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A Strategic Analysis Framework

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The Value of Open Government Data: A Strategic Analysis Framework

Research-in-Progress

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Abstract

Government data has been accumulated for centuries in protected repositories and registries as public record and a matter of civil order. Recently, the Open Government Data (OGD) movement has emerged as a group that focuses on facilitating open access to government data. Proponents of OGD initiatives argue that it can strengthen democracy and improve government through increased participation, collaboration and transparency. OGD advocates are also motivated by its potential contribution to greater productivity and economic growth through increased government efficiency and the creation of new businesses and services. However, as most OGD initiatives are relatively recent, the key questions regarding the value propositions and return on investment of these initiatives remain unanswered. In this theory development paper, we propose a strategic options framework that offers criteria for generating and prioritizing OGD initiatives. The framework can guide structured analysis of the economic and social impacts of OGD with an emphasis on its value propositions for both the public and private sectors. Building on a literature review and fieldwork-based anecdotal evidence, we expect OGD initiatives to generate value and substantial returns through increased transparency, efficiency of government activities, citizen participation and entrepreneurial activity.

Keywords: Open government data, Public sector information, Value assessment, Open access.

Introduction

Data is the fuel of the information age revolution. Nowadays, more data is generated and stored than at any other time in history. Computing and networking capabilities combined with openness enhance the potential impact of the accumulated data and offer society an opportunity to drive massive social, political and economic change (Kundra, 2012). The public sector and especially the various government branches are one of the main sources of data. Government data has traditionally been accumulated in protected repositories and registries as public record and a matter of civil order. Consequently, over centuries, archived government data has had limited access via proprietary interfaces and often cumbersome fee-based procedures. In response to the Budapest Open Access Initiative (2002) and the Open Access movement (see Suber, 2007), governments have started to look into the prospects of providing open access to their data repositories. The Open Government Data (OGD) movement has emerged as a distinct group that focuses on facilitating open access to government data in consideration with its unique characteristics, political significance, and legal stature.

Clearly, OGD has far-reaching effects that go beyond direct economic gain. OGD implies that the public sector relinquishes its role as information gatekeeper in lieu of a new role as information publisher. Thereby, OGD involves a realignment of the power dynamics between the public and private sectors (Davies, 2010). Proponents of OGD hope that such shifts will readjust the power balance between government and citizenry and subsequently strengthen democracy and improve government work through increased participation, collaboration and transparency. OGD advocates are also motivated by the potential of open data for promoting innovative entrepreneurs, who can use the open data to propel economic growth as well as to address social challenges (Gigler et al., 2011). Moreover, advocates of OGD argue that it enables greater government efficiency through an information infrastructure that allows for better data re-use within the public sectors and inter-agency coordination.

The impact and ramifications of providing open access to government data, let alone its value propositions are, however, still debated in professional and academic circles. Huijboom and Van den Broek (2011) argue that the precise economic impact of open-data policies remains largely unclear and that calculations differ substantially. According to Uhlir (2009), there are relatively little empirical data available on the effects of the various policy approaches used when opening up data. This state of affairs leaves policy makers and information managers without the facts they need to assess and improve these policies (Uhlir, 2009). Halonen (2012) finds it likely that the release of government data has the potential to lead to significantly enhanced efficiency in the long run, but he points out that in the UK certain obstacles have emerged, namely the operability of current IT systems, the lack of context in data, data literacy and negative attitudes among public officials (Halonen, 2012). Other possible reasons for less than expected gains are lack of technological knowledge in the public sector and a lack in recognition of the value of data (Halonen, 2012). There is also a need for a common understanding of the concepts and terms used in the OGD discourse. Questions like what is OGD, why should data be open, what is the value of OGD, how can OGD be evaluated and captured, and what are the real-life enablers and inhibitors that governments face, need to be answered.

The relatively short experience with OGD initiatives, the scarcity of case studies and evidence-based research on the topic, let alone the complexity of the underlying issues, have led us to develop a framework that addresses the following core questions:

- How to evaluate the effect of open government data on government work?
- How to evaluate the effect of open government data on the generation of social and economic value

Building on the literature and fieldwork-based anecdotal evidence, we present in this theory development paper a framework that offers criteria for evaluating, prioritizing, and designing OGD initiatives based on their main value propositions and potential economic as well as social benefits. Next we review the context and nature of OGD, then we describe the proposed framework, and finally we conclude with a discussion of their implications to research and practice.

