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An analysis of open government portals: A perspective of transparency for accountability

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ABSTRACT

This study aims to assess whether the current structure and organization of some of the most prominent open government portals ('data.gov' type) is adequate for supporting transparency for accountability. A set of requirements was established based on key characteristics of desired data disclosure proposed by the literature on open government and transparency assessment. These requirements were used as a framework to analyse the structure and data organization of the selected portals. Results suggest that this type of open data portal does not possess important structural and organizational elements needed to fully support ordinary citizens engaged in public accountability efforts. Examples of good practices were found in some portals and should be considered by those responsible for open government programs.

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1. Introduction

In the last few years, dataset (open data) portals have emerged as flagship initiatives of open government programs. One of the most prominent dataset portals, data.gov, lists a total of 44 international (country wide) open data sites,¹ providing clear evidence that the open government data movement has spread throughout many countries. The creation of these dataset portals aims to fulfill one of open government's major goals: to promote transparency through the publication of government data, and therefore allow for the accountability of public officials and the re-use of disclosed data with social or economic value (Linders & Wilson, 2011).

This work is focused on online transparency for accountability purposes. In the context of public administration, *accountability* is often defined as the obligation for public officials to report on the usage of public resources and answerability of government to the public to meet stated performance objectives (Armstrong, 2005; Behn, 2001; Bovens, 2007; Wong & Welch, 2004). Among the different types and dichotomies associated with the concept of accountability (Bovens, 2005, 2007; Sinclair, 1995), Bovens (2007) identifies *political accountability*, involving elected representatives, political parties, voters (citizens), and media, as the counterpart of political delegation: citizens delegate political power and responsibilities to their representatives, who, in turn, are expected to account for their actions by providing the necessary information for citizens to assess their conduct.

Traditionally, citizens and other interested stakeholders, when seeking data concerning a particular public entity or subject, had to rely on individual entities' or thematic websites. Internet-based research on transparency assessment (Gandia & Archidona, 2008; Reggi & Ricci, 2011; Rodríguez Bolívar, Caba Pérez, & López Hernández, 2007; Styles & Tennyson, 2007) also relied on this information seeking strategy which required the analysis of many different individual websites in order to gather the data required to assess the different entities' degree of transparency online. The emergence of 'data.gov' type portals would, in principle, change the way both citizens and researchers look for accountability-related data, since these portals, by definition, function as a centralized point of access to governmental data. There is no doubt that open government portals disclose and make available a huge number of datasets,² but the question remains whether the way such datasets are organized and disclosed really facilitates the task of finding the required data and helps to answer the following questions: Which public entities are not providing information? Which information is not being provided by a certain entity? Which expected time periods are missing from either a certain entity or information type? Without an appropriate structure and dataset organization, the data needed to answer these and other similar questions remain difficult to obtain and analyze, even if available in an all-encompassing open government portal.

The lack of evaluation guidelines regarding the implementation of open government principles was emphasized by Darbishire (2010), who recognized that "limited examples of monitoring of proactive

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¹ <http://www.data.gov/opendatasites>.

² Over 90 000 datasets are available in data.gov (last visited 2/4/2014).

disclosure by official or oversight bodies” were found. Even the 2009 US Open Government Directive (OGD), perhaps the best-known open government initiative, did not provide an assessment framework of how to evaluate US agencies’ plans and, more importantly, of how to evaluate their implementation and results (Bertot, McDermott, & Smith, 2012). More recently, Huijboom and Broek (2011) noted that, from the five countries analyzed in their work, only the UK and the US have evaluated their open data policies but none of them have assessed their economic and social impacts. Harrison et al. (2012) also acknowledge the lack of frameworks and procedures to assess open government. And although some open government assessment frameworks and exercises can be found in the literature (Sandoval-Almazán, 2011; Sandoval-Almazán & Steibel, 2013), none seems to specifically adopt a “transparency for accountability” perspective or focus on ‘data.gov’ type portals (structure and organization).

Regarding the actual data being disclosed, McDermott (2010) recognized that, concerning data.gov, “no one has done an overall assessment of the data sets”. According to Harrison et al. (2012), even if the data disclosed is “both usable and of high quality”, simply making data available does not necessarily mean that government is being more transparent and accountability of public agents is facilitated. Questions arise also concerning the nature of the data being disclosed: “While such open data is to be welcomed, these datasets are hardly useful to hold government itself to account since the government owned data is mainly related to practical decisions of citizens (traffic, weather, public transportation) and/or is information about other organizations, for instance data about emissions of factories” (Grimmelikhuijsen, 2012).

Data.gov is a general purpose (disclosing all kinds of data from all public agencies and entities), national portal created by the US Government which operates under the open government principles and objectives, including the promotion of transparency to support public accountability.³ As such, this portal inspired the creation of similar portals around the world that adopt the ‘data.country’ address format and designation, and may therefore be considered as serving the same open government objectives. These are the ‘data.gov’ type portals that will be targeted for analysis in this paper.

The goal of this research is to contribute to an analysis of currently available ‘data.gov’ type portals and, in particular, to understand whether these dataset portals provide data in a way that in fact facilitates public accountability. This research does not focus on the data itself being disclosed, but rather on structural and organizational aspects which might influence citizens’ ability to better access and use the available data for accountability purposes. Also, although seven specific portals were analyzed, it is not the purpose of this work to individually (fully) assess them or to compare them. Rather, these seven portals were considered as ‘representative’ of ‘data.gov’ type portals (see Section 4 for a discussion on the selection process) for analysis purposes.

To guide the portal analysis process, a first effort was made to identify key data disclosure characteristics, compiled and synthesized from previous internet-based transparency assessment research and open government policy guidelines. Although some of these characteristics concern qualitative aspects of data being disclosed, they were also considered in the context of this study as inspiring the formulation of a set of structural and organizational requirements to guide the portal analysis process (second step of the research effort). Once these requirements were defined, several ‘data.gov’ type portals were selected and each one was analyzed according to the pre-established framework.

