Open Data Barometer

2013 Global Report

31 October 2013

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This project was supported with funding from The Open Data Institute (www.theodi.org) and the World Wide Web Foundation's Web Index project (DFID grant GB-1-203318)

Additional support for this work has been provided through the World Wide Web Foundation 'Exploring the Emerging Impacts of Open Data in Developing Countries' research project, supported by grant 107075 *from Canada's International Development Research Centre (web.idrc.ca). Find out more at www.opendataresearch.org/emergingimpacts*

A joint project of:

WORLD WIDE WEB FOUNDATION

open data institute

Enabled by funding from:

UKaid from the British people

IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international

Part of the Web Index project, funded by UK aid from the UK Government.

Part of the ODDC research programme:

Open Data Research Network

ODDC
Exploring the Emerging Impacts of Open Data in Developing Countries

www.opendataresearch.org

About the Open Data Barometer project

The Open Data Barometer aims to uncover the true prevalence and impact of open data initiatives around the world. It analyses global trends, and also ranks countries and regions via an in-depth methodology that considers: readiness to secure the benefits of open data; actual levels of implementation; and the impact of such initiatives.

This is the pilot edition of the Open Data Barometer. This report also marks the first large-scale research collaboration between the Open Data Institute and the World Wide Web Foundation.

Follow the project's development at www.opendatabarometer.org

About the Web Foundation

Established by Sir Tim Berners-Lee, the World Wide Web Foundation (webfoundation.org) seeks to establish the open Web as a global public good and a basic right, creating a world where everyone, everywhere can use the Web to communicate, collaborate and innovate freely.

We work with others to make the web truly universal, open and free, through initiatives such as the Alliance for Affordable Internet (a4ai.org), which aims to bring down the cost of internet access, and the Web Index (thewebindex.org), which tracks the health and utility of the Web in over 80 countries.

We also put the open web to work to strengthen democracy and participation, especially by helping to harness the power of open data.

About the Open Data Institute

The Open Data Institute catalyses the evolution of open data culture to create economic, environmental, and social value. It unlocks supply, generates demand, creates and disseminates knowledge to address local and global issues. Founded by Professor Sir Nigel Shadbolt and Professor Sir Tim Berners-Lee, the ODI is an independent, non-profit, non-partisan, Limited by Guarantee company. It has secured £10 million over five years via the UK innovation agency, the Technology Strategy Board, $750,000 from global philanthropic investor Omidyar Network, and is working towards long-term sustainability through match funding and direct revenue.

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Executive Summary

Open data is still in its infancy. Less than five years after the first major Open Government Data (OGD) portal went live, hundreds of national and local governments have established OGD portals, joined by international institutions, NGOs and businesses. All are exploring, in different ways, how opening data can unlock latent value, stimulate innovation and increase transparency and accountability. Against this backdrop of rapid growth of the open data field, this Open Data Barometer global report provides a snapshot of OGD practices at national level. It also outlines a country-by-country ranking. Covering a broad sample of 77 countries, it combines peer-reviewed expert survey data and secondary indicators to look at open data readiness, implementation and emerging impacts. Through this study we find that:

- **OGD policies have seen rapid diffusion over the last five years**, reaching over 55% of the countries surveyed in the Barometer. The OGD initiatives launched have taken a range of different forms: from isolated open data portals launched within an e-government framework, through to ambitious government-wide OGD implementations.

- **But – there is still a long way to go:** Although OGD policies have spread fast, the availability of truly open data remains low, with less than 7% of the dataset surveyed in the Barometer published both in bulk machine-readable forms, and under open licenses. This makes it unnecessarily difficult for users to access, process and work with government data, and potential entrepreneurs face significant legal uncertainty over their rights to build businesses on top of government datasets.

- **Leading countries in the ODB are investing in the creation of 'National Data Infrastructures'** to provide a foundation for public and private innovation and efficiency. They have high-level and broad-based political backing for the OGD initiatives, and are investing in capacity building with entrepreneurs and intermediaries. They are also focussing on building communities around open data, convening government officials and outside stakeholders to understand more clearly how data can be harnessed for economic and social progress. However, no countries can yet claim to fully be 'open by default', and embedding OGD practices across government is a key future challenge.

- Mid-ranking countries have put in place some of the components of an OGD initiative, such as an open data portal and competitions or events to catalyse re-use of data, but have often failed to make key datasets available, and are lacking in important foundations for effective open data re-use. **Absence of strong Right to Information laws may prevent citizens from using open data to hold government to account**, and weak or absent Data Protection Laws may undermine citizen confidence in OGD initiatives. In addition, limited training and support for intermediaries may mean data cannot be mobilised to generate economic and social benefits.

- Low-ranking countries have not yet started to engage with Open Data, and **many developing countries lack basic foundations such as well-managed and digitised government datasets**. In these countries, interventions to support OGD may look radically different from the leading OGD initiatives surveyed in the Barometer – with opportunities for open data approaches to be used to generate, as well as use, public information.

- The Barometer ranks the UK as the most advanced country for open data readiness, implementation and impact, scoring above the USA (2nd), Sweden (3rd), New Zealand (4th), Denmark and Norway (joint 5th). The leading developing country is Kenya (21st), ranking higher than rich countries such as Ireland (29th) and Belgium (31st). However, no country can yet claim to be fully 'open by default'.

Furthermore, in offering the first global snapshot covering both OGD policy and practice, the Barometer highlights:

- Different countries and regions face different challenges in pursuing OGD – including the need to build government data collection and management capacity; the need to support and equip innovators and intermediaries to use data; and the need to secure civil society freedoms that will enable the use of open data for effective transparency and accountability. There is no one-size fits all approach to OGD.

- Key datasets such as Land Registries and Company Registries are least likely to be available as open data[1], suggesting that OGD initiatives are not yet securing the release of politically important datasets that can be vital to holding governments and companies accountable.

- In most countries, key datasets for entrepreneurship and improving policy are not available as open data, and when published are in non-standard formats. For example, even in the case of public transport, where data standards are well established, just 25% of countries surveyed have machine-readable data available. Mapping data is also often unavailable in digital forms, or only available for a fee, suggesting that inefficient charging for public data continues to be an issue in many countries[2].

- Categories of data managed by statistical authorities are the most likely to be accessible online, but are often only released in very aggregated forms and with unclear or restrictive licenses. Adding a focus on open data to statistical agency capacity building may assist in making key datasets available as bulk, machine-readable open data, contributing positively to the 'data revolution' (UN, 2013).

- Strong evidence on the impacts of OGD is almost universally lacking. Few OGD programmes have yet been evaluated, and the majority of discussion of impacts remains based on anecdote. The Barometer asked about six kinds of OGD impact (government efficiency, transparency and accountability, environmental sustainability, inclusion of marginalised groups, economic growth, and supporting entrepreneurs). In countries with some form of OGD policy (n = 43) in 45% of impact questions no examples of impact could be found, and on average evidence of impact was scored at just 1.7 out of 10. Scores were particularly low for inclusion and environmental impacts of OGD, suggesting an area in need of further focus.

It remains very early days in the development of OGD practices. The World Wide Web has now been with us for almost 25 years, and, even so, many governments, businesses and civil society groups are still in the early stages of learning how to harness its potential. The open data vision is a bold one: but one that will take considerable work to make a reality. It cannot just be a case of ad-hoc dataset publication, but needs attention paid to legal, social, economic, technical, organisation and political dimensions of open data publication and re-use. This year's Open Data Barometer provides a baseline for tracking how we collectively progress in the open data arena in years to come.

Open Research

This report is just one way of engaging with the Open Data Barometer project. All the data, and methodologies underlying this report will be available under an open license at www.opendatabarometer.org - shared to support further analysis, deeper discussion of open data research methods, and deeper exploration of the global state of open data policy and practice.

[1] *With average openness scores of 21.6 and 13.6 out of 100 respectively*
[2] *Of the 55 countries with national maps available online in any form, 26 had a free and machine-readable copy available, with just 15 with bulk data available for download*

Open Government Data: A Global Snapshot

Open Government Data – a global snapshot

Introduction

The idea of Open Government Data (OGD) has seen rapid diffusion across the globe. At the end of the last decade few governments had engaged at all with the idea of open data, and the number of OGD initiatives could be counted on one hand. By mid-2013 the concept of OGD has spread across the globe. There are now OGD portals and projects to be found on every continent, and in an increasing number of cities and international institutions. Open data has made it into strategies and actions plans at the highest levels, from Open Government Partnership National Action Plans, to the G8 Open Data Charter, and from initiatives on open data in Aid, Extractives and Agriculture to the UN High Level Report on the Post-2015 Development Agenda, which calls for a 'data revolution' incorporating a move towards open data.

However, amongst this dramatic progress, diffusion of the open data idea has not been equally experienced across geographies and sectors; nor have the potential benefits of open data been locked-in. There is still a long way to go before the democratic, social and economic potentials of open data can be fully realised in every country, and – even where contextual factors are conducive to open data supply and use – many OGD initiatives are presently resting on shallow foundations, at risk of stalling or falling backwards if political will or community pressure subsides.

In the Open Data Barometer we have sought to capture a snapshot picture of OGD around the world. The macro-level picture presented in this report is informed by, and complements, our on-going qualitative research work to explore open data readiness, open data use, and emerging impacts of open data, in different country contexts and sectors across the world[3]. We start from the assumption that there is no one-size-fits-all approach of securing the benefits of open data. The Barometer is designed to help us understand both common progress, and different pathways, towards unlocking benefits from OGD. By creating a composite index from the indicators gathered for the Barometer we hope to raise questions about how OGD in different countries compares, and by breaking this down into a range of sub-components we aim to illustrate the many different elements that may be important to effective OGD policy and practice.

Above all, the Open Data Barometer is a piece of open research. All the data gathered to create the Barometer will be published under an open license, and we have sought to set out our methodology clearly, allowing others to build upon, remix and reinterpret the data we offer. Data collected for the Barometer is the start, rather than the end, of a research process and exploration.

The promise and realisation of open data

Open data has many roots and many branches. Different groups have come together to advocate for Open Government Data based on the potential for it to lead to:

- **More efficient and effective government** – both through government using its own data better, and through innovators outside of government identifying improved ways to provide public services, meeting the diverse needs of citizens through digital technologies;

- **Innovation and economic growth** – acting as a 21st Century infrastructure, and a raw material, for activity in the information economy. Start-ups and established businesses can use open data to generate new products and services, and secure efficiencies, generating a net-gain for country economies;

- **Transparency and accountability** – allowing citizens and civil society to see, understand and monitor better what their governments and the private sector are doing, challenging corruption or unaccountable activity, and finding opportunities to influence policy and

[3] *See www.opendataresearch.org/emergingimpacts/ for details*

practice;

- **Inclusion and empowerment** – enabling marginalised groups to get involved in the political process, and removing imbalances of power created through information asymmetry.

Taken together these potential outcomes provide a strong argument in favour of shifting to 'open by default' for all the non-personal data governments collect. Right now, much of the value of government held data remains locked-up.

However, just because OGD in the abstract is a common ingredient to all these forms of change, that does not necessarily mean that any and all open data help secure any and all outcomes. There will be different datasets and different pre-requisites involved in securing different kinds of open data impact. Meanwhile, across different countries the range of quality of data that is 'locked up' inside government, and the relative costs of getting it out, will vary. In the Open Data Barometer we've measured a range of factors that affect the capacity of government, citizens and civil society, and entrepreneurs and business to secure the benefits from open data, and we've looked at a breadth of datasets, from those primarily useful for accountability, to those that provide key foundations for building innovative businesses.

In the pages that follow we take a broad look at how far the promise of open data is being delivered, and outline some of the current challenges to be met in further securing the potential.

The following section then takes a more in-depth regional and country look at the Open Data Barometer components, including a more detailed discussion of the methodologies used in data collection and aggregation.

Key facts: methodology
The Open Data Barometer is based upon three kinds of data:

- **A peer reviewed expert survey** carried out between July to October 2013, asking researchers to provide a score from 0 – 10 in response to a range of questions about open data contexts, policy, implementation and impacts. Scores were normalised (using z-scores) prior to inclusion in the Barometer.

- **Detailed dataset assessments** also completed by our expert researchers, reviewed through a double-blind review process, and subsequently verified by a technical expert. These assessments were based on a 10-point checklist, completed for 15 kinds of data in each country[1], touching on issues of data availability, format, license, timeliness and discoverability. Each checklist answer is supported by qualitative information and detailed hyperlinks, and checklist responses are aggregated to provide a 0 – 10 score for each dataset. These are presented in their original form, to allow comparison between datasets, and are averaged to give a dataset implementation sub-index. This sub-index is normalised (using z-scores) prior to inclusion in the overall Barometer calculations.

- **Secondary data** selected to complement our expert survey data. This is used in the readiness section of the Barometer, and is taken from the World Economic Forum, United Nations e-Government Survey, and Freedom House. The data is normalised using z-scores prior to inclusion in the Barometer.

The list of countries included in the 2013 Barometer is based upon the Web Index (thewebindex.org) sample, which was designed to represent a broad range of different regions, political systems and levels of development. It also supports further interrogation of ODB data alongside data from the forthcoming 2013 Web Index.

Open data diffusion: rapid but unequal

In the Open Data Barometer sample of 77 diverse states across the world, over 55% have developed some form of Open Government Data (OGD) initiative, with over 25% of the total sample establishing initiatives with dedicated resources and senior level political backing[4]. The map below demonstrates both the global extent and depth of government level activity on open data, yet also reflects the unequal diffusion of OGD practices.

