Becoming more open: The view from four European Cities

Open Data Institute

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About

This report was produced as part of the Open Data Institute's research and development work funded by Innovate UK. The views in this report are those of the interviewees and the report authors.

This report has been researched and produced by the Open Data Institute and was published in April 2020. The lead authors are Ben Snaith and Renate Samson, with contributions from Jack Hardinges and Leigh Dodds.

To share feedback by email or to get in touch, contact the open cities project lead, Renate Samson. To share feedback in the comments, highlight the relevant piece of text and click the 'Add a comment' icon on the right-hand side of the page.

How can it be improved? We welcome suggestions from the community in the comments.

Executive summary

As part of a three-year innovation programme, the Open Data Institute (ODI) undertook a project looking at the opportunity for cities to become 'open' as opposed to 'smart'.

Our desk research, outlined in a blog post[1], uncovered dissatisfaction with, and a move away from, the language of 'smart' in relation to strategies cities were revisiting or devising from scratch. We found that it was widely felt that the language of 'smart cities' was little more than a marketing strategy and that the move towards speaking about 'open', 'digitised', 'citizen-centric' and so on was proving to be more desirable, meaningful and positive.

We identified a number of European cities that have recently released strategies which emphasised the importance of open data, open culture and citizen engagement. To find out more, we interviewed representatives from organisations working within four European cities – Amsterdam, Gdańsk, Hamburg and Helsinki – to understand their approach to 'open', what they have done so far and what they intend to do in the future. These interviews took place during August and September 2019.

This report consolidates what we learned from these interviews and offers insight into whether these four cities are moving towards a more open future. In turn, we will consider how cities are:

- changing how they define themselves
- embracing openness
- developing their (open) data infrastructure
- fostering innovation
- encouraging the use of data within departments
- accessing data held by the private sector
- considering the ethical implications of their use of data and technology.

This report contains a number of insights into how these four cities have become more open, which will be relevant to cities of all sizes.

We hope the words of the five individuals we interviewed will help guide cities towards a better and fairer future. Achieving this future will not be a smooth process – there will be challenges, there will be projects that cannot deliver upon their desired impact, there may be promises in strategies which go unfulfilled. But by adopting an open culture and sharing lessons learned, cities around the world can help each other along this journey.

The movement of cities towards a more open future – where open data, open innovation and civic engagement leads to the fairer and more effective use of

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[1] Open Data Institute (2019), 'Smart cities are decades away: but open cities are cities are within reach', https://theodi.org/article/smart-cities-are-decades-away-but-open-cities-are-in-reach/

technology – is encouraging and we hope the progress continues. If we can champion these cities, we hope we can stimulate others to follow.

Introduction

Cities, and their wider metropolitan areas, have a huge bearing on the functioning of global systems. By 2030, 60% of the world's population are forecast to live in a city.[2] Cities are often significant centres of culture, history, business and politics. Metropolitan areas of over one million inhabitants account for more than half of global economic output.[3]

City governments are responsible for managing an elaborate ecosystem of sectors and people – in transport, planning, energy, emergency services and more – while balancing economic, political and societal pressures.

Cities face a huge array of challenges such as:

- providing sufficient affordable housing
- stimulating business growth and innovation
- increasing jobs
- minimising the causes of climate change and mitigating the impacts
- reducing crime levels
- keeping the streets clean
- managing the transport systems.

This complexity is precisely what makes cities so appealing to technology vendors, systems integrators and solution providers, who sell the idea that these problems can be solved by the addition of technology to everyday services.

Smart cities and open cities

In response to the pressure they are under, city governments are expanding their use of data to include movement of people, energy usage, crime statistics, infrastructure monitoring, weather conditions, and more.

The collection, storage, analysis and use of this type of data is not new, but smart technologies – such as Internet of Things (IoT) sensors, apps or tech-enabled services – enable it to happen at a far greater speed and scale than ever before.

At the Open Data Institute (ODI) we advocate for, and support, an open culture. This involves data infrastructure that is as open as possible; encouraging data literacy and capability for all, and advocating for open innovation. Underpinning these activities should be a commitment to increasing the trustworthiness of cities to use technology. This means:

- building ethical considerations into how data is collected, managed and used
- ensuring equity around who accesses, uses and benefits from data
- engaging widely with affected people and organisations.

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[2] United Nations (2016), 'The World's Cities in 2016: Data Booklet', https://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2016_data_booklet.pdf
[3] CityLab (2011), 'Why Cities Matter', https://www.citylab.com/design/2011/09/why-cities-matter/123/

At a time where criticism of the smart city movement is becoming more vocal,[4] these approaches could, and arguably should, be adopted by cities as a way of moving away from the strategy of smart first, towards one of open.

As noted, the 'smart city' agenda was initially driven by technology companies. It then became a major topic in the strategies, reports and commissions of political organisations, including the European Commission, the World Economic Forum[5] and the Association of South East Asian Nations (ASEAN)[6]. City governments have subsequently adopted the language and have begun to develop strategies based on the context of 'smart', with many seeking to be acknowledged as the 'smartest' city in the world.

The European Commission

In order to work from a definition that we could measure cities by, we looked to the work of the European Commission, notably the work of the European Innovation Partnership on Smart Cities and Communities. In their Strategic Implementation Plan 2013[7] they outlined a 'smart city' as an environment with:

- sustainable urban mobility
- sustainable districts
- built environment and integrated infrastructures and processes across energy, information and communications technology (ICT), and transport.

These requirements were not solely about technology or smartness. In fact, an integral part of this view of smart was that "citizens must… be at the heart of the solution".

Furthermore, the plan outlined the role of data, and indeed openness of data, as integral to the good design and implementation of a smart city. It stated that "relevant data from public and private sources should be considered 'open by default'" and that "a focus should be put on building applications with a clear added value to citizen [sic] to make good use of this data".

The Lighthouse Programme

The Lighthouse Programme[8] was used as the practical vehicle for this agenda. The programme funded 14 'Lighthouse Projects', with 40 'Lighthouse Cities' and 50 'Fellow Cities'. It was hoped that this approach would enable testbeds for innovative approaches in areas such as transport and mobility, energy and environment, and housing, to be tested in the Lighthouse Cities before attempts were made to replicate them in the Follower Cities.

This approach was based on the thinking that cities "are all alike in terms of their political economy, culture and governance".[9] But in reality, cities are complex; they

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[4] Open Data Institute (2019), 'Smart cities are decades away: but open cities are within reach', https://theodi.org/article/smart-cities-are-decades-away-but-open-cities-are-in-reach/
[5] World Economic Forum (2019), 'Unprecedented Global Alliance for Smart City Technology Launched to Counter Growing Tensions', https://www.weforum.org/press/2019/10/unprecedented-global-alliance-for-smart-city-technology-launched-to-counter-growing-tensions/
[6] Association of South-East Asian Nations, 'ASEAN Smart Cities Network', https://asean.org/asean/asean-smart-cities-network/
[7] European Innovation Partnership on Smart Cities and Communities (2017), 'Strategic Implementation Plan', https://eu-smartcities.eu/sites/eu-smartcities.eu/files/2017-09/SIP.pdf
[8] European Commission, 'Horizon 2020: Smart Cities & Communities', https://ec.europa.eu/inea/en/horizon-2020/smart-cities-communities
[9] Rob Kitchin (2015), 'Data-Driven Networked Urbanism', https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2641802

differ in terms of people, culture, politics and history, which all influence what approaches are taken and how decisions are made. The process of tackling issues therefore will differ from city to city.

While marketing has encouraged widespread enthusiasm and adoption of 'smart city' language, the actual impact appears to be minimal. When looking further than individual projects using 'smart city' branding to denote the use of data and technology (which is not the revolution promised by smart cities), it can be seen that large-scale implementations, such as Sidewalk Labs in Toronto or Songdo in South Korea, are plagued by empty neighbourhoods[10], complaints of mass surveillance[11], or they are simply not being built at all.[12]

[10] CityLab (2018), 'Sleepy in Songdo, Korea's Smartest City',
https://www.citylab.com/life/2018/06/sleepy-in-songdo-koreas-smartest-city/561374/
[11] The Guardian (2019), '"Surveillance capitalism": critic urges Toronto to abandon smart city project',
https://www.theguardian.com/cities/2019/jun/06/toronto-smart-city-google-project-privacy-concerns
[12] BBC (2019), 'India election 2019: Have 100 'smart cities' been built?',
https://www.bbc.co.uk/news/world-asia-india-47025472

Background

The open cities project[13] is part of the ODI's three-year innovation programme, funded by Innovate UK.

