Chapter 10

Governments leading by example with public sector data

This chapter examines the benefits and challenges of opening access to data from one of the economy's most data-intensive sectors, the public sector. The potential of public sector information (PSI) including open government data (OGD) is discussed from several perspectives: use by government itself which, in tandem with data analytics, can make for better informed policy making and enable delivery of more innovative services; open access for citizens, which can greatly improve accountability through transparency and lead to citizens' empowerment; and reuse in the private sector, a stimulus to innovation. The challenges in implementing open data strategies are also enumerated, including dissuasive pricing and licensing practices; differences in licensing systems across national institutions; lack of information and standards and poor interoperability; organisational and cultural obstacles within the public sector; and legal constraints. The chapter concludes with a number of recommended policy options.

A leader is best when people barely know that he exists, not so good when people obey and acclaim him, worst when they despise him. Fail to honor people, They fail to honor you. But of a good leader, who talks little, when his work is done, his aims fulfilled, they will all say, "We did this ourselves." (Lao-Tzu, Tao Te Ching)

« L'ouverture et le partage des données publiques ne sont pas vus comme des fins en soi, mais comme des leviers qui peuvent être mis au service de trois objectifs : une démocratie plus aboutie ; l'innovation et la croissance ; et une meilleure efficacité de l'action publique. » (Verdier, 2014)

Public organisations produce and collect a huge volume of data in order to perform their tasks, making the public sector one of the economy's most data-intensive sectors (OECD, 2013). In the United States, for example, public sector agencies stored on average 1.3 petabytes (millions of gigabytes) of data in 2011, and the public sector is that country's fifth most data-intensive sector. Chapter 2 has highlighted the public sector as an important actor in the data ecosystem, in both respects: as a key user of data and analytics, and as a key producer of data that can be reused for new or enhanced products and processes across the economy – that is to say, for data-driven innovation or DDI.

Better access to and use of public sector data can lead to important value creation from economic, social, and good governance perspectives (Vickery, 2012; Ubaldi, 2013; OECD, 2015). Direct use of public sector data can generate products and services, and thus contribute in a variety of ways to improved efficiency and productivity within the public sector and across the economy. Public sector data can thus contribute to the shift towards knowledge-based societies and economies, where data is a potential driver of growth, employment, as well as of improved public service delivery and more efficient, transparent and participatory governance.

The economic value here is certainly significant: the value of the OECD market for public sector information – PSI, including public sector data – was estimated to be around USD 97 billion in 2008, and could have grown to around USD 111 billion by 2010. Aggregate OECD economic impacts of PSI-related applications and use were estimated to be around USD 500 billion in 2008, and there could be close to USD 200 billion of additional gains if barriers to use are removed, skills enhanced, and the data infrastructure improved. These are among the Principles reviewed in the OECD (2008) *Council Recommendation for Enhanced Access and More Effective Use of Public Sector Information* (OECD PSI Recommendation; see Annex and OECD, 2015 on the review of its implementation by governments).

In 2013 the OECD conducted a survey focusing on open government data, or OGD (see Box 10.1 defining PSI and OGD).[1] The intention was to acquire a comprehensive picture of national efforts and contexts for open data implementation. The knowledge base created could then serve as an indicator of countries' progress in developing metrics on OGD impact and value creation. Aspects covered by the survey were strategic approach; implementation efforts; countries' focus on value and impact creation; and the main challenges for further progresses. The survey reveals many of those data sets most generally available in OGD portals are commercially valuable. These include (in decreasing order of citation): meteorological and environmental information (19 out of 20 countries cited these as available), geographical information, social information, cultural information and content (each cited by 18 out of 20 countries), economic and business information, traffic and transport information, tourist and leisure information, and educational information. Countries with high data set availability by domain are: Canada, Denmark and France (all 15 domains listed including selected defence areas), Australia, New Zealand, Slovenia (all domains except defence) and the United Kingdom. Countries with the lowest number of domains available are the Netherlands and Portugal (7 out of the 15 listed domains), Italy (9 out of 15), Germany and Norway (Figure 10.2).

Box 10.1. **Defining public sector information and open government data**

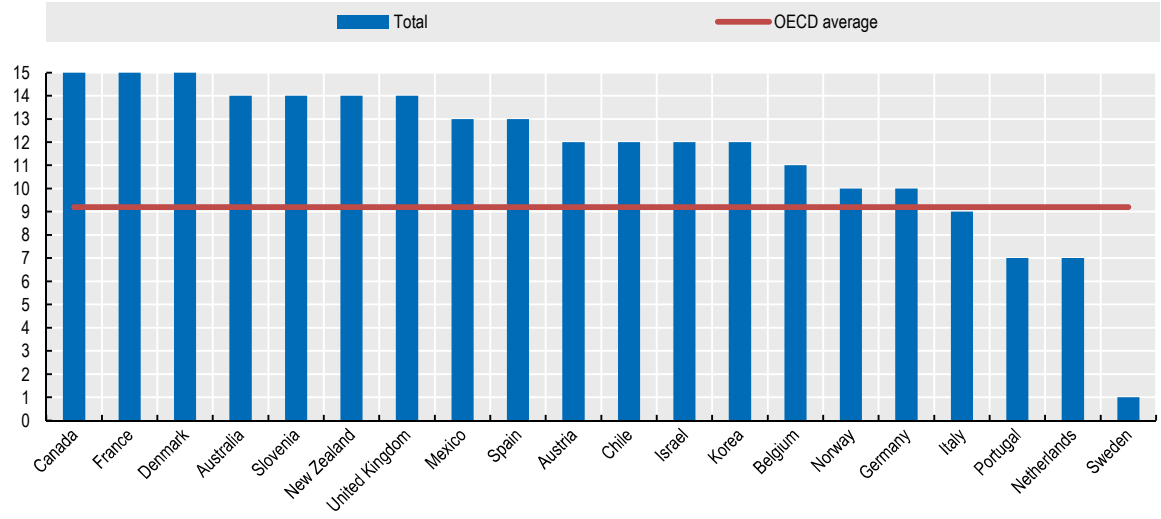
Public sector information (PSI) is information (including data) generated by the public sector as part of its public task; the term covers weather, map, statistical and legal data, as well as digital content held and maintained by the public sector in galleries, libraries, archives and museums. PSI is increasingly made available through open access regimes, as specified by the Openness Principle of the *OECD (2008) Council Recommendation for Enhanced Access and More Effective Use of Public Sector Information* (PSI), often at low or no cost. PSI is made available for potential reuse for economic and social ends that for the most part are not within the public sector or aimed at enhancing government services. Nevertheless, government efficiency and effectiveness is improved by easier information access and transfer across agencies at low or no cost and without restrictive legislative controls.

Open government data (OGD) refers to government or public sector data (i.e. any "raw" data produced or commissioned by the public sector) made available through open access regimes, so that they can be freely used, reused and distributed by anyone, subject only to (at the most) the requirement that users attribute the data and (sometimes) that they make their work available to be shared as well. Enhancing transparency, accountability and citizen participation for good governance and socio-economic development is an important objective of OGD (OECD, 2014a). Open government data are a subset of PSI (Figure 10.1); PSI, in addition, includes not only data but also digital content, such as (e.g.) text documents and multimedia files. In this chapter, the terms "open government data" and "public sector data" are synonymous.

Figure 10.1. **The relationship between public sector information and open government data**

The key idea behind open access to public sector data is that value can be derived through the reuse of that data by any user from within or outside the public sector. As highlighted in Chapter 4, the full range of goods and services enabled by data often cannot be anticipated ex ante by the data producer, and thus may not be realised if access is limited. Given that data are a non-rivalrous good, social welfare is maximised when everyone who values the data can use them. Therefore, the gains from public sector data emerge from removing any type of disincentive to data access and reuse.

Figure 10.2. **Variety of data sets in the centralised government portal**



Note: Data refer to the number of different types of data provided in the centralised portal in a list of 15 policy domains: economic and business information, geographic information, legal system information, meteorological and environmental information, social information, traffic and transport information, tourist and leisure information, agricultural, farming, forestry and fisheries information, natural resource information, scientific information and research data, educational information and content, public order and safety information, defence (including military), political information and content, cultural information and content.

Source: OECD survey on Open Government Data, version 1.0, 19 April 2013.

Open access to public sector data comes with great promise but also with many barriers and challenges. As discussed below, impediments include dissuasive pricing and licensing practices; differences in licensing systems across national institutions; lack of information and standards and poor interoperability; organisational and cultural obstacles within the public sector; and legal constraints impeding easy access, use, reuse and data sharing within and across levels of government. Additionally, as public sector data are progressively seen as potential public value generators for society (including the public and private sector) – rather than as a source of government revenue – pricing practices are moving towards making data accessible for free or at a marginal cost (e.g. the cost of reproducing the data when necessary). However, at times of budget cuts and financial constraints, governments feel the need to clearly articulate a business case and identify funding models to open up and digitise government data without penalising data providers. For similar reasons, great emphasis is now placed on devising more solid methodologies to assess the impact of open access to public sector data.

The purpose of this chapter is to discuss the potential of public sector data from a public sector perspective, highlighting some of the main trends in open government data and PSI strategies and initiatives in OECD member countries. The chapter first highlights the potential of DDI, focusing on the potential of public sector data analytics for the public and private sector and for citizens. It then discusses key challenges for implementing open data in the public sector. Analysis of government strategies for implementation in several OECD countries follows, and the chapter concludes with key findings and policy conclusions.

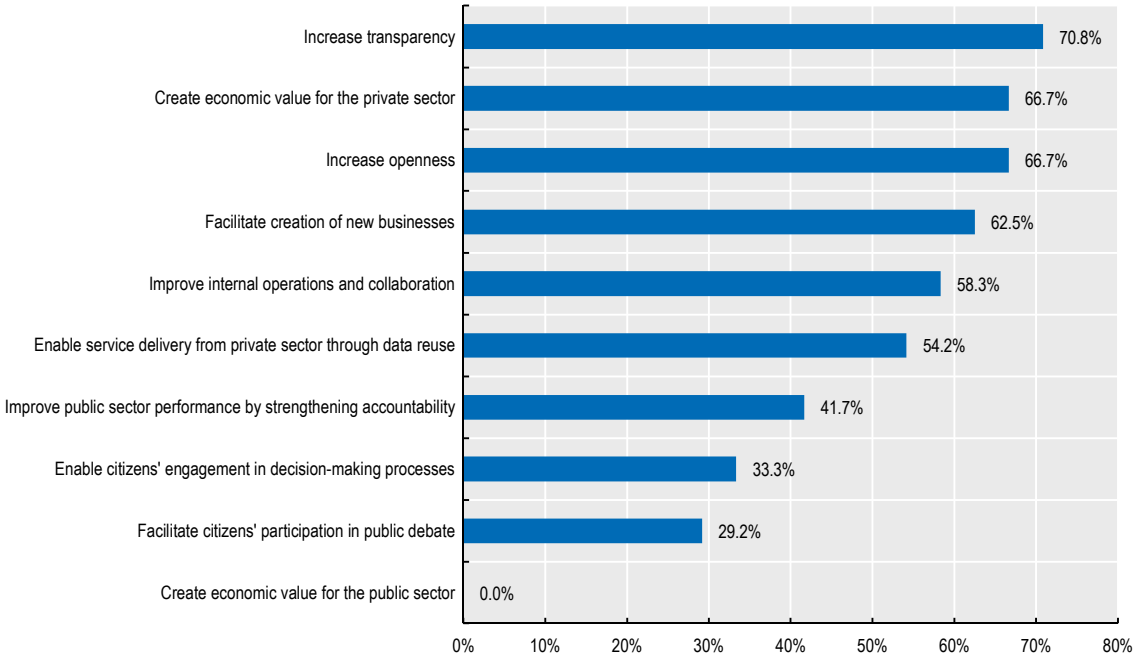
10.1. The potential of public sector data

As a recent OECD survey highlights, there are a number of objectives linked to enabling the reuse of data. These include broader societal and economic aims than simply

producing value internally within the public sector (Figure 10.3). In particular, creating economic value for the private sector ranked among the top objectives noted in the survey, no matter how they are counted or regrouped. Objectives related to good governance value – i.e. transparency and openness – also rank at the top. This is consistent with the fact that many national agendas on open data emanated as complement, or reinforcement, of national transparency agendas. The objectives of citizen participation and citizen engagement ranked lower than would be expected, given that many open government and service delivery agendas point to open data as a key enabler for strengthened public engagement in service design, policy making and rulemaking.

Figure 10.3. **Main objectives of open government data strategies**

Percentage of countries ranking each feature among their top five objectives



Source: OECD survey on Open Government Data, version 1.0, 19 April 2013.

This section looks at the benefits and value that can be derived from the use of public sector data – for governments (e.g. public sector productivity and internal costs savings, improved policy development, more effective service delivery, transparency), for citizens (e.g. public participation and engagement, people's empowerment), and for businesses (e.g. product and process innovation).

Use of public sector data and analytics by government

Due to the recession and government budgetary constraints, governments feel an urgent need to improve their own performance. This involves making the transfer of information and data among different parts of government more efficient, transparent and less costly; reducing or eliminating the burden of inter-agency charging for data; and developing common data access, all to achieve public sector productivity gains and more effective service delivery.

The use of OGD by government agencies can lead to efficiency improvements in the public sector. It can, for example, help bring down silos and foster collaboration across

and within public agencies and departments. As common or shared data sets and/or registers are being created, collaboration and exchange on who owns which public information and for what purpose are needed. This provides an opportunity to re-engineer and simplify internal procedures and/or delivery services in new ways. Moreover, public resources are freed from having to maintain individual registers, and data sets can be reallocated to more productive tasks. Finally, the release of public sector data has provided a platform for innovation in service delivery, as will be seen below. This has resulted from the reuse of data not only by private sector actors or civil society organisations, but also by civil servants who have in several instances taken the initiative – for example, to develop new apps.

