15

Smart cities, algorithmic technocracy and new urban technocrats

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Introduction

Over the past decade, many cities have adopted policies and rolled out programmes and projects designed to transform them into a 'smart city'. It is clear from the plethora of initiatives underway globally that the idea and ideals of smart cities are quite broadly conceived, with enterprises ranging from those: aimed at changing the nature of urban regulation and governance through the use of data-driven systems that make the city knowable and controllable in new, dynamic, reactive ways; to digital systems that improve the efficiency and effectiveness of city services, increase the economic productivity, competitiveness and innovation of businesses, and drive economic growth and urban development; to ICT-enabled schemes that enhance environmental sustainability and urban resilience; to technology-led approaches that improve quality of life and promotes a citizen-centric model of development which fosters social innovation, civic engagement and social justice (Townsend, 2013; Kitchin, 2014).

In all these cases, digital technologies are front-and-centre as a vital ingredient for addressing the major issues facing city managers, urban citizens and industry leaders. Digital technologies are seen as a key means of providing solutions to urban problems (see Table 15.1), both in terms of instrumental issues such making traffic flow more freely or increasing the efficiency of service delivery, but also wider substantive issues such as increasing resilience, sustainability, civic participation and innovation. Indeed, whatever the challenge, technology is increasingly being positioned and deployed as the optimum means to resolve that challenge, rather than through specific or wider policy initiatives and programmes, politics and deliberative democracy, or citizen

Table 15.1: Smart city technologies

Domain	Example technologies
Government	E-government systems; city operating systems; performance management systems; urban dashboards
Security and emergency services	Centralised control rooms; digital surveillance; predictive policing; coordinated emergency response
Transport	Intelligent transport systems; integrated ticketing; smart travel cards; bikeshare; real-time passenger information; smart parking; logistics management; transport apps
Energy	Smart grids; smart meters; energy usage apps; smart lighting
Waste	Compactor bins and dynamic routing/collection
Environment	Sensor networks (for example, pollution, noise, weather; land movement; flood management)
Buildings	Building management systems; sensor networks
Homes	Smart meters; app controlled smart appliances
Civic	Various apps; open data; volunteered data/hacks

Source: Kitchin, 2016 **[[2016a 'The ethics…' or 2016b *Reframing…?*]]**

interventions. In other words, a technocratic, 'solutionist' approach to running cities is widely being adopted (Greenfield, 2013; Kitchin, 2014). The adoption of smart city technologies, across a range of urban domains, are then, we argue in this chapter, at the vanguard of producing a new urban technocracy. Accompanying and facilitating the creation of smart cities and its technocratic ethos and approach is the rise of a new set of urban technocrats (for example, chief innovation/technology/data officers, project managers, consultants, designers, engineers, change-management civil servants and academics), supported by a range of stakeholders (for example, private industry, lobby groups, philanthropists, politicians, civic tech bodies), and events (for example, various smart city expos, workshops, hackathons) and governance arrangements (for example, smart city advisory boards).

In this chapter, we examine the technocracy of smart cities and the set of urban technocrats that promote and implement their use. We first set out the new technocracy at work and the forms of technocratic governance and governmentality it enacts. We then detail how this technocracy is supported by a new smart city epistemic community of technocrats that is aligned with a wider set of smart city interest groups to form a powerful 'advocacy coalition' (Sabatier and Jenkins-Smith, 1993) that works at different scales. In the final section, we consider the translation of the ideas and practices of this advocacy coalition into the

policies and work of city administrations. In particular, we consider the reasons why smart city initiatives and its associated technocracy are yet to become fully mainstreamed and the smart city mission successfully realised in cities across the globe.