Open data and government

Open Government Data (OGD) is a particular and relatively large class of open data. Government data is defined as "data and information produced or commissioned by government or government controlled entities" (OKF, 2012). But what is the meaning of *Open* in OGD? Open refers to *Open Access*, that is data must be accessible freely online, available without technical restrictions to re-use, and provided under open access license that allows the data to be re-used without limitation, including across different "fields of endeavor" (e.g. commercial and non-commercial alike) (OKF, 2012).

One strand of the OGD discussion focuses on the economic aspects of use and re-use of government data. The general economic idea of openness is to stimulate economic activity by increasing the use and re-use of this valuable resource, which has historically been subject to multiple barriers to use (Houghton, 2011; Kundra, 2012; Vickery, 2011). Being free for use is of course not the same as being free of use (Clark, 2006), however it is common in the economic discussion to interpret the concept of openness as meaning that the data is/should be free of charge. These results from research show that in the cases where governments charge nothing (or at most the marginal cost of dissemination of electronic data which is almost zero), re-use, and consequently economic activity, is markedly increased (de Vries et al., 2011;

Koski, 2011, Pollock, 2008). Accordingly, the use of the concept and idea of openness in the economics discourse is in this sense different from the use of the same concept in the open source software discourse. The Free Open Source Software (FOSS) movement has for instance clearly differentiated between the concepts of open and free.

In the last few years, OGD has been associated more prominently with the more social aspects of the Free Open Source Software (FOSS) culture of sharing and collaboration. Perhaps more specifically, this trend has arrived with the rise of the Open Government ideology, where public participation, collaboration, interagency and cross-sector partnerships have become part of the discussion (Linders and Wilson, 2011). The idea of Open Government draws in part on the philosophical perspective that citizens not only have access to information, documents, and proceedings, but can also become participants in a meaningful way (Harrison et al., 2011). It is important to notice, that in both the economic and social aspects of the discussion, opening government data is seen as a means to an end, not an end in itself. The importance of openness comes from the extent that it helps us achieve other goals, not because it is valuable in and of itself.

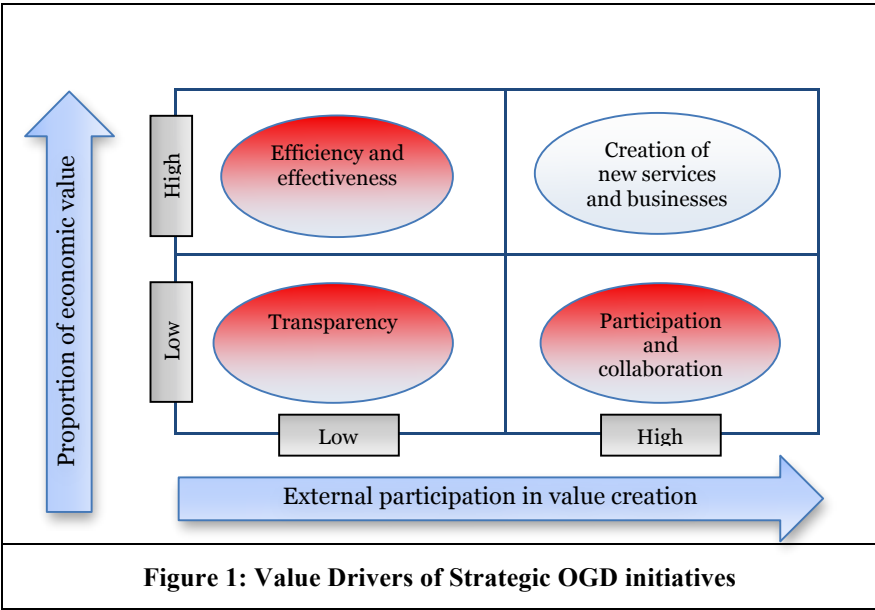
A number of economic studies on OGD have tried to estimate market size, either by estimating the total turnover of the information industry (PIRA, 2000), the “use value” or added-value from use of the information (Dekkers et al., 2006), or exchange value in the meaning that the information is worth what buyers are willing to pay for it (DECA, 2010). Vickery (2011) made a survey on existing findings on the economic impact of OGD and estimated that the overall direct and indirect economic gains could be around EUR 140 billion throughout the EU. In general, the consensus of multiple studies on the value of OGD is that the economic value seems to substantially outweigh the costs of collection and dissemination (Uhlir, 2009; Houghton, 2011; PIRA, 2000; Weiss, 2001). But when the Open Government/FOSS movement created social value in collaboration, the estimation of value becomes more complicated. The public value perspective, introduced by Moore (1995), describes public value as the product of governmentally-produced benefits, part of which is derived from the direct usefulness of such benefits and part that is derived from the fairness and equitability of their production and distribution. A simplification of this perspective, often seen in the OGD discourse, is that value generated by government actions can either be of an economic nature (more economic activity, increased productivity) or social nature (better democracy, less corruption, happier and healthier citizens).

