

# Benefits and Risks of Open Government Data

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**Abstract:** Public sector bodies maintain a large amount of data from various domains. This data represents a potential resource that organizations and individuals can use to enhance their own datasets or which can be used to develop new and innovative products and services. In order to foster the reuse of the data held by the public sector bodies a number of countries around the world has started to publish its data according to the Open Data principles. In this paper we present a set of benefits that can be achieved by publishing Open Government Data (OGD) and a set of risks that should be assessed when a dataset is considered for opening up. Benefits and risks presented in this paper were mostly identified during two of our OGD activities.

**Key words:** Open Data, Open Government Data, Public Administration, Benefits, Risks, Risk Analysis, Czech Republic

## 1. Introduction

Public sector bodies maintain a large amount of data that represents a valuable resource that can be utilized by various entities ranging from individuals to enterprises and even to other government agencies. Publication of the government data according to the Open Data principles is seen as a way how to make this data accessible and easily reusable by anyone (Bauer & Kaltenböck, 2011). Importance of Open Data to unlocking the value of government data has already been reflected in some recent legislative acts. In June 2013 an amendment to the Directive 2003/98/EC on the re-use of public sector information was adopted which emphasizes that data should be reusable for both commercial and non-commercial purposes and that it should be published in open and machine-readable formats (European Union, 2013). Another example of Open Data related legislation is the US Open Government Directive adopted in May 2013 (Executive Office of the President, 2013).

In this paper we discuss potential benefits and risks of Open Government Data (OGD). We present a set of benefits that can be achieved by publishing OGD and a set of risks that should be assessed when a dataset is considered for opening up. We based the identification of the benefits and risks presented in this paper on our experience resulting from several OGD activities that we have participated in. Authors of this paper are members of the Open Data Forum which is a joint collaboration of the Otakar Motejl Fund, University of Economics, Prague and the Charles University in Prague (University of Economics, Prague, 2013). Open Data Forum promotes application of the Open Data principles among the public sector bodies and provides consultations to those who are willing to publish OGD. Alongside this long term activity there were two narrower focused activities during which we identified and discussed the OGD benefit and risk. The first activity was a project whose goal was to perform an analysis of the potential OGD datasets of one of the central public sector bodies in the Czech Republic. The second activity was a one-day workshop with representatives of four Czech municipalities.

This paper is structured as follows. In the first section of the paper the concept of Open Data is introduced and it is described what attributes OGD should have. Next we explain why the analysis of OGD benefits and risks is important. In the following section of the paper we discuss the potential benefits of OGD and the risks related to publication of OGD. Concluding remarks are presented at the end of this paper.

## 2. Open Government Data

Open Government Data is a specific subset of data which lies at the intersection of the two domains: Open Data and government data. In general Open Data is data published on the Internet in a way that anyone can freely use, re-use and redistribute this data (Open Knowledge Foundation, 2012). In this paper government data is any data that is owned by a public sector body. Therefore OGD is data owned by a public sector body that is published on the Internet for free use, re-use and redistribution.

The Sunlight Foundation (2010) formulated ten principles for opening up government information. These principles were adopted in the Open data cataloguing strategy of the Czech public administration (shortly the Strategy) and based on them ten attributes of OGD were defined (Chlapek, Kučera & Nečaský, 2012a). According to the Strategy OGD should be:

1. complete,
2. primary,
3. timely,
4. easily accessible,
5. machine-readable,
6. non-discriminating,
7. using commonly owned (open) standards,
8. available under explicitly stated terms of use (license) which allows its reuse with minimal restrictions,
9. permanent,
10. available to the potential users for minimal possible costs.

Only the attributes 1, 4, 5, 7, 8 and 10 are considered compulsory for the Czech OGD by the Strategy. The remaining 4 attributes are voluntary because it might not be always easy to comply with them. For example some primary government datasets contain personal information. Therefore the protection of personal information might prevent some data to be published as OGD. However anonymized data or statistics derived from the primary dataset might still be interesting to the potential users.

