Supporting sustainable development with open data

Open Data Institute

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Executive summary

Open data can make an impact across the globe. Its role in combating development challenges of the next 15 years, both as a tool for measuring progress and in finding solutions, is becoming more clear. As this paper will show, open data has been used to help plan smarter cities in Rio de Janeiro, streamline emergency response in the Philippines, map the Ebola outbreak to save lives in West Africa and help parents to assess school performance in Tanzania. Open data can also bring significant economic benefits: it could be used worldwide to generate between US$720-920bn in digital transport applications,[1] and US$150–270bn in geospatial technology. [2]

In 2015, the United Nations will gather governments, civil society groups and international non-governmental organisations (NGO) from around the world to decide on global development priorities for the next 15 years. The previous eight Millennium Development Goals (MDGs) have guided global efforts to reduce extreme poverty since 2000. The next 'Sustainable Development Goals' (SDGs) will address major global issues of justice, human rights, social inclusion, prosperity and the environment.[3]

Following the release of the UN Secretary General's synthesis report on the post-2015 development agenda,[4] this is a critical time for country governments, donors, business, NGOs, academia and the open data community to consider how open data can be applied practically in pursuit of the new UN principles, goals and targets.

> **"Open data has been used to inform city planning in Rio de Janeiro, streamline emergency response in the Phillippines and assess school performance in Tanzania.'**

While open data can be used to benefit many sectors, this report identifies three where it could have a significant impact in the next development agenda and beyond.

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1   Schneider Electric, Arup, and the Climate Group (2014) *Urban Mobility in the Smart City Age*

2   Oxera Consulting (2013) *What is the economic impact of Geo services?*

3   UN (2014) *Synthesis report of the Secretary General on the post-2015 agenda: The road to dignity by 2030: Ending poverty, transforming all lives and protecting the planet*

4   Ibid.

Open data can: **i) more effectively target aid money and improve development programmes, ii) track development progress and prevent corruption,** and **iii) contribute to innovation, job creation and economic growth.**

To achieve these aims the development community must address many challenges, including:

1. A weak enabling environment for open data publishing
2. Poor data quality
3. A mismatch between the demand for open data, and the supply of appropriate datasets
4. A 'digital divide' between rich and poor, affecting both the supply and use of data
5. A general lack of quantifiable data and metrics

With these challenges in mind, the report sets out ways that governments, donors and (international) NGOs – with the support of researchers, civil society and industry – can apply open data to help make the SDGs a reality:

1. **Reach global consensus around principles and standards**, namely being 'open by default', using the Open Government Partnership's Open Data Working Group as a global forum for discussion.
2. **Embed open data into funding agreements**, ensuring that relevant, high-quality data is collected to report against the SDGs. Funders should mandate that data relating to performance of services, and data produced as a result of funded activity, be released as open data.
3. **Build a global partnership for sustainable open data,** so that groups across the public and private sectors can work together to build sustainable supply and demand for data in the developing world. The ODI supports the UN's proposal for a Global Partnership for Sustainable Data, which should include data-users and the private sector to foster global technology transfers, policy development and knowledge sharing.

This report explores how world leaders can use and promote open data to tackle global problems post-2015. It does not evaluate specific SDGs, but provides examples of where open data is starting to make a difference in cities and nations around the world. It draws extensively on international open data case studies, the Open Data Barometer,[5] – a survey of open data policy and practice across the world, launched by the World Wide Web Foundation – and ongoing research by the Open Data Research Network.[6]

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5   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

6   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

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Introduction: why open data?

Around the world, governments have recognised the potential of open data to drive development and improve livelihoods. Open data is data that is made available by organisations, businesses and individuals for anyone to access, use and share. By being available to anyone, open data can be used by policy-makers, researchers, entrepreneurs, civil society, journalists and citizens to improve service delivery, build new businesses or hold aid recipients to account for resource allocation.

Over the past five years, national, regional and city governments have built open data platforms, enacted open data policies and strategies, conducted open innovation competitions and hackathons, and built capacity in open data and digital literacy. Alongside this, a number of international institutions and NGOs have launched open data projects. In 2013, the Open Data Charter was signed by G8 countries, setting out the principle of open by default,[7] prompting calls for a 'data revolution' to take centre-stage in the post-2015 development agenda.[8] Underlying these efforts is the notion that opening data can improve access to information and transparency, which promotes better informed decision-making and accountability.

12 of the 41 national platforms for accessing open data by 2013 were owned by developing countries.

While the benefits of open data are relevant to governments the world over, open data can make a particularly important contribution towards international development. Recognising the potential for open data, 12 of the 41 national platforms for accessing open data launched by 2013 were created by developing countries.[9] Regional and global institutions have followed suit, with the African Development Bank becoming the first pan-African entity to provide regional information through a central platform.[10] As the international community considers what the next global development framework will look like, open data is a central part of this discussion.

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7   Cabinet Office UK (2013) *G8 Open Data Charter and Technical Annex*

8   UN High Level Panel of Eminent Persons (2013) *A new global partnership: Eradicate poverty and transform economies through sustainable development*

9   Mutuku, L. & Mahihu C.M. (2014) *Understanding the impacts of Kenya open data applications and services*, iHub Research, Nairobi Kenya

10   For example, the African Development Bank (ADB) has initiated the 'Open Data for Africa' platform, which is aimed at boosting access to quality data necessary for managing and monitoring development results in African countries, including the Millennium Development Goals. See: http://opendataforafrica.org, accessed on 2014-12-22

The data revolution is still in its early stages, so the full range of impacts and gains from open data are yet to be fully realised. Truly harnessing the transformative potential of open data will require cooperative efforts of country and local governments, donors, global institutions, civil society, academia, business/industry and the wider open data community.

This report examines what is possible in the post-2015 world to inspire and motivate leaders on their open data journey, rather than evaluate specific Sustainable Development Goals and targets. It provides examples of where open data is already making a difference in cities and nations around the world, and draws extensively on the Open Data Barometer,[11] which surveys open data policy and practice internationally, case studies from the ODI's work and ongoing research by the Open Data Research Network.

