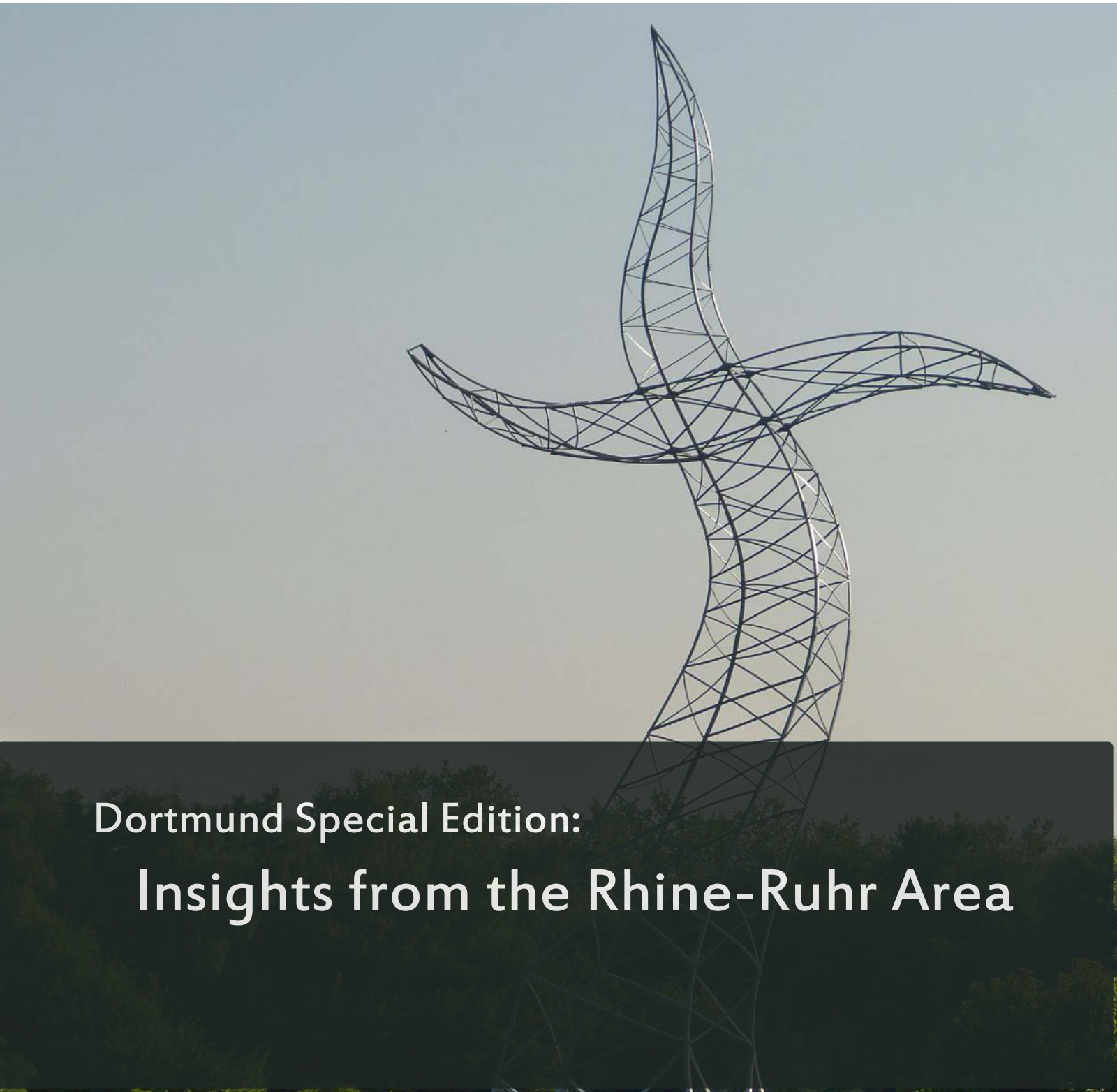
iglusQUARTERLY

INNOVATIVE GOVERNANCE OF LARGE URBAN SYSTEMS

Vol 2 | Issue 2 | October 2016



Dortmund Special Edition:

Insights from the Rhine-Ruhr Area

IGLUS Quarterly | Published four times a year, IGLUS Quarterly contains information about Governance, Innovation and Performance of Cities in general. It provides original analysis, information and opinions on current issues. The information and views set out in this publication are those of the author(s) and do not necessarily reflect the official opinion or views of IGLUS/EPFL. The author(s) is solely responsible for the accuracy of the information presented and will be held liable for any potential copyright infringement.

ISSN | 2571-628X

Subscription | The subscription is free. Please do register at www.iglus.org to be alerted upon publication.

Letters | We do publish letters from readers. Please include a full postal address and a reference to the article under discussion. The letter will be published along with the name of the author and country of residence. Send your letter (maximum 450 words) to the editor-in-chief. Letters may be edited.

Cover image | © Dieter Schütz, pixelio.de, Tanzender Strommast / Dancing Power Pole
Publication directors | Matthias Finger, Mohamad Razaghi
Editor of this Issue | Mohamad Razaghi, Rebecca Himsl, Maxime Audouin, Matthias Finger
Publishing manager and coordinator | Rebecca Himsl, Maxime Audouin
Founding editor | Matthias Finger
Publishers | Chair MIR, Matthias Finger, director, EPFL-CDM, Building Odyssea, Station 5, CH-1015 Lausanne, Switzerland (**phone:** +41.21.693.00.02; **fax:** +41.21.693.00.80)
Email | iglus@epfl.ch **Website** | www.iglus.org

INNOVATIVE GOVERNANCE OF LARGE URBAN SYSTEMS

IGLUS.EPFL @IGLUSEPFL company/iglus

European University Institute — Robert Schuman Centre for Advanced Studies — Florence School of Regulation Transport

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

EDITORIAL

Hello and welcome to our third edition of the IGLUS Quarterly. In this issue we travel to the Ruhr region of Germany for the Dortmund Special Edition. This edition features a series of three articles written by our IGLUS partners in Dortmund, focusing on three cases that each discuss a different dimension of the governance of large urban systems in the Ruhr region and beyond.

The first contribution by Professor Karsten Zimmerman discusses the challenges associated with establishing strong governance schemes in fractured metropolitan regions and explains how three different European countries – France, Italy, and Germany – have attempted to tackle these challenges.

In the second article, authors Mario Reimer and Karsten Rusche explain what exactly constitutes a green infrastructure, outline the numerous benefits associated with the infrastructure, and discuss, how in Germany, one green infrastructure initiative- the IBA Emscher Park- helped to revitalize a region in economic decline.

The final contribution, Smart City: Theory & Practice, by Andreas Putlitz is a two-part article in which the author defines, and explains, the theory underlying the loosely-defined, hotly-debated concept of the 'Smart City'. Then, in the second half of the article the author describes the governance framework underlying the smart city initiative in Vienna, 'Smart City Wien', and introduces us to one project in particular- the Smart Urban Lab Aspern greenfield development.