Dedication to public domain is a preferred way how to make OGD legally open in (Sunlight Foundation, 2010). However in the context of the European legal tradition it might not be always possible to dedicate a dataset into the public domain because in some countries (e.g. Germany) waiver of author's rights is not valid (Kreutzer, 2011). Therefore publication of the data under explicit terms of use or under a license that allows free use, re-use and redistribution of a dataset with minimal possible restrictions is recommended in (Chlapek, Kučera & Nečaský, 2012a).

### **3. Importance of Benefits and Risks Analysis for OGD**

Data held by the public sector bodies has a great reuse potential. Vickery (2011) in his study estimates that aggregate direct and indirect economic impacts from use of public sector information across the whole EU27 economy are of the order of billions EUR annually. He also estimates that the economic impact might increase if the policies for access and use of the public sector data were "*open, with easy access for free or marginal cost of distribution*" (Vickery, 2011).

United Kingdom belongs to the world's leaders in OGD topping the Open Data Index in 2013 (Open Knowledge Foundation, 2013). However National Audit Office (2012) report indicates that costs and benefits of opening up government data are not systematically assessed. In contrary to the original assumption that releases of already held information would incur zero or very low costs it was evident from estimates provided by some departments that just the staff costs associated with preparing and publishing the data according to the requirements of the UK's transparency agenda ranged from £53,000 to £500,000 (National Audit Office, 2012).

In the UK concept of the National Information Infrastructure (NII) was introduced recently (Cabinet Office, 2013). The NII will provide government datasets with highest potential economic and social impact. Processes for identification and prioritization of datasets based on the likely impact of their benefits should be part of the NII (Cabinet Office, 2013).

However OGD initiatives promise not only benefits but there are also risks with possible negative impacts. For example risks to privacy and fraud risks are named in the UK report by the National Audit Office (2012) and setting up risk management processes is recommended as a response to this issue.

Although the publication of OGD must not always be costly, it is not a zero-cost activity either. Public sector bodies work with limited resources and budgets. Because the number of datasets that can be potentially published as OGD is large, some kind of prioritization of the OGD activities based on the expected benefits of these activities seems desirable.

One of the tools for maximizing value from investments is a business case (IT Governance Institute, 2006). According to the IT Governance Institute (2006) the benefits analysis and the risk analysis

should be a part of the business case development. Therefore identification of the possible benefits and risks of OGD should help in development of business cases for publication of OGD.

#### 4. Benefits and Risks of Open Government Data

##### 4.1 Benefits of Open Government Data

Logica Business Consulting (2012) performed an assessment of the Open Data standards in the United States, the United Kingdom, Canada, and New Zealand. According to this study there are six motivations for opening up data commonly present in these countries (Logica Business Consulting, 2012):

- increase transparency,
- stimulate economic growth,
- improve government services and responsiveness,
- encourage reuse,
- improve public relations and attitudes toward government,
- improve government data and processes.

The above mentioned motivations for opening up government data also represent possible OGD benefits. We took these benefits (*B1-2, B5-6, B8 and B10*) as a starting point for discussion of OGD benefits in our OGD activities. One of these activities was a project in which we performed an analysis of datasets of one of the central public sector bodies in the Czech Republic (herein the Office). The goal of this analysis was to identify datasets that can be published as OGD by the Office and to assess potential risks and to perform estimates of workload needed to publish the selected datasets as OGD. Another activity during which we discussed the OGD benefits and risks was a one-day workshop with representatives of four Czech municipalities. The goal of this workshop was to discuss possible approaches and obstacles in OGD publication at the municipal level. Description of all OGD benefits discussed during these two activities is provided in the table 1.

**Tab. 1: Possible benefits of Open Government Data**

ID	Benefit	Description
B1	Increased transparency	Better availability and accessibility of data about performance of the public sector, e.g. budgetary data or public contracts data.
B2	Improved public relations and attitudes toward government	Public sector can use OGD to better inform citizens about its actions. This can help to build trust, understanding and general attitude of citizens and organizations towards the public sector (Logica Business Consulting, 2012).
B3	Increased reputation of a public sector body	By publication of OGD a public sector body can present itself as an open and transparent institution. This might help to increase its reputation among citizens and organizations.
B4	Transparent way of informing the general public about infringement of legislation	Many public sector bodies perform an administrative supervision. Publication of results of the administrative supervision as OGD might be a way how a public sector body performing such supervision can inform general public about those subjects that do not comply with legislation.
B5	Improved government services	Better availability of data about government services improves their accessibility and helps citizens and organizations to better utilize them (Logica Business Consulting, 2012). OGD about public services can be analyzed and therefore its availability can help in identification of inefficiencies and subsequent improvement of the government services provision.