Open data and the data revolution: the story so far

In 2000, the Millennium Development Goals (MDGs) were committed to by the nations of the world as a new framework to guide development priorities until 2015. By 2014, enormous progress had been made towards achieving many of the goals, in particular, halving the number of people living in extreme poverty. However, progress has been slow other areas, such as gender equality, maternal and infant mortality, governance and environmental sustainability.[12]

As the MDG deadline approaches, funders, NGOs, international government organisations, governments, civil society organisations and other interested parties have joined in a global consultation to define a new framework. This consultation process has led to 17 proposed Sustainable Development Goals (SDGs) to guide international development cooperation for the next 15 years.

The data revolution has formed a central part of the post-2015 development discussions. It was first identified in the report of the High Level Panel of Eminent Persons on the post-2015 development goals, in May 2013:[13]

   "New technologies are leading to an exponential increase in the volume and types of data

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11   The 2013 Open Data Barometer report was a joint collaboration between the World Wide Web Foundation and the ODI.

12   UN (2014) *The Millennium Development Goals, 2014 report*

13   UN High Level Panel of Eminent Persons (2013) *A new global partnership: Eradicate poverty and transform economies through sustainable development*

available, creating unprecedented possibilities for informing and transforming society and protecting the environment. Governments, companies, researchers and citizen groups are in a ferment of experimentation, innovation and adaptation to the new world of data, a world in which data are bigger, faster and more detailed than ever before. This is the data revolution."[14]

The revolution has been driven by multiple factors, most importantly the fast-growing quantity of data that is being collected by corporations, governments, NGOs and individuals, and new technologies which make it possible to better collect and analyse data. Many in the development community recognise the need to measure development indicators more reliably to be able to determine progress. This is driven by a push for greater aid effectiveness and accountability from development programmes: requiring reliable, transparent data as evidence.

"While the elements provide a useful lens for understanding the interrelated dimensions of poverty, there is still no agreement on how to reach the SDGs."

To enhance understanding of the data revolution, the UN Secretary General appointed an independent expert advisory group to prompt a 'data revolution for sustainable development'. Their report, released in November 2014, calls on governments and the UN to enable data to play its full role in the realisation of sustainable development by closing key gaps in access and use of data.[15]

This means:
- integrating traditional and new data sources to produce relevant information for many purposes and users, especially to monitor development progress
- promoting greater openness and transparency, while minimising inequality in data production, access and use
- encouraging more empowered people, better policies, better decisions and greater participation and accountability

However, the report also raises two main problems in achieving this vision: a lack of high-quality data, and data not being used or usable.

In response to this report and many other submissions from citizens and organisations, the

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14   IAEG on a data revolution for sustainable development (2014), *A world that counts*

15   Ibid.

UN Secretary General released a 'Synthesis report on the post-2015 development agenda' on 4th December 2014.[16] The report proposes six elements essential to delivering on the SDGs, to eradicate extreme poverty by 2030. The elements have interrelating themes such as justice, prosperity, dignity, social inclusion and environmental protection.[17] While the elements provide a useful lens for understanding the interrelated dimensions of poverty, there is still no agreement on how to achieve the SDGs.

However, there is a stated commitment to more public transparency, information sharing, participatory monitoring and open data. The report also calls for a global action plan on data, including supporting national data capacities and a 'global partnership for sustainable data' to mobilise and coordinate actions to make the data revolution for sustainable development a reality.[18]

What can open data do for development?

Open data can work as a tool for development in many different ways, from boosting aid transparency to broadening access to education, as the case studies in this section demonstrate. Following the release of the UN Secretary General's synthesis report, this is a critical time for governments, donors, business, NGOs, academia and the open data community to consider how open data can be applied in pursuit of the new principles, goals and targets. This section identifies how open data can be embedded into the next development agenda.

Informing evidence-based policy-making for better government services

Open data can help to inform evidence-based policy-making and the design of government services. It offers policy-makers a source of information to identify wasteful spending, better target resources and design more responsive services. Although open data can be useful to most services, to date it has been especially relevant in the areas of healthcare, education, disaster risk management and transportation, as the case studies presented here show.

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16   UN (2014) *Synthesis report of the Secretary General on the post-2015 agenda: The road to dignity by 2030: Ending poverty, transforming all lives and protecting the planet*

17   Ibid. The six principles proposed by the UN Secretary General are: 1) dignity, to end poverty and fight inequality; 2) prosperity, to grow a strong, inclusive and transformative economy; 3) justice, to promote safe and peaceful societies, and strong institutions; 4) partnership, to catalyse global solidarity for sustainable development; 5) planet, to protect our ecosystems for all societies and our children; 6) people, to ensure healthy lives, knowledge, and the inclusion of women and children.

18   Ibid. p38

Open data can improve government services in three main areas: first, streamlining the dissemination of information within government; second, providing better information for policy-makers; and third, enabling the targeting of resources. By opening up datasets on a central portal, government departments can share information easily and prevent silos from emerging. Evidence suggests that where governments have introduced open data portals, a large proportion of the views or downloads are from civil servants in other departments.[19] Therefore, open data portals can quickly circumvent bureaucratic obstacles, and instead provide policy-makers with immediate access to the relevant data.

