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Open data for better public services

Governance Committee

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Summary

The past decade has seen a growing tendency towards the release and the re-use of public data. More and more cities are recognising the potential that technology and open public data can bring. The release and the re-use of public data give local governments the opportunity to transform themselves into more transparent, democratic and effective authorities.

This report shows how the release of open data can foster the participation of citizens in political and social life, improve the provision of public services and make possible a whole range of social, cultural, democratic and environmental initiatives.

The Congress calls upon local and regional authorities to develop strategies to make local authority information datasets open to the entire population and to ensure that data protection and privacy laws and policies are strictly adhered to when data is made available to the public. The Congress also asks the Committee of Ministers to recognise the importance of open data for improving local democracy, to provide guidelines for member States on open data standards and strategies and to address the risk of a digital gap in open data participation.

1 L: Chamber of Local Authorities / R: Chamber of Regions
EPP/CCE: European People's Party Group in the Congress
SOC: Socialist Group
ILDG: Independent and Liberal Democrat Group
ECR: European Conservatives and Reformists Group
NR: Members not belonging to a political group of the Congress

RESOLUTION 417(2017)²

1. The rapid and ongoing rise in the quality and quantity of digital data and information managed and generated by local authorities is providing valuable new opportunities for them to improve the quality of local life by sharing the data and releasing it into the public domain. An increasing number of cities are demonstrating that there is huge untapped potential in this data for NGOs and interest groups, when it is released into the public domain in a reusable format.
2. In many sectors, including transport, public health, use of cultural facilities, environment quality and energy use, public authority data sets are beginning to be used by civil society groups, often working in partnership with the local authority, to develop new tools and applications for promoting good governance in towns and cities. The benefits can be improved governance, improved quality of life and cities that are ecological and smart.
3. Open data offers greater transparency and not only provides citizens with the information to understand what their local governments do but also empowers them to contribute to the decisions-making process of their local governments. It can lead to more participation in policy making, to achieve more intelligent and tailored and responsive policies and more accountability.
4. The reuse of public sector information can also stimulate social and economic growth by enabling third parties to create innovative products and services. Recent estimates have put the potential benefits of open data at more than 1% of global GDP.
5. In the light of the above, the Congress:
 - a. Bearing in mind :
 - i. Congress Resolution 290 and Recommendation 274 (2009) on E-democracy: opportunities and risks for local authorities;
 - ii. Congress Resolution 389 (2015) on New forms of local governance;
 - iii. the Convention on Access to Official Documents (CETS No. 205);
 - iv. the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (CETS No.207);
 - b. Convinced that open data is and will be a strong engine for improving local governance, with the power to transform cities into more open, democratic, transparent spaces;
 - c. Convinced that the use of open data by cities in the future is necessary in order to keep up with the new generation of computer literate young;
 - d. Aware of the challenges that remain in providing access to open data in easy to use formats;
 - e. Conscious of the need to respect privacy and data protection laws and policies.
6. Calls upon local authorities in the Council of Europe member States to:
 - a. Develop strategies to make local authority information datasets open to citizens in machine readable formats for their citizens to reuse, including on mobile devices;
 - b. Take measures to ensure that the entire population in a city have access to open data, benefit from and actively participate in open data initiatives, dialogues between government and citizens, and public facilities delivered by open data;
 - c. Encourage citizens to make use of open data by publishing information, organising public meetings and programmes to stimulate the use of open data to provide societal value;
 - d. Create partnerships with civil society groups and other organisations that can help to provide training and capacity building in the re-use of open data and the organisation of open data activities;
 - e. Consult citizens and civil society for input about how to make the data more responsive to their interests and concerns through public events, workshops and consultations, in order to understand which data should be provided and generated;

² Debated and adopted by the Congress on 30 March 2017, 3rd sitting (see Document [CG32\(2017\)15](#), rapporteur: Manuela BORA Italy (R, SOC))

f. Ensure that data protection and privacy laws and policies are strictly adhered to when data is made available to the public.

7. Commits itself to:

a. Supporting and encouraging local authorities to re-use public information and make datasets available to the public in order to improve their public service delivery, strengthen local democracy and stimulate social, cultural and environmental initiatives;

b. Encouraging cities to go beyond the release of open data sets towards making local data infrastructures more responsive to the interests, needs and concerns of their citizens;

c. Assisting cities to gather feedback from citizens, civil society groups and other stakeholders through organising public events, workshops and consultation to understand the interests of the different user groups and to inform data publication priorities;

8. Asks national associations of local and regional authorities to encourage their national governments to sign and ratify the Council of Europe Convention on Access to Official Documents (CETS No. 205) and the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (CETS No.207) if they have not yet done so.