ID	Benefit	Description
B6	Improved government data and processes	If OGD users are allowed to provide feedback about the published datasets they might notify the curators of these datasets about possible errors in data (Both & Schieferdecker, 2012). This feedback might be utilized to improve quality of the provided data. Not only businesses and citizens might become OGD re-users, other public sector bodies might also benefit from better discoverability and usability of OGD. Linked Open Government Data (LOGD) can further improve flexibility of data integration and it can reduce integration costs (Archer, Dekkers, Goedertier & Loutas, 2013). LOGD allows a public sector body to link to data published and maintained by other public sector bodies without the need to maintain separate copies of that data.
B7	Better understanding and management of data within public sector bodies	Cataloging of OGD and development of lists of published or maintained datasets might help public sector bodies to better understand what data they have and how to better manage this data.
B8	Supporting reuse	Machine readability, availability of metadata and legal openness of OGD makes the government data easier to re-use. Thanks to this it should be also easier to develop applications utilizing OGD and these applications might be developed by private sector entities.
B9	Increasing value of the data	New value can stem from the re-use of OGD. Application of Linked Data principles allows enrichment of data held by an organization with Linked Open Data resources available on the Web (Kusý, 2013). Therefore application of the Linked Data principles to OGD can facilitate increase of its value because it allows interlinking of separate OGD datasets.
B10	Stimulating economic growth	Publication of OGD as a resource that can be used by entrepreneurs to develop new or innovative products and services. Public sector might stimulate use of OGD and as a result it can stimulate innovation and growth as well (Deloitte, 2011).
B11	Minimizing errors when working with government data	Availability of data in machine readable formats minimizes the need to manually transcribe data from documents. Since errors might be introduced into manually transcribed copies, availability of OGD might help to lower the probability of these errors.
B12	Easier translations	Availability of machine readable data helps in situations when for example a report is being translated into other languages. This allows graphs, charts, column headers or table cells to be easily translated. It is much more difficult to translate charts or tables that are available only as pictures in the original document.
B13	Less requests for data	Publication of OGD can help to reduce the number of requests for data because people and organizations will be able to satisfy their information needs by utilizing the published datasets.

A set of interviews with the heads of departments of the Office were conducted during the project. Based on these interviews benefits B3-4, B7, B9 and B11-12 were formulated and then all the benefits B1-12 were presented at a workshop with the employees of the Office. Although all the benefits B1-12 were considered relevant to the OGD initiative of the Office, increased transparency was viewed as the most important benefit (Czech Telecommunication Office, 2013).

According to Tennison (2012) proactive publication of data that are often target of requests pursuant to the Freedom of Information laws might help to reduce the number of these requests and therefore it can also lead to cost savings. We thought that this potential benefit might be interesting to municipalities and therefore we added the benefit B13 "*Less requests for data*" for the workshop with the municipalities. On the other hand we considered the benefit B12 "*Easier translations*" to be

relevant to the Office rather than to the municipalities because the Office is obliged to publish the annual report that is translated into English.

During the workshop with the municipalities we presented benefits B1-11 and B13 to the participants of the workshop and we asked them to vote for benefits that they considered being the most important. Each participant was allowed to vote for more than one benefit. 5 of the 12 presented benefits received no votes. Total number of 16 votes was distributed among the remaining benefits. Results of the voting are presented in the table 2 (benefits with no votes are not presented).