Each of these articles discusses a domain of urban governance in the central European context, but it is plain to see that these lessons and concepts could be equally relevant when expanded elsewhere. These three topics- metropolitan governance, smart cities and green infrastructures- stand to be important priorities for many cities across the globe, and it is evident that there is still much left to be explored in these fields. But, it is our hope that this special edition of the IGLUS Quarterly can trigger the interest of scholars and urban practitioners around the globe and spark critical discussions around these practices and their underlying complexities.

We invite you to join in on the discussion at www.iglus.org, and if feel you that there are innovative practices underway in your city-region and would like to contribute to your own special edition of the IGLUS Quarterly, we encourage you to contact Rebecca Himsl, project manager, at rebecca.himsl@epfl.ch or Maxime Audouin, editor-in-chief, at maxime.audouin@epfl.ch.

Mohamad Razaghi and Rebecca Himsl

Recent trends in governing fractured metropolitan regions

Karsten Zimmermann*

ABSTRACT: Expanding metropolitan areas are a challenge for metropolitan governance. The article describes recent reforms in France and Italy as well as initiatives in Germany to illustrate the difficulties in building up institutional capacity in fractured metropolitan regions.

1. Introduction

Metropolitan Governance is a broad phenomenon and has been an issue for practitioners and academics worldwide for many decades now (OECD 2016; Heinelt and Kübler 2005). On the one hand, the governance of problems in metropolitan areas is related to challenges resulting from globalization and increased societal diversity and fragmentation in densely populated metropolitan areas. On the other hand, newly established metropolitan governance arrangements have profound political and economic implications. Public actors (from local government to agencies of upper-level government) are interlinked in these arrangements in complex formal and informal networks with private companies, business associations, trade unions, universities and a multitude of civil society organizations.

In their seminal book on "Struggling Giants", Paul Kantor et al. (2012) describe in detail how the effective implementation of city region governance is hampered in the megacity regions of London, New York, Paris and Tokyo. Usually a mix of institutional misfits and uneven socio-economic developments constitutes the problem of failed political and administrative coordination. A lack of metropolitan governance has several implications. For example, in waste management, difficulties in finding sites for waste dumps occur or the joint use of waste incinerators is blocked because of a lack of cooperation. Dense functional interdependencies and urban sprawl result in a high number of commuters paying taxes in their suburban hometown. The effective planning and management of transport infrastructure and services is considered a key challenge in metropolitan regions. Fiscally overstrained core cities alone cannot provide for an appropriate transport infrastructure but can collaborate with the neighboring cities and counties (sharing of costs). Competition of municipalities for firms and richer strata of the population, and lack of regional planning and infrastructure planning in metropolitan areas results in space consumption for business development, housing and infrastructure such as airports. This collides with protection of regional parks and green areas. These are only but a few of the negative externalities that speak in favor of metropolitan governance. However, creating appropriate governance solutions for solving the mentioned issues has faced many problems in the past. In some politico-administrative systems, metropolitan regions as institutions do not even exist or are a rather weak level of policy-making. However, in some of the European states we observe renewed national initiatives to support the creation of metropolitan governance arrangements.

2. Metropolitan Governance and National Urban Policies

A renewed interest can be observed since the 1990s when a huge variety of different metropolitan reform experiments were summarized more or less convincingly under the label of "new regionalism" (Savitch and Vogel, 2000). However, the new regionalism is an ambiguous project that serves little to explain the high diversity of metropolitan arrangements in general or for a single country, like for instance Germany. Also, new region-

* Karsten Zimmermann, Professor and head of department of European Planning Cultures, Faculty of Spatial Planning, TU Dortmund University of Technology

alism gives little guidance for the institutional design of metropolitan governance arrangements in a particular local context or for a particular policy such as waste management, transport or land use planning.

As will be shown in the remainder of this article, we observe a new wave of institutional reforms in Europe that have effects for the governance of metropolitan regions but can't be subsumed using label new regionalism. Besides the already mentioned normative ambiguity of the approach, the solutions under discussion in a large number of states follow an old regionalism in terms of organizational aspects and the territorial dimension (creation of regional counties or regional cities, amalgamation). Also, the approach fails to give guidance the governance of post-suburban and post-metropolitan realities (Charmes and Keil 2015).

The implementation of the Cittá Metropolitana in Italy, the recent discussion on City Regions in England, territorial reforms and the several new laws in France, the Kallikratis-Reforms in Greece and the obligatory use of the EU-structural funds tool "Integrated Territorial Investment" (ITI) in Polish city regions, show that metropolitan regions have again become a focal point in the political as well as scholarly debate. A more detailed view of the recent developments in France, Italy and Germany illustrates that the restructuring of the political sphere at the metropolitan level can be related to the general debate on statehood and on how to govern modern societies as well as to the diagnosis of a shift from government to governance.

3. France

France established an explicit national policy for city regions already in 1960s. Since then, inter-municipal associations (Communautés Urbaines) have proven to be effective service providers and planning bodies in most of the French agglomerations (Geppert 2016). Nevertheless, between 2010 and 2015 several new laws changed the established institutional order and resulted in territorial and institutional re-organizations. In particular the new instrument for inter-municipal cooperation called "Métropole" will be stronger in terms of competences than the former inter-municipal associations. However, the current state of reform shows mixed results. While Greater Lyon presents a successful case of establishing a sort of metropolitan government, other regions such as Nice or Marseille-Aix en Provence face problems on their way to become a Métropole. Old rivalries prevail and, interestingly, the French state allows for non-standardized solutions. In other words: the creation of a Métropole depends on local coalitions.

A weakness, however, is the territorial delimitation of the new administrative bodies. They remain in the territorial borders of their precursors. Hence, the extension of functional urban spaces is not reflected in the new solution.

4. Italy

Like in France, the territorial and institutional re-organization of the public sector was heavily influenced by austerity policies. The so-called del Rio law from 2014 made the implementation of metropolitan regions (Cittá Metropolitana) compulsory in the 10 biggest agglomerations of the country (Fedeli 2016). The provinces (second tier of local government) will be abolished in most of these areas. As a result, the Cittá Metropolitana is a new jurisdictional body resulting from the merger of the former province and the core city (such as Naples, Bologna, Florence, Milan, Turin). The Cittá Metropolitana is expected to act in several fields of public action such as strategic planning, infrastructure and promotion of business development. Also the reform is accompanied by an intensive debate on the direct or indirect election of the council of the metropolitan city.

However, in terms of spatial scale the new layer of planning and metropolitan policy-making simply is a continuation of the former provinces. In most of the agglomeration, the territory of the provinces does not cover the functional urban region. Therefore, the Cittá Metropolitana is an under-complex solution for metropolises that are ever expanding and becoming more and more polycentric. In particular the wider metropolitan area of Milan shows characteristics of a post-metropolitan development. Also scope, competences and autonomy of the cittá metropolitana are limited and therefore questionable.