RECOMMENDATION 398(2017)³

1. The Council of Europe Internet Governance Strategy 2016-2019 underlines the importance of public access to information and data for strengthening democracy and improving governance at all levels.
2. An increasing number of European cities are demonstrating that the release of local authority datasets into the public domain can empower citizens to develop new tools and applications for improving governance and the quality of life in towns and cities and can stimulate a variety of social, cultural, democratic and environmental initiatives.
3. Local authority data also has economic potential. The release of local authority datasets can be useful for local businesses and can serve to stimulate economic innovation and growth.
4. Democracy at local level can be enhanced by open data increasing transparency in the decision-making process and contributing to better accountability of local governments, as well serving as a preventive tool in the fight against corruption by providing data on governmental expenditures and performances.
5. The Congress therefore,
 - a. convinced that open data has the power to transform Europe's cities into more open, democratic, transparent institutions;
 - b. aware that a 'digital divide' remains between those who have access to and are able to use such data and those who do not;
 - c. Bearing in mind:
 - i. Congress Resolution 290 and Recommendation 274 (2009) on E-democracy: opportunities and risks for local authorities;
 - ii. Congress Resolution 389 (2015) on New forms of local governance;
 - iii. the Convention on Access to Official Documents (CETS No. 205);
 - iv. the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (CETS No. 207);
 - v. The Council of Europe Internet Governance Strategy 2016-2019;
 - d. Calls on the Committee of Ministers to:
 - i. recognise the importance of open data for improving local democracy by increasing transparency, accountability and citizen participation;
 - ii. provide guidelines to the member States on adopting open data standards and strategies and introducing forms of data licensing such as the Creative Commons licenses;
 - iii. address the risk of a digital gap in open data participation caused by a divide between those who have access and benefit from open data initiatives and those who do not;
 - e. Recommends that the Committee of Ministers call upon the governments of its member States to:
 - i. create more awareness of the use of open data and highlight the advantages of sharing open data with citizens and civil society and other organisations, by organising public events, conferences and workshops on the use of open data;
 - ii. support local open data initiatives, through the provision of necessary information and government data, and by ensuring that open data initiatives by local authorities are supported through legislative or regulatory frameworks;
 - iii. provide guidelines and formulate policies for the re-use of public sector information and introduce national standards for licensing data sets;
 - iv. sign and ratify the Council of Europe Convention on Access to Official Documents (CETS No. 205) and the Additional Protocol to the European Charter of Local Self-Government on the right to participate in the affairs of a local authority (CETS No.207), if they have not yet done so.

³ See footnote 2

EXPLANATORY MEMORANDUM⁴

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I. Summary

In this paper we introduce the idea of open data and examine the opportunity that it represents for European cities. In particular we focus on its role in improving public service delivery as well as exploring the different kinds of social, cultural, democratic and environmental initiatives that it can facilitate. We conclude with some thoughts on how cities might go beyond the release of datasets towards making local data infrastructures more responsive to the interests, needs and concerns of their citizens.

II. The open data revolution from States to cities

1. Our lives and societies are mediated by digital information systems as never before in human history – from weather and transport information systems, to financial flows or administrative dashboards.
2. The past decade has seen the rise of a global agenda to open up data from public information systems in order to facilitate progress towards a range of goals – including transparency, accountability, public participation, public service delivery, technological innovation, efficiency and economic growth.
3. This open data agenda has obtained traction and support amongst global, national and subnational institutions around the world – including the EU, the G20, the World Bank, the UN and dozens of states. A report from the UN calls for a “data revolution”, describing data as the “life-blood of decision-making and the raw material for accountability”.⁵
4. Open data is widely defined as information which can be freely used and shared by anyone for any purpose. Definitions and principles provided by governments, intergovernmental organisations and civil society organisations focus on the removal of legal and technical restrictions to re-use.⁶
5. Legal barriers to re-use may include copyright and related rights (such as database rights). These may be lifted by means of licenses, legal tools or legal statements – including through several of the Creative Commons licenses (such as CC0 and CC-BY), the Open Data Commons legal tools (such as ODbL, the Open Database License or the PDDL, the Public Domain Dedication License), or national licenses (such as the UK’s Open Government License). Open data initiatives are often legally supported through “soft” policies and practices rather than formally encoded into law.⁷

⁴ This explanatory memorandum was prepared by Jonathan Gray, Director of Policy and Research, Open Knowledge and Danny Lämmerhirt, Researcher, Open Knowledge.

⁵ See: <http://www.undatarevolution.org/report/>

⁶ See, for example, the “Open Definition” from Open Knowledge, available at <<http://opendefinition.org>>; Sunlight Foundation’s “Ten Principles for Opening Up Government Information”, available at: <<http://sunlightfoundation.com/policy/documents/ten-open-data-principles/>>; Tim Berners-Lee’s “Five Stars” of Linked Open Data, available at:

<<http://www.w3.org/DesignIssues/LinkedData.html>>; and the “8 Principles of Open Government Data”, available at: <https://public.resource.org/8_principles.html>.

⁷ See, for example, Gray, J. and Darbishire, H. (2011) Beyond Access: Open Government Data & the Right to (Re)Use Public Information. Access Info Europe and Open Knowledge. Available at SSRN: <http://ssrn.com/abstract=2586400>.

6. The EU has also issued official guidelines and policy recommendations encouraging the legal re-usability of European Public Sector Information (PSI). The PSI Directive stipulates that public bodies must make the re-use conditions of PSI clear, and also recommends (but does not require) marginal cost recovery for the pricing of public information.⁸ The EU co-financed Legal Aspects of Public Sector Information (LAPSI) project contains further recommendations around the re-use of public sector data in Europe.⁹

7. It is worth noting that while open licenses and legal tools can remove certain sets of restrictions and legal obligations, they do not remove others, such as, for example, privacy and data protection rules when it comes to the handling of personal information.¹⁰

8. As well as legal barriers, there are also technical barriers to re-use, including technical mechanisms restricting access to data through web interfaces and publishing data in non-machine readable formats (such as PDF files or as scanned images). Open data advocates recommend making information available for download in bulk in structured, “machine readable” formats.