Realistically, ordinary citizens (“members of a society ... not holding office or administrative positions in government” (Roberts, 2004)) might not possess the necessary skills or willingness to directly access and analyze the information disclosed. Instead, citizens may rely on

information brokers such as journalists, NGOs or even academic researchers (Heald, 2003). Information brokers may therefore be considered as the direct users of public entities’ websites and portals. Regardless of the actual users, portals should be designed in such a way that even ordinary citizens, without specialized technical skills, may use them to find data. Therefore, the analysis was conducted from an ordinary citizens’ point of view.

Results seem to indicate that, while most ‘data.gov’ type portals do explicitly refer to transparency for accountability as one of their goals and provide a great amount of data and sophisticated functionalities, they still lack some important basic organizational structures which are deemed relevant to ease accountability processes. Therefore, those responsible for implementing open government programs should consider that simply creating a ‘data.gov’ type portal is not sufficient to support transparency for public accountability.

The next section presents a brief review of some of the most prominent data characteristics contemplated in the literature on online transparency assessment. Then, in Section 3, these characteristics will be used to derive and present a list of structural and organizational requirements to be used, in Section 5, as a framework to analyze seven open government ‘data.gov’ type portals. The criteria for selecting these portals and the overall analysis procedure are stated previously in Section 4. After presenting the analysis results, the paper ends with some final conclusions in Section 6.

2. Data disclosure characteristics in the literature

Previous literature on web-based transparency and open government has identified several key characteristics of data being disclosed. Such characteristics have been identified in different contexts, such as part of metrics for measuring open government performance (Lee & Kwak, 2011) or as requirements for digital governmental financial reporting (Caba Pérez, López Hernández, & Rodríguez Bolívar, 2005), and have been referred to using different expressions. The following sub-sections are the result of an effort to identify their commonalities and relations, and the goal is to provide the conceptual basis for formulation of the set of requirements to guide the analysis of open government portals.

2.1. Quality

In a sense, the notion that all data disclosed should have *quality* or be *intrinsically good* is self-evident. But such a concept is not easy to pinpoint in the context of open government, and the requirement for data quality may be considered as encompassing several characteristics. Its importance is illustrated by the recognition that the reputation and public trust in public agencies might be irrevocably lost if low quality data is disclosed (Lee & Kwak, 2011). But while quality is sometimes simply associated with *accuracy*, also considered an objective of transparency (Drew & Nyerges, 2004), it is not enough simply to consider intrinsically good (accurate) data as high-quality data (Dawes, 2010). Therefore, it is possible to identify in the open government literature another specific characteristic associated with it, namely *validity*: “agencies should make sure that only valid and accurate data becomes available to the public” (Lee & Kwak, 2011). *Consistency* is also associated with accuracy, and both are required characteristics to ensure data quality (Lee & Kwak, 2012), thus providing metrics for Agency Open Government (OG) Performance (Lee & Kwak, 2011). *Reliability, authenticity* or *validity* is another important aspect of data quality, as it concerns the possibility to *review* and *certify* the *compliance* of adopted procedures and disclosed data with open government policy principles and the desired characteristics of data disclosure (Caba Pérez et al., 2005; Open Government Working Group, 2007; Rodríguez Bolívar, Caba Pérez, & López Hernández, 2006).

³ <http://www.data.gov/open-gov/>.

2.2. Completeness

The first of eight Principles of Open Data, as laid out by the *Open Government Working Group* (2007), states that all public data (not subjected to privacy, security or other valid limitations) should be available. In the context of public financial reporting, *completeness* means that citizens should “have access to the legally required and permissible financial information” or, at least, to a “highly detailed summary of such information” (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006). As for the transparency of decision processes, completeness is associated with a “fully laid out and fully disclosed process” and *integration* or *consolidation* of all data in a single document (Drew & Nyerges, 2004).

A balance needs to be struck between completeness, *relevance*, *comprehensibility*, and *granularity* (detail). When publishing a particular dataset, public entities need to consider the level of detail in which such data is disclosed. Too much *detail* on a dataset might compromise its comprehensibility and ‘hide’ relevant data, but the lack of detail might be considered as a lack of completeness.

2.3. Access and visibility

Data access is often referred to as one important practical challenge of public access (Dawes, 2010) and, as such, it is directly addressed by the fourth Principle of Open Government Data (“Data Must Be Accessible”) and is also stressed by three other principles: “Access Must Be Non-Discriminatory”, “Data Formats Must Be Non-Proprietary”, and “Data Must Be License-free” (Open Government Working Group, 2007). In sum, these guidelines state that there must be low or no barriers to prevent or hinder citizens’ access to relevant data and, in this sense, access is directly related to *openness*.

The idea to disclose data through a centralized open government portal is, in itself, a way to increase citizens’ access to data that otherwise might not be available or, if available, might be distributed by different entities’ web sites. However, due to the amount of datasets available in a single portal, with different characteristics and for different purposes, it is essential to ensure the *visibility* of accountability-related datasets.

2.4. Usability and comprehensibility

The concept of *usability* has a dual meaning in the context of web-based governmental transparency. On the one hand, usability of open government portals refers to “to the ease with which users can access information and navigate the web portal” (Pina, Torres, & Royo, 2007, 2010). As such, usability is closely related to *interactivity*, and comprehends technical aspects of web site design such as the ones assessed by Web Site Attribute Evaluation System (WAES) methodology developed by the Cyberspace Policy Research Group, which defines interactivity as “the ease with which visitors can use information provided on line” (cf. (Cucciniello, Nasi, & Valotti, 2012)).⁴

On the other hand, usability is referred to as a required characteristic of the data disclosed and closely related to its quality (Lee & Kwak, 2011; Lee & Kwak, 2012). In this context, several authors refer to usability as encompassing comprehensibility and *timeliness* (Dawes, 2010). While the characteristic of timeliness will be addressed in a separate section, we will focus here on comprehensibility.

