizens have less to do with individuals exercising rights and responsibilities and more to do with operationalizing the cybernetic functions of the smart city (Gabrys 2014:38).
    - In the case of STEP UP, a number of projects have been developed in each partner city. In Glasgow, the Commonwealth Games Athletes' Village and the Future City Glasgow programme awarded by Innovate UK and Clyde Waterfront as the biggest regeneration project ever undertaken in Scotland were developed. In Ghent, two initiatives were developed: a Car Free City Centre of approximately 35 hectares and a renewal project called Ledeberg Alive. In Gothenburg, a new sustainable urban district called Kvillebäcken was established, and two initiatives were implemented in parallel: Congestion Charge and New Travel Habits. Finally, in Riga, two interventions were undertaken: a smart card as a transport, social and education policy instrument and a new building complex in the Torknakalns district.
    - Regarding SMART CITY REGION, this project understands 'smart cities' as, in essence, entrepreneurial cities that respond immediately and efficiently—in imaginative, novel ways—to continuous, complex, socio-technical changes caused externally by global market dynamics and internally by unequal stakeholders' power relations. Indeed, this project compares strategically and ethnographically four specific city-region cases located in two European nation-states: Bristol and Glasgow in the UK and Bilbao and Barcelona in Spain. This project focuses initially on how each case study has produced a particular discourse of 'smartness'. Through this analysis, a stakeholder analysis and its unique configuration are provided. Thus, a comparative analysis will proceed with multilevel governance and stakeholder analysis. It is noteworthy that scales of multilevel governance pluralise with intensifying patterns of European connectivity and accelerating economic restructuring. This gives rise to the notion of city-regional governance in nation-states. This may involve new concepts and narratives, mobilisation of different knowledge, and imaginative thinking about new governance strategies and use of institutions while employing more informal collaborative networks among regional stakeholders. Thus, in this paper, smart city-regional governance entails opening up and pressing for significant new ideas about democratic legitimacy and political inclusion. Additionally, 'smartness' should be taken as an outcome of regional urban transformations in governance, reconciling seeming contradictions between established growth agendas and a rising concern with a broader range of qualitative parameters, such as societal and territorial cohesion. Nevertheless, considering the nation-state's limited capacity to manage conflicting patterns of urban growth and decline, political demands regarding devolution of metropolitan and regional powers should be smartly taken into account. This common trend remains crucial in four cases. While local governments increasingly are in charge of their own economic destiny, this paper compares city-regions to understand better stakeholders' dynamics in each socio-communitarian location. Socially and politically innovative processes are occurring at all scales, from neighbourhood participation interventions (micro) to city-regional strategic logics (macro). Hence, this paper establishes the 'smart city-region' term both as a unit of analysis and a mode of production among stakeholders. However, one must acknowledge the particular histories, unique geographies and diverse power relations among stakeholders in different city-

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regions. This comparative analysis of the four cases will enhance two dimensions of the 'smartness' for each city-region. On the one hand, the focus will be on the metropolitan governance dynamics and the stakeholder interactions. On the other hand, it will tackle a special consideration for the devolution dynamics between the city-region and each referential nation-state. An analysis for the four cases follows:

- For a long time, Barcelona[1] has been investing and promoting itself as the first Spanish Smart City, the fourth in Europe and the 10th in the world. At present, due to a new city mayor—Ada Colau, who represents a radical new citizen platform called 'Barcelona in Common'—an initial smart city strategy has been shifted towards an 'open source' strategy.
- In 2013, Glasgow[2] won £24m of funding from the UK Technology Strategy Board (TSB) to explore ways to use technology and data. At present, the strategy is being reviewed based on the demonstrator project, which focuses on four main areas of urban infrastructure: health, energy, transport and public safety. The question here is whether the 'urban governance' model has integrated the city-regional scale as suggested by The Scottish City Alliance.
- By contrast, Bristol[3] received £3m from the UK TSB, but its approach has followed 'open innovation' principles by its flagship operational organisation called 'Bristol is Open'. The university is playing a remarkable role in engaging stakeholders at the metropolitan level. However, how the city-regional devolution affects Bristol's smart-city strategy remains uncertain.

o Finally, the recently launched lighthouse project called REPLICATE, funded by the European Union's Horizon 2020 Research and Innovation programme grant agreement No. 691735, shows the following challenge from the urban transformation perspective: the project advocates innovative approaches to citizenship, with the aim of involving citizens as stakeholders at all stages of the activities to co-create appropriate solutions and services which celebrate and work successfully with the characteristics and context of each metropolitan area in each lighthouse and follower city.