Strategic analysis framework for OGD initiatives

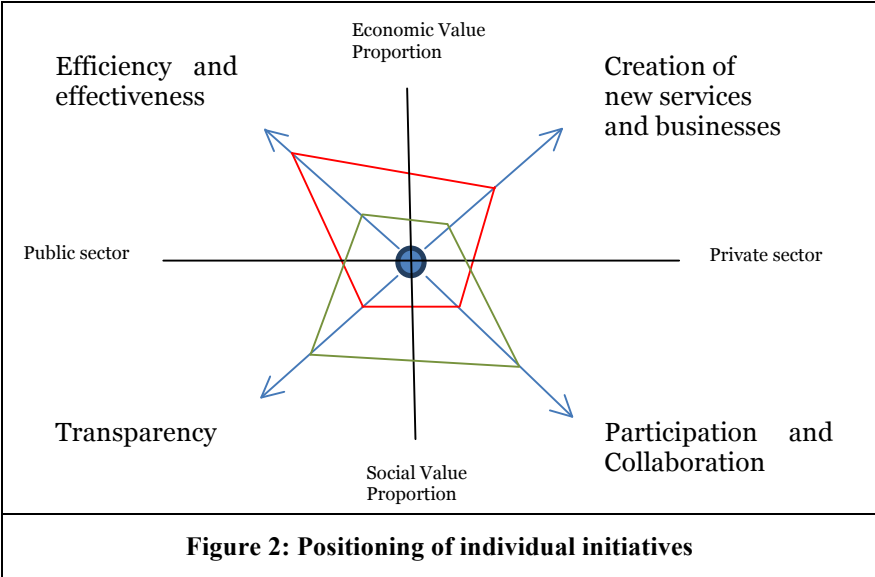
After going through the literature on OGD we found that the value generating initiatives set forth by OGD resemble those set forth by a value network. In a value network, value is co-created or co-produced (Morgan et al., 2010). Creating value cannot be done unilaterally based on the efforts of a single organization, nor can it be done without keeping in mind the different and divergent interests of all collaborating partners (Vanhaverbeke, 2008). Verna Allee defines value networks as any web of relationships that generates both tangible and intangible value through complex dynamic exchanges between two or more individuals, groups or organizations (Allee, 2008).

In the case of OGD, different initiatives have the ability to create value of both social and economic nature for both the private and public sector. However, when we looked at these initiatives from the practical implementation oriented point of view, we could see important differences. Using the two-by-two matrix to show the main strategic options for government, we simplified the value generating initiatives into value driven primarily by the actions of the public sector on one hand and the private sector on the other. The resulting value can be both social and economic, but some value propositions are geared more towards the social types of value while others are prone to deliver more economic value. This classification resulted in four drivers of value, illustrated in Figure 1. The matrix explores two key dimensions: "Sector" where the involvement of the private sector is dominant in the right hand column; and "Type of Value" where the proportion of economic value generated is more substantive in the top row. In each of the quadrants we have a different value proposition, namely Transparency, Participation and Collaboration, Public sector efficiency and effectiveness and Creation of new businesses and services. Different philosophies or ideologies driving OGD initiatives can be illustrated in the rows of the framework. Open Government ideology types of initiatives are more focused on the social types of value (bottom row) while

other initiatives (EU) focus more on the ability of open data to increase efficiency and drive economic growth (top row).