Furthermore, the increasing amount of data made available in formats that enable reuse and linkage is supporting the expansion of data analytics in the public sector. As is the case with the private sector, the use of data and analytics holds great potential for value creation for the public sector. Predictive data analytics can, for example, facilitate identification of emerging governmental and societal needs. And greater ability to combine different (public and private) data sets can help develop enhanced insights that can be used for innovative goods and services. Authorities point to the need in the future not just for "big data" to draw on citizen data and facilitate analytics – for example to develop and simulate public policies and better target public services – but also for a more qualitative approach that includes ethnographic surveys. Use of this data by the public sector can also make for better decisions, inform policies, support the development of data-driven processes and services, and deliver more innovative services (Ubaldi, 2013). There are two major types of DDI benefits for the public sector: i) improvement of the evidence base for policy making, and ii) personalised public service delivery.

There are also, of course, considerable risks in governments' use of data analytics, in particular with regard to the privacy of citizens. Advances in analytics make it possible to infer sensitive personal information that citizens may not even have shared with governments. This is especially the case when data from different sources are linked across public sector bodies, or with personal data available on the Internet. As highlighted in Chapter 5, misuse of these insights can affect core values and principles, such as individual autonomy, equality and free speech, and may have a broader impact on the functioning of democratic societies as a whole. For example, while personalisation enabled by data analytics may result in greater efficiencies for public service delivery as highlighted below, it may also lead to discrimination that limits citizens' ability to escape the impact of pre-existing socio-economic indicators. Governments should therefore lead by example by seriously addressing the privacy challenges when using data analytics for the benefits presented below. Possible responses discussed in Chapter 5 include improving transparency, better access and empowerment of citizens, promoting responsible usage of personal data by organisations, and the use of technologies in the service of privacy protection. Finally, application of risk management to privacy protection may effectively protect privacy through ongoing DDI, including in the public sector.

Personalised public service delivery

Over the past decade the private sector has increasingly used data analytics to target the delivery of goods and services. There is much governments can learn from the private sector regarding methods for combining the use of (personal) data and the latest technology to achieve targeted delivery. True citizen-government dialogue, however, requires structuring, tracking, tracing and personalising answers to the input received by local officials, and at the right level in the government rather than by an anonymous agency or ministry. This

demands time and effort, but can also mean wins for citizens as well as for government. It can move governments from one-size-fits-all to segmentation and finally to personalisation. Estimates suggest that better exploitation of data could significantly increase efficiency, with billions of EUR in savings for the public sector. According to MGI (2011), full use of big data in Europe's 23 largest governments may reduce administrative costs by 15-20%, creating the equivalent of EUR 150 billion to EUR 300 billion in new value, and accelerating annual productivity growth by 0.5 percentage points over the next ten years.[2] The main benefits are estimated to come from greater operational efficiency (due to greater transparency), increased tax collection (due to customised services, for example), and fewer frauds and errors (due to automated data analytics) (see Box 10.2).

Box 10.2. **Data analytics at the municipal level**

In New York City (NYC), data analytics promises to better target fire, safety and health inspections. NYC receives over 20 000 complaints per year for "illegal conversion", i.e. properties that house more people than is considered safe. Historically, inspectors at the Department of Buildings (numbering around 200) would find serious high-risk conditions at 13% of inspections. Recently, the Department embarked on co-operation with around 20 other NYC agencies. They cross-tabulated enormous amounts of additional data on the individual properties, and used the results to guide inspections. The result is that currently, between 70% and 80% of inspections discover high-risk properties, for which action can be taken. Moreover, the NYC mayor office used advanced analytics and combined data from several of the city's departments to boost predictive capacity and help save lives and taxpayers' money in the city. Results include:

- a fivefold return on the time building inspectors spend looking for illegal apartments
- an increase in the rate of detection of dangerous buildings that are highly likely to result in firefighter and tenant injury or death
- more than a doubling of the hit rate for discovering stores selling bootlegged cigarettes
- a fivefold increase in the detection of business licences being flipped
- fighting the prescription drug epidemic through detection of the 21 pharmacies (out of an estimated total of 2 150 in NYC) that accounted for more than 60% of total illegal Medicaid reimbursements for oxycodone in the city.

Similar studies focusing on the United Kingdom show that the public sector could save GBP 2 billion in fraud detection and generate GBP 4 billion through better performance management by using big data analytics (Cebr, 2012). That does not include the potential for public health care, where for example analytics is used for diabetes audit data.[3] The National Diabetes Audit toolkit analyses data originating from primary care that are linked with secondary care data sources. Data can be stratified and analysed in many different ways, e.g. sex, age, ethnicity. The information comes from general practitioner (GP) practices, primary care trusts (PCTs), strategic health authorities (SHAs) and hospital diabetes units, specialist paediatric units and HES/PEDW (Hospital Episode Statistics/Patient Episode Database for Wales). The potential of data analytics in the health care system is discussed in detail in Chapter 8.

Combining public sector data and external data sources for policy making

Torrents of data streaming across public and private networks can improve the quality of statistics in an era of declining responses to national surveys, and can create close to real-time evidence for policy making in areas such as prices, employment, economic output and development, and demographics (Reimsbach-Kounatze, 2015). Not just for OECD countries but also for developing economies, the exploitation of these new data sources (through public-private co-operation) provides a new opportunity to better inform public policy making (UN Globalpulse, 2012).[4]

Among the new sources of statistics that policy makers are now using as a complement to existing public sector data are search engine data derived from keywords entered by users searching for web content. Google Insights for Search, for example, provides statistics on the regional and time-based popularity of specific keywords (see Chapter 3). Where keywords are related to specific policy topics such as unemployment, Google Insights can provide real-time indicators for measuring and predicting unemployment trends that policy makers are increasingly considering as a complementary statistical source.[5] The Central Bank of Chile, for example has explored the use of Google Insight for Search to predict present (or "nowcast") economic metrics related to retail good consumption (Carrière-Swallow and Labbé, 2010).

Other statistics are created by directly "scraping" the web. The Billion Price Project (BPP), for example, collects price information over the Internet to compute a daily online price index and estimate annual and monthly inflation. The index is basically an average of all individual price changes across all retailers and categories of goods. More than half a million prices on goods (not services) are collected every day by "scraping" the content of online retailers' websites such as Amazon.com. This is not only five times what the US Government collects, it is also cheaper because the information is not collected by researchers who visit thousands of shops, as they do for traditional inflation statistics. Also, unlike official inflation numbers that are published monthly with a time lag of weeks, the online price index is updated daily with a lag of just three days. In addition, the BPP has a periodicity of days as opposed to months. This allows researchers and policy makers to identify major inflation trends before they appear in official statistics. For example, in September 2008, when Lehman Brothers collapsed, the online price index showed a decline in prices, a movement that was not picked up until November by the consumer price index (Surowiecki, 2011). Governments in the United States, the United Kingdom, Germany and France, and in key Partner countries such as Brazil, have established a partnership with PriceStats, which manages the BPP index, to contribute to and use the index.

Rapid take-up of these new sources by policy makers is a growing trend, although it should be acknowledged that methods to mine the sources are still in their infancy and need rigorous scientific scrutiny. Besides the privacy challenges highlighted above, there are considerable risks that the underlying data and analytic algorithms could lead to unexpected false results – an even greater danger when decision-making is automated (see Chapter 3). Governments should therefore be aware of the limitations that come with the use of data and analytics; their activities could otherwise be based on wrong assumptions and lead to social and economic harms to citizens. A number of national statistical offices (NSOs) are currently exploring, if not already tackling, the benefits and challenges of supplementing official statistics with big data. In September 2013, for example, the European Statistical System Committee (ESSC) adopted the Scheveningen Memorandum on Big Data and Official Statistics (ESSC, 2013) to encourage partners of the ESSC to "effectively examine the potential of Big Data sources" and to "adopt an

action plan and a roadmap by mid-2014". As another example, the High-Level Group for the Modernisation of Statistical Production and Services (HLG), which was set up by the Bureau of the Conference of European Statisticians to promote standards-based modernisation in 2010, began to assess the potential of "big data" in 2014.[6]

Improving government accountability, transparency and responsiveness as well as democratic control

Strong supporters of open data as a key enabler of open government believe there is a correlation between lack of open government data and levels of corruption in any given country. For instance, a common assumption is that the lack of data in the public domain allows public servants to engage in corrupt behaviour with impunity. In addition, open government advocates believe that open access to public sector data can be a powerful force for public accountability, by making existing information easier to process, combine and analyse. OGD can then promote greater transparency, and allow a new level of public scrutiny that can increase public accountability.

This can raise the level of public trust and the perceived responsiveness of government actions. The Open Government Declaration "Open Government Partnership" (September 2011)[7] is considered to have established the use of new technologies – information and communication technologies (ICTs) in particular – to spur data sharing in the context of political accountability. This then blurs the distinction between the technology of open data and the politics of open government. However, it is important to underline that open government and open data can each exist without the other. A government can be open, in the sense of being transparent, even if it does not embrace new technology, and a government can provide open data and still remain deeply opaque and unaccountable (Robinson and Yu, 2012). Making public sector data available in machine readable format indeed has the potential to improve service delivery and citizens' quality of life, but it may have little impact on political accountability. Additional measures for enhancing government accountability and transparency, as well as democratic control, may be needed in addition to open access to public sector data.

Self-empowerment, participation and engagement of citizens

Another point often made by open government advocates is that opening government data enables individuals to make better decisions in their lives and increases participation in public affairs. Normally, e-participation is part of a government's broader digital government policy. It is the element aimed at harnessing IT use for openness, transparency and collaboration within the public sector, but also at enhancing citizens' engagement in public life, e.g. in lawmaking, policy making and service design and delivery. OGD initiatives, particularly as they are supported by Web 2.0[8] and social media applications, are creating architectures for participation that enable citizens to be not just passive consumers of public sector content and services, but also active contributors and designers in their own right. The expanding use of new technologies, combined with the rise of the OGD movement, is seen as a key enabler and driver of self-empowerment, higher e-participation, and the public engagement of citizens.

Legitimate stakeholders are for example invited more openly into a participative and empowering relationship with government in terms of:

- working arrangements of the public sector and public governance more widely
- planning and land use issues

- service design and delivery
- community building
- dispute and conflict resolution and broader public policy and decision making as part of the overall democratic process.

Open access to public sector data, but also exclusive access to citizens' own personal data (i.e. "smart disclosure"), empower citizens to make more informed decisions that can enhance the quality of their lives (Howard, 2012b).[9] For this to happen, governments need to enable users to have access to their own data and decide how to use it (e.g. the Blue Button Initiative in the United States to give veterans complete control of their personal health records held by the public sector; or the Green Button, also in the United States, which is a similar initiative around individuals' energy use data).

It is equally important to empower the public sector workforce. Opening up government data can enable civil servants, many of whom are front-line professionals, to participate in ensuring that government is open and participative, and to develop applications that better respond to users' needs. Many civil servants see the real-time performance and impact of public services and public policies on citizens. Empowering them could generate appropriate data and other inputs that could in turn improve the service experience if they were given the data, tools and incentives to do so – for example by being enabled to participate in a professional capacity in citizens' social networks, offering advice and knowledge.

Moreover, many civil servants see a blurring of their personal and professional lives in terms of the tools they use; both could improve through a two-way exchange of experience and skills. Sensible structures are needed to ensure that civil servants are empowered this way while maintaining impartiality and a position of trust, from the government itself as well as from citizens. This requires also that civil servants be equipped with the necessary skills, tools and mechanisms (Millard, 2012) and guidelines.

But for this to happen, strategies and programmes are needed to build the next generation of civil servants. New skills are required, not only for IT but also for data science; predictive analytics to identify patterns and create models; a better knowledge of how to use Web 2.0 technologies for social engagement and to negotiate with and connect to people; and a finer understanding of emerging problems and use of IT use to solve them (e.g. cybercrime investigation).

Fostering data-driven innovation in the private sector

Increasing efficiency and effectiveness in public services delivery

Granting the private sector better access to public sector data can increase efficiency, effectiveness and innovation in public service delivery. The strategy is to provide innovators from outside governments with the opportunity to develop modular services that are more agile and targeted to citizens' needs than those developed in-house by governments (see Box 10.3). Even though the release of data online can raise a number of substantive enquiries in terms of government activities, from a public service delivery perspective its reuse can also lead to a significant reduction in the questions routinely received by public authorities, thus decreasing workload and costs. Additionally, the remaining questions concerning service delivery per se would be easier for civil servants to answer, as it would be clearer where all the relevant information could be found.

Box 10.3. **Countries releasing PSI to the private sector**

The Cultural Heritage Agency of the Netherlands is actively releasing their data and collaborating with amateur historical societies and groups such as the Wikimedia Foundation in order to execute their own tasks more effectively. This can result in improvements in the quality of data and ultimately make government departments leaner, while encouraging external inputs and new sources of knowledge, possibly making the departments more innovative. In addition, one could argue that the co-development of knowledge in this example increases not just the quality but also the awareness of the Dutch public authority's work, thereby further increasing its value and relevance.

Similarly, in *France* the new version of the French national Open Data Portal (www.gouv.data.fr) enables non-institutional actors to upload data collected or produced by the government that can be mashed and linked with data uploaded by the public authorities. As highlighted in Chapter 4, this can lead to the development of innovative products such as apps, and to greater public-private collaboration in jointly identifying and developing solutions to problems. The government's credibility and accountability are ensured, as only the data provided by the French Government are released as certified open government data.