An algorithmic technocracy

As detailed in the opening chapter of this volume, technocracy is government led and performed by 'competent', knowledgeable experts, in contrast to democracy in which elected officials make decisions based on experience and politics (Savini and Raco, 2018**[[not in references]]**). In essence, technical experts gain power to control how governance is organised and performed, replacing politicians and directing the activities of generalist civil servants. In turn, governance becomes more technocratic in nature, underpinned by scientific principles and expert knowledge and enacted through technical measures, methods and specialist technologies (Liu, 2015). Within a technocracy there are moves to align competences and expert experience with the management of society and the delivery of services, and to develop and institutionalise technical and administrative systems that will successfully encapsulate expert knowledge to deliver desired outcomes. For Savini and Raco (2018**[[not in references]]**) the creation and maintenance of a technocracy is achieved through three analytic pillars: ways to tackle urban issues are abstracted and codified into knowledge that become institutionalised within programmes of action; particular technocratic logics for tackling specific issues are positioned as the legitimate approach to be deployed by generalists; instrumental knowledge and forms of action are imposed on the normative processes of politics so that they define public interest with a goal-orientated rationality that subverts democratic governance.

Smart city initiatives are all about introducing and embedding a particular form of urban technocracy designed to fundamentally shift the nature of urban governance to a highly technocratic and prescriptive approach – what Dodge and Kitchin (2007) term 'automated management'. That is, governance is ceded to software systems which administer governance in an 'automated, automatic, autonomous' means, with systems directly regulating service delivery and citizen behaviour. Here, following Savini and Raco's terms, expert knowledge is abstracted and codified into algorithms that are amalgamated to create smart city technologies (see Table 15.1); these technologies can be slotted into the usual practices and programmes of existing city departments and used by generalists; and the instrumental

rationality of the technologies are promoted and sold as the most effective means to tackle urban issues (such as congestion, crime, energy-use, public service delivery). In effect, the smart city is one underpinned by a form of *algorithmic technocracy* that implements new forms of algorithmic governance.

There are two key transitions at work. The first is the degree to which governance becomes automated and autonomous and the role of people in enacting technocratic systems. Technocracy has always been accompanied by technical and technological systems through which governance is enacted, but these systems have consisted of human-in-the-loop enterprises; that is, people perform the key decision-making role. With new forms of automated management algorithms identify patterns and relationships and enact regulation, with systems becoming human-on**[[in?]]**-the-loop (the system is automated, but under the oversight of a human operator who can actively intervene) or human-off-the-loop (algorithms work autonomously without human oversight) in nature. The second is the emergence of a new form of governmentality – what Vanolo (2015)**[[not in references, is 2014]]** terms 'smartmentality'. As we have argued elsewhere, this form of governmentality seeks to use ubiquitous computing to shift the governmental logic of regulatory systems from surveillance and discipline to capture and control (Kitchin et al, 2017). In other words, through automated management urban governmentality is shifting from subjectification – moulding subjects and restricting action – to modulating affects, desires and opinions, and inducing action within prescribed comportments. Here, computational systems, such as automated traffic control, nudge behaviour implicitly and explicitly through the sequencing of traffic lights, rather than inducing (self) discipline (Braun, 2014; Krivỳ, 2016). From this perspective, the city increasingly becomes a system of technologically-mediated and automated technocratic systems.

This shift to algorithmic technocracy has also been accompanied by a shift from a social contract between the state and citizens to corporate contract wherein city services are delivered through public–private partnerships or private entities only (Kitchin, 2014; Sadowski and Pasquale, 2015). Smart city rhetoric and initiatives promote intensive collaborations between public sector bodies and other stakeholders, such as industry, NGOs and academia, and actively build on neoliberal arguments concerning the limitations of public sector competencies, inefficiencies in service delivery, and the need for marketisation of state services and infrastructures (Graham and Marvin, 2001; Greenfield, 2013; Kitchin, 2014).

Public authorities, it is argued, lack the core skills, knowledges and capacities to address pressing urban issues and maintain critical services and infrastructures, which are becoming more socially and technically complex and require multi-tiered specialist interventions (that is, technocratic solutions). Instead, they need to draw on the competencies held within industry in particular that possess sufficient expertise to guide city administrators and can deliver better city services through public–private partnerships, leasing, deregulation and market competition, or outright privatisation. The logic of a reliable, low-cost, universal government provision in the public interest is supplemented or replaced by provision through the market, driven in part or substantively by private interests (Graham and Marvin, 2001; Collier et al, 2016).