Rod Waddington: Flickr (CC By-SA 2.0)

Case study 1: Protecting banana farmers' livelihoods in Uganda

Open-sourced, open datasets (gathered via Ureport)[20] on banana bacterial wilt in Uganda provided the government with real-time information on the spread of the disease. They were able to quickly identify the most affected areas and direct the limited treatments for the disease to prevent further advances. At the same time, they could disseminate information directly to the public via SMS on treatment options and how to protect their crops. Within five days of the first messages being sent out, 190,000 Ugandans had learned about the disease and knew how to save bananas on their farms.[21]

19   Stott, A. (2014) *Open data for economic growth*. World Bank: http://www.worldbank.org/content/dam/Worldbank/document/Open-Data-for-Economic-Growth.pdf, accessed on 2014-12-21

20   Ureport's website: http://ureport.ug/about_ureport, accessed on 2014-12-20

21   Find a blog on the combating of banana bacterial wilt at: http://www.worldbank.org/en/news/feature/2013/04/26/open-data-can-transform-farmers-response-to-crisis, accessed on 2014-12-21

Governments, NGOs and other stakeholders must establish where there is a need for services, so they can determine where to target scarce resources. Information about water quality, police coverage or concentration of resources against demographic changes, for example, is vital for planners. If this data is released openly, all stakeholders can access and reuse it to demand improved services, policy changes, or build on the knowledge about their community's profile.

Case study 2: Using maps to improve access to education in Kenya

Visualising education data in Kenya revealed a dynamic picture of the state of schools, as well as future opportunities for improvement. In a country where 50% of the population is under 18, it is important for policy-makers to have access to accurate information about access to education, literacy rates and performance across regions. A joint operation between GroundTruth Initiative, Map Kibera, Development Gateway, Feedback Labs, and the Gates Foundation, among others, has connected existing data to bring the informal school sector in Kenya to light for parents, school leaders and education officials.[22] With open data visualisations, it is now possible to see where schools are located in Kenya, and the percentage of children not in education, revealing areas of the population which may be under-served and can therefore be targeted with better services.

Case study 3: Helping parents to assess school performance in Tanzania

Open data can provide an incentive for quality and performance improvements in education by revealing patterns of sliding test scores. Shule.info is a website set up in Tanzania to allow users to examine school performance, compare exam results (by region, or over time),

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22   Hagen, E. (2014) *Making education information available to all in Kebera*, available at http://groundtruth.in/2014/07/09/making-education-information-available-to-all-in-kibera, accessed on 2015-02-11

and evaluate the impact of a huge drop in pass rates in 2012. Those schools performing well can be identified to set the benchmark for best practice in the country. Conversely, those institutions that are under-performing can be more easily identified and targeted with support and interventions. Parents may also be more selective in their choice of schools.[23]

Open data is also being applied in emergency and disaster scenarios. For example, New York has a well-established open data culture, which was utilised when Hurricane Sandy struck the eastern coast of the USA.[24] The experience also prompted the city to open up more data. Meanwhile, Haiti lacked basic information and communication technology infrastructure, but was supported by those who contributed to OpenStreetMap efforts to improve information on Port-au-Prince in the aftermath of the 2010 earthquake. In the Philippines, the value of open data was demonstrated by the response to Typhoon Haiyan/Yolanda. In many respects the response to Typhoon Haiyan/Yolanda shows how these forms of crisis response are maturing quickly.[25]

Case study 4: Exposing $62m in potential pharmaceutical savings in Southern Africa
The Southern Africa Regional Programme on Access to Medicines and Diagnostics (SARPAM) has painstakingly collected and published data on the price and availability of medicines used by members of the Southern African development community. The study revealed huge variations of prices between countries, with public and private sector health groups in Southern Africa having the potential to save over $62m simply by switching to generic medicines, and being charged the same price as other countries.[26] If this data was openly published, it would allow for the prices of medicines to be easily compared and savings to be made. For example, Prescribing Analytics, a joint venture of NHS doctors, academics and London tech startups used open data on the prescription records of family doctors in the UK to reveal over £200m in potential National Health Service savings, where generic drugs could have replaced branded versions.[27]

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23   See '*Open Education Tanzania,*' on Open Knowledge's Open Education Working Group website: http://education. okfn.org/open-education-tanzania, accessed on 2014-12-22

24   Open Knowledge Blog (2012) *Hurricane Sandy and open data*: http://blog.okfn.org/2012/11/01/hurricane-sandy-and-open-data, accessed on 2015-02-11

25   Ibid. See also: '*Open data in the Philippines: best practices from disaster relief and transportation mapping,*' on Innovation is Everywhere's website: http://www.innovationiseverywhere.com/open-data-in-the-philippines, accessed on 2014-12-22

26   Blog post: http://www.sarpam.net/archives/category/news, accessed on 2014-12-22. Database showing potential savings: http://med-db.medicines.sadc.int/country-ranking, accessed on 2014-12-22

27   *NHS efficiency savings: the role of Prescribing Analytics*: http://www.prescribinganalytics.com, accessed on 2015-02-10

Case study 5: Mapping the Ebola outbreak to save lives in West Africa

The Ebola outbreak in West Africa has claimed over 9,000 lives to date,[28] and the spread of the disease has been difficult to track. Initially, maps lacked sufficient detail to show the spread of the disease. The Humanitarian Data Exchange has sought to accurately map the spread of the disease as well as where the treatment centres are, using OpenStreetMap.[29] These maps can quickly show governments and NGOs where the disease is most prevalent, and where new hotspots may be developing.

Keeping track: boosting transparency to help monitor progress and tackle corruption

Without access to basic metrics, it is difficult to build an accurate picture of a country's status in order to improve programmes and demonstrate impact. Aggregating, visualising and publishing baseline information is a critical first step for distributing resources equitably and efficiently. Opening this data provides country governments, international institutions, NGOs, citizens and donors with tools to monitor their progress against development targets and outcomes.

Case study 6: Monitoring child malnutrition around the world

Health inequality within many countries is becoming more pronounced. Malnutrition is one area that requires access to subnational data to make urgent, well-informed decisions. A global database utilising World Health Organisation data on child growth and malnutrition is making subnational data on child malnutrition indicators available and openly accessible. The database, published by the World Bank in Google Maps Gallery showcases sub-national estimates of child malnutrition (prevalence of stunting, underweight, overweight, wasting and severe wasting indicators) using the most recently available data for each country mapped. Data is also available over a 10-year period to track how individual jurisdictions perform against the national average over time and to reveal pockets of vulnerability.[30] A particularly beneficial use of this data would be to build a global subnational map of the prevalence of underweight children that could be used by governments and aid groups to target nutrition interventions to where they are needed most.