With the same aim, the government of *Canada* has committed to creating an open data institute (the Canadian Open Data Exchange, or CODX) as a national marketplace for those engaged in the commercialisation of open data, and will among other things allow the development of new tools and applications that access and manipulate public sector information; establish a framework for open data standards; and include the articulation of industry standards for presenting and providing access to open data for key sectors.

Enabling new goods and services in the private sector

As the importance of data in the development of new services, products and markets has increased dramatically (Koski, 2011), open access to public sector data can stimulate innovation in the course of that development. When public sector data are open, however, access to the data per se no longer provides a competitive advantage to firms with exclusive data access agreements. Competitive advantage has to come from offering innovative value-added services on top of data, and providing opportunities for business start-ups. The private sector (technology developers) is expected to be among the primary users of public sector data sets in pursuing their commercial exploitation. A profit incentive can help to drive innovation and experimentation; one would expect the best ideas to be emulated and improved upon, as no service provider has the monopoly on data.

There is in particular cross-country evidence that significant firm-level benefits are to be had from free or marginal cost pricing, with small and medium-sized enterprises (SMEs) benefiting most from less expensive data and the switch to marginal cost pricing (Koski, 2011). For example, analysis of 14 000 firms in architectural and engineering activities and related technical consultancy services in 15 countries in the 2000-07 period shows that in countries where public sector agencies provide fundamental geographical information for free or at maximum marginal cost, firms grew about 15% more per annum compared with countries where public sector geographic data have cost-recovery pricing. Positive growth comes one year after switching to marginal cost pricing, but growth is higher with a two-year time lag. Apart from SMEs (once again) benefiting most from cheaper geographical information, switching to marginal cost pricing of PSI substantially lowers SME barriers to enter new product and service markets.

Public sector geographic data also have the potential to enhance transportation and environmental performance. The value of improved time allocation can be estimated from data for Norway, where a minimum of two hours per citizen per year could be saved through better access to public information (Norway, 2013). A simple GDP-based pro-rata calculation for the OECD gives USD 6.4 billion in annual value of individual time saved if better access to public information saved only two hours' time per citizen per year. Furthermore, European Law requires environmental impact assessments and strategic environmental assessments. The European assessment market has been estimated to be valued at EUR 1 billion per year for national assessments (Craglia et al., 2010); improving accessibility of the information required could save up to EUR 200 million per year for these assessments. Including sub-national assessments values could be 10 times higher, i.e. a market value of EUR 10 billion, with potential savings from better information of EUR 2 billion across the EU27 countries. Further initiatives such as GovLab in the United States (see Box 10.4) are under way to study the potential of public sector data for businesses.

Box 10.4. **Open Data 500**

The Governance Lab at New York University (the GovLab) undertook a comprehensive study of US-based companies that use open government data to generate new business and develop new products and services. The objectives of the Open Data 500 are to:

- provide a basis for assessing the value of open government data
- encourage the development of new open data companies
- foster a dialogue between government and businesses on how government data can be made more useful.

Having launched the website OpenData500.com with in-depth information on 500 companies in early April 2014, GovLab is now focused on organising roundtables with the aim of spurring interaction between government agencies and their stakeholders to accelerate and improve the release and use of valuable open government data. The dialogue should help prioritise the release of open data sets for businesses and developing ongoing collaboration and feedback loops from data users to providers. Initial analysis of the data collected through the survey filled in by the 500 companies led to the identification of 13 main types of companies using OGD; the main types are data/technology, finance and investment, business and legal services, governance, health care, logistics and transportation, research and consulting, and energy.[10] Initiatives such as Open Data 500 are key to fostering the development of an ecosystem in which data providers improve their knowledge of data users' needs, which can help them make their open data programmes more effective.

Source: The GovLab, 2014.

Estimating the wider impact on the economy

The approximate size of the OECD market for PSI and the broader economic impacts of PSI are estimated in this section (see Vickery, 2011, 2012 for the approach and references). The results presented here are based on using aggregate studies available to estimate plausible values for the PSI market, potential gains from freeing up access, and wider economic impacts that could accrue from using PSI across the economy. Further estimates could be provided if relevant aggregate studies are available from (for example) Canada, Chile, Israel, Japan, Korea, Mexico, the United States, or key partner economies.

Market size and aggregate economic impacts of public sector data at the country level are available for Australian spatial data-related economic activities, with results generated from a general equilibrium model of the Australian economy (ACIL Tasman, 2008). In the Netherlands, similar estimates are available of the size of the geo-information sector (Castelein, Bregt and Pluijmers, 2010). Productivity-related impacts on the New Zealand economy from the use and reuse of spatial information have been estimated using a general equilibrium model. Benefits from removing barriers to use, improving infrastructure, and expanding training are also estimated (ACIL Tasman, 2009). For the United Kingdom, estimates of gains from opening up access to digital, non-personal, public sector information are also available (Pollock, 2010).

OECD values are derived by prorating available national data to give estimates for Total OECD using macro data from OECD (2014b) and available EUROSTAT data on the European Union economy.[11] The same method was applied using national and OECD data for: a) GDP shares, b) computer services spending, and c) ICT spending by government (WITSA, 2009) for each set of national data. The three sets of results for each set of national data were pooled and the mean calculated. In the case of estimates based on geospatial data, it is assumed that the geospatial market/impact is about one-half of the total PSI-related market/impact,[12] and that one-half of the PSI-related market/impact comes from government PSI. Both assumptions are conservative. Geospatial information may be considerably less than one-half of all PSI, and governments are the basic source of information for probably more than one-half of all PSI-like activities. Furthermore, estimated values within and across different sources were reasonably comparable, suggesting that the averages provide reasonable albeit low estimates of the economic features of PSI markets and the impacts of PSI use.

Averaging the OECD PSI market estimate derived from Netherlands data (USD 113 billion) with the estimate from Australian data (USD 82 billion) gives an estimated OECD PSI market of around USD 97 billion in 2008.[13] Various studies have reported PSI market growth rates in the range of 6-18% per year (Castelein, Bregt and Pluijmers, 2010; Coote and Smart, 2010; Fornefeld, 2011; MICUS, 2010, 2009). Taking 7% per year as a lower estimate, the OECD PSI market would have grown to around USD 111 billion by 2010 provided that it continued earlier growth and was not dramatically affected by the recession. This value is estimated in the same way as, and is comparable with, the estimated EU27 market of EUR 32 billion in 2010.

Averaging the OECD estimate derived from Australian data (USD 557.5 billion) with the estimate derived from New Zealand data (USD 461 billion) gives estimated OECD aggregate economic impacts of around USD 509 billion in 2008. There could be approximately USD 194 billion of additional gains if barriers were removed and the data infrastructure improved, as described in the New Zealand study. That is, if PSI were opened up, skills barriers removed and the infrastructure more effective, aggregate direct and indirect economic benefits for OECD economies could have been of the order of USD 700 billion (1.7% of GDP) in 2008, and more in 2010.

United Kingdom estimates were used to give an approximate value of annual gains from moving from an average cost/cost recovery pricing model to marginal cost pricing for digital public sector information (Pollock, 2010). Upper range values for the OECD are estimated to be USD 127.9 billion to USD 170.6 billion in 2009, or alternatively USD 45.5 billion to USD 56.9 billion for middle range estimates. These ranges assume that the structure of public sector information and related markets and pricing models across the OECD area are similar to those of the United Kingdom (average cost/cost recovery pricing in many cases). From

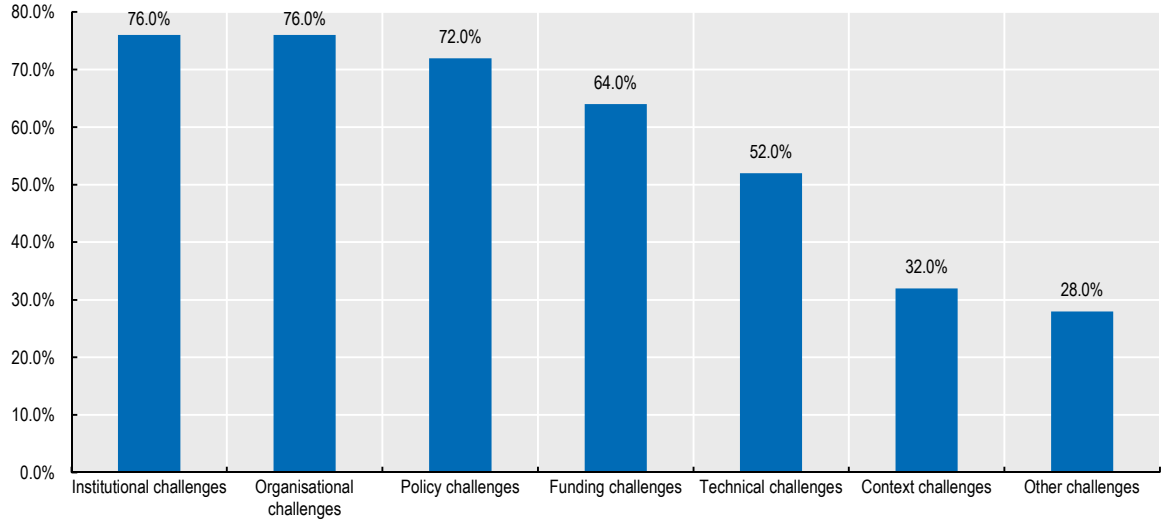
the upper range OECD welfare gains of USD 127.9 billion to USD 170.6 billion, a value of USD 145 billion is adopted in OECD, 2015.

10.2. Key challenges in implementing open data strategies

Initiatives to enhance open access to public sector data can be undermined by problems related to implementation, organisation, technical challenges and administrative delays, as well as those due to existing legal obstacles. If not properly tackled, implementation challenges might obstruct or restrict the capturing of benefits of national efforts aimed at spurring DDI based on public sector data. Technological, legal and financial restrictions, among others, may limit data access and reusability (e.g. making it difficult to fund data or find valuable ways to reuse data). Addressing various challenges related to technology, financing, organisation, culture, policy, and legal frameworks is essential to create an ecosystem, and build sustainable business models for PSI and OGD initiatives that can bear the desired fruit.

The most important challenges to furthering the development of OGD initiatives relate to policy, and funding challenges are most commonly cited as the second most important. The results shown in Figure 10.4 underline that the main obstacles for implementation of open data in governments are not technical but are linked to legal barriers or resistance within organisations.

Figure 10.4. **Open government data's main challenges as reported by countries**



Note: Other challenges include: cultural challenge both in government and in society about information and data management (Mexico), Multi-jurisdictional challenges, i.e. ensuring consistency in the environment within which OGD is being implemented (Canada), interoperability (Portugal), cultural change within the administration (Germany), lack of evidence of impact making selling the agenda to departments difficult (United Kingdom), demand-supply balance (Denmark).

Source: OECD survey on Open Government Data, version 1.0, 19 April 2013.

Policy challenges

Disclosure policies may limit data transparency and cause lack of clarity regarding who owns public sector data, and in so doing restrict the right of the public to use the data. In some cases, for example, public sector information or data are sold or come with restrictive copyright licences that prevent reuse. This may cause an unresolved conflict

between the right to access information as an inherent part of the right to freedom of expression, and limitations on reuse from copyrights or charges for commercial use.

The lack of procedures and standards on how to deal with open data in governments (e.g. lack of tools available to make data open, lack of validation structures and guidelines, lack of guidelines on data collection) can compromise the quality of the data and eventually the output of OGD initiatives. The adoption of an overall national strategy for PSI or OGD can help overcome many of the issues highlighted above. Not only can such a strategy clarify matters pertaining to licensing and standards, but it can also define a national approach and targeted goals that can help guide and structure actions and initiatives at all levels of government.

Technological challenges

Public sector data often are not harmonised given that individual units collect and/or produces their own set of data using different metadata, formats and standards. This can make it difficult from the user perspective to know which piece of data is valid or should be trusted. Critical to access is to know the source of what one is searching for, and in many instances where to start searching is a challenge. Accessibility can also be limited if data cannot be reused, and data transparency may be hindered if data are not simple to access or reuse due to their format. Additional technology-related shortcomings include the need to: i) improve information technology infrastructure, ii) enhance privacy and information security, and iii) integrate open data tools and applications.

A second layer of technical challenges can emerge when the federal government seeks to impose co-ordination or consistency across the broad range of rulemaking processes, data and portals enabling access to public sector data. Even though the establishment of a single OGD portal should not be the goal – and is far from being the best advisable solution for implementing OGD – a single point of access to government open data can certainly ensure integration of shared data input from various sectors of government, and can greatly enhance accessibility (see Box 10.5). Therefore, a lot of emphasis is often placed on the establishment of a single portal. Most OECD countries have indeed developed an online OGD centralised platform with the idea of increasing citizens' and private actors' access to a growing variety of government information made available as open data. However, to meet government-wide needs in terms of data management, any decision to create a single portal should be developed through a collaborative approach, to create ownership and secure sustainability. The trade-off between standardisation and experimentation, and concerns about incomplete or inaccurate data in centralised government repositories, are difficult problems that most OECD member countries are currently dealing with.

Box 10.5. **The case of Regulations.gov**

Regulations.gov is a government-wide docket publishing system created in the United States in response to the E-government Act of 2002, and launched in 2003. It is used today by most US departments and agencies (Regulations.gov, n.d.). The policy of the Office of Management and Budget (OMB) not only requires its use but also precludes the agencies from using "ancillary and duplicative" docketing and rulemaking systems of their own design (OMB, 2004). This exclusivity rule, combined with the difficult interagency politics involved in honing system features, is considered by many to have led to a bare-bones approach that leaves out the agency-tailored functionality found in many of the systems it replaced.