Smart city technocrats, an epistemic community and advocacy coalitions

A decade ago, there were few professionals in any stakeholder group (city administrations, industry, academia) who would prefix their title with the words 'smart city' (for example, 'smart city project manager'). Moreover, within city administrations there would have been hardly any CIOs (Chief Information Officer – a senior executive officer responsible for IT, including operations and strategy), CTOs (Chief Technology Officer – a senior executive focused on technological developments in an organisation, including research and development), or CDOs (Chief Data Officer – an executive position responsible for the governance and use of data across an organisation); posts that are presently strongly aligned to the smart city mission in those cities that have appointed them. Over the past ten years, the situation has changed in many cities, with city administrations employing new technical, operational and policy staff aligned to a smart city agenda, including data coordinators/managers, data scientists, designers, policy specialists, software engineers and IT project managers. Many of these new technocrats are recruited from industry or academia, seeking to bring specialist knowledge and skills into an organisation, and act as new 'institutional entrepreneurs' (Wejs, 2014), driving internal change in how city administrations work. Beyond city administrations there has been a very large growth in consultancies offering specialist smart city services, employing a raft of new smart city 'experts'. Similarly, tech companies have created new smart city units/divisions and universities have founded smart city research centres.

This rapidly growing set of smart city professionals within city administrations, governments (local, national, supranational), NGOs, industry and academia suggest that a new smart cities epistemic community has been formed over the past decade. In his seminal work, Peter Haas (1992: 2) defined an epistemic community as a 'network of professionals with recognised expertise and competence in a particular domain and an authoritative claim to policy relevant knowledge within that domain or issue-area'. Such a community of knowledge-based experts help decision-makers identify and define the problems they face along with possible policy solutions, and also to assess policy outcomes – in this sense, they are key to promoting and sustaining technocracies. Haas (1992) details that epistemic communities share a set of knowledge, normative and casual beliefs, and practices, and work in common action to forward a particular vision and policy response. They seek to provide contextual framing, advice and social learning to navigate a complex and uncertain social-economic political landscape (Dunlop, 2013), and exercise influence through their claims to insightful and authoritative knowledge that has high utility for decision- and policymakers who maybe lacking sufficient expertise to make informed choices (Haas, 2001). If successful, the community's ideas and practices become institutionalised over time, continuing to shape how problems and solutions are identified and tackled. What is important is that Haas (1992) argues that epistemic communities differ from interest groups or policy networks through their claim to authoritative expertise. That said, epistemic communities are not necessarily composed of technical and theoretical knowledge experts: they can also emerge from communities of practice which connect experience and practical knowledge, such as in the case of 'expert amateurs' and communities engaged in 'citizen sensing' and peer-to-peer collaboration (Gabrys, 2014; Tironi and Criado, 2015).

Given that in general terms smart city professionals claim and are often given authoritative voice, share a set of knowledge, beliefs, practices and aim to craft a particular vision and policy response to urban issues, it thus seems fair to conclude that they constitute an epistemic community. That said, it is also the case that there is a blurred line between a smart city epistemic community and smart city vested interest groups. The two overlap with respect to how they think urban issues should be addressed through technocratic technological solutions, and they work in concert to form an 'advocacy coalition' – that is, a coalition of 'people from a variety of positions (elected and agency officials, interest group leaders, researchers) who share a particular belief system' and 'who show a non-trivial degree of

coordinated activity over time' (Sabatier and Jenkins-Smith, 1993: 25). However, while theoretically an epistemic community does not have direct pecuniary incentives to seek to shape the policy landscape, being driven by normative beliefs, some elements of advocacy coalitions are also motivated by a desire to provide solutions and generate profit. In the latter case, not only are substantive policy advice (means) and policy proposals (ends) being proffered (usually for a hefty fee), but a pathway to a particular solution is usually provided by private enterprise (Dunlop, 2013). As such, the kinds of advice given by a tech/consultancy company such as IBM is far from impartial and not simply rooted in authoritative knowledge expertise, a particular technical approach, and a belief in the power of technology as the most effective way to run cities and fix urban problems. With respect to the smart city, an epistemic community and advocacy coalition is evident at four scales: global, supra-national, national and local.