Each of these initiatives is enabled by OGD but when examined more thoroughly there are different implementation considerations to each of them. Different levels and types of investment in processes and technology are needed as well as different data sets, licenses and even business models. In each case there is a direct and indirect cost, that can incur only (or mostly) in the public sector (left hand column) or be shared with the private sector (right hand column). Therefore, we conclude that the return on investment is dependent on how well these value generating initiatives are understood. OGD initiatives can have the ambition to implement more than one value driver and it can be argued that the most interesting synergies occur on the margins. There can also be spillovers between the squares, for instance greater transparency can lead to increased effectiveness. Figure 2 shows how initiatives can be designed using the framework. Bigger diamond means more total value created but also bigger investment and more need for collaboration. The balance between public and private involvement is shown in the horizontal axis and the balance between economic and social value created on the vertical axis.



In the next section, we discuss each of the four value propositions and provide arguments for why and how each of them is considered to be able to generate value from opening up government data.

Transparency

“Sunlight is said to be the best of disinfectants; electric light the most efficient policeman.”
(Brandeis, 1914, pp.xx).

Our first identified value proposition is *Transparency*. Transparency represents an action by the *public sector* that drives *social value*. The relationships between information, transparency, and democracy are fundamental and basic (Harrison et al., 2011). But why and how does transparency drive value? Transparency provides citizens and other stakeholders with a window into what government is doing. Open data enables better government through transparency of government activities and processes that encourage due process and fairness. In economic terms, increased transparency means less information asymmetry. Asymmetry of information can lead to adverse selection and moral hazard (Cook, 2010) resulting in corruption, defined as the misuse of public power for private benefits. The Open Budget Index found in 2008 that 80% of the world's governments fail to provide adequate information for the public to hold it accountable for managing public funds: Nearly 50 percent of 85 countries provided minimal information enabling government to hide unpopular, wasteful, and corrupt spending (Fioretti, 2011). Transparency is also valuable for the public sector itself as transparency can create trust in public operations. In breaking down information silos between agencies, government officials can also consume information from other parts of the bureaucracy to benefit their work (Gigler et al, 2011).

However, it is not obvious that any OGD initiative automatically leads to increased transparency, at least not one that is valuable for everyone. Here we have to consider the context of the project in question. Is the data current, is it of high quality, is it secure, and is it available and accessible for all? Data collection, management, access, and dissemination practices all have strong effects on the extent to which datasets are valid, sufficient, or appropriate for policy analysis or any other use (Dawes and Pardo, 2006). Data literacy and skills of individual groups of citizens and their access to technology should also be considered. Benjamin et al. (2007) studied the Bhoomi program in Bangalore and found out that the digitization of land records led to increased corruption, much more bribes and substantially increased time taken for land transactions. And it eventually enabled very large players in the land markets to capture vast quantities of land (Benjamin et al., 2007). Malensky et al. (2011) point out that transparency can cause perverse effects in systems where agents (politicians) understand the relationship between behavior and outcome better than their principals (the voters). In general, in order to achieve social value through transparency, equal access to information, equal opportunities for use and the context and quality of data become the prerequisites.

Participation and collaboration

The US Open Government Directive, issued on December 8, 2009 foregrounded the principles of transparency, participation, and collaboration as the cornerstone of an open government (see for instance Harrison et al., 2011; Linders and Wilson, 2011; Noveck, 2009). Our second value proposition is *Participation and Collaboration*. This driver represents a set of actions by the *private sector* that drives *social value* and is representative of the latter two principles of open government. Participation, according to Lee and Kwak (2011), refers to public engagement in relatively simple interactive communications such as blogging and social networking and relies primarily on expressive social media to connect people and help share their ideas. Noveck (2009) argues that collaboration is “a form of democratic participation” that differs in important ways from traditional participative and deliberative practices, which often take place in circumstances disconnected from decision making. This driver includes both types of participation and describes the ability of citizens to help governments with difficult decisions and even workload.