Concerns about cost sharing have also led the system to omit even features whose usefulness and desirability are a matter of broad consensus (Farina et al., 2008). Regulations.gov was launched with a limited search engine and no browsing capability, so that only those who already knew the terms used to categorise rulemaking documents were able to use it effectively. Five years later, a relaunched version of the site offered up its limited inventory of computer-readable data directly to the public (in this case, using a single rich site summary (RSS) feed, which allowed any interested person or group to create an alternative, enhanced version of the website. This has permitted the creation of OpenRegulations.org, which competes with Regulations.gov by offering "paired [sic] down, simple-to-navigate listings of new agency dockets" and a more sensible set of RSS feeds, one for each individual agency.

A recent OECD (2015) survey of government strategies to enhance the reuse of PSI highlights that all countries are aiming to achieve machine-readability and interoperability among data sets. They also hope to switch to or encourage the use of open standards (see Table 10.1). However, the reality is at some distance from achievement of these aims, and varies considerably across countries and features. An Australian survey on PSI management across 191 government agencies showed that 38% of them reporting that all or most of their PSI is in open and standards-based formats, and 58% reported routinely applying metadata to information published online (OAIC, 2013). In addition, at the end of 2011-12, 90% of the Australian National Library's collection was catalogued and searchable online (survey reply, Australia).

While new material is often provided in machine readable formats, older material generally is not. The response of the United Kingdom, for example, pointed out that a great deal of previously saved information is locked in PDFs or other unprocessable formats, and not in linked data formats. Similarly, not all PSI material on central government portals is available in open standards. This is the situation in most countries but not all, due to the evolution of such standards over time and their relatively recent widespread diffusion and use. Metadata are also less widely associated with data sets than might be hoped.[14]

Table 10.1. **Machine-readability, open formats and interoperability**

Country	Machine-readable	Open source / standards used	Metadata available
Australia	Data searchable	Where possible	Available
Belgium	Minority of data	Minority of data	
Canada	Large proportion of data		Common profile
Chile	Yes in principle	Work in progress	No. Technical guide being developed
Czech Republic	Data provided in formats of creation	Unrestricted use	
Denmark	Variable, depends on subject area	Variable, depends on subject area	Variable, depends on subject area
Estonia	Varies greatly. Information Society Strategy 2020 concentrates on making public data available in better machine readable formats. Green paper on machine-processable formats planned for 2014	Use of open formats is moderate or poor	Availability of metadata is moderate or poor
Finland	No reliable information	Planned	Planned, international standards
Hungary	Preferred for PSI. Not a requirement for freedom of information		Metadata database available for centralised public data portal
Japan	Planned. Significant amount machine readable for statistics	Significant amount of open format data for statistics	Provided via registration on data catalogue site
Korea	Significant portion of open data are machine readable and released, in principle, in machine readable format		Metadata are available for data registered at data.go.kr and further metadata will be available systematically
Mexico	Working on it via the Federal Public Administration's Interoperability and Open Data Scheme	Working on it	Available for an increasing set of statistical databases
Portugal		All, on national data portal	Most. Working towards mandatory availability
Slovak Republic	Standardised, but wide variety		
Slovenia	No express provision	Actively promoted	
Spain	Important part		Minimal already; Standardisation planned
Sweden	No general information		
Switzerland	Planned. International compatibility	Planned. International compatibility	Planned. International compatibility
United Kingdom	Recent data are machine readable		
European Commission	Source data yes	Not always	Catalogue metadata available

Source: OECD (2015) review of the OECD Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information.

Economic and financial challenges

Economic and financial challenges are hindering fast-paced development of PSI and OGD initiatives in several OECD countries. In particular, many governments wish to recover costs, partly for budgetary reasons and partly on the grounds that those who benefit should pay. However, the calculation of the overall benefits can be problematic. Moreover, as Stiglitz *et al.* (2000) have argued, if government provision of a data-related service is a valid role, generating revenue from that service is not. There are further key aspects that need to be taken into consideration; these are highlighted in the paragraphs below.

Revisiting financing and costing models

The common assumption that making data available as open data is just a product of what happens already inside the public sector and therefore does require new investments is not entirely correct. Open does not imply free of costs, as there are some potential costs that need to be considered when making data openly available. There is, for instance,

substantial commitment and investment on the part of agencies as they need to acquire new skills, train employees, purchase technologies, and upgrade network infrastructure. There are indeed human-resource costs associated with ensuring timely updating of data as well as with organising and preparing information to be put on line – particularly if the decision is taken to develop a special portal that may require an IT and design team. The additional costs for timely data publication, or coherent production of high-quality data, are normally held by each agency.

In addition, converting large volumes of data into reusable formats can have significant cost implications, particularly if there is a high level of proprietary software use. Initiatives such as converting government data to semantic web and linked data formats, as well as enabling partial access to large volumes of data (through e.g. anonymisation[15]), can be time-consuming and therefore costly. Because of these additional costs there is some reticence on the part of government bodies, which can result in refusal of even partial access to a requested database, even if privacy concerns are eased. However, to comply with the right of access to information, public bodies often have no option but to take the time to remove the sensitive data and then grant access. This has a cost that needs to be factored into the overall cost and benefit analysis of enhanced access to public sector data.

Countries such as the Netherlands and Denmark are looking into developing a business case with funding and alternative financial models to augment investments on open data and ensure the buy-in of public sector agencies. This approach emerges also from the need to compensate the loss of revenues claimed by many agencies as consequence of the abolition of fees within the new open data regime. Especially in times of austerity, governments are concerned by the cost of opening up public sector data; worries are worsened by the fact that such costs – such as in the case of data production – have not been sufficiently appraised so far.

As highlighted in OECD (2015), sales of PSI (including public sector data) generate very little direct revenue for most governments compared to their costs (around 1% of expenditures to make the data available). The notable exceptions are found in the Netherlands and the United Kingdom, and even in these countries sales are a maximum of around one-fifth of expenditure incurred by the agencies generating the information or data. In contrast, the benefits for society – including for the private sector – can be significant (as highlighted above), and can lead to additional tax revenues from downstream private sector activities.

In terms of the balance between revenues forgone and benefits from free access, a Danish study, for example, explored the impacts of making address data free (Danish Enterprise and Construction Authority, 2010). Official address data have been free of charge since 2002. The study showed that direct financial benefits for society in the period 2005-09 were around EUR 62 million (USD 83 million), while total costs were around EUR 2 million (USD 2.7 million). In 2010, estimated social benefits were around EUR 14 million (USD 18.8 million), with costs around EUR 0.2 million (USD 0.27 million), with 30% of the benefits in the public sector and 70% in the private sector. The study only included the direct financial benefits for the 1 200+ parties receiving address data from a public data server -distributor; not included were additional economic benefits in later parts of the distribution chain, for example in GPS systems. Further benefits could be expected if the availability of official addresses is extended to business registration addresses and utilities.

In Finland the Ministry of Finance reviewed the 2009-10 income of key governmental agencies from information disclosures/sales (survey reply, Finland). Income was estimated at around EUR 30 million (USD 40 million) per year from the private sector. As Finland progressively shifts to an open data strategy, adjustment for this income is being reviewed on a case-by-case basis. In Switzerland, many federal offices provide their data for free; nevertheless, federal revenue from that provision was CHF 41 million (USD 44.6 million) in 2012 (Federal Department of the Interior, 2013). The Swiss study produced estimates for the federal administration of the overall balance of free data between revenue foregone, new tax revenue, efficiency gains and switching costs. Annual net direct benefits were estimated in the range CHF 2.9 million to CHF 20.3 million (USD 3.2 million to USD 22.1 million) over three years. It was concluded that Switzerland would benefit from introduction of open government data (open PSI). The Swiss federal administration would obtain clear efficiency gains, provided the issue of compensation for federal offices can be settled.

In addition, a recent OECD (2015) survey of PSI strategies suggests that countries have not had particular difficulties in funding the switch to free and open data and information, and that this has not been the major barrier that was foreseen in the past (see Table 10.2). Half of the respondents (12 of 20 countries plus the European Commission, including countries reporting both) did not have special funding or budgets for the switch to open and free PSI strategies. The sources of finance were largely internal, or derived from reallocation of existing funds. The United Kingdom did not foresee significant increases in spending, and the European Commission foresaw lower administrative expenditures from switching to open strategies. For those countries where special funding was envisaged, it came from either within the budget process (Chile, Denmark, Estonia, Finland, Japan, Korea, Mexico) or from broader funding packages for modernisation or open government (Portugal, Slovenia).

Table 10.2. **Budgeting for the costs of opening up public sector information**

Country	Special funding	Sources of funds	Issues, other
Australia	No	Included in existing budgets (but central funding for central government portal and support to whole of government)	Agencies responsible for own licensing practices
Belgium	No		Study under way on budget models
Canada	No	Included in existing budgets (but central funding for central government portal)[1]	
Chile	Yes	Budget includes transparency funding	
Czech Republic	No	In overall budget	
Denmark	No/yes	Good Basic Data for Everyone resources provided at central, regional, local levels	
Estonia	No/yes	Resources inside normal general budgets. Ministry of Economic Affairs and Communications has additional central funding to accelerate open data projects for other ministries, agencies and local governments	
Finland	Yes	Decisions part of budget process (plus funds for national open data programme)[1]	Stepwise introduction of opening data
Hungary	No	No specific budget funds	
Japan	Yes	Budget funds allocated 2013 fiscal year, adjusted for 2014	
Korea	Yes	The Ministry of Security and Public Administration allocates budget for pan-government efforts and each ministry/agency allocates relevant budget	
Mexico	Yes	Budget funds allocated to the Federal Institute for Access to Information and Data Protection	Over half of Institute funds promote information access
Norway	Yes	Central government for central open data activities[1]	
Portugal	Yes	Part of Global Strategic Plan for Rationalisation of ICT Costs in Public Administration (PGETIC)	Funded within overall PGETIC envelope
Slovak Republic	No	No extra funds provided	
Slovenia	Yes	Part of Open Government Strategy. Special funds planned for opening PSI	
Spain	No	Internally financed	Small budget to facilitate opening
Sweden	No		
Switzerland	Yes	In planning stage	Revenue loss compensated
United Kingdom	No	Significant increases in spending on national data strategy not foreseen nor additional administrative complexity (but financing e.g. the Open Data Institute and aiding departments release their data)[1]	Aim to broaden objectives and sharpen planning and controls
European Commission	No	Included in budget	Free reuse policy lowers administrative expenditures

1. Information from the OECD survey on Open Government Data.

Source: OECD (2015) review of the OECD Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information.

Nevertheless, several respondents pointed out that in times of budget pressures and cuts in government expenditures, it is important to articulate clearly the advantages of opening up public data for wider use and, where necessary, to compensate the providers of public sector data for any initial extra funding necessary to open up and digitise the data (see the following section). The 2013 OECD Open Government Data survey reports that no government has adopted a methodology to measure returns on investment in OGD, and that there are relatively few and only scattered attempts to track economic or social gains from the reuse of OGD. Nine out of twenty-five countries reported that they are working in this area, mainly in terms of developing and collecting case studies. And even fewer countries have information, for example, on government income or the value of extra tax revenue from new business associated with the commercial exploitation of

public sector data. This highlights the need to establish a clear measure of the potential costs and benefits of opening up public sector data. Doing so could help governments build a better business case for open access to public sector data. A clear business case could in turn help secure the needed political support and facilitate implementation in pragmatic and affordable ways so as to avoid unnecessary burdens and loss of revenues.

Establishing the right ecosystem

It has been suggested that one solution, for the longer term, is to design databases with the right of public access in mind – which appears to be increasingly easy, at least from a technical perspective. It is possible, for example, to build a database that performs one-way encryption. This permits e-mail addresses to be included in a database, but in another table that is linked via a hash value so that when the data are shared, the e-mail addresses can be separated. Similarly, there are many solutions to releasing information that come at a very low cost, and it would be advisable to see these as part of the day-to-day activity of public bodies, such as posting full data sets in open source formats on government websites, properly tagged with metadata so that the information can be found but with no other special formatting or presentation.

The "business model" for OGD also needs to take into account where potential benefits may accrue, and how to align funding and incentives. When government provides reusable data, the practical costs of reuse, adaptation, and innovation by third parties are significantly reduced. It is reasonable to expect that the low costs of entry will lead to a flourishing of third party sites extending and enhancing government data in a range of areas – rulemaking, procurement and registered intellectual property, for example. This approach could be adopted by those governments that decide to shift their online focus from developing finished websites based on public sector data to the infrastructure that allows new sites to be created. If the creation of infrastructure causes better third party alternatives to emerge, then the government entity can cut costs by limiting its own. This reinforces arguments in favour of better appraising the costs and benefits of OGD and PSI, as well as a clear strategy that provides incentives to public officials to invest in related activities. Such an approach would more clearly frame co-ordinated and efficient decisions on government IT and information architecture, and could secure alignment with wider government IT procurement strategy.

If on the other hand third party alternatives to the government site do not satisfactorily emerge, then the public site can be maintained. The overall picture is that government IT costs will decline in those areas where private actors have the greatest interest in helping to leverage the underlying data, while government IT costs will increase in those areas where, for whatever reason, there is no private actor willing to step forward and create a compelling web service based on the data. Governments are keen to collect evidence on recent initiatives showing that putting raw data on line demonstrates that it can be considerably cheaper than presenting the data to the user via a custom web interface.

Organisational challenges

Implementation of OGD requires also dealing with a number of organisational challenges, described in the paragraphs below.