As part of the project, we wanted to understand why European cities have followed certain paths over the past decade or so, and we wanted to explore which cities were actively championing and developing an open and trustworthy approach in the use of data and technology. This period of desk research involved, among other things, reading a broad range of literature, as reflected in the bibliography (Annex 1).

The research has been concentrated on cities, but many of the findings can be applied to areas of all sizes. The benefits of using data and technology effectively and fairly should be felt by rural as well as urban areas.

Who we interviewed and why

We wanted to learn and understand the history, strategic approach, challenges and opportunities of an open culture in cities that are defining themselves as 'open'. We also wanted to interrogate whether the approach to open data had stretched beyond opening up datasets, to gaining access to data from the private sector, which may be of value to city governments and their decision making.

We interviewed key figures working in the city government or relevant open city organisations of four European cities: Amsterdam, Gdańsk, Hamburg and Helsinki. There are other cities in Europe, and beyond, which are also championing the use of open data and an open culture, including London, New York City, Barcelona, Batticaloa (Sri Lanka), Dhaka (Bangladesh) and Kathmandu (Nepal).[14]

Amsterdam and Helsinki are typically regarded as two of the leading European cities in the technology space,[15] and we believe their insight into establishing that position provides an interesting contrast to the rising cities; Hamburg and Gdańsk. The approaches to smart and open in these cities all started at different stages, and all have different focuses, different pressures, different histories, and have made different decisions. But they have all committed to being open or people-focused, which makes them all perfect candidates to highlight their journeys towards becoming more open.

The interviews provided great insight into how these particular city governments think about being smart and open, how they have used data in public services, some of the challenges they have faced and some of their aims for the future.

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[13] Open Data Institute, 'R&D: Open cities', https://theodi.org/project/open-cities/
[14] World Bank (2014), 'Planning an Open Cities mapping project', https://www.worldbank.org/en/region/sar/publication/planning-open-cities-mapping-project
[15] European Startup Initiative (2019), 'Startup Heatmap', http://startupsandplaces.com/shm2019-startup-city-brands-highways/

City profiles

Amsterdam

Ger Baron, Chief Technology Officer (CTO) at Amsterdam City Council
With a population of over 800,000 people, Amsterdam is the largest city in the Netherlands. The city council, made up of 45 members from 12 political parties who sit for four-year terms, determines the general policies of the city.[16]

In 2019, Amsterdam was ranked the third smartest city in the world, according to the IESE Cities in Motion Index.[17]

The Amsterdam Smart City initiative "brings together proactive citizens, innovative companies, knowledge institutions and public authorities to shape the city of the future."[18] Since the initiative's launch in 2009, there have been over 70 innovative projects. Amsterdam has also participated in major European Union (EU)-funded projects such as DECODE[19] and CitySDK[20].

Gdańsk

Krzysztof Garski, IT Project Manager at City Hall Gdańsk
Gdańsk has a population of over 450,000 people and is the centre of Poland's fourth-largest metropolitan area. The city council is made up of 34 people who sit for four years. The council decides on local laws, budgets and plans.[21]The elected mayor of Gdańsk has been responsible for initiating activities, such as the city's openness policy.

The Gdańsk 2030 Plus Development Strategy was launched in 2015. One of the top priorities in the strategy is openness: "The openness of the process of selecting projects for implementation, their hierarchy, and clear, public criteria of their selection underlie the idea of an open city, which Gdańsk is beginning to become. Access to information, learning and cooperation complement the open nature of project creation the process [sic]."[22]

An open data portal was launched in 2016, based on ckan, the Open Source software that can be used to build data portals.

Gdańsk participated in the EU RUGGEDISED[23] project and is also a member of the Open and Agile Smart Cities network.[24]

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16 City of Amsterdam, 'Amsterdam's City Council', https://www.amsterdam.nl/en/governance/city-council/
17 IESE Business School, University of Navarra (2019), 'IESE Cities in Motion Index', https://media.iese.edu/research/pdfs/ST-0509-E.pdf
18 City of Amsterdam, 'Amsterdam's city council', https://amsterdamsmartcity.com/network/amsterdam-smart-city
19 Decode Project, https://decodeproject.eu/
20 CitySDK, https://www.citysdk.eu/
21 Gdańsk City Council, https://www.gdansk.pl/en/city-council
22 Gdańsk (2014),'Gdańsk 2030 Plus Development Strategy', https://www.gdansk.pl/download/2016-08/77054.pdf
23 RUGGEDISED, https://ruggedised.eu/home/
24 Open & Agile Smart Cities, https://oascities.org/

Hamburg

Sascha Tegtmeyer, Head of Urban Data Hub Hamburg

The city of Hamburg, located within the federal state of Hamburg, is Germany's second-largest city, with a population of just under two million people. Its size makes it the eighth largest in the EU. The City Hall is the centre of both the local and state governments.

In 2019, Hamburg was ranked at 34 on the IESE Cities in Motion Index.[25] In 2014, a Memorandum of Understanding (MoU) was signed with Cisco to become a 'smart city'.[26] Hamburg participated in the MySMARTLife[27] EU programme, alongside Nantes and Helsinki.

Helsinki

Hanna Niemi-Hugaerts, Program Director of IoT at Forum Virium Helsinki
Pekka Koponen, Development Director at Forum Virium Helsinki

With a population of around 650,000 people, Helsinki, the capital of Finland, is the country's most populous city. The City Council has 85 permanent councillors, in addition to 85 deputy members. It is responsible for the strategy and organisation of the city, as well as controlling the budget and local plans.[28]

The city has aspirations to be "the most functional city in the world".[29] This is reflected in Helsinki's placements in smart city rankings for 2019 – fifth by the Eden Strategy Institute[30] and eighth in the IMD (International Institute for Management Development) Smart City Index[31]. The European Commission ranked the Helsinki-Uusimaa region as the most innovative region in the EU, with Finland being ranked the second most innovative member state.[32] This could be due to how, in Finland, "Nokia created this mindset that we usually take quite a positive approach to technology", according to Hanna Niemi-Hugaerts.

During our interview, Pekka Koponen discussed how the city government is empowered to make significant city-wide changes as it "is responsible for almost all of the services: education, kindergartens, healthcare, everything".

Helsinki is part of the 'Finnish 6 Aika: Six City Strategy for sustainable urban development',[33] as well as participating in the EU-funded MySMARTLife[34],

[25] IESE Business School, University of Navarra (2019), 'IESE Cities in Motion Index', https://media.iese.edu/research/pdfs/ST-0509-E.pdf
[26] Hamburg Smart+Connected City (2014), 'Hamburg and Cisco agree on Cooperation', https://www.hamburg.de/smart-city/4311574/cisco-english/
[27] MySMARTLife, https://www.mysmartlife.eu/
[28] City of Helsinki, 'Helsinki City Council', https://www.hel.fi/helsinki/en/administration/decision/council/
[29] City of Helsinki (2017), 'The Most Functional City in the World – Helsinki City Strategy 2017–2021', https://www.hel.fi/helsinki/en/administration/strategy/strategy/
[30] Eden Strategy Institute and ONG&ONG (OXD) (2019), 'Top 50 – Smart City Governments', https://static1.squarespace.com/static/5b3c517fec4eb767a04e73ff/t/5b513c57aa4a99f62d168e60/1532050650562/Eden-OXD_Top+50+Smart+City+Governments.pdf
[31] IMD World Competitiveness Center (2019), 'IMD Smart City Index 2019', https://www.imd.org/research-knowledge/reports/imd-smart-city-index-2019/
[32] European Commission (2019), '2019 Innovation Scoreboards: The innovation performance of the EU and its regions is increasing', https://ec.europa.eu/commission/presscorner/detail/en/IP_19_2991
[33] 6Aika, 'What is 6Aika?', https://6aika.fi/en/what-is-6aika/

Synchronicity[35] and CitySDK[36]. In February 2019, the Helsinki Chief Digital Officer, Mikko Rusama, signed a 'city to city digital declaration' on smart cities and data ethics,[37] with the London Chief Data Officer, Theo Blackwell.

