CHALLENGES OF THE 'URBAN DIGITAL': ADDRESSING INTERDISCIPLINARITY AND POWER IN THE PLANNING AND DESIGN OF THE DIGITAL CITY

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ABSTRACT
This paper identifies and discusses a set of challenges relating to the design of digital services in policies and strategies for more liveable and sustainable cities. These challenges emerge in the meeting between the knowledge and practice fields of digital design, which deal with service and interaction design, and urbanism, which is concerned with the study, planning and design of cities. The purpose of this paper is to lay the ground for a more inclusive and cross-disciplinary perspective on the conceptualisation, planning and realisation of the 'urban digital'. This relates to how design and urban planning professionals learn to take seriously the societal responsibility implied in the development of digital services and products for everyday urban living.

INTRODUCTION
Urban environments are teeming with communication technologies, and data and media are increasingly ubiquitous, flexible and integrated across urban governance, industry and daily practices. Urban digital services combine data, infrastructures and people in ways that serve commercial and/or civic purposes in the city. Moreover, digital systems based on 'big data' – the collection and analysis of vast amounts of information – are increasingly used in governance, planning and public service provision as well as in policy and decision making. Global examples of influential digital urban services are Airbnb, which connects property owners with paying guests through a global digital platform, and the 'smart mobility' company Uber, which provides transport in a customer-friendly way outside of established public transport systems. These services are part of the growing 'sharing economy', which is a major force in ongoing and often controversial processes of urban transformation (Greenfield 2015). Other, more localised examples of data-driven urban services are the recent generation of bike sharing services, like the one found in Oslo, which goes beyond providing access to bikes to involve wider

systems for connectivity and 'transport as a service'.[1] As such, it integrates both with issues of everyday life and larger issues of urban development and mobility.

Dourish and Bell argue 'the technologically mediated world does not stand apart from the physical one within which it is embedded; rather, it provides a new set of ways for that physical world to be understood and appropriated' (2011: 132). This makes the digital technologies and media a potent starting point for seeking new ways of designing urban services that would positively affect issues of urban liveability, sustainability, design and governance. Thus, the design of digital services is increasingly important for how cities are planned, built and lived in. This, however, is a fact that is not readily acknowledged or well understood in traditional forms of urban planning and governance (Landry 2016).

In this paper, we posit a set of key challenges relating to the increased, but generally not yet fully conceptualised and theorised, entanglement between the design of digital urban services and processes of urban planning and development. In doing so, we take into consideration not only prevailing views and factors within the professional fields involved, but also their reciprocal relationship. This is reflected in the interdisciplinary team behind this research, which includes urbanists and digital designers. As such, this is a question for design in its broadest sense: from urban to digital design, dealing with conflicting epistemologies, powers of definition, and economic and political actors and agendas within and around emerging interdisciplinary design challenges regarding the digitalisation of cities.

The paper is based on a panel organised by the 'Digital Urban Living' research group at the urban development conference Oslo Urban Arena in 2016. This panel brought together the digital and urban sectors in the context of discussing challenges for digital urban futures.[2] This paper proceeds as follows: First, the research is theoretically positioned and contextualised in terms of current digital and urban development. Second, the challenges are posed, exemplified and extended into questions for further research. Finally, reflections and conclusions draw up wider questions around comprehending the 'urban digital' as a new field of evolving practices, knowledge and epistemologies.

POSITIONING THE 'URBAN DIGITAL'

The overall context for this paper is the great impact of increased digitalisation on the transformation of cities and societies. Digital urban technology was posed as research topics and experiments 10 to 20 years ago and later 'rediscovered' as a platform for corporate visions of 'smart cities'. Now, we are looking at a broad range of implementation and prominence of digital infrastructures, monitoring and data-driven approaches within urban governance and strategy (Hill 2013, 2016; Townsend 2013; Marvin *et al.* 2016). Today, digital structures not only affect how cities are planned and governed, but they are also embedded into most aspects of everyday urban living as interactions with mobile devices and networked services. As early as 2002, urban theorists Ash Amin and Nigel Thrift observed that software would be increasingly responsible for the future of cities and that 'nearly every urban practice is becoming mediated by code' (p. 125). While we agree that this has happened, we argue that there is a substantial lack of knowledge in urbanism about issues of digital design and the technological infrastructures that constitute the 'urban digital' complex. The design of the built environment of cities largely rests on pre-digital models, and it is likely that adaptations must be reversely engineered into such contexts by way of designing digital services (Landry 2016).