Ensuring accountability, quality of data and responsibility in a context of collaboration

Given the complexity and crosscutting nature of public sector data, governments need to establish the appropriate institutional structures. Tasking a government body – often the centre of government (e.g. the prime minister's office) – with championing, co-ordinating and providing support for and leadership of open government data initiatives and programmes has been seen as a way to bring the various stakeholders on board. Having a ministry (dedicated body) in charge of soliciting from governments the various data sets that will then be made public has been additionally considered as a way to ensure timely and full compliance with the national strategic directions. This dedicated body can sustain collective work to strengthen data integration across different parts of the public sector, help build better capacities across governments to deal with emerging concerns (e.g. privacy/transparency), and ensure that those making decisions about the release of data do so in a rigorous and consistent fashion.

Empowering independent oversight bodies to demand and to publish information on budgets, procurement and expenditures is considered crucial for ensuring data transparency. Several countries, e.g. the United Kingdom, are considering establishing independent ethics and governance groups to oversee policies and procedures for improving the use of administrative data. In addition, some countries have assigned the role of open data "evangelists" to a person responsible for promoting open data across the public sector (see Box 10.6).

Box 10.6. **The Evangelist for US Data.gov**

On 10 August 2013 a position was posted for an "Evangelist for Data.gov Open Government". The job description indicated that the candidate for the role was required to show four very different capabilities: 1) extensive outreach and communications skill and experience; 2) extensive experience in designing and implementing open government systems; 3) a proved research record for identifying and developing new technologies; and 4) managing a complex data and information environment that encompasses data ranging from public to classified. The job description also indicated that the Evangelist would have to work extensively with multiple parts of the government, thus underlining the importance of understanding the multitude of policy issues inherent in the release of information key to Data.gov. Hence, the role required knowledge of, and access to, an extensive network of people, organisations and experience, given the many linked areas of public outreach and engagement. The role was established also to spur knowledge dissemination and "evangelisation" in relation to the development and use of Data.gov, with the goal of gaining the greater involvement of agencies and other stakeholders such as the open government community and the mash-up programmer communities. The announcement clarified that the Evangelist was expected to create excitement and drive around the programme to facilitate practical field application of leading-edge technology issues with important stakeholders.

Source: Federal Business Opportunities, www.fbo.gov, accessed 15 May 2015.

Ensuring sustainable change through the data ecosystem

Creation of the right ecosystem is essential, not only to reap the economic benefits but also to generate the value of OGD initiatives, in social and political terms. As indicated earlier in this chapter, data used by third parties, as well as the use of the apps developed based on them, are absolutely necessary to make public sector data sustainable for value

creation. "Asthmapolis" in the United States is an excellent example of an app developed thanks to the ecosystem around public sector data, and which has brought social value and improved quality of life to a vulnerable segment of the population: people with asthma. Public data and data provided by people affected by the disease have been merged in the app to enable identification of highly dangerous spots for asthmatic people in the United States. Hospitals have recorded a decrease of 25% in incidents since the app was created.

However, establishing the right ecosystem around public sector data is no simple task. It requires the involvement of all actors and provision of the right business case to spur usage. It also entails identification of the various categories of actors; adoption of policies built around issues that are universal; nurturing of a culture of public sector interaction with the actors; and reaching out to some that might normally be less actively involved in public affairs (e.g. civil society organisations operating in geographically remote areas, and as such more aware of data that might be needed to develop target services that would better serve the local community). At least three roles of actors identified in Chapter 2 can be highlighted here as highly relevant for the use of public sector data:

1. *Data (service) providers* (i.e. in the public sector, academia, media and private sector).
2. *Data-driven entrepreneurs* (i.e. media, developers, civil society) – which essentially provide products to make sense of and create value out of public sector data. Media, for instance, can tell interesting stories based on such data; developers can produce web services and apps; civil society organisations can spot the relevance of certain data for specific segments of the population (e.g. charities in remote areas), play a critical role in building capacities at the community level, and create a culture that appreciates the relevance of public sector data.
3. *Users/citizens* – Communities need to use public sector data and engage to get the most out of OGD initiatives. Libraries also play a key role in relation to data mining and as facilitator of accessibility to data, particularly in countries' remote areas, and thus enhance the cost-effectiveness of access.

Interaction among all actors is essential (see Chapter 2). Knowing and understanding each category is important, as it helps grasp what value can be created for the community and how this can be achieved. The key questions are, for instance: who are the main members of the user community? Who leads interaction with them, what are the expected outcomes of this interaction, and how can these be measured?

Good examples of strongly collaborative ecosystems exist at local government level (see Chapter 9). The City of San Francisco, for instance, is characterised by a culture based on a strong sense of community, with a relatively large number of citizens and ICT activists forming a dynamic ecosystem supporting a strong bottom-up innovative context. San Francisco can also count on the open-minded and collaborative attitude of the city authorities as a real driver for OGD. And in that, San Francisco is not unique. It indeed presents many elements that typify several OECD medium-sized cities, as well as large municipalities. A way to replicate the positive experience might be to adopt a strategy that leverages these conditions where they exist, or fosters their development where they are lacking. Establishing collaboration frameworks may also help to ensure the involvement of different actors (e.g. SMEs that may be important incubators for innovation but that are as yet little aware of opportunities generated by OGD.

Engaging with the wider community in a two-way conversation to build capacities and find agile solutions

Churning out data is not sufficient to create value. Robust engagement models also need to be in place, to allow two-way dialogue to take place between the public sector and the users of public sector data (i.e. individual developers, SMEs, citizens, civil society organisations, academics and private companies). It is key for governments to (e.g.) focus on users' needs and for users to (e.g.) provide feedback on the data sets they would like to see released as a priority. Capturing feedback may result in value creation, as doing so enables new features, new lines of business, new markets, new competencies, new services and new tools. Similarly, users can spot anomalies and mistakes in government data and thus contribute to improving public service delivery and policy making. Developers at the cutting edge of technology can be kept up to date on new data sets being released, and governments can find help in doing things differently and in more agile ways.

The government of the United Kingdom is for instance working on a Government Developer Engagement Strategy, setting out principles for how individual government departments are expected to engage with the development community. Several governments' initiatives launched competitions with the intention to encourage reuse of public sector data (e.g. the Apps for Democracy, run for a 30-day period by the government of the United States – which apparently led to an estimated 4 000% return on investment – or the similar Finnish Apps4Finland. The Norwegian initiative Nettskap 2.0 resulted in the development of 135 apps). Other initiatives have fostered close collaboration between individual civil servants/public sector bodies and civil society. As an example, in the Netherlands the online network "civil servants 2.0" (Ambetnaar 2.0) was developed together with initiatives sustaining a community-based and collaborative approach, such as the running the data catalogue overheidsfeeds.nl or the event BarCamp on Open Government).

Alongside mobile technologies, social media can also play an important role in inspiring or enabling many OGD uses. This underlines the relevance of informing communities of practices to sustain OGD initiatives, and involving them to help create a network of actors. Social media channels can also help capture users' feedback and create a need for use, i.e. get the data to where people really need them. However, engaging users requires adequate sills and resources.

In order to ensure the views of open data users are captured, the United Kingdom has established a group in its Cabinet Office that comprises 14 officially selected volunteers from civil society and the private sector, who advise the government on the data it should release.

Revisiting internal processes to support data release workflows

Actual implementation of open government data portals requires adequate workflows for data gathering, integration, validation, release approval granting and reuse promotion. In some instances the process of online data release is supported by an organisational culture already oriented towards data sharing and reuse, which facilitates process re-engineering. In other cases the internal culture of the relevant public sector institution is not immediately conducive to data sharing, which requires additional efforts. All departments and ministries must commit to these efforts for the success of open data in the public sector (Box 10.7); for some, that may require a significant cultural challenge.

Box 10.7. **The UK open data white paper: Unleashing the potential**

In June 2012, the UK Cabinet published its open data white paper, which set out how the government intends to put data and transparency at the heart of public services. The document underlines the intention of the central government to facilitate access to public data; make it easier for data publishers to release data in standardised, open formats; and engrain a "presumption to publish" unless there are specific reasons not to do so (for instance relating to privacy or national security). These objectives are integral to the full commitment to make open data an effective engine of economic growth, social well-being, political accountability and public service improvement in the United Kingdom. In order to frame a feasible public sector implementation plan for open government data, the paper highlights that following two years of the centre of government leading the initiative, government departments are expected to take a greater role in driving efforts forward. Therefore, alongside the white paper, each government department published their first open data strategy. Each strategy contains a department's commitments for proactively publishing data over the next two years, which will complement their existing statutory publication schemes. These strategies represent an important step forward in the way the country is making data readily and systematically accessible; they are a core requirement of each department's activity.

Source: UK Cabinet Office, www.cabinetoffice.gov.uk.

Cultural challenges

Legislation, IT platforms and applications need to be matched by a culture within the public service that supports a presumption to publish, release and share data. The sections below underline some of the key cultural challenges that many governments around the world are still dealing with, within the public sector and in society at large.

Increasing public interest and engagement

Raising capacity relevant to OGD and awareness of civil servants, citizens, civil society organisations and the private sector with regard to their rights is important for society as a whole to fully capture the benefits of public sector data. Government departments, in partnership with civil society groups, can for instance create awareness of legislation and policies that empower citizens to access information, such as the Access to Information or Freedom of Information Acts. Additionally, undertaking research to establish users' information needs and barriers to information use and reuse, or seeking public-private partnerships to encourage data use to foster innovation, can lead to ventures for the worthwhile reuse and redistribution of and universal participation in OGD, such as application development and provision of e-government services.

Recognising the value of crowdsourcing

Of critical importance for governments is to recognise the value of crowdsourcing to find the "talent" outside the public sector that can use data, create value from it and exploit it (see Chapter 3 on the potential of crowdsourcing data analytic capacities). This is not necessarily easy, as successful crowdsourcing also depends on a sufficient scale and representativeness of participation to get valuable results. A critical new resource to fuel such changes is public sector data made available in machine readable data sets that can also be searched, manipulated and interlinked using freely available tools. To date there is still only a limited number of governments that have embarked down this path to

any real degree and even fewer local and regional governments, where the benefits are likely to be greatest. The United States federal government as well as some cities in that country, and the United Kingdom, Australia and France as well as a handful of other governments have been leading the way in this respect.[16] Companies and SMEs, including start-ups in some countries, are exploiting such data to expand business and create jobs, while a few governments are using the data to encourage innovation camps, "hackathon" events, and other competitions to create new services and insights for policy making.

Providing incentives and building new capabilities for a cultural shift in the public sector

Missing participatory and collaborative elements, incomplete data and the lack of raw data represent much more than technological challenges. Solving these matters requires a fundamental cultural change in the approach of public authorities: from disclosure to proactive and smart disclosure, and from provision of information to provision of data that abandons the notion of interpretational sovereignty. The belief that making data public dis-empowers public officials – or makes them more vulnerable, since they risk unveiling faults – can at times create an environment among civil servants, or even policy makers, that does not fully support implementation of OGD initiatives. In some public sectors, these initiatives are actually producing a negative behavioural impact on civil servants, who show unusual resistance to collecting data. Governments are for instance increasingly considering developing training or awareness-raising programmes to help change the attitudes of public officers with regard to making data available to the public and improving its sharing with peers. Many governments are realising that cultural and administrative barriers to data sharing can best be addressed through engaging with, and crowdsourcing the experiences of, civil servants working with data, both on the front line and in central governments.

Additionally, governments must have the capability to analyse, interpret and consume the outputs of data and analytics work intelligently. This includes the capacity to debate the meaning of data and find ways to use it in democratic debate, as well as the ability to support more targeted policy making and improved service delivery. This is only partly about cutting-edge IT and data science skills; it is also about ensuring that public sector managers and policy makers are confident in combining data with sound judgement, and are aware of the need to encourage the pursuit of the OGD agenda, possessed of strong ethics and integrity.

Furthermore, even though having a firm idea of what data are available is an essential step for any government's OGD strategy, most governments currently do not have a comprehensive overview of the data in their possession. The government of the United Kingdom, for instance, organised information engineering programmes that forced more than 100 000 authorities to re-engineer their records; these are considered to have been essential for the success of open data initiatives. However, the cultural context matters, and the forceful approach that may have worked to make OGD initiatives successful in one country may not have the same rate of success in another. Governments can, for example, increase attention and foster valuable reuse of data by identifying specific economic and societal problems that they wish to see solved, or by providing incentives to reusers.

Finally, special efforts have been made by many governments while developing data portals to encourage the use of linked data. Skills in and experience working with linked

data may as yet be limited, but advocates of linked data approaches believe they could revolutionise how data are accessed and utilised (Davis, 2010). There is however much that governments need to do to reach that point. Data.gov.uk appears to be one of the few OGD initiatives where links among the different data sets have been created (Kalampokis, Tambouris and Tarabanis, 2012). The following figure is an example of how the linking can be depicted. More specifically, data from the Department for Education describing schools are linked to data from the Office for National Statistics. The "joint point" of these data sets is the LocalLearning Skills Council (LLSC) that is responsible for the specific school.

Ensuring the support of all stakeholders

Initiating dialogue among various stakeholders about the importance of sharing information and its benefits with the public can help secure their participation and ensuring their support. Current and potential reuse initiatives by the private sector, civil society organisations and individuals can be publicised to increase awareness of the benefits of opening up data.