5. Germany

Germany represents a case of diversity of metropolitan governance and shows a constant dynamic that results in incremental changes in most of the metropolitan regions. The reason for this diversity is German federalism and a strong institutional idea of local self-government that finds broad support. Inter-local coordination in metropolitan areas in various functional domains like spatial planning, economic development, waste management or transport has been on the agenda in Germany for quite a while. Besides the fact that in Germany the strong tradition of spatial planning has a significant influence on metropolitan governance there is no blueprint for the content and organizational form and we can find a highly differentiated landscape of metropolitan governance arrangements with reference to the functional scope, the geographical scale, the institutional form and even the content of the policy. The creation of inter-municipal associations (kommunale Zweckverbände or Regionalverbände) still is the instrument most frequently used for the organisation of public services and planning functions in metropolitan areas.

One important element of the debate on metropolitan regions in the last decade was the establishment of the "Initiative European Metropolitan Regions in Germany" or EMR (Initiativkreis Europäische Metropolregionen or IKM) in 2001 which can be seen as a network of the largest German metropolitan regions. The EMR initiative is exceptional in the German institutional context as it is a joint initiative of the 16 states and the federal government. However, it did not change the institutional framework but is a more soft intervention without granting any substantial legal responsibilities or subsidies to metropolitan regions. Hence, the effectiveness of metropolitan governance, understood here as enhanced and stable coordination of municipalities as well as private actors, depends on the institutional solution found in each region and the policies addressed.

The emergence of a new spatial scale as a result of the EMR initiative can be described as a pattern of combination of a strong institutional core on a smaller scale (usually planning associations in city regions, in part created in the 1970s) and softer forms of governance on larger scales (metropolitan regions). This pattern can be observed in Hannover where a three-scaled constellation has been established as well as in Stuttgart and Munich. Whilst the strong core is responsible for significant tasks such as regional planning, waste management, planning and management of public transport, the upper scales usually focus on economic development and international marketing. However, the new multi-scaled arrangements in German metropolitan regions are not the result of careful institutional design but contingent on local actor constellations and incentives provided by other governmental layers. The disadvantage of the absence of nationally coordinated metropolitan policies may be seen in the fact that in the majority of German metropolitan regions institutional misalignment, a lack of cooperation, or fragmentation prevail (Heinelt/Razin/Zimmermann 2011). Only in a few regions such as Hanover and Stuttgart have comprehensive solutions been found while others, such as Rhine-Ruhr or Frankfurt/Rhine-Main, experience more incremental betterments.

6. Conclusion

Although a re-scaling of administrative and socio-economic functions is taking place in most of the metropolitan areas worldwide as a simultaneous process, we have to notice that a contested politics of re-scaling leads to various outcomes (including failures). The restructuring of the political sphere at the metropolitan level reflects the general debate on statehood and on how to govern modern societies. In this debate doubts are raised about the capacity of the political system to govern modern society at all (and we might add: metropolitan regions in particular). However, assuming that it is possible to govern modern societies to a certain extent, the relevance of formal hierarchical political-territorial structures is questioned and growing emphasis is given to horizontal networks with flexible political geographies. Furthermore, an old comment by Dahl and Tufte (on the issue of size and democracy) remains relevant, namely: "Different problems require political units of different size" (Dahl and Tufte 1973, 135). This leads to the conceptualization of a system of vertically layered territorial political

units reaching from the local to the global level which is complemented by functionally determined (sectoral) political entities overlapping vertically and also breaking through single territorial levels. In such a flexible political geometry problems are taken up and addressed by different spatially related political units depending on specific and usually spatially determined challenges as well as the means to tackle them.

The most remarkable observation in Germany, that needs to be highlighted against the experience of the two other countries presented in this article, is the emergence of several scales of governance in quite a few of the German metropolitan regions. These added scales are the result of different political dynamics such as the introduction of the European Metropolitan Regions as a new informal layer of metropolitan politics that refers to larger metropolitan regions (instead of smaller city regions). The emergence of these new scales can best be described and explained by referring to the concept of politics of scale – also to underline the dimension of conflict and contestation (Keil and Mahon 2009). It is also striking that the governance of (networked) infrastructure for energy, water and transport is largely absent in the academic literature. Also in the mentioned national reform initiatives in Italy, France and in Germany this aspect is largely missing. This is surprising as the building and maintenance of resilient infrastructures seems to be one of the key challenges for the future in the post-metropolis (Mahon, Keil and Young 2011).

References

Aguilar-Barajas, I., Magaña-Rueda, V., Ramírez-OrozcAhrend, R.; Schumann, A. (2014). "Approaches to Metropolitan Area Governance: A Country Overview", OECD Regional Development Working Papers, 2014/03, OECD Publishing. http://dx.doi.org/10.1787/5jz5j1q7s128-en

Charmes, E.; Keil, R (2015). The politics of post-suburban densification in Canada and France, International Journal of Urban and Regional Research, vol. 39, no. 3, 581-602.

Dahl, R. A.; Tufte, E. R. (1973). Size and Democracy. Stanford.

Fedeli, V. (2016). Metropolitan governance and metropolitan cities in Italy: outdated solutions for processes of urban regionalisation?, Raumforschung und Raumordnung (in print)

Geppert, A. (2016). Metropolitan Governance and Spatial Planning. The new French "metropolises", a concentration of powers for underbounded spaces, Raumforschung und Raumordnung (in print).

Heinelt H. and Kübler D. (eds.) (2005). Metropolitan Governance. Capacity, democracy and the dynamics of place, Oxford: Routledge.

Heinelt, H.; Razin, E.; Zimmermann, K. (2011). Metropolitan Governance. Different paths in contrasting contexts. Campus: Chicago/Frankfurt am Main.

Kantor, P.; Lefèvre, C.; Saito, A.; Savitch, H.V.; Thornley, A. (2012). Struggling Giants. City-region governance in London, New York, Paris, and Tokyo. Minneapolis: University of Minnesota Press.

Keil, R.; Mahon, R. (2009). Introduction, in: ibid. (eds) Leviathan Undone? Towards a Political Economy of Scale, UBC Press. 3-23.

McMahon, M.; Keil, R.; Young, D. (2011). In-Between Infrastructures: Imagining New Forms of Techno-social Politics in the Contemporary Canadian Metropolis. Occasional Paper Series. Volume 1, Issue 2. The City Institute at York University (CITY).

Savitch H.V. and Vogel R. (2000). 'Paths to new regionalism' State and Local Government Review, 32(3): 158-168.

Green Infrastructure – an important element in strategic urban planning

Mario Reimer*, Karsten Rusche*

Abstract: Green infrastructure, as part of an integrated planning approach, is becoming more and more important for reaching the policy goals of resilient and sustainable city regions. Therefore, it is important to understand what defines green infrastructure as a concept, what its decisive elements are and how it can be fed into strategic planning approaches. This contribution addresses these elements and briefly introduces a real-world example from the Ruhr region in Germany where green infrastructures have become an important part of the regions development plans.

