Shaping successful smart cities

Reflections on the APPG Smart Cities' Top Tips
for City Mayors

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1.   Introduction

Ahead of the 2017 General Election the All Party Parliamentary Group (APPG) on Smart Cities[1] called on its membership to submit their Top Tips for Metro Mayors – a significant new office within city regional government[2]. This was an opportunity for those already steeped in Smart City policy and practice to pass on insights to those who may be considering engaging for the first time with the rapidly developing Smart City agenda. In total, 17 APPG member organisations from across the public and private sectors and academia responded, sharing more than 50 Top Tips. The APPG collated these suggestions into a booklet, which was formally launched in November 2017.[3] It is currently being circulated to Mayors, APPG members and more widely.

In his foreword to the APPG's booklet the APPG Chair (at the time) Mark Prisk MP[4] set out its aim: "to stimulate ideas and discussion". Our aim in compiling this brief report is to offer an initial response to this challenge. As an APPG member, home to a newly elected (West of England) Mayor and a Smart City pioneer[5], we consider Bristol to be an appropriate vantage point from which to do this.

Below we reflect on the Top Tips as a unique body of expert advice and opinion. We have undertaken a simple content analysis to determine key messages, common themes and areas of disagreement.[6] We then provide a brief commentary on the Top Tips, drawing both on the academic literature and our professional and research experience in this field. Before we do that, however, we will briefly introduce the idea at the core of this discussion – the Smart City.

2.   What is a "Smart City"?

There is currently a huge amount of interest in, and talk about, Smart Cities. There are many events, conferences and Expos promoting the idea to global, national or local audiences. There is a Smart City policy and practice community that spends its time exploring how to take the idea from the research laboratory and into reality.

Yet what constitutes a "Smart City" is by no means agreed. There have been many attempts to offer a definition, and those definitions can differ significantly in emphasis.[7] This has led some to describe the "Smart City" as a "chaotic concept".

Much of the debate focuses on using information and communications technologies to address urban problems. This might be restricted to thinking about how Web 2.0 or social media can help local authorities to provide services more efficiently and responsively. Alternatively it might explore how bringing different data sources together (so-called big data and/or open data) can facilitate new ways to understand and address urban issues or generate new types of urban services. Or it might focus on the potential of the Internet of Things and networks of sensors to help tackle problems such as air pollution or traffic management. There is also an argument that "smart" industries should be nurtured and promoted because they can form the basis for economic development in the twenty-first century urban economy.

Some definitions of the Smart City try to capture many of these facets of the debate. For example, one widely-referenced definition states that:

> "[a] city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance".[8]

In contrast, one of the early, influential definitions of urban "smartness" places less explicit emphasis on technology and more emphasis on service provision:

"A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens. Smart city generally refers to the search and identification of intelligent solutions which allow modern cities to enhance the quality of the services provided to citizens".[9]

The authors go on to offer one of the most capacious summaries of the dimensions of the Smart City. They see it as referring to: smart people, smart economy, smart environment, smart government, smart mobility and smart living.

A joint initiative of the British Standards Institution (BSI) and the Future Cities Catapult, the City Standards Institute, brings together cities and key industry leaders and innovators to work together in identifying the challenges facing cities, providing solutions to common problems and defining the future of Smart City standards. Two Policy Advisory Standards, PAS 181 and 182, have been produced to provide guidance on developing strategies for Smart Cities and communities and on developing and applying a data concept model to promote data sharing across city sectors. The BSI offers a further definition of the Smart City as one where "there is effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its citizens".[10]

The important point about these definitions is that they are not technology-centric. They retain focus on people/citizens and an emphasis on how the Smart City is governed (eg participatory governance). This more rounded understanding of smartness has sometimes been lost because the discussion quickly gravitates towards the potential, and complexities, of digital technologies and their implementation.

The second important point to emerge here is the need to clarify what we are talking about when we talk about the Smart City. We might all be clear in our own minds, but we might be thinking of rather different things.