Comprehensibility or *understandability* “aims to ensure that users can understand and interpret appropriately the provided financial information” (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006). The demand for comprehensibility stems from the concern that ordinary citizens might not be able to correctly interpret the data disclosed (financial data, for instance). Similarly, *clarity* of released documents is

considered a primary objective of governmental transparency and includes assuring that those documents are “readily comprehensible”, contain no hidden meanings and minimal jargon (Drew & Nyerges, 2004).

2.5. Timeliness

As described earlier, timeliness might be considered as a key characteristic to allow for disclosed data usability (Dawes, 2010) and, more generally, it is also strongly associated with data quality (Lee & Kwak, 2011; Lee & Kwak, 2012): “... agencies need to put in place an effective governance structure and process to formally identify relevant data, assure its quality, and publish it in a timely manner.”

Considering the timeliness of transparency, Heald (2006) distinguishes between *transparency in retrospect* and *transparency in real time*. Accountability, as defined by Bovens (2007), is in nature retrospective as public officials are accountable after performing their actions (“the fact”). But that does not necessarily mean that information about the internal workings of public entities should only be released at periodic intervals (transparency in retrospect). The Internet has made it possible to increase the frequency of information disclosure (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006), thus increasing its relevance (“enables citizens to obtain information about government policies when these still matter” (Dawes, 2010)) and preserving its value (3rd principle of Open Government Data (Open Government Working Group, 2007)). In this context, it is now possible to adopt transparency in real time where data is made available in a continuous way and shortly after the actions that originated the data have occurred.

2.6. Value and usefulness

The effort to collect, produce, manage and publish data through open governmental portals is considered by itself as providing *public* value. Disclosing internal data in a fair and equitable way promotes the value of *stewardship* with an impact on intrinsic societal and democratic outcomes such as public trust, integrity and legitimacy (Harrison et al., 2012). Stewardship is also considered to be a fundamental information policy principle, a principle by which citizens expect and demand that governments manage their internal data as a resource with societal value (Dawes, 2010).

But the value of the data itself is also regarded as a key characteristic to consider when planning and assessing open government data initiatives. In this context, Harrison et al. (2012) discard the idea that simply making greater amounts of government data available equates to more transparency, and therefore suggest that “metrics that merely quantify how many datasets are available ... cannot be taken as unequivocal indicators that open government has been successful.” Lee and Kwak (2011) agree with this view by stating that public agencies should not try to publish all the data they own. Instead, they should start by identifying *high-value, high-impact, relevant* data that would “most benefit the public”.

These desired characteristics may be considered under the broad fundamental information policy principle of *usefulness* as proposed by Dawes (2010): “The principle of usefulness recognizes that government information is a valuable asset that can generate social and economic benefits through active use and innovation.” Such usefulness is sometimes identified as a complement to usability in order to achieve a meaningful level of open government maturity (Lee & Kwak, 2012), and it is also equated to the requirement that data should be “fit for an intended use” or “appropriate for the task”. In the context of this work, the “task” at hand is *transparency* that allows for the accountability of public officials. This means that open government data portals are expected to disclose relevant data which allows citizens to assess the conduct of public officials to whom they delegated power and responsibility.

Again, there is the need to strike a balance between completeness and relevance (usefulness): as previously stated, agencies should not

⁴ The authors also refer to interactivity as a close concept of transparency, meaning “the ability to find out what is going on inside a public sector organization”. This viewpoint is not considered here.

Table 1
Summary of key characteristics of desired data disclosure.

Characteristics of data disclosure	Associated with (similar references considered)	Related to (other characteristics of data disclosure)
Quality	Intrinsically good, accuracy (Dawes, 2010; Drew & Nyerges, 2004) Validity (Lee & Kwak, 2011) Consistency (Lee & Kwak, 2012) Reliability, authenticity, validity, to review and certify compliance (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006)	Usability Timeliness
Completeness	"Data Must Be Complete" (Open Government Working Group, 2007) "[all] legally required and permissible" (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006) "fully laid out and fully disclosed" (Drew & Nyerges, 2004) "integration or consolidation of all data" (Drew & Nyerges, 2004)	Relevance (value) Comprehensibility Granularity (detail) Comparability
Access and visibility	"Data Must Be Accessible", "Access Must Be Non-Discriminatory", "Data Formats Must Be Non-Proprietary", "Data Must Be License-free" (Open Government Working Group, 2007) Openness	Comparability
Usability and comprehensibility	Easiness [access, navigation] (Pina et al., 2007, 2010) Interactivity (Web Site Attribute Evaluation System – WAES) Easiness [information usage] (Cucciniello et al., 2012) Understandability (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006) Clarity (Drew & Nyerges, 2004)	Quality Timeliness Completeness Value and usefulness
Timeliness	"Data Must Be Timely" (Open Government Working Group, 2007) "Transparency in real time" (Heald, 2006)	Usability Comprehensibility Quality Comparability
Value and usefulness	High-value, High-impact, Relevant, "[data that would] most benefit the public" (Lee & Kwak, 2011) "Fit for an intended use", "appropriate for the task" (Lee & Kwak, 2012) Relevant/appropriate (Lee & Kwak, 2011)	Usability Completeness
Granularity	Level of detail "Data must be primary" (Open Government Working Group, 2007) "as collected at the source" (Open Government Working Group, 2007) "as is" (Robinson et al., 2009)	Completeness Comparability
Comparability		Timeliness Completeness Granularity Access and visibility

publish, without any criteria, all data internally available (Lee & Kwak, 2011) but instead they should disclose *valuable* data, that is, *relevant/appropriate* data for the different tasks citizens (and other stakeholders) might perform. This means that public entities should justify the public value of the data disclosed using, for instance, the different types of public values identified by Harrison et al. (2012). In the context of this work, public entities should focus on data relevant for accountability purposes.