Legal challenges

The legal landscape surrounding data sharing and opening is complex.[17] Having a consistent legal framework in place is critical to facilitating PSI accessibility and reuse; to improve secure data sharing between public authorities and with the wider community to improve insights, results and impacts; and to inform better policy making. Fragmented and diverse legislation concerning privacy, the reuse of data and (sometimes) related fees (e.g. in Sweden and Germany[18]) can create confusion for end users. PSI and FOI (freedom of information) legislation, as well as clear licensing guidelines, are a cornerstone of open access to public sector data. Guidelines and handbooks are among the useful measures a government may choose to adopt in order to facilitate and co-ordinate the work of agencies in their transition towards open provision. These guidelines cover technical and legal issues, economics and communication strategies. Several countries are already working on the development of such guidelines (e.g. Norway) or have recently published them (e.g. Spain,[19] France[20] and Denmark[21]).

Several member countries have adopted legal and regulatory frameworks to ensure adequate support for open data (see Table 10.3). Some countries are reviewing existing frameworks, or developing new ones. Mexico, for example, is reviewing its Access to Information Law, while Spain recently adopted the Law on Transparency (Law No. 274/2013 of 26 November) (see OECD, 2014c). The law has a triple purpose: to increase and strengthen government transparency; to recognise and guarantee citizens' right of access to information; and to establish good governance obligations to be met by public officials as well as the legal consequences of non-compliance. The law does not fill an absolute vacuum but delves into what has been achieved so far, correcting deficiencies and creating a legal framework to grant certainty to citizens' rights. The law for instance establishes a number of obligations to sustain proactive dissemination of certain information without waiting for specific requests from citizens. This applies to institutional, organisational, planning, legal, economic, budgetary and statistical data. Additionally, the law broadly establishes the *right* of access to public information, which may be exercised without having to justify the request (OECD, 2015).

Table 10.3. **Public sector information licensing practices**

Country	Licence used on central portal	National model licence
Australia	Free of charge under CC Attribution Licence (CC BY). Other licences may be used	CC BY defined as the default model
Belgium	Developing new licensing models including one restriction-free model	Standard federal level licence since 2007
Canada	New Open Government Licence. Similar to CC BY	Yes
Chile	CC 3.0; GNU General public licence (GPL) for software; and Open Database Licence (ODbL)	
Czech Republic	Generally non-exclusive; exclusive only if indispensable and in public interest	
Denmark	Recommended national licence, similar to CC BY	Yes
Estonia	No exclusive licences. Most PSIs free of charge with no specific conditions for use or reuse. Specific non-discriminatory licence conditions in some areas	
Finland	Under development. CC 4.0 and CC0 based (CC0 has no rights reserved)	Planned
Hungary	PSI agreement required for reuse	
Japan	CC licence for trial version of national data catalogue site. Licence for full-scale site to be determined	
Korea	No national licence policy, but at data.go.kr, conditions for use are stated for specific data	
Mexico	No information available	
Norway	Open licences where attribution permitted	Norwegian Licence for Open Government Data is a standard optional licence
Portugal	Non-exclusive licences. Central portal CC "BY" 3.0	
Slovak Republic	No general policy. Open government portal ODbL 1.0	
Slovenia	CC encouraged	Guidelines available end-2013
Spain		National model licence
Sweden	Licences relatively rare	No
Switzerland	Unified solution not yet available	
United Kingdom	All public data to be released under same open licence	Developing "New Open Licence"
European Commission	Reuse provided source acknowledged. Disclaimer rather than formal licence	

Source: OECD (2015) review of the OECD Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information.

Additionally, a number of countries have focused on changing the legal context to enhance the impact of open data on good governance value, i.e. transparency and accountability. In May 2014 the United States adopted an innovative open data-related norm, the US Digital Accountability and Transparency Act (better known as the Data Act), which is supposed to bring a greater level of transparency and accountability to federal spending information by ensuring that agencies use a common set of data standards and by putting accurate, timely information on line for public consumption (see Box 10.8).

Box 10.8. **The US Digital Accountability and Transparency Act ("Data Act" 2014)**

In May 2014 the United States Government signed the Digital Accountability and Transparency Act (the Data Act of 2014). The result of adopting what is referred to as the "open data law" is a new policy aiming to standardise spending data and publish it on a single website within three years. The act also demands that the website be updated with new information at least every quarter, if not every month. The new law requires federal agencies to account for every dollar they spend on a single website, in an easy-to-read format, and aims to help people identify duplication, waste and fraud. It will take several years before all of its components go into effect, but the result should be federal agencies using a standardised reporting method to disclose their expenditures in even greater detail than previously. This is expected to enhance the transparency of federal spending, which the US Government regards as a means to achieve greater accountability to the taxpayers. The information was not necessarily hidden from the public before, but it may have required working with each individual agency to find and decipher it.

Under the Data Act, all spending information will appear on USASpending.gov, and visitors will be able to search through and download it. Supporters hope that the site will facilitate better oversight of government spending, and identify waste that can be eliminated. The bill also gives the government the option to create a centre dedicated to analysing the newly sorted data, so as to provide even more effective oversight on spending and further improve spending efficiency and transparency.

While the bill does not dictate the exact standard, it does require that the government chose something that is already widely accepted and not dependent on a single platform. The standard must also be able to be continually updated — a requirement that may help prevent the government from falling into a situation where agencies are all reporting information separately and in their own manner.

Because of the differences in national legal contexts and the difficulties in tracking actual implementation, legal developments are almost impossible to compare. Even though it is difficult to say how they compare to the US Data Act, there are a number of innovations in the legal framework of different countries supporting financial openness that are worthwhile mentioning, even though they are not necessarily enshrined in one single law. Brazil is a long-time pioneer in the field. As a result of passing the Law of Fiscal Responsibility, federal government agencies have since 2004 been required to publish all of their financial data on line in machine readable formats and on a daily basis through the country's Transparency Portal. The website contains vast amount of detailed and up-to-date information on government revenues and expenditures, procurement processes, and federal transfers to municipalities, states and individuals. Budget lines have both the official and popular names of the initiatives, and as a result the website is widely used by the media, government officials and citizens. Reports using data from the website led into investigations on the alleged misuse of public funds, and ultimately to the resignation of a minister. Civil society also used information to reveal how taxpayers' money is spent in Brazil.

In the case of the United Kingdom, instead of passing a single law the British financial transparency regime is a mixture of codes of practices, policies, amendments to the FOI law and governmental experimentation. Also not a result of one single law, South Korea's Digital Budget and Accounting System (dBrain) is seen as another innovative approach in the area of financial openness. The portal contains real-time information on budget formulation and execution, data on procurement processes, and a participatory budgeting feature where the central government, local governments, public

institutions and the public jointly decide on the allocation of resources. As an extra feature, citizens can also report alleged misappropriation of government funds, and may even be awarded up to USD 30 000 if allegations are proved. Finally, a recent law passed in Italy states that the information contained in SIOPE[22] will soon be accessible to the public in open data formats.

Notwithstanding these important developments, below are some important aspects and issues concerning the legal debate around open data in governments that remain unresolved:

- *The scope of right of access to information* – In principle, the right of access to information applies to all information held by public bodies, and hence should apply to databases. But in some countries databases are excluded from the scope of the law and in others the law is not clear; practice varies across countries. Similarly, not all countries establish a right of access to information stored in electronic format, and many access to information laws do not make reference to machine readable or open formats. The definition of information in most access to information laws typically refers to all information recorded in any format, which should include databases. However, there is often no explicit reference to a right of access to databases, except for laws such as in Finland and Norway that do expressly permit such access. On the other hand, in Sweden such access is provided but only in printed format, while in the Netherlands and Denmark databases are specifically excluded from the scope of the law. This is a problem predominantly with older access to information laws. In the majority of countries where there is no specific exclusion for databases, access to information and open government data advocates can use the wording of the national access to information law to argue that the right applies to databases.

- *Legal exceptions to openness* – There are a number of ways in which information held by public bodies may – rightfully – not be completely open to information seekers, from a legal perspective. The first is that the information qualifies as a legal exception on grounds such as national security or protection of privacy and is therefore not released to the public, even when someone files an information request. The second is when the public body assesses that the information can be commercialised by being sold to for-profit companies, which can then produce value-added products. The information will therefore be released to members of the public or to private companies only upon payment of a fee. These exemptions are actually necessary to reassure users that the right data are protected; the challenge arises from ensuring that the right criteria are explained to third parties and applied consistently.

- *Complexities of the various national legal frameworks for copyright and related rights as they apply to government digital content databases* – One additional legal area that especially lacks clarity, and that affects public sector information and data "openness", is the question of who owns government data sources and digital content. Many access to information laws presume that public information is to be accessible, and in that sense these laws consider the general public as the legitimate owner of public sector information and data. However, in some countries it is still the case that public bodies assert intellectual property rights such as copyright and database rights over the data they have generated or collected. Even where intellectual property rights are not asserted, public bodies tend to assume that they are the exclusive owners of the data and information, and their economic model sometimes includes selling the information for profit.

- *Compared to technologists in the private sector, national webmasters in the public sector face a daunting array of additional challenges and requirements* – These often are not technology-related, e.g. legal challenges, but they still have an impact on technological matters. In the United States for instance, an online compliance checklist for designers of federal websites identifies about 24 different regulatory regimes with which all public federal websites must comply.[23] These range from privacy and usability to Freedom of Information Act, compliance with the demands of the Paperwork Reduction Act and, separately, the Government Paperwork Elimination Act. Each of these requirements is justified by federal mandate and reflects an assessment informed by the understanding of information technology that was available when it was written. But the cumulative effect of these requirements, taken together, is to place federal web designers in a compliance minefield that makes it hard for them to avoid breaking the rules – while diverting energy from innovation into compliance. These problems are not unique to the United States; they are faced by public websites in many countries.
- *Extent of flexibility in existing regimes* – Updating policies and rules is essential to properly address issues related to putting public sector information on line. A number of recently adopted laws that explicitly address such issues raise a question of interpretation: does an Internet server that contains (machine readable) XML files that can be displayed directly in a web browser and deciphered by humans, but is designed to be used as input into an application count as a "website"? If not, statutory requirements may require government bodies to continue maintaining their own sites. It could be argued that XML pages are not web pages because they cannot be conveniently understood without suitable software to "parse" them and create a human-facing display. Adopting established regulations allowing access to information acts to be operational is important. Furthermore, with access to information acts, the government is expected to promote accessibility to open data for minorities to avoid creating new forms of digital divides, and to increase inclusion. These should include language options for content and access for the disabled, including for the hearing and vision impaired. Inconsistent laws, such as the Official Secrets Act in the United States, if not amended to be brought into line with the requirements of increased transparency and openness by public bodies, can hinder the full-fledged development of OGD initiatives and enforcement of the supporting legislation.

Box 10.9. **Landmark decision in the Netherlands**

In April 2009 the Judicial Division of the Dutch Council of State (*Raad van State*), the highest administrative court in the Netherlands, placed limits on the possibility for public bodies to charge for access to databases they have created, when it ruled that a public authority could not assert database rights over, nor charge for, data collected with public funds as part of its regular activities. The case was taken to the court by Landmark Nederland, a large supplier of land and property search information, which in 2006 put together a national data set of environmental risks such as contaminated land from a range of sources including Dutch council records. These reports were part of a portfolio of products to be sold to homebuyers via estate agency brokers. The City of Amsterdam sought compensation for supplying the data and also wanted to limit its reuse, arguing that a substantial investment had been made in compiling the original data set.

Box 10.9. Landmark decision in the Netherlands (cont.)

The court rejected the appeal lodged by the City of Amsterdam for compensation costs for supplying information that would be sold on for profit. The court ruled that, while the data could be considered to form a database because there had been a substantial investment in its collection, the City of Amsterdam had not borne the risk of this substantial investment, and was therefore not a producer of the database and so could not assert database rights. Consequently, the city was not entitled to attach financial conditions or other limitations on the use of this data by Landmark.

Source: Based on material published on the EPSIPlatform website www.epsiplatform.eu/examples/cases/landmark_nederland_bv_v_amsterdam_city_council, accessed 15 May 2015.

10.3. Key findings and policy conclusions

The public sector is one of the most data-intensive sectors, and is an important actor in the data ecosystem, in two respects: as key user of data and analytics, and as key producer of data. Public sector data can benefit governments (e.g. in terms of public sector productivity and internal costs savings, improved policy development, more effective service delivery, transparency), citizens (e.g. through public participation and engagement, people's empowerment) and businesses (e.g. through product and process innovation).

Objectives related to good governance value – i.e. transparency and government openness – rank among the top motives driving government initiatives to promote open data. This is consistent with the fact that many national agendas on open data emanated as complement to or reinforcement of national transparency agendas. Creating economic value for the private sector also ranks among the top objectives. The objectives of citizen participation and citizen engagement ranked lower than would be expected, given that many governments' open government and service delivery agendas identify open data as a key enabler of strengthened public engagement in serving design, policy making and rulemaking.

The potential of public sector data for the private sector is significant. The OECD market for public sector information (including data) was estimated to be around USD 97 billion in 2008, and could have grown to around USD 111 billion by 2010. Aggregate OECD economic impacts of PSI-related applications and use were estimated to be around USD 500 billion, and there could be close to USD 200 billion of additional gains if barriers to use are removed, skills enhanced and the data infrastructure improved. There is also firm-level evidence that there are significant cross-country benefits from free or marginal cost pricing, with SMEs benefitting most from cheaper data and the switch to marginal cost pricing.

The main barriers to open access to public sector data are not technical but i) policy challenges (e.g. the lack of procedures and standards for dealing with open data in governments), ii) funding challenges (e.g. cost recovery), and iii) organisational and cultural challenges (e.g. ensuring accountability, the quality of data and responsibility in the context of collaboration).