Figure 1   Tag cloud of commonly used terms in APPG Top Tips booklet

3.   Key messages

The Tag Cloud (see Figure 1 above) is made up of the words commonly used in the APPG Top Tips booklet. It is immediately apparent that Technology, although present, does not emerge as the key descriptor of the Smart City. Mentions of Citizens, People and Society are more prominent. Infrastructure is not obviously mentioned, although closer inspection reveals mention of specific infrastructure systems including mobile network and transit systems. Instead, the focus of the Tips is more commonly on Data, Services and Solutions. Other themes are less clearly characterised by common terminology (and therefore less visible in the Tag Cloud). These include Resources, Priorities and Partnerships.

In summary, our analysis suggests that, collectively, the APPG Top Tipsters advise new Metro Mayors to consider the following when developing their Smart City strategies and plans:

CITIZENS:
•   Place citizens at the heart of your Smart City Strategy through pro-active engagement
•   Work with citizens alongside businesses and other partners – remember that they, rather than simply the Combined Authority, are customers of the Smart City
•   Understand that citizens want to co-produce Smart City solutions for themselves but will require your help to develop skills and build capacity to take an increasingly active role
•   Recognise that Smart City outcomes go beyond efficiency and economic development. When developing metrics to assess Smart City performance include social inclusion, caring and quality of life
•   Adopt an open and inclusive leadership style – but be prepared to be directive, as you will need to lead disruptive change

RESOURCES:
•   Smart Cities can generate resources in three ways: reducing costs through sharing; generating new revenues; and attracting inward investment to support economic development goals
•   The best ways for you to create budgets for Smart Cities is through joined-up procurement and closer working with the private sector and other stakeholders

PRIORITIES:
•   Focus on creating an enabling culture as well as making practical interventions
•   Creating a Digital Office will help drive this culture within and outside your organisation
•   Use Urban Labs to identify and mobilise people and partners around commonly agreed city challenges and to embed continuous learning
•   Mobile Infrastructure and Transit systems are important opportunities but will require your strong leadership to lever their full Smart City potential

DATA:
•   Build an open and interoperable Data Store
•   Develop analytical capabilities to derive new insights from data, including testing-out future policy interventions and physical developments before you make them
•   Recognise that staff, including those concerned with the built environment, need to develop their professional skills to ensure effective data use
•   Use 3D models, maps and visualisations to make data easier for everyone to engage with

PARTNERSHIPS:
•   The challenges associated with Smart City development and delivery are complex and interconnected so partnerships are essential
•   Work with partners to drive common standards and interoperability
•   Build an open ecosystem of Smart City providers and collaborators, creating a shared platform for Smart City innovation.

4.   Customers, citizens and civil society

> *"Keep citizens at the heart … initiatives should hold citizens at their core"*

The Tipsters are concerned with transport, data, mobile connectivity and street lighting amongst other things - but many cite citizens and their needs as an important reason why Metro Mayors should be thinking about Smart Cities. Whilst there is consensus on the importance of keeping citizens at the heart of the Smart City, the Tipsters ascribe citizens a variety of different roles within it:

> *"Smart cities are not about governments or corporates. They're about the users of services"*

In many instances, citizens are positioned as service users but this goes beyond the current Local Authority client-customer transaction. The suggestion is that Metro Mayors must work hard to promote greater collaboration between public bodies and commercial companies. By working together in an increasingly joined-up way, Mayors should align approaches between city systems and use standards to help support industrialisation of solutions and thus provide confidence in the market. The result is that citizens become customers, not just of the new Mayoral Combined Authority but also of the Smart City itself. Ultimately it is citizens who benefit from efficient, integrated and targeted place-based services. This is a key Smart City outcome but it is only part of the wider opportunities that Tipsters foretell:

> *"your Smart Cities shouldn't just increase efficiency or economic growth; they also affect citizen wellbeing and the way we interact with our communities in everyday life"*

> *"Ultimately, the 'smarter city' generates outcomes for its citizens and businesses: creating a better city for its people to live and work in"*

> *"A Smart Society should be a key mission if you are to tackle climate change, improve air quality, congestion, overcome unemployment and plan for future skills"*