In just a handful of years, a number of sizable global smart city consortia have been formed consisting of aligned actors who share a common vision with regards to how cities should be managed and urban issues addressed. Each consortia makes claims to provide city administrations with authoritative, neutral, expert advice, resources and partnerships that can cut through the complexities of managing cities to provide guidance on how to use digital technologies to solve difficult issues/problems. For example, the 'Smart City Council' (SCC) is a coalition of partners strongly advocating for the adoption of smart city policy and interventions. The SCC consists of 21 'Lead Partners' (including IBM, Cisco, SAS, Schneider Electric, Deloitte, Oracle; Microsoft), 21 'Associate Partners' (including Intel, Huawei, Siemens, Panasonic), and 70 'Advisors' (including the Institute of Electrical and Electronics Engineers (IEEE), International Finance Corporation (part of the World Bank), International Organization for Standardization (ISO), International Telecommunication Union (ITU), World Bank Urban Advisory Unit, and a number of university research centres). Collectively, the SCC provides a number of resources, events and task forces designed to promote smart city ideas and create social learning.

Working somewhat in parallel with the global networks/coalitions, which are primarily driven by business interests, are supra-national, governmental-led policy and programmatic initiatives. This is particularly the case in the European Union where a number of institutional networks and high-level programmes have been driving the smart cities agenda through a set of institutional arrangements, funding schemes, networking events, and conferences and workshops. These networks and programmes, and their strategies and mechanisms, are

overseen through management boards and scientific advisory boards primarily staffed by a mix of academic and public sector actors who act as an epistemic community. For example, 'The European Innovation Partnership on Smart Cities and Communities' (EIP-SCC) seeks to bring together 'together cities, industry, SMEs, banks, research and other smart city actors'[1] in order 'to improve urban life through more sustainable integrated solutions'.[2] By 2015 the EIP-SCC documented 370 commitments (which it defines as measurable and concrete smart city engagements/actions) with 4,000 public and private partners from 31 countries. These commitments have received hundreds of millions of euros in investment to embed smart city doctrine in city administrations and implement on-the-ground smart city initiatives.

While the global and supra-national scales provide a transnational means for the knowledge of epistemic communities and advocacy coalitions to circulate and propagate, it is at the national and local level that the grounding of their ideas takes place through their embedding in institutional structures, appointment of personnel at different scales of government (for example, national-level departments and agencies, and regional and local/municipal authorities), and the development of specific policies and deployments. In the Irish context, there are a number of well-funded interdisciplinary research institutes and centres that specialise in smart cities research that actively partner with numerous industry collaborators and work with Irish cities, including extensive testbedding and trialling. In addition, the recently launched (Dec 2016) 'All Ireland Smart Cities Forum' brings together representatives from seven Irish cities, five from the South (Cork, Dublin, Limerick, Galway, Waterford) and two from the North (Belfast and Derry) to share insights, support collaborative research, and work with stakeholders on collective city priorities. More locally, Smart Dublin and Cork Smart Gateway are LA initiatives that seek to guide smart city projects within LA departments and work with 'smart technology providers, researchers and citizens to solve city challenges and improve city life'.[3]

Bridging the 'last mile' problem

Over the past decade the drive to create smart cities has emerged as a potent agenda, with many cities adopting smart city initiatives and rolling out smart city programmes. The smart cities movement is explicitly an exercise in technocracy: of transforming urban governance and governmentality into an algorithmically mediated enterprise, underpinned and supported by expert knowledge, an associated

epistemic community, and advocacy coalition that operates across scales to produce policy mobility and a global enterprise. However, while smart city policy and programmes are being implemented in many cities, it is clear that they are fragmented in nature and the smart city vision is only partially embedded within city administrations at present. Consequently, the ideas, policies and technologies of the smart city movement have so far only gained partial traction in driving how city bureaucracies manage and govern their jurisdictions and approach tackling urban issues. Moreover, they are being greeted with apathy or resistance by some staff. In other words, it seems that promoters and technocrats of the smart city vision are having difficulty 'bridging the last mile' from theory and vision to fully mainstreamed policies and adoption across organisations. Here, we want to consider the reasons for these 'last mile' difficulties in ameliorating the work of epistemic communities and advocacy coalitions.