Digital urban services are understood through their design and interfaces as well as through the interactions they enable and the range of possibilities they open up. Here, design, seen as an 'act of shaping digital products and services' (Löwgren 2007: 1), is increasingly involved in the transformation of life in cities, as argued by Malcolm McCullough (2013), for instance. Furthermore, digital technologies give a range of new challenges and possibilities for participation, social interaction and the creation of new urban public spheres (Hill 2012; Hemmersam *et al.* 2015). However, despite the growing proliferation of urban digital services, there is a lack of

[1] https://oslobysykkel.no/en

[2] This paper originated from the research group Digital Urban Living (Digitalt Byliv) at the Oslo School of Architecture and Design. Questions and challenges were developed and investigated as part of a panel session for Oslo Urban Arena on September 29, 2016. Panel participants were Even Westvang (Bengler), Rikke Gram-Hansen (Copenhagen Street Lab), Tor Inge Hjemdal (Design and Architecture Norway) and Fredrik Matheson (BEKK Consulting).

systematic knowledge on issues of urban transformation and development within the field of interaction and service design (Knutsen 2015; Martinussen 2015; Dourish & Bell 2011). Across these design fields, there is a growing need for in-depth, applicable knowledge about the interrelations between urbanism, urban cultures, digital technology and the development of new digitally based urban services.

Within urbanism, 'smart city' regimes are adopted on the promise of cost reduction and efficiency – a largely functionalist framework. Thus, one could say that there seems to be a clear techno-determinist stance in many of today's discourses on 'smart' urban development (Marvin *et al.* 2016; Greenfield 2013). In contrast, contemporary theoretical positions on the urban condition argue that the city is not to be understood as a given, i.e. as a stable order or object, but rather as a complex and dynamic field of possibilities and potentials. Therefore, we subscribe to Benjamin Fraser's assertion that 'We do not yet know the digital cities awaiting us along our route' (Fraser 2015: 7). Such a point of view also differs from many of the more instrumental approaches to issues of liveability and sustainability within today's predominantly neoliberal, 'technocratic/managerial approach to urban governance' (Gleeson 2014: 59), influenced as it is by new kinds of rhetoric within urban consultancy.

We are not the first to critique concepts of the 'smart city' (e.g. Albino *et al*. 2015; Calzada *et al.* 2015), but we seek to do it explicitly from a broad digital and urban design perspective. We fundamentally agree with the claim that 'our understanding of the opportunities, challenges and implications of smart urbanism is limited' (Luque-Ayala *et al.* 2016). Our agenda is, thus, to work towards broadening interdisciplinary critiques between digital design and urbanism/urban planning, relating to issues such as urban liveability. As these fields increasingly overlap, we find that more comprehensive forms of conceptualisation and theorisation are highly important. This is also related to the fact that a range of disciplinary and sectorial agendas takes part in shaping the 'urban digital'.

FOUR CHALLENGES FOR THE 'URBAN DIGITAL'

The overall aim of this research is to establish a framework for understanding the 'urban digital' as an emerging new field of research and practice. This includes raising and discussing societal and disciplinary challenges for digital design in the context of cities and asking what tensions and new constellations emerge when technologies are not only used for solving urban problems, but also become integral to shaping urban life, planning and politics. We have identified four central thematic challenges that concern questions about regulatory power, globalised technology and the individual agency of citizens.

CHALLENGE 1: NEW ACTORS INVOLVED IN THE DIGITAL DEVELOPMENT OF CITIES CHALLENGE TRADITIONAL DISCOURSES ON URBAN POLITICS AND PLANNING.

New constellations of actors are increasingly taking part in shaping both urban development generally and the conditions of urban living and public domains more specifically. This is becoming evident at multiple levels, for example, in the way global ICT companies like IBM, Cisco and Siemens are developing and implementing technology strategies for cities around the world. Companies like these are becoming powerful urban actors with responsibilities for envisioning, delivering and maintaining 'smart city' systems. At another level, we find the growth of global digital urban services related to social media platforms, personal transportation and sharing economy solutions. This includes citizens' use of social media and new modes of digital communication that affect the social and cultural landscape of individual cities – for example, through changing modes of dissemination and the distribution of local news.