EU Project	Cities involved	Timeframe & Title	Funding Institution
EU-H2020-SCC-1st Lighthouse: REPLICATE	Bristol (UK) St. Sebastian (ES) Florence (IT) Laussane (CH) Essen (DE) Nilüfer (TR) Bogotá (CO) Guangzhou (CN)	< 2015-2020 > REnaissance of PLaces with Innovative Citizenship And TEchnology	EU-H2020-SCC-Lighthouse www.replicate-project.com
EU-Marie Curie Actions-Cofund-Regional Programmes: SMART CITY-REGIONS	Bristol (UK) Glasgow (UK) Bilbao (ES) Barcelona (ES)	< 2015-2016 > Comparing Smart City-Regional Governance Strategies: Bilbao, Barcelona, Bristol & Glasgow	EU-FP7 Marie Curie Actions- Cofund BilbaoMetropoli-30/Bizkaia Province Council
EU-FP7-314679 STEP UP Smart City Plan	Glasgow (UK) Riga (LT) Gothenburg (SE) Ghent (BE)	< 2014-2015 > Energy Planning for Cities *MSc Master in Global Sustainable Cities	EU-FP7 www.stepupsmartcities.eu/
EU-FP7-314277-STEEP Smart City Plan	Bristol (UK) St. Sebastian (ES) Florence (IT)	< 2014-2015 > Systems Thinking for comprehensive city Efficient Energy Planning	EU-FP7 http://www.smartsteep.eu/

Table 3: Smart City EU Projects.

[1] http://smartcity.bcn.cat/en/smart-city-areas.html
[2] http://futurecity.glasgow.gov.uk
[3] http://www.bristolisopen.com

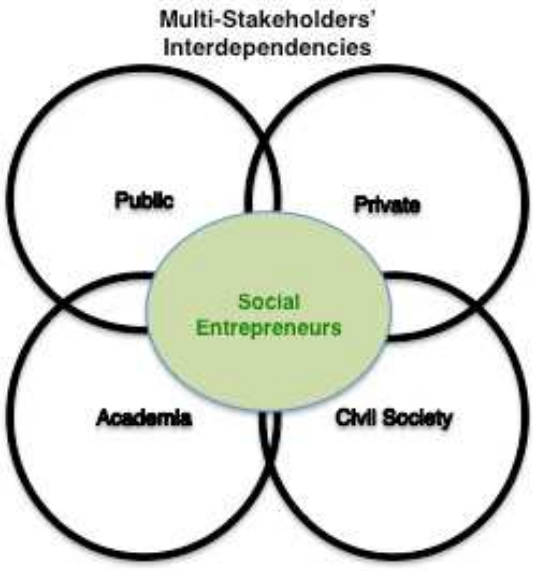
5 FINAL REMARKS

After presenting on-going EU projects, in this section, the paper concludes that despite the fact that smart city projects are indistinctively using the brand of the smartness, a deeper analysis is required by contrasting their findings with the cutting-edge research compiled by the ESRC Urban Transformations portfolio (ESRC 2016). In this portfolio, projects regarding specific interventions on big data (Bright 2016), economic evolution of the transformations in cities (Martin 2016), urban living labs (Bulkeley 2016), and neighbour and local development (Perry 2016) are showcased. Thus, in this last section, the author advocates that smartness in European cities should be critically complemented with an holistic urban transformation action research perspective (Calzada 2013, Evans 2014, Harvey 1997 and Sennett 2012).

In these final sections, the paper presents five intertwined research lines in order to leverage the transitions that smart cities require to align them with a systemic interpretation of the current urban challenges that are meant to be tackled in the upcoming years. The article is presented as a proposal for a further research agenda on smart urban transformations.