1. Introduction

For some years now green space planning has been gaining in importance for urban development. Once declared "leftover areas", urban green today is increasingly perceived as a major priority in urban development. Thus, planning must be adjusted to account for these contiguous open spaces in order to reach goals of maximized welfare. In growing cities open spaces are under pressure for development and utilization goals. Shrinking cities have, due to the economic and demographic changes, possibilities and potentials for the design and the reconnection of open spaces.

The term "green infrastructure" subsumes a "strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings" (European Commission 2013). Therefore, in urban regions green infrastructure includes a wide range of classical types of open space: parks, sports facilities, playgrounds, cemeteries, smaller greenways, allotment and community gardens and street trees. In addition, this term also encompasses "vertical" forms of green, i.e. green roofs and green walls. Connecting elements like cycle tracks and trails are key components in the consideration of green infrastructure as a network of different land uses.

2. Multifunctionality and connectivity as key elements of green infrastructure

In current debates, a special focus is placed on the importance of strategically planned urban green infrastructure as a key lever for dealing with the challenges associated with sustainable and resilient urban futures. The main reason for this is the potential of green infrastructure have tackle social, ecological and economic issues all at once.

Described as an "ecosystem service all-rounder" (Schröter-Schlaack/Schmidt 2015: 17), green infrastructure elements are especially relevant for urban planning. "Ecosystem services" describe services provided by nature that produce important benefits for humans. In this way, humans can gain social, ecologic and economic benefits. This triad, combined with a focus on the integrated, connected provision of open spaces, generates the essential added value green infrastructures have over existing approaches, such as urban green belts or green wedges. In order to highlight these impacts schematically, Figure 1 depicts the most important benefits of green infrastructure for urban societies.

In terms of social impacts, green infrastructure can provide important contributions for social cohesion as well as for mental and physical health and wellbeing. For example, green areas are meeting places (e. g. parks or sports areas) therefore foster social exchange. The health and wellbeing and of the urban population are also positively influenced by elements of green infrastructure, as green open spaces provide several opportunities for individual physical activities and invite people

* Both authors: ILS – Research Institute for Regional and Urban Development, Dortmund, Germany

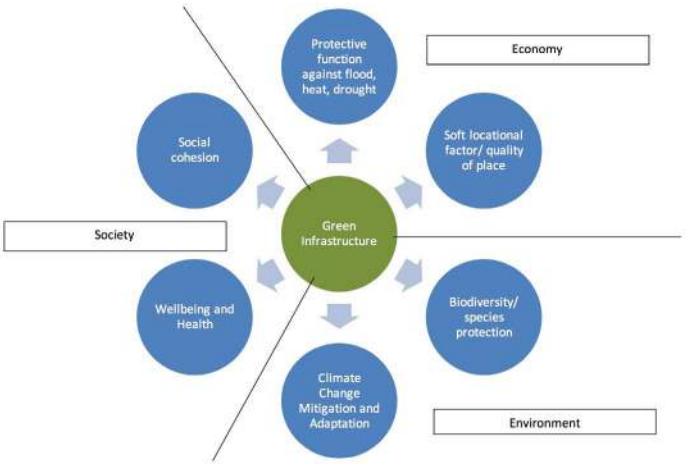


Figure 1: Overview of the fields impacted by green infrastructures (source: author's own illustration, based on Scholz, 2014)

to be active, which is proven to have a high positive impact on physical wellbeing. In addition to these factors, urban green reduces individual stress levels and thus also increases mental wellbeing.

Green infrastructure can also play a decisive role in the field of ecological impact, as it can be very powerful in supporting climate change mitigation and adaptation. Urban (micro) climate is positively influenced through the mitigation of urban heat island effects, the formation of cold air corridors and the general improvement of ambient air quality. Furthermore, some elements of green infrastructure, such as parks, meadow landscapes and protected areas, facilitate flood control by providing floodwater retention spaces. Another important benefit of green spaces comes in the form of carbon sequestration, as above and below ground biomass serve as a massive storage for carbon. A network of green areas ensures that unique habitats can develop and that the migration of species can be safeguarded. Therefore, green infrastructure can be an instrument to compensate the negative effects of urbanization and to support aims of conservation and biodiversity improvement.

Green infrastructure development also involves certain economic impacts. It contributes to resilient urban communities by minimizing the risk of damage due to storms or heat waves. Green infrastructure also ensures access to natural resources (e. g. through rainwater filtration). They also constitute an important amenity in residential and commercial neighbourhoods, thereby increasing property values. All in all, green infrastructures raise the urban quality of life and stimulate the influx of people and companies.

3. Green Infrastructure in the Ruhr region

All over Europe and elsewhere across the world, green infrastructure planning, management and implementation is on the agenda (Mell 2016). In Europe, the city region of Copenhagen is one of the most well-known examples of long-term strategic management of green infrastructure. As a strategic guideline and planning framework, the Fingerplan guarantees a well-balanced development of gray and green infrastructure for the capital region. In Milan, the strategy and concept of the "Raggi Verdi" represents a similar approach for a greener, and thus sustainable, development of the metropolitan region.

In Germany, the Ruhr region has a long history of green space management and implementation. The region is situated in the mid-West of Germany and constitutes the country's largest polycentric agglomeration. Currently, the regional population is about five million people, which accounts for around 6.5 per cent of the German population. With the beginning of its industrialization in the early 20th century, the Ruhr Area became the heart of the German steel and coal industry. Up until the mid-1950s, the region grew very rapidly in terms of population and employment opportunities. From the 1960s onwards, as coal from the US and Asia became cheaper to extract, the Ruhr area became less competitive and a deep and long-lasting economic decline set in.

Politicians saw the need for action and, in 1989, decided to set in place an international building exhibition (IBA) in the Ruhr area. The federal government initiated a long-term, ten-year funding concept and regional stakeholders in the Ruhr Area developed a common idea on how to change the image of the region: investing in ecological qualities (i.e. green infrastructure) in order to improve the region's economic performance. The IBA Emscher Park moderated and initiated over 120 projects accounting for a financial volume of four billion Euros and an area of about 800 square kilometers. One main aim was to actively initi-

ate a regional green infrastructure that was connected throughout the entire Emscher region (named after the river Emscher, passing the northern part of the Ruhr). Starting as an IBA project, the Emscher Landscape Park today covers an area of 458 km² and defines the regional green infrastructure, combining seven regional green corridors to create the "regional backbone" of the metropolitan agglomeration. After the IBA Emscher Park ended, a masterplan (as an informal strategic planning approach) was developed by key institutions with the objective of further developing on the idea of a regional green infrastructure. Recently, a new strategic framework, called "Emscher Landscape Park 2020+", has entered its development stage. It aims at defining future challenges and topics for green infrastructure management and is meant to be a milestone of the regional dialogue combining all societal forces in order to guarantee sustainable regional development and to design a new urban future.