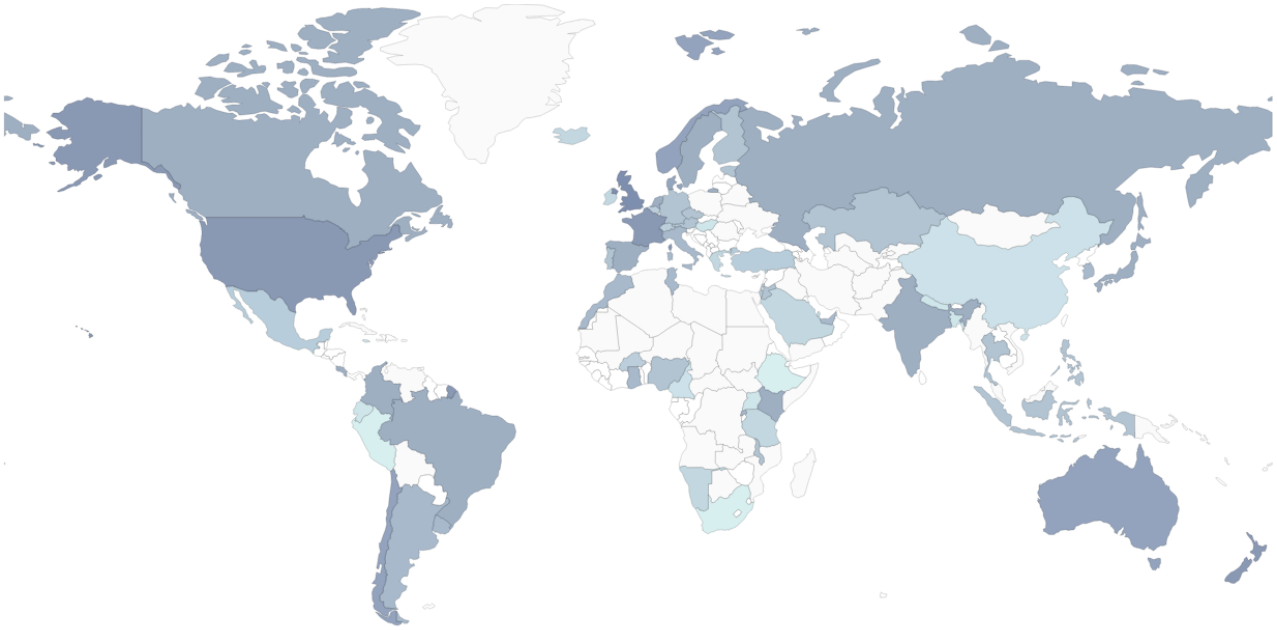


Figure 1: Heatmap of scores for expert survey question: "To what extent is there a well-resourced open government data initiative in this country?" Higher scores (darker colours on the map) indicate a well-resourced initiative, with strong political commitment. Countries in white were not included in the Open Data Barometer study.

The Open Data Barometer survey asked a range of questions to explore the extent of OGD adoption in different countries, including: establishing whether underpinnings for OGD were in place through Right to Information (RTI) laws; whether central government had an OGD initiative; whether city or regional governments were running OGD initiatives; whether there was demand from civil society and the technology community for OGD; and whether governments were providing support for OGD re-use through training, innovation events, grants and voucher schemes. By looking at these different dimensions we are able to get a sense of how broad-based existing OGD initiatives are.

Regions	Right to Information laws	OGD Initiative	Demand from civil society & technologists	Government support for OGD innovation	City or regional OGD
Africa	35.71	28.57	28.10	14.81	5.29
Americas	60.77	50.77	42.31	29.06	34.19
Asia Pacific	56.92	50.00	46.15	29.06	23.93
Europe	61.36	55.45	61.82	38.89	47.47
Middle East & C. Asia	22.50	38.75	21.25	8.33	8.33
Total	**49.48**	**44.68**	**42.47**	**25.83**	**25.69**

Table 1: Regional breakdown of Open Data Barometer survey responses. Mean average of normalised (z-score) and scaled values. OGD Initiative variable in bold. Higher scores are better.

As Table 1 above highlights, the Americas, Asia Pacific and Europe have broadly comparable scores when it comes to the presence of OGD initiatives, but greater variation can be seen when it comes to civil society and technologist demand for OGD and government support for innovation. Across all the areas surveyed, government support for innovation is low, suggesting an emphasis on getting data

[4] Based on a score of 5 out of 10 or above on the Expert Survey indicating the presence of some form of OGD; and 7 or above indicating resourcing and/or Ministerial level support.

online, but less attention being paid to supporting re-use of data. Table 1 also highlights that at present it is more common for countries to have OGD initiatives at the national level, rather than the city level, although there are some notable exceptions emerging, such as Nigeria, where Edo State has recently launched an OGD portal ahead of the presence of a national government portal.

Looking at the same data, grouped by the 2012 Human Development Index ranking of the countries concerned (Malik, 2013), we see a strong relationship between levels of development and variables concerning the diffusion of OGD policy and practice (Table 2).

Regions	Right to Information laws	OGD Initiative	Demand from civil society & technologists	Government support for OGD innovation	City or Regional OGD
Very High	57.81	59.69	60.31	40.28	45.14
High	48.75	43.13	31.88	18.06	22.22
Medium	40.00	40.91	34.55	18.18	12.12
Low	41.11	21.67	25.00	11.73	2.47
Total	**49.48**	**44.68**	**42.47**	**25.83**	**25.69**

Table 2: Average score by HDI Rank, normalised and scaled variables from expert-survey.

It is notable however, that the gap between medium and high HDI countries is narrow with respect to the presence and strength of OGD initiatives, and that demand from civil society and technologists appears marginally stronger in medium HDI than in those with a high HDI rank.

Open data readiness

Successful OGD initiatives need more than just datasets. They also need intermediaries, able to take government data and turn it into platforms and products with social and economic value, and re-users equipped to access and work with data in different ways. This is sometimes talked of as the need for an ecosystem around the core data infrastructures of an OGD programme. In recognition of this, the Open Data Barometer looks at a number of different variables as part of assessing a country's capacity to secure and sustain the full benefits of open data.

For analysis we divide the Open Data Barometer readiness variables into three components. These are:

- **Government** capacity and the presence of government commitments to open data, addressing the political will and organisational ability of governments to both make open data available, and to secure benefits from open data, such as increased operational efficiency.
- **Citizen and civil society** freedoms and engagement with the open data agenda, including the presence of strong Right to Information and Data Protection regimes, which exploratory research in the Open Data in Developing Countries project (Davies, Perini, & Alonso, 2013) has suggested are important for empowering citizens to hold government to account, and protecting citizens from potential abuses of open data.
- Resources available to **entrepreneurs and businesses** to support economic re-use of open data and to catalyse intermediary actions, including internet penetration, the availability of training for businesses, and government support for open data led innovation.

The readiness variables selected were also designed to cover all six dimensions of open data readiness (Alonso, 2011): legal, political, social, economic, organisational and technical capacity, recognising that effective open data initiatives require engagement of a broad range of actors in society (Hogge, 2010).

The radar charts in Figure 2 below present a regional breakdown of the ODB readiness component.

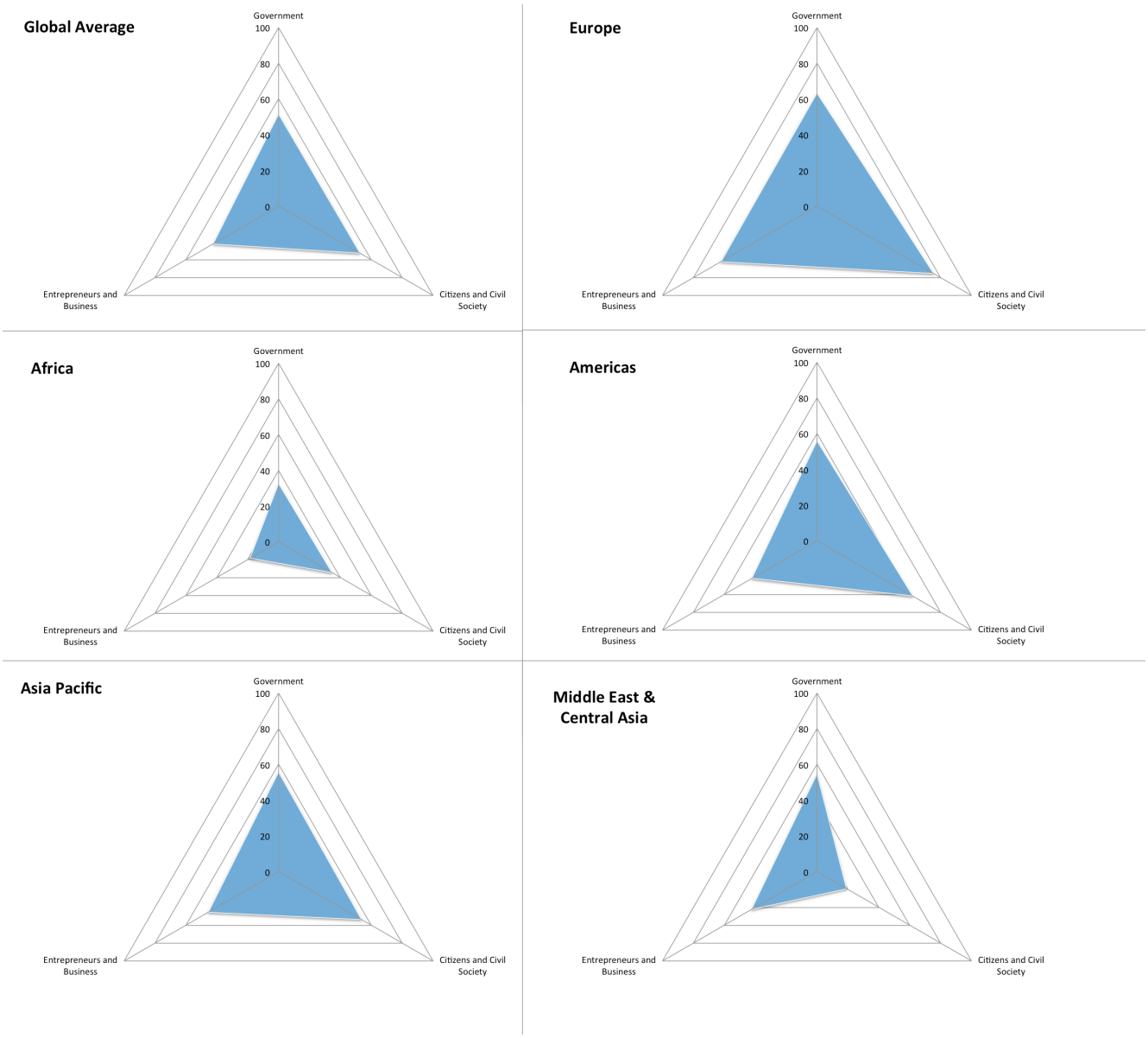


Figure 2: Radar charts showing scaled component scores in the readiness sub-index by region.

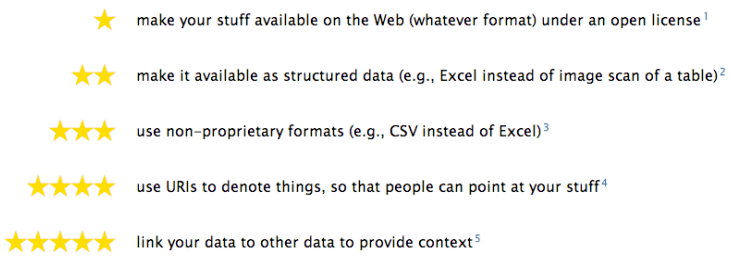
The low open data readiness in Africa is particularly impacted by limited internet penetration, and a scarcity of training for the entrepreneurs and civic technologists who often act as key intermediaries between open data, and wider use of that data. Developing open data on the African continent may require both substantial focus on building the capacity and sustainability of such intermediaries, as well as exploring different approaches to making data accessible that do not rely on Internet penetration, such as through print media, community radio and mobile phones.

By contrast, in the Middle East and Central Asia, there is reasonably strong technical capacity, but limits on civil society freedoms, and the absence of strong Right to Information laws to back up civil society use of open data lead to much lower citizen and civil society readiness to secure benefits from open data. The presence of open government data portals in a number of countries with low civil society readiness (Kazakhstan, Bahrain) raises questions about open data policy transfer taking place at the elite level, with open data potentially developed largely as an 'e-government' project, rather than as part of broader based open government initiatives involving governments, private sector and civil society.

In following chapter we look at a number of country case studies to explore in more depth the different paths that countries are taking to open data readiness and implementation.

Implementation: dataset availability and accessibility

In calling for 'Raw Data Now', Tim Berners-Lee set out a progressive model for open data publication in the 'Five Stars of Linked Data' (Berners-Lee, 2010). This calls on governments to place data online in any format, to move towards making it machine readable in open formats, and then ultimately to complement these accessible datasets with standardised and linked datasets, supporting citizens, entrepreneurs and government itself to connect up disparate data across the web.



In this model, the perfect should not be the enemy of the good: government should get data online, and then should work to improve it - lowering the technical and legal barriers that might prevent it being re-used - and adding value to it through linked data. In the Open Data Barometer, we used a 10-point checklist to assess the relative openness of 14 different categories of data in each country: addressing not only the availability, format and license of data, but also how easy it was to discover, and whether it was a one-off data dump, or a sustainable on-going stream of high-quality and timely data. In addition to assessing the extent to which governments were publishing open data, we also looked at the wider climate of open data publication in each country with questions on academic, civil society and business publication of open data, although to maintain the focus of the overall ODB rankings on *central government* OGD actions, these are not included in the overall scoring framework.

The heat map below contrasts with the previous map of policy diffusion, showing the availability of open data currently lags behind the formation of open data policies in many countries.

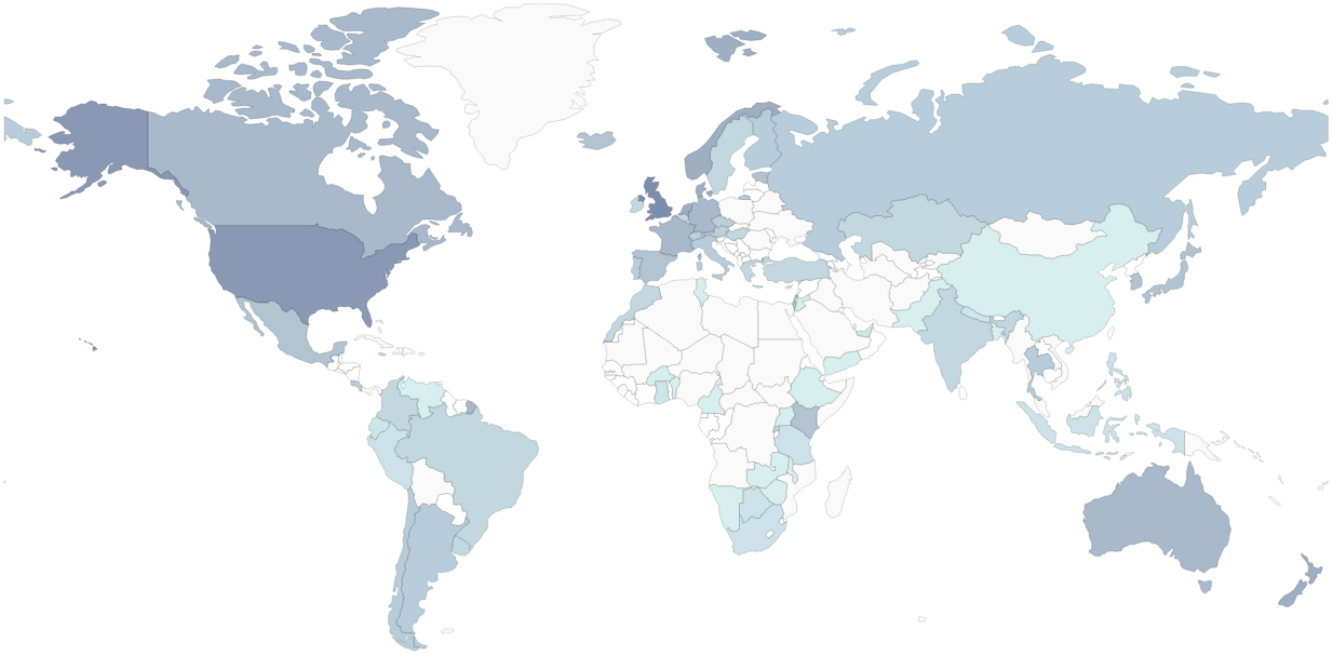


Figure 3: Heatmap of ODB Implementation score by country - based on openness of 14 key datasets.