Our two interviewees work at Forum Virium, an innovation organisation owned by Helsinki City Council. Forum Virium is "kind of a facilitator and catalyst for the city to get better services and for the companies that provide the innovation". Forum Virium can be a "bit faster to be able to get insight... and to hire people"; they can get the "first projects rolling and then the city has time to see if it makes sense". If these projects work, that's great for the city, who can then adopt the services. But, "if it doesn't make sense…the city didn't spend any resources".

[34] MySMARTLife, https://www.mysmartlife.eu/
[35] SynchroniCity https://synchronicity-iot.eu/
[36] CitySDK https://www.citysdk.eu/
[37] New Statesman Tech (2019), 'London and Helsinki CDOs sign digital declaration on smart cities and data ethics' https://tech.newstatesman.com/it-leaders/london-and-helsinki-cdos-sign-digital-declaration-on-smart-cities-and-data-ethics

How cities define themselves is ever-changing

The academic Ben Green states in his 2019 book *The Smart Enough City* that: "The age of the 'Smart City' is upon us! It's just that we don't really know what that means."[38] We asked our interviewees whether they used the language of smart cities.

Ger Baron (CTO at Amsterdam City Council) explained that 'smart cities' was a term that Amsterdam used back in 2008/09. He said that then it was "nothing more than a programme to create awareness about the impact that technology would have on society." Since then, things have changed: "the whole idea around smart cities obviously has been taken away by a few corporates, putting in billions of a marketing budget." Sascha Tegtmeyer from Hamburg concurred: "I think that smart city is often used as advertising."

Sascha described how in Hamburg they: "don't talk about smart city… our strategy is a digitalisation strategy. So we talk about a digital city, not the smart city." An updated digitalisation strategy for Hamburg is in process of being written, to emphasise that the focus is "about the digitalisation and optimisation of public services", and that this can be achieved partly through "good data management", which is "essential for making new and good public services".

This approach of digital as opposed to smart was emphasised by our interviewees from Helsinki as well. We heard from Pekka Koponen that "in Helsinki… open came first and smart came later". Pekka's colleague, Hanna Niemi-Hugaerts, told us that "the city is now busy with its digitalisation programme".

Ger Baron explained that smart cities are often seen as "put[ting] a sensor in something", whereas a city focused on digitalisation "is about redesigning whole processes and the way we work and the way we manage stuff in a redesign process". This has been focused on since 2018, as "when the city council was elected, one of the 12 most important topics they addressed was digitalisation."

Shift to openness

While our interviewees distanced themselves from the language of 'smart', there was significant enthusiasm for the use of openness, digitalisation and citizen engagement as ways of talking about their city's strategy.

Interviewees indicated that there has been a concerted effort to foster an open culture through engaging with citizens, using and publishing open data, encouraging open innovation, or developing the digital skills of citizens and government workers.

Openness is not in itself new to cities. Many began the move to openness during the early 2000s, following a push from citizens and governments to be more transparent.

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[38] Ben Green (2019), 'The Smart Enough City' https://mitpress.mit.edu/books/smart-enough-city

Around this time, governments began to enforce freedom of information and access to government and public sector data.[39]

By 2014, in Gdańsk, transparency had become a mainstream political issue that voters cared about. Kris Garski told us that during that year's elections, "...one of the hot topics was openness of the City Hall. Is the City Hall open towards citizens? Is it accessible? Can citizens trust the City Hall?". The open data programme, initiated by the then Mayor Paweł Adamowicz, included a register of expenses and the decision to "publish the spendings we make as City Hall daily on the internet… so everybody can check what we are spending money for." This approach led to the city developing an open data programme, which we were told also included citizen engagement, such as "development of district meetings… public consultation [and] civic panels".

Citizen initiatives in Hamburg led to the creation of a comprehensive Transparency Law ('Hamburgisches Transparenzgesetz')[40] – a cornerstone of the functioning of the city. The law requires the government to publish all public data openly, including government decisions, statistics, contacts and geographic data.[41]

The law was proposed through Hamburg's petition scheme,[42] which allows residents to propose ideas through petitions. The law and the push to open data up publicly has had a lasting impact on Hamburg, according to Sascha Tegtmeyer: "We opened this data to the public, but we also opened this data within the city. That was a big step for us to be open, open to others, but also open to ourselves."

We learned from Hanna and Pekka that Helsinki's move to open stemmed in part from an event called 'Restaurant Day'.[43] The day was "a kind of guerilla thing" where "four times a year, anybody can put up a pop-up restaurant and sell food from home, or in the parks… it was a citizen initiative, and then the city [which] is seen as very bureaucratic, embraced that at the same time… so there was a kind of a change for openness, not only on data, but the city was kind of more willing to engage citizens".

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[39] Proposals for a freedom of information law in the United Kingdom were published by the government in 1997. The Freedom of Information Act was signed into law in 2000. Information Commissioner's Office, 'What is the Freedom of Information Act?',
https://ico.org.uk/for-organisations/guide-to-freedom-of-information/what-is-the-foi-act/
[40] Hamburgisches Transparenzgesetz (HmbTG) (2014), http://transparenz.hamburg.de/das-hmbtg/
[41] Democracy International (2012), 'Parliament of Hamburg opts for more transparency',
https://www.democracy-international.org/parliament-hamburg-opts-more-transparency
[42] Hamburgischen Bürgerschaft, https://www.hamburgische-buergerschaft.de/
[43] Atlas Obscura (2019), 'On Restaurant Day in Helsinki, Anyone Can Open an Eatery, Anywhere',
https://www.atlasobscura.com/articles/restaurant-day

How cities are embracing openness by engaging with citizens

We can see that it is often citizens who stimulate change when it comes to pushing for more openness of data. City governments that actively talk to citizens about the problems they are facing, getting them to vote on potential solutions, and involving them in decision making processes, appear to be taking the right steps towards the European Commission's requests (page 6).

Our interviewees spoke about the emphasis on citizen engagement. Kris Garski in Gdańsk said: "For us, openness is a part of smart city, and technology is also part of smart city, but the most important is citizen engagement, and improving the quality of life in Gdańsk."

Hanna Niemi-Hugaerts said that in Helsinki "the city government itself, they've gone very citizen centric" and this is being utilised throughout projects at Forum Virium, where "citizen engagement [and] co-creation is very much on the agenda". In practice, Forum Virium "try to share what we are doing and make the agenda we are working on more seen in the media. We use words and terminology that are more easy to approach for citizens". It is important that city governments don't overburden citizens with technical jargon terms, but to use language that they can engage with.

The importance of citizen engagement in Gdańsk was summarised by Kris Garski: "Most important is engaging people, and not just building solutions to build solutions, or building tools just for our [City Hall] purpose. What we would like is to build tools that are used by people, or tools that make life in the city easier."

While our interviewees placed a lot of value on engaging citizens, their methods of how differed widely.

Putting it into action

Research shows that many cities are struggling to put citizen engagement into practice.[44] However, we heard that in Gdańsk, involving people in decision making processes – through civic panels and participatory budgeting – "makes people feel very responsible for every project in the streets". Civic participatory budgeting has been used for the last five years or so, with around 15% of citizens (more than 50,000) voting in this process. The City Hall has gradually increased the budget over the years for the programme, from less than a million euros to €4.2m.

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[44] Current Environmental Health Reports (2017), 'Public and Stakeholder Engagement and the Built Environment: a Review', https://link.springer.com/article/10.1007/s40572-017-0159-7

This approach was pioneered in Brazil in the 1980s, and similar schemes have been utilised around Europe. In Paris, for example, 5% of the capital budget is allocated for the residents to decide how to spend.[45] It is also in place in major cities such as Lisbon, Cologne and Rome.[46]

The civic panels, championed by Gdańsk's former Mayor Adamovicz in 2016, are "shaped in very close cooperation with local activists". Over a few days in City Hall, a representative 60 citizens – taken from the voting register – are invited to discuss the most important city issues with staff from City Hall and topic experts.[47] The aim of the first panel was to discuss flood preparedness.[48] Subsequent panels have discussed air pollution, civic engagement and LGBTQ+ rights.[49]

Before the meetings, the participants are provided with "all the resources… all the documents, our strategy and other resources we have" to maximise meaningful and informed participation. These panels have, over time, become more inclusive by lowering the participation age to 16 and allowing temporary residents of Gdańsk to participate.