Beyond reducing the friction of everyday life, Tipsters suggest that Smart Cities will be healthier and safer places with less traffic congestion and improved air quality. Wellbeing will increase as both citizens and cities flourish. Metro Mayors might unlock such transformations, according to many of the Tips, by making sure that citizens feel part of the change, and finding new ways to engage with the wider population:

> *"smart cities need to focus on real citizen needs, which then dictate the tech solutions, rather than the other way around"*

> *"Working with citizens and other stakeholders at the outset is key to adopting a smart approach, helping to establish what the priority areas should be"*

As a minimum, citizens are seen as the owners of problems that Smart City technologies can fix – they have real needs that Metro Mayors and their teams must first understand in order to address. As one Tipster puts it, "allow your teams the time and space to engage with communities".

> *"they were looking for smart cities to provide them with the digital tools for information simplification and collaboration that would help them collectively optimise their cities for themselves."*

Tipsters see citizens as part of the team that will create Smart City solutions – working alongside businesses and other stakeholders. Based on direct consultation, one Tipster reports that citizens aspire to an even more active and empowered role – creating Smart City solutions for themselves. A few Tipsters go even further by considering the ultimate aim of this empowerment:

"civil society cannot replace the state overnight. Building medium term partnerships is important. This helps civil society organisations to learn and evolve."

A small number of Tips suggest that civil society will ultimately take ownership of the Smart City – presumably replacing functions currently undertaken by the State. This is seen as a longer-term evolution based on new skills and capacities being acquired. It is also noted that involving citizens now is important to moderating and mitigating the risks of an overtly techno-focussed Smart City approach, which if unchecked might lead to unwelcome outcomes - social isolation, fractured communities and the increased exclusion of vulnerable individuals and groups:

"People were also clear that they wanted smart solutions which increased, rather than decreased, community interaction and offline social cohesion"

"Technology is only as good as the people that use it, so behaviour change, inspired by city leadership, is essential"

"While digital technology has focussed on 'sharing cities', top cities in well-being index are great because they are also 'caring cities'. They care for the children, the elderly, the minority groups and celebrate ethnic, cultural, linguistic, and sexual differences."

To achieve change, Mayors are generally encouraged to take an open and inclusive leadership style but a few Tips also hint that Metro Mayors may need to adopt a more directive approach, leading behaviour change that will be disruptive to current ways of doing things. This is seen as particularly true in relation to vulnerable members of society, where Metro Mayors are challenged to celebrate diversity and to go beyond the limitations of current Smart City thinking to create cities where people care for each other.

5. Resources to do the job

"With budgets a key barrier for smart city development, it is important you decide benefits that could be a return on investment and consider collaborative partners to help deliver"

Metro Mayors can seek to lead and deliver complex Smart City change and Tipsters refer to the resources they will require to achieve this. Perhaps surprisingly, few Tips explicitly refer to austerity or local authority budget reductions. When finance is mentioned it is seen as a challenge that sits alongside the need to deliver better customer service outcomes, or as an input that must be considered when determining which businesses cases to prioritise for future investment.

"Take this saving/growth and reinvest in the region and the people who work for the city"

On the whole, Tipsters see Smart Cities as: an opportunity to reduce or share costs through increased cross sector partnership; a route to generating revenues for Metro Mayors to re-invest locally; or as an opportunity to attract new inward investment to support economic development goals. A specific example of where Smart Cities might enable these outcomes is given in relation to social care, where embracing innovative technologies - "Artificial Intelligence and Robotics" - is seen to enable high value work and investment in what is recognised to be a pressurised area.

By far the most common way that Tipsters suggest Metro Mayors can drive resources for Smart Cities is through addressing siloed and fragmented approaches, including in procurement:

"City operations have become specialised and fragmented. Functions, services, and domains are managed within individual procurements, and this creates significant challenges when introducing anything new. While cities may conventionally implement one technology at a time, a smart city can aspire to a connected ecosystem of different technologies and data sources that collectively improve the city's efficiency, security, sustainability and lives of its citizens"

"the temptation to 'copy' must be resisted. Solutions must be made fit-for-purpose to the particular needs of each city"

The Tips include some potentially contradictory advice for Metro Mayors about the basis for more effective procurement. One Tipster rejects the idea of procuring off the shelf solutions as a false economy, instead favouring solutions tailored to meet individual city needs. Another suggests the benefit of sharing common solutions between cities.