2.7. Granularity

Granularity is an important characteristic of information disclosure as it is related to the level of detail with which data is made available. The concern with granularity is expressed by the Open Government Working Group (2007) in its second principle ("Data must be *primary*") which associates it with the need to publish data "as collected at the source", that is, "with the finest possible level of granularity, not in aggregate or modified forms". In a similar way, Robinson, Yu, Zeller, and Felten (2009) argue that governments should be more concerned with their core responsibility – providing data "as is", rather than offering sophisticated interfaces which, in a sense, might give citizens and other stakeholders a pre-formatted view or biased analysis of the data disclosed.

2.8. Comparability

To pass judgment on public officials' actions, an important step in accountability processes (Bovens, 2007), citizens often need to compare performance, resource management and other data concerning

different public entities and/or different time periods (Caba Pérez et al., 2005; Rodríguez Bolívar et al., 2006).

Comparability is therefore a key characteristic to consider when publishing data online which, in turn, depends on timeliness, completeness and granularity. To allow users to compare datasets concerning different public entities or within a common time span, data needs to be published *on time*, needs to be *complete* (or, at least, the same data concerning different entities and time spans needs to be available), and needs to have a compatible degree of granularity (detail). Also, even if only a part of all internally available data is published (hopefully, the "relevant" part), access and visibility might still be in danger if proper identification and classification mechanisms are not put in place. Such organization structures help users to find the required data (increasing its visibility) and allow for easier *comparisons* between datasets. Since it depends heavily on other characteristics, no requirement concerning comparability was explicitly considered in this work.

The list of key characteristics of desired data disclosure is presented in Table 1.

3. Open government portal requirements

A set of requirements was developed to define an analysis framework for 'data.gov' type portals. These requirements were defined according to the key characteristics of data disclosure identified in the open government literature (presented in the previous section). However, to avoid a dataset-by-dataset individual analysis, these requirements focus on the overall structural and organizational elements of each portal ("the way in which transparency mechanisms should be structured" (Heald, 2012)) which can be associated with these

characteristics. The goal is to provide an overall image of the fitness of 'data.gov' type portals as tools for transparency for accountability from a (non-technical) ordinary citizen point of view.

3.1. Quality

Citizens expect data disclosed by official entities to have quality in the sense that it is official data and therefore should be accurate and reliable. But sometimes it is not clear which organization in particular is responsible for a portal, and even when this is known, citizens might not be aware of its 'credibility'. Also, when the data presented has been collected and processed by external entities, portals may not even be directly responsible for its quality. On the other hand, individual ordinary citizens do not have the necessary skills to assess, by themselves, the 'quality' of the disclosed data, which may vary according to each specific dataset. Therefore, the following requirement is proposed.

[R1] Portals should consider mechanisms for external and independent quality assurance processes, and associate the results of such revision processes with each published dataset.

3.2. Completeness

One of the most important aspects of accountability has to do with the possibility of assessing the completeness of the data disclosed, considering the overall availability of datasets. Such completeness might be characterized by (at least) three dimensions:

- the entities for which data is being disclosed;
- the informational items being disclosed; and
- the time periods covered.

According to these dimensions, completeness enables users to assess whether *all* entities are disclosing *all* informational items for *all* periods and, if not, what is missing (thus not being complete). In sum, citizens should be able to find answers to the following questions: Which entities are not providing information? Which information is not being provided by a certain entity? Which expected time periods are missing from either a certain entity or information type?

Concerning the entities dimension, it is necessary to distinguish between the entity responsible for the publication of a dataset ('authoring'), and the 'target' entities for which data is being disclosed. For instance, a National Institute of Statistics ('authoring' entity) might release financial data concerning several municipalities ('target' entities).

Therefore, from a public accountability perspective, it is important to know which 'authoring' entities are responsible for the disclosure of data, and also which 'target' entities should be covered by the datasets. This information is not only necessary for assessing completeness, but it also helps ordinary citizens to know which 'authoring' entities are responsible for the disclosure of data concerning a specific 'target' entity of interest.

With respect to the informational items being disclosed, the requirement of completeness is more difficult to analyse as there is no pre-defined, normative, universe of accountability-related informational items portals should disclose. Also, the informational items expected to be disclosed might vary for different types of entities. In this context, portals may consider a compilation of transparency assessment information items required in the literature (for instance) and explicitly identify which item users should expect to be disclosed in the portal.

Finally, the time periods expected to be covered by the portal need to be explicitly identified (possibly depending on types of entity and informational item) so that users may again assess the completeness of the effective data disclosed.

Therefore, the following requirement is proposed.

[R2] Portals should present a master list of:

- all relevant governmental dataset sources ('authoring' entities), not just of those actually providing data, including the data and 'target' entities they are responsible for;
- all 'target' entities (those entities which might be accountable to citizens), including the indication of the 'authoring' entities responsible for providing related data;
- all accountability-related informational items expected to be disclosed, perhaps varying according to the type of public entities; and
- all time periods that ought to be covered (possibly depending on entity type and/or information type).

But while these requirements define the reference against which completeness may be assessed, this is not sufficient: users need to be able to easily compare the data effectively disclosed against the reference.

[R3] Portals should provide metadata for each dataset which include, at least, the identification of the 'authoring' and 'target' entities, informational items and time periods covered.

In short, for accountability purposes and to allow users to assess the completeness of the data disclosed, portals should provide information concerning *what should* be disclosed and *what is* effectively being disclosed.

3.3. Access and visibility

Due to their nature, dataset portals already contribute to better data access for users provided they are able to download it. Such portals usually have external visibility since they often constitute open government flagship initiatives.

Nevertheless, merely putting together a huge amount of datasets is not enough to ensure internal visibility. Therefore, portals must provide mechanisms to help users to find required data, thus increasing their visibility. Also, in particular, accountability-enabling data should be clearly distinguishable from other types of disclosed data (such as economically valuable, re-usable data) therefore increasing its visibility inside the dataset portal.