In Amsterdam, a suite of interactive open source[50] tools has been developed to encourage collaboration between residents and the municipality, under the heading of OpenStad ('Open City').[51] This approach enables citizens, other departments, organisations or cities to make use of them.

One such tool is 'De Stem Van' ('The Voice Of'),[52] which gives citizens the ability to upload ideas for the neighbourhood and create polls in order to determine support. The plan with the most votes is automatically put on the agenda of the borough council.

When new bike stations were needed in Hamburg, the public was asked where they should be placed. There were 4,000 suggestions provided for new locations. Such approaches are helping the city authority test similar processes to explore the development of housing. City representatives engage the public with "all the information and data that the administration has... and we also give them tools to do this at an event, or at home or online with a smartphone." Previously, the city did much of this "without digital tools, but we are now trying to digitalise all of these participation processes". Furthermore, they are "working on processes to analyse this information in a better way."

In Helsinki's first smart city district of Kalasatama, the city "managed to engage two-thirds of the citizens... in their workshops and co-creation sessions". In Jatkasaari, another of the smart districts, Forum Virium said they don't want to

[45] The Guardian (2019), 'Pissoirs and public votes: how Paris embraced the participatory budget', https://www.theguardian.com/cities/2019/oct/03/pissoirs-and-public-votes-how-paris-embraced-the-participatory-budget
[46] Public Policy Institute for Wales (2017), 'Participatory Budgeting: An Evidence Review', http://ppiw.org.uk/files/2017/08/PPIW-report_participatory-budgeting-evidence-review_-July-2017-FINAL.pdf
[47] Medium (2017), 'Civic Panel. Residents decide', https://medium.com/@gdansk/civic-panel-residents-decide-e844590e88ec
[48] A2P2 (2016), 'Civic Panel on climate change adaptation in Gdańsk', http://a2p2.pl/en/projects/civic-panel-on-climate-change-adaptation-in-Gdansk/
[49] Resilience (2017), 'Solutions: How the Poles Are Making Democracy Work Again in Gdansk', https://www.resilience.org/stories/2017-11-22/solutions-how-the-poles-are-making-democracy-work-again-in-gdansk/
[50] Github, 'Amsterdam Projects', https://amsterdam.github.io/projects/
[51] OpenStad: online participant tools, https://www.amsterdam.nl/bestuur-organisatie/meedenken-meepraten/openstad-online/
[52] De Stem van Centrum, https://stemvancentrum.amsterdam.nl/

"engage people on a project-by-project [basis]" and instead are "going to be running a club of people, we want to have a continuous dialogue with people living there". Equipping citizens with basic digital skills can also make engagement more meaningful. In Amsterdam, there is a "whole digital skills education programme, which is free and accessible for everybody". The city council also funds "a few local initiatives that help people in digital literacy [such as] for refugees". The schemes are small – "only €20,000 per initiative" – but they are using them to "try to reach out to people who are not in the library, who don't look at our website, are not in the same target group that we always find".

How cities use open data and support a data infrastructure

Cities collect a wide range of data about people, businesses and services. The data is collected primarily by city governments, but also by academic institutions, community groups and private sector organisations. Data is collected through:

- delivery of services
- embedded sensors in infrastructure
- research from statistics authorities.

As cities seek to embed more data capture technologies into public spaces, the data collected is likely to increase. This data will be from across the data spectrum – from closed, to shared, to open.[53] It will have the power to help inform and make better decisions, but it must be done ethically and fairly, and with privacy, data protection and security firmly in place. This means considering any negative impacts and minimising them; being transparent with what data is being collected, for what purpose and by whom; and determining how and when it will be accessed, shared, stored and deleted.

Hanna Niemi-Hugaerts described Forum Virium's IoT programme as "trying to ensure that the city is creating or collecting the data that our future city services need". This data will be about everything from transport to movement of people, energy usage, crime, infrastructure, weather and so on. The collection, storage, analysis and use of this type of data is not new, but smart technologies (such as IoT sensors, apps or tech-enabled services) enable it to happen at a far greater speed and scale than ever before. The most important thing cities can do in this area is to understand what data is needed for what a city is trying to achieve. The focus should be on finding good quality data that is useful, rather than focusing on accumulation and big data.

Open data

Open data is data that anyone can access, use and share.[54] It can bring significant value to cities, by helping to improve the efficiency of services, increase access to services and lead to more evidence-based policymaking.[55] It can also lead to innovation by bringing new and more diverse apps and services to citizens, businesses and authorities alike.

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[53] Open Data Institute, 'The Data Spectrum', https://theodi.org/about-the-odi/the-data-spectrum/
[54] Open Data Institute (2017), 'What is open data and why should we care?', https://theodi.org/article/what-is-open-data-and-why-should-we-care/
[55] Open Data Institute (2018), 'Using open data for public services', https://theodi.org/article/using-open-data-for-public-services-report-2/

Open data portals act as platforms for anyone to access public data relating to the city, region or state. All four of the cities we focused on have an open data portal, these portals are:

- Amsterdam: data.Amsterdam[56]
- Gdańsk: Otwarty Gdańsk[57]
- Hamburg: Transparenzportal Hamburg[58]
- Helsinki: Helsinki Region Infoshare[59]

Kris Garski in Gdańsk spoke of the difficulty in knowing what data to publish: "It is always a question of demand and supply. So should we wait for people to request the data and be open? Or should we make an effort on our own to open some data… because sometimes it takes a lot of money to open data and there is a risk that the demand for it will be relatively small."

For example, geospatial and map data, which can bring huge value if made openly available, enabling the calculation of efficient transport routes, support for planning of homes and businesses, or for identifying areas of flooding risk, for example,[60] is not openly available everywhere. We learned that in Poland the law prohibits providing free access to "some geographical or map data, related to real estate… we have to take money from people, even if we believe such a resource could be freely available". Kris Garski was well aware that this was a barrier to wider opportunity.

This is why the principle of publishing with a purpose can bring such value. The Open Data Charter described this reasoning in its 2018 strategy: "Rather than advocating for governments to open up as much data as possible, as fast as possible, we develop practical guidance for government reformers to open up datasets in ways that are most likely to yield specific and tangible benefits to citizens."[61] This purpose can be for transparency, to allow people to solve specific problems, or to boost innovation. Part of being able to find this purpose is by ensuring that cities are in open and receptive dialogue with the public and engage in open innovation so that problems can be solved together – open data can support this.

APIs

One method of accessing data is via the use of Application Programming Interfaces (APIs). An API is code which enables digital services to interact with each other and exchange data. APIs allow real-time access to data and therefore form the foundation of many services used frequently: weather apps, paying for products in online stores, integrating maps into websites, and more.

APIs "provide the foundations for digital services of the future".[62] They help to link data across different systems and improve interoperability. The success of journey planning apps such as Citymapper would not be possible without APIs.

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[56] data.Amsterdam, https://data.amsterdam.nl/
[57] Otwarty Gdańsk, https://www.gdansk.pl/otwarte-dane
[58] Transparenzportal Hamburg, http://transparenz.hamburg.de/open-data/
[59] Helsinki Region Infoshare, http://www.hri.fi/en/
[60] Open Data Institute (2019), 'Using geospatial data: what you need to know about licences', https://theodi.org/article/using-geospatial-data-what-you-need-to-know-about-licences/
[61] Open Data Charter (2018), 'Publishing with Purpose', https://medium.com/@opendatacharter/publishing-with-purpose-introducing-our-2018-strategy-ddbf7ab46098
[62] European Data Portal (2017), 'Open Smart City APIs', https://www.europeandataportal.eu/en/news/open-smart-city-apis

Helsinki is a leader in developing what Hanna referred to as an "API first approach with a lot of service design for new services". Forum Virium chair the CitySDK project,[63] which aims to develop an open source API toolkit for cities around the world to use.[64]

Open source

Rather than being tied to lengthy and expensive contracts for proprietary software, cities are increasingly turning to software which is open source.