Having access to basic demographic data that is collated and tracked over time is especially

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28   Ebola response roadmap: Situation report, World Health Organisation: http://www.who.int/csr/disease/ebola/situation-reports/en, accessed on 2014-12-22

29   See the Humanitarian Data Exchange website: https://data.hdx.rwlabs.org/ebola, accessed on 2014-12-22

30   Sub-national malnutrition indicators for Kenya, Tanzania and Uganda, World Bank Group: http://maps.google.com/gallery/details?id=z8hzujMV2-Do.kYtn9L0FoNyl&hl=en, accessed on 2015-01-22

important to uncover patterns of inequality, and increase awareness of it in communities. A recent study by Development Initiatives assessed the role of open data in the equitable allocation of resources for the eradication of extreme poverty in Kenya and Uganda. They found that although open data is a relatively new concept in both countries, it is facilitating citizen engagement and driving demand for the release of datasets, which, over time, could influence resource allocation.[31] In Uganda, a joint initiative of AidData, the Office of the Prime Minister and Renewed Efforts Against Child Hunger is using geocoding to map nutrition assistance against nutrition indicators, such as prevalence of stunting, to measure impact of development programmes.[32]

Greater openness around budgets, procurement, contracts and aid spending can lead to a number of good governance outcomes, including greater accountability and reduced corruption. The International Aid Transparency Initiative (IATI) and the Extractive Industries Transparency Initiative (EITI), for example, encourage transparency and monitor financial information on a global scale. The former tracks aid spending, while the latter examines the disclosure of taxes and payments made by oil, gas and mining companies to governments.[33] The 2013 Open Data Barometer report found that accountability was the most commonly reported impact by participating countries.[34] Individual donors, government agencies, global institutions and NGOs are responding to calls for greater transparency by making their financial and programme information open and accessible.

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31   Lwanga-Ntale, C.,Mugambe, B., Nganwa, P. (2014) *Understanding how open data could impact resource allocation for poverty eradication in Kenya and Uganda*

32   AidData (2013) *Can mapping nutrition assistance help Uganda solve its malnutrition problem*?

33   IATI website: http://www.aidtransparency.net, accessed on 2014-12-22 and EITI website: https://eiti.org, accessed on 2014-12-22

34   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

Case study 7: Making aid more effective in Nepal[35]

Nepal is currently focusing on building transparent and accountable public institutions following a period of disruptive civil war. By 2013-14, foreign aid represented 22% of the national budget[36] and financed most development spending. NGOs, journalists and civil society have demanded more comprehensive, timely and detailed information on aid flows, particularly geographic information, to show where money is being directed.

In June 2013, the Aid Management Platform[37] was launched by the Ministry of Finance to assist efforts aimed at monitoring aid and budget spending. All NGOs are now required to report details about their funding and programmes to the platform, building on civil society-driven open data initiatives including Open Nepal's open data portal, Aid Snapshot, and the Open Aid Partnership.

There have been positive indications of open data use: civil society organisations are using budget and aid-related data to produce analysis for policy reform; development agencies and NGOs use open government data for programme planning, monitoring and evaluation; and the Ministry of Finance uses open data to formulate the entire government's budget, helping to trace gaps between spending and output.

Case study 8: Holding the Global Fund to account for its health spending

An early application of open data has been the monitoring of aid spending, contributing towards greater donor transparency. Aidspan is an international NGO based in Kenya,

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35   Sapkota, K. (2014) Exploring the emerging impacts of open aid data and budget data in Nepal

36   IECC (2014) *Development cooperation report*

37   Nepal's Aid Management platform: http://portal.mof.gov.np, accessed on 2014-12-21

working to enhance the effectiveness of the Global Fund to fight AIDS, Tuberculosis and Malaria by serving as a watchdog of the fund's programmes.[38] It does this using open data from the Global Fund to publish information, analysis and policy advice for use by policy-makers, data scientists and health advocates alike.

Aidspan publications have covered topics such as procurement cost trends; levels of donor contributions to the fund; the costs and impact of investment in antiviral therapy; and the effect of investment in malaria treatment on child mortality. Impacts of Aidspan's work include informing Global Fund governance reform efforts, influencing the Global Fund funding model, improving the quality and completeness of data through requests to the fund for information, and exposing the misuse of Global Fund money.

Open data initiatives provide motivation for government and intermediary actors to improve and harmonise internal procedures for creating, preparing and using data. Open data standards may lead to improvements in overall data management and the ability to reuse off-the-shelf tools, by providing a format and set of shared practices for collecting and sharing data. For example, in Sao Paulo, geocoding of government budget and spending data by the 'Caring for my neighbourhood' project, has inspired discussion within the city government about how to support more detailed geocoding.[39]

Creating new spaces for citizens to engage with governments

Opening data can improve policy feedback loops and create new spaces for civil society to engage with government, even in closed political contexts. Increased availability of open data allows researchers, civil society and entrepreneurs to access sources of information to support constructive dialogue with government on improving specific services or programmes. The 'Know your budget' initiative in Kaduna state, Nigeria, allows citizens to access budget data and feedback on it to their government.[40] Open Contracting seeks to combat corruption surrounding public contracting (including those funded by combinations of public, private and donor sources) by offering people more information on their government's procurement practices.[41]

38   Aidspan website: http://www.aidspan.org/page/home, accessed on 2014-12-22

39   Davies, T. (2014) *Open data in developing countries: emerging insights from phase 1*, The World Wide Web Foundation, 2014, 8

40   Department for International Development (2013) *Thinking and acting politically: Supporting citizen engagement in governance: The experience of the State Accountability and Voice Initiative in Nigeria*

41   Open Contracting website: http://www.open-contracting.org, accessed on 2014-12-22

Case study 9: Engaging citizens in policy-making in Nigeria[42]

Corruption, wastage and dysfunctional public services are major concerns for citizens in Nigeria.[43] In 2011, the Edo state government began implementing an open data initiative with the support of the World Bank. The initiative explores new approaches to addressing budget transparency, teacher absenteeism and urban upgrading through a citizen engagement platform. An open data portal, data.edustate.gov, was launched in September 2013, the first in Nigeria, and first sub-national portal in all of Africa. For the first time, the state budget, including historical data, was published and made available online for citizens to access.