[R4] Portals should provide a mechanism to clearly identify and distinguish accountability-related datasets.

[R5] Portals should provide free search, oriented search and browsing mechanisms to help users to find the required and related/complementary datasets (according to the master listings – see previous requirements, metadata, or ontology).

3.4. Usability and comprehensibility

One main concern regarding publicly available data is its comprehensibility by ordinary citizens (with no specific expertise in economic or administrative areas), which in turn affects the capacity of these citizens to use the data available (usability). Open government portals have a particular responsibility in this matter and should not be considered solely as platforms for mere data availability. Therefore, the following requirement for enhancing comprehensibility is proposed.

[R6] Portals should provide clear and simple descriptions (dictionaries) about the concepts associated with the data being disclosed (including master lists and metadata, and relate them to the relevant datasets).

Such descriptions or definitions should also provide a common language which helps to describe the datasets, categorize them, and relate their metadata with the master lists which allow for completeness assessment.

3.5. Timeliness

While the previous requirements already consider the time factor, they do so from a particular perspective: data concerning a specific informational item and entity may be available (thus complete in this sense), but it may have been disclosed with a considerable time delay

(thus hampering its relevance or quality). Therefore, citizens might be interested in making public officials accountable for the delay in information provision. In order to allow doing so the following requirements are proposed.

[R7] Portals should provide information that allows for assessing delay in information provision (e.g., release date and/or periodicity of publication of data, and the actual release and update date of each dataset).

3.6. Value and usefulness

The value and usefulness of each particular dataset to accountability processes is hard to determine. Analysis of the literature on assessment of web-based transparency might provide a list of informational items in this context, but a final assessment would have to consider the specific interest of each citizen searching for information. Therefore, portals should somehow consider the way users value the disclosed data (measured, for instance, by the number of accesses or downloads, the number of external tools using the data or some voting mechanism) and pay attention to the requests for (valued) non-available data. The following requirements are therefore proposed.

[R8] Portals should provide mechanisms to allow users to suggest missing valuable data.

[R9] Portals should provide mechanisms that allow users to express some measure of value or usefulness of the data disclosed.

3.7. Granularity

It is important, according to the 2nd principle of Open Government Data (“Data must be primary”) to provide data with the lowest level of granularity. Also, to facilitate comparison among data from different (although related) datasets, those should be presented with a common granularity. As previously stated, this study did not evaluate individual datasets and therefore the following requirement was proposed.

[R10] Portals should provide, for each dataset, an indication of its granularity (unit of analysis) level.

4. Dataset portal selection and analysis procedure

This study aims to analyze whether ‘data.gov’ type portals possess the structural and organizational elements needed to fulfill the requirements identified in Section 3. This study is interested in general purpose, country wide portals, that is, portals that do not restrict the type of data disclosed nor the public agencies and entities addressed within a particular country. These portals have emerged as flagship initiatives of open government efforts and therefore, unless otherwise explicitly stated, they are expected to promote public accountability, as this is a major goal of open government.

For this purpose, a small number of portals was selected for analysis. The initial list was formed by the 44 international (countries) open data sites identified by data.gov.⁵ From this initial list, seven portals were selected according to the following criteria:

- only strictly national portals (‘data.country’) were considered (the European Union portal, for instance, was not considered)⁶;
- due to limitations of research resources, only portals with English or French interfaces were considered; and
- portals with fewer than 1000 published datasets were also excluded since it was considered that they would not have enough critical mass to provide useful insights.

Table 2
List of portals considered.

Country	Portal address
Australia (AU)	http://data.gov.au/
Canada (CAN)	http://www.data.gc.ca/
France (FR)	http://data.gouv.fr/
New Zealand (NZ)	http://www.data.govt.nz/
Singapore (SI)	http://data.gov.sg/
United Kingdom (UK)	http://data.gov.uk/
United States (US)	http://data.gov

The final list of seven portals considered is presented in Table 2.

It is worth noting that the New Zealand portal does not host data; instead it links to datasets held on other government websites.⁷

Each portal was visited several times to collect the data (the process ended in April 2014). Since each portal has its own structure and internal organization, it was not possible to apply a pre-defined set of analysis procedures and the examination was carried out by browsing through each portal. Whenever possible the analysis looked for clear indications of visible structural and organizational elements. Also, in the absence of a clear description of all possible characteristics associated with datasets (metadata) and their organization, some conclusions were inferred after analyzing several (randomly selected) datasets within each portal. The whole process was conducted from an ordinary citizen point-of-view, that is, without using any specialized web-content analysis tool or inside technical knowledge of the portals. In some cases the analysis was complemented by a Google targeted search using specific terms (e.g. ‘accountability site: data.gov’).

The metadata provided for each dataset was analyzed to assess several requirements. However, each portal adopts its own metadata and even within each portal, different datasets may have different associated metadata fields. In the US portal, for instance, the dataset-associated metadata varies according to the dataset which, in the absence of an overall description, makes it very difficult to analyze and understand. For instance, some datasets from data.gov have associated ISO-19139 Metadata, FGDC Metadata and “Additional Info” while others just have “Additional Info” (also with varying fields). Also, within the same portal, some datasets have no associated metadata and sometimes some fields are empty or filled with clearly ‘wrong’ values. Despite these limitations, which hamper general analysis and comparison, it was possible to obtain a general picture concerning the fitness of these portals as tools for transparency and accountability.

As explained in Section 5.1, the Singapore portal will not be considered for detailed analysis since no explicit or implicit reference to promoting transparency and accountability was found.

5. Results and overall analysis

Table 3 presents a summarized view of the analysis results. The next sections will detail the findings associated with each requirement.

5.1. Accountability as a goal

Before addressing the proposed requirements, it is important to understand the degree to which portals clearly expressed their direct relation with *accountability*.