City administrations are to a large degree like an oil tanker. They are large, complex organisations consisting of many departments, with entrenched structures, ways of working and established legacy systems that create a high degree of embedded path dependency. They are also full of internal politics, fiefdoms and competing interests. As such, they are not easy to reorientate with respect to shifting how units and staff think about and undertake their work, especially when they directly challenge the paradigmatic training and ideals of professionals schooled to think and act in certain ways (for example, planners, engineers, architects, educators, social workers, community development workers). A smart city approach promises to create a more nimble, flexible, data-driven, efficient, horizontal organisation, cutting across departmental silos and enabling joined-up responses to urban issues. They thus promise to disrupt the status quo and radically change working conditions, including leading to redundancies.

Smart city ideas and policy thus run into internal inertia and resistance by both managers and workers. In addition, they can run into external critique from academics, NGOs, community groups and politicians (especially on the Left), who hold different views as to the supposed benefits and underlying ideology of the smart city agenda. Part of the critique of the smart city epistemic community is that while they claim to be able to tackle perceived problems, they have a limited perspective shaped by their disciplinary expertise and lack sufficient grounded domain knowledge of an issue (Cullen, 2016; Kitchin, 2016b), often treating the city as a technical system as opposed to a multifaceted place. The result is a form of technological solutionism in which digital technologies are positioned as the answer to all issues, regardless of

context and history. Consequently, there has been a marked push-back against the ideas and ideals of the smart city in recent years, especially concerning the role of citizens, the technocratic nature of governance and its instrumental rationality, and the marketisation of public services (Greenfield, 2013; Kitchin, 2014; Datta, 2015).

Fuelling resistance and doubts is a sense that the majority of smart city technology is not yet mature and unsuitable for mainstreaming. Technologies are still being developed and tested. This is borne out by the large number of pilot projects and what has been termed 'experimental' or 'testbed' urbanism or 'living labs'. Practically all EU-funded smart city projects have this status, being initiatives to scope out, produce and implement proof-of-concepts, and share knowledge about efforts, rather than being market-ready and proven to work in practice. As such, while there is a general consensus on the utility of digital technologies for tackling urban issues, there is no universal agreement on the form of technical solution or related factors such as the role of citizens in shaping how issues are tackled (Townsend, 2013). In other words, smart city ideas and technology are still very much in development phase and investing in them poses a risk for city administrations charged with providing stability, certainty and reliability in the delivery of city services.

Fostering scepticism is a lack of trust among many city administrators as to whether a smart city approach will work in practice. Cities have a long history of purchasing technologies that are costly and do not always deliver on their promises. This includes the first wave of smart city products sold to them that bound them into unfavourable contracts and supplied technical solutions that did not deliver on their promises. An additional concern relates to financing and the amount of perceived value for money spent and the return on investment. Many smart city solutions are expensive to procure and service, yet it is not always clear what the return on investment will be beyond promises that a service will improve or an issue be ameliorated in some way. Moreover, it is clear that the same technology will be cheaper and better – in terms of spec, functionality, performance – in a few years, so it is difficult to know when to make the initial investment. Many cities are currently operating in a condition of austerity, so finances for new investments are constrained. As such, although some technologies could save the city money over the long term, the city still must find the initial investment capital. This is why so much effort is now being expended on new business models for smart city investments. Another issue is competing demands for finance with a limited budget. Many services are statutory obligations and unless the smart city technology

can address these critical issues, they will have trouble competing for attention and resources.

In addition, the epistemic communities and advocacy coalitions coalescing around the field of smart cities, in true technocratic fashion, seem to little appreciate the need for democracy, openness and public consultation in city management: mostly, executive decisions are made outside of democratic process and city managers green-light smart city projects with little political, media or public oversight or feedback. In the case of Dublin, local politicians and the public have been ignored almost entirely in the formulation of Smart Dublin and the development and rollout of smart city initiatives. Indeed, nearly all decisions for selecting and implementing smart city initiatives seem to have bypassed public consultation and political debate. As such, the focus of the epistemic community and advocacy has been exclusively at the city bureaucracy. This is perhaps no surprise given that the city has no mayor and is largely run by the CEOs of the four local authorities.