Two Tips suggest that Metro Mayors may need to exert some caution in relation to procurement. One Tipster asks Metro Mayors to consider incentives for business partners to engage. This perhaps reflects a concern that there is no guarantee that solutions developed in a pilot phase will be selected at a later stage through open procurement. Another Tipster highlights that Smart Cities still represent something of a leap of faith as, "whilst we all know that smart city solutions will ultimately be central to addressing many urbanisation challenges, most of the potential applications are not yet commercially proven".

6. Priorities for action

"A city is only smart if the people living in that city see clear outcomes that have improved their quality of life. A technology solution with hidden costs or erratic performance is counter-productive."

Having understood the importance of engaging citizens and the need to generate resources, Metro Mayors may look next to the Tips for advice on priorities - where should they start? On this matter, the advice included is both practical – indicating priority areas for action - and conceptual – describing the type of culture that the Metro Mayors should seek to create.

Metro Mayors are advised to consider the structure of their organisations, creating "a Digital Office" that will "share knowledge and information across organisations and between departments to help develop a culture of self-learning, enhanced by collaboration with other cities". There is a strong emphasis on being open and honest, driving "a spirit of innovation to create new ways to a better environment rather than a slow degradation of service quality as funds dry up". There is a belief that risks should be effectively shared through public-private cooperation to deliver inclusive and positively joined-up services. One Tipster indicates the need for a permissive culture: "identify what the 'no regrets' actions are to make a substantial difference". Another comments philosophically, "achieving smartness is a journey, not a destination. It's a learning mind-set that involves constantly seeking ways to improve upon the status quo".

In terms of practical interventions, some Tipsters advocate a Masterplanning approach – "creating a masterplan design response and a 3D model of the city or neighbourhood". Others advocate for the development of a sustainable business case in collaboration with partners. One Tipster suggests an approach which perhaps sits between the two – "Urban Labs" that adopt replicable methodology and "start with a strategic challenge which partners or those attracted to the challenge can seek to address". Urban Labs "can be applied at a single service level but [are] better applied to the entire innovation effort within a city/city region" and their aim is to test new solutions, generating measurable impact and continuous learning. The Tipster cites three areas – environmental services, adult social care and city centre strategy - where Urban Labs have previously been successfully deployed across multiple city locations.

Some Tipsters advocate strongly for specific interests, for example, in relation to Mobile Infrastructure which must be integrated into strategic thinking and "efficient and integrated mass transit systems" that will require "effective policies … to deliver the potential afforded by clean, efficient technologies".

7.   Data

"Advances in digital technologies and open-data are finding new ways to augment and improve the world we live in"

"High-quality interoperable data that will drive good policies and decisions can underpin a city that works for everyone"

The Tipsters refer more frequently to the value of data than they do to technology. Data, like glue, is seen to hold together many different aspects of the Smart City – policy and strategy, new insights and innovation, cross-sector partnerships and citizen engagement. By having the right data at the right time it is seen to be possible for Mayors to create a holistic platform that will ultimately enable better, more accountable decision making.

At a formative stage, through working with citizens and other stakeholders the aim is to help establish what the priority areas should be, the types of data needed, and how and when it should be collected. An integrated approach should be established, including building an interoperable Data Store to which businesses can also contribute data. Mapping can help deliver new insight by demonstrating cause and effect and predictive analytics can be used to test new policy Interventions. As one Tipster suggests, "the model can be used to help stakeholders understand the impact of new developments and policies before they are implemented, so that any risks or concerns can be addressed". The overall result is that Mayors can explore different scenarios to "deliver smart, flexible future city environments - which can be modified, without the need to rework the vision".