One year on, the portal is being reused by the tech community, media and civil society, providing citizens with access to about 90 government datasets, including census, fiscal and geospatial data.[44] Other opportunities for participation have included hackathon events and stakeholder roundtables, including with the extractives industry. With the support of the World Bank, the next phase of implementation will focus on releasing new datasets and data visualisations to draw value from existing datasets. Edo state's experience is now being used to inform future initiatives elsewhere in Nigeria.

Stimulating $13tn in economic growth, job creation and innovation

Transforming economies to boost growth and employment has been a major theme of discussion on the global development framework post-2015. The International Labour Organisation estimates that 200 million new jobs are needed over the next five years to keep pace with the growing working-age population in emerging economies and developing countries.[45] To date, many of the benefits of open data for the economy have taken place in developed countries, but there is enormous potential for developing countries to gain from similar approaches. Kenya, which in 2011 became the first sub-Saharan African nation to launch an open data initiative, estimates that opening up government procurement data and exposing price differences could save the government $1bn annually.[46]

42   Bujoreanu, L.,Kaplan, J.,McNaughton, M. (2014) *Open government initiative in Edo State: Fostering an ecosystem of collaboration and transparency*, World Bank

43   See Transparency International's article on Nigeria: http://www.transparency.org/news/feature/nigeria_corruption_ and_insecurity, accessed on 2014-12-22

44   Repackagers and civil society organisations reportedly using open data include Budgit, Connected Development, and the Centre for Social Justice: http://www.opendataresearch.org/project/2013/unilorin, accessed on 2014-12-22

45   International Labour Organisation (2014) *World of Work Report 2014: Developing with Jobs*

46   Berkowitz, E. & Paradise, R. (2011) *Innovation in government: Kenya and Georgia*, McKinsey Quarterly: http://www. mckinsey.com/insights/public_sector/innovation_in_government_kenya_and_georgia, accessed on 2015-02-10

McKinsey has estimated the value of open data at $3tn a year globally, which includes the value of new companies and efficiency gains in key sectors as such as education, health, agriculture and energy.[47] A study for Omidyar has set the cumulative value of open data to G20 countries over the next 5 years at $13tn.[48] A report by the World Bank, 'Open data for economic growth,' identifies several economic benefits of open data, including reducing the costs of existing services, and supporting creation of new businesses, digital service and innovation.[49]

> **"The geospatial sector alone is estimated to generate US$150-270bn in revenue globally, by providing mapping and location data services."**

Governments are beginning to realise the value of releasing datasets which support business activities, such as land registries, addresses of public and private institutions, company registers and geospatial data. The geospatial sector alone is estimated to generate US$150–270bn of revenue globally, by providing digital mapping and location data services.[50] In the UK, data from the Ordnance Survey, the UK's national mapping agency, underpins an estimated £100bn per year of economic activity, for a production cost of £100m.[51] Meanwhile, Norway has introduced an open company register with strong uptake from the business community, who use it to assist invoicing.[52] An evaluation of the policy providing free access to Denmark's address register found that 1,200 enterprises and individuals were consuming the data, with an estimated financial benefit of €62m, compared to implementation costs of €2m.[53]

Corporate data philanthropy: exploring an emerging trend

A small number of companies have started opening anonymised and aggregated data enabling others to analyse the data to derive policy insights or other public goods.[54] In the Ivory Coast and Senegal, for example, Orange Telecom hosted a 'Data for development challenge,' which

47   Manyika, J., Chui,M., Farrell, D., Van Kuiken, S., Groves,P., & Almasi Doshi, E. (2013) *Open data: Unlocking innovation and performance with liquid information*, McKinsey Global Institute

48   Gruen, N., Houghton,J., & Tooth, R (2014) *Open for Business: How open data can help achieve the G20 growth target*, Omidyar Network.

49   Stott, A. (2014) *Open data for economic growth,* World Bank, Transport and ICT Global Practice

50   Oxera Consulting (2013) *What is the economic impact of Geo services?*

51   Ibid.

52   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

53   Ibid. See also: Danish Enterprise and Construction Authority, *The value of Danish address data*, 2010.

54   Term coined at the World Economic Forum in Davos 2011. See http://edition.cnn.com/2011/OPINION/02/02/wolfe. gunasekara.bogue.data, accessed on 2014-12-22

encouraged researchers and developers to use anonymised, aggregated data from their mobile company to develop solutions related to transportation, health and agriculture.[55] Some corporations have voluntarily moved towards open and collaborative practices, but to improve their reputation and, ultimately, their bottom line. Burkina Faso has implemented the Extractive Industries Transparency Initiative (EITI), where companies disclose what they have paid in taxes and other payments, and governments report on what they receive.[56]

> ## "OpenCorporates has aggregated data for nearly 50 million companies in 84 countries and aims to include every country in the world."

Case study 10: Shedding light on 84 million companies around the world[57]
OpenCorporates is the largest open database of companies in the world. Running since 2010, the project has aggregated data for nearly 50 million companies in 81 countries and aims to include every company in the world. The data, collated from government websites, company registers, official filings and data released under the Freedom of Information Act is being used by various people and organisations, from journalists to audit companies and tax offices.