All portals refer, in one way or another, to open government action plans and declarations which provided the framework in which they were developed. However, that does not necessarily mean that their specific goal is to promote public accountability.

An exception is the Singapore portal, where no reference to a broader open government action plan was found, and no reference was made concerning transparency and accountability as a goal.

⁵ <http://www.data.gov/opendatasites> (last visited 2/4/2014).

⁶ This step was necessary because the ‘International Countries’ section also includes non-country portals such as the European Union portal.

⁷ “This site does not host data, instead it links to datasets held on other government websites” <https://data.govt.nz/> (last visited 2/4/2014).

Table 3

Analysis results for each requirement and portal.

Requirement	Portal	Analysis results
Quality [R1]	AU	Metadata quality field found in some datasets. Quality control explicitly not assured by portal: "The datasets ... have been created by many different government agencies ... consequently we cannot guarantee the quality or timeliness of the datasets".
	CAN, FR, NZ	May have quality-related metadata fields, but no reference was found to any type of independent/external quality control mechanism.
	UK	May have quality-related metadata fields, but no reference was found to any type of independent/external quality control mechanism. Users may report "issues that people may spot with data quality... via the contact information at the bottom of each data set page."
	US	Metadata quality field found in some datasets. Data Policy statement according to which, "all information ... is subject to the Information Quality Act (P.L. 106–554)" and "each agency has confirmed that the data being provided ... meets the agency's Information Quality Guidelines."
		No information was found concerning the entities, informational items or time periods which were expected to be covered.
Completeness [R2]	All	Provides a link to an external web page containing an "alphabetical list of links to current Government of Canada Departments, Agencies, Crown Corporations, Special Operating Agencies and other related organizations."
	CAN	Offers an interactive organogram of the UK Government, and a table with "all Core Government departments".
	UK	One tool ('Open Spending') lists all "items of major government expenditure" organized by department.
Completeness [R3]	All	Not clear what is precisely covered by each dataset (<i>vis-à-vis</i> what should be available [R2]). Entities, information items, and time periods covered by a particular dataset are mostly designated in its title and textual description, sometimes complemented by the metadata.
	UK	It is possible to check whether each Core Government department has published its mandatory monthly transactional expenditure report.
Access and Visibility [R4]	All	<i>Adhoc</i> tags, themes, groups, or keywords are used to suggest transparency, accountability and open government related data. No specific mechanisms were found to give accountability-related datasets extra visibility.
	AU	'Government', 'Governance', 'Finance management' groups ¹ were found.
	CAN	An 'Open Government'/'Government Spending' section was found where some spending data is presented.
	UK	Some sections are dedicated to government spending and public officials' salaries (see [R2]).
Access and Visibility [R5]	All	<i>Adhoc</i> tags, themes, groups, or keywords may be used to associate related datasets. However, this does not allow users to find, in a systematic and exhaustive way, all datasets covering the same information item for different entities, and different time periods (for instance).
Usability and Comprehensibility [R6]	All	No global ontologies or dictionaries were found.
	UK	A Payments Ontology was found. No evidence was found of this ontology actually being used in the portal.
	US	The metadata of some datasets includes a field ('Data Dictionary', not always present or filled in) which contains a link to dataset-specific dictionary.
Timeliness [R7]	ALL	Several metadata time related fields (e.g. DCTERMS, Modified, Date Published, Date Updated, Update Frequency) may be used to assess timeliness, but were only used in specific datasets.
	UK	A list of all Core Government departments was found showing how up-to-date their spending reports are: 'No data', 'Has past data', 'Up-to-date'.
Value and Usefulness [R8]	AU	Users may suggest/ask for new datasets using email. Allows users to vote on the best suggestions.
	CAN	Users may suggest/ask for new datasets using a web form.
	NZ	Users may suggest/ask for new datasets using a web form or email. Provides mechanisms to monitor the processing of each dataset request.
	US	Users may suggest/ask for new datasets using a web form (login required).
	UK	Users may suggest/ask for new datasets using a web form.
	AU	Allows users to report a dataset reuse (data use cases).
	UK	Displays the Top 10 downloaded datasets. Lists the most searched datasets (" <i>Le plus recherchés</i> ").
Value and Usefulness [R9]	NZ	Allows users to list a dataset reuse (data use cases).
	UK	Displays the number of views and downloads (statistics) per dataset. Allows sorting datasets by popularity. Identifies apps that use the data ("examples of Internet-based applications that make use of publicly-available government data sources").
	US	Allows for user dataset ratings (Data utility, Usefulness, ...).
		Includes a section called 'Impact' with "examples of companies leveraging open data".
	All	Granularity metadata may be used but its meaning is not clear and varies from dataset to dataset.
	AU	One metadata field example found (Granularity: individual employee).
Granularity [R10]	UK	One metadata field example found (Temporal granularity).
	US	One metadata field example found (Granularity: State or Country).

¹ CKAN provides 'groups' to create and manage collections of datasets.

Instead, the portal simply mentions providing "convenient access to publicly-available data published by the government". Therefore, this portal will not be considered for further analysis since no explicit or implicit reference to promoting transparency and accountability was found.

The Australian portal, although pointing to the Government's Declaration of Open Government, simply mentions encouraging "public access to and reuse of government data" and support for "increased citizen participation in government" with no explicit reference to promoting accountability. The UK portal, although including a reference to the Government's Transparency agenda in its "About" page, does

not explicitly refer to promoting accountability: rather, it aims to "help people understand how government works and how policies are made". All remaining portals (Canada, France, New Zealand and US) do explicitly state that their goal is to enhance transparency and accountability, sometimes accompanied by promoting efficiency in the public sector and a greater level of participation (New Zealand).

This analysis seems to indicate that some 'data.gov' type portals, while not explicitly referring to supporting accountability as their goal, opt for other more vague formulations which include links to open government plans.