Just 71 of the datasets assessed in the Open Data Barometer study were available as full open data (6.6%), and just 13 (1.2%) were published with clear URIs for key elements in the data in ways that would support linked data publication (for 4- or 5-star Linked Open Data). Even removing the 257 cases in which national governments do not hold the data surveyed (for example, in some countries company registration or cadastral information is only held at a state or local government level), we still find less than 1 in 10 datasets are published as full open data (71 of 821). In particular, many datasets that were otherwise available were published under restrictive licenses, or without clear license terms – and many datasets were not available for bulk download.

The most common file-format for published data was Excel (approximately 280 datasets) with many of these datasets providing only aggregated data. CSV was the second most common format, with over 130 datasets available in this format. Around 80 datasets were available in XML format. Overall these figures suggest that we are still at an early stage of making data available and open online, with the majority of available government data currently meriting only one or two stars on the five-star scale[5].

Which data is being made available?

It doesn't just matter that governments are publishing data: it matters what that data is. Whilst countries may boast of the hundreds of datasets they have published online, if these are not the data demanded by citizens, or the kinds of data that can enable transparency, accountability, innovation and greater inclusion, then there may be little potential for an OGD initiative to deliver impact.

In selecting datasets to include in the Open Data Barometer study, we sought to include a breadth of categories that represent both the different functions of government, and the different kinds of data that particular re-users of data may be interested in. We paid close attention to selected datasets that had a high likelihood of being available across diverse countries, and we provided guidance to researchers on a dataset-by-dataset basis to deal with cases where data might be only available at a sub-national level. Table 3 below shows how the datasets included in the Open Data Barometer represent a range of different potential uses of data. Of course, the nature of open data means categories are not mutually exclusive: the same dataset might be useful across social policy, innovation and accountability arenas. Future work is needed to unpack which datasets contribute most to certain kinds of impacts in different contexts, and how the technical features of those datasets affect their use.

Innovation Cluster	Social Policy Cluster	Accountability Cluster
Data commonly used in open data applications by entrepreneurs, or with significant value to business.	*Data useful in planning, delivering and critiquing social policies & with the potential to support greater inclusion and empowerment.*	*Data central to holding governments and corporations to account. Based on the 'Accountability Stack' proposed by Perrin* (2012).
• Map Data • Public Transport Timetables • Crime Statistics • International Trade Data	• Health Sector Performance • Primary or Secondary Education Performance Data • National Environment Statistics • Detailed Census Data • Land Ownership Data	• Legislation • National Election Results • Detailed Government Budget • Detailed Government Spend • Company Register

Table 3: Dataset clusters used in Open Data Barometer analysis

Figure 4 below shows the average score each dataset received in each region, along with the global average. The number in brackets shows the number of datasets in each category that were found to meet the full Open Definition requirements of being machine readable, accessible in bulk, and openly licensed. Through this we can see considerable variation in the kinds of data being made available.

Census and trade data, generally supplied by national statistical agencies score highest on this scale, reflecting the capacity of statistical agencies to provide timely and regularly updated datasets, and the widespread existence of online platforms for accessing machine-readable extracts of statistical agency data. However, many of these datasets fall short of meeting the open definition due to the absence of a clear open license statement, or limitations preventing re-users from accessing bulk extracts of the data – instead leaving governments to play an interpretive role in determining what analysis can be made of statistical data.

[5] *Figures are approximate based on analyzing free-text responses from researchers. Further analysis of formats will be shared at www.opendatabarometer.org*

After statistical datasets, national budgets are the next highest scoring, almost ten points on average ahead of spending data, which is less likely to be published, and when available is often published in very aggregated forms that do not allow citizens to drill down to track government transactions in detail. Least likely to be openly available are Land and Company Registration data, reflecting both the absence of coherent land and company registry datasets in a number of countries, and a low priority apparently placed by many OGD initiatives on making these datasets available. Given the current political salience of corporate transparency, and the presence of land governance as a high-profile issue on the international agenda, this does raise questions about whether Open Government Data initiatives, as currently constituted, are able to deliver valuable, but potentially contentious datasets, the release of which may threaten entrenched political interests. One of the barriers to the release of these datasets appears to be the established charging regimes, in which agencies are either funded through sales of data, or where historic conventions of charging for access to paper records have been continued as datasets have been digitised.

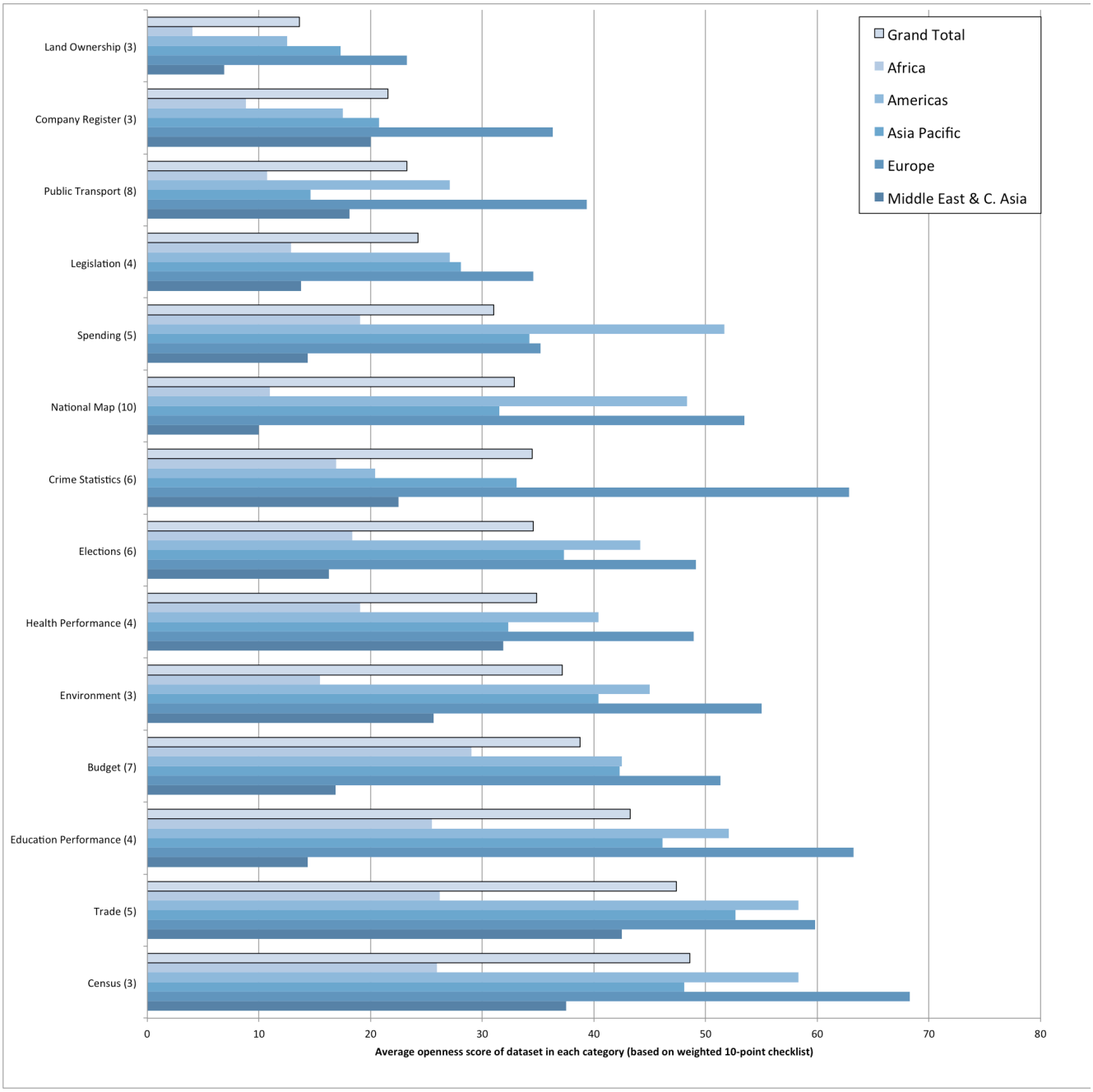


Figure 4: Average openness scores by dataset category, using weighted dataset checklist survey responses.

Across the datasets available, there was very little evidence of standardisation, with the exception of Public Transport data, where many data publishers were making use of the General Transit Feed Specification (GTFS). Given the potential value in being able to combine statistics, financial

information and company information across borders in order to address key social issues, further work on developing inclusive and open standards is likely to be needed in future.

Not all data is created equal: looking inside the dataset

This report is focussed primarily on our quantitative findings. However, our expert survey also pointed to important issues of data quality and trustworthiness. Of the 113 datasets that were available in machine-readable and openly licensed form, researchers found 15 where the sustainability of their publication was questionable, and 20 that were not up-to-date or published in a timely fashion. Entrepreneurs and businesses are much more likely to build upon data when they are assured about its continued availability, and many forms of citizen action rely on having timely access to data. For example, data on crime that is months old, or not published regularly in the same format, is hard to use to scrutinise police performance, or to power innovative applications.

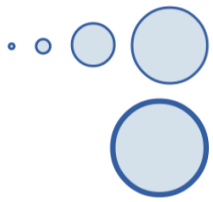
In their qualitative responses, researchers drew attention to the limited scope of many datasets, particularly in developing countries. For example, researchers reported that education statistics were missing for certain regions, or that health statistics were only provided at very aggregate levels. In many countries public transport data is unavailable, either because it is not managed in any structured way (see for example (Raman, 2012)) or because no public transport services exist. The reliability of key datasets in some countries was also raised as a significant issue. For example, in Chile, the 2012 Census data were called into question due to methodological flaws, and the results have now been withdrawn. In viewing the Open Data Barometer results it is important to be aware that not all data is created equal, and a full assessment of the potential of open data in each country needs to look in more depth at the particular histories of each dataset (Gitelman, 2013; Rosenburg, 2013).

One of the reasons that innovators value government data is its reliability, standardisation and comprehensiveness (Lakomaa & Kallberg, 2013). In well-resourced states, few other institutions can provide such consistent data covering the whole country. This makes open data, or Public Sector Information, a valuable input to economic activity. However, where government capacity is limited, the data available might not have these properties. This suggests that alternative approaches to using open data for innovation, and for securing accountability, will need to be explored in many developing countries, and raises questions about how far applications from one context can easily be transferred to another. Securing benefits from open data is likely to require contextually aware capacity building: rather than the implementation of top-down training templates.

Full data availability listings

In total, the Open Data Barometer has collected information on the availability of 1078 different datasets across 14 categories, looking at a range of aspects of data availability and openness (including online availability, machine-readability, license, sustainability, timeliness of updates and discoverability). The matrix overleaf sets out the scores assigned for each category of data by country, with larger circles representing greater openness, and a thick outline given to each dataset which meets the full open definition.

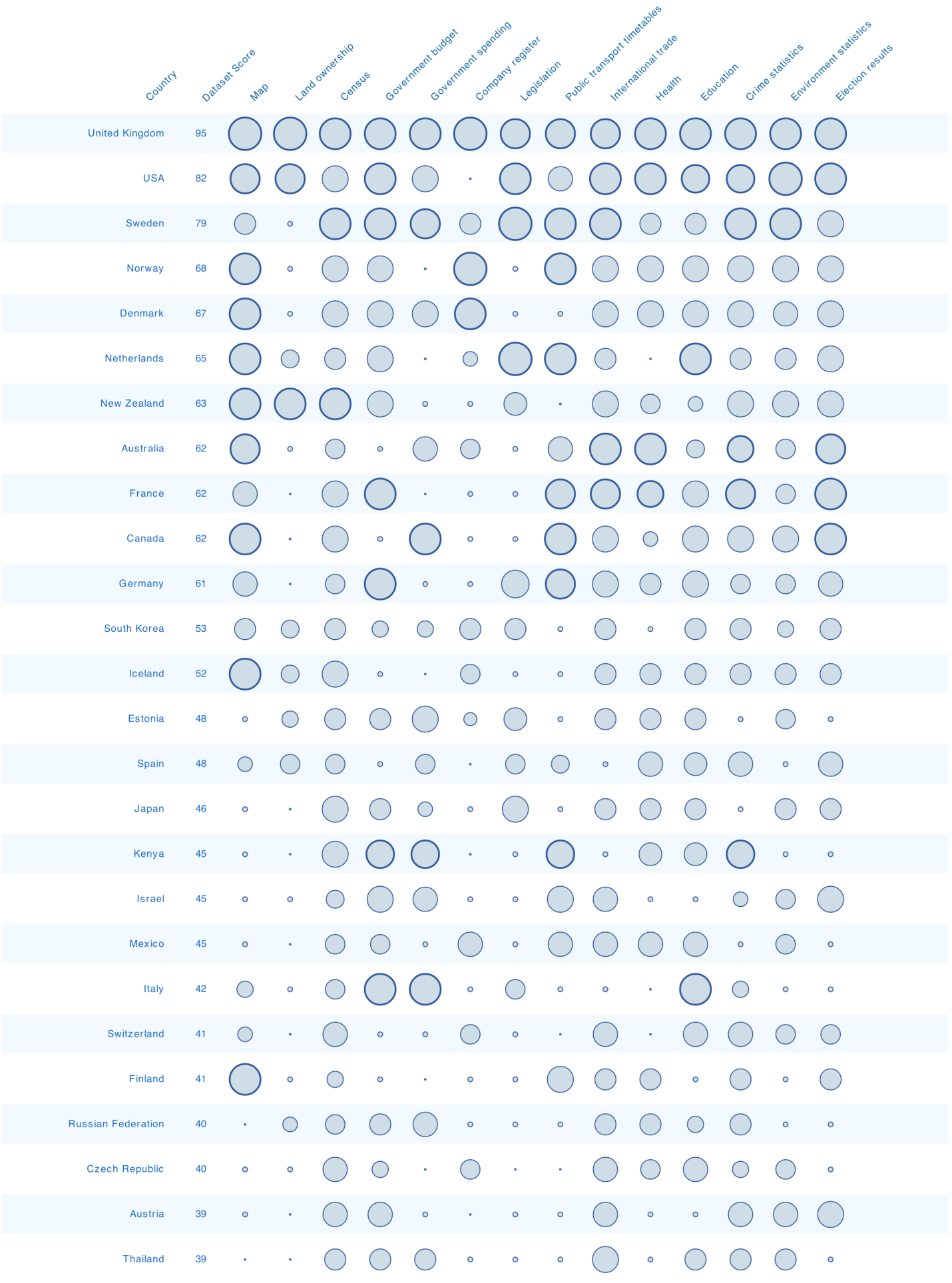
Key



Circle size represents openness score.