Data is also seen as a way for citizens to understand the impact of policies and strategies that are adopted to support the Smart City. Tipsters recognise that engaging with data can be difficult or off-putting for many people and suggest ways that this can be addressed, for example, "overlaying Data on a 3D model or map of the city or neighbourhood" and by staff and citizens "developing new skills".

One Tipster highlights the importance of physical city infrastructure to data collection and suggests that cities who use their Mobile Infrastructure to collect data on, for example, congestion and pollution will win out over cities that fail to seize this opportunity. More generally, the Tipsters make a strong connection between data and the built environment, suggesting that professional bodies need to do more to champion change and encourage the staff they represent to develop new skills to effectively use big and open data to improve the professional advice they provide.

8.   Partnerships

"embracing an open ecosystem approach to smart city enablement. Instead of expecting one vendor to provide a complete smart city solution"

Talk of partnerships infuses all aspects of the Tipsters' advice to Metro Mayors: from working with citizens and communities to ensuring buy-in and ownership, to forming close alliances with business and city stakeholders to share risk and allow new investments to be made. One distinctive characteristic of partnerships relating to Smart Cities is the idea of fostering open and collaborative networks. This is seen by some Tipsters as essential to avoiding lock-in to particular technologies or platforms and in driving common standards and interoperability. These are seen as amongst the most important attributes of driving benefits from Smart Cities for Mayors, businesses and citizens.

9.   Commentary

Taken as a whole the Top Tips offered by the APPG Smart Cities booklet for Metro Mayors give a good flavour of the current state of thinking. In this section we wish to draw out and reflect on some of the points, note some of the tensions, and highlight issues that deserve greater attention.

Citizens

Much of the early Smart City discussion was dominated by technology. Over the last few years there has been a major effort to return the focus of the conversation to citizens, their needs, and ensuring inclusion. It is argued that a city cannot be smart without smart citizens. The Top Tips reflect this change of emphasis, as noted above.

However, there is a difference between a policy discourse that acknowledges the importance of citizens, their needs and capabilities in shaping the Smart City, on the one hand, and ensuring that citizens participate meaningfully in practice, on the other. Making it a practical reality is no small task. While there is much activity across the country addressing this issue, and there are promising developments and approaches, there are many outstanding questions about how to deliver effective citizen participation in the Smart City.

We also need to be more precise about what we mean by citizen participation and what it is that citizens are participating in. These are debates that are very familiar in other policy areas such as urban planning.

In the Smart City context, there are examples of citizen involvement in problem definition and design or co-creation of apps or services – indeed there are examples of citizen-led Smart City developments – but at the moment many such developments are in the form of small-scale pilots or at the proof of concept stage. Where citizens are involved in shaping the Smart City it tends less often to be at the large-scale infrastructure end of the spectrum of Smart City activity. What citizen involvement in the Smart City operating at scale does, or could, mean is a debate that has a long way still to travel.

Governance

We would make a similar point about the broader question of the governance of Smart Cities. So far there has been limited attention paid to governance, even in respect of the governance of project development. Certainly there has been relatively little analysis of the way in which Smart City governance will, or could, function when in day-to-day operation, or how new types of data or analysis interact with broader policy-making processes.

The way in which Smart City developments relate to questions of legitimacy and systems of local democratic accountability needs to be considered. In the Smart City conversation "e-government" and "e-democracy" can be treated separately from questions of efficient city management. Is that an appropriate separation? In an era where there is increasing concern about, for example, the danger of biases embedded in algorithmic regulation, how do we ensure that our Smart City processes are appropriately even-handed and genuinely inclusive, and our ways of governing have broad support?

Leadership

The Tipsters make reference to the need for leadership in Smart City development, as well as the benefits of partnership and moving beyond working in silos. These are important issues. But there has been limited discussion about the styles of leadership appropriate to the Smart City. To build a Smart City a Mayor will very likely need to take a brave, active and nuanced approach. The approach starts from an acceptance of the need for disruptive social change. The electoral politics of this could be challenging: it will never be an easy vote-winner.

