



European Innovation Partnership for  
Smart Cities & Communities (EIP-SCC)

# **Rethinking the city:** using the power of data to address urban challenges and societal change

A guide for city leaders

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# 1. Introduction – Why city data is so important?

## 1.1 From rhetoric to reality: rethinking the city with data

It is not news. It is fact. A data revolution is underway. All of infrastructure, services, utilities, households and citizens are producing - and indeed becoming increasingly dependent on - more and more data. The astounding increase in city data volumes is set to continue, driven by sensor technology, the Internet of Things, machine to machine technology, and social media. Forecasts suggest that within 4 years, 50 billion devices worldwide will be connected through sensor or Internet of Things technology.

It is this potent mix of digital technology and data that offers perhaps the greatest chance for city leaders to exert a positive influence on the urban communities and economies for which they are responsible. Resilient, responsive public services and truly intelligent city governments that relate to how the society they serve is changing as new participatory and sharing business models emerge, are within reach.

Data is the connecting piece that will allow us to create new forms of value. Yet our collective ability to organise this data and exploit it in a way that delivers better urban services and a better society is at best formative and uneven. We have reached a stage at which key issues need to be addressed:

- Cities institutions are still to be found lacking in data-related capacity and skills, and often struggle to justify the funds and partnerships needed to enable the meaningful exploitation of data for positive policy outcomes
- Whether because of regulatory, legal, political or organisational barriers, the broader city operating

environment remains one in which departments and organisations cannot effectively join up to deliver the full potential of data

- New, disruptive services, and business models, even new sectors of the economy like the sharing economy are emerging as a result of data progress and technological advancement. The way in which Uber and Air b'n'b have crept up on cities and changed consumer and provider behaviour is instructive
- Technology preparedness needs to be a preoccupation for city government and leaders. New technologies like Blockchain are not yet well understood in terms of their potential effect on city government and urban life. This disruptive trend is set to continue as new forms of data grow in volume
- Progress needs to be made on related, and enabling areas such as data privacy and security issues, to grow consumer and partner trust

When all this is taken in the round, there need to strike a better balance between industry-led, technology-centric discussions, and those that are based on how cities and urban institutions can use technology and data to deliver better services and a better society, is obvious.

It is time to rebalance the conversation. It is time to make sure that complexity does not overtake your city authority.

## 1.2 Who should read this document?

This document is for leaders of European cities, small to large. You are most likely a Mayor or Chief Executive, exercising political or managerial leadership and control. You could provide strategic leadership for a regional or national network of smaller cities. Other senior political and officer

posts holding associated 'Smart' or financial portfolios will also find the contents of this document valuable. You may be highly data and technology literate; at the very least you will be data and technology curious and alert to the potential of both.

## 1.3 Why should you read it? What will you learn?

You have a choice. Your city can join the revolution and understand how data and its organised exploitation on urban platforms can be a principal actor in efforts to meet the challenges of our time – how to optimise urban living and city service operations in the face of population growth, environmental, economic and financial pressures. Or you can let the opportunity pass you by.

This deliberately short document tells you why you should organise your city for action, and says how you should go about it. In effect, it is the headline business case for proactive city data stewardship, which when used with other resources available to your authority, can inform the development their development, as well as that of wider data strategies.

## 1.4 Who has written it?

This document has been produced within the European Commission's European Innovation Partnership for Smart Cities & Communities (EIP-SCC). It is written for cities by a group of cities of varying sizes and from all corners of the continent. This is a vitally important point – we are devoted to accelerating the widespread adoption of urban platforms and advanced city data practices by EU cities, and to do so in a way in which city-needs are absolutely central to designing and implementing urban platforms. In this way the valuable asset that is city data can be shared and used upon platforms in a way that is fully enabled and supported, rather than driven and constrained, by industry.