Such new actors and actor-relations in the urban sphere bring with them different disciplinary, cultural and political perspectives on urban development and living. These again shape the possibilities for what it means to design both *for*, *in* and *with* cities and their inhabitants. It is, therefore, important to identify such perspectives and to discuss how they might align or conflict with different existing urban and digital traditions and epistemologies. Over the last 10 to 20 years, the global ICT industry, identified by Dan Hill as the 'Urban Intelligence Industrial Complex' (2013), has promoted visions for technology-led models for efficient, secure, sustainable and competitive cities (Marvin *et al.* 2016). This has been taken up as a central issue of urban development and strategy in many cities (Caragliu *et al.* 2011; Hatzelhoffer & Kolar-Thompson 2012). As these visions are implemented through planning, the

politics, values and perspectives that underlie these visions impact urban living and culture. Consequently, it is important to critically challenge the visions and approaches advanced by the 'smart city' industry to unveil their underlying reliance on specific ways of understanding cities, technology and design.

The concept of the 'smart city' is biased towards quantitative approaches for solving urban issues – for instance, using embedded sensors to gather and analyse data for optimising urban operations. Einar Sneve Martinussen (2015) argues that much of the 'smart city' thinking is grounded in a 'belief that cities should, and could, be controlled and optimised through technology' (2013: 293). This is closely linked to the rationale of the companies behind these concepts that develop hardware and software infrastructures for large-scale logistical and administrative tasks, but lead to perspectives and epistemologies that in many respects are contradictory to traditions within both urbanism and design. In problematising and complementing the 'smart city' perspectives, it could, for example, be fruitful to draw on discourses on embodied observation and qualitative discussions of city life to critique how 'smart city' proponents recover modernist urban ideals of planned order. This involves arguing for the value of street life, social diversity and urban cultural flux (Jacobs 2006; Aspen & Pløger 2015). Similarly, design has a rich tradition for user-centred design and co-design methods (e.g. Norman 1998; Sanders & Stappers 2012). These traditions from critical urbanism and design might be used to shift the focus from a top-down, technology-driven perspective of the city to addressing the daily, networked lives of citizens (Martinussen 2015).

The emergence of the urban digital entails both new and continued power relations and tensions between techno-based industry and governance, urban daily life and design practices. It opens up questions of how these can be represented, how they are enacted and discussed across disciplines of design, planning and governance. New actors bring with them visions and approaches from specific epistemological and disciplinary framings that become normative for both digital design and urban development. We need to examine and critique such perspectives across politics, epistemology, practices, infrastructures and design.

CHALLENGE 2: THE INSTRUMENTAL APPROACHES OF DOMINANT URBAN TECHNOLOGY ACTORS

CHALLENGE HOLISTIC AND INTEGRAL THINKING WITHIN URBAN PLANNING AND DESIGN.

Urban planning and design traditionally involves holistic and integral ways of thinking beyond technological and instrumental frames. This regime is now challenged by technicist approaches to urban problems, represented by an array of tactics and solutions, especially within sectors of transport and energy, but increasingly also when it comes to issues of sustainability, public services and health. This trend is strengthened by the fact that many of the new, large technology actors represent international firms that rarely have local contact or integration, but rather reproduce general services that are meant to be applied in any city. This applies to both global hardware and systems technology companies as well as specialised providers of urban services. Many such companies move their services in and out of cities depending on juridical and economic considerations. Given that cities are highly different in terms of size, history, urban culture and locational characteristics, such geographical 'faithlessness' runs counter to perceptions of social obligations in urbanism as well as discourses on the importance of 'place' (e.g. Massey 1994).

International digitally based urban services (such as Airbnb) have great impact on urban life and local environments, but are often outside urban regulations and local policies. They are discrete, self-contained services that are designed for specific users and use cases, and they have big implications for urban development and design. This can be exemplified by how Uber offers a largely global service that lets the user, through a smartphone app, arrange to be picked up and driven to a chosen location. Importantly, Uber drivers use their own cars and are not employed by Uber, but they are officially registered as contractors. Thus, local attachment is minimised. In current media and political discourse, Uber is on the one side praised for allowing for a car-free, sustainable urban lifestyle, while on the other side, it is criticised for threatening local transport industries and labour regulations. In Greenfield's analysis, Uber acts as a cautionary example of what a technology-driven 'smart city' of the near future might lead to and what 'kinds of values we can expect such a city to uphold in its everyday operation' (2015: online).

Uber is an emblematic example of how technology and digital design are becoming part of both urban practices and challenging politics and urban

policies. It furthermore shows how the innovation models of so-called 'disruptive' digital services challenge and change the regulatory and commercial landscape of cities globally. Given that the digital design and global scope of such services falls outside of traditional urban planning perspectives, they are less clearly addressable within established urban development policies.