Thick outline represents data a dataset meeting the open definition criteria

The overall dataset score (column 2) is the average of individual dataset scores for a country. Scores are awarded on a 0 – 100 scale, based on a weighted 10-point checklist. For the weights given to each question see Table 6 in the methodology Annexe. 60% of the overall score is made up by the components of the Open Definition (OKF, 2006).


Country
Dataset Score
Map
Land ownership
Census
Government budget
Government spending
Company register
Legislation
Public transport timetables
International trade
Health
Education
Crime statistics
Environment statistics
Election results
United Kingdom 95
USA 82
Sweden 79
Norway 68
Denmark 67
Netherlands 65
New Zealand 63
Australia 62
France 62
Canada 62
Germany 61
South Korea 53
Iceland 52
Estonia 48
Spain 48
Japan 46
Kenya 45
Israel 45
Mexico 45
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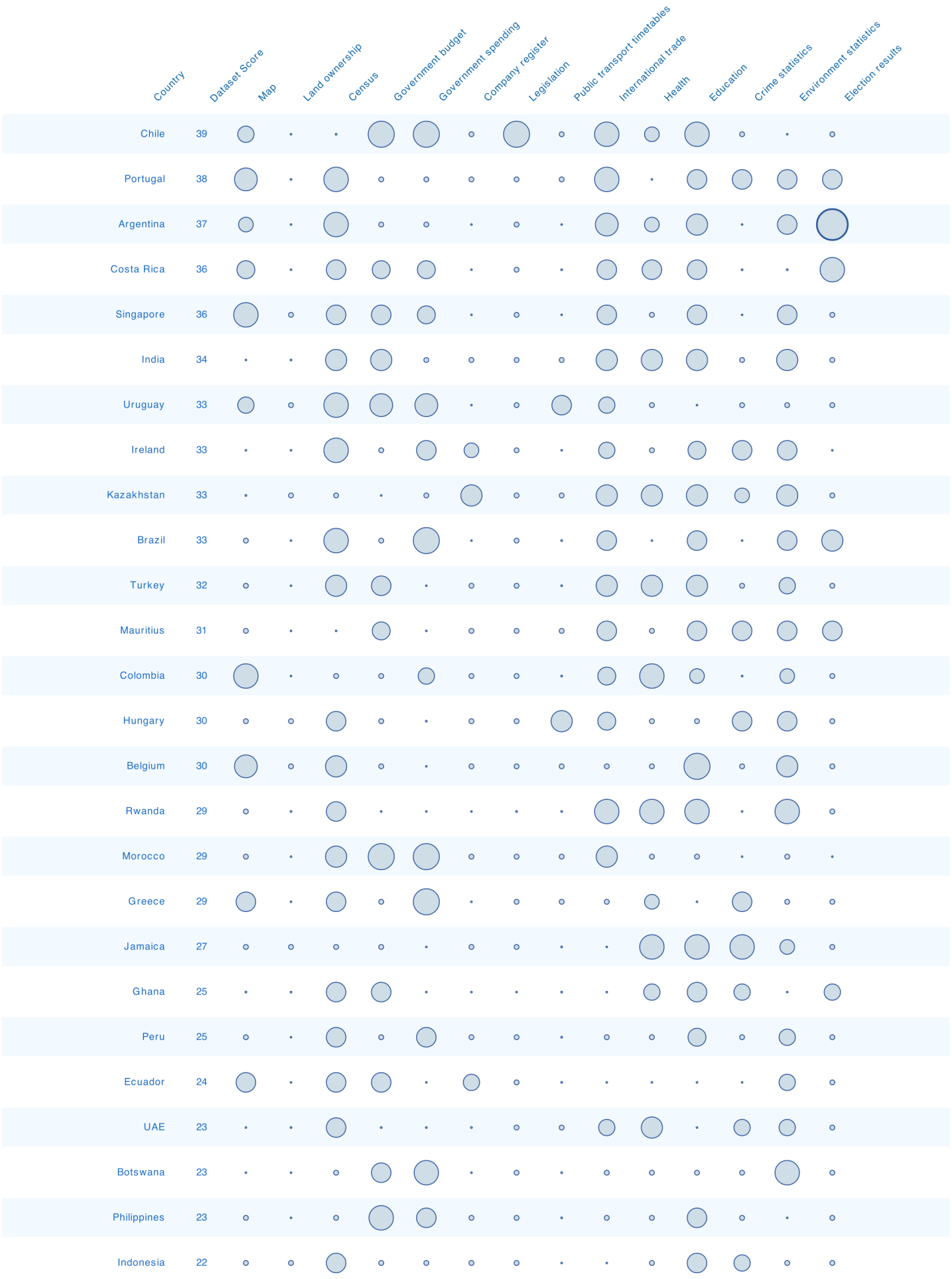
Switzerland 41
Finland 41
Russian Federation 40
Czech Republic 40
Austria 39
Thailand 39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Portugal 38
Argentina 37
Costa Rica 36
Singapore 36
India 34
Uruguay 33
Ireland 33
Kazakhstan 33
Brazil 33
Turkey 32
Mauritius 31
Colombia 30
Hungary 30
Belgium 30
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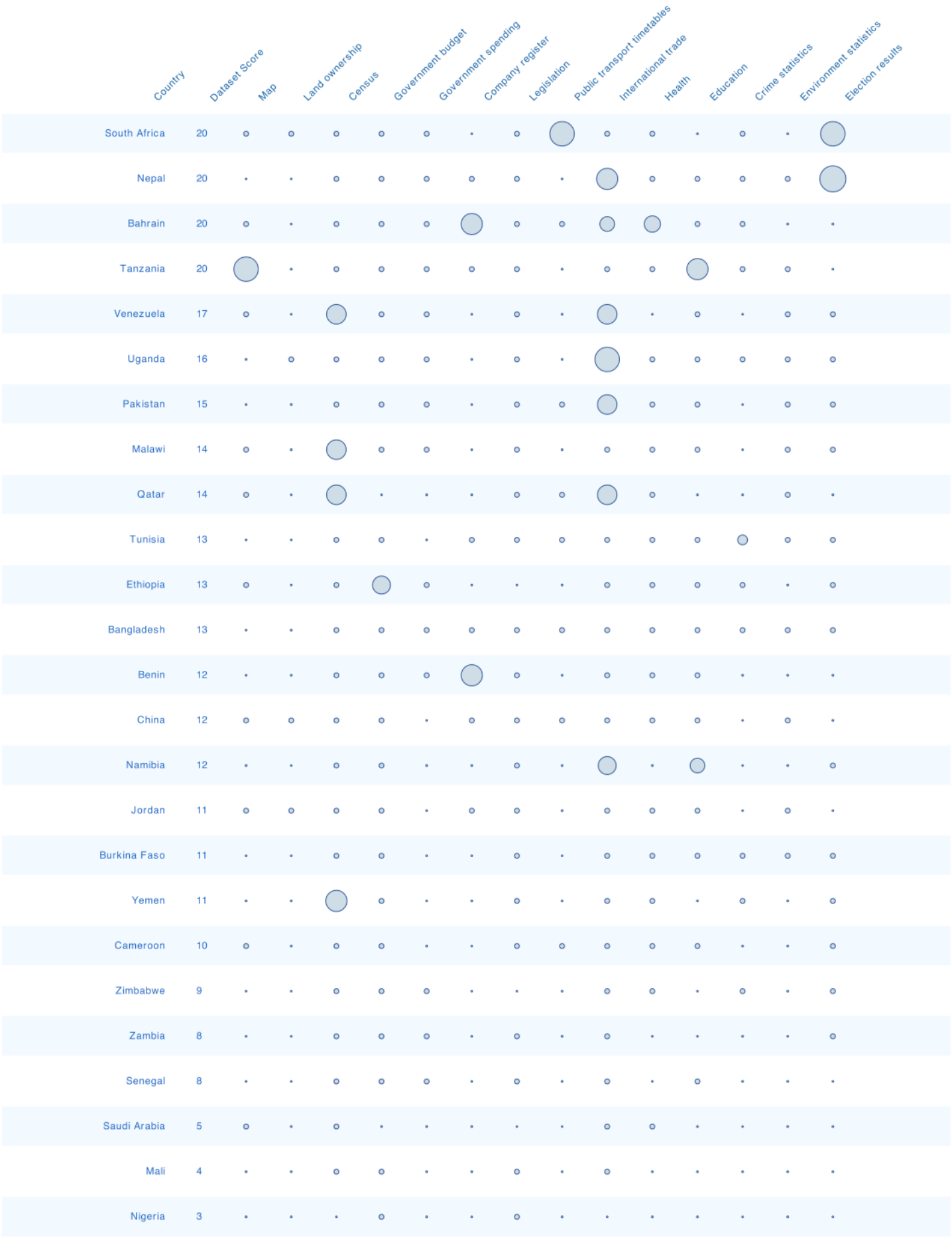
Jamaica 27
Ghana 25
Peru 25
Ecuador 24
UAE 23
Botswana 23
Philippines 23
Indonesia 22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South Africa 20
Nepal 20
Bahrain 20
Tanzania 20
Venezuela 17
Uganda 16
Pakistan 15
Malawi 14
Qatar 14
Tunisia 13
Ethiopia 13
Bangladesh 13
Benin 12
China 12
Namibia 12
Jordan 11
Burkina Faso 11
Yemen 11
Cameroon 10
Zimbabwe 9
Zambia 8
Senegal 8
Saudi Arabia 5
Mali 4
Nigeria 3

Early indications of impact

Few methods exist for assessing the impacts of open data publication. Whilst in a number of countries studies exist that have estimated the economic potential of open data, across our 77-country research we could not locate any comprehensive evaluations that quantify the benefits of open data. This is unsurprising given the very early stage of open data initiatives in most countries, although it does highlight a key challenge for research in the coming years.

To help inform the development of future impact measurement methods, we asked our expert survey researchers to look for media and academic mentions of where open data had been used, and had been cited as the cause of some substantive change, across a range of different settings, including government transparency, government efficiency, environmental sustainability, social inclusion, economic growth and entrepreneurial activity. The more mentions of impact, and the more substantial the impact mentioned, the higher the score researchers could grant a country on each of these dimensions. Although this does not offer substantive proof of impact, it does allow us to start exploring the relative emphasis on different kinds of open data impacts currently seen in different countries.

Figure 5 shows the non-normalised mean impact score given against these different categories. Researchers could award scores on a 0 – 10 scale. The median score awarded across all six of the impact questions asked was 0, with the exception of accountability, with a median score of 1. Excluding countries with a low score on variables for the presence of OGD initiatives marginally increases the mean, but does not alter the ordering of the categories.

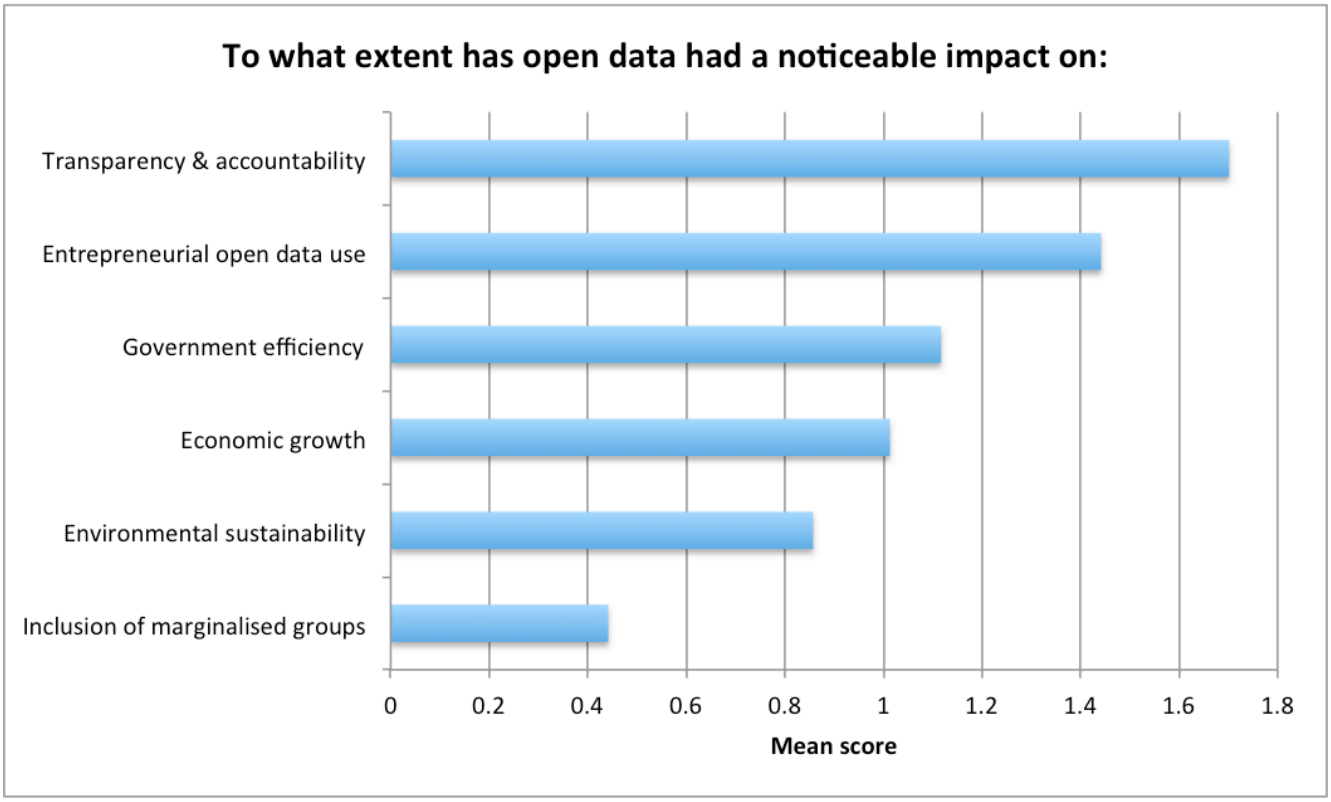

Figure 5: Average across all countries of response to expert survey question of the form 'To what extent has open data had a noticeable impact on...X' (see Annexe for question wording). Non-normalised values to allow comparison between questions.

Stories of open data impact discovered across the ODB survey were most likely to focus on accountability, closely followed by entrepreneurship and the creation of innovative applications or start-ups. Many of these enterprise stories were closely related to app competitions and hack-days, highlighting the importance of activity to stimulate the economic re-use of open data, although researchers noted that few hack day events were rigorously evaluated. Environmental and social inclusion impacts of open data are the least cited, suggesting that there is much more work to be done to explore and stimulate potential uses of open data in these areas. In particular, there may be scope for more sectoral capacity building around open data.