Funding challenges are often seen as a critical challenge at times of budget cuts and financial constraints. Some governments therefore feel the need to clearly articulate a

"business case" and identify funding models. Available evidence suggests, however, that where revenues are collected from the use of public sector data, in most cases they are less than 1% of expenditures, with a maximum of one-fifth of expenditures in a few cases. This suggests that revenue collection models have restricted use without collecting significant revenues. That said, there is a need to establish a clear measure of the potential costs and benefits of opening up public sector data, and to help governments build a better "business case" for open access in the public sector.

A number of countries – including Australia, France, the United Kingdom and the United States – have radically overhauled their open data access systems, and other countries including Norway, the Netherlands and Spain have made access easier and less costly. There are differences in approaches used depending on where countries are positioned in their open data-related activities.[24] Policy strategies include: opening up public sector data that have been difficult to access and reuse; reviewing and amending unnecessary restrictions; reviewing and redefining the public task; facilitating access to third party rights holders' material where rights holders agree. The international dimensions of access to public sector data are also being stressed, both in accessing international data, and in developing international markets for national data.

The following policy options can be recommended based on the discussion in this chapter:

1. Governments should ensure that existing legal and regulatory frameworks enable release of public sector data in open formats and enable non-discriminatory and free-of-charge access and reuse while ensuring the needed level of confidentiality, security and privacy protection.
2. Adopting an overall strategy for public sector data based the strong principles of openness (including machine-readability), copyrights (including standard open data licences such as Creative Commons), and pricing (free or at most marginal cost priced) – and covering issues concerning licences, standards, etc. – should be a priority, to co-ordinate efforts, exploit synergies, facilitate use of linked data, and create a shared view of open data within and across levels of government.
3. Governments should ensure early and timely data release, and the high quality and clarity (i.e. metadata) of published public sector data, as these are all essential conditions to enable reuse and value creation.
4. Recognising that the public sector holds a vast amount of data and information that may be of interest to the public, governments should improve their knowledge of the needs of the community of users and their capacity to consult with them to identify which data to prioritise for release as open data.
5. Governments should nurture the development of the data ecosystem and promote a culture of collaboration among the key actors to increase the value created from public sector data. A wide range of public sector data reuse by a wide range of actors is a key condition for economic and social value creation, and necessary to stimulate creativity and innovation.
6. Governments should increase open data literacy, within both the public sector and society, to promote reuse and thus unlock the value of open data.
7. Governments should promote coherence among open data frameworks, many of which relate to access, linkage and reuse. In this respect, the merging of existing

OECD Council Recommendations that aim to promote better access to and use of data could be considered to stimulate a data-driven public sector. These recommendations include the OECD (2008) *Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information* of 30 April 2008, the OECD (2006) *Recommendation of the Council concerning Access to Research Data from Public Funding* of 14 December 2006 – both currently under review – and the OECD (2014d) *Recommendation of the Council on Digital Government Strategies*.

Annex – Principles of the OECD (2008) Council Recommendation on PSI

- **Openness**. Maximising the availability of public sector information for use and reuse based upon presumption of openness as the default rule to facilitate access and reuse. Developing a regime of access principles or assuming openness in public sector information as a default rule wherever possible no matter what the model of funding is for the development and maintenance of the information. Defining grounds of refusal or limitations, such as for protection of national security interests, personal privacy, preservation of private interests for example where protected by copyright, or the application of national access legislation and rules.
- **Access and transparent conditions for reuse**. Encouraging broad non-discriminatory competitive access and conditions for reuse of public sector information, eliminating exclusive arrangements and removing unnecessary restrictions on the ways in which it can be accessed, used, reused, combined or shared, so that in principle all accessible information would be open to reuse by all. Improving access to information over the Internet and in electronic form. Making available and developing automated on-line licensing systems covering reuse in those cases where licensing is applied, taking into account the copyright principle below.
- **Asset lists**. Strengthening awareness of what public sector information is available for access and reuse. This could take the form of information asset lists and inventories, preferably published on-line, as well as clear presentation of conditions to access and reuse at access points.
- **Quality**. Ensuring methodical data collection and curation practices to enhance quality and reliability including through co-operation of various government bodies involved in the creation, collection, processing, storing and distribution of public sector information.
- **Integrity**. Maximising the integrity and availability of information through the use of best practices in information management. Developing and implementing appropriate safeguards to protect information from unauthorised modification or from intentional or unintentional denial of authorised access to information.
- **New technologies and long-term preservation**. Improving interoperable archiving, search and retrieval technologies and related research including research on improving access and availability of public sector information in multiple languages, and ensuring development of the necessary related skills. Addressing technological obsolescence and challenges of long-term preservation and access. Finding new ways for the digitisation of existing public sector information and content, the development of born-digital public sector information products and data, and the implementation of cultural digitisation projects (public broadcasters, digital libraries, museums, etc.) where market mechanisms do not foster effective digitisation.
- **Copyright**. Intellectual property rights should be respected. There is a wide range of ways to deal with copyrights on public sector information, ranging from governments or private entities holding copyrights, to public sector information being copyright-free. Exercising copyright in ways that facilitate reuse (including

waiving copyright and creating mechanisms that facilitate waiving of copyright where copyright owners are willing and able to do so, and developing mechanisms to deal with orphan works), and where copyright holders are in agreement, developing simple mechanisms to encourage wider access and use (including simple and effective licensing arrangements), and encouraging institutions and government agencies that fund works from outside sources to find ways to make these works widely accessible to the public.

- **Competition**. Ensuring that pricing strategies take into account considerations of unfair competition in situations where both public and business users provide value-added services. Pursuing competitive neutrality, equality and timeliness of access where there is potential for cross-subsidisation from other government monopoly activities or reduced charges on government activities. Requiring public bodies to treat their own downstream/value-added activities on the same basis as their competitors for comparable purposes, including pricing. Particular attention should be paid to single sources of information resources. Promoting non-exclusive arrangements for disseminating information so that public sector information is open to all possible users and reusers on non-exclusive terms.
- **Redress mechanisms**. Providing appropriate transparent complaints and appeals processes.
- **Public private partnerships**. Facilitating public-private partnerships where appropriate and feasible in making public sector information available, for example by finding creative ways to finance the costs of digitisation, while increasing access and reuse rights of third parties.
- **International access and use**. Seeking greater consistency in access regimes and administration to facilitate cross-border use and implementing other measures to improve cross-border interoperability, including in situations where there have been restrictions on non-public users. Supporting international co-operation and co-ordination for commercial reuse and non-commercial use. Avoiding fragmentation and promote greater interoperability and facilitate sharing and comparisons of national and international data sets. Striving for interoperability and compatible and widely used common formats.
- **Best practices**. Encouraging the wide sharing of best practices and exchange of information on enhanced implementation, educating users and reusers, building institutional capacity and practical measures for promoting reuse, cost and pricing models, copyright handling, monitoring performance and compliance, and their wider impacts on innovation, entrepreneurship, economic growth and social effects.

Notes

1 The survey was undertaken by the OECD Directorate for Public Governance and Territorial Development (GOV). A complementary survey by the OECD Directorate for Science, Technology and Innovation was undertaken in parallel but focused on the larger concept of PSI with the review of the OECD Council.

2 It is necessary to exercise caution when interpreting these results, as the methodologies used for these estimates are unknown.

3 Full information on the data included can be found at: www.ic.nhs.uk/services/national-clinical-audit-support-programme-ncasp/diabetes, accessed 15 May 2015.

4 UN Globalpulse introduced the concept of "data philanthropy", whereby the private sector shares data to support more timely and targeted policy action, and to heighten public interest in shared data. In this context, two ideas are debated: i) the "data commons", where some data are shared publicly after adequate anonymisation and aggregation; and ii) the "digital smoke signals", where companies share the results of sensitive data with government but not the data themselves.

5 Askitas and Zimmermann (2009), for example, analyse the predictive power of keywords such as Arbeitsamt OR Arbeitsagentur ("unemployment office or agency") to forecast unemployment in Germany. The authors find that forecasting based on these keywords indicated changes in trends much earlier than official statistics. Similar conclusions have been drawn by D'Amuri and Marcucci (2010) for the United States and by Suhoy (2010) for Israel.

6 See www1.unece.org/stat/platform/display/bigdata/Big+Data+Project, accessed 15 May 2015.

7 Open Government Declaration, "Open Government Partnership" (September 2011), www.opengovernmentpartnership.org/sites/www.opengovernmentpartnership.org/files/page_files/OGP_Declaration.pdf, signed by the United States and seven other countries in September 2011.

8 In contrast to Web 1.0 applications, which were conceived for the passive delivery of content to a mass audience broadcast from 'one-to-many', Web 2.0 applications allow users to participate directly in the creation, refinement and distribution of shared content (user-created content, UCC) (see OECD, 2007).

9 For example, the Department of Health and Human Services in the United States has pushed for the "smart disclosure" of data on flights operated by national airlines, to enable people to make informed choices on the airline company selection.

10 Also identified were the main providers among federal departments, agencies and offices of data used by the 500 companies studied. The main providers appear to be Department of Commerce and Department of Health and Human Services, followed (distantly) by the Securities and Exchange Commission, the Department of Labor, the Department of Energy, the Department of Education, and the Environmental Protection Agency.

11 See http://europa.eu/about-eu/facts-figures/economy/index_en.htm, and http://en.wikipedia.org/wiki/Economy_of_the_European_Union, accessed 10 May 2013.

12 Spatial information is around one-half of all PSI according to PIRA, 2000; MEPSIR, 2006; and Proyecto Aporta, 2011.

13 Note that these values differ somewhat from those estimated in previous work (Vickery, 2011, 2012), due to the use of more recent macroeconomic data and the choice of exchange rates to convert national estimates to USD and EUR.

14 Countries generally have the stated aim of being able to provide standardised and appropriately comprehensive metadata with all data sets, but most central portals fall short of this aim. This is due to the reliance on making available existing data sets that may not have extensive, or any, associated metadata.

15 A field in a database that contains personal data such as the e-mail addresses of private individuals can be removed before the remainder of the information is released, in order to protect personal privacy while respecting the right of access to information.

16 Most of these countries provide open data via participation and collaboration platforms – United States: www.data.gov; United Kingdom: www.data.gov.uk; Australia: www.data.gov.au; France: www.data.gouv.fr, accessed 30 July 2012.

17 In order to establish a framework for fair, proportionate and non-discriminatory conditions for the reuse of information held by public sector bodies in the European Union, the European Commission adopted Directive 2003/98/EC, which states in Article 1 that its main objective is to establish "a minimum set of rules governing the re-use and the practical means of facilitating re-use of existing documents held by public sector bodies of the Member States". This objective should be placed in the context of the wider goal of facilitating access to knowledge for citizens, and business promoting the emergence of Community-wide (data-driven) services as an important part of the internal market: http://ec.europa.eu/information_society/policy/psi/index_en.htm, accessed 14 May 2015.

18 The German Law on the reuse of information for public bodies ("Informationsweiterverwendungsgesetz"), implemented in December 2006, reflects the aims and goals of the EU PSI Directive. However, it does not include elements to proactively provide government data to the public, nor does it create the right of access to government information; application of the law assumes such a right is already in place. As a result, the decision as to whether official information may be reused and the details of that use are subject to the discretion of the public authority

concerned (Schellong and Stepanets, 2011). source Unchartered Waters – The State of Open Data in Europe, Business Solutions Technology Outsourcing, 2011).

19 See www.aporta.es/web/guest/guia_reutilizacion, accessed 14 May 2014.

20 See www.gfii.asso.fr/article.php3?id_article=3278, accessed 14 May 2014.

21 See www.digitaliser.dk/resources/559456, accessed 14 May 2014.

22 A government database of public bodies' payments and transactions, at www.rgs.mef.gov.it/ENGLISH-VE/SIOPE1/, accessed 14 May 2014.

23 Web Content Managers Advisory Council, Requirements Checklist for Government Web Managers, www.usa.gov/webcontent/reqs_bestpractices/reqs_checklist.shtml, accessed 2 December 2008.

24 The exchange of experiences and best practices is crucial for the development of more ambitious and innovative action plans related to open data. The International Open Data Working Group, currently chaired by Canada and working in the context of the Open Government Partnership, offers a platform for governments to share successes, failures and new ideas.

References

ACIL Tasman (2009), "Spatial information in the New Zealand economy: Realising productivity gains", prepared for Land Information New Zealand; Department of Conservation; Ministry of Economic Development, www.geospatial.govt.nz/productivityreport, accessed 15 May 2015.

ACIL Tasman (2008), "The value of spatial information: The impact of modern spatial information technologies on the Australian economy", report prepared for the CRC for Spatial Information and ANZLIC, Australia, the Spatial Information Council, www.anzlic.org.au/Publications/Industy/251.aspx, accessed 15 May 2015.

Askitas N. and KN. Zimmermann (2010), "Google econometrics and unemployment forecasting", Technical report, SSRN 899, 2010, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1465341, accessed 13 May 2015.

Castelein, W.T., A. Bregt and Y. Pluijmers (2010), "The economic value of the Dutch geo-information sector", *International Journal of Spatial Data Infrastructures Research*, Vol. 5, pp. 58-76.

Carrière-Swallow, Y. and F. Labbé (2010), "Nowcasting with Google Trends in an Emerging Market", *Central Bank of Chile Working Papers*, No. 588, July, www.bcentral.cl/estudios/documentos-trabajo/pdf/dtbc588.pdf, accessed 13 May 2015.

Cebr (2012), "Data equity: Unlocking the value of big data", Report for SAS, April, www.sas.com/offices/europe/uk/downloads/data-equity-cebr.pdf, accessed 13 May 2015.

Coote, A. and A. Smart (2010), "The value of geospatial information to local public service delivery in England and Wales", Local Government Association, www.lga.gov.uk/GIresearch, accessed 15 May 2015.