Open source is code that is published under an open licence, allowing anyone to use, share and improve the software. Using open source can help a city government save money, while building software from scratch or adapting code that has already been published – such as from the open source code repository GitHub – can lead to better and more bespoke solutions.

Because the open source code is published online, anyone with the right skills can view, test and audit it, enabling issues to be spotted, or suggestions for improvements to be more collaborative. Fostering a community around open source develops the skills of the city and keeps the economic activity within it.

In Helsinki, Hanna Niemi-Hugaerts told us that: "There's a lot of open source development work going on… data platforms, data management, data content management, and so forth."

Kris Garski detailed how his team sees potential in an open source tool developed in Madrid for engaging with citizens. At Gdańsk City Hall, Kris said they are "researching things like Consul, which was software developed by the City Hall of Madrid[65]".

The City Council in Amsterdam has gone one step further. In summer 2019, it officially announced that for software "everything will be open… we're going to build [it] ourselves". While this will benefit Amsterdam first and foremost, in the long term it has the potential to benefit other cities who will be able to adapt the software for their own use and particular needs and circumstances.

Putting data infrastructure into practice: mobility

The European Commission outlined mobility as one of the key requirements for the smart city. The movement of people around a city is obviously a critical element of any city's infrastructure. It is hugely complex; involving a range of different actors and challenges, as different public and private companies are responsible for different modes of transport. Open data has been shown to help. The oft-cited example of this is in London, where the provision of free, accurate, real-time open data by Transport for London was found to help the city's economy by up to £130m a year.[66]

Open data can also help join up data from different sources so that cities can deliver better services to citizens. Cities recognise this potential. Vision Hamburg 2030

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[63] CitySDK, https://www.citysdk.eu/
[64] CitySDK (2017), 'Open API recommendations', https://www.citysdk.eu/wp-content/uploads/2017/11/20171116_APIrecommendations_WEB.pdf
[65] Consul, http://consulproject.org/
[66] Transport for London (2017), 'TfL's free open data boosts London's economy', https://tfl.gov.uk/info-for/media/press-releases/2017/october/tfl-s-free-open-data-boosts-london-s-economy

describes the desire for "intelligent mobility for a livable city"[67] achieved through a combination of sharing initiatives, on-demand services and local public transport.

Journey planning apps – such as Whim[68] in Helsinki, Citymapper and Google Maps – allow users to plan, from one app, their transport routes across the city using live transport open data published by the city. Users see the length of journeys, what transport to use (including suggestions on walking, buses, trains, taxis and dockless bikes) and prices.

In all the cities we focused on, open data has been used to address mobility challenges. Amsterdam has "all mobility data accessible as well via APIs, including parking, traffic etc". Hamburg uses "live data for traffic and car parks", which is also used by logistics organisations and some large navigation companies such as TomTom and Here.

Kris Garski outlined further data linking opportunities for Gdansk: "If we just connect all of these data… from different sources, like from public administration and private sectors and data from transportation companies, data from telecommunication companies, we may get a lot of new insights on how residents of Gdańsk commute." In order to do this, it would be beneficial if non-personal data held by private sector organisations was published openly.

If cities know better how its citizens move around the city, they can make better decisions; they can design roads and public transport better. They can also more easily understand the effects of changes to the transport system, such as roadworks or subway re-developments.

The opportunity for the joining up of data from different mobility sources is perhaps best exemplified by developments in Mobility as a Service ('MaaS'). Seen as the 'Netflix of mobility',[69] MaaS platforms operate using a monthly subscription model whereby users pay a set fee for unlimited travel and booking for multiple forms of transport, all from one app. This means that users pay for access to buses, trams, tubes, and sometimes bikes and taxis, using one account and one fee.

Helsinki has embraced this potential, mandating through law "that everybody who is selling tickets has to sell them through an API". The use of the API allows the data to be exchanged more easily between the various platforms and be consolidated into one service. The benefits for users are clear: they get easier, quicker and often cheaper access to transport within their city. For cities, there is a potential for access to more complete data about door-to-door travel, which is very difficult with current transport systems when buses, trains and taxis are operated by different organisations and are not booked through a common platform. In Helsinki, it has had the effect of "kind of forcing them [transport providers] towards an open ecosystem". MaaS is still in its infancy and has not been capable of demonstrating its economic sustainability as an idea as of yet.

[67] E-zigurat (2019), 'Smart City Series: Smart City Hamburg — A Look Inside The Visionary Bottom-up Initiative', https://www.e-zigurat.com/blog/en/smart-city-series-smart-city-hamburg/
[68] Whim, https://whimapp.com/
[69] Helsinki Smart, 'Whim', https://helsinkismart.fi/portfolio-items/whim/

Putting data infrastructure into practice: environment

Sustainability and energy efficiency was another requirement outlined by the European Commission. According to UN Habitat, cities are a "cause of and solution to" climate change.[70]

Our interviewees all referenced being involved in energy-related EU-funded projects, such as mySMARTLife[71] and RUGGEDISED[72]. These projects include activities such as smart home solutions, electric vehicle charging outputs and smart grids. They also involve 'retrofitting' certain areas, or zones within cities, with new forms of heating or energy production.

Gdańsk participated as a follower city in the RUGGEDISED project. The goals of RUGGEDISED were to "demonstrate in total 32 innovative and integrated smart solutions in the cross-section of energy, transport and ICT".[73] Gdańsk focused on offering "activities complementary to building insulation, thermo-modernisation, and heat-network connections".[74]

Helsinki and Hamburg participated in the mySMARTLife project, with the aim of making the cities "more environmentally friendly by reducing the CO2 emissions of cities and increasing the use of renewable energy sources".[75]

According to Ger Baron, as part of the Energy Atlas project[76], data has begun to be shared in Amsterdam about "rooftops, that would potentially be interesting for solar panels". There is now "quite a bit of data being used", in particular by "quite a few smaller companies who actually sell solar panels to these houses, or companies".

The use of data in mobility may also encourage people to be more environmentally aware about the modes of transport they use. According to Pekka Koponen, if people use data enabled mobility services to move around, it could have "quite a large impact for the city, if people don't own a car and the cars are not parked on the streets". Research suggests that moving away from a reliance on cars, when they are not vital to someone's livelihood, can boost the health of city residents and reduce a city's emissions.[77]

Not all environmental projects involve large technological deployment. Hanna Niemi-Hugaerts described how Forum Virium is testing "ready-made… home mobile sensor kits" that citizens can use to monitor the environment themselves. Around 350 people have signed up to the project, which revolves around "smart flower pots in community gardens". Throughout the process, it has been "really hands on" and the city has "ideate[d] together" alongside the participants.

[70] UN News (2019), 'Cities: a "cause of and solution to" climate change', https://news.un.org/en/story/2019/09/1046662
[71] MySMARTLife, https://www.mysmartlife.eu/mysmartlife/
[72] RUGGEDISED, https://ruggedised.eu/home/
[73] RUGGEDISED, 'Smart Solutions Overview', https://ruggedised.eu/smart-solutions/smart-solutions-overview/
[74] RUGGEDISED, 'Gdańsk', https://ruggedised.eu/cities/Gdańsk/
[75] MySMARTLife, https://www.mysmartlife.eu/mysmartlife/
[76] Opendatasoft (2017), 'How Amsterdam Uses Urban Data to Build a More Sustainable City', https://www.opendatasoft.com/blog/amsterdams-energy-atlas-using-urban-data-to-build-a-sustainable-city
[77] BBC (2019), 'What happens when a city bans cars from its streets?', https://www.bbc.com/future/article/20191011-what-happens-when-a-city-bans-car-from-its-streets

These projects in the field of mobility and energy offer a glimpse into how technology and data may be used to improve the environment in cities. Going forward, these projects can help cities to adopt greener and more sustainable approaches to air quality and transportation. Furthermore, the opportunity for citizens to collaborate and collect data to aid these approaches is a positive and welcome approach to collaborative open data.