Global snapshot: conclusions

From this global snapshot we can see that whilst OGD policy has spread rapidly, and in a number of regions there are strong government, business and civil society foundations for open data initiatives, we are still a long way from seeing widespread implementation and impacts of those policies, in terms of data published and used, with uses and their consequences evaluated.

In the following section we turn to a comparative country analysis of the Open Data Barometer survey to explore in more depth the kinds of activities that leading countries are undertaking to build their open data programmes, and to identify different patterns of OGD development around the world.

Open Data Barometer: ranking and country analysis

The Open Data Barometer global ranking

The Open Data Barometer forms part of a research project into common assessment methods for open data initiatives. Through this we are seeking to identify measurement approaches that can help inform open data policy and practice, allowing governments, citizens and businesses to understand the relative maturity of different Open Government Data (OGD) initiatives, and to identify key areas for proactive interventions that can unlock the potential of government data in diverse contexts. Through the process of creating an index we are creating a shared resource that can be used to explore various hypotheses about the development of OGD. In addition through presenting data here, we offer a starting point for further exploration and storytelling about the commonalities and differences in OGD across the world. Our index is necessarily a subjective construction: although one informed by wider research and theory. In this section we outline the construction of the Open Data Barometer rankings. You will also find details of how you can access our data and create your own interpretations and analysis of open data across the globe.

Barometer structure and calculation

The Open Data Barometer is structured in three sub-indices to reflect the different stages involved in realising the benefits of open data, and the different groups who may be involved in, and may benefit from, open data. The three sections are readiness, implementation and impact.

- **Readiness** - identifies how far a country has in place the political, social and economic foundations for realising the potential benefits of open data. This sub-index contains three components:
    - **Government:** recognising the need for governments to have political will for an OGD initiative, and the technical capacity to put an OGD initiative into place;
    - **Entrepreneurs and business**: recognising the key role played by innovators and established firms as re-users and intermediaries of government data – and identifying the extent of existing capacity and support for open data use available to the private sector;
    - **Citizen and civil society**: recognising the importance of political freedoms, rights and protections to allow citizens and civil society to use OGD to hold government to account, and to engage in improving policy;

- **Implementation –** identifies the extent to which government has published a range of key datasets to support innovation, accountability and more improved social policy. This sub-index contains three components, picking out clusters of datasets commonly used in:
    - Securing government **accountability;**
    - **I**mproving **social policy;** and
    - Enabling **innovation** and economic activity.

- **Emerging impacts** – identifies the extent to which open data has been seen to lead to positive political, social and environment, and economic change. This sub-index contains three components:
    - **Political impacts** – including transparency & accountability, and improved government efficiency and effectiveness;
    - **Economic impacts** – through supporting start-up entrepreneurs and existing businesses;
    - **Social impacts** – including environmental impacts, and contributing to greater inclusion for marginalised groups in society.

In the following sections we display detailed scores from each sub-index for each country, along with an overall score, and then provide a detailed breakdown of component scores for selected countries. This helps to highlight the relative strengths and weaknesses across different countries and regions, and to focus attention on areas for deeper investigation.

Calculating the rankings

To calculate each component an average of the variables in that component is taken. The average of components is used to generate each sub-index. Details of the variables in each component and sub-index can be found in the Annexe. For consistency, the normalised scores for all the sub-indexes, and the readiness and impacts components, have been rescaled to a 0 - 100 range using the formula [(x - min)/(max - min)]*100 prior to presentation. This means that a score of 100 on these components and sub-indexes illustrates the highest scoring country across the 77 included in the Barometer Global ranking. It does not mean that a score of 100 is perfect.

All scores in a study of this kind are subject to a margin of error. To offer an indicative comparison between countries we offer a ranking based on rounding each countries overall ODB score to its integer value (no decimal places), and placing countries in order of score. This ranking, and each of the other scores, should be treated as the starting point for exploration, rather than a definitive judgement on each countries open data readiness, implementation and impacts.

Country selection

The selection of countries covered in the Open Data Barometer is based upon those included in the forthcoming 2013 Web Index, with four exceptions due to difficulty sourcing primary data on time[6]. This sample was selected to represent a wide range of regions, levels of development and political systems. The list of countries included in the Open Data Barometer is: Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Benin, Botswana, Brazil, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Ecuador, Estonia, Ethiopia, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Republic of, Malawi, Mali, Mauritius, Mexico, Morocco, Namibia, Nepal, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Portugal, Qatar, Russian Federation, Rwanda, Saudi Arabia, Senegal, Singapore, South Africa, Spain, Sweden, Switzerland, Tanzania, United Republic of, Thailand, Tunisia, Turkey, UAE, Uganda, United Kingdom, United States of America, Uruguay, Venezuela, Yemen, Zambia and Zimbabwe.

Get the data

The full data used to compute the Open Data Barometer is available from http://www.opendatabarometer.org Open Data Barometer data is also archived with the Zenodo research archive at https://zenodo.org/collection/user-opendatabarometer. Zenodo is a permanent research archive hosted on CERN infrastructure, dedicated to the long-term archival of research data.

With the release of this report a number of files will be published.

Filename	Description
Open Data Barometer - Research Handbook.PDF	The detailed research handbook providing the full text of questions and source guidance used in the expert-survey.
ODB-2013-Rankings.csv	The calculated components and sub-indexes of the 2013 Open Data Barometer.
ODB-2013-Structure.csv	All input variables included in the Open Data Barometer, their source and definition
ODB-2013-ScoresMatrix.csv	Peer-reviewed numerical scores assigned to each primary data variable collected for the Open Data Barometer.
ODB-2013-Datasets-Scored.csv	Validated and weighted dataset assessments; one row per dataset per country.
ODB-2013-Calculations.xls	Primary and secondary data, along with calculations and final index values.

In November and December 2013 we will be releasing additional qualitative data, including detailed justifications data for each of the questions. This will be released following a full review to ensure no private or confidential source details are contained within these files.

[6] *Egypt, Malaysia, Poland and Vietnam*

Global ranking: results

The table below presents global rankings of the Barometer index. Scores on each sub-index are based on normalised and scaled data, so indicate the comparative position of countries.

Country	Rank	Readiness Sub-Index	Implementation Sub-Index	Impact Sub-Index	ODB Overall
United Kingdom	1	100.00	100.00	79.91	**100.00**
United States	2	95.26	86.67	100.00	**93.38**
Sweden	3	95.20	83.14	71.95	**85.75**
New Zealand	4	81.88	65.49	89.81	**74.34**
Norway	5	91.88	70.98	46.15	**71.86**
Denmark	5	83.54	70.20	55.73	**71.78**
Australia	7	87.88	64.71	51.19	**67.68**
Canada	8	79.11	63.92	51.59	**65.87**
Germany	9	74.50	63.14	53.81	**65.01**
France	10	79.39	64.31	39.07	**63.92**
Netherlands	10	85.92	67.06	21.42	**63.66**
Korea (Rep. of)	12	77.19	54.90	24.56	**54.21**
Iceland	13	62.99	52.94	26.45	**51.01**
Estonia	14	72.38	49.41	24.00	**49.45**
Finland	14	91.19	41.18	40.87	**49.44**
Japan	14	76.99	47.06	27.94	**49.17**
Spain	17	67.48	49.41	21.13	**48.19**
Austria	18	68.56	39.22	48.62	**46.03**
Israel	18	61.82	45.88	25.36	**45.58**
Italy	20	50.39	42.75	45.69	**45.30**
Russia	20	54.43	40.39	48.86	**44.79**
Switzerland	22	65.11	41.57	26.80	**43.24**
Czech Republic	22	61.83	40.00	35.36	**43.18**
Kenya	22	49.70	45.88	21.55	**43.06**
Mexico	25	49.10	45.49	8.37	**40.30**
Chile	25	65.79	39.22	18.27	**40.11**
Portugal	27	60.38	38.04	19.25	**38.63**
Brazil	28	66.03	32.16	27.87	**36.83**
Singapore	29	70.28	35.29	8.97	**36.29**
Ireland	29	61.81	32.55	23.92	**35.76**
Thailand	31	38.09	39.22	14.88	**35.33**
Argentina	31	46.08	36.47	17.29	**35.00**
Belgium	31	72.01	28.63	25.64	**34.80**
India	34	57.36	33.73	9.87	**33.38**
Uruguay	34	54.66	32.94	13.31	**33.04**
Costa Rica	36	47.34	35.29	0.00	**31.21**
Kazakhstan	37	34.96	32.16	2.84	**27.61**
Greece	37	43.95	27.84	12.30	**27.59**
Turkey	37	41.92	31.37	0.00	**27.58**
Morocco	40	36.46	27.84	16.59	**27.24**
Colombia	40	44.33	29.02	2.49	**26.71**
Hungary	42	32.42	28.63	10.51	**26.09**
Mauritius	42	35.71	30.59	0.00	**26.08**
United Arab Emirates	44	53.88	21.57	12.30	**24.59**
Rwanda	45	36.71	27.84	0.00	**24.27**
Jamaica	46	32.56	25.88	2.49	**22.69**
Philippines	47	40.33	21.18	10.31	**21.91**
Peru	47	36.36	23.14	4.95	**21.74**
Ghana	47	39.51	23.53	0.00	**21.60**
Ecuador	50	38.51	22.35	2.83	**21.12**
Tunisia	50	63.52	10.98	26.46	**21.02**
South Africa	52	35.39	18.43	10.31	**19.20**
Indonesia	52	34.91	20.39	0.00	**18.66**
Bahrain	54	42.94	18.04	0.00	**18.18**
Uganda	55	23.99	13.33	23.07	**16.15**
Botswana	55	12.16	21.57	0.00	**16.08**
Nepal	55	21.15	18.43	2.84	**15.70**
Tanzania	58	20.43	17.65	0.00	**14.51**
Malawi	59	28.24	11.76	16.52	**14.47**
Qatar	60	39.01	11.76	0.00	**13.09**
China	61	41.72	9.41	0.00	**11.82**
Venezuela	62	9.59	14.90	0.00	**10.91**
Pakistan	63	14.59	12.16	0.00	**9.70**
Jordan	63	30.95	8.63	0.00	**9.63**
Bangladesh	63	23.00	10.20	0.00	**9.56**
Ethiopia	66	15.45	10.59	0.00	**8.70**
Burkina Faso	67	17.63	8.24	0.00	**7.35**
Benin	67	11.60	9.41	0.00	**7.28**
Saudi Arabia	67	40.82	1.57	5.69	**7.09**
Namibia	67	11.57	9.02	0.00	**7.00**
Senegal	71	28.57	4.71	0.00	**6.46**
Cameroon	71	7.11	6.67	5.56	**5.65**
Zimbabwe	73	15.20	5.88	0.00	**5.30**
Yemen	73	0.00	8.24	0.00	**4.69**
Nigeria	75	36.90	0.00	0.00	**4.35**
Zambia	75	11.84	5.10	0.00	**4.23**
Mali	77	6.15	0.39	0.00	**0.00**
Grand Total		**47.99**	**32.20**	**18.62**	**32.47**

Table 4: Sub-index and overall scores. Each column independently scaled on a 0 - 100 min-max scale (i.e. 100 = top scorer out of our sample; but does not indicate a perfect score on that component). Rank based on rounded integer value of overall score.

Country analysis: top five

Table 4 shows a clear regional variation between the readiness, implementation and impact scores assigned by the Open Data Barometer. In the following pages we explore the scores of selected countries, and dig into the narratives behind these scores, drawing on secondary literature and the qualitative data gathered during the Barometer survey. The focus here is on drawing out lessons from OGD initiative strengths, and highlighting unique aspects of different initiatives, rather and providing a full critical assessment of each initiative, and these narratives should be read in light of the substantial distance all countries still have to travel before they can claim to be fully 'open by default'.

United Kingdom (Overall rank #1)

The United Kingdom established an Open Government Data initiative in 2009, and has placed a high policy priority on open data. The national OGD initiative has been sustained and extended across a change of government in 2010, and has received high-level backing from the Prime Minister. A strong emphasis has been placed on the potential of open data to support innovation and economic growth, including through the establishment of the Open Data Institute to support and catalyse business use of open data. To secure contributions to the data.gov.uk portal from across government, each department was required to create a departmental open data strategy, including details of actions that could be taken to stimulate use of data, and progress against these strategies is regularly reported upon in written ministerial statements. Sector Transparency Boards have been established in many departments, with business and civil society representatives in many, and an Open Data Users Group has been in operation since 2012, acting as a conduit for data requests and advising government on priority datasets to release. Local authorities have been mandated to publish certain open datasets, and many have established their own open data portals. Training on open data topics is increasingly available, and there are frequent thematic and general open data hack-days, events and competitions, as well as government-supported innovation funding dedicated to helping new and existing businesses to engage with open data. There are a number of different vibrant user communities around open data, although efforts to increase charity and voluntary sector engagement with open data remain in the early stages.

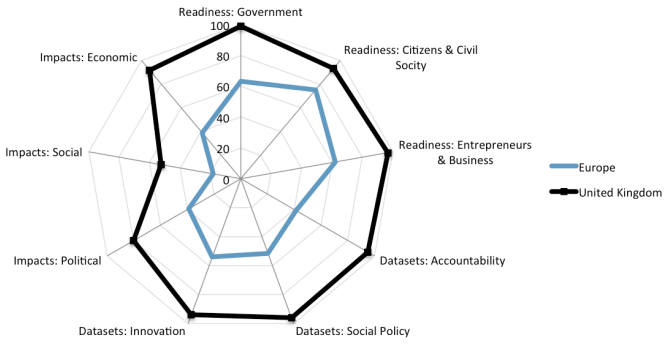

Figure 6: Radar chart of scaled sub-component scores. Comparison of UK and Europe average.

The UKs weakest area in the Barometer ranking is in securing social impact from open data, and although there are some experiments taking place to make community and local government data available to support policy discussions, recent government policy has particularly emphasised economic re-use of data, and requiring economically-centred 'business cases' to justify data release, rather than looking to support thematic communities of practice around data. Only limited examples of open data used as a tool for more open policy making exist. Concerns have also been raised that the 'open by default' principle the government signed up to in the G8 Open Data Charter (G8, 2013) may not be applied to important new datasets such as a register of company beneficial ownership being created to address tax dodging and corruption. Civil society organisations have criticised the government's reluctance to make an explicit commitment to providing this as open data, and slow progress on providing existing comprehensive data from the companies register.