9. Open data is typically made discoverable through dedicated web pages or websites, including through “data portals”, as pioneered by initiatives such as the US’s Data.gov, the UK’s Data.gov.uk, France’s Data.gouv.fr and the EU Open Data Portal. In addition to data portals for national governments and supranational institutions, there are now hundreds of subnational data portals for accessing data from local and regional governments, in particular from cities.¹¹

10. Cities currently publish a wide variety of datasets, reflecting the diversity and heterogeneity of the information systems used in local governance, policy-making, decision making and service delivery, from geo-referenced data about the locations of public facilities to information about environmental conditions, from local election data to information about local revenues, expenditures and public sector contracts. There are also new forms of digital traces (or “transactional metadata”) being generated as a by-product of digital platforms, services and infrastructures, such as metrics concerning the use of official websites or digital services.

11. In recent years there has been an explosion of city-level initiatives to use this data in the service of a wide range of different goals. City open data initiatives have the potential to contribute to the formation of new kinds of publics, public spaces and public participation around the use of official information, facilitating new kinds of relationships between public institutions and civil society.

12. In the following sections we shall particularly focus the re-use of city data in four areas: (i) improving public service delivery, (ii) strengthening local democracy, (iii) transitioning to greener cities and (iv) enhancing cultural experience. Finally we will conclude with a discussion of steps cities might take to open up and realise the potential of their data. As well as looking at the role of data intermediaries, this will also include a brief discussion about making city data infrastructures more participatory and responsive to the concerns of citizens and civil society.

III. Improving public service delivery

13. City data can be used to provide citizens with analysis, insight and tailored information to enhance their use of public facilities. For example, there are many data projects which enable citizens to locate public services using location data through customised maps or applications. Applications have been created to help citizens to find all kinds of public services – from recycling points to public toilets, from parks to kindergartens, by displaying them on interactive map applications and websites.¹²

14. Open city data may also be used to provide residents with information to facilitate decisions about their use of services. For example, there are several projects that use data about local services to help

8 See: <https://ec.europa.eu/digital-agenda/en/european-legislation-reuse-public-sector-information>

9 See project outputs at LAPSI project: <http://lapsi-project.eu.halotest.cc.kuleuven.be/>

10 See Zuiderveen Borgesius, F. J., van Eechoud, M. and Gray, J. (forthcoming) Open Data, Privacy, and Fair Information Principles: Towards a Balancing Framework. Berkeley Technology Law Journal. Available at SSRN: <http://ssrn.com/abstract=2695005>

11 For a directory of these initiatives, see: <http://dataportals.org/>

12 This includes projects to map facilities such as public toilets in the UK: <http://greatbritishpublictoiletmap.rca.ac.uk/>; car parking in the Netherlands: <http://www.parkshark.nl/> fountains in Barcelona: <https://play.google.com/store/apps/details?id=cat.bcn.fontspubliques>; bike lanes in Glasgow: <https://www.glasgow.gov.uk/index.aspx?articleid=14348> or public garbage bins in Berlin: <http://www.bsr.de/13951.html>.

parents to make choices about schools for their children based on their various needs and criteria. These applications and websites aim to help parents to find educational institutions, to know more about their profiles, to understand how these institutions perform and to make more informed choices about how their children will be educated. The British newspaper The Guardian uses open data to give parents information on specific curriculum subjects in schools and to compare how schools have performed in GCSE (General Certificate of Secondary Education) results¹³. Skills Route¹⁴ shows parents and young people in the UK their different educational options after finishing their GCSEs. The same concept is applied to kindergartens and nursery schools: for instance the German websites Kindertagesstätte¹⁵ and Kleiner Spatz¹⁶ show residents in Berlin, Bremen and Ulm the closest kindergartens available for children as well as their profiles.

15. Other projects build on public data to create new channels of dialogue between citizens and institutions. Helsinki's Service Map provides citizens with information regarding the departments and services of the City of Helsinki.¹⁷ It also allows Helsinki's residents to give feedback and engage in direct discussions with the people who are in charge of the various departments and services.

16. Open data may also be provided to citizens in form of a newsletter. The application CityGram¹⁸ (US) allows citizens to receive updates on topics they care about such as restaurant inspections, customer complaints or broken city infrastructure, offering an immediate communication channel between municipal authorities and citizens.

17. Citizens may also be involved in generating openly accessible data on public services. Applications like FixMyStreet, FixMyTransport or the European CitySDK project enable citizens to send complaints or reports about infrastructural issues like broken streetlights and transport issues to the relevant public institutions.¹⁹ The data tell municipalities and citizens where and how issues occur, enabling public institutions to locate and handle issues more responsively and updating citizens about how their issue is being dealt with.

18. Open data may stimulate civic engagement in order to improve the quality and availability of public services and facilities. For example, the Adopt a Hydrant initiative allows residents in Boston to see the location of hydrants in their vicinity and to subscribe as a volunteer to clear the snow from around them in winter months.²⁰ During snowstorms or heavy snowfall, firefighters would not be able to see or access these hydrants in order to fight fires, constituting a public safety hazard during severe weather. As well as coordinating the mobilisation of local residents to assist during bad weather, the non-profit service also enables citizens to contact volunteers so they can take action to remove snow from around hydrants.