Open data and use of information technology enables increased citizen participation and collaboration, leading to improved citizenship and collaborative behavior through crowdsourcing activities. In this case, OGD not only transforms how services are delivered, but opens the opportunity for citizens to take an active role in the provision of those services. A good example of citizen collaboration is the crowdsourcing activities that have been immensely helpful in natural disaster incidents, such as hurricane Katrina and

the earthquake in Haiti. While government agencies and formal organizations failed to respond quickly, open collaboration among the public demonstrated it as a viable and effective initiative to respond to those daunting challenges (Lee and Kwak, 2011). Another example is the Web and SMS-accessible platform called the Public Participation Information System (LAPOR), launched by the Government of Indonesia in 2011. The new unit lets citizens monitor and verify the delivery of government services in real time. It also uses this information to improve the way it allocates public resources in areas ranging from education and health to energy and defense (McKinsey, 2012).

However, participation and collaboration must be meaningful and directed toward goals that are carefully defined and acknowledged by ample government feedback. Further, the citizen input generated must be represented in outcomes that are visible to stakeholders in the decisions and the value produced (Harrison et al., 2012). These kinds of changes are not easily made; they call for considerable change of processes and even mindset within the public sector. They also demand investment in technology and moreover, deliberative design of collaboration platforms, including both the community and society dimensions (de Cindio, 2012).

Public sector efficiency and effectiveness

The third value proposition is *Public sector efficiency and effectiveness*. This proposition represents an action by the *public sector* to create *economic value*. OGD is, in this context, strongly related to digital or e-government activities where the goal is to modernize and streamline government with the help of information technologies. By opening government data, efficiency can be increased through consolidation of overlapping repositories, improved information infrastructure, inter-agency coordination and better financial controls. One example of such an initiative is the Danish “Better Access to Public Data” free-of-charge access to address data agreement from 2002. The aim of the agreement was to improve public and private services and to promote public safety (ambulance, police and other emergency services) by using the official addresses of citizens as a common reference which could promote interoperability in different IT systems. In 2010 a study on the benefits of the agreement concluded that the direct financial benefits in the period 2005-2009 amounted to EUR 62 million. Until 2009 the total costs of the agreement were around EUR 2 million (DECA, 2010). The Danish government is now running a similar, but broader based initiative, where over the next four years all basic government data will be improved in quality and context and collection and dissemination of the data will be coordinated within the public sector. A common infrastructure will be established for stable and efficient distribution of government data, with the aim of making the administration of the basic data registers easier and more efficient (Digitaliseringsstyrelsen, 2012). At the same time the data will be opened, so that it will be free and available for the private, as well as the public, sector. The estimate of the project leaders is that when the project has been fully implemented (from 2020) the annual savings to the public sector will be around EUR 35 mio (Digitaliseringsstyrelsen, 2012).

A special effort is required in order to ensure that opening data leads to increased efficiency. Schematic heterogeneity and lack of consistency complicate access and integration of the data. Adoption of standards for the documentation, organization and dissemination of information is an important part of government systems for keeping and managing data (Bountouri et al., 2010). The key information architecture principles include treating data as an asset through a value, cost and risk lens and thereby ensuring timeliness, quality and accuracy of the data. Finally, the security of information must be considered, a holistic approach to data governance begins with an understanding of the information life cycle—the collection, updating, processing, and eventual deletion of personal information—and the adoption of a technology framework that enables governments to set controls which safeguard individuals’ privacy (Lampri, 2012).

Creation of new businesses and services

The last value proposition identified is the *creation of new businesses and services*. This proposition represents a set of actions by the *private sector* that generates *economic value*. Generally this means that organizations outside of the public sector use OGD to create new services (private sector innovation) ultimately leading to economic growth. The 2009 Digital Britain Report described data as ‘an innovation currency’ and ‘the lifeblood of the knowledge economy’ (Department for Culture, Media and Sport and

Department for Business, Innovation and Skill, 2009). Open data is an essential raw material for a wide range of new information products and services that build on new possibilities to analyze and visualize data from different sources (European Commission, 2011).