Conclusion

We have argued in this chapter that over the past decade there has been a turn to smart city initiatives by city administrations. These initiatives strengthen technocratic approaches to governing city life and delivering urban services by tasking their implementation to technical systems designed by knowledgeable experts and run by a new suite of urban technocrats. These systems appear to operate beyond policymaking processes. They have an autonomous position built through automated mechanisms of information processing that end up having an impact on democratic processes. These systems heavily input public policymaking through the production and transmission of information, processed through unknown and unaccountable algorithms that policymakers actively mobilise as legitimate knowledge in order to build political justifications of their policies. Moreover, the reliance of smart city systems on ubiquitous computing and the generation and processing of urban big data has produced a new form algorithmic technocracy that enables a shift in governmentality from regimes focused on discipline to that of control. Algorithmic technocracy is highly prescriptive and technocratic, exercising forms of automated management in which people are increasingly removed from mediating the practices of governance and delivery of services with power ceded to algorithms to control domains and make decisions. The creation, and often the operation of smart city initiatives, is predominately undertaken by private enterprises, meaning that algorithmic technocracy is market-led

and there is a creeping corporatisation and privatisation of urban governance.

The rollout of algorithmic technocracy has been accompanied and facilitated by a new wave of urban technocrats and a powerful new advocacy coalition that works across scales to promote adoption. In a short space of time a new cadre of smart city technocrats – CIOs, CTOs, CDOs, data scientists, designers, policy specialists, software engineers and project managers – have been appointed to roles in city administrations, and organisational structures have been re-jigged to accommodate them. These technocrats are working with, and supported by, a panoply of external professionals within institutional bodies, academia and companies, who provide a range of services and enact social learning through consultancy, professional development training, conferences and workshops, cooperation in project work, and hackathons. While there are communities of scholars and 'expert amateurs' who forward an alternative vision of smart cities, particularly a version that is more citizen-focused, -engaged or -run, the dominant paradigm of smart cities is still rooted in a technocratic formulation, albeit one that now acknowledges the need for citizen participation, though very much from a civic paternalist or stewardship perspective (Shelton and Lodato, 2016).

Collectively the smart city epistemic community and advocacy coalition is starting to reshape urban policy, how funding is distributed and spent, and how city government works. However, due to a number of issues – not least of which is the relative immaturity of the policy and technical solutions being offered, along with institutional inertia – smart city ideas and ideals have only become partially embedded in city administrations. In effect, while the smart city movement has captured some of the bureaucratic and political terrain at local, national and supra-national scales (for example, some mayors, government departments, EU bodies) it has a 'last mile' problem in many cities.

The challenge then for smart city advocates is to bridge this 'last mile', persuading key decision-makers that the smart city approach to managing cities and tackling urban issues through algorithmic technocracy will radically improve the lives of citizens and help businesses thrive. Such a drive seems likely to continue for the foreseeable future as the smart city epistemic community and advocacy coalition show few signs of abating. Rather, they are continuing to grow as ever more technical and scientific academics and companies turn their attention to urban issues and cities further embrace technological solutions to urban management and governance. Nonetheless, the last mile issues we detail will not dissipate in the short term. How this will

ultimately play out is difficult to pre-determine, but it is fair to say that the new technocrats are unlikely to be leaving city government any time soon, many ICT solutions already deployed are embedded in city governance (for example, intelligent transport systems) and unlikely to be decommissioned, and large investment is being ploughed into developing and trialling new technology for deployment across domains (for example, transport, energy, economy, environment, homes). As such, algorithmic technocracy and its associated governmentality is set to be a growing feature of our everyday urban lives.

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Notes

[1] https://eu-smartcities.eu/about
[2] http://ec.europa.eu/eip/smartcities/
[3] http://smartdublin.ie/about/