19. City data may also contribute to social inclusion, for example by helping disabled persons to navigate through a city and enhancing safety and life quality. Wheelmap is a German website that engages citizens to map wheelchair accessibility of public spaces European-wide.²¹ The site allows citizens to mark a space as fully, partly or not wheelchair-accessible. Thus it provides disabled people and municipal decision-makers with an unprecedentedly clear and detailed picture of wheelchair accessibility in public space, based on the input and experience of citizens. Hills are Evil uses topographical data to help wheelchair users avoiding obstacles like cobbles and hills, and tailors the best routes through a city to the needs of a user.²² The mobile application 'BlindSquare' translates open geographical data into voice messages to navigate blind and visually impaired persons through the city.²³ A Dutch application GoOV assists people who have difficulties in travelling alone on public transport by providing updated information about travel routes and public transport schedules.²⁴

13 See: <http://www.bengler.no/skoolgate> and <http://www.theguardian.com/education/gcse-schools-guide>

14 See: <http://www.skillsroute.com/#about>

15 See: <http://www.tursics.de/kindergarten/de/>

16 See: <http://www.ulmapi.de/kleinerspatz/>

17 See: <http://servicemap.hel.fi/>

18 See: <https://www.citygram.nyc/>

19 See FixMyStreet: <https://www.fixmystreet.com/>, FixMyTransport: <http://www.fixmytransport.com/>, CitySDK:

<http://www.citysdk.eu/participation/>

20 See: <http://www.adoptahydrant.org/>

21 See: <http://wheelmap.org/about/>, other examples include EsAccesible (Spain): <http://www.esacesibleapp.com/> or AXS Map (United States): <https://www.axsmap.com/>

22 See: <http://www.watershed.co.uk/dshed/hills-are-evil>

23 See: <http://blindsquare.com/about/>

24 See: <http://www.go-ov.nl/>

20. Public transport data may be used to indicate journey times and to inform citizens and decision-makers how travel times affect the accessibility of public services.²⁵ The Mapumental project combines different data sources to enable users to understand things like how long fire fighters need to respond to incidents for each post code, or areas to live within a certain range of travel times from a place of work. It also evaluated regional inequalities in access to schools (based on school children's travel times). Mapumental informed the Welsh government about the accessibility of schools by public transport, leading the latter to take steps towards making such calculations on a broader scale in order to improve the accessibility of public services.²⁶

21. Open data may improve the enforcement of hygiene regulations and foster consumer protection while at the same time opening a dialogue between government, food business and customers. The United Kingdom website Ratemyplace provides users with information about food safety inspections including scores on food hygiene and safety or premise structure and safety.²⁷ Additionally, it offers businesses a channel to respond to these scores and to improve their hygiene ratings.

22. Open data may improve existing information channels between municipalities and citizens and thereby facilitate more inclusive decision making processes between citizens and municipal authorities. The city of Berlin is obliged to make plans of new building projects available for citizens to enable them to comment on the plans. However, often information about these plans is scattered across multiple different websites and sources. The website BürgerBautStadt aggregates multiple data about construction plans in Berlin (from the Administrative Office for Citizens and several newspapers) and makes them accessible online in an easily usable format.²⁸ Thus open data may support municipalities in their duty to inform citizens about urban planning.

23. Several police departments across Europe provide citizens with information about police performance and crimes in particular neighbourhoods, in order to improve the public accountability of local forces. Such data may include location, date and type of crime, the outcome of stop and searches²⁹ or names of police officers to be able to address complaints about a policeman's behaviour. Interfaces to access police data may comprise data portals like police.uk³⁰ or so-called crime maps³¹. Open data about police may also contain more fine-grained data about police performance. The city of Indianapolis has developed an open data portal³² to show information about the use of force, officer-involved shootings and complaints against officers. Opening up police-related performance data may also be supported by measures to improve the quality of respective data³³.

IV. Strengthening local democracy

24. City data can also be used to strengthen local democracy. Many city data initiatives aim to increase transparency, accountability and public participation, including through "e-democracy" projects, "civic hacking" projects,³⁴ local data journalism initiatives,³⁵ and the use of data in more inclusive planning and public policy-making processes.

25. Quite a few of the projects using data in the service of democratic engagement are national in scope. Over the past decade there have been many developments in the field of "parliamentary

25 For examples see the applications Mapumental (UK) (<https://mapumental.com/>), Nice City Pass (France): <https://play.google.com/store/apps/details?id=com.inqbarna.citypass&hl=en> or Mapnificent (worldwide) <http://www.mapnificent.net/>

26 See: <https://www.mysociety.org/2013/10/02/accessibility-of-welsh-schools-by-public-transport-visualised/>

27 See: <http://www.ratemyplace.org.uk/about>: a similar example is the app Dont Eat At (New York City): <http://www.donteat.at/>

28 See: <http://blog.buergerbautstadt.de/about/>

29 See: <https://www.police.uk/city-of-london/cp/performance/stop-and-search/>

30 See: <https://www.police.uk>

31 Examples for crime maps may be found for West Yorkshire (UK): <http://www.beatcrime.info/>, Copenhagen:

<http://www.dognrapporten.dk/>; or Vienna: <http://www.vienna.at/features/crime-map>,

32 See: <http://www.codeforamerica.org/blog/2015/12/04/comport-open-police-data-in-indianapolis-and-beyond/> and <https://www.projectcomport.org/>.