Open data published on the platform also provides businesses around the world with intelligence on competitors, suppliers and potential collaborators. For journalists and civil society, OpenCorporates also provides information to research companies, providing an avenue for policy analysis and corporate responsibility. The World Bank recently recognised the work of OpenCorporates at the G8, when discussing the importance of opening data to tackle trade, tax and transparency.[58]

Predicting crop patterns and weather systems for improved farming and food security

Agriculture is one particular sector where open data has great potential. As the World Bank notes, open data and knowledge sharing "can help farmers and governments in Africa and around the globe protect their crops from pests and extreme weather, increase their yields, monitor water

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55   See: http://www.d4d.orange.com/en/home, accessed on 2014-12-22

56   Ousemane, D., and Kluttz, C. (2013) *Open Contracting addresses employment in the Burkina Faso mining sector*

57   For more information see: http://theodi.org/case-studies/opencorporates-case-study, accessed on 2014-12-22

58   Anstey, C., Remarks at 'Closing Plenary of G8 Conference on Tax, Trade and Transparency' in 2013

supplies and anticipate planting seasons that are shifting with climate change."[59] Farmers may benefit through new approaches to pest management, for example, while intermediaries such as NGOs or entrepreneurs who access this data can develop new derived services. Some groups are already putting open agriculture data to use in analyses and visualisations. For example, the Agriculture Market Information System, which is an initiative of the G20, uses open data to monitor and analyse key markets for wheat, maize, rice and soy bean prices. This information helped inform responses and quell panic surrounding the 2012 drought by providing transparency around the food market.[60] Meanwhile, the Arab Spatial Development and Food Security Atlas uses open data to map land degradation, irrigated land, crop value and other data across the Arab region.

> **Case study 11: Making data available to help feed the world**
>
> The Global Open Data for Agriculture and Nutrition network (GODAN), of which the ODI is a member, is a partnership of development, open data and agricultural actors calling for institutions to open up agriculture and nutrition data, so it can be freely used to benefit the agriculture sector and improve food security.[61] So far, a variety of web-based portals, maps and tools have already been built using publicly available data, such as the Food Security Portal,[62] which helps to track price volatility of different crops. The portal collects data from various sources, including the World Bank, the Food and Agriculture Organisation of the United Nations and others. It provides data and tools, as well as facilitating policy dialogues and networks of members to design appropriate policies. Going forward, GODAN seeks to create a high-level platform for policy engagement, and to reach out to the private sector and innovation startups to foster collaboration on projects that use open data to benefit agriculture and food security in the developing world.

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59   At the 2012 G8 Summit, leaders committed to sharing relevant agricultural data with African Partners as part of the 'New alliance for food security and nutrition'. In April 2013, an international conference on open data for agriculture was also convened, which resulted in several countries releasing action plans to make agricultural datastreams available to users worldwide.

60   Abbassian, A. (2014) *Quelling Future Panic Over Global Food Security,* Australian Institute of International Affairs: http://www.internationalaffairs.org.au/australian_outlook/quelling-future-panic-over-global-food-security/, accessed on 2015-02-05

61   GODAN website: http://www.godan.info/index.html, accessed on 2014-12-22

62   Food Security Portal website: http://www.foodsecurityportal.org, accessed on 2014-12-21

Driving innovation, fostering startups and building smart cities

One of the most significant impacts open data can have is supporting entrepreneurship around the world.[63] Some of the benefits are being seen through startups delivering new data-rich services and through existing companies utilising open data to improve their operations.

Open data supports a range of business activities and models, including:

- **Suppliers:** public and private sector bodies who publish their data.
- **Aggregators:** collectors and aggregators of open, and sometimes private, data.
- **Developers:** those who design, build or sell applications.
- **Enrichers:** those using open data to improve products or services.
- **Enablers:** organisations that provide a platform or technology for open data users.[64]

With new businesses that use open data in these ways emerging internationally, it shows that open data innovation can serve to create employment opportunities.

Open data can also spur innovation in the ways cities are planned and organised, enhancing architecture, transportation systems, basic services, crisis management and the environment. Designing infrastructure to meet the needs of a growing urban population, while ensuring economic and social inclusion, is a major development challenge. By 2050, the urban population is projected to increase by 2.5 billion people, with 66% of the global population living in cities.[65]

> **"Arup estimates that US$720-920bn could be generated worldwide every year by utilising open data to develop digital transport applications."**

Different sectors of government, entrepreneurs and citizens can reuse open government data to solve infrastructure problems, and construct new applications which can improve the local and national economy. For example, in Rio de Janeiro, engineers and architects use Geographic Information Systems (GIS) data made available through a portal called Armazem de Dados for strategic planning and developing commercial activities.[66] A recent report from Arup, 'Urban mobility in the smart city age,' considers the opportunities for cities to improve

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63   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

64   Deloitte analytics (2012) *Open growth: Stimulating demand for open data in the UK*

65   Floater, G. & Rode, P. (2014) *Cities and the new climate economy: The transformative role of global urban growth*, New Climate Economy Paper 01, LSE

66   Matheus, R. & Maia Ribeiro, M. (2014) *Open Government Data in Rio de Janeiro City*

their operational efficiency and traveller experience of transport systems, while generating economic value. Arup estimates that US$720-920bn could be generated worldwide every year by utilising open data to develop digital transport applications.[67]

The integration of open data with new technologies also provides new opportunities for citizens to engage in decisions that affect their day-to-day lives, such as energy use and traffic planning.[68] For example, the Rio Ideas and Rio Apps initiatives called for citizens to share their ideas for how to improve the city, which were then successfully developed into demand-led applications (see case study 12).[69] Local governments in diverse areas, from Sao Paulo and San Francisco, have introduced similar app competitions and hackathons to stimulate innovative, demand-led approaches toward economic reuse of open data.