We referred above to Mayors adopting an open and inclusive style of leadership. Mayors needs to build an "ecosystem of the willing". We might add to the mix the idea of collaborative leadership – as Mayors

reach beyond the public sector to include a range of diverse stakeholders. The task of taking some of these well-established ideas about public management and applying them to the Smart City context is one that is actively being pursued at the moment.

There are important questions about whether governance approaches that place greater emphasis upon the use of cutting edge technologies present particular challenges to inclusive styles of leadership. The technological means being used to reach desired ends can seem complex and opaque. Some people feel they don't get on well with tech, some are suspicious of it. How do Mayors communicate with their communities about opportunities and future directions in ways that keep people on board?

Conflicting priorities

The ideas provided by the Tipsters, taken together, hint at the fact that there are very different models of the Smart City in operation and that some of the aspirations for the Smart City are in tension.

We would simplify the story to highlight two key tensions.

The first is between the ground-up and top-down approaches to the Smart City. The ground-up approach starts from citizens' priorities and local needs. It then considers whether there are ways of addressing those needs and priorities that can be assisted by technology. It leaves open the possibility that the more appropriate response may not lean heavily on technology. But if there is a technological route forward then it may well require tailored, non-transferable solutions. The top-down model, in contrast, is about large software vendors offering off-the-shelf urban operating systems. Few of the Tipsters were arguing strongly for this latter approach, but in practice it can appeal where local expertise or resources are limited. The key point is that there is a difference between "being" a Smart City and "buying" a Smart City.

The second tension is related. The development of a Smart City approach geared towards addressing local issues is unlikely to be preoccupied with the potential for scaling up and selling on. However, if we view "smart" as being a driver of local economic development then we may well be looking for solutions that can be packaged and marketed widely. In the latter case, citizen engagement may be relatively minimal, and that might be appropriate: the local economic benefits flow from the presence of high technology clusters rather than necessarily having direct impacts on local communities, issues or services. While there is a potential tension here it is possible for a local Smart City ecosystem to encompass both approaches. Indeed many local pilot projects involve major multinational telecom companies as partners and those partners are looking to learn something that is transferrable.

Our point is simply that it is important to understand what is being attempted, what is happening, and how these tensions are being resolved locally.

Business models and value

One of the Tipsters rightly observed that in the Smart City context "most of the potential applications are not yet commercially proven". This is an important point. There is a lot of talk about the potential of Smart City infrastructures and applications. It would be fair to say that there is some measure of hype and hyperbole. The broader point is that, leaving aside the question of commercialisation and the value of future market opporunities, there is a long way to go before we can evidence and safely conclude that Smart City developments reliably deliver value to the public. This is something that is being researched and evaluated but at present it is still to be demonstrated.

One component of this issue is how Smart City developments can be put on a sustainable financial footing. The proprietory urban operating system, bought from a big ICT vendor, offers one answer. But it is an answer that does not appeal to everyone. Once one starts to talk about open ecosystems, open data, joining up and the like the question of how the system can pay for itself inevitably arises. Where is value generated, how can that value be captured, and by whom? Who is going to pay? It is a debate that can be seen occurring in other industries, such as publishing, where technology has caused

significant disruption to existing business models. But it is one that is crucial to shaping the way in which the Smart City of the future develops.

Privacy and security

The Tipsters don't focus very heavily on issues such as ownership and security of data or ICT systems, but these are a key part of the current debate over the Smart City.

Where Smart City applications are based upon gathering data on, for example, population or traffic movements in order to manage city flows more effectively this implies that the system will monitor individuals or their vehicles. That can be done using a range of different technologies. Many such technologies can be configured to record more or less precise data. Do we want to know that a person passed a particular location, or that it was you, specifically? Tracking mobile phone signals could give us either. More precise data could be more useful or flexible, but it is more intrusive. How much data do we, as individuals, want to give away? Do we even know we are giving that data away and to whom? This takes us back to our points about governance.

Where Smart City applications rely on, for example, the Internet of Things this brings with it a host of questions about the susceptibility of the systems to hacking or other malign forms of disruption. We know that globally many IoT devices are eminently hackable, largely as a result of users neglecting to take basic security precautions. How can we make the Smart City resilient?