33 The topic of undocumented homicides related to police violence is highly contested in the US. Projects like The Guardian's The Counted demonstrate that data of police violence may have significant gaps. Currently the Federal Bureau of Investigation (FBI) discusses measures to improve these data. See also: <http://www.theguardian.com/us-news/2015/dec/09/fbi-police-killings-database-change>

34 "Civic hacking" is a term which is often used to describe how technology can be used to improve civic life and increase democratic engagement. See, for example, J. Crabtree (2007) "Civic hacking: a new agenda for e-democracy", Open Democracy, available at: https://www.opendemocracy.net/civic_hacking_a_new_agenda_for_e_democracy; and J. Levitas (2013) "Defining Civic Hacking", Code for America, available at: <http://www.codeforamerica.org/blog/2013/06/07/defining-civic-hacking/>

35 The use of data to improve journalism. See, for example, J. Gray, L. Bounegru & L. Chambers (Eds.) (2012) The Data Journalism Handbook. Sebastopol, CA: O'Reilly Media. Available at: <http://datajournalismhandbook.org>

informatics” which enables citizens to receive customised updates around their political representatives or issues they care about.³⁶ For example, the TheyWorkForYou project enables British citizens to follow what their elected representatives say and how they vote.³⁷ The GovTrack.us project lets US citizens track bills through congress.³⁸ In France, the *La Fabrique de la Loi* project aims to make it easier to understand, analyse and engage with law-making processes.³⁹

26. There are now similar projects to enable citizens to track political activity at subnational level, including for regional and city level governments. For example, in the US the open source Councilmatic project enables citizens to receive updates and comment on city bills, council members and events.⁴⁰ The project has also been used to identify trends in speeches and voting patterns.⁴¹ The city of Helsinki has released detailed data about local decision-making leading to numerous projects enabling citizens to follow decisions as they happen.⁴²

27. Several projects combine information from different sources to provide a richer picture of local government and local politics. For example, Transparency International Lithuania aggregated information from local council websites, including asset registers, party affiliations, and employment records, in order to profile local politicians and possible interest connections between them.⁴³

28. In addition to initiatives enabling people to follow and better understand local political activity, several projects use data about politicians to provide services which let citizens contact their local representatives. The UK’s WriteToThem project helps users to contact their political representatives at local, national and European level, based on their postcode.⁴⁴ Government research showed that 78% of UK citizens don’t know who represents them.⁴⁵ The project addresses this by making it easy to find and contact their representatives. In a similar vein, the AskThem project lets users publicly ask and get public answers to questions from their political representatives.⁴⁶

29. Some projects aggregate information about local politicians and political parties to help citizens make informed decisions about who they vote for. The German Talomat 2.0 project combines data from public institutions and political parties in order to help identify which politicians are most strongly aligned with their views and interests.⁴⁷ The Election Leaflets project is a citizen archive of political leaflets to enable civil society groups and journalists to track statements and promises.⁴⁸

30. Granular data about local elections also enables the creation of projects that narrate, analyse and let users explore the results.⁴⁹ For example, a data project from the Berlin Morgenpost highlights major changes from previous elections, close results, and voting trends in areas with long term unemployment, older populations, and low voter turnout.⁵⁰ The Election Data Guide provides principles for public authorities and others who are interested in best practices for opening up data about elections.⁵¹

31. Some cities provide data about lobbying activities directed towards local politicians and institutions. This information has been used to enable public scrutiny of interactions between lobbyists and officials. The Chicago Lobbyists project gives an overview of the highest paid lobbyists and lobbying firms, as well as the most active clients and most lobbied agencies.⁵² The Toronto Star has used data about local lobbying activities in a series of projects, reports and investigations.⁵³

36 For a list of national examples, see: https://en.wikipedia.org/wiki/Parliamentary_informatics

37 <http://theyworkforyou.com>

38 <https://www.govtrack.us/>

39 <http://www.lafabriquedelaloi.fr/>

40 <http://www.councilmatic.org/>

41 See: <http://gapersblock.com/mechanics/2013/06/04/keep-tabs-on-city-council-and-your-alderman-with-councilmatic/>

42 See: <http://dev.hel.fi/projects/openahjo/>. For an explanation and examples, see: <http://fi.okfn.org/paatokset-nakyviin/>.

43 <http://jurgiokepure.lt/>

44 <https://www.writetothem.com/>

45 <https://www.writetothem.com/about-qa#point>

46 <http://www.askthem.io/>

47 <http://www.wuppermeister.de/>

48 <https://electionleaflets.org/>

49 For examples of the use of electoral data in journalism, see: <http://www.theguardian.com/news/datablog/2012/jun/21/open-data-election-hack-vote>

50 <http://berlinwahlkarte2013.morgenpost.de/>

51 <http://openelectiondata.net/en/guide/>

52 <http://www.chicagolobbyists.org/>

53 https://www.thestar.com/news/city_hall/lobbyists.html

32. Data about local public finances has been used in numerous projects from journalists and civil society organisations to help citizens understand where money comes from and how it is allocated and spent.⁵⁴ These include numerous data visualisation projects showing to make city finances more accessible - including with maps, timelines, charts, dashboards and other graphics.⁵⁵

33. City data has also helped to facilitate more participatory planning and policy-making processes. For example, after public debates about plans to develop the site of the former Tempelhof airport, the Berliner Morgenpost used public data in order to create an interactive graphic, demonstrating the plans and the debates around them.⁵⁶

V. Transitioning to greener cities

34. Open data can also be used to help with the transition to greener, cleaner and more environmentally friendly cities. For example, open data about air or water pollution may be geographically mapped in order to see the concentration of hazardous material in a neighbourhood over time. Airlapse shows the concentration of particles such as carbon monoxide per hour in different areas of the city of Bath (UK).⁵⁷ The website “In the Air” visualizes air pollution data in Madrid to show particles which would otherwise remain invisible - such as particulate matter, pollen, and gases.⁵⁸

35. Similarly the German website Berliner Badestellen shows a map of natural bath spots in Berlin with playful visualizations indicating their water quality.⁵⁹ Open data on the quality of tap water may inform citizens about particular particles in their drinking water. The German project *Was steckt in meinem Leitungswasser?* (“What is in my tap water?”) collected municipal data of every neighbourhood in the city of Heilbronn, made it machine-readable and transformed it into a valuable resource for citizens to learn about water quality.⁶⁰ Citizens may learn how water quality can vary even within one city and about where their drinking water comes from. This information can be used by citizens to advocate for the reduction of pollution and better water quality.