5.1 Multi-stakeholders' interdependencies: the hidden urban governance driver

If the crisis in 2008 underlined an evidence-based economic fact, it was that visions of smart cities are very diverse. Actually, how they dovetail with local and global economies, and how they unfold in practice, vary between places (Kitchin 2015:3). But who is benefitting from the smart city investments? (Glasmeier and Christopherson 2015). Who pays the bill at the end of the day? Some authors alert us to the fact that the design of an intervention has significant implications for its usability and accessibility and that each design gesture has an intended community. The assumption behind many smart city projects is that everyone owns a smart phone and knows how to operate it at maximum performance. Consequently, technology audits are necessary to reveal just how flexible, usable and accessible these technology designs are for different targeted stakeholders. So, to understand from smart city interventions, we need thoughtfully designed, rigorous comparative research by considering three main elements uniquely in each particular location: First, technology has reemerged as a prominent debate for urban development as long as we reconsider the different role of specific stakeholders in the given location. Second, around the power relations and topics of discussion, the dominance of green growth and ecological modernisation will be such a recurrent subject. Third, a total reconfiguration of urban partnerships should be encouraged in our cities.



According to some findings in the STEEP, STEP UP and SMARTCITYREGIONS, and by considering the results of the Urban Governance and Its Discontents International Conference organised by the Future of Cities Programme at the University of Oxford in 2016 (Oxford City Debates 2016), the potential, conflictive and deliberative stakeholders' interactions should be deeply considered before and during each smart city intervention. Actually, this is one of the main innovative aspects of the REPLICATE H2020 lighthouse project. As Harvey (1997) pointed out, the smart city and new urbanism movements build an image of the community and a rhetoric of place-based civic pride and conciousness for those who do not need it while abandoning those that do to their underclass fate. In order to overcome this gap in the smart city discourse,

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this paper suggests using the Penta Helix multistakeholder framework (Calzada 2013), which consists of the private sector, public sector, academia, civic society and social entrepreneurs. As has been said before, some signals show this direction. Especially, there are significant attempts (Saunders et al. 2015 and Smart Retro Project 2015) coming from the social innovation field to uncover the hidden urban governance engine that could be defined as the way multi-stakeholders' interdependencies operate in diverse smart cities.

5.2 Urban data to decide

The second remark is a concern. In the context of the smart city, the data that are generated are the products of choices and constraints shaped by a system of thought, technical know-how, public and political opinion, ethical considerations, the regulatory environment and funding and resourcing (Kitchin 2015: 21). Thus, how can a sensor, a smartphone or a commercial transaction have politics? The UrbanData2Decide project (Bright 2016) found that, in public decision-making processes, stakeholders have opposite positions and advocate different solutions but have difficulty providing details about what the different positions are based on and what the consequences can be.

According to Batty (2012: 18), there are some new functionalities for urban data to decide: the acquisition of data from multiple distributed sources, the management of data streams, the integration of heterogeneous data into a coherent database, data transformations, definition of new observables, methods for distributed data mining and network analytics, the management of extracted models, tools for evaluating the quality, visual analytics, simulation and prediction methods and finally, incremental and distributed strategies needed to overcome the scalability issues that emerge when dealing with big data. Regarding the last idea about big data, it should be completed with the statement made by Rae et al. (2015), when they argue that the debate on big data often lacks clarity, direction and reason. In their attempt to define big data, the authors conclude that there is an indefinite definition of big data so far. However, according to the findings of the EU projects presented before, interdisciplinary interventions are required to tailor open and big data platforms in each project. As such, the multi-stakeholders' interdependencies should be linked to data issues insofar as platforms will be developed on the basis of tackling the following urban transformations (2012: 35): housing booms and busts in large cities, impacts of changes in energy on urban transportation systems and mobility, the fracturing of transport networks, synthesis of different urban data sets, the impact of climate change on cities in Europe, the participation of citizens in the development of plans for smart cities and the impact of immigration phenomena in a global world.

In addition to all these functionalities and urban transformations, this paper underlines that data management should strongly fit the idea of governance that extends in this way to the many functions that we envisage being coordinated in the smart city. This relatively new prospect is part of the wider debate about the metropolitan and regional devolution of governance in the information age. Hence, as we can observe, multi-stakeholders' interdependencies, urban data to decide and metropolitan and regional scalability for smart cities are firmly intertwined.