How cities foster open innovation

Open innovation involves sharing data and ideas, and supporting innovative projects from citizens, civic tech organisations, startups, and business or academia. For this to work, city governments need to share details about what problems they are facing, and equip citizens and organisations with the skills and resources to be able to solve these problems. Activities which can aid and contribute to this include:

- providing shared and open data
- hosting events
- running accelerators and challenges
- establishing specialist organisations[78]
- creating new centres and buildings for GovTech and startups[79]
- establishing partnerships
- running digital skills programmes.

Hackathons are one example of open innovation and collaboration. They are short events where programmers, entrepreneurs and public sector authorities gather to collaborate on solving a problem. Often, the best proposals from these events are granted funding to pursue their ideas further. Other similar models include co-creation events, accelerator programmes and crowdsourcing.[80]

Kris Garski detailed how Gdańsk City Council is "considering cooperation with other public sector units and the private sector to take part in hackathons they are running to provide them with data and to promote our data". He explained that they "would like to see more and bigger engagement from the developer community". He wants people to: "come to us with ideas for new applications. And then if it is a sensible idea, we are ready to talk about opening new data in the city." Sascha Tegtmeyer from Hamburg, where they use hackathons to help participants "realise their use cases with our data", said that they use such events to "explain to people: here is our open data – this is the data that might be useful for your use case".

Yet, Ger Baron in Amsterdam expressed that the short timescale of these events is not always beneficial. He outlined that sustainability of the projects was key; something which wasn't always appreciated: "Ideas are not the issue, but actually building something that can be used is a bit more complicated." In Amsterdam, there is an opportunity for "companies to create partnerships with us, so they get our data but we also spend some time with them [doing] workshops on what they actually need", and establish whether any adjustments need to be made in the data so that they can use it. There is also a startup residence programme[81] which is run three or

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[78] For example, the London Office of Technology and Innovation, https://www.londoncouncils.gov.uk/who-we-are/london-office-technology-and-innovation-loti
[79] For example, the Tontine building in Glasgow (https://www.tontineglasgow.co.uk/) or the Urban Innovation Centre in London (https://futurecities.catapult.org.uk/urban-innovation-centre/about/)
[80] Viima (2016), '16 Examples of Open Innovation – What Can We Learn From Them?', https://www.viima.com/blog/16-examples-of-open-innovation-what-can-we-learn-from-them
[81] Startup in Residence, 'Amsterdam', https://startupinresidence.com/amsterdam/

four times a year. Supporting new business in this way can help to overcome some of the barriers the ODI has identified[82] that organisations could face when they attempt to scale beyond an interesting pilot; including sustainable funding, and access to advice and skills.

Hanna Niemi-Hugaerts from Forum Virium said that there is the need to "have a line open towards the [technical] community". She suggested that "it's good to start this communication as soon as possible – start at the planning stage". For example, if Forum Virium has an idea that is thought would be an effective service, they will ask relevant technical individuals or organisations: "Hey, we might create this API, and this is what we were planning. What would you need for it?" This engagement can help prevent time and money being wasted if Forum Virum has what they believe is a good idea, only for "the developers [to] have some other needs".

Continuous engagement with an enthusiastic 'open' community can result in a virtuous cycle. According to Hanna, in Helsinki, when people within government departments "hear all these creative ideas this community is having, they get a lot more motivation to work on getting the stuff open."

Multiple interviewees mentioned how important the Code for America movement – described on the website as "a national alliance of community organizers, developers, and designers that are putting technology to work in service of our local communities"[83] – was for their city. Code for Poland[84] and Code for Hamburg[85] were both set up following the success of Code for America. In Poland, Kris Garski told us that the main aim was to "[build] a community between administration and developers". In Hamburg, they use the group "to explain our data [and] to hear what their needs are for our data platform".

Helsinki formed a similar group – Helsinki Loves Developers[86] – to engage directly with the people who want to use city data. This engagement can be meaningful for all parties involved, as skills and insights are shared between participants.
Schools, colleges and universities can also play a part in innovation in the city. Ger Baron spoke of the role of the Amsterdam Metropolitan Solutions Institute.[87] Students there are given the opportunity to "use our data for a lot of their research."

In Gdańsk, Kris Garski told us about the encouragement of students to "play with the data to try to build a solution". Although no sustainable, commercial projects have come out of this engagement with students, they saw it as "a very useful tool to sharpen [the students'] coding skills by coding with real data and build a better understanding of how the city works.".

[82] Open Data Institute (2019), 'Scaling data-enabled projects: a checklist', https://theodi.org/article/scaling-data-enabled-projects-a-checklist/
[83] Code for America, 'The Brigade Network', https://brigade.codeforamerica.org/
[84] Code for Poland, https://codeforpoland.org/
[85] Code for Germany, 'Hamburg', https://codefor.de/hamburg/
[86] Helsinki Loves Developers, https://dev.hel.fi/
[87] Amsterdam Institute for Advanced Metropolitan Solutions, https://www.ams-institute.org/

How cities are encouraging the use of data within city departments

For cities to take advantage of innovative approaches to services, it is important they overcome any internal issues.

First, cities already have access to a wealth of data, from official statistics to data collected during the delivery of services. Ensuring it is used, shared and understood is critical.

Unlocking valuable, untapped data is an important and ongoing focus in the cities we focused on. Our interviewees outlined the problem of data silos between city government departments. In Gdańsk, the city took steps to begin breaking these silos down. A "tour through the city hall departments" was conducted, which involved "talking with managers and talking with staff… [asking them] what data do you have? Who is responsible for it? Who is cooperating with the data you have? What could we open?". This provides a solid foundation for which to evaluate the benefits that new technologies or projects could bring – for example if they provide a source of useful data that is not already collected.

But, there is little point pursuing a revolutionary, tech-based agenda if the city staff don't trust the data, don't have the skills to understand it, or don't see the value in data and technology. The ODI's Data Skills Framework[88] shows the range of skills required to maximise value of data across an organisation such as a city authority. Our interviewees spoke of how, in their organisations, they are recognising a deficit in data skills, and are trying to change it.

In order to develop trust and belief in the use of data and technology, the Helsinki government is to "start acting and doing even small things… set up a pilot and try something and learn". Hanna Niemi-Hugaerts spoke about the value of focusing first on "the internal benefits of getting data out there and open" so that you have "direct benefits... as an organisation". This means that it "doesn't then feel as though you have to add on so much, because you've already benefited yourself". Starting small and demonstrating value can help get people on board with the change cities are trying to achieve.

In both Amsterdam and Helsinki, there has been a concerted effort over the last few years to hire people with the right skills who can deliver on data-enabled change, such as coders, software developers and data analysts. In Amsterdam, the emphasis is now on hiring "people who understand software and coding". This approach was taken early on by Helsinki city government; they hired scores of coders and developers at the beginning of their digitalisation journey, and have recently

[88] The Open Data Institute (2019), 'The 2019 Data Skills Framework'
https://theodi.org/article/open-data-skills-framework/

expanded their call to attract international tech talent to work in the city.[89] Hiring staff with this expertise can help city governments to build things themselves, meaning that expensive proprietary software does not need to be procured.

The balance then needs to be struck between hiring staff with the right technical skills to work alongside staff with more policy experience and understanding of how city governments operate. Cities should also be attempting to upskill those already working within the authority, encouraging everyone to speak the same language. In Amsterdam, directors were sent on a course "where they got educated on data: what does it mean, what are the ethics behind it, what is the legislation behind it, what does GDPR [General Data Protection Regulation] mean". Part of this was changing the mindset so that they know that "this is not something you should switch to the data department, but is something that, as a director of a department, you are responsible for these things yourself". They are treating this as an "ongoing exercise" and are also now training the layer of managers below them in a similar manner.

Specialist positions such as Chief Digital Officers can also provide this leadership. Hamburg's Chief Digital Officer has a "working group that is all of the leaders of the departments and different ministries" that are "working good together". If senior figures recognise the value of data and advocate for the extensive use of technology and openness within their city, positive change will be easier to achieve.