### Two Key Definitions

**'City Data':** *data that is held by any organisation - government, public sector, private sector or not-for-profit - which is providing a service or utility, or is occupying part of the city in a way that can be said to have a bearing on local populations and the functioning of that place. This data consists of varied characteristics such as static, descriptive near-real time or in the future, real time and operational. It will be generated, to an increasing extent, by individual citizens and this too (with due consideration to privacy and a strong trust framework) can be considered city data.*

**'Urban Platform':** *is the way of describing a logical city data architecture that brings together and integrates data flows within and across city systems in a way that exploits modern technologies (sensors, cloud services, mobile devices, analytics, social media etc). An urban platform provides the building blocks to enable cities to rapidly shift from fragmented operations to include predictive effective operations, and novel ways of engaging and serving city stakeholders; It has the potential to transform, in a way that is tangible and measurable, outcomes at local level (e.g. increase energy efficiency, reduce traffic congestion and emissions, create (digital) innovation ecosystems, efficient city operations for administrations and services).*

## 1.5 A high level business case is useful, but I will need to know more

The good news is the cities, and their industry counterparts involved in the Urban Platforms initiative, have produced a range of resources on which your authority can draw. These increase in detail and focus as you read down the page:

- **A Management Framework** – A more detailed set of very practical, organising approaches (e.g. templates, tools, value and business cases) which when taken together can be used to establish, guide and enhance the quality of cross-domain and integrated city data management approaches. *To be read by CEx, CTO, CDO*
- **Standards** – A wide range of national and international standards are available to promote open source approaches and interoperability across city organisations, to reduce vendor lock-in and drive value for money solutions. *To be read by Smart City Lead, CIO, DTO, CDO, Industry Partners*
- **Requirements Specification for Urban Platforms** – A comprehensive reference guide for the development of your city's data management approaches, which

establishes a clear set of technical (e.g. related to standards) and non-technical requirements (e.g. policy related outcomes). *To be read by Smart City lead, CTO, CD(ata)O, Industry partners*

## City Data – facts and figures

- “The volume of data generated globally in the last few years exceeds the total volume produced since humankind became social”
- The smart city market worldwide is forecast to grow at to \$1.2 trillion by the early 2020's
- 94% of a cars' life is spend stationary; linear pavement utilisation rates are still at low double digit percentage; 30% of central urban traffic are hunting for a parking spot; 25% of traffic is related in some way to health – all offering substantial scope for understanding and exploiting data potential
- 85% of 2016 survey respondents see 5G as the priority new shift in technology to enable IoT (internet of things); and IoT sensor deployments are nearing exponential levels.

## 2. Main section – What are the key considerations?

### 2.1 The starting point

An initial survey<sup>1</sup> of European cities small, medium and large, spread across the Union, clearly indicated that the vast majority did not have an urban platform. A fault of both government and industry, the other headline finding is that the definition of urban platform - and therefore its uses and potential value – is poorly understood. Frequently, authorities describe static data catalogues, housing data that is readable by humans but not machines, as urban platforms. This is to distinctly overplay a city authority's ability to drive value from data.

There are a number of easily identified and significant barriers to adoption to overcome. These including lack of funding, a deficit of internal capabilities, and the lack of a business case to encourage work across service 'silos');

From a technical perspective, the survey also showed that the legacy systems currently in operation are a mixture in terms of their quality and complexity.

The technology roadmap that enables city authorities to ensure that existing data platforms are aligned with one another, and the data they hold is discoverable and interoperable (i.e. it is made usable), rarely exists. The opportunity is to mobilise your city data partners around the development of the business case and an agreed approach to city data management and urban platform development.

#### Demand-Side Survey: "Sitting on the Fence"

*The EIP-SCC Demand-Side survey elicited responses from cities with 28 million citizens from 12 Countries.*

*Cities appear to be "Sitting on the fence". About 75% of cities have not as yet acted on an Urban Platform, and the principal focus for urban platforms is on 'place' related services.*

*Feedback Suggests:*

- 1. **A lack of confidence and capacity** within cities is based on a poor knowledge of the urban platform landscape.*
- 2. Cities struggle to get the **silos** - departments, organisations, sectors - to work together, thus prohibiting effective action.*
- 3. Cities suffer **budget** and funding constraints.*

Steps in this direction will create the vital foundations for smart city infrastructure and operations, and improvements to the services you and other parties can provide to your population and business community.