**Tab. 2: Importance of benefits to the participants of the workshop**

ID	Benefit	Votes
B4	Transparent way of informing the general public about infringement of legislation	4
B6	Improved government data and processes	4
B1	Increased transparency	2
B5	Improved government services	2
B7	Better understanding and management of data within public sector bodies	2
B2	Improved public relations and attitudes toward government	1
B10	Stimulating economic growth	1

The voting of the workshop participants yielded some interesting results. Although the transparency is commonly cited as a huge OGD benefit (see Logica Business Consulting, 2012), the participants valued more the possibility to inform citizens about the government services and the results of their actions and the possibility to improve their data and processes. According to Deloitte (2011) publication of data about outcomes at hospitals or about results of health inspections at restaurants might help to facilitate markets because this data can help customers to make better informed decisions. Data about the health inspections at restaurants is one domain of data that would result from the performance of the administrative supervision in the Czech Republic (see the Act No. 146/2002 Coll. on Czech Agriculture and Food Inspection Authority). Therefore one of the possible impacts of the benefit B4 is the facilitation of markets.

Although we initially thought that B13 “*Less requests for data*” will be an interesting benefit to the representatives of the municipalities it received no votes from the participants of the workshop.

#### 4.2 Risks Related to the Publication of Open Government Data

During the project aimed at identification of the potential OGD datasets of the Office we also identified a set of related risks. During the interviews the employees of the Office expressed various concerns about publication of OGD. We took these concerns as a basis for formulation of the risks. As a next step a risk assessment was performed in a form of a workshop with the employees of the Office where relevant risks were assigned to each of the identified candidate datasets. Assessment of severity of the potential negative impact was also performed during this workshop.

A set of possible risks to OGD publication is described in the table 3. The degree of severity assigned to each of the risk represents our view of the general severity of the possible impacts of the particular risk. Therefore severity assessment of the risks in the table 3 does not correspond to the severity assessment performed during the project mentioned above. Description of the risk R4 “*Risk to the security of the infrastructure*” was also slightly altered in order to generalize the risk beyond the domain in which the Office operates.”

**Tab. 3: Risks related to publication of Open Government Data**

ID	Risk	Description	Severity
R1	Publication of data against the law	Publication of data that violates some legislations, i.e. it is prohibited by law or it infringes someone's rights or freedoms.	High
R2	Trade secret protection infringement	Publication of data that reveals some trade secrets that ought to be protected.	High
R3	Privacy infringement	Publication of personal data that ought to be protected.	High
R4	Risk to the security of the infrastructure	Detailed data about infrastructure (power plants, dams, transmitters etc.) might be misused to cause damage to the infrastructure.	High
R5	Publication of improper data or information	Publication of data that does not violate legislation but that might lead to a negative publicity or negative attitude of other public sector bodies.	Medium
R6	Publication of inaccurate data	People and organizations might provide incorrect data to the public sector bodies. As a consequence incorrect OGD might be published if datasets are derived from incorrect primary data.	Medium
R7	Misinterpretation of the data	Published data can be interpreted in different ways. Users might intentionally or unintentionally misinterpret the data (to cause scandal, to get competitive advantage, to cause harm to other subjects etc.)	Medium
R8	Absence of data consumers	There will be no consumers of the data because it will not be possible to locate the dataset or because nobody will find it interesting.	Medium
R9	Subjects less willing to cooperate	Published data about the results of the administrative supervision might bring negative publicity to those who do not comply with the legislation. These subjects might be then less willing to cooperate with the public sector bodies.	Low
R10	Overlapping of data	Datasets might contain overlapping collections of data. More datasets on various websites might contain data on the same topic. If these datasets are inconsistent users might get confused.	Low
R11	Increased number of requests for data	Increased number of published datasets might lead to an increased number of requests or questions about the published data or some related data.	Low

Although the risks were identified during only one project they might be relevant in other scenarios as well. Some of the risks identified during this project are also mentioned in the literature. For example risks to privacy or privacy infringement (R1) as a result of OGD publication is mentioned in (Logica Business Consulting, 2012), (National Audit Office, 2012) or in (O'Hara, 2011).

Misinterpretation of the data (R7) is another risk listed above that has also been mentioned by another study (see Logica Business Consulting, 2012). We were quite surprised that the employees of the Office were really concerned about the proper interpretation of some of the candidate OGD datasets as misinterpretation of the data might lead to a negative publicity of the Office or it can lead to a wrong understanding of the market that the Office regulates.