36. Open environmental data may help people with specific health issues to improve their life quality. The app Allairgoo offers people with asthma or allergies individual information on air quality in multiple cities.⁶¹ It combines data on air quality, i.e. data of single pollutants, official air quality indexes, etc. - with personal user data, for instance about chronic respiratory diseases.

37. Data about city water management can be used to keep citizens informed so that they can avoid coming into contact with potentially hazardous materials. Chicago’s water management agencies periodically release sewage into the Chicago River in case of heavy rainfall to prevent sewers from flooding, which is one of the reasons that parts of the river cannot be used for swimming or recreational purposes.⁶² A project called “Is There Sewage in the Chicago River?” collects official announcements from Chicago’s water management agencies published on a variety of different websites in order keep citizens updated about pollution events via email, SMS or Twitter alerts.⁶³

38. City data can be used to flag up toxic threats for soil and groundwater. The map of “Spills in Brooklyn” visualizes records of the New York State Department of Conservation to show noxious chemical spills in different locations around New York’s neighbourhood Brooklyn.⁶⁴ Circular graphics mark a spill on the map, the size of a circle indicates the extent of spill in gallons. Thereby the map

54 For examples on this topic see: J. Gray (2015) Open Budget Data: Mapping the Landscape. Available at: <http://dx.doi.org/10.2139/ssrn.2654878>

55 See: J. Gray (2015): Examples of Fiscal Data Visualisations. figshare. Available at: <https://dx.doi.org/10.6084/m9.figshare.1548331>

56 <http://interaktiv.morgenpost.de/tempelhofer-feld/>

57 See: <http://www.bathhacked.org/airlapse/#>

58 See: <http://intheair.es/>; other examples include AirLR (France): <http://www.epsiplatform.eu/content/montpellier-open-data-used-create-app-monitors-air-quality> or Air Quality+ (UK): http://betterwithdata.co/portfolio/air-quality-plus/?utm_source=sccweb&utm_medium=weblink&utm_campaign=airqualityplus

59 See: <http://berlin.codefor.de/badestellen/>

60 See: <http://opendatalab.de/projects/trinkwasser/>

61 See: <http://allairgoo.com/#>, a similar example is the Plume Air Report (worldwide): <https://www.plumelabs.com/>

62 See also: <http://www.chicagotribune.com/news/ct-chicago-river-bacteria-20150827-story.html>

63 See: <http://istheresewageinthechicagoriver.com/>

64 See: <http://jillhuble.com/project/spills/>; other examples with a more regional scope include the Spillmapper project: <http://spillmapper.westernpriorities.org/> or the website ‘Whats Down’: <http://whatsdown.terradex.com/#/7/42.298/-77.432/>. These records are based on confirmed and suspected releases of noxious material to the environment. For further details see: <http://www.dec.ny.gov/chemical/8428.html>

enables a person to see whether and to what extent a neighbourhood is affected by contamination and opens new possibilities for stakeholders to inquire into the effects of spills on soil and groundwater.

39. City data can also be used to identify and re-vitalize unused land and urban spaces for purposes such as gardening and food projects.⁶⁵ The website 596 Acres uses municipal data about publicly owned vacant land in New York City and information of public institutions responsible for the maintenance of the land.⁶⁶ The map helps to identify vacant land in Brooklyn, enabling communities to share and collect ideas about how to revitalize these areas and to get into contact with responsible institutions which may grant access to these sites. The 596 Acres project serves multiple purposes: raising awareness for land resources in Brooklyn; stimulating civic engagement; fostering food sovereignty projects in the city and creating spaces for communities and institutional actors to enter into dialogue about using vacant land in a way that can benefit multiple stakeholders. Leerstandsmelder is a similar German project, which indicates the location and description of vacant buildings and municipal territories⁶⁷.

40. Open data may improve municipal capacities to enforce environmental regulations, help citizens and civil servants to identify gaps in services and to support people in complying with the law. The project “My Building Does Not Recycle” allows Chicagoan residents living in high-density units to report whether their landlords provide them with adequate recycling services.⁶⁸ Although these services are mandatory, the city of Chicago does not effectively enforce them for multi-unit housing. By reporting a lack of recycling services, the project helps citizens to provide evidence on how many buildings are under resourced and to hold landlords to account for the provision of recycling services.

41. Similarly, New York City’s Heat Seek project combines low-cost sensors in private households and compares them with minimum temperature requirements according to heating regulations in private households.⁶⁹ These regulations oblige landlords to ensure hot water and heating, especially in cold months.⁷⁰ Heat Seek constantly monitors the room temperature offering both citizens and responsible authorities evidence to ensure that landlords comply with the law.

42. Open data may be re-used in services that facilitate the transition towards more energy-efficient housing. The Danish husetsweb.dk helps citizens to find ways of improving the energy efficiency of their homes, including financial planning and finding builders who can do the work.⁷¹ The service is based on cadastral information and information about government subsidies, as well as the local trade register.

43. Open data may improve the efficient management of scarce natural resources in a city and make them more resilient. The application Save the Rain facilitates rainwater harvesting, i.e. the storage of rainwater, by calculating how much rain can be captured from a rooftop per year.⁷² The website translates open water management data into an interactive map, on which users can identify their house and mark their roof in order to indicate its size. Primarily used in the context of developing countries, the app demonstrates how open data on water management and weather may inform urban dwellers about more efficient strategies to use resources.