5.3 Scalability: metropolitan & regional scales

According to the latest policy report by Habitat III Policy Unit (LSE Cities 2016), there is an expansion of metropolitan areas that is producing at the same time a growing gap between these and intermediary cities by posing additional challenges to urban and national governance. This trend should be included in smart city interventions. So far, the smart city perspective has been understood and sold as a means to show better cities, just considering city centres and centric districts in the major metropolitan areas. However, as we have discovered in some on-going interventions in St. Sebastian, Florence, Bristol, Glasgow, Ghent, Riga, Gothenburg, Bilbao or Barcelona, among others, a realistic revision of the implementation of smart city interventions is required by incorporating the idea of strengthening decentralisation processes that could reinforce metropolitan- and also regional-scale governance (2016: 22). And here is where the smart city should become a smart metropolitan or city-regional entity by enhancing the institutional instrumentarium, as Noveck (2015) suggests, by reviewing and improving the public services (WEF 2016). Similarly, Martin (2016) pays attention to the role of city-regions in national development as a driver of urban growth and the way economic evolution in cities requires the scaling-up of policy solutions. Indeed, García-Ayllon and Miralles (2015) have even contributed a model of territorial analysis that consists of more than 50 indicators in the following areas: revitalisation of the urban system, R&D, crisis of rural, access to transport, access to

ICT, sustainable energy, disaster risk prevention and management of natural resources, management of cultural resources, sustainability of regional and economic resources, governance and landscape management. Thus, we can observe that despite the fact that numerous protocols are appearing worldwide to develop these processes within smart cities, the real challenge for the future is to make the leap from the urban scale to the metropolitan and city-regional scales and deploy and scale-up these policies in an integrated manner between the urban, the metropolitan and the city-regional domains.

5.4 Benchmarking: comparing smartness & city-to-city co-creation

There is a lack of comparative analysis and a dearth of knowledge about the range of urban, metropolitan and regional contexts within which forms of smart and digital urbanisation are emerging internationally. In this attempt, the author of this paper carried out a four-year comparative benchmarking between eight city-regions (www.cityregions.org). The main conclusions have been published in an article entitled 'Benchmarking Future City-Regions beyond Nation-States' in the RSRS open access journal (Calzada 2015). If we dare to suggest a comparative basis for smartness, according to Anthopoulus et al. (2015) we could be overwhelmed with the number of approaches we would find (IBM, ITU, UN-Habitat, ISO, etc.). Given the broadness of this field, it is not surprising that many benchmarking approaches have been developed. Nonetheless, few of them mention the distinctiveness of cities (Barbenhön et al. 2016), a fact that is very significant at this stage of the evolution of the smart cities. As Branchi et al. (2014: 62) stated, the history of a city cannot be detached from that of its citizens, who are the ones who have determined the city's location, spatial configuration, growth and development. These comprise the key aspects that should set the basis to compare smartness and city-to-city learning processes in the future.

5.5 Visualisation: rankings & city dashboards

Finally, as we have suggested so far, including stakeholders' interaction seems to be particularly necessary, insofar as the data that cities will deal with require a vast amount of sectoral information that would cover not only the local scale but also the metropolitan and the city-regional scales. As such, urban indicators are recurrent quantified measures that can be tracked over time to provide a picture of stasis and change with respect to urban phenomena. Nevertheless, we should advocate the usage of benchmarking and the visualisation of the indicators in rankings and city-dashboards in a more contextual way. Rather than cities being understood as mechanical systems that can be disassembled into their component parts and fixed, or steered and controlled through data levers, cities are conceived as consisting of multiple, complex, interdependent systems that influence each other in often unpredictable ways. As a consequence, as we said in the second section, governance is seen as being complex and multi-level in nature, and the effects of policy measures are perceived as diverse and multifaceted, and neither is easily reducible to performance metrics and targets (Kitchin 2015: 25).

This paper aimed to (un)plug in or unpack the term 'smart city' in the light of some EU projects' findings. It attempted to overcome the smart city trend as a fetish buzzword in the hands of indistinctive place branding (Cleave et al. 2016) in order to embrace the merger of sustainable and smart policy agendas in the direction of the sharing cities paradigm (McLaren et al. 2015). In this endeavour, it suggests five alternatives for developing a further research and policy agenda from the urban transformations perspective: the stakeholders' interdependencies, the need for urban data need to focus on local specificities rather than global features, the requirement of the territorial scale-up, comparing smartness via benchmarking and city-to-city co-creation processes and holistic visualisation tools.

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