One of the concerns mentioned by some of the employees of the Office was the potential increase in overall costs and workload due to the publication of OGD. We treated increased costs and workload similarly to the risks during the project in order to capture the view of the employees of the Office that publication of some of the datasets as OGD might be costly, time consuming or both. However we do not consider cost or effort to be risks of OGD publication in general. Publication of OGD will require

some effort and it might lead to some additional costs as well. Amount of this effort or costs will probably vary between OGD datasets depending on their type, size and other factors. Therefore costs and effort incurred by publication of some OGD dataset represent an impact or a result of a decision to publish this dataset.

In order to reduce or mitigate the risks described above we propose a set of measures or actions that are described in the table 3. These recommendations are by no means comprehensive and their applicability should be always assed for the concrete risk scenario.

**Tab. 4: Proposed mitigations for the identified risks**

ID	Mitigation	Description	Related risks
M1	Monitoring and assessment of the demand for data	Demand for data should be assessed by public sector bodies in order to provide datasets that are in demand by the potential consumers. This demand might be assessed in different ways, e.g. by an analysis of the received requests for data, web site monitoring or by voting for datasets. For example in the UK people can highlight potential uses of the unpublished datasets if made openly available (Cabinet Office, 2013).	R8, R11
M2	Proper specification of datasets	It should be properly specified what data should be contained in OGD datasets. It should be analyzed whether the data that is being considered for opening up is already published by some other public sector body. This should reduce datasets overlapping.	R10
M3	Compliance assessment	Publication of every dataset as OGD should be assessed for compliance with the legislation. Potential legal barriers to publication of a dataset should be identified in this step. Potential risks to privacy should be taken into consideration during the assessment but there might be other types of protected information like trade secrets or classified information. Korn & Oppenheim (2011) recommend that publisher should make sure that there is no confidential information in a dataset published under an open license.	R1-4
M4	Anonymization of data, aggregation of data	If publication of some data is prohibited due to the privacy protection or other reasons publication of anonymized or aggregated data might be an option. According to O'Hara (2011) different techniques for anomization exist and he suggests anonymization of sensitive data. However he also points out that under certain circumstances it might be possible to deanonymize once anonymized data and he suggest assessment of the potential risks of deanonymization.	R2-4

ID	Mitigation	Description	Related risks
M5	Quality control of the data being published	Controls applied to datasets before they are published whose goal is to assess whether a dataset meets all defined quality criteria. These controls might help to identify inaccurate or incorrect data. Verification of performed aggregation, transformation or anonymization of the data might be also part of the quality control. Curator of a dataset should be responsible for the data quality assurance (Kučera, Chlapek, Nečaský, 2013b).	R1-6
M6	Internal data catalog	Data catalog is a collection of catalog records which consist of metadata describing datasets (Cyganiak & Maali, 2012). Internal data catalog is a data catalog that is not publicly available and that is maintained within an organization. It can contain catalog records about data managed internally so not only OGD datasets might be cataloged in this catalog. Internal catalog records might include information according which legislation some data is collected, what is the confidentiality level of data, whether the data contains personal or other protected information etc. This metadata might help to perform assessment of data that is being published as OGD. For example in the UK development and maintenance of an inventory of data held by government is seen as one of the necessary steps to develop the National Information Infrastructure (Cabinet Office, 2013).	R1-4
M7	External data catalog	External data catalog is a data catalog which is publicly available. It contains catalog records about the OGD datasets and it improves their discoverability (Cyganiak & Maali, 2012). Metadata (including descriptions of the datasets) helps users to understand the data and therefore it can help to prevent its misinterpretation (Logica Business Consulting, 2012).	R7-8, R11
M8	Linking to already published datasets	Providing links to already published datasets might help to avoid publication of overlapping datasets. Providing links to some related datasets enriches a dataset with context which might increase its reuse potential.	R8, R10