The opportunity of this innovation currency is already to some extent available, since it has been produced, collected and paid for by governments. Since 2003, the Spanish Oficina del Catastro (the Spanish Cadastre/Land Registry) has put increasing amounts of geographical data online and, from 2010, has facilitated electronic land registry certification. From June 2004, free access to cadastral maps for non-commercial users was provided and in April 2011 free access was also extended to commercial re-users, and a new model allowed mass downloads. Since obtaining free access in 2011, the number of private companies downloading data increased 15 fold; alphanumeric data download volume per week increased 20 fold; total digital map downloads increased by a factor of 80 and downloads increased by 100 fold (De Vries, 2012, Koski, 2011). And Open Data can create business opportunities even when not all potential customers or beneficiaries have internet access. Question Box, a mobile phone-based tool developed with support from the Grameen Foundation, allows Ugandans to call or message operators who have access to a database full of information on health, agriculture and education (Fioretti, 2011).

The networked value creation is demonstrated clearly in many OGD based innovations. Collaboration between students, the creative industry, local government, and inhabitants was used to stimulate idea exchange and foster innovation in an OGD initiative in Rotterdam (Conradie et al., 2012). The conclusion after this project was that such an approach, where crucial partners collaborate together, can create a sustainable infrastructure to co-create public services and fosters further innovation based on OGD. Another good example of possible OGD based innovations is the TWC LOGD Portal, an open source infrastructure supporting government data conversion, publishing, enhancement and access. A team of graduate and undergraduate students have used this infrastructure to create over 40 different mashups and visualizations (Ding et al., 2011). These mashups are diverse, some demonstrating the integration of data from multiple sources or deploying data via web and mobile interfaces, others showing how open data can support interactive analysis for specific domains including health, policy and financial data and yet others showing the design of data access and semantic data integration tools.

Making data available and making it re-usable are, however, two very different things (Alani et al., 2007). A big part of the economic value generation possibilities depend on the ability to mash up different sets of data to gain new insights and knowledge, for instance by linking sensor data, government data and company data. One enabler of such activities is the linked data and Semantic Web technology. A lot of promising work is being done on showing how these technologies can solve the need for integrated and interconnected datasets (Böhm et al.; 2012, Ding et al., 2011; Hausenblas, 2011; Höchtl and Reichstädter, 2011; Zuiderwijk et al., 2012). Platforms designed to make use of and work with big, connected datasets for use in various applications are also an enabling technology. Grid and service-oriented high performance systems can be used as an effective cyber infrastructure for implementing and deploying geographically-distributed services and applications (Talia and Trunfio, 2010). The value of OGD can also be discovered through statistical, visual or semantic models, designed to deliver new knowledge. Parallel to the increased access and coherency to government data, we are witnessing a revolution in the technologies for analyzing, exploiting and processing data. However, the results of a data mining process depend strongly on the quality of the data it processes (Paulheim and Fümkrantz, 2012), which again strengthens the argument for solid data governance.

Discussion

Government data is a rich source of potentially valuable but currently relatively untapped resource as the data is frequently locked up within the public sector, even only usable at the institution that creates or collects the data. It can be seen from the examples above that OGD is capable of generating both economic and social value. The value generated can range from being of a social nature like increased trust in government activities to financial benefits like those resulting from increased economic growth. We identified four distinct, but complementary, value-generating initiatives. Each of them has its own enablers and inhibitors as well as technical and organizational requirements. The value generation is available to different sectors in the value network, but these value-generating initiatives are complex and there can be substantial synergies and spillovers between the drivers. In all cases the value can be

captured by both the public and the private sector and the relationship between who generates and who captures the value is not simple. We conclude that there is need for a new approach to explain the generation, capture and measurement of OGD value. This should be based on complex co-creation of social and economic value in value networks, rather than the value of ownership and exchange. The understanding of the complex value generating initiatives as well as the possible inhibitors and enablers is imperative to the ability to maximize value captured from OGD.

One possible inhibitor to OGD value generation is a general lack of awareness of the value of government data, both by public officials and the private sector in general. And the opportunities to capture value from OGD might also differ within the private sector, even if the data is made available and free, as some citizens don't have the required skills to capitalize on the opportunities brought forth by OGD (Gurnstein, 2010; Rath, 2012). However, while the digital divide is a fact, this should not be seen as a reason not to open government data, just as illiteracy should not be conveyed as a reason not to publish books. Rather, governments should consider these possible adverse effects and optimally implement some measures to counter-affect them. One way of doing so is to encourage crowdsourcing activities to help increase computer and data literacy as well as to educate and increase the awareness of public officials and the general public.