Across the extensive data that is provided by the government, there are clear efforts to increase quality, standardisation, reliability and link-ability. A number of datasets surveyed in the barometer (national map, land registry, company registry, and legislation) are available as five star linked data. In response to a 2013 independent review of Public Sector Information policy (Shakespeare, 2013), the UK is now increasingly focussed on articulating and developing a National Information Infrastructure of core datasets that need to be maintained, developed and enhanced as open data. A number of departments are exploring how to build their public web presence on top of their open data publication, creating platforms that are 'open all the way down', including legislation.gov.uk, and the

http://devtracker.dfid.gov.uk site which brings together IATI standard aid transparency data from different government departments.

United States (Overall rank #2)

The USA launched the world's first high-profile national OGD initiative in 2009, catalysed by a presidential memorandum on Transparency, Participation and Collaboration. The initiative is currently backed by an executive order and policy memorandum that focussed on machine-readable, standardised, clearly licensed, and well catalogued data. Government agencies are encouraged to identify and release 'high value' datasets, with an emphasis on economic value from data. The USA has historically scored high on open data availability due to the fact that copyright laws do not apply to federal data, meaning many datasets have long been in the public domain. However, the recent 'project open data' created some controversy by proposing datasets should be 'licensed', which may create confusion about their public domain status.

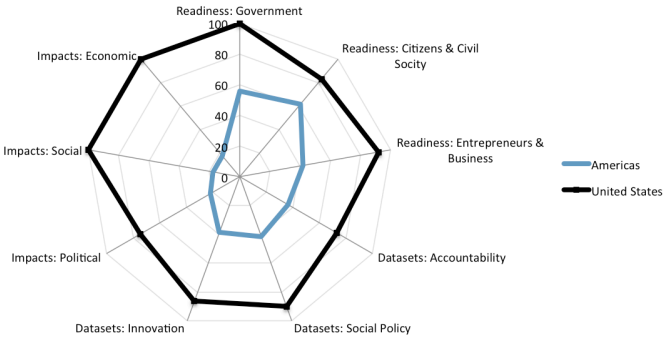

Figure 7: Radar chart of scaled sub-component scores. Comparison of USA and Americas region average.

The US government has placed a strong emphasis on bringing innovators into government, and increasing engagement between government and outside communities, linked to the idea of 'government as a platform' (O'Reilly, 2010). A programme of 'Presidential Innovation Fellows' has seen private sector experts embedded in government departments on short-term placement to support open data work, and a series of high-profile 'Datapalooza' events sought to engage entrepreneurs in solving social problems and building businesses using government data. The US also benefits from a wide range of civil society organisations seeking to work with government data for transparency and accountability purposes.

There has been a particular emphasis placed in the development of the data.gov data portal placed on the 'Communities' section, creating thematic spaces that bring together content, documentation and discussions on topics such as agriculture, health, energy, law and manufacturing. However, recent experiences of the US Government Shutdown highlighted the weaknesses of a centralised data portal approach, when access to data.gov was turned off for two weeks – leaving anyone relying on Open Government Data without access to this essential resource.

Sweden (Overall rank #3)

Sweden was the first country to adopt a Right to Information law in 1776 (most recently renewed and updated in 2003), providing a strong foundation for the launch of the country's national OGD portal as a pilot in 2012. This followed the launch two years earlier of data.riksdagen.se, a pioneering open data portal launched by the Riksdag, Sweden's national legislative assembly. This leadership from the legislative assembly is notable, as in many countries OGD policies have been led by the executive branch of government, without being subject to parliamentary discussion and debate.

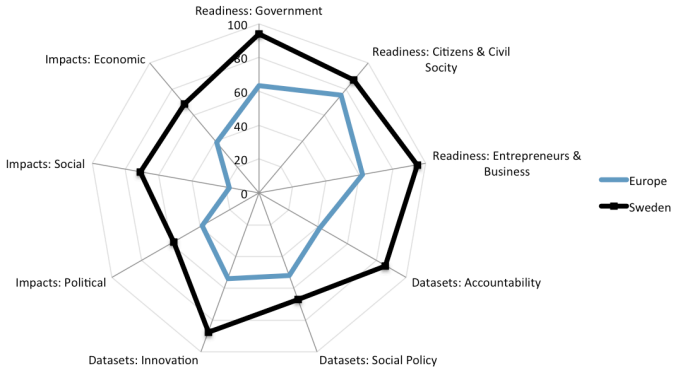

Figure 8: Radar chart of scaled sub-component scores. Comparison of Sweden and Europe region average.

Sweden's OGD portal does face some weaknesses when it comes to clear licencing, with a number of key datasets published without an open licence. The portal itself is managed by the Vinnova, the National Innovation Agency, and has a dedicated staff who have also been involved in supporting pilot open data projects in different cities and organisations across Sweden.

Hack day and innovation events have taken place across the country to stimulate engagement with data, and projects such as TrafikLab bring together public and private data on transport in one platform for innovators to build on. Sweden scores particularly highly across the impact components of the Barometer, with examples of open data use to improve the efficiency of healthcare, and use of environmental data by data journalists to visualise how cuts to the environment budget might affect endangered species.

New Zealand (Overall rank #4)

The OGD initiative in New Zealand is part of a wider Open and Transparent Government Agenda, initially driven by the 'Open Government Information and Data Re-use Working Group' established in 2009, and later by the 2011 'Declaration on Open and Transparent Government' approved by the Cabinet in August 2011. This declaration mandates public service departments, notably with the explicit inclusion of the New Zealand Intelligence Service, to "commit to releasing high value public data actively for re-use…in accordance with the NZGOAL Review and Release process". NZGOAL is the New Zealand Government Open Access and Licensing Framework, based on the Creative Commons framework. This places work on open data within the wider context of *"enabling people to re-use government material for their own purposes, whether economic, environmental, creative or cultural"* and *"encouraging experts and others to contribute to improved policy development and more efficient financial performance by government through being able to access, manipulate and provide feedback on such material."* (www.nzgoal.info). This focus means many key datasets are clearly licensed in New Zealand, although more could be done to make datasets easily accessible in bulk rather than through online interfaces.

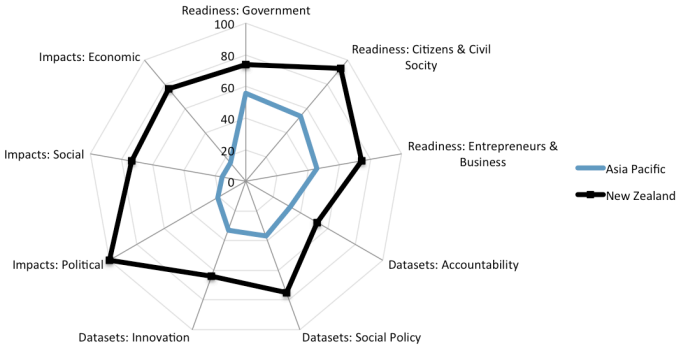

Figure 9: Radar chart of scaled sub-component scores. Comparison of New Zealand and Asia Pacific region average.

Whilst there is a civil society community engaging with government around open data in New Zealand, the community is relatively small. There have been some hack day events and app competitions since 2010, but government has not yet widely experimented with grants, innovation vouchers or incubator programmes to stimulate entrepreneurial re-use of open data.

The New Zealand Government has put considerable effort into monitoring progress towards open government and open data, with Agencies asked to regularly report to Ministers on their progress, case studies collated on re-uses of open data, and an annual reporting process on adoption of the Declaration on Open and Transparent Government. New Zealand was one of the few countries in the Barometer where a significant emphasis on environmental impacts of open data could be observed, with a wide range of environmental datasets made available and seeing re-use, particularly in supporting coordination around extreme weather and geological events.

Denmark and Norway (Overall joint rank #5)

Denmark and Norway both rank highly in the Open Data Barometer[7], with governments, civil society and businesses well placed to secure benefits from open data. Both countries also have a broad range of data available in machine-readable and bulk formats, although their strategies to achieve this vary.

In Norway, an open data platform has been undergoing iterative development since 2010, with a blog initially launched to engage the community, and then a data catalogue launched in 2011. Run by the Agency for Public Management and eGovernment (Difi), the platform has also created the 'Data

[7] *The scores of Norway and Denmark are within 0.5 percentage points of one another. Given margins of error, these countries are ranked equally.*

Hotel', a hosted API[8] and data store which will host machine-readable copies of government data through a common API, and which provides stable URIs (links) for many elements in these datasets. The Data Hotel is offered as an optional service to government agencies publishing on the data.norge.no portal, allowing them to increase the accessibility of their data for users.

Norway is one of the three countries in the Barometer with a fully open company register, and has reported strong uptake, including from the business community who are using API access onto the register for e-invoicing, clocking up over 190,000 hits a month within the first year[9].

Denmark also has an open data catalogue, launched in 2010 and run by the national Digitization Agency. However, greater emphasis has been placed in Denmark on reforming processes of data management inside government, with the ambitious 'Danish Basic Data Program' launched in 2012 to encourage consolidation of government registers, ending duplication and increasing efficiency through internal re-use of data. This might be compared and contrasted to the UK 'National Information Infrastructure' project, which has primarily focussed on publishing existing data, rather than rethinking the way core reference data is handled inside government.

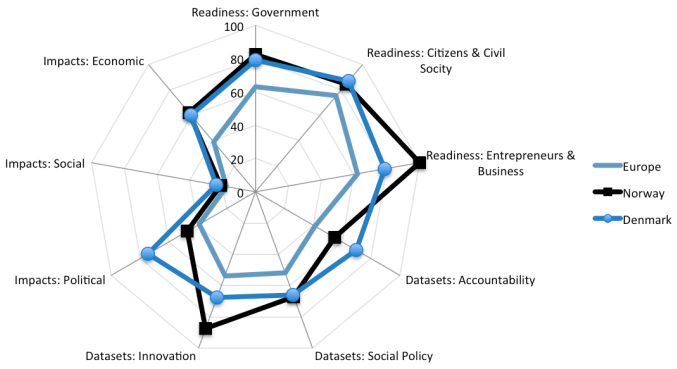

Figure 10: Radar chart of scaled sub-component scores. Comparison of Norway, Denmark and Europe region average.

It is notable in the radar chart above that Denmark demonstrates higher availability of accountability datasets and stronger political impacts, whilst also seeing lower business readiness to engage with open data and secure benefits from it, along with lower availability of innovation enabling datasets. However, access to data has still had a substantial economic impact in Denmark. In 2002 the government launched an agreement to provide free of charge access to address data. A 2010 evaluation of the policy commissioned by the Danish Enterprise and Construction Authority found that 1,200 parties were consuming the data via 22 public data distributors, with an estimated financial benefit to society of EUR 62 million, against costs to 2009 of only EUR 2 million (DECA, 2010). Although not framed in terms of open data, this policy demonstrates the importance of key datasets as inputs for a wide range of business activities.

[8] *Application Programming Interface: APIs are used by developers to access data programmatically – and can make it much simpler for developers to work with regularly changing government data.*
[9] *Source: ODB Expert Survey interviews.*

Regional rankings

The table below presents Barometer rankings grouped by region.

Country	Readiness Sub-Index	Implementation Sub-Index	Impact Sub-Index	ODB Overall
Africa	25.90	14.73	5.72	**14.29**
Kenya	49.70	45.88	21.55	**43.06**
Morocco	36.46	27.84	16.59	**27.24**
Mauritius	35.71	30.59	0.00	**26.08**
Rwanda	36.71	27.84	0.00	**24.27**
Ghana	39.51	23.53	0.00	**21.60**
Tunisia	63.52	10.98	26.46	**21.02**
South Africa	35.39	18.43	10.31	**19.20**
Botswana	12.16	21.57	0.00	**16.08**
Uganda	23.99	13.33	23.07	**16.15**
Tanzania	20.43	17.65	0.00	**14.51**
Malawi	28.24	11.76	16.52	**14.47**
Ethiopia	15.45	10.59	0.00	**8.70**
Burkina Faso	17.63	8.24	0.00	**7.35**
Benin	11.60	9.41	0.00	**7.28**
Namibia	11.57	9.02	0.00	**7.00**
Senegal	28.57	4.71	0.00	**6.46**
Cameroon	7.11	6.67	5.56	**5.65**
Zimbabwe	15.20	5.88	0.00	**5.30**
Zambia	11.84	5.10	0.00	**4.23**
Nigeria	36.90	0.00	0.00	**4.35**
Mali	6.15	0.39	0.00	**0.00**
Americas	51.13	37.50	19.19	**36.84**
United States	95.26	86.67	100.00	**93.38**
Canada	79.11	63.92	51.59	**65.87**
Mexico	49.10	45.49	8.37	**40.30**
Chile	65.79	39.22	18.27	**40.11**
Brazil	66.03	32.16	27.87	**36.83**
Argentina	46.08	36.47	17.29	**35.00**
Uruguay	54.66	32.94	13.31	**33.04**
Costa Rica	47.34	35.29	0.00	**31.21**
Colombia	44.33	29.02	2.49	**26.71**
Jamaica	32.56	25.88	2.49	**22.69**
Peru	36.36	23.14	4.95	**21.74**
Ecuador	38.51	22.35	2.83	**21.12**
Venezuela	9.59	14.90	0.00	**10.91**
Asia Pacific	51.18	33.24	18.49	**33.67**
New Zealand	81.88	65.49	89.81	**74.34**
Australia	87.88	64.71	51.19	**67.68**
Korea (Rep. of)	77.19	54.90	24.56	**54.21**
Japan	76.99	47.06	27.94	**49.17**
Singapore	70.28	35.29	8.97	**36.29**
Thailand	38.09	39.22	14.88	**35.33**
India	57.36	33.73	9.87	**33.38**
Philippines	40.33	21.18	10.31	**21.91**
Indonesia	34.91	20.39	0.00	**18.66**
Nepal	21.15	18.43	2.84	**15.70**
China	41.72	9.41	0.00	**11.82**
Pakistan	14.59	12.16	0.00	**9.70**
Bangladesh	23.00	10.20	0.00	**9.56**
Europe	68.97	50.12	35.34	**51.50**
United Kingdom	100.00	100.00	79.91	**100.00**
Sweden	95.20	83.14	71.95	**85.75**
Norway	91.88	70.98	46.15	**71.86**
Denmark	83.54	70.20	55.73	**71.78**
Germany	74.50	63.14	53.81	**65.01**
France	79.39	64.31	39.07	**63.92**
Netherlands	85.92	67.06	21.42	**63.66**
Iceland	62.99	52.94	26.45	**51.01**
Estonia	72.38	49.41	24.00	**49.45**
Finland	91.19	41.18	40.87	**49.44**
Spain	67.48	49.41	21.13	**48.19**
Austria	68.56	39.22	48.62	**46.03**
Italy	50.39	42.75	45.69	**45.30**
Russia	54.43	40.39	48.86	**44.79**
Switzerland	65.11	41.57	26.80	**43.24**
Czech Republic	61.83	40.00	35.36	**43.18**
Portugal	60.38	38.04	19.25	**38.63**
Ireland	61.81	32.55	23.92	**35.76**
Belgium	72.01	28.63	25.64	**34.80**
Greece	43.95	27.84	12.30	**27.59**
Turkey	41.92	31.37	0.00	**27.58**
Hungary	32.42	28.63	10.51	**26.09**
Middle East & C. Asia	38.05	18.48	5.77	**18.81**
Israel	61.82	45.88	25.36	**45.58**
Kazakhstan	34.96	32.16	2.84	**27.61**
United Arab Emirates	53.88	21.57	12.30	**24.59**
Bahrain	42.94	18.04	0.00	**18.18**
Qatar	39.01	11.76	0.00	**13.09**
Jordan	30.95	8.63	0.00	**9.63**
Saudi Arabia	40.82	1.57	5.69	**7.09**
Yemen	0.00	8.24	0.00	**4.69**
Grand Total	**47.99**	**32.20**	**18.62**	**32.47**

Table 5: Sub-index and overall scores. Each column independently scaled on a 0 - 100 min-max scale (i.e. 100 = top scorer out of our sample; but does not indicate a perfect score on that component).