Our claim is that certain technology actors have much to gain by applying a broader approach to many of the urban issues they are confronted with. There is an emerging space for new technological practices that bridge disruptive practices and holistic urbanist approaches – seeing contemporary urban challenges and problems, as well as digital urban futures more generally within a local urban cultural framework.

Thus, a key question is how the dominant approaches of technology *actors* can be critiqued from a knowledge regime with an emphasis on the role and meaning of place-specific and urban cultural qualities and dynamics in planning and urban design. Also, how can technological design *practices* be cultivated that reflect cultural frames regarding the design and production of the city, its spaces and its urban life?

CHALLENGE 3: ACTORS AND DISCIPLINES INVOLVED IN THE 'URBAN DIGITAL' DO NOT YET SEE IT AS AN INTEGRATED PRACTICE.

To frame the 'urban digital', it is important to address the relations and hierarchies between the sectors, professions and disciplines involved. The ongoing digitalisation of cities and society means that previously separate groups and fields are drawn together around urban issues. While this activates existing discourses on e.g. the socially sustainable city, an established and evolving discourse on urban technology is still in its infancy. Global ICT companies that previously performed discrete engineering tasks are now delivering critical infrastructure and strategies for urban sectors like health, education, transport and commerce. At the same time, digital design consultancies, previously doing projects for banks and airlines, are increasingly involved in citizen consultation and delivering urban planning processes as services. Furthermore – as mentioned above – new digital services have the potential to disrupt existing sectors in unexpected ways.

Most urban planners have disciplinary backgrounds from architecture and the social sciences, and they are mostly without specific technological competencies. At the same time, the digital design industries that are increasingly making their mark on cities and city life rarely have significant competencies within urbanism. Thus, a major challenge is to develop new kinds of interdisciplinary knowledge, competence and collaboration within and between these fields. Within urbanism, a key challenge to developing such a critical awareness and strengthening practices of interdisciplinarity is the wide distribution of decision making within the deliberative democratic local, regional and national systems of politics and administration, which also includes wider decision processes involving locals and a wide array of businesses and organisations. Within digital design a challenge is bridging the varying degrees of awareness and social responsibility among commissioning clients (including public bodies), the profit driven agendas within the commercial design and media field, and the design professionals' interests and capacities. One important reason for developing such a new interdisciplinary stance is that a more comprehensive urban understanding can make for better service and design solutions by the technology and design sectors that are involved in creating the 'urban digital'.

Developing a more integrated understanding of the 'urban digital', that can work as a coherent frame of reference across sectors, implies creating settings and conditions for more comprehensive forms of interdisciplinary collaboration and exchange between technical and design-specific knowledge regimes *and* the more academic fields of urban knowledge production and planning practice. This, however, might not be very easily achieved, because real interdisciplinary dialogue and exchange in many instances can be hard to accomplish and because one often tends to define interdisciplinarity in too narrow terms (cf. Fraser 2015).

CHALLENGE 4: POLITICAL THINKING DIRECTED TOWARDS THE EVOLVING REGIME OF THE 'URBAN DIGITAL' IS NOT REFLECTED IN ANY DISTINCT ARENA OF CRITIQUE.

Addressing issues of power in networked cities and digital urban services is complicated. In some cases, like in the discussions about Uber, the discourses tend to focus on the regulation of labour conditions, transport and taxation, while strategies of 'smart cities' tend to see technologies as instrumental for achieving other societal goals that

are mostly seen to be uncontroversial. However, there is a need for developing an interdisciplinary and inter-sectorial discourse that scrutinises the technology in cities on a more fundamental level, for example, through informed, political discussions about power relations that underpin much of digital urban life, including exclusionary mechanisms and issues of privacy and control.

Digital technological systems should be understood as infrastructures for everyday networked life, but also for business and city maintenance and operation. Traditional critical infrastructure like electricity and sewage grids and roads are subject to political and democratic scrutiny and control, but are not politically neutral (e.g Graham & Marvin 2001). Digital infrastructures and investments, and their inherent politics, are even more opaque and difficult to assess and evaluate. These are often privately driven and proprietary technological systems and platforms, and there is a need for addressing the political agency and powers embedded in such systems, as is reflected in the movement toward open data sharing. Their inner workings, embedded values and goals are often obfuscated and difficult to discern from the outside. In this way, the infrastructures become part of what Thrift (2004) describes as the 'technological unconscious', that is, the technological backgrounds of human activity (satellites, software, wireless signals etc.) and the ways in which such a background shapes our activities, experiences and anticipations in often unnoticed ways.