5.2. Quality

Concerning the quality of the data made available, the Australian portal is very explicit: “The datasets provided through data.gov.au have been created by many different government agencies ... consequently we cannot guarantee the quality or timeliness of the datasets”. Although not explicitly stated, this seems to be the general policy adopted by these portals which fits into their *modus operandi*: it is a platform which public entities may use to disclose data, but the platform itself is not responsible for the data.⁸

The US portal goes further and presents a Data Policy statement according to which, “all information ... is subject to the Information Quality Act (P.L. 106–554)” and “each agency has confirmed that the data being provided ... meets the agency’s Information Quality Guidelines.”

In the US portal some datasets had an associated metadata field called *Data Quality* whose purpose and meaning, however, was not clear (in some cases the value ‘Yes’ was present, perhaps meaning that the data does indeed meet the agency’s Information Quality Guidelines). Quality description metadata associated with some datasets was also found in the Australian portal.

In the UK portal a reference was made (in response to a question by a user in a forum) that users may report “issues that people may spot with data quality... via the contact information at the bottom of each data set page.”

It is expected that other portals may have similar metadata fields (particularly those using the same platform) but, overall, no references were found to any type of independent/external quality control mechanism on any portal.

5.3. Completeness

In general, and in accordance with requirement [R2], no information was found concerning the entities, informational items or time periods which were expected to be covered. Some portals do provide a list of publishing entities (and respective datasets) and allow users to browse through the datasets according to the entities that published them. However, it is not possible (or very difficult) for citizens to know which entities should be publishing data but are not (by allowing a comparison between actual and potential publishers). More importantly, portals do not provide information concerning ‘target’ entities, that is, which entities are being covered by the published data even if they are not publishing it directly.

Still, there are some particular cases worth mentioning. The Canadian portal, for instance, does provide a link to an external web page which contains an “alphabetical list of links to current Government of Canada Departments, Agencies, Crown Corporations, Special Operating Agencies and other related organizations.” The UK portal, besides providing a hierarchical list of all entities providing datasets, offers an interactive organogram of the UK Government (under a special section called ‘Public Roles and Salaries’), and a table with “all Core Government departments” (under a special section called ‘Spend Reports’) where it is possible to check whether a department has published its mandatory monthly transactional expenditure report. Another tool (‘Open Spending’) lists all “items of major government expenditure” (organized by department) produced from the data published separately by these departments. None of these improvements, however, are enough to allow citizens to easily determine which entities are not reporting accountability-related data.

Concerning requirement [R3], the analysis seems to indicate that the entities, information items, and time periods covered by a particular dataset are mostly designated in its title and textual description. Some of these aspects are also covered by the metadata but, even within each portal, different datasets may have different associated metadata

⁸ As mentioned before, the New Zealand portal does not even host data. Instead “it links to datasets held on other government websites.”

fields, with different designations and content. For instance, while some portals (and datasets) describe a *geographical coverage*, this does not allow for the precise identification of all involved (‘target’) entities.

When considered together, the analysis of both requirements leads to the conclusion that it is very difficult to assess whether or not the disclosed data is complete, namely if all entities are covered, concerning a specific period of time and set of information items.

5.4. Access and visibility

Concerning requirement [R4], although all portals provide mechanisms such as tags, themes, groups, or keywords to better characterize and associate related datasets, none seems to devote particular attention to transparency or accountability in this respect. At most, some datasets were found to have user-defined keywords that somehow suggest transparency, accountability and open government related data.

The Canadian portal, in particular, has an ‘Open Government’/‘Government Spending’ section where some spending data is presented. As mentioned before, the UK portal has also some sections dedicated to government spending and public officials’ salaries.

Overall, it seems that portals do not provide specific mechanisms to identify and give extra visibility to accountability-related datasets.

Despite the use of tags, themes, groups, and keywords to associate related datasets, along with dataset search and browsing capabilities, these mechanisms do not provide the necessary functionality to fulfill requirement [R5]. Although some datasets were found with several associated data and resources (usually covering different time periods) this does not seem to be the general practice nor does it allow users to find, in a systematic and exhaustive way, all datasets covering the same information item for different entities, and different time periods (for instance). The absence of overall organization structures (master lists, see completeness requirements) also hampers finding these related (complementary) datasets.

5.5. Usability and comprehensibility

According to requirement [R6], portals should help users to better understand the concepts behind the data being disclosed. Apart from glossaries mainly dedicated to open data concepts (e.g., Canadian and UK portal) and FAQ sections explaining the functioning of the portal itself, in general, no global dictionaries or ontologies were found to help users to understand the terminology and concepts used in datasets, or to improve the way datasets are related through common tags and keywords.

It was also found that, in some cases, publishing entities used the metadata associated with specific datasets to provide links to external documents which may be used to help understand that specific dataset. In the US portal, for instance, the metadata of some datasets includes a field (‘Data Dictionary’, not always present or filled in) which contains a link to dataset-specific dictionary.

Notably, the UK portal proposes and describes a *payments ontology*,⁹ “a vocabulary to allow spend data to be represented in linked data format”. However, no evidence was found of this ontology actually being used in the portal and its focus was more on the technical aspects of linked data provision rather than on improving data understandability for users.

5.6. Timeliness

As expected from requirement [R7], in general, portals have the necessary structures (metadata) to allow users to determine the timeliness of the information provided (date of creation, date published, date updated, ...), as well as its expected frequency of update (when

⁹ <http://data.gov.uk/resources/payments>.

applicable). However, the terminology used to designate the fields is not always clear, metadata fields vary from dataset to dataset and the relevant fields are sometimes empty or show different types of data. Furthermore, presenting this data in a fragmented way (associated with each particular dataset) does not allow users to get a global view of publishing timeliness concerning a particular ‘authoring’ or ‘target’ entity and all of its datasets, or concerning a particular informational item and all the ‘target’ entities.

In this respect, the UK portal provides an interesting example of how timeliness could be assessed for a particular informational item (‘UK Departmental Spend Reporting’¹⁰) listing all Core Government departments and showing how up-to-date their spending reports are: ‘No data’, ‘Has past data’, ‘Up-to-date’.