The quality of government data is another possible inhibitor to value generation, even to the extent that data is not always available in a digital format (Hogge, 2011). It is also important to give the correct context to the data. Government data is in many cases collected or created for specific purposes, creating substantial risks for validity, relevance, and trust if taken out of that context. In spite of that, information is often seen as a given, used uncritically, and trusted without examination (Dawes, 2012). Dawes (2012) suggests that we are more likely to achieve the promised benefits of OGD if we look at government data as one of four linked phenomena - policy, management, technology, and data - embedded in social, organizational, and institutional contexts that have substantial influences on data quality, availability, and usability. Many of the tools and techniques that are being developed today can make a huge difference for the collection, management and dissemination of government data. New technologies also offer new ways of capturing value from OGD, via the semantic web, mobile apps, network platforms and big data connectors and analytics. Use of information technology can be the most important enabler to enhance the value of OGD initiatives.

Two of the most discussed enablers for OGD success are open licenses and low prices. Still, the distribution of costs and value between the public and private sectors is the cause of some controversy. The benefit from lower prices is increased use and re-use of data, leading to increased economic activity (Pollock, 2008; Koski, 2011). But observers like Bates (2012) worry that the OGD model is essentially becoming little more than a corporate subsidy. The question remains: "Is OGD being made available for private gain at public expense?" (Grupe, 1995). Even if many OGD initiatives should be able to create positive financial return on investment to the public sector, this is not by definition true of every OGD initiative, especially those focused on creating social value. Furthermore, administrations that first see the extra money generated by OGD are almost never the same who created them in the first place (Fioretti, 2011). And finally, improved quality and governance of government data, as well as the use of new technologies, can significantly boost OGD generated value. However, these improvements call for public sector investment and therefore increased costs. We suggest that new business models based on cost sharing, as well as co-creation of value between the public and private sector, could help solve this paradox.

Conclusion

The discussion above brings us to our two questions:

- How to assess the effect of open government data on government work?
- How to assess the effect of open government data on the generation of social and economic value

Many empirical research papers have shown evidence towards the potential benefit of opening government data. To name one example, Houghton (2011) estimates the benefit/cost ratio from opening up Australian spatial data as 13/1. Of course the value generated will be different between datasets, but datasets that do not offer much economic value might have a lot of potential for generating social value.

However, in order to safeguard the ability of government to collect high-quality, high-value data, new business models where costs as well as benefits are shared between the public and private sectors should be explored. From the perspective of the private sector the value captured from OGD could be of an economic nature like direct cost savings (cheaper services), indirect cost savings (saving time through better services) or increased opportunity to generate revenue (new businesses). The value captured can also be of a social nature like increased trust, more equal and fair society and increased life expectancy. From the public value perspective (Moore, 1995), the value of OGD is also derived from the fairness and equitability of the economic benefits. Eventually, more market activity and increased market efficiency should benefit everyone to a point, at least in democratic societies. And increased transparency, participation and collaboration through citizenship and due procedure could be the initiatives needed to ensure that opportunities and value are distributed more evenly.

From the evidence we have collected we conclude that:

- OGD initiatives are likely to create both economic and social value and for certain datasets the direct financial benefits will substantially outweigh the costs;
- OGD initiatives need investment in data management and technology, but the type and level of investment, as well as the implementation approach, depends on what value propositions are of importance;
- Consequently, considerable effort should be spent on agreement towards what kind of value or value propositions are of interest and in what way this value should be captured and by whom;
- For these deliberations to be successful, the potential inhibitors (and enablers) in the current OGD initiative environment need to be identified and new business models should be explored.

We conclude that there is a need for further research to identify more clearly the enablers and inhibitors that governments operating in different social and economic contexts have to consider when opening up government data. There is also a need for a more structured set of goals and measurements for governments to use when estimating the captured value of OGD initiatives. From a theoretical perspective, the notion of openness requires a reconsideration of the processes that usually generate value creation and capture, from a value chain perspective to a value network perspective. Open Government and Open Data have the ability to facilitate networks of collaboration and co-creation that produce real economic and social impact, but more research on these value generating initiatives is needed in order to guide future initiatives.

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