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[89] Signals From Helsinki (2019), 'Helsinki, World's First City as a Service Is Not Just a Joke – Attracts Over 6,500 applications from +100 cities', https://www.signalsfromhelsinki.fi/en/news/helsinki-worlds-first-city-service-not-just-joke-attracts-over-6500-applications-100-cities

How cities are accessing data held by private organisations

A city's data infrastructure consists of data that is managed by public institutions such as housing and transport authorities, as well as data collected and held by the private sector organisations that operate within them. This includes data generated by businesses that work with the cities to deliver public services, as well as those that provide services directly to their citizens, visitors and others.

Data that is currently held by a variety of private sector organisations, for example Uber, Google, AirBnB, IoT sensor manufacturers, portal developers, dockless bike providers or app creators, is often out of reach to city governments. This data could be highly valuable in helping cities develop better services or make better decisions. As access to privately held data is complex, some researchers who are keen to try and develop similar data have attempted to deploy alternative workarounds, such as "sending students to catch rides en masse, or signing up to drive themselves".[90]

A paper by the Open Source Lab suggested that: "Data sharing between the public and private sector will play a critical role in helping transit agencies leverage future disruptions in mobility induced by shared mobility services and be of even greater service to their community by adapting to user needs, for example."[91]

In general, our interviewees spoke of their desire to get access to data from commercial and private sector organisations working within the city. We learned that there are a range of potential uses of this type of data. The data, from Uber, Waze and Lyft for example, could assist in making decisions that could inform traffic planning. Opening up or establishing shared access to this data could also help to stimulate innovation and promote competition – as the Helsinki mobility API has demonstrated with the development of Whim. There may also be regulatory or enforcement reasons whereby access can bring benefits, such as ensuring rental properties are not driving up property prices or circumventing rental laws in certain areas.[92]

In some cities, this data sharing is happening. Strava, the popular fitness activity tracking app, has developed Strava Metro[93] in a bid to share more data with city governments to improve the quality and safety of urban bike lanes.[94] Through Uber

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[90] WIRED (2018), 'Dying to Know Uber's Secrets, Data-Hungry Cities Get Creative', https://www.wired.com/story/uber-lyft-data-research-driver-pay/

[91] Open Source Lab (2019), 'The Open Source Paradigm in the Digital Transformation — Enabling a Sustainable Future in Mobility', https://opensourcelab.dfki.de/wp-content/uploads/2019/04/OpenSourceMobility_WhitePaper_March2019.pdf

[92] WIRED (2019), 'Airbnb and New York City Reach a Truce on Home-Sharing Data', https://www.wired.com/story/airbnb-new-york-city-reach-truce-on-home-sharing-data/

[93] Strava Metro, https://metro.strava.com/

[94] Curbed (2016), 'How a fitness app for cyclists is reshaping city planning', https://www.curbed.com/2016/9/2/12749686/cycling-city-planning-app-strava

Movement,[95] Uber is sharing anonymised trip data with city authority planning teams to help them to understand the flow of traffic. These big companies can leverage data access on favourable terms, for example being able to operate in a city, or for a wider public benefit – as with Strava. In other cities, in the US in particular, regulatory power has been used to compel access to data from scooter and electric bike companies.[96] But such initiatives are still not the norm, and may only occur in some cities and not others.

In all four of the cities we focused on, there were discussions ongoing about ways and opportunities of gaining access to data private companies have acquired and are retaining.

This is an area which the ODI is keen to see explored further. We want cities to be ensuring equity around who accesses, uses and benefits from data. We know this is an area that much work needs to be done in, particularly in relation to building trust and ensuring that cities approach companies to share with specific projects in mind – at least to start with.

One of the key barriers the private sector claims it faces is ensuring the trust of their customers. Our interviewee in Helsinki told us that the telecoms companies are "afraid of privacy and security and losing the customer trust". Privacy and security of personal data are of course critical, and data protection laws, including GDPR, are a fundamental part of that. But not all data relevant to city decision making needs to be personal data; lots of data is what we refer to as 'societal data'. Societal data is data which has traditionally been collected to help society make decisions for everyone about everyone, as opposed to pinpointing individuals. It can include census data, demographics, travel patterns and crime statistics, for example.

A recent project the ODI undertook with the RSA and Luminate revealed that if this data is not used to re-identify people, and its use is explained, then people in the main are happy for it to be collected, used and shared.[97] Private sector organisations could therefore share non-personal data with cities going forward, in order to improve decision making. This is also an opportunity for better communication with the public about the types of data being collected and why.

A 2019 Bloomberg article[98] discussed the issue of access to data while respecting privacy: "Privacy concerns are real, but that doesn't mean companies should be able to prevent responsible access to their data… Better cities need better data — to prevent crashes, minimize traffic congestion and get people where they need to go efficiently. So the way to protect mobility data is not to let private companies keep it to themselves; it's for cities to raise the bar on digital privacy, championing practices that protect both citizens and the public interest."

Ger Baron in Amsterdam is trying to work more closely with the private sector. He told us of 28 partnerships with large insurance, car and tech companies – the data

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95 Uber Movement, https://movement.uber.com/?lang=en-GB
96 Los Angeles Times (2020), 'L.A. wins appeal in fight with Uber over scooter and bike data',
https://www.latimes.com/california/story/2020-02-11/uber-jump-bikes-scooters-permit-ladot-data-fight-ruling
97 RSA, ODI, Luminate (2019), 'About Data About Us',
https://www.thersa.org/globalassets/pdfs/reports/data-about-us-final-report.pdf
98 Bloomberg Opinion (2019), 'Cities Need Scooter Data, and They Need to Keep It Safe',
https://www.bloomberg.com/opinion/articles/2019-06-17/uber-and-lyft-shouldn-t-hold-electric-scooter-data-hostage

from which was used for mainly mobility, such as "crowd management, traffic management on a daily basis."

In Hamburg, Sascha Tegtmeyer discussed how access to private data represented a more fundamental issue: "We also have to manage our city, and it's not an option for us that a company knows how many cars are paring in Hamburg, but we as a city don't know this."

In Helsinki, Forum Virium told us how they purchased – using EU funding – data from telecoms companies. Now that they have "got some of the data, we are learning how we can use it together with the city, how we can use that in transport, or traffic planning and city planning". This approach is one way of engaging with the private sector, but alternatives to using public money should be sought where possible.

Ger Baron indicated a similar concern and offered a couple of ideas as to how companies could improve engagement with cities. He indicated that he felt companies "have an image problem" and that improved sharing of data would "help their image". Furthermore, he speculated that regulation in this area would come "within five years", enabling cities access to private sector data and improved collaboration.

As with any use of data within cities, there is no singular approach that can act as a model for other cities to adopt. Instead, cities at the leading edge of developing modes of access should continue their dialogue with the private sector, experiment incrementally and publicly share the successes and challenges from their work.

How cities are acting ethically with the use of data

Ethics play a crucial role in the use of data and technology within cities, just as they do within all facets of life. Citizens need to be able to trust that the government is going to use data securely, fairly and ethically. When misuse or exploitation of data is in the news, it is important that cities develop strong, transparent and ethical approaches to how citizens' data is to be collected, used, shared and stored. As artificial intelligence (AI), algorithms and machine learning become the norm for decision making, cities will need to be clear how their use is delivering a positive impact and how negative impacts are minimised.

Our interviewees discussed their progress in adopting these principles. As a baseline, Kris Garski asserted that in Gdańsk, "we protect the data of private citizens. It's rule number one that we open only data which is not protected by law. So privacy is very protected here".

But the ethical use of data goes beyond following laws, such as the EU's GDPR[99], to protect privacy. In Amsterdam, Ger Baron said that technology must be "responsible" and "work for us and not against us". Ger defined responsible technology as "open, auditable, transparent and doing something that actually contributes to people… [and] society". To make this more practical, the city government has developed a methodology, as part of the Tada[100] project, "to discuss ethics and dilemmas" when using and combining data.