5.7. Value and usefulness

It is difficult to assess, even in a simplistic way, the usefulness of the data disclosed. But in response to requirement [R8], all portals let users suggest the inclusion of new datasets they might consider useful (usually either by filling in a specific (web) form or by email). The Australian portal even allows users to vote on the best suggestions while the New Zealand portal provides mechanisms to monitor the processing of each request.

As for requirement [R9], portals seem to make use of some or all of the following ways to allow users to express the usefulness of some datasets:

- by giving users the possibility to rate datasets;
- by showcasing use cases of the datasets, including the possibility for users to report themselves the re-use of data; and
- by disclosing the number of downloads and visualizations (by users) for each dataset.

The US portal even includes a section called ‘Impact’ with “examples of companies leveraging open data”.¹¹

5.8. Granularity

Concerning requirement [R10], it was found that portals allow ‘authoring’ entities to include in their metadata some kind of granularity indication such as *temporal granularity* (month, week, ...), *geographical granularity* (state, country, ...), or *unit of analysis/data granularity* (e.g., ‘Individual employee’). However, the examples analyzed seem to indicate that granularity information is not usually included in metadata. It also seems that the exact meaning of granularity varies from portal to portal.

As with other aspects related to datasets’ metadata, the information seems fragmented (dataset and ‘authoring’ entity dependent), not allowing users to assess whether the same type of data is being presented by different entities with different types of granularity (for instance). Nor does information seem to be present concerning the ‘adequate’ type of granularity expected for entities to report the different types of data.

6. Conclusion

The emergence of open data portals, as flagship initiatives of open government efforts, seems to have increased the perception that governments are becoming more transparent. But transparency, in the context of open government, may serve (at least) two goals: accountability of public agents or re-use (mostly by private companies) to create new products and services. Despite the multiple functionalities offered by

governmental portals, and the impressive number of datasets disclosed (although most falling into the category of ‘statistics’), the question remains whether these portals may be effectively and directly useful for public accountability processes.

This study aimed to close gaps in the existing open government research literature regarding the assessment of ‘data.gov’ type of open government portals and their potential to promote transparency and support *political accountability*. The analysis did not take into consideration the data effectively disclosed, as is customary in most research on online transparency assessment (e.g. (Stewart, Asha, Shulman, Ng, & Subramaniam, 2012)) or Internet Financial Reporting assessment (e.g. (Styles & Tennyson, 2007)), but instead focused on structural aspects of ‘data.gov’ type of open government portals. The study began by defining a set of requirements from a list of desired data disclosure characteristics proposed in the open government literature. This set of requirements is debatable and it is certainly not the only one possible. Also, portals have complex (and not always clear) organizational structures that are continuously evolving, which hinders any analysis conducted from an ordinary user point-of-view (that is, without inside knowledge of each portal). Furthermore, in some cases, the analysis relied upon the examination of several (actual) datasets.

Although the goal was not to fully assessing individual portals, the identified requirements and the corresponding analysis framework might become part of a more comprehensive portal assessment model. In this case, not only quantitative scales would have to be associated with each requirement (to make the assessment more precise and to allow for comparability), but content analysis of disclosed datasets might also be considered.

Despite the limitations, the overall scenario emerging from this study seems to indicate that, currently, the structure and organization of open government portals is not suitable to support transparency for accountability, a clear objective of open government efforts (stated in most portals).

Overall, portals seem to function as ‘simple’ data repositories, although in some cases they also constitute a single point-of-access for a broader open government policy by providing data processing applications, discussing open data trends and concepts, etc. Most importantly, portals do not seem to have been designed to clearly identify ‘what should be reported’ and, by comparing with what is effectively disclosed, ‘what is not being reported’ and ‘by whom’. The *Spend Reports* dashboard available in the UK portal provides an elucidative example of how such matters might be addressed to provide an answer to these questions.

Also, although all portals provide some kind of metadata for each dataset, its usefulness is somewhat diminished by the fact that it is usually difficult to understand: different datasets have different metadata structures, no complete listing of possible metadata fields and their description is provided (a complete description of the metadata elements was only found in the Canadian portal)¹², several metadata fields remain empty, and some are filled with ‘peculiar’ values. Some of these problems may arise from the fact that most datasets are self-reported, and different reporting entities fill metadata differently. The fact that no quality assurance mechanisms seem to be put in place (or, at least, not visible to the common user), might also contribute to some of these problems.

Entities responsible for open government portals must therefore consider the specific needs of those looking for accountability-related data, and provide structures and mechanisms to address them. The requirements listed in Section 3 may be used as guidelines for any strategy for accountability involving ‘data.gov’ type portals. At the top of those requirements is the need to clearly define which entities should report accountability data and which data should be reported. This definition (possibly using a controlled vocabulary or ontology) must then be

¹⁰ <http://data.gov.uk/data/openspending-report/index> (last visited 2/04/2014).

¹¹ <https://www.data.gov/impact/> (last visited 2/04/2014).

¹² <http://data.gc.ca/data/en/dataset/e418841e-d9dc-4caf-9a19-09b3269a3e1e> (last visited 2/4/2014).

used as an overall framework by reporting entities to publish their data through 'data.gov' type portals. Only then could simple questions such as "Which entities are not providing accountability-related data?" be easily answered.

One particular functionality of the UK portal, the spending report, provides a good example of the direction these portals should take in order to overcome at least some of the identified shortcomings. In this respect it is crucial that portals start devoting more attention to informational items other than 'just' spending.

Without such dedicated functionalities and organizational structure there is a risk of relegating the accountability objective in favor of economically valuable data disclosure (re-use), and let mostly statistical data take precedence over accountability-relevant data. This might also lead to the illusion that by simply making available a greater quantity of datasets, governments become more transparent and public agents become more accountable.

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