44. Noise pollution can be a major issue in some cities, with traffic being a major contributor.⁷³ Several projects provide maps of noise levels in different cities to make the problem visible in the most affected neighbourhoods.⁷⁴ NoiseTube demonstrates how user-generated maps may help to increase evidence about noise levels in order to improve policy-making processes, planning and action around this problem.⁷⁵ Using smartphone microphones, the app allows citizens to track noise levels on a regular basis and to tackle noise pollution issues with local governments.

65 For further details on food sovereignty projects, see for instance: <http://usfoodsovereigntyalliance.org/what-is-food-sovereignty/>

66 See: <http://596acres.org/en/about/>.

67 See: <http://www.leerstandsmelder.de/>

68 See: <http://mybuildingdoesntrecycle.com/>

69 See: <http://heatseeknyc.com/>

70 For further details see: <http://www1.nyc.gov/site/hpd/owners/heat-hot-water.page>

71 See: <http://www.husetsweb.dk/>

72 See: www.save-the-rain.com/

73 See also : <http://www.eea.europa.eu/themes/noise>

74 Examples include maps for noise levels in different British cities: <http://services.defra.gov.uk/wps/portal/noise> or Amsterdam: <http://maps.amsterdam.nl/geluid/?LANG=de>

75 See: <http://noisetube.net/#&panel1-1>

45. Open data may improve the safety of citizens and help to prevent disasters and damages. For example, FloodAlerts is a website using data from the British Environment Agency to supply residents in England and Wales with alerts about flood events.⁷⁶

VI. Enhancing cultural experience

46. Around the world public institutions in the GLAM (Galleries, Libraries, Archives and Museums) sector have taken steps to open up their collections by openly publishing their digital content and information via datasets and APIs.⁷⁷ Events such as hackathons⁷⁸ or workshops between public institutions, cultural heritage organisations, creative professionals and tourism experts can help to stimulate the development of applications that enhance the experience of a city's cultural heritage and open new possibilities for cultural tourism.⁷⁹

47. "Augmented reality"⁸⁰ applications such as the Europeana Beacon project make use of city sensors that communicate with a user's smartphone to provide openly accessible information for a specific location.⁸¹ Monuments, squares and other places may be enriched with images, videos and audio files, offering citizens an enhanced experience of a city's history. The Blinkster app allows users to take pictures with a mobile device and to receive information from institutions, amateurs and experts about a work of art as well as proposals for new places to go, artworks to see and itineraries to discover.⁸²

48. Other projects make use of photographic material to innovate the experience of a city's cultural past. For example, Nostalgeo⁸³ (The Netherlands) and Historic Bath⁸⁴ (UK) integrate historical photographs and other images into Google Streetview to discover and compare historical photographic material with the present. Discover Derbyshire and Peak District (UK) blends historical and present photographic material and adds descriptive texts with historical information.⁸⁵

49. Various projects use mapping technologies such as OpenStreetMap⁸⁶ or Google Maps and overlay them with georeferenced historical information or cultural material. The History Map of the city of Bath (UK) overlays contemporary maps from OpenStreetMap with historical maps of the city.⁸⁷ Through this project, users can learn more about the city's historical development. Additionally the same website runs a project to locate historical paintings (including the name and image) on a map of Bath. Users may find the original spots that served as inspiration for painters more easily, understand which and how many places served as a model for paintings and experience the city and its cultural history in a new way.

50. Cultural data may be used to build navigation apps and websites that allow users to explore cities in new ways. The Adelaide City Explorer (Australia) is a map-based interface that allows to select a neighbourhood and show collections of points of interest within that area, visualized as pin points.⁸⁸ These collections or "trails", help users to discover the lesser known details of Adelaide by presenting stories covering architectural styles, social and technological innovation or personal biographies. Similarly, RandomApp is a project allowing visitors of Amsterdam to discover new museums.⁸⁹ Based on a user's location the app creates a list of institutions in the vicinity. Instead of giving driving directions

76 See: <http://www.shoothill.com/FloodMap/>

77 See, for example, the Open GLAM project: <http://openglam.org/>. For a directory of APIs, see: <http://museum-api.pbworks.com/w/page/21933420/Museum%C2%A0APIs>

78 Such as hackathons by Europeana Space:<http://www.europeana-space.eu/hackathons-home/> or Open Cultuur Data: <http://www.opencultuurdata.nl/wiki/hack-de-overheid-open-data-weekend/>

79 See: <http://www.eu2015lu.eu/en/agenda/2015/10/14-15-europeana-smart-cities/index.html>

80 "Augmented Reality allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, [it] supplements reality, rather than completely replacing it" Source:

https://www.mitpressjournals.org/userimages/ContentEditor/1332945956500/PRES_6-4_Azuma_web.pdf

81 See: <http://www.oimmi.com/europeana/europeana-beacon.html>

82 See: <http://www.blinkster.eu/en>

83 See: <http://www.nostalgeo.com/>

84 See: <http://www.historyofbath.co.uk/>

85 See: <http://www.discover-derbyshire.com/#about>

86 OpenStreetMap describes itself as '[a]n openly licensed map of the world being created by volunteers using local knowledge, GPS tracks and donated sources'. Thereby it allows users to add new geographic data to existing maps. For further information see: <http://www.openstreetmap.org/about>

87 See: <http://nadnerb.co.uk/HistoryMap/>; a similar example is Old Maps Online : <http://www.oldmapsonline.org/>

88 See: <http://adelaidecityexplorer.com.au/>

89 See: <http://www.opencultuurdata.nl/2013/01/demo-randomapp/>

it guides users to their destination through a compass, thereby emphasizing random encounters with the city that happen on the way to a location.