<sup>1</sup> Survey performed Q1'15 and reported on the EIP\_SCC Marketplace site

### 2.2 Why do city leaders need to pay attention to data in the modern city?

The best city leaders manage to have one eye on the future while they wrestle with today's problems. Doing so helps to ensure economic and social resilience. Leading the organised deployment of urban platforms, and establishing the necessary organisational, cultural and technical conditions to encourage the sharing of data and its consequent exploitation can deliver real and tangible benefits across society and your own organisation.

In terms of society, advanced city data management can spark the design and delivery of new digital services which address societal needs and deliver social equity. With strong political support, data driven innovation efforts can drive the active participation of urban residents and city businesses in city service development.

More specifically:

- **Mobility** – The creation of efficient, greener, and more flexible mobility options for residents (these also deliver benefits for urban planners - e.g. reduced congestion - and draw on the disruptive business models we see developing in the sharing economy)
- **Environment and Quality of Life** – The development of more integrated infrastructures and processes across energy systems and city assets, to deliver environmental benefits and better quality of life through reduced energy consumption, a smaller carbon footprint and lower levels environmental pollutants

- **21st Century City Services** – Delivering wider inclusion through improved access to high quality, digitised human-centred city services in under-pressure domains like health and social care

In terms of value **to you and your organisation**, a mature and organised approach to city data can deliver advantage in the following spheres:

- **Strategy** – City data can be used to anticipate and indeed develop the new business models that will enable your city authority and smart city stakeholders to capitalise on the IoT and emerging sensor technology and analytical approaches
- **Civic Analytic Prowess** – Cities can capitalise on advanced analytics engines which sit on top of data platforms, in a way that drives new insights into policy decision making, city service management and urban planning exercises, and which can also stretch into private sector and revenue generating use cases (e.g. retail)

- **Finance and Economic Value** – Cost efficiencies are to be found in emerging smart city business models (e.g. smart lampposts) and the application of Internet of Things technology in city services. To not have a developed urban platform that enables the exchange and exploitation of data can diminish the chances of achieving these savings and suppress the developments of data-driven businesses in the city economy
- **Brand** – International status and leadership can come from the increased innovation activity, the stronger public and private sector alliances working, the increased inclusivity and transparency that spin out from strong urban platform approaches
- **Political** – Across all of the above, stakeholders will see you are taking a pro-active stance with regard to long-term urban sustainability and economic development, and the management of city infrastructures and services

## 2.3 What are the policy and regulatory considerations? What risks must I mitigate?

The change we are going through - in terms of the acceleration of technology, the potential application of data-driven innovation and the disruption to each of society, the economy and public service delivery – means that city leaders need to give careful consideration to these headline questions.

- **Security and privacy** – How do citizens give consent for their data to be used? When do they need to, and when do they not? In all instances, can you guard against disclosure and harm? The new General Data Protection Regulation puts clear accountability on local public bodies
- **Commercialisation of data** – How do you know that current contracting arrangements and licensing agreements ensure that your city authority is enabling the sharing, and therefore maximising the use, of city data sets? How do you ensure (through monetisation) that all data publishers, users and value generators are being treated fairly and can exchange data effectively?
- **Wider market issues** – How do you create the right conditions in which private sector organisations share their data but keep competitive advantage intact?
- **Delivering funded innovation across silos** – What new arrangements are needed across city organisations and other partners to make sure that data is used in accepted innovation processes that focus on city and citizen needs? What are your strategies for supporting innovation through sustainable funding and financing arrangements?
- **Governance** – given all of the above, and the array of parties involved, what form of governance arrangements do you need achieve the balance between making progress, involvement in planning, and ensuring ethically and legally sound approaches?

## 2.4 What are the cost and resource implications?

As previously suggested, our EIP Survey demonstrated a massive range of costs associated with urban platform development in European Cities. This implies that the scope of, and ambition for, existing urban platforms also varies widely. Key considerations - which are addressed in the Management Framework document - in developing your approach will be:

- **Technology costs** – Estimates need to be made for platform development (implementation, deployment and testing) as well as maintenance and running
- **Data costs** – What does your city data landscape look like in terms of sources, volume, providers, ownership aspects, and demand for individual datasets (with different costs attached to each of them)? Is the cost of data warehousing and reliable publishing outweighed by the benefits delivered through its exploitation?