4. Conclusion

Looking at the possible impacts of urban green, it can be stated that the term green "infrastructure" is perfectly chosen. The multifunctionality of strategic and integrated planned networks of green spaces leads us to the conclusion that green infrastructure should be treated equally with other "grey" infrastructure (streets, grid infrastructure etc.) when considering their sociopolitical relevance to urban planning. Urban development policies have to balance the different types of urban green when developing a network of green and open spaces in urban regions. Only then can the full scope of social, ecologic and economic benefits be realized in urban societies. It is important to focus on the different elements of green infrastructure, the interaction of these as well as the side effects of green infrastructure. Thus, it is necessary to develop a strategic approach to integrate the different aspects of green infrastructure into a comprehensive concept. The combined view of the elements of the green infrastructure is elementary to understanding the key principles of green infrastructures. The whole is more than the sum of its parts – this is especially true for green infrastructure.

Green infrastructure has to be seen as a green multifunctional network of functional elements with different characteristics and qualities. The idea of green infrastructure is based on planning, safeguarding and developing the network and its elements. To improve the urban quality of life in a region by green infrastructure planning is of particular importance when striving to understand the idea of green infrastructure in an ecological, economic and social nexus.

References

Austin, Gary (2014): Green Infrastructure for Landscape Planning: Integrating Human and Natural Systems. London.

European Commission (2013): Building a Green Infrastructure for Europe. Brussels.

Mell, Ian (20216): Global Green Infrastructure. Lessons for successful policy-making, investment and management. Abington.

Mell, Ian (2013): Can you tell a green field from a cold steel rail? Examining the "green" of Green Infrastructure development. In: Local Environment, Vol. 18, No. 2, pp. 152-166.

Millington, Nate (2015): From urban scar to 'park in the sky': Terrain vague, urban design, and the remaking of New York City's High Line Park. In: Environment and Planning A, Vol. 47, pp. 1-15.

Scholz, Carola (2014): Grünstrategien in der Stadtentwicklung. Argumente und Beispiele [Green Strategies in Urban Development. Arguments and Examples]. In: RaumPlanung, 172 (1), 9-14.

Schröter-Schlaack, Christopher; Schmidt, Jenny (2015): Ökosystemdienstleistungen grüner Infrastrukturen. Erfassung, Bewertung und Inwertsetzung [Ecosystem Services of green infrastructure. Assessment, Valuation and Activating Values]. In: RaumPlanung, 180 (4), 17-21.

Wright, Hannah (2011): Understanding green infrastructure: the development of a contested concept in England. In: Local Environment, Vol. 16, No. 10, pp. 1003-1019.

Zupancic, Tara; Westmacott, Claire; Bulthuis, Mike (2015): The impact of green space on heat and air pollution in urban communities: A meta-narrative systematic review. Vancouver.

Smart City: Theory & Practice

Andreas Putlitz*

ABSTRACT: The smart city is without doubt one of the most intensive fashions in urban planning in the recent decades. This article will provide a compact overview over the debate, understandings and criticisms, and will also present the current smart city strategy of Vienna, including the greenfield development 'Smart City Wien Aspern'.

1. Introduction

Even if you have been buried by projects throughout the last years, it is unlikely that you have been able to avoid the hype around smart cities, emerging in many places in the world. The smart city is, without doubt, one of the most intensive fashions in city planning in the recent decades, mobilizing vast amounts of investment money and business interests, and polarizing planning professionals and citizens all over the globe.

Disregarding the current ubiquity of the notion and the intensity of the hype, the debate still appears to be fairly frayed. There are various different readings and notions revolving around the term, and more often than not, there seems to be a great deal of confusion about what a smart city is at the very core of the concept – and what it is not.

As we get into more depth with the concept, it becomes apparent, that the smart city has the potential to meld a diverse set of issues and topics under a single label, and to furnish it with a technology-embracing and fairly optimistic attitude towards the future of our cities. Simultaneously, we have to acknowledge, that not many trends in urban planning in the past have had a similar potential to mobilize professionals, scholars, citizens, and business makers to come together and debate urban planning issues.

To provide the reader with a better grip on the concept of the smart city, this article will provide a compact overview of the debate, discuss different understandings and point out common criticisms. Furthermore, the article will present a case from Vienna: the smart city greenfield development "Wien Aspern", which represents one of the largest smart city projects in Europe.

2. Smart City Theory

2.1 Intro to the debate

Despite efforts to harmonize and standardize the concept (cf. ISO 2015, DIN 2016), the notion of the smart city still comes with a broad set of, sometimes contradicting, meanings and definitions. However, there are certain reoccurring qualities, which can be associated with the notion. It is safe to say, that the smart city has a wide angle, and hence is able to embrace a wide range of meanings, which on the other hand can be seen as a lack of substance and meaning.

Despite the ongoing debate, there is not much evidence for a sharpening of the concept. Seven years after Hollands diagnosed the smart city with a "definitional impreciseness, numerous unspoken assumptions and a rather self-congratulatory tendency" (2008: 304), Albino et al. observe, that there is "still confusion about what a smart city is, especially since several similar terms are often used interchangeably." (2015: 3)

2.2. Definitions, core elements and indicators

The probably most familiar categorization of a smart city was introduced by Giffinger et al. (2007) in their city-ranking study 'Smart cities Ranking of European

* Andreas Putlitz: Research fellow & PhD student, TU Dortmund University, Germany, andreas.putlitz@tu-dortmund.de

medium-sized cities', which Vanolo considers to be the "the most reliable source of a definition of smart city" (2014: 887). The study differentiates six 'characteristics' (Giffinger et al. 2007: 13ff) of a smart city, alongside which further data is organized to assess the smartness of seventy medium sized European cities. The characteristics are: smart economy, smart mobility, smart governance, smart environment, smart living, and smart people. Each of these categories is backed up by a broad set of quantitative indicators, adding up to a total of 74 indicators, amongst which are, for instance, GDP, share of female city representatives, or sunshine hours.

The linkage between the explicit smartness of a city and the used indicators doesn't impose itself immediately. Giffinger et al. clarify: "A Smart City is a city well performing in a forward-looking way in these six characteristics, built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens." (2007: 11) Vanolo points out, that the "division into six characteristics probably contains a certain amount of conventional wisdom and runs the risk of naturalizing and depoliticizing political choices." Nevertheless, these six dimensions represent a classification, which is "present in most literature about the smart city" (2014: 887).

A comprehensive and up-to-date overview of the variety of different definitions and readings of the smart city is provided in a literature review paper by Albino et al. (2015), which analyzes a broad range of smart city studies published after 2008.