> **Case study 12: Building smarter, more responsive cities in Latin America[70]**
>
> Cities often represent the lifeblood of their nations' economies, acting as hubs for innovation, tourism, research and employment. Urbanisation is a global phenomenon, with 84% of people in Latin America living in cities, according to the Open Data Research Network.[71] In recent years, several cities throughout the region, including Buenos Aires, Montevideo,
>
> Sao Paulo and Rio de Janeiro, have begun to put open data initiatives into practice. These will address a host of policy challenges such as increasing efficiency, stimulating business innovation, and engaging marginalised groups.
>
> In Rio de Janeiro, open data is being used to inform city planning, transportation and emergency responses.[72] Following flooding in 2010, where torrential rains left thousands homeless, over 70 dead, and the city's infrastructure crippled, the Mayor determined that the city needed a more resilient information management system to safeguard it against future disasters. The Centre of Operations Rio de Janeiro (COR) was created, providing all government departments with access to georeferenced information on issues such as the position of public transport, tidal levels and traffic, much of which is derived from real-time data. This data provides the basis for rapid decision making and coordination between

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67   Schneider Electric, Arup, and the Climate Group (2014) *Urban Mobility in the Smart City Age*

68   For more examples of how big open data is being applied in major cities, see Hinssen, P. (ed.) (2012) *Open Data Power Smart Cities: How Big Data Turns Every City into a Data Capital*

69   Matheus, R. & Maia Ribeiro, M., (2014) Open Government Data in Rio de Janeiro City; pp20-22

70   For more, see the ODDC's research project on open data in local governments of Argentina, Brazil and Uruguay: http://www.opendataresearch.org/project/2013/jcv, accessed on 2014-12-22

71   Ibid.

72   Matheus, R. & Maia Ribeiro, M., (2014) *Open Government Data in Rio de Janeiro City*

departments such as police and health, especially when crises occur.

Recognising the value of this data to citizens and local businesses, the city decided to open it: anyone can access data collated by the COR through a central web portal, Rio Datamine.[73] Rio's municipal government has since hosted several hackathons, bringing together CSOs and developers to create applications that solve social problems. Winning apps include 'The BUUS' which gives the location of the nearest bus and its current status – full or empty. The app has since been introduced to Sao Paulo, where it has become one of the key applications for urban transportation. Another application, EasyTaxi, has recently attracted financing and operates in 12 countries.[74]

Ongoing challenges and gaps in support for open data

Despite significant progress by governments at multiple levels embracing open data policies and portals, substantial challenges remain to be solved before open data can be widely applied to support development. From the available body of research, some of the ongoing gaps and challenges which have been identified by the World Wide Web Foundation, Open Data Research Network and the Open Data Institute, particularly for developing countries, include:[75]

1. **A weak enabling environment.** Low connectivity, scarce technical skills, weak legal frameworks and political barriers can limit effective implementation of open data. The 2013 Open Data Barometer report found that low and mid-ranking countries often lack the foundations for effective publication and reuse of data such as weak or absent right to information laws.[76] Introducing a law or policy of full disclosure is important, but is only part of a broader culture change. Early reviews of an open local government data project in the Philippines have found that other necessary enabling factors required include public awareness of open data, identifying data user demand and building the capacity of data users such as NGOs.[77]

2. **Poor quality, not necessarily poor quantity, of data.** The low quality of published data can often inhibit use of open data platforms and related applications. Missing data or low

73   Rio Datamine website: http://riodatamine.com.br, accessed on 2014-12-22

74   Ibid

75   See namely Tim Davies observations in *Open data in developing countries: emerging insights from phase 1*, The World Wide Web Foundation, 2014

76   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

77   Cañares, M., Marijoe, N., de Guia, J., & Jare, A. (2014) *Opening the Gates - Will open data initiatives make local governments in the Philippines more transparent?*, Step Up Consulting

accuracy of datasets is particularly a challenge for developing economies. Between 1990-2009, very few Sub-Saharan countries had data on all 12 MDG indicators.[78] When data is available, it is sometimes based on models rather than empirical observations or surveys. Obtaining access to information on public spending and projects at the local level can be particularly difficult. For example, an exploratory study of Kenya's experience of open data found that issues of limited relevance, outdated information and a lack of readily useable datasets was contributing to underuse of the central platform (opendata.go.ke).[79]

3. **A mismatch between the demand for open data, and the availability of appropriate datasets.** Often the datasets released are those that are easiest to publish, not those most in demand by data users. For example, land ownership records and company registries are only partially digitised in many developing countries, despite high demand for this type of information.[80] Similarly, in the Philippines, citizens within Bulacan province were most interested in datasets related to disaster risk reduction given their vulnerability to natural disasters, but the data was difficult to find.[81]

4. **A 'digital divide' between rich and poor, affecting both the supply and use of data.** In some countries, data is not digitised or available in standard machine-readable formats[82]. Just 25% of countries surveyed in the 'Open Data Barometer 2013' report had machine-readable data available on public transport.[83] On the demand side, low internet connectivity may affect access to information, particularly in rural or poor areas. Urban areas tend to have higher levels of connectivity, but even there, only more affluent parts of the population may have access to applications built on open data. In developing country contexts, traditional offline channels such as community radio stations, poster campaigns and journalists may still need to play a crucial intermediary role in promoting access to information especially for marginalised communities.[84] A related challenge is building capacity to make sense of open data, and be able to use it, among citizens, national statistical organisations, and data intermediaries.

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78   Data for African Development Working Group (2014) *Delivering on the data revolution in Sub-Saharan Africa*, Centre for Global Development, 2014

79   Mutuku, L. & Mahihu, C. (2014) *Open data in developing countries: Understanding the impacts of Kenya open data applications and services*, iHub Research

80   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

81   Cañares,M., Marijoe, N.,de Guia, J., & Jare, A. (2014) *Opening the gates - will open data initiatives make local governments in the Philippines more transparent?*, Step Up Consulting

82   If data is machine-readable, it might be in PDF documents, which humans can read, but machines cannot.

83   Davies, T. (2013) *Open Data Barometer, 2013 Global Report*

84   Davies, T. (2014) *Open data in developing countries: emerging insights from phase 1*, The World Wide Web Foundation

5. **A lack of quantifiable data and metrics.** The MDG framework and global development practice generally has sometimes found it difficult to establish accountability. This is partly due to a lack of clear targets that include quantitative, time-bound benchmarks, clearly defined responsibilities and enforcement mechanisms.