Ensuring that technology is responsible has resulted in certain projects being halted. Ger Baron described how in Amsterdam they "developed some algorithms which the input was people with a certain profile who would get an invite for a job interview". The intention was to get unemployed people into work for the same company for over 12 months, but Ger outlined an issue with an algorithm, when it was revealed that it was only flagging "people with a certain profile". Rather than trying to fix the algorithm or the datasets used, Ger described how they simply "decided that we're not going to do this. So we want just people to do the matchmaking basically, we can try to find ways to do this without discrimination".

Other cities around the world are protecting data ethics through new rules and regulations. In San Francisco, the strong step was taken to ban facial recognition use by the police and other city agencies, citing the need to protect citizens from potential abuse.[101]

The Chief Digital Officers from Helsinki and London signed a declaration which included exploration of ethical uses of data in smart cities.[102] Upon signing the

[99] General Data Protection Regulation (2016), https://eur-lex.europa.eu/eli/reg/2016/679/oj
[100] Tada.city, https://tada.city/
[101] New York Times (2019), 'San Francisco bans facial recognition technology', https://www.nytimes.com/2019/05/14/us/facial-recognition-ban-san-francisco.html
[102] New Statesman Tech (2019), 'London and Helsinki CDOs sign digital declaration on smart cities and data ethics', https://tech.newstatesman.com/it-leaders/london-and-helsinki-cdos-sign-digital-declaration-on-smart-cities-and-data-ethics

declaration, Helsinki Chief Digital Officer Mikko Rusama said that they're "planning to work on clarifying the ethical principles of utilising data and AI, which is crucial in order to gain trust from residents".

It is paramount that cities consider the ethical implications of their services. Tools such as the ODI's Data Ethics Canvas[103] can help start this conversation by posing questions to ensure that the positive and negative impacts of a newly designed service can be considered and discussed before they become a reality.

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[103] Open Data Institute (2019), 'The Data Ethics Canvas', https://theodi.org/article/data-ethics-canvas/

Concluding thoughts: the future of open cities and beyond

Speaking with representatives of these four cities gave us an opportunity to listen to, and learn from, their successes in moving towards a more open future. It also enabled us to better understand the challenges they faced.

Refocus to addressing local challenges

Data and technology have great potential to be used by cities to make better decisions and make the city work better for everyone. But this has to be a deliberate process – initiated through strategies and policy positions, with the focus on delivering positive value through services.

Rather than focusing on technology, the people we spoke to are seeking a range of other approaches: digitalisation, better and wider citizen engagement, APIs, improved use of existing data and the publication of government data. These approaches are welcome and we encourage the priority of openness.

Most important, however, is the need to focus on solving specific, local challenges using data, and using openness and building trust as a means of doing that. By doing this, cities can move away from the focus on technology and work towards making services work for citizens, businesses and all communities. These services may be improved by the use of technology, but the emphasis we feel should be on using data to increase engagement, improve decision making and deliver better services. A focus on addressing specific problems can similarly help this re-prioritisation and may get more meaningful results than being the most cutting edge or technically innovative.

Increase access to useful data from across the public and private sector

There are, however, a number of foundational issues that cities must get right. One of the reasons the smart city vision is failing on its promises is that it focuses too much on expensive high-tech 'solutions', without developing a strong underlying data infrastructure and without upskilling staff to capitalise on it.[104] The focus in the future must be on laying this groundwork.

First, cities already have access to a wealth of useful data that, if identified and understood, may help them achieve their goals. One problem we are aware of is that data may languish within departments or organisations that are unaware that it could benefit other departments or organisations more widely. Ecosystem mapping a city's

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[104] New York Times (2019), 'Opinion: I'm an Engineer, and I'm Not Buying Into "Smart" Cities', https://www.nytimes.com/2019/07/16/opinion/smart-cities.html

data to understand where data sits, where it can and does flow, and where blockages to data access or sharing may exist, is a critical process for any city to undertake. Not only does this help determine existing data infrastructure, but it can aid the process of breaking down departmental silos. This alone can enable more value to be derived from useful data.

Develop internal skills and motivation

Second, developing internal skills and capability is vital. Cities should look at how to improve the digital capability of their departmental teams. This should be done first and foremost through upskilling the staff that are already working there, who already have the knowledge of policy and services, but who could benefit from training in data, technology and digital skills. Large city governments would be wise to follow Helsinki's lead with an injection of highly skilled developers and coders.

The belief that data, digital and technology can improve services must be held throughout all levels of the cities' organisation. Senior management needs to champion their department or organisation's use of data and technology. This can be formalised through schemes such as Hamburg's Chief Digital Officer Council and the appointment of dedicated staff.

Develop relationships between the private and public sectors to enable access to data

Third, while we have learned that many cities are actively publishing data, making it openly available and encouraging wider use, the same cannot be said of the private sector. When it comes to decision making within a city environment, data held by the private sector has the potential to help answer a wide range of valuable questions, improve citizens' lives and deliver better services. Without access to that data, many important and potentially urgent opportunities are being missed.

We have learned that Forum Virium in Helsinki is buying data from the private sector, and this is also the case in local government in the United Kingdom. Rather than being required to use public money for this data, we would prefer to see better relationships built between cities and the private sector, where specific questions to help address specific problems can be discussed and worked on collaboratively. These partnerships should be strengthened by a belief in the equitable and sustainable access to data. City governments need to be able to access useful data sustainably, and relying on purchasing private sector data can push this access towards long-term uncertainty.

For cities to solve complex problems for the benefit of citizens, engagement with the private sector needs to be developed.

Engage with citizens and technical communities

Tapping into the collective knowledge of citizens and citizen groups can lead to better engagement, better decision making and better services that people want to use.
Engagement can be done in various ways, such as through focus groups like in Hamburg, using online platforms such as Decidim or Consul, or through citizen panels like in Gdańsk. To maximise the value of this engagement, citizens need to

firstly understand the major issues around the use of data and technology – and cities can support this through education and digital skills.

Engaging with skilled people and startups can help generate ideas for how a city can work better. Running innovation events, supporting and incubating startups, and publishing data are just some of the ways cities have been encouraging this innovation. When ideas are found to benefit the city, the government or other actors must ensure that the projects can scale to benefit wider groups and become sustainable.[105]

Learn from others

Although cities are different in regards to their history, and their cultural, societal and geographical make-up, this does not mean that cities cannot work together and learn from the challenges and successes each has. Our research has shown that they have a lot in common, for example many are trying to tackle big issues such as the climate emergency and increasing citizens' involvement in political decision making.

In this politically challenging climate, cities can start by forming partnerships and expanding relationships with one another. The London–Helsinki Chief Digital Officer partnership launched in 2019,[106] the data twinning of cities such as the Data City project in Leeds and Lille,[107] and large-scale participation in the Open and Agile Smart Cities (OASC)[108] network, offer glimpses into what these relationships can entail.

But these relationships should go further, cities should adhere to Forum Virium's Hanna Niemi-Huagerts' rallying call: "don't be afraid of copying things that work!". With open data and open source software, this is a lot easier. Cities can benefit from a more open ecosystem by sharing data, source code, ideas, tips and guidance. Cities can build on past work and support other cities to do the same. Being open can bring cities closer to their citizens and businesses, and closer to other cities. And finally…

We want to see the movement towards openness continue and for this report to generate some momentum for cities around the world to follow. We want to see cities try and build a more open and trustworthy ecosystem. The use of data and technology within cities can have a positive impact for everyone, if it is done so in an equitable and ethical manner. We want this open and trustworthy future to be delivered by cities through greater collaboration between cities and within city departments, less data hoarding from the public and private sector, and greater engagement with people, businesses and communities. And this positive should not remain in urban areas, but be replicated and adjusted to more rural areas too.

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[105] Open Data Institute, 'R&D: Scaling data innovation',
https://theodi.org/project/rd-scaling-data-innovation/
[106] New Statesman Tech (2019), 'London and Helsinki CDOs sign digital declaration on smart cities and data ethics',
https://tech.newstatesman.com/it-leaders/london-and-helsinki-cdos-sign-digital-declaration-on-smart-cities-and-data-ethics
[107] Open Data Institute (2018), 'The Data City in Leeds and Lille: measuring data innovation',https://theodi.org/article/the-data-city-in-leeds-and-lille-measuring-data-innovation/
[108] Open and Agile Smart Cities, https://oascities.org/