By synthesizing the different definitions, it can be observed, that definitions of the smart city usually revolve around the topics of technology, especially ICT, networked infrastructure, connectivity of people and information, mobile devices, or big data; pursuing goals of being better coordinated, more resource efficient, generally optimized; and to provide a better quality of life; more economic growth, resilience; or sustainability.

Very broadly speaking, two archetypes of definitions can be differentiated: in a narrow sense, a smart city is mostly about technology, networked infrastructure, or big data, which are employed in one way or another, to be able to bundle and use resources more efficiently. In a broad sense, a smart city is a city, which strives to better cope with upcoming challenges by improving its general state of affairs, in order to be more sustainable, greener, improve the economy, and provide a better quality of life. Oftentimes, these two perspectives become intertwined, seeing technology as the key towards a general improvement.

When it comes to describing and analyzing the smart city, Albino et al. identify a set of 'key dimensions' (2015: 10ff) of a smart city that are reoccurring in various studies. While some research shows a bias towards ICT-based variables, such as IT infrastructure or technology, it becomes apparent that the measuring of a smart city draws mostly upon a very traditional set of indicators, such as quality of life, economy, mobility, environment, governance, people, or social capital.

Albino et al. summarize the core elements as follows (2015: 13):

- a city's networked infrastructure that enables political efficiency and social and cultural development;
- an emphasis on business-led urban development and creative activities for the promotion of urban growth;
- social inclusion of various urban residents and social capital in urban development; and
- the natural environment as a strategic component for the future.

What becomes obvious from the broad collection of definitions, dimensions and indicators, is that scholars regularly seem to see a need to tailor-make definitions from scratch, rather than to draw on prior definitions and operationalizations, which suggests that the notion of the smart city, even though introduced more than a decade ago, is still highly fluid and subject to disagreement and debate.

Albino et al. see a reason for the widespread disagreement about the term in a separation into two major "domains" of the smart city: "'hard' domains such as, buildings, energy grids, natural resources, water management, waste management, mobility and logistics", as well as "'soft domains' such as, education, culture, policy inno-

vations, social inclusion, and government, where the application of ICT are not usually decisive." – a definitory ambiguity, that notwithstanding has not led to a further differentiation of the terminology (2015: 10).

2.3. Provenience of the Smart City

To better understand the diagnosed definitory ambiguity of the notion of the smart city, it is helpful to look at the origins of the concept. Vanolo identifies two main intellectual incubators for the smart city (2014: 887f): The notion of 'smart growth', which emerged from the New Urbanism movement in the 1980s in the US, aims at "making cities more compact, less greedy and less soil-consuming"; and the 'intelligent city', which embraces the idea of amalgamating technology with the urban, for instance by laying a focus on ICT infrastructures or new forms of self-organization through e-governance solutions.

In an extensive media analysis about the use of the term in newspaper articles, Söderström et al. (2014) trace the origins of the smart city back to the mid-1990s, where it was mainly used as a self-labeling mechanism, when cities "introduced functioning ICT infrastructure, e-governance or attracted high-tech industries to foster economic growth." (310)

In the late 1990s, the meaning of the term became broader, with the cities of Adelaide and Cyberjaya pioneering the use of ICT not only as a means to become more attractive to businesses, but also to employ technology to optimize the steering of the cities affairs, as well as adding ideas of sustainability and environmental aspects to it. (311)

An entry point of big business interests into the arena of the smart city, was, according to Söderström et al. (311f), marked by a speech given by IBM's CEO Sam Palmisano in 2008. In his speech, Palmisano calls on cities to 'become smarter' in order to be able to be more sustainable and economically efficient. Shortly after, IBM launched its 100 million USD 'smarter city campaign', in order to tap into the so far underdeveloped 39.5 billion USD market of smart city solutions. Subsequently, the term 'smarter cities' was registered as a trademark by IBM. Söderström et al. comment: "With Palmisano's speech and the trademark, we have a problematization of cities as smart cities, the first step in the creation of an obligatory passage point. Cities' problems are defined as the need to become smarter". (311)

In other words, by labeling itself as an expert in smart cities, and by defining 'becoming smarter' as the bottleneck to a better future, IBM positions itself as the gatekeeper to a successful and sustainable city development.

2.4. Lessons Learned from Theory

What can be gleaned from the literature is that the notion of the smart city is far from being a clear-cut, well-defined concept. Not only is there a wide range of different, potentially contradicting readings and definitions, but the term also still seems to be highly fluid and subject to debate and repeated re-interpretations. Simultaneously, the smart city comes with the potential to be an enabler and activator, inducing widespread attention for urban development issues. However, the concept has an inherent need for clarification, as well as translation to the local situation, and a tendency to over-simplify complex urban issues as mere technological challenges. Also, we can observe a trend towards shifting decision-making powers from the socio-political arena towards globally operating enterprises, working on unlocking a multi-billion dollar market.

3. Smart City Practice: The Vienna Case

3.1. Vienna's Smart City Strategy

To get a better grip on the practical implications of the smart city, we will turn our attention to the practice of smart city projects and applications, to assess the factual translations of the rather fuzzy concept into tangible design decisions. The contents of this section were presented as part of the IGLUS Europe Module at the Technical University of Dortmund, Germany in September 2016. It is based on my own research as

part of my PhD thesis, as well as a presentation held by Oliver Juli, working with the smart city Vienna as part of its engagement with the Aspern Smart City Research GmbH as well as Siemens Austria.

Vienna's smart city strategy can be traced back to 2010 where, following the 'European Initiative on Smart Cities', the 2007 founded 'Austrian Climate- and Energy Fund' picked up on the European smart city initiatives in the wake of the Europe 2020 goals, as one of the first member states in the European Union. It is worth noting, that the European smart city initiatives do not stand by themselves, but are closely linked to other European funding tools, such as the Seventh Framework Programme for EU research funding (FP7), Horizon 2020, the European Regional Structural and Investment funds, the Joint Programming Initiative (JPI) Urban Europe, the European Research Area (ERA-NET) and other national funds.

On the municipal level, the Austrian Climate Fund's smart initiative was quickly picked up by the MA18, Vienna's department for city development as well as the TINA Vienna (Transport Infrastructure Needs Assessment). Due to its private enterprise structure as a limited liability company, the TINA was able to act more flexibly than the municipality's administration, which proved itself to be an important asset in implementing the smart city. A second implementation pillar became the 'Smart City Task Force', assigned to the MA18 as an organizational unit of the municipality across traditional administrative structures.

Under the lead of the MA18 and the TINA Vienna, in March 2011, a small consortium of private sector stakeholders prepared a first funding application under the project name 'Smart City Wien'. However, the application was eventually declined, supposedly due to a lack of focus. A second attempt succeeded and Vienna became part of the Transform Network, or 'Transformation Agenda for Low Carbon Cities', a 2012 founded, European Union funded joint collaboration of six European cities, working on the reduction of carbon dioxide emissions. The implementation plan of the Transform program stipulated the implementation of Smart Urban Labs "in order to provide a realistic test for further spreading out" of smart urban technologies, such as "local networks and exchange of energy, renewable energy produced locally, and the use of waste heat" (TRANSFORM 2013).