Regional analysis: Africa

The first OGD initiative in Africa was launched in Morocco in April 2011, closely followed by Kenya in July of that year. A number of other countries have explored creating OGD initiatives, and international donors such as the World Bank have been supporting open data readiness studies across the continent. Civil society groups have also engaged with campaigning for open data in countries such as Uganda and South Africa. The African Development Bank has launched the Open Data For Africa platform (www.opendataforafrica.org) bringing together key statistical indicators as open data from all 54 African countries, although we did not find any countries linking out to this portal or pointing their citizens to it. Where data was available from African governments, it was often provided through national statistical services, the beneficiaries of considerable investment in statistical capacity building over recent years. Adding support for these agencies to publish bulk machine-readable data, and to apply open licenses, could increase the supply of fully open data on the continent.

Budgets were also often published online in ways that are just a few steps from being fully open data. However, many important datasets will be trickier to secure as open data – as robust digital data collection and management is often lacking when it comes to information such as detailed public service performance, government spending, land registration, company registration and national maps. Given one of the factors underlying the role of OGD in stimulating entrepreneurial activity is the idea that government data is comprehensive and reliable (Lakomaa & Kallberg, 2013), models of open data based innovation in areas of Africa may need to develop new approaches, potentially based around open approaches to generating, rather than using, key public datasets.

Kenya (Overall rank #22)

The Kenya OGD Initiative was launched in July 2011 by President Mwai Kibaki, in front of a 3,000 strong audience, including many of the technologists and developers who had advocated for the project. Benefiting from the presence of a vibrant technology scene in Nairobi, and with support from the World Bank, the Kenya OGD initiative generated significant interest and discussion. However, in 2012 the lead architect of the initiative, then PS Bitange Ndemo, suggested the initiative may have stalled, due to challenges in securing new and updated datasets from a wide range of government departments (The Nation, 2012).

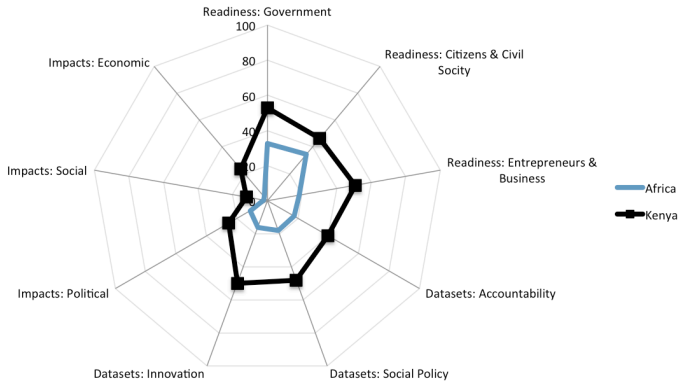

Figure 11: Radar chart of scaled sub-component scores. Comparison of Kenya and Africa region average.

Significant effort has gone into capacity building with the local technology community, and with journalists as key open data intermediaries. Initiatives include hack days, data journalism training, and the Code for Kenya incubator, which embedded data experts inside established news organisations. These projects have often faced challenges getting relevant data from the opendata.go.ke portal, but have managed to access datasets through data scraping and interacting directly with ministries, suggesting that the idea of open data has acted as a catalyst for a range of activities, even if open datasets are not, in the end, the main input to those activities.

Civil society groups have also engaged with the open data agenda, exploring how open data could be a resource for informing and empowering marginalised communities. Early research suggests that there is a long way to go before the impacts of the open data initiative are widely felt. In a recent survey of Kenyan citizens, the Jesuit Hakamani Trust found that whilst there was significant demand from the population for government data, at most 14% of citizens were aware of, or had accessed, the national open data portal (Mokua & Chiliswa, 2013), and open data will need to be accessible through a range of non-technical intermediaries such as community centres and radio if the gap between information online, and effective access to information for citizens is to be bridged.

Morocco, Mauritius, Rwanda (Overall ranks #40, #42, #45)

Morocco launched an open data portal in April 2011, with a focus on financial datasets. The portal currently hosts 50 datasets, all placed under a clear Open Database License. There has been limited outreach around the portal, although the increased availability of budget and finance information has stimulated discussions about government transparency, and some local experimentation with different ways to visualise and use the data.

Neither Rwanda nor Mauritius currently have OGD initiatives, although Mauritius has included elements on open data within its 2013-17 eGovernment Strategy, focussing on its potential contribution to transparency, public service improvement, innovation and efficiency.

Ghana (Overall rank #47)

Ghana began an OGD Initiative in early 2012, following a readiness assessment carried out by the World Wide Web Foundation in May 2011. The Initiative has launched a 'beta' open data portal for public comment, with around 120 datasets from 12 departments, and is focussing on the development of clear open data strategy and on building an open data community in the country. Ghana recently passed a Right to Information Law, and has had a data protection law on the books since 2012, providing key foundations for trust in the OGD initiative. However, both laws are yet to be fully tested in practice. With external support the government has run data journalism training, but there is a lot more to be done to build a community of intermediaries around the data published by government, and to increase the quality and reliability of key datasets as the open data portal moves from beta to a production version.

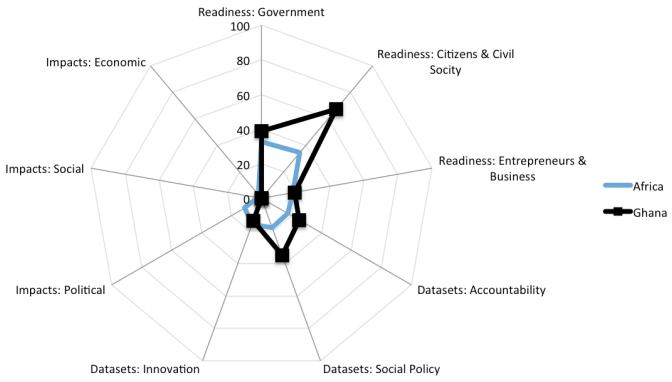

Figure 12: Radar chart of scaled sub-component scores. Comparison of Ghana and Africa region average.

Regional analysis: Europe

A number of European countries have already been discussed in the top five analyses. Looking at the overall picture for Europe, countries are generally strong on the civil society readiness component. This component includes issues such as the presence of Right to Information legislation, political freedoms, and the quality of Data Protection Laws. We hypothesise that clear data protection regimes are important for citizen trust in open data, and to ensure (a) that private data is not wrongly released during open data programmes; and (b) that open data cannot be easily abused by being combined with other retained records on individuals. European Union and Council of Europe instruments contribute strongly to the consistent and robust data protection regime in Europe.

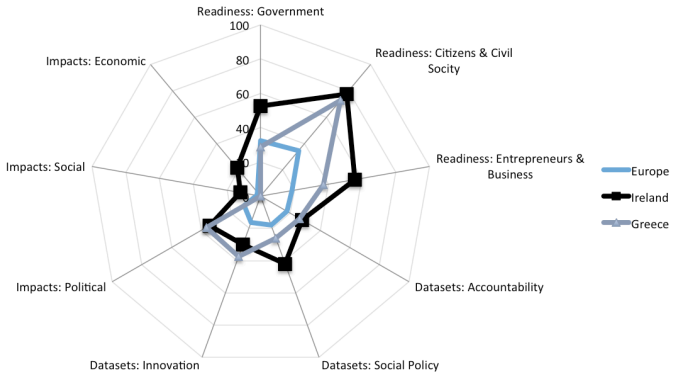

Figure 13: Radar chart of scaled sub-component scores. Comparison of Ireland, Greece and Europe region average.

The civil society readiness component also includes a variable concerning the extent of bottom-up campaigning for open data. A number of countries have well developed advocacy for open data, with broad coalitions of developers, academics and civil society, yet have not yet secured clear government commitment and action on open data. Notable examples include Ireland and Greece, both of which have also had a strong community focus on Linked Data.

With a few exceptions, whilst most European nations have high levels of internet penetration, and firms with capacity to absorb ICTs, there are considerable opportunities for governments to increase

the availability of open data related training, and to invest in support for innovation and open data re-use in order to have a greater chance to gaining benefits from data publication.

Regional analysis: Middle East and Central Asia

Amongst the Middle East and Central Asia countries in the ODB sample only Yemen has no evidence of any Open Government Data activity. Bahrain, Kazakhstan and Israel each have dedicated open data portals, and the United Arab Emirates, Jordan and Qatar have created Open Government Data pages on existing government websites. Elbadawi's argument that Gulf Coooperation Council open data initiatives are primarily e-government driven (Elbadawi, 2012) is supported by the ODB data, showing strong government technology capacity, but much more limited civil society and private sector readiness to secure benefits from open data. Without strong foundations of civil society freedoms, the Right to Information and Data Protection, it is likely to be far harder for transparency and accountability benefits of open data to be secured.

The region has also seen very little support for innovation with open data, suggesting the economic potential of open data will also be hard to realise. This raises questions about the motivation and drivers for the launch of open data portals and platforms.

Open data is written into a number of national e-government action plans in the region, and is a component of Jordan's Open Government Partnership action plan. However, a pattern of stop-start OGD initiative development so far is apparent from our qualitative research. Bahrain's OGD initiative delivered a portal in 2011, but it has been largely dormant since. In Israel, an OGD initiative began with ministerial backing, but progress appeared to slow when the minister involved left the government. Both appear to be receiving new attention, but a lack of sustained progress is likely to have harmed the confidence of potential users, and work will be needed to build community and re-user confidence in open data supply.

Regional analysis: Asia Pacific

Together the countries in our Asia Pacific regional grouping account for over 3.5bn of the world population, and represent a full range of levels in the Human Development Index (HDI).

In the low HDI countries (Bangladesh, Pakistan and Nepal) only Nepal has seen substantial activity around open data, although this is primarily led by civil society, and is substantially driven by an aid transparency agenda, recognising the substantial contribution that international donors make to the national budget. Amongst medium-ranked HDI countries (China, India, Indonesia, Philippines, and Thailand) there are a number of different approaches. China has a national initiative on 'Open Government', but no explicit open data initiative at the national level, although some activity is taking place in Shanghai City. Availability of key open datasets in China is amongst the lowest in the Barometer rankings. Indonesia and the Philippines are both at the early stages of developing OGD initiatives, with significant work to do to increase the availability of structured, machine-readable data. As Sunlight Foundation have recently argued, whilst the Philippines has good legally mandated disclosures of contracting information, as well as having strong incentives for local government units to publish information online, the absence of machine-readable open data makes searching through all this information challenging, and limits public engagement in the transparency and accountability process (Furnas, 2013). India's Open Government Data initiative has built upon the introduction of the National Data Sharing and Accessibility Policy (NDSAP), and has led to the launch of the data.gov.in portal. The initiative is notable for publically announcing 'data controllers' for government ministries and departments, offering citizens and entrepreneurs a direct channel to data holders in various departments, rather than routing all communications with government through a central portal.

Amongst higher HDI countries, Japan's Open Government Data policy has received a boost through the recent G8 Open Data Charter. New Zealand, South Korea, Australia, Japan and Singapore all have a high level of government and private sector readiness to secure benefits from open data, although civil society readiness is notably lower in Singapore and Korea.

Regional analysis: Latin America and the Caribbean

The first regional conference on Open Data in Latin America and the Caribbean took place in June 2013, bringing together emerging and established initiatives from across the region. Those involved have suggested that this event also saw evidence of new forms of civil society collaboration emerging, with technologists, activists, private sector, government officials and policy makers all coming together around open data as a catalyst for cooperation.

In the ODB rankings, Mexico and Chile jointly top the regional table for Latin America and the Caribbean (LAC)[10] closely followed by Brazil and Argentina. At the national level, LAC countries are generally stronger in their governmental and civil society readiness, than in business and entrepreneur readiness, but this may hide significant sub-national variations, with major cities acting as hubs of entrepreneurial open data activity. The smart-cities agenda present in many of the large urban centres of the region provides one point of connection between open data and wider technical change. Not only can open data play an important role in smart cities innovations (for example, through innovation on top of standardised public transport data), but as technical platforms become increasingly embedded in the governance of cities it is important to ensure that citizens have open access to data on their cities that will enable them to engage in policy discussions.

A number of regional open data activities build on a history of 'transparency portals' that gave legally mandated access to public finance information. As a result, moves to make public spending data available as open data in Brazil, for example, are backed by strong mandates to ensure the data is published in a timely fashion. Brazil has also framed the launch of its open data portal, datos.gov.br within a 'National Infrastructure of Open Data' project, setting out technical standards for sharing public sector information, and linking the open data and free software agendas.

Conclusions

This brief regional survey does not pretend to be a comprehensive review of the similarities and differences between national OGD policies. However, it does begin to demonstrate how the comparative data in the Open Data Barometer can provide the starting point for deeper analysis of different OGD programmes around the world, and for thinking about the different kinds of interventions that can be encouraged to secure benefits from open data.

We've not been able to say as much in this discussion about the emerging impacts of open data in different countries as we would have liked. As already mentioned, the majority of evidence remains anecdotal, and hard to draw detailed cross-country comparisons with at present, particularly given the significant variations in the populations of the countries covered by the ODB study.

We hope that, ultimately, the Open Data Barometer 2013 report, data and methods establish an initial baseline for tracking open data developments around the world, and act as a contribution to the discussion of approaches to monitor and measure open data progress.

This report is just one route into the Barometer study. The greater value of our research lies in the dataset that we have, naturally, made available as open data for others to analyse and build upon – and which we will continue to analyse and report on at www.opendatabarometer.org

[10] *The Americas region excluding Canada and United States.*

Annex: Detailed methodology

Annex: Detailed methodology

This section outlines in more detail the construction of the Open Data Barometer rankings, including details of the primary and secondary data used.