Craglia, M., L. Pavanello and R. S. Smith (2010), "The Use of Spatial Data for the Preparation of Environmental Reports in Europe", European Commission Joint Research Centre Institute for Environment and Sustainability, Ispra, Italy, available at: http://ies.jrc.ec.europa.eu/uploads/SDI/publications/JRC_technical%20report_2009%20EIA-SEA%20survey.pdf, accessed 13 May 2015.

D'Amuri, F. and J. Marcucci (2010), "Google it! Forecasting the US unemployment rate with a Google job search index", SSRN, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1594132, accessed 14 May 2015.

Danish Enterprise and Construction Authority (2010), "The value of Danish address data", 7 July.

Davis, T. (2010), "Open data, democracy and public sector reform: A look at open government data use at data.gov.uk", Thesis, University of Oxford, www.opendataimpacts.net/report/, accessed 13 May 2015.

European Statistical System Committee [ESSC] (2013), *Scheveningen Memorandum on "Big Data and Official Statistics",* September, available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/pgp_ess/0_DOCS/estat/SCHEVENINGEN_MEMORANDUM%20Final%20version_0.pdf, accessed 13 May 2015.

Farina, C. et al. (2008), "Achieving the potential: The future of federal e-rulemaking", Committee on the Status and Future of Federal e-Rulemaking (US), http://scholarship.law.cornell.edu/facpub/1237/, accessed 13 May 2015.

Federal Department of the Interior (Switzerland), (2013), "On the economic impact of open government data", English summary available at: www.opendata.admin.ch/en/about, accessed 14 May 2015.

Fornefeld, M. (2011), "INSPIRE & open data: Activator for the European PSI market?", presentation at Open Data: Apps for Everyone? Opportunities and Challenges in the Reuse of Public Sector Information", Berlin, 18 February.

Howard, A. (2012a), "Predictive data analytics is saving lives and taxpayer dollars in New York City", *O'Reilly Radar*, 26 June, http://strata.oreilly.com/2012/06/predictive-data-analytics-big-data-nyc.html, accessed 8 May 2015.

Howard, A. (2012b), "What is Smart Disclosure?", *O'Reilly Radar*, 1 April, http://radar.oreilly.com/2012/04/what-is-smart-disclosure.html, accessed 13 May 2015.

Kalampokis, E., E.Tambouris and K. Tarabanis (2012), "A classification scheme for open government data: Towards linking decentralised data", *International Journal of Web Engineering and Technology,* Volume 6 Issue 3, June 2011, pp. 266-285, http://dl.acm.org/citation.cfm?id=1999591.

Koski, H. (2011), "Does marginal cost pricing of public sector information spur firm growth?", *ETLA Discussion Papers*, No. 1260, www.etla.fi/en/publications/dp1260-en, accessed 15 May 2015.

MGI (McKinsey Global Institute) (2011), "Big data: The next frontier for innovation, competition and productivity", McKinsey & Company, June, www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Technology%20and%20Innovation/Big%20Data/MGI_big_data_full_report.ashx , accessed 15 May 2015.

Measuring European Public Sector Information Resources [MEPSIR] (2006), "Final report of study on exploitation of public sector information – benchmarking of EU framework conditions", Executive summary, final report Part 1 and Part 2, http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=1197 http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=1198 http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=1199, accessed 13 May 2015.

MICUS (2010), "European legislation as a driver for German geobusiness", MICUS Management Consulting, Dusseldorf, Germany, www.micus.de/51a_GeoBusiness_en.html, accessed 15 May 2015.

MICUS (Fornefeld, M., G. Boele-Keimer, S. Recher and M. Fanning) (2009), "Assessment of the reuse of public sector information (PSI) in the geographical

information, meteorological information and legal information sectors", MICUS Management Consulting, Dusseldorf, Germany.

Millard, J. (2012), "Rethinking e-participation: Smash down the silos and move to open participation", white paper prepared for the E-Participation Summit in Stockholm, 9-11 May, on behalf of the Swedish Association for Local Authorities and Regions, http://skl.se/download/18.9f425ef147b396d4676d20d/1408369822233/Whitepaper%26Slideshow_Jeremy_Millard.pdf, accessed 15 May 2015.

OAIC (2013), "Open public sector information: From principles to practice – Report on agency implementation of the Principles on Open Public Sector Information", Office of the Australia Information Commissioner, February.

OECD (2015), "Assessing government initiatives on public sector information: A review of the OECD Council Recommendation", OECD, forthcoming.

OECD (2014a), *International Forum on Open Government – Agenda*, OECD Publishing, Paris, 30 September, www.oecd.org/mena/governance/FINAL%20Agenda%20Forum%20Open%20Gov%20ENG.pdf, accessed 15 May 2015.

OECD (2014b), "OECD.StatExtracts", *National Accounts*, OECD Publishing, Paris.

OECD (2014c), Spain: From administrative reform to continuous improvement, *OECD Public Governance Reviews*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264210592-en.

OECD (2014d), Recommendation of the Council on Digital Government Strategies, 15 July 2014, C(2014)88, OECD Publishing, Paris, www.oecd.org/gov/public-innovation/recommendation-on-digital-government-strategies.htm.

OECD (2013), "Exploring data-driven innovation as a new source of growth: Mapping the policy issues raised by 'Big Data'", *OECD Digital Economy Papers*, No. 222, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k47zw3fcp43-en.

OECD (2008), Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information, C(2008)36, 30 April 2008, OECD, www.oecd.org/internet/ieconomy/40826024.pdf.

OECD (2006), Recommendation of the Council concerning Access to Research Data from Public Funding, 14 December 2006, C(2006)184, OECD Publishing, Paris.

OMB (2004), "Expanding e-government: Partnering for a results oriented government", US Office of Management and Budget, Executive Office of the President, www.whitehouse.gov/omb/budintegration/expanding_egov12-2004.pdf, accessed 14 May 2015.

Pira (2000), *Commercial Exploitation of Europe's Public Sector Information*, *Executive Summary*, Pira International Ltd, University of East Anglia and KnowledgeView Ltd, and *Final Report*, Pira International, European Commission, Directorate General for the Information Society.

Pollock, R. (2010), "Welfare gains from opening up public sector information in the UK", University of Cambridge, 15 September, http://rufuspollock.org/economics/papers/psi_openness_gains.pdf, accessed 15 May 2015.

Proyecto Aporta (2011), "Characterization Study of the Infomediary Sector", prepared by the Ministry of Territorial Policy and Public Administration, the State Secretariat of Telecommunications and Information Society, of the National Observatory of Telecommunications, of the Information Society (ONTSI), and of the Ministry of Industry, Tourism and Trade, Madrid, www.aporta.es/web/guest/estudioRISP2011; updated (2012) as "Characterization Study of the Infomediary Sector 2012 Edition", http://datos.gob.es/datos/?q=node/2148, accessed 10 May 2015.

Regulations.gov (n.d.), www.regulations.gov/#!home, accessed 9 May 2015.

Reimsbach-Kounatze, C. (2015), "The proliferation of data and implications for official statistics and statistical agencies: A preliminary analysis", *OECD Digital Economy Working Papers*, http://dx.doi.org/10.1787/5js7t9wqzvg8-en.

Robinson, D. and H. Yu (2012), "The New Ambiguity of Open Government", *UCLA Law Review, Discourse*.

Schellong, A. and E. Stepanets (2015), "Unchartered waters: The state of open data in Europe", *CSC Public Sector Study Series*, http://assets1.csc.com/de/downloads/CSC_policy_paper_series_01_2011_unchartered_waters_state_of_open_data_europe_English_2.pdf, accessed 9 May 2015.

Stiglitz, J., P. Orszag and J. Orszag (2000), "Role of government in a digital age", Computer and Communications Industry Association, October, www.ccianet.org/CCIA/files/ccLibraryFiles/Filename/000000000086/govtcomp_report.pdf, accessed 10 October 2013.

Suhoy, T. (2009), "Query indices and a 2008 downturn: Israeli data", Technical Report, Bank of Israel, 2009, www.bankisrael.gov.il/deptdata/mehkar/papers/dp0906e.pdf, accessed 13 May 2015.

Surowiecki, J. (2011), "A Billion Prices Now", *The New Yorker*, 30 May, p. 28, www.newyorker.com/magazine/2011/05/30/a-billion-prices-now, accessed 13 May 2015.

Ubaldi, B. (2013), "Open government data: Towards empirical analysis of open government data initiatives", *OECD Working Papers on Public Governance*, No. 22, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k46bj4f03s7-en.

United Nation [UN] Global Pulse (2012), "Big Data for Development: Opportunities & Challenges", Global Pulse White Paper, May, available at: www.unglobalpulse.org/sites/default/files/BigDataforDevelopment-UNGlobalPulseJune2012.pdf, accessed 13 May 2015.

Verdier, H. (2014), "Open data et démocratie : la réponse d'Henri Verdier, « monsieur Data » du gouvernement", 11 August, http://rue89.nouvelobs.com/2014/08/11/open-data-democratie-reponse-dhenri-verdier-m-data-gouvernement-254156, accessed 14 May 2015.

Vickery, G. (2012), "Review of recent studies on PSI reuse and related market developments", Update, Statistivcs Sweden, www.scb.se/statistik/_publikationer/NR9999_2012A01_BR_X76BR1201.pdf, accessed 10 May 2015.

Vickery, G. (2011), "Review of recent studies on PSI reuse and related market developments", European Commission,

http://ec.europa.eu/information_society/policy/psi/facilitating_reuse/economic_analysis/index_en.htm, accessed 10 May 2015.

WITSA (2009), "Digital Planet 2009: Report tables", World Information Technology and Services Alliance, based on research conducted by Global Insight Inc., Vienna, Virginia.

Further reading

De Vries, M. (2012), "Reuse of public sector information – Catalogue and highlights of studies, cases and key figures on economic effects of changing policies", Report for the Danish Ministry for Housing, Urban and Rural Affairs, 11 August.

European Union (2013), Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 amending Directive 2003/98/EC on the reuse of public sector information. For an overview see http://ec.europa.eu/digital-agenda/en/legal-rules, accessed 15 May 2015.

European Union (2003), Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the reuse of public sector information.

Etalab (2013), "Etalab a été rattachée directement au Secrétaire général pour la modernisation de l'action publique", www.etalab.gouv.fr, accessed 15 May 2015

Etalab (2011), "Création de la mission Etalab, chargée de la mise en ligne de data.gouv.fr", www.gouvernement.fr/gouvernement/creation-de-la-mission-etalab-chargee-de-la-mise-en-ligne-de-datagouvfr, accessed 15 May 2015.

Ministry of Government Administration, Reform and Church Affairs (2013), "Digital Agenda for Norway", white paper, 22 March, www.regjeringen.no/pages/38354256/PDFS/STM201220130023000EN_PDFS.pdf, accessed 15 May 2015.

OAIC (2012), "Information publication scheme and public sector information: Survey of Australian government agencies; Data pack report for Part B: Management and publication of public sector information", Office of the Australian Information Commissioner, Orima Research, Australia.

OECD (2007), *OECD Principles and Guidelines for Access to Research Data from Public Funding*, OECD Publishing, Paris.

OMB (2009), "Open Government Directive", US Office of Management and Budget, Executive Office of the President, 8 December, www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-06.pdf, accessed 15 May 2015.

Pollock, R. (2011), "Funding options for trading funds and other PSI holders", accessed 1 March 2011, http://rufuspollock.org/economics/papers/psi-funding-options/ via http://rufuspollock.org/economics/, accessed 15 May 2015.

Pollock, R. (2009), "The economics of public sector information", University of Cambridge, 2 December 2008, subsequently published as *Cambridge Working Papers in Economics,* 0920, Faculty of Economics, University of Cambridge, www.rufuspollock.org/economics, accessed 15 May 2015.

Pollock, R., D. Newbery and L. Bently (2008), "Models of public sector information provision via trading funds", Department for Business, Enterprise and Regulatory Reform, United Kingdom.

Power of Information Taskforce (2009), "Final report", 13 April 2010, http://webarchive.nationalarchives.gov.uk/20100413152047/http://poit.cabinetoffice.gov.uk/poit/2009/02/summary-final/, accessed 15 May 2015.

SerdaLAB (2012), "Information électronique professionnelle: Marché et tendances en 2011-2012", SerdaLAB, Paris.

SerdaLAB (2010), "L'information électronique professionnelle en France: Le marché et les tendances en 2009-2010", SerdaLAB, Paris.

The GovLab (2014), *Open Data 500*, The Governance Lab @ NYU, http://thegovlab.org/tag/open-data-500/, accessed 10 May 2015.

The National Archives (2011),"The United Kingdom Report on the Reuse of Public Sector Information 2010: Unlocking PSI potential", 1 April, www.nationalarchives.gov.uk/documents/psi-report.pdf, accessed 15 May 2015.

UK Cabinet Office (2012), "Open data white paper: Unleashing the potential", June.

Zangenberg & Company (2011), *Kvantificering af værdien af åbne offentlige data,* [Quantifying the value of open government data], Report prepared for the Danish National IT and Telecom Agency, http://digitaliser.dk/resource/1021067/artefact/Kvantificering+af+den+erhvervsm%C3%A6ssige+v%C3%A6rdi+af+%C3%A5bne+offentlige+data+-+Zangenberg2011.pdf, accessed 15 May 2015.

From:

Data-Driven Innovation

Big Data for Growth and Well-Being

Access the complete publication at:
https://doi.org/10.1787/9789264229358-en

Please cite this chapter as:

OECD (2015), "Governments leading by example with public sector data", in *Data-Driven Innovation: Big Data for Growth and Well-Being*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/9789264229358-14-en