51. Open data may be combined with citizens' feedback to improve the quality of data while engaging citizens with historical data. For instance, the "Tag. Check. Score" project allows users to comment on digitized picture files of the Museum of Ethnology in Berlin to say whether the classification of an image corresponds with the actual content of an image.⁹⁰ Thereby users help to improve the classification of a picture and engage with historical information while museums may improve the quality of their metadata.

VII. The making of data cities?

52. In this report we have introduced the idea of open data and examined four ways in which it might provide value to cities: (i) improving public service delivery, (ii) strengthening local democracy, (iii) transitioning to greener cities and (iv) enhancing cultural experience. In this section we will conclude with some suggestions on steps that cities can take to support innovation in these areas.

53. As noted in our introduction, the process of starting an open data initiative can be relatively straightforward. One of the main steps is to release information in a form which is legally and technically open, namely under an open license in a machine readable format.⁹¹ From this point of view a very basic open data pilot can potentially be as simple as a web page with links to open datasets which are made available by city institutions. Datasets can also be published via dedicated open data portals.

54. While these elements might be good first steps for an open data pilot, they must be accompanied by at least some activities to engage with citizens and prospective data users. As well as providing "machine readable" data suitable for analysis and re-use, cities should also consider providing "human readable data" to communicate public information to citizens. The external re-use of data should complement, not replace, the use of data by cities to provide information and digital services to citizens.⁹²

55. As well as publishing information, cities can proactively engage with different publics to stimulate the re-use of city data. This might include engaging citizens and civil society groups who might be interested in using city data through events, activities and programmes to stimulate the use of data to provide societal value. For example, many cities have run public events, hackathons, fellowship programmes, competitions, and also provided grant funding for data projects. Many applications of city data may be through "data intermediaries" who communicate and provide services to broader publics. Mapping and engaging with the local landscape of potential data intermediaries can increase the impact of city data.

56. In addition to direct outreach to potential re-users, cities may also collaborate or create partnerships with civil society groups and others to organise activities that re-use official data. Groups like Code for America,⁹³ Code for Germany,⁹⁴ Code for Europe,⁹⁵ Code for Africa,⁹⁶ Code for All,⁹⁷ Young Rewired State,⁹⁸ and Hacks/Hackers⁹⁹ have played an important role in fostering the use of public data, as have numerous grassroots open data groups and national chapters of global civil society organisations such as Open Knowledge¹⁰⁰ and Transparency International.¹⁰¹ Universities and research centres may also be interested in re-using local data. This might include local computer science and digital media departments as centres and labs – such as the MIT Media Lab (US)¹⁰², the médialab at

90 See: <http://cityapps.fokus.fraunhofer.de/tcs/#content-tag>

91 See, for example, the Open Data Handbook: <http://opendatahandbook.org/>

92 More on this point is included in the report: J. Gray (2015), Open Budget Data: Mapping the Landscape. Available at: <http://dx.doi.org/10.2139/ssrn.2654878>

93 <https://www.codeforamerica.org/>

94 <http://codefor.de/>

95 <http://codeforeurope.net/>

96 <http://www.codeforafrica.org/>

97 <http://codeforall.org/>

98 <http://www.yrs.io/>

99 <http://hackshackers.com/>

100 <https://okfn.org/network/>

101 <https://www.transparency.org/country/>

102 <https://www.media.mit.edu/>

Sciences Po (France)¹⁰³ or the Citizen Data Lab (Netherlands).¹⁰⁴ These and other groups may help to undertake training, capacity building or data literacy activities.

57. Local institutions should also consider gathering feedback from various stakeholders to understand the interests of different user groups and to inform data publication priorities. Releasing inventories or “asset registers” of information held by local institutions can help to guide discussions about what data would be of interest for different re-user groups. Events, workshops and consultation activities can also help to gauge demand for different types of data.

58. Finally, cities can go beyond opening up datasets to making city data infrastructures more responsive to the interests and concerns of their publics. This can include not just engaging with citizens and civil society groups about what data is *released*, but also about what data should be *generated* in the first place, whether through adjusting existing data collection practices, or through establishing new data creation activities.¹⁰⁵

59. This might include through workshops and consultation activities with relevant public institutions, request or feedback mechanisms, or official communication channels or digital engagement staff. Any adjustments to existing data infrastructures or new data collecting operations must of course be pursued in compliance with relevant laws and policies. This includes ensuring adequate protection of privacy and personal information, as per EU Data Protection rules.¹⁰⁶

60. Taking steps to make city data infrastructures more responsive to the interests and concerns of citizens can open up new spaces for dialogue between public institutions and civil society about what matters and how this should be translated into policies.

103 <http://medialab.sciences-po.fr>

104 <http://www.citizendatalab.org/>

105 See: J. Gray (2015) Democratising the Data Revolution: A Discussion Paper. Open Knowledge. Available at: <http://blog.okfn.org/2015/07/09/democratising-the-data-revolution/>; and Gray, Gerlitz, Bounegru (forthcoming) Towards a Literacy for Data Infrastructures.

106 F.J. Zuiderveen Borgesius, M. van Eechoud and J. Gray (2015) Open Data, Privacy, and Fair Information Principles: Towards a Balancing Framework. Available at: <http://ssrn.com/abstract=2695005>