Addressing these critical issues in the next global development framework will help to realise the many potential benefits of open data to promote development.

The way forward for open data and development

As this report has discussed, open data can provide a tool to both monitor and drive progress towards diverse development outcomes, whether through providing information for nutrition programmes or enabling entrepreneurs to access essential data for their businesses.

Regardless of the specific goals agreed upon in the post-2015 framework, the next development agenda should request and rely on accurate, open data to assess those goals, and to inform their solutions. This will require the cooperation of a multitude of stakeholders, including governments at different levels, civil society, researchers, NGOs, technology developers and corporate actors.

Any approach to maximising the benefits of the data revolution within the post-2015 process should begin by applying the principle of open by default. This principle underpins the G8 Open Data Charter, as well as the international Open Data Charter being formulated by the Open Government Partnership's Open Data Working Group. This principle, and the commitments that flow from it in the G8 and international Open Data Charter, offer a strong standard to guide work in this area.

More specifically, the UN Secretary General's synthesis report on the post-2015 development agenda laid out several recommendations for use of data in development, primarily to launch "a comprehensive programme of action on data."[85] Governments, donors and other development actors working to meet the Sustainable Development Goals should:

Build global consensus around principles and standards
Use the Open Data Working Group in the Open Government Partnership as a global forum within which to discuss and shape consensus on principles and standards regarding data

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85   UN (2014) *Synthesis report of the Secretary General on the post-2015 agenda: The road to dignity by 2030: Ending poverty, transforming all lives and protecting the planet*

that advances or measures progress towards the SDGs. These principles and standards should build on work that has been undertaken by groups including the W3C Consortium, Open Knowledge, the World Wide Web Foundation, the Open Government Partnership, Open Data Research Network, the Sunlight Foundation and the Open Data Institute.

Embed open data into funding agreements
Government data producers must be supported to ensure that relevant, high-quality data is collected to report against the Sustainable Development Goals. Funders should mandate that data relating to performance of services, and data produced as a result of funded activity, be released as open data. This should be explicitly addressed at the Third International Conference on Financing for Development in July, 2015.

Build a global partnership for sustainable development data
Groups across the public and private sectors need to work together to build sustainable supply and demand for data in the developing world. The ODI supports the UN's proposal for a Global Partnership for Sustainable Data, which should include data-users and the private sector to foster global technology transfers, policy development and knowledge sharing.

Conclusion

Open data is a relatively new concept, but its impacts in broad areas across the world are already beginning to show. The potential for open data in international development is significant.

As this report shows, open data is being used to promote aid transparency, with platforms such as Nepal's Aid Management Platform monitoring and sharing aid flows. Open data boosts corporate accountability, with groups such as OpenCorporates tracking companies across the world. It drives innovation in business and economic growth, with the potential to generate an estimated US$3tr a year globally in business activity and efficiency gains in key sectors as such as education, health, agriculture and energy, according to McKinsey.[86] It streamlines disaster responses in humanitarian crises, shaping maps used by emergency services in Haiti, the Philippines and New York.

It is too early to evaluate the full extent of many of the economic, social and political impacts of open data. But, following the promising progress that has been seen, much more can be done to unlock the value of open data for development.

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86   Manyika, J., Chui, M., Farrell, D., Van Kuiken, S., Groves, P., & Almasi Doshi E., (2013) Open data: Unlocking innovation *and performance with liquid information*, McKinsey Global Institute, 2013

In maximising open data's positive social, economic and environmental impacts, the global development community must address many challenges, such as a weak enabling environment and poor quality of datasets. Governments, donors and NGOs, with the cooperation of researchers, civil society and industry, will need to embrace and promote open data in all stages of development processes in order to make reaching the Sustainable Development Goals a reality.

About the Open Data Institute and the Partnership for Open Data

This paper is part of a series produced by the Open Data Institute, as part of the Partnership for Open Data (POD), funded by the World Bank.

What is the Open Data Institute?

The Open Data Institute (ODI) is an independent, non-profit and non-partisan company based in London, UK. The ODI convenes world-class experts from industry, government and academia to collaborate, incubate, nurture and explore new ideas to promote innovation with open data. It was founded by Sir Tim Berners-Lee and Professor Sir Nigel Shadbolt, and offers training, membership, research and strategic advice for organisations looking to explore the possibilities of open data.

In its first two years, the ODI has helped to unlock over US$55m in value through the application of open data. With 22 nodes around the world, the ODI has trained more than 1,000 people from over 25 countries. In 2014, the ODI trained officials from countries including Botswana, Burkina Faso, Chile, Malaysia, Mexico, Moldova, Kyrgyzstan and the UK on the publication and use of open data.

What is the Partnership for Open Data?

The Open Data Institute has joined Open Knowledge and the World Bank in the Partnership for Open Data (POD), a programme designed to help policy-makers and citizens in developing countries to understand and exploit the benefits of open data. The partnership aims to: support developing countries to plan, execute and run open data initiatives; increase reuse of open data in developing countries; and grow the base of evidence on the impact of open data for development. The initial funding comes from The World Bank's Development Grant Facility (WB DGF).[87]

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87   Find more on the Partnership for Open Data at http://theodi.org/odp4d

Under POD, the ODI has carried out open data readiness assessments, strategic advice, training and technical assistance for low- and middle-income countries across four continents. One example is our work in Burkina Faso, supporting the launch of their open data initiative and providing technical assistance to construct an open data portal.

In 2015, POD will merge with the Open Data for Development (OD4D) network. As part of this new, larger network, the ODI will continue to take a lead in supporting the world's government leaders in implementing open data, and in doing so will continue to publish practical guides and learning materials, such as this series of reports.

What do you think?

The ODI will continue to explore ways to build on this paper, and encourages feedback and comments from the open data and global development communities. Get in touch with william. gerry@theodi.org to share your thoughts.

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