These are not new questions. And there are many people working on Smart Cities wrestling with them right now. Nor are they questions to which there are no answers. But they are dimensions to the Smart City that are less visible and yet profoundly important. They are the sort of issue that those contemplating joining the Smart City conversation need to be aware of.

10. Conclusions

To conclude, we bring the focus briefly back to our own locality – Bristol and the West of England. Tim Bowles, the West of England Mayor, has stated an ambition for the West of England to become a Smart Region and, under the leadership of Mayor Marvin Rees, Bristol already ranks as the UK's leading Smart City in 2017.[11] So as a pioneering Smart City and ambitious region, how might Bristol and the West of England respond to the APPG Top Tips and the analysis and challenges included in our report?

We conclude that the answer must be that no single City or Metro Mayor, Combined Authority, University, Business or Community can navigate the complexity of the Smart City alone.

The convening power of the Mayoral office at City and Regional levels provides a significant opportunity to foster new smart alliances as cross-sector open innovation partnerships and networks. This could bring us closer to turning the prospect of a Smart City and Region into reality. It could do so by ensuring that collective efforts are focussed on priorities and goals that deliver tangible benefit to citizens. But, as our comments above should suggest, the task of realising this potential is a subtle one.

We also acknowledge that children and young people are generally absent from the Top Tips booklet – and from the broader Smart City conversation. We conclude that this needs to be urgently addressed. The journey towards smartness is likely to be a long one: engaging younger people now is crucial to shaping the sort of Smart City and Smart Society that they will ultimately inhabit.

This approach would build on what the Top Tipsters collectively hint at but don't articulate very directly: treating the city a machine to be optimised through smartness will only get you so far; treating the city as an ecosystem that needs diversity and nurturing in order to flourish will get you much further.

11.   About the authors

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12. Endnotes

1   The All-Party Parliamentary Group (APPG) on Smart Cities was established in 2014 and aims to inform Parliamentarians about how the digital revolution can benefit cities and identify ways that the UK could take the lead and seize a substantial share of the international "smart cities" market. It provides a platform for Parliamentarians, business, academia, think tanks, trade bodies, NGOs and local government to debate, collaborate and share.

2   In May 2027, six new mayors were elected to lead combined authorities in England. Combined authorities are groups of councils working together to assume powers, devolved from central government, over matters such as transport, housing, planning, skills and economic development.The areas which elected mayors were: Cambridgeshire and Peterborough; Greater Manchester; Liverpool City Region;Tees Valley; West of England and West Midlands.

3   The report is available here: http://www.smartcitiesappg.com/wp-content/uploads/2014/09/Top-Tips-for-City-Mayors.pdf (last accessed: 01/12/17).

4   Ian Stewart MP has taken over as APPG Chair.

5   The University of Bristol co-founded Bristol is Open with the City Council; is a partner in the UK Collaboratory for Research on Infrastructure and Cities (UKCRIC); is part of the NIC 5G Demonstrator.

6   The content analysis in sections 3-8 do not make explicit reference to the tips supplied by Stephen Hilton in his capacity as director of Bristol Futures Global, although these tips are included in the database used to produced Figure 1 and inform the key messages we draw from the APPG report as a whole. We return to some of the points made by Hilton in his tips in our commentary in section 9.

7   For a review see Albino, V., Berardi, U. and Dangelico, R.M. (2015) Smart Cities: Definitions, Dimensions, Performance, and Initiatives, *Journal of Urban Technology*, 22, 1, 3-21.

8   Caragliu, A., Del Bo, C. & Nijkamp, P. (2011) Smart Cities in Europe, *Journal of Urban Technology*, 18, 2, 65-82, p.70

9   Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic´, N., & Meijers, E. (2007) *Smart cities: Ranking of European medium-sized cities*, Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology.

10   British Standards Institute (2014) Making Cities Smarter (https://www.bsigroup.com/LocalFiles/en-GB/smart-cities/resources/BSI-Making-cities-smarter-Guide-for-city-leaders-UK-EN.pdf)

11   Smart Cities Index (2017), Huawei and Navigant Research.

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