Data collection

The sub-indexes and overall ranking in the ODB are draw on three forms of data:

- **Peer-reviewed expert survey responses** - between July and October 2013 we conducted an expert survey, in which researchers were asked to respond to a number of detailed questions about the open data situation in a specific country (see Annex for the list of questions in the survey). Each question invited a response on a 0 - 10 scale, with detailed scoring guidance provided. Researchers also provided detailed citations for all scores. Responses were peer-reviewed, rescored by researchers where required, and cross-checked by the research coordination team.

  For the index, scores were normalised using z-scores for each question. This converts the 0 - 10 score into a measure of how far above or below the mean (in standard deviations) any given answer is. Normalisation gives us the ability to compare how well countries are doing relative to one another, and makes the measurements more robust to marginal alterations in scoring guidance year-on-year.

- **Detailed dataset assessments** - between July and October 2013 our expert country researchers investigated the availability of 15 kinds of data within each country, and answered a 10-point checklist with respect to the qualities of data provided. These assessments were peer-reviewed and subjected to a detailed review by a team of technical reviewers.

  For the Barometer Ranking, an aggregation logic and weightings were applied to the checklist results (see Annex) to generate a score between 0 and 100. These scores were not individually normalised, to allow clear comparison between the different datasets in the Barometer, but the aggregated index of dataset availability (the Implementation Sub-Index) was normalised using z-scores to bring it onto the same scale as other questions prior to inclusion in overall Index calculations.

- **Secondary data** - in order to complement the expert survey data for the ODB in the Readiness section of the Barometer, we draw on five secondary indicators, each selected on the basis of theory and their ability to measure important aspects of readiness not covered in our survey. Four of these are based on independent expert surveys (by the World Economic Forum; Freedom House and the United Nations Department of Economic and Social Affairs) and one is based on World Bank collated data on internet penetration.

  For the Barometer Rankings, these variables are each normalised using the same approach as for our peer-reviewed expert survey data (z-scores).

Structure

The Barometer builds upon tri-partite structure of three sub-indexes, each containing three components. These are all equally weighted in the final calculations.

Readiness (Primary & secondary data)			**Implementation** (Dataset assessments)			**Impacts** (Primary data)		
Government	Entrepreneurs & business	Citizens & civil society	Accountability dataset cluster	Innovation dataset cluster	Social policy dataset cluster	Political	Economic	Social

This structure is based on the idea that:

- Effective OGD initiatives requires involvement of Government, Civil Society and the Private Sector;

- OGD has a range of potential impacts, and the choices made in implementing an OGD policy may affect which of these impacts are realised;

Readiness sub-index: primary and secondary data

The Open Data Barometer measures Readiness through three components focussing on: Government; Citizens and Civil Society; and Entrepreneurs and Business. We are not measuring readiness to start an open government data initiative, but rather readiness to secure positive outcomes from such an initiative. As such, we include measures relating to the existence of open data, and a range of interventions that support engagement with and re-use of open data.

Each of the groups are important for a successful Open Government Data initiative. As Tim Berners-Lee has observed, open data *"has to start at the top, it has to start in the middle and it has to start at the bottom"* (Hogge, 2010). Policies and portals are just one component of an effective open data agenda. In carrying out qualitative Open Data Readiness assessment across a number of countries from 2010 to 2013, the Web Foundation developed a six-dimensional framework for looking at open data readiness, paying attention to the Political, Organisational, Legal, Social, Economic and Technical context within a country in order to understand factors that may facilitate or inhibit the development of an OGD initiative, and the successful use of open data (Alonso, Boyera, Grewal, Iglesias, & Pawelke, 2013; Grewal, Iglesias, Alonso, Boyera, & Bratt, 2011). These six dimensions have informed the selection of indicators in the Readiness section of the Open Data Barometer.

In selecting indicators we have also drawn upon emerging findings from the Open Data in Developing Countries (ODDC) research network which have highlighted important relationship between open data policies and the Right to Information (Davies et al., 2013; Perini, 2012), and the importance of complementing open data release with robust protection for citizens personal data (Davies, 2013). These two issues are represented in the Barometer by indicators on Right to Information and Data Protection laws. The experience of the Open Data Institute in delivering training and capacity building for the economic re-use of data also informed the design of our indicator on training availability. There were a number of further aspects of readiness we would have liked to include in this section, such as quality of government record keeping (Thurston, 2012), and the statistical capacity of governments. However, we could not locate comprehensive secondary indicators, nor design simple expert survey questions adequate to capture these. We continue to seek approaches to be able to include these in future Barometer studies.

The variables used in the readiness sub-index are:

Government

- Expert survey question: To what extent is there a well-resourced open government data initiative in this country?
- Expert survey question: To what extent are city or regional governments running their own open data initiatives?
- Secondary data: Importance of ICT to government vision (World Economic Forum Global Information Technology Report 2013; Variable 8.01; Taken from WEF expert survey)
- Secondary data: UN E-Government Survey, Government online services index (2012 edition)

Entrepreneurs and businesses

- Expert survey question: To what extent is training available for individuals or businesses wishing to increase their skills or build businesses to use open data?
- Expert survey question: To what extent is government directly supporting a culture of innovation with open data through competitions, grants or other support?

- Secondary data: Firm-level technology absorption (World Economic Forum Global Competitiveness Index, 2012; Variable 9.02; Taken from WEF expert survey)
- Secondary data: Internet users per 100 people (World Bank indicator IT.NET.USER.P2)

Citizen and Civil Society

- Expert survey question: To what extent does the country have a functioning right-to-information law?
- Expert survey question: To what extent does the country have a functioning right-to-information law?
- Expert survey question: To what extent are civil society and information technology professionals engaging with the government regarding open data?
- Secondary Data: Freedom House Political Freedoms and Civil Liberties Index (2013)

To ensure variables collected on different scales are comparable, all variables in the readiness sub-index are normalised using Z-scores prior to aggregation. For presentation, variables are scaled on a 0 – 100 scale.

Implementation sub-index: dataset questions and aggregation

The 2012 Web Index asked researchers 'To what extent are there government data on [X] on the web in your country?', covering trade data, budget and spend, health sector performance, educational performance, transport data and schedules, census, national map, tax return, government service contact details, and crime, followed by a separate question on the extent of accessibility of these datasets (taken together) as open data. In the 2013 Open Data Barometer expert survey we modified this approach, asking researchers to complete a detailed checklist for each of 15 categories of data. The 10 checklist questions are show in Table 6 below, along with details of the qualitative data researchers were asked to provide in justification for each answer[11].

In many cases where machine-readable open data was not available (question c), researchers provided additional answers with respect to the non machine-readable data published by governments (e.g. providing details on whether PDF census information is up to date or not). This information is valuable for building an understanding of different patterns of information and data management within governments, but should not feature in a score that measures the availability of open data. Therefore, we apply a validation logic to the original survey data gathered from the Barometer survey, after question a and b, to ensure we are measuring only the properties of machine-readable datasets.

Following validation, we weight the checklist responses, awarding the value in the weight column of Table 6 for answers of 'Yes'. The weighting is designed to emphasise the four questions (c, d, e, f) which pick out key aspects of the Open Definition (OKF, 2006). A positive score on these variables is also used to calculate a binary 'Is Open Data' variable, which is used in presenting dataset listings and in selected summary statistics.

Q	Question	Validation Logic	Weight	Qualitative data collected
a	Does the data exist?		5	Description of data; Agency responsible; Reasons for non-collection
b	Is it available online from government in any form?	If a = No THEN No	10	URL; Limits on data published; Policies preventing publication
c	Is the dataset provided in machine-readable formats?	IF b = No THEN No	15	URL; File formats;
d	Is the machine-readable data available in bulk?	IF c = No THEN No	15	URL

[11] Comparability with the OKF Open Data Census (http://census.okfn.org) methodology, in order to allow cross-validation of data and to support further methodological development was a consideration in the design of this checklist. The checklist was subject to a two-month open consultation period, and was tested with ODDC research cases (www.opendataresearch.org/emergingimpacts) prior to being finalized.

e	Is the dataset available free of charge?	IF c = No THEN No	15	Details of charging regimes
f	Is the data openly licensed?	IF c = No THEN No	15	URL; License details
g	Is the dataset up to date?	IF c = No THEN No	10	Last update date; Frequency of updates
h	Is the publication of the dataset sustainable?	IF c = No THEN No	5	Evidence of sustainability
i	Was it easy to find information about this dataset?	IF c = No THEN No	5	Steps taken to locate data
j	Are (linked) data URIs provided for key elements of the data?	IF c = No THEN No	5	URL of linked data publication

Table 6: Data assessment checklist questions

Table 7 shows the categories of data covered in the Open Data Barometer survey, along with a brief definition of each. These definitions were carefully designed to avoid creating a strong bias against states who have less advanced internal systems for managing data, and to be able to capture cases where states are making an effort to share the data that they do have. We also sought to gather information about where data is managed federally rather than nationally, to avoid penalising countries with a federal system, although recognising that from the perspective of a data re-user, nationally aggregated data may be much more useful than separate non-standardised federal datasets. By putting forward categories of data, rather than specific named datasets, we allowed researchers to exercise judgement as to the extent to which countries were making data of this kind available, whilst also sourcing specific examples of datasets that fit into these categories in different countries, and generating a rich collection of qualitative information about the reasons that certain data may or may not be available in different countries, and the extent to which certain datasets tend to exist at national or federal levels. This qualitative data will feed into future iterations of the Open Data Barometer design.

N	Title	Definitions and Notes
1	**Map Data (full coverage of the country)**	A detailed digital map of the country provided by a national mapping agency and kept updated with key features such as official administrative borders, roads and other important infrastructure.
2	**Land Ownership Data**	A dataset that provides national level information on land ownership. This will usually be held by a land registration agency, and usually relies on the existence of a national land registration database.
3	**Government Service Directory**	This is a dataset providing details of the key services provided by government and contact details that citizens can use to secure these services. **Data from this question was not included in the final survey due to difficulty in operationalization of the definition.**
4	**Detailed census data**	A detailed census data should generally contain information such as age, gender and education levels broken down at least regionally.
5	**Detailed government budget**	Setting out government spending plans.
6	**Detailed data on government spend**	Government spending data at a reasonable level of disaggregation (i.e. more than just top-level categories). The best data will include detailed transaction records.
7	**Company register**	Containing details of the registered firms within a country.
8	**Legislation**	The constitution and laws of a country.
9	**Public transport timetables**	Details of when and where public transport services such as busses and rail services are expected to run. If no national dataset exists, the assessment may be carried out for the capital city.
10	**International trade data**	Details of the import and export of specific commodities and/or balance of trade data against other countries.

11	**Health sector performance**	Statistics generated from administrative data that could be used to indicate performance of specific services, or the healthcare system as a whole.
12	**Primary or secondary education performance data**	Statistics generated from administrative data that could be used to indicate performance of specific services, or the education system as a whole
13	**Crime statistics**	Annual returns on levels of crime and/or detailed crime reports.
14	**National environment statistics**	Data on one or more of: carbon emissions, levels of pollution, and deforestation.
15	**National election results**	Details of who received votes in elections to a national parliament or assembly

Table 7: Listing of data categories included in Barometer survey

To generate three sub-components in the Implementation sub-index we cluster these datasets into three groups, based on a qualitative analysis of the common ways in which these categories of data are used. As previously discussed, these clusters are not mutually exclusive. It is within the nature of open data that a dataset can be used for multiple purposes – and a single dataset might have applications across innovation, improving policy, and increasing accountability. However, for simplicity of presentation and analysis we place each dataset in only one cluster. Further work is needed to refine these clusters in future analysis, and readers are encouraged to explore different clustering using the open data from the Barometer study.

Innovation Cluster	Social Policy Cluster	Accountability Cluster
Data commonly used in open data applications by entrepreneurs, or with significant value to business.	*Data useful in planning, delivering and critiquing social policies & with the potential to support greater inclusion and empowerment.*	*Data central to holding governments and corporations to account. Based on the 'Accountability Stack' proposed by Perrin* (Perrin, 2012).
• Map Data • Public Transport Timetables • Crime Statistics • International Trade Data	• Health Sector Performance • Primary or Secondary Education Performance Data • National Environment Statistics • Detailed Census Data • Land Ownership Data	• Legislation • National Election Results • Detailed Government Budget • Detailed Government Spend • Company Register

In order to maintain the ability to compare scores from one dataset to another, individual variables in this sub-index are not normalised prior to aggregation. However, the implementation sub-index score is z-score normalised prior to calculation of the final Barometer score, and then rescaled to 0 – 100 for presentation.

Impacts sub-index:

Recognising the early stage of open data developments around the world, we sought to develop an approach to capture stories of impact, and to be able to compare the relative strength of impact these indicated across different categories of impact, and across different countries. Our approach was to treat online, mainstream media and academic publications about open data impacts as a proxy for existence of impacts, with researchers asked to score the extent of impact on a 0 – 10 scale. Scoring guidance outlined that the highest scores should only be given for peer-reviewed studies showing impact, and emphasised the importance of sources making a direct connection between open data and observed impacts. For scores over 5 researchers were asked to cite at least two separate examples in the given category.

The six questions asked in this section were:

- To what extent has open data had a noticeable impact on increasing government efficiency and effectiveness?

- To what extent has open data had a noticeable impact on increasing transparency and accountability in the country?
- To what extent has open data had a noticeable impact on environmental sustainability in the country?
- To what extent has open data had a noticeable impact on increasing the inclusion of marginalised groups in policy making and accessing government services?
- To what extent has open data had a noticeable positive impact on the economy?
- To what extent are entrepreneurs successfully using open data to build new businesses in the country?

These variables are all normalised using z-scores priort to aggregation.

Additional variables

In addition to the variable included in the components above, a number of further questions were included in the ODB survey. The data from these questions has not been included in the overall analysis of this report, but these variables will be available in published open data. These are responses to the expert survey questions:

- To what extent are academic institutions in the country opening up their data?
- To what extent are businesses in the country opening up their own data?
- To what extent are civil society in the country opening up their own data?

Along with a question capturing the extent of training availability across a range of categories.

Computation

To calculate each component an average of the variables in that component is taken. The average of components is used to generate each sub-index.

For consistency, the normalised scores for all the sub-indexes, and the readiness and impacts components, have been rescaled to a 0 - 100 range using the formula [(x - min)/(max - min)]*100 prior to presentation. This means that a score of 100 on these components and sub-indexes illustrates the highest scoring country across the 77 included in the Barometer Global ranking. It does not mean that a score of 100 is perfect.

All scores in a study of this kind are subject to a margin of error. To offer an indicative comparison between countries we offer a ranking based on rounding each countries overall ODB score to its integer value (no decimal places), and placing countries in order of score. This ranking, and each of the other scores, should be treated as the starting point for exploration, rather than a definitive judgement on each countries open data readiness, implementation and impacts.

Further details of the computation of the ODB rankings are provided in the Ranking and Country analysis section above, and at www.opendatabarometer.org

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