- **Institutional Capacity** – An assessment will need to be made of which services and components can be developed in-house and which while others should be provided by external partners. This will inform considerations around...
- **Partnership working** – There are some interesting models emerging in what is still a very immature market. Cities like Copenhagen have established a public-private partnership to deliver a city data platform and market in which data can be exchanged and exploited. Others larger cities, like London, will operate best on the basis of strengthened public sector collaboration
- **Sustaining a Network** – Organisational resource, including high-level political support, needs to be put towards a development process in which stakeholders will have to be educated and persuaded to sign up to a roadmap for city data deployment

## 2.5 Why do standards matter for urban platforms?

The urban platform created for your city needs to overcome fragmentation and complexity so that data creators (public services, utilities, private sector, citizens) are easily persuaded to share, harmonise, and make their data (quite likely sitting on different platforms) discoverable, interoperable, and ultimately useable.

Adopting an open standards approach that is understood and accepted by all achieves this, and at the same time lowers costs, and minimises the risks associated with new, emerging technologies. It also minimizes the risk of getting locked into long term proprietary arrangements which may suit vendors, however do not always meet the needs of cities.

### Learning from experience

'City X: xxxxx

'City Y: xxxxx:

'City Z: xxxxx

# 3. Time for action – Six next steps for city leadership

Assuming you are persuaded, what do you as a City Leader do next? Here are the 6 elements of a City Leadership Action Plan which ensure that urban platform development and data exploitation connect to city vision, strategy, and political and policy outcomes.

- 1. Establish data priorities** – What are the most pressing city challenges, and indeed opportunities (e.g. housing, energy management, single customer view, sharing economy) that you want to address? Are these 'data rich' policy areas, and if not, can you fill in the gaps with less common forms of data? Can you choose a mixture of quick wins and 'giants to slay' over the longer term? Can you establish what you need to do with the data, and present an emerging but well-evidenced case to other parties if that data sits outside of your own organisation? Is there need of a city data strategy?
- 2. Build clear value cases** – For both quick wins and the giants, it is essential to set out in clear terms the social, environmental, economic and pure financial gains that exploiting city data will deliver.
- 3. Scenario plan the models for the broader city data operating environment** – There are various aspects to scenario planning, which will need to be iterated as stages 5 and 6 are activated. These are as follows:
  - A federated set of data stores or a single central repository within your city
  - A city data platform that is part of a wider collaborative network running city-to-city or city-to-region
  - The choice between adopting an open *source* model which promotes public collaboration, rapid iteration and frequent releases of software; or an open *standards* model which applies publicly available specifications which do not discriminate in terms of data format and vendor software, and which ensure interoperability
- Whether to work with a larger supplier, bringing with them a fuller range of services, or, as is the most likely outcome from adopting an open source model, to work with a plurality of smaller, more-nimble (and perhaps local) businesses.
- How you configure your data storage and options (i.e. to what extent you will manage on on-site operation or manage data in the cloud).
- 4. Set the foundations for good, proactive governance** – Your authority has the role of city data convener, and there are other key actors who can be classed as data publishers, owners, aggregators and enrichers, and who come from both private and public sector alike. What governance arrangements are required to secure the supply of data, proper treatment of it, and focus on political and policy priorities?
- 5. Establish business models and financing** – What are the business models your city authority can work with? Develop an investment strategy involving both industry and public grant. What is the operating model over the longer term - will the city be the principal data trader to fund the city data operating environment, or is this best achieved through a public-private partnership?
- 6. Exert personal influence across all of the above** – As a city leader you need to ensure that through good governance and drawing on your own organisation, you are able to chart the course to proactive city data leadership and value generation. This means having clear outlines for resource management across organisational boundaries, and goals to achieve around both how data is used to achieve positive outcomes, and also around the development of supporting data infrastructure.



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