The impact of this infrastructure should not be overlooked, as its characteristics 'matter a great deal, since it determines the base material conditions under which applications, services, and devices will perform' Blanchette (2011: 1). Additionally, the promise of 'big data' and its analysis is that it can assist in the prediction of future events and make smarter decisions, prevent crime and optimise our cities and our everyday activities as long as the ever-increasing aggregation of personal and environmental data and the development of more sophisticated algorithms continue. Like infrastructures, algorithms, are not neutral mechanisms that operate outside human political agency or influence. They are shaped by particular actors with certain intentions, competencies and agendas that remain distressingly opaque. These concerns are starting to be raised by a number of scholars and technology critics. Analysing Facebook and other social networking sites, Taina Bucher (2012: 61) argues that 'the impact of algorithms can hardly be overstated as they are used to sort, rank, recommend, suggest, classify, predict and cluster items, data, things and people'. Furthermore, Evgeny Morozov (2013) problematises 'the presumed objectivity and quite real lack of transparency' (ibid.: Ch.6, Para. 8) of data collection and opaque algorithms that increasingly permeate decision-making processes. As laypeople, but also as urban planners, policy makers and designers, our agencies are increasingly determined by the decisions and output of such black-boxed systems, yet our insights about and influence on their inner workings continue to be limited.

Drawn together, these problematics concerning the politics of digital systems point at tensions regarding the political agencies embedded in technological systems that cities increasingly rely on. The challenges include ensuring that digital infrastructures are open, accessible and democratically accountable, and finding ways to generate knowledge and insights into how digital infrastructures operate, which is relevant and accessible across disciplines, sectors and society at large. Thus, there is an urgent need to develop platforms for policies, practices and cultures that facilitate and encourage transparent and accountable digital infrastructures.

CONCLUSIONS

The challenges raised in this paper are based on an understanding of cities and urban culture as constituting a vast and diverse field of opportunity for the development of new technology and design solutions as well as for finding new ways to use technology. This in turn is based on a perception of the city not as a given, but as dynamic, complex and continuous in transition (Aspen & Pløger 2015). Such consideration provides a basis to develop a critical corrective to the more streamlined technology perspectives that dominate much of the discourses on 'smart cities'.

Our contention is that seeing the city as *a field of possibilities* presupposes that one can read the city on its own terms and not as something else, be it as a 'machine', a 'business' or otherwise. This is a consideration that has affinity with recommendations of influential urban theorists like Ash Amin and Nigel Thrift (2017) and Warren Magnusson (2011). It also relates to a strategy of 'thinking *with* the city' (Aspen & Pløger 2015). To

read the city on its own terms will makes us better equipped to trace much of the creative dynamics and vitality that urban culture encompasses. This also represents the best way of guiding technology in more 'liberating' directions that correspond to people's needs, wants and desires.

We, as researchers, urbanists, designers and technologists in the digital city are constantly faced with the challenge of updating our disciplinary understanding of the city so that it corresponds to its actual dynamics and responding to emerging actors and their agendas. The challenge consists of developing an understanding of the city that is just as rich and complex as urban culture itself. This presupposes that one can cultivate a perspective that makes it possible to scope subliminal or nascent forces in the city that herald something 'new' and represent opportunities for urban development and urban life. The city, thus, represents an important resource and set of dynamic forces that planning and design can play up against in the endeavour to develop new technologies and digital solutions. To realise this, however, new arenas for critique have to be established, and new directions for urban digital politics have to be tentatively formulated.

From the intersection of practice and academia, we have to identify new ways of joining together and mobilising interdisciplinary competencies and perspectives on the 'urban digital' for two reasons. One is that the city or the urban phenomenon itself is multidimensional and interdisciplinary in character.[3] The other is that, to understand, use and plan for digital resources in the urban realm, we must challenge and go beyond the recognised limits of disciplinary specialisation and framings to see how technology, design and urban practices can be joined in new and innovative ways. For this purpose, we have identified a set of four challenges that, if taken seriously, could help to lay the groundwork for creating the 'urban digital' as a new field of fertile interdisciplinary critique, collaboration and exchange between the technology, design and urbanism sectors.

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[3] Analytically speaking, the city or the urban can be seen as a series of conceptual levels or planes, as elaborated by urban theorists from Lefebvre to Fraser (Lefebvre 2003, Fraser 2015).

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