Simultaneous to the project-based implementation of the smart city in the form of Smart Urban Labs, Vienna's administration backed the process through more strategic, top-down, and policy-focused instruments. One of the cornerstones of the spatial implementation of the smart city is the 2012 approved 'City Development Plan 2025' or STEP 2025 (City of Vienna (2014a), a strategic document for the city's spatial development with a mid-range timeframe.

Additionally, with an exclusive focus on the smart city, since 2014, the strategic implementation of the smart city Vienna is fleshed out in the 'Framework Strategy 2050 – Smart City Wien' (City of Vienna 2014b), formulating strategic goals, with a timeframe leading up to 2050, such as social inclusion, resource conserving mobility, or the development of an ongoing monitoring process.

3.2. The Smart Urban Lab Aspern

An important feature of the Vienna case is that the city is working on implementing two Smart Urban Labs, instead of only one, like other cities in the Transform Network: a brownfield development in the district 'Liesing' at the southern limits of the city, which focuses on logistics measures in a nearby commercial zone as well as in-fill developments in fragmented zones between agricultural parcels and large-scale social housing; and a greenfield development on a former airfield on the outer rim of the district 'Aspern' in the very northeast of the city. Since the Smart Urban Lab Aspern is further along in its implementation and better documented, I will be focusing on this project.

The Smart Urban Lab Aspern is located on the northeastern rim of the municipal territory, where the city landscape opens up into a vast plain, the so-called 'Marchfeld'. With the historic inner city being blocked from further expansion into any other direction, the Marchfeld plain provides the only easily mobilized ex-

pansion area for the quickly growing city, which added another 20% to its inhabitants during last twenty years.

Settlement development in this area, however, has been far from ordered in the past, producing a highly fragmented settlement pattern alternating between single-family-homes, dense social housing and extensive agriculture. Due to an oversupply of already zoned building land, remaining agricultural lots, shaped in long, narrow strips due to the traditional heritage logic, get selectively sold to investors, producing random, disconnected isles of urbanization. In this context, the Smart Urban Lab Aspern can be seen as an attempt to get back into the driver's seat of the settlement structure of those parts of the city, where the majority of construction activities will take place in any foreseeable future.

The new area is planned as a multifunctional neighborhood with flats, office space and service providers, as well as a business, science, research and education district. The total area will be 240 hectares and thus represents one of Europe's largest urban development projects currently under construction, with a net development area of 100 hectares, planned gross floor space of 2.2 million sq. m, 10,500 apartments for 20,000 inhabitants, and estimated 20,000 workplaces

Timeframe	Gross floor space realized	Net development area realized
2009-2017	650'000 sq. m	400'000 sq. m.
2017-2022	900'000 sq. m	400'000 sq. m.
2022-2030	650'000 sq. m.	200'000 sq. m.

The implementation process follows three major phases, and is managed by the Wien 3420 Aspern Development AG, of which 73.4% belongs to the Vienna Business Agency and 26.6% to the ARE Austrian Real Estate Development GmbH. The Wien 3420 AG is responsible for every aspect of the project development, including acquisition of further partners, the sales of surfaces, marketing and branding of the development, as well as to accompany the formal planning and zoning activities.

3.3. ASCR Aspern Smart City Research

Through the link-up with the Transform network, the overall direction of the Smart Urban Lab in Aspern goes mainly towards technical solutions to increase carbon dioxide efficiency. According to Transform, the overarching goal of the test-bed is the "development and implementation of networked systems for energy provision, based on local renewable sources of energy". (TRANSFORM 2016) These can be provided for instance by heat pumps, solar heat, photovoltaics, district heating, or biomass.

The challenge in Vienna as, however, to both provide a supply concept for the energy provision, according to the requirements of the Transform funding regulations, from scratch, and to adapt it to the local situation, taking into account existing city developments and mobility concepts, the given fragmented settlement structure as well as the lifestyle and usage patterns of the future inhabitants.

Under this perspective, the implementation of a Smart Urban Lab provided not only the opportunity as a sandbox for technical gadgets, but also to explore their interaction with the real-world user in an everyday living situation. Open questions arising around the usage side of the energy provision were for instance: "How does the future energy system have to be designed, to be able to sell solar energy on the market? How do we get people to deal with energy in an efficient way?" (AIT 2016)

To be able to harness the Smart Urban Lab in Vienna efficiently as a test-bed for both the technological as well as the user-oriented part of the implementation process, the development of the Smart Urban Lab Aspern was attached to the ASCR Aspern Smart City Research GmbH, which bundles the smart city activities of the Smart Urban Lab under its umbrella. The ASCR operates as a joint venture composed by Siemens Austria (44%), the energy provider Wien Energie (30%), the network operator Wiener Netze (20%), the Vienna Business Agency (5%), and the Wien 3420 Aspern Development AG (1%).

3.4. Current Smart City Research

The research by the ASCR in the Smart Urban Lab Aspern is aimed at four main aspects of energy provision and consumption:

1. Smart Grid (Strategic grid management, operative grid management, maintenance & repair, new models for frequency/voltage stability)
2. Smart ICT (Data capturing and preparation, monitoring and benchmarking, security & privacy, apps and portals for stakeholders)
3. Smart Building (Optimization of self-consumption, participation in energy markets; tariff models, home automation & user interaction; predictive maintenance)
4. Smart User (Holistic information for sustainable decisions; smart & privacy appliances; integration with other urban grids)

The task of the ASCR is to experiment with new smart city applications, and to monitor and document the lessons learned. In the current phase of the project, the ASCR is experimenting with focusing mainly on smart grid technology for energy provision. Six primary performance goals for the infrastructure have been formulated, which are to be pursued in the framework of the smart city test-bed in the Smart Urban Lab:

1. Renewable energy: System integration and intelligent control of renewable energy to reduce CO2 and increase energy efficiency.
2. Consumption control: Demand side management and real-time measurement of power consumption to adapt to price fluctuations.
3. Efficient use of energy: Intelligent control of distribution networks and buildings, which is expected to lead to energy savings.
4. Energy storage: Wind and solar energy production is only inconsistently reliable, power storage and management are necessary to even out the supply.
5. Low voltage grid control: In the future, millions of small power producers will feed electricity into the grid. The low voltage grid provides stability in the network and balances production and consumption.
6. Security of supply: Energy must always be reliable and affordable.

In order to pursue their research goals, the ASCR is implementing smart grid test-beds in housing developments and public social infrastructure, which are part of the urbanization process in the area; amongst other objects a student's residence, a kindergarten, and an elementary school. For the monitoring process, smart grid components have been installed and provide data on performance and impact on energy consumption and provision. The appliances that are part of the current phase are district heating, heat pumps, solar heat, energy storage facilities, data warehouses, and smart monitoring and grid control systems (ASCR 2016).