ID	Mitigation	Description	Related risks
M9	Properly formulated terms of use of the data	Terms of use of the OGD datasets should place minimal restrictions on their reuse (Chlapek, Kučera & Nečaský, 2012a). However the terms of use can also contain disclaimers through which the OGD publisher might inform the potential users that it is not responsible for errors or omissions in the data (see for example National Archives, n.d.). This might be important in situations when some dataset contains data provided to a public sector body by a third party (e.g. citizens, businesses).	R5-7
M10	Clearly explain duties	Duties imposed on the citizens and businesses and the administrative supervision responsibilities of the authorities should be clearly explained by the responsible public sector bodies. Publication of OGD about the administrative supervision might lead to frustration of those who want to be compliant but who are not able to find the necessary information.	R9
M11	Continuous monitoring of the OGD initiative impacts	Monitoring of the OGD initiative impact should help to better focus its future development. It will not prevent mistakes and errors from happening for the first time but it might help to prevent them from being repeated. It might for example provide the necessary feedback that some data released was improper. Analysis of this feedback should help to better adjust the assessment procedures for newly published or updated datasets.	R1-11

Some of the mitigations described above (especially M1-5 and M11) can be implemented as a part of the OGD publication process. Methodology for publication of OGD of the Czech public administration was proposed in 2012 (Chlapek, Kučera & Nečaský, 2012b). Alongside the recommendations for the technical steps of OGD publication, this methodology recommends anonymization of personal information or performing a legal compliance assessment for the datasets being published. Therefore a properly designed OGD publication process should help to properly manage the risks related to publication of OGD.

Mitigation M7 “*External data catalog*” highlights that the OGD cataloging is an important practice in OGD publication as it helps to improve discoverability of OGD (Cyganiak, Maali, Peristeras, 2010) and thus it can help to reduce the risk that there will be lack of users. Over the past years many OGD catalogs have been established around the world (Kučera, Chlapek, Nečaský, 2013a). In the Czech Republic a concept of the official OGD catalog was introduced in 2012 (Chlapek, Kučera, Nečaský, 2012a). However the official Czech OGD catalog has not been launched yet.

## 5. Conclusion

Open Government Data offers many opportunities and promises significant benefits to governments, citizens and businesses. However there are also risks related to publication of OGD that should be managed. In this paper we presented a set of potential OGD benefits and a set of possible risks that we were able to identify and discuss during two of our OGD activities.

In the first project we extended a set of OGD benefits described in literature with benefits identified during interviews with the employees of a central public sector body in the Czech Republic (the

Office). OGD might help increase transparency and it can support reuse of government data. However identification of the potential OGD datasets might also help public sector bodies to better understand and manage its own data. It can represent a transparent way of informing about the results of the administrative supervision a well.

Slightly refined set of benefits was discussed during a workshop aimed at OGD and its publication on the municipal level. Transparent way of informing the general public about infringement of legislation (B4) and improved government data and processes (B6) were marked as the most important benefits by the participants of the workshop. Although we assumed that B13 “Less requests for data” will be an interesting benefit to the representatives of the municipalities it received no votes from the participants of the workshop.

During the first project aimed at identification of the potential OGD datasets of the Office we also identified a set of related risks based on the concerns expressed by the employees of the Office. Publication of data against the law (R1), trade secret protection infringement (R2), privacy infringement (R3) and risks to the security of the infrastructure (R4) are risks that might have a severe negative impact. Therefore the compliance assessment and the quality control of the data being published should be implemented into the OGD publication process. Anonymization should be applied to the primary data that contains sensitive data like personal information.

Some of the employees of the Office were concerned about the proper interpretation of some of the candidate OGD datasets. In general misinterpretation of the data might lead to a negative publicity of the public sector body that published the data and it can also lead to wrong conclusions. Therefore descriptions of the OGD datasets should be published. These descriptions might be included in the catalog records that contain metadata about the datasets. OGD catalogs not only support discoverability of the published OGD datasets but they might also help the potential users to better understand these datasets and therefore they might play a significant role in mitigation of certain OGD publication risks such as the misinterpretation of the data (R7) or the absence of data consumers (R8).

The sets of potential OGD benefits and risks as well as the proposed mitigations presented in this paper are not comprehensive. Future work should focus on methods for identification and assessment of the OGD benefits and risks. Risks related to the publication of OGD should be managed. Therefore application of the risk management best practices in this domain should be discussed. We will try to verify the set of OGD benefits and risk proposed in this paper in our research projects.

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**JEL Classification: O38, O39, Z18**