Since this is the very last update on the current process, we are still waiting for the preliminary results of the research. However, we are looking forward to presenting more news on the ongoing research process and first findings in the upcoming IGLUS Europe Modules at the Technical University of Dortmund.

4. Conclusion

As can be learned from the literature, smart city, to this day, is still a fairly ill-defined and fuzzy concept and requires further research about its implied meanings and implications for practice. Criticism of the concept usually points to the over simplification and techno-embracing perspective on complex urban issues, the intrusion of globally operating tech-companies into political decision-making processes concerning the future development of cities, as well as the risk of excluding individuals and groups from the benefits of the smart city- the so called 'digital divide'. Notwithstanding, in planning practice, the smart city has started to become a widespread reality, and it cannot be denied that it has a powerful potential to mobilize attention and resources towards urban issues, which has already induced a vast range of urban developments worldwide.

As we can learn from the Vienna case, however, a smart city does not only have to be about technology or infrastructure, but also – and maybe even most importantly – about the process leading up to it. There is evidence that Vienna's dynamicity in the field of smart cities is rooted in a particularly beneficial governance arrangement, which brings together four key elements. The initiative

1. is fueled by a committed political impulses from the European (Europe 2020, European Initiative on Smart Cities) and national level (Austrian Climate and Energy Fund);
2. brings together complementary stakeholders from administration (Mayor, MA18), more flexible political bodies (TINA Vienna, Smart City Task Force), local service providers (Wien Energie, Wiener Netze) as well as a global player in the smart city arena (Siemens Austria);
3. is supported by an established strategic instrument for spatial development (STEP2025), and a tailor-made strategic smart city document (Framework Strategy – Smart City Wien) as well as
4. two large-scale urban developments as implementation test-beds (the Smart Urban Labs Aspern & Liesing).

The smart city process in Vienna, in this way, differs remarkably from other translations of the smart city into practice in Europe and the world. While other cities in Europe, such as Amsterdam (Amsterdam Smart City), leave the implementation of smart city projects mostly to young startups and large local enterprises, with the city focusing mostly on the marketing aspects of the smart city label, approaches in Asia (Songdo International Business District, India Smart City Challenge) or Arabic countries (Masdar City) strive to build whole new smart cities from scratch, trying to avoid constraining the brand-new, utopian developments with ballasts from the past.

It remains to observe, where the many different approaches to a smart city end up leading. What is safe to say at this point, however, is that the smart city already has become far more than a rash fashion that will pass by without leaving a trace.

References

AIT Austrian Institute of Technology (2016), 'SCDA Smart Cities Demo Aspern', <http://www.ait.ac.at/departments/energy/smart-grids/smart-grids-projects/smart-cities-demo-aspern>, accessed 1 July 2016.

Albino, Vito; Berardi, Umberto; Dangelico, Rosa Maria (2015), 'Smart Cities. Definitions, Dimensions, Performance, and Initiatives' in Journal of Urban Technology 22 (1): 3–21.

ASCR Aspern Smart City Research (2016), 'Aspern Smart City Research (ASCR). Überblick des Vorhabens.' http://www.ascr.at/wp-content/uploads/2015/10/150519_ASCR_Praes_D.pdf, accessed 1 July 2016.

City of Vienna (2014a), 'STEP 2025. Urban Development Plan Vienna', <https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008379b.pdf>, accessed 1 July 2016.

City of Vienna (2014b), 'Smart City Wien. Framework Strategy', <https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008384a.pdf>, accessed 1 July 2016.

DIN Deutsches Institut für Normung (2016), 'Smart Cities. Kontext: Urbanisierung. Warum Normung und Standardisierung?' <http://www.din.de/de/forschung-und-innovation/smart-cities>, accessed 1 July 2016.

Giffinger, Rudolph, et al. (2007), 'Smart cities. Ranking of European medium-sized cities' (Vienna: Centre of Regional Science, Vienna UT).

Hollands, Robert (2008), 'Will the real smart city please stand up?' in City 12 (3): 303–320.

ISO International Organization for Standardization (2015), 'How to measure the performance of smart cities', <http://www.iso.org/iso/news.htm?refid=Ref2001>, accessed 1 July 2016.

Söderström, Ola; Paasche, Till; Klauser, Francisco (2014), 'Smart cities as corporate storytelling' in City 18 (3): 307–320.

Vanolo, A. (2014), 'Smartmentality. The Smart City as Disciplinary Strategy.' in Urban Studies 51 (5): 883–898.

TRANSFORM (2013), 'Roadmap to make an Implementation Plan. Deliverable 4.1.' <http://urbantransform.eu/wp-content/uploads/sites/2/2015/07/D4.1-Roadmap-to-Make-and-Implementation-Plan.pdf>, accessed 1 July 2016.

TRANSFORM (2016), 'Stadtteilentwicklung in zwei "Smart Urban Labs". Umsetzungspläne für Liesing Groß-Erlaa und aspern Seestadt', http://www.transform-plus.at/index.php?id=16&tx_ttnews%5Btt_news%5D=3&cHash=bb8566fc19cc0298ab2d9edb1a1541f9, accessed 1 July 2016.

IGLUS Quarterly

IGLUS Quarterly is an online quarterly publication dedicated to the analysis of **Governance, Innovation and Performance** in Cities and is edited at École Polytechnic Fédérale de Lausanne (EPFL), Switzerland. IGLUS Quarterly aims to facilitate knowledge and experience sharing among scholars and practitioners who are interested in the improvement of urban system's performance in terms of the service efficiency, sustainability and resilience.

IGLUS Quarterly applies the highest academic standards to analyze real world initiatives that are dealing with today's urban challenges. It bridges the gap between practitioners and scholars. IGLUS Quarterly therefore adopts a multidisciplinary perspective, simultaneously considering political, economic, social and technological dimensions of urban systems, and with a special focus on how governance affects and is affected by the use of technologies in general, and especially the pervasive application of the ICTs.

IGLUS MOOCs (Massive Open Online Courses)

Management of Urban Infrastructures

The MUI MOOC provides an introduction to the principles of urban infrastructures management. In this MOOC, you will receive lessons from practitioners (City of Geneva, Veolia, Boston Consulting Group, CarPostal), experts (The World Bank) and academics (EPFL, CUNY). More information below.

http://iglus.org/mooc/

Smart Cities

Smart Cities is a Massive Open Online Course that offers an introduction to the principles of management of smart urban infrastructure systems. It addresses the main challenges in management of Smart Cities during the transition and operation phases in the life-cycle of a Smart City.

iglus.org/smart-cities-mooc/

European University Institute
ROBERT SCHUMAN CENTRE FOR ADVANCED STUDIES
FLORENCE SCHOOL OF REGULATION TRANSPORT

iglus INNOVATIVE GOVERNANCE OF LARGE URBAN SYSTEMS

EPFL ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE