



A Strategy for Applying Open Data Initiatives

Lucija Brezočnik^(✉), Gregor Polančič, Sašo Karakatič, Grega Vrbančič, Špela Pečnik,
and Vili Podgorelec

Intelligent Systems Laboratory, Faculty of Electrical Engineering and Computer Science,
University of Maribor, Koroška cesta 46, 2000 Maribor, Slovenia

{lucija.brezocnik, gregor.polancic, saso.karakatic, grega.vrbancic,
spela.pecnik}@um.si

Abstract. The advances of information technology have brought us to a period of increasingly rapid creation, sharing and exchange of information. In general, we do not perceive just how much information we are creating by using modern information technology devices. Still, the reality here is that we are creating data on a business and personal level while it continues to grow in both importance and volume. Therefore, this paper provides guidelines for a successful open data initiative implementation. For the latter, we present key stakeholders with their engagement reasons, critical success factors, and strategic themes for the designated area.

Keywords: Open data · Open government · Freedom of information · Transformation · Guidelines

1 Introduction

Nowadays, most individuals and organisations generate a broad range of data when performing their operations; however, the data is often left inaccessible in a local database or even forgotten after the initial use. Because of that, properly prepared and presented data is a largely untapped resource. However, the question that arises is why would such data be of public interest? There are many areas where we can expect open data (OD) to be of value and where examples of its use already exist [1]. Many different groups of people and organisations can benefit from the availability of OD, including the government itself [2]. At the same time, it is impossible to precisely predict how and where value will be created in the future because the use of data often creates new possibilities for further uses. The nature of innovation is that developments often come from unlikely places.

OD is data that anyone can access, use and share. It should be available online, open-licensed, machine-readable, available in bulk, and free of charge [1]. Opening up data is not a complex process, though it must be implemented wisely. Foremost, one must choose a dataset(s) and apply desired open license. There are several OD licenses from which one could choose [3]: the creative content is usually licensed using a Creative Commons License, and datasets using an Open Data Commons license. However, lately, the Creative Commons 4.0 license has been recommended for data as well as creative content.

The demand for OD is rising, and currently, we are speaking about the emergent third wave, which concept is to reuse the public and private data [4]. The philosophy behind the third wave is that the attention to the demand is at least as important as the supply side of the data equation. As a selected region always defines the OD specifics, this paper provides guidance on carrying out this specialization.

The main missions of the paper are:

- to present the key stakeholders of open data with their benefits and challenges,
- to present the current status of the open data, and
- to provide recommendations and guidelines for utilising the open data initiative in the selected region.

2 Stakeholders of Open Data

When defining key stakeholders [5], the government and, more precisely, local governments, i.e., municipalities, have precedence in the OD area. In those, vital role plays geospatial data, which is a key for smart, sustainable, and prosperous communities, revealing crime rates in neighbourhoods, road closures or nearest health facilities. Another key stakeholder is civil society, which has been a motivity in progressing OD plans, primarily via raising awareness, setting standards, and specifying public expectations. The list also includes journalists and media covering various practices from data science to finding stories, all the way to creating interactive content and visualizations for articles. Researchers strive to produce knowledge on OD, either if they are part of academia or part of the international development sector. Through data collaboratives, private sector actors can be data users, data intermediaries, and/or data providers. Lastly, we must mention multilateral organizations formed between three or more countries that work on their joint issues. An example of that could be development banks, which are crucial in promoting development outcomes in low- and middle-income nations.

Table 1 presents multiple benefits for stakeholders of OD and some challenges.

Table 1. Benefits and challenges of open data stakeholders.

Stakeholder	Benefits	Challenges
Civil society	The activities which publish OD, have positive impacts on the public awareness about the availability of OD, commonly building online platforms for hosting and sharing OD. They leverage interaction between government institutions and community groups. Besides, they train other organisations as potential users and educate them on how OD can help to fulfil their missions	The major challenge of smaller civil society organisations is the lack of resources which are required to develop the technical capacities needed to take the advantage of OD

(continued)

Table 1. (continued)

Stakeholder	Benefits	Challenges
Government	Government progress on OD is being monitored with OECD studies and the UN E-Government Reports. In general, institutionalisation requires clear and transparent frameworks for the governance of OD. This allows OD being made an integral part of government business and enables engagement across traditional programming silos and well across stakeholder groups	A growing awareness of the need to upgrade policies, institutional structures, programmes, and practices may be spotted. It includes production, and management, and well it ensures an effective reuse of government data to secure long-term sustainability and continuity of OD initiatives
Private sector	Business sector applies OD in its procedures to provide new products and services. Incubators and accelerators have managed large amounts of businesses worldwide in applying and utilising OD	OD demonstrates considerable potential to SMEs (small and medium-sized enterprises) to discover its benefits to innovations
Journalists and media	Journalists tend to acquire, extract, analyse, report on, and also produce OD. Journalists can alter the raw data into new insights, which informs customers, boosts public engagement in the democratic process, and hold powerful organisations responsible	If more media houses focus on making OD an essential source, more examples of automation tools may be seen in the future. However, the promise of “automated journalism” based on OD still remains unfulfilled
Researchers	A significant increase in research volume on OD is evident. This could lead to presumptions that OD research created a space for emerging areas of enquiry, e.g. privacy, data justice, and rights	OD should become more collaborative across disciplines and regions
Multilateral organizations	Multilateral organizations invest in many dimensions of the data ecosystem. They could obtain a considerable impact by mainstreaming OD work in their practices and increasing the ROI (return on investments) in operations with a strong data component	Multilateral organizations should put “open by default” and “open by design” ideas into application. Both initiatives will require distinct perceptiveness to security and privacy as well in-depth research and learning to utilize continuous advancement

It is vital to emphasize, that each stakeholder could be either supplier of OD, consumer of OD, or even both.

3 Current Status of Open Data

Few websites provide a brief overview of the OD sites worldwide (see Fig. 1). Nonetheless, two of the most known are Data.gov [6], comprising the USA government's open data, and data.europa.eu [7], including the European countries. The latter arose from the initiative of the European Commission around five years ago. Annually, they provide an OD maturity report, where they assess the status of OD maturity in the 27 EU member states and three EFTA countries, Liechtenstein, Norway, and Switzerland. Assessment is conducted with four main topics [7]: Policy, Portals, Impact, and Quality. The Policy topic covers policy framework, governance of open data, and open data implementation; Portals topic covers portal features, portal usage, data provision, and portal sustainability; Impact topic covers strategic awareness, political impact, social impact, environmental impact, and economic impact; and Quality topic covers monitoring and measures, currency and completeness, DCAT-AP compliance, and deployment quality. Based on those topics or dimensions, each country gets a maturity score. Figure 2 presents Slovene maturity level rating.

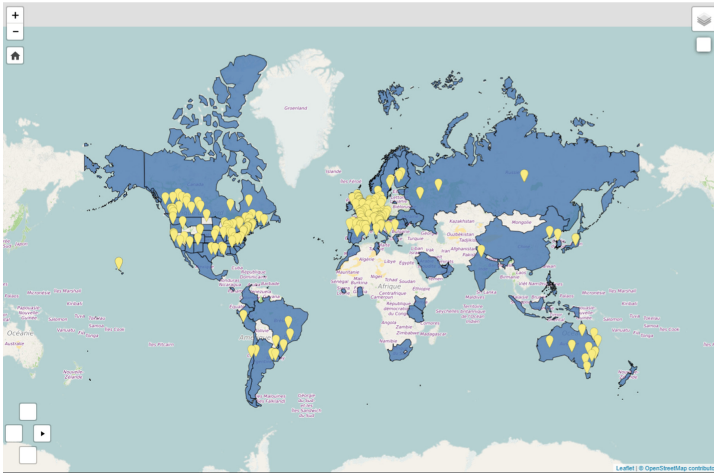


Fig. 1. Map representation of open data sites [6].

Even if we consider the whole world or specifically a selected region, the stakeholders providing regional data are usually local governments. However, all those local government stakeholders are always united in the central government OD websites. For example, the Italian government manages the Italian National Open Data portal, the Austrian government manages the Open Data Austria, and the French government manages the Open Data Portal France. Besides, it is also standard practice for other organizations to present data on their websites which consist of multiple data providers. One great example of that is Geoportal.de [8], which explores over a few hundred data providers who contributed their data, all grouped in different categories, i.e., Federation, Countries, Municipalities, and Science and Research. Furthermore, stakeholders could

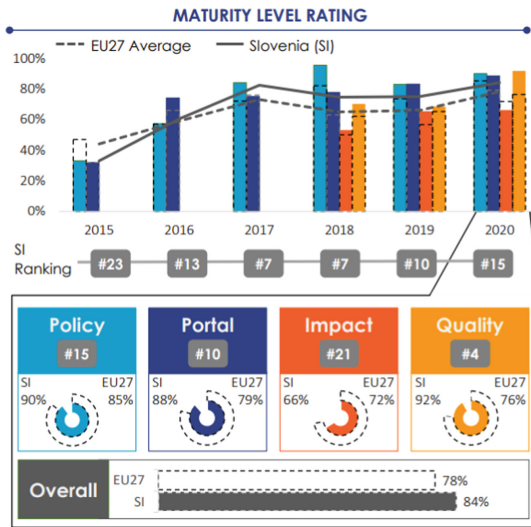


Fig. 2. Slovene open data maturity level rating [7].

also be non-profit organizations like 52° North Initiative for Geospatial Open Source Software [9], whose primary mission is to develop spatial research data infrastructures to foster information derivation from data.

In general, non-regarding the stakeholder type, OD usually comprises topics of Agriculture, Environment, Transport, and Government, followed by Economy, Education, Society, Technology, Culture, Tourism, and others.

4 Recommendations for a Selected Region

4.1 Stakeholder Engagement

To enhance OD awareness, we must stimulate stakeholders to contribute data. One of the biggest reasons for opening data is visibility. Opening data allows the stakeholder to become an established partner in the field of the provided data topic. This does not include purely providing the data but also publishing the results obtained while analyzing it. Such an approach even increases the recognition of the stakeholder. Another reason is promotion. Link to published data can be easily shared on social media, newsletters, local news stations, or others. Social media posts can be shared on the company’s social media profiles, which employees can reshare. Newsletters are also standard practice in organizations to spread the voice of their novelties, and news stations would spread the news about it if adequately presented. Opening up the data also shows professionalism. When stakeholders think of opening data, they must think about the sharing format, e.g., Excel file, pure CSV, XML, JSON, and service, e.g. database, API, interactive website. Non-regarding the way, a stakeholder must first decide on the delivery type, prepare data and then provide it to others. If this is done correctly, the professionalism of the stakeholder increases.

When people, organizations or consortiums recognize that some stakeholders provided data that could benefit them, they can offer a potential partnership. Such partnership could not be purely on the data level but could also be expanded to a profound research project(s). Defined OD requirements increasingly limit the latter and force partners to share data. Lastly, stakeholders already use some OD in their business. That could be Google Scholar if we are talking about Academic data; World Health Organization or HealthData.gov for organizations working with health and scientific data; World Bank Open Data if an organization is doing some business in the financial or economic field; or Climate Data Online if the environmental topic is relevant to the organization. Consequently, it is reasonable for a stakeholder to give something back to the community.

4.2 Critical Success Factors

To perform effective OD initiatives in the selected region, several factors should be addressed. Table 2 presents six generic success factors, which have been defined by the specialization of more generic OD success factors [10] tailored to the selected region specifics. These factors are applicable at a macro-level, e.g. when reviewing a government OD initiative, and at a micro-level, e.g. when an organization or municipality wants to start publishing OD.

Table 2. Success factors tailored to the selected region.

CSF of OD initiatives	Generic	Selected Region Specifics
Policy	A clear OD policy enables a shared vision for all stakeholders with defined overall objectives and a strategy with a defined action plan, timeline and corresponding responsibilities. Such policy should embed in a broader digital, innovation, or reform policy package of a government or organization	The selected region can comprise territories with contrasted demographic, social, and economic trends and a significant cultural and linguistic diversity. For example, Alpine Space specifics are identified and addressed in the EUSALP strategy [11]
Governance	A clear Governance structure with a dedicated owner who drives the policy's implementation, reviews its progress, and measures its success is vital for a successful OD policy. There also needs to be responsible parties for each of the actions within the roadmap	Potential diversity in the selected region accompanies a great variety of governance systems and traditions, implying a need to establish a multilateral organization for monitoring and controlling an OD initiative

(continued)

Table 2. (continued)

CSF of OD initiatives	Generic	Selected Region Specifics
Capacity	An OD policy with an adequate governance structure forms a solid foundation, whereas the capacity or resources are needed to publish and manage OD on the operational level. Ongoing communication and training are vital to ensure people from technical (e.g., IT, geospatial, data scientists) and non-technical backgrounds (e.g., business owners, project managers, domain experts) have the necessary skillsets to engage with OD projects actively	OD initiatives in the selected region should include staff training, focusing on developing new skillsets. For example, action group 3 of the EUSALP strategy [11] aims to improve the competence of the job market, education and training with employment prospects in strategic sectors in the region and increase the region's employment levels through shared macro-regional activities
Technical	A set of Technical Publishing Guidelines with simple examples can support a streamlined approach to making valuable OD available	The technical aspect of OD publishing should be part of the innovation aspect of the selected region strategy
Engagement	The OD initiatives should analyze and address the needs of stakeholders who want to discover, understand, and access information. User engagement and following a user-centric approach are paramount to understanding user needs, fostering collaboration, and building trust	A think tank of public interest on the availability of services could be implemented in the selected region. Sharing awareness of OD should also be part of a multilateral strategy
Demand	The actual demand for publishing OD should be identified. Working directly with stakeholders to identify challenges and projects that could benefit from OD is the most effective way to achieve substantive impact	A multilateral organization responsible for OD should also have the responsibility to promote it and share best practices and cases

4.3 Strategic Themes Guiding the Open Data Initiative

Based on generic or regional OD initiatives [12], the strategic themes used for guiding the OD initiative are then tailored to the specifics of the selected region and the underlying strategy [11] (see Table 3).

Table 3. Strategic themes guiding the open data initiative in the selected region.

Strategic theme	Description
1	Broaden the range of public bodies (governments, local governments, multilateral organizations, HEI) actively engaged in the OD initiative
2	Widen the scope and improve the quality, quantity and range of OD and associated meta-data. Improve the quality and range of services provided in the selected region
3	Continue to engage with all stakeholders and encourage the use of OD, which includes civil society, governments, municipalities, private sector, journalists and media, researchers, and multilateral organizations
4	Support and encourage various OD users in the selected region, including civil society, governments, local governments, private sector, journalists and media, researchers, and multilateral organizations
5	Provision of a framework tailored to the selected region, to support and train all Data Providers and build capacity in the management and use of OD
6	Monitor and evaluate the impact, benefits, and risks of the OD initiative and benchmark against other jurisdictions
7	Ensure that effective governance structures and multilateral organizations are in place to implement the OD strategy

4.4 Possible Specializations for a Selected Region

It is essential to identify possible specializations for a selected region. They could be divided to feature ideas familiar to the countries and regions in the selected region and those that arise due to differences in the area's features.

Firstly, a group of people preparing such an initiative must define the most distinctive and unique common features of all the regions in the selected region. If such features comprise shared natural resources and natural biodiversity, a shared OD platform covering them could be implemented. For example, tracking the biodiversity of flora and fauna across the region can boost the pattern extraction about possible adverse effects which may arise as the consequence of any economic decisions. This can be especially useful as the flora, fauna, rivers, lakes and other natural habitats stretch across multiple regions and countries. Furthermore, the common weather and soil patterns manifest in similar agriculture and livestock farming.

Another shared topic could be a way of transportation across the selected region. Even though some international automotive vehicle and train systems exist, there is a big area for improvement as there are no common regional goals in this field. For example, traffic and freight control across the countries enable quicker responses to the changing patterns.

Since some countries and regions have excellent working OD platforms, they could share them as examples or guidance for other countries. For example, Switzerland has an excellent OD platform that provides data on public transport. Therefore, it would

be helpful to create an OD portal that would include data, e.g. on transport from all countries around Switzerland with regard to the selected region. A similar portal (Research Alps Dataset) already exists and covers data on private and public research entities and business companies located in these countries.

One essential feature is also cultural diversity. The latter could be an advantage for a shared OD platform, where different cultures could display different work procedures and goals. Working on a shared platform would further connect these regions, boosting the cooperation in academic, economic, and other sectors. Nonetheless, even the tourism sector can benefit from mentioned differences. There are strives of tourists that visit a region because of its cultural and ecological diversity, so providing a shared data platform about this topic can lead to potential new connections and synchronizations among different regions.

5 Conclusion

This paper demonstrates how OD plays an essential role in all sectors globally. We presented the key stakeholders and provided their main benefits and challenges of using OD. Then, we displayed the current status of the OD and pointed out websites where people can see and search publicly available datasets. Later, we focused on providing guidance and recommendations for users applying OD initiatives to the selected region. We highlighted reasons why stakeholders would contribute data, emphasized critical success factors to perform an effective OD initiative, and presented possible specializations.

In the future, we would like to conduct a specific case study for a selected area. Such a case study could result in concrete recommendations and a framework that would serve as a manual for OD initiatives in the designated area.

Acknowledgements. The authors acknowledge the financial support from the Slovenian Research Agency (Research Core Funding No. P2-0057).

References

1. Verhulst, S., Young, A.: Open Data Impact When Demand and Supply Meet Key Findings of the Open Data Impact Case Studies, pp. 1–56. SSRN (2016)
2. Janssen, M., Charalabidis, Y., Zuiderwijk, A.: Benefits, adoption barriers and myths of open data and open government. *Inf. Syst. Manag.* **29**(4), 258–268 (2012). <https://doi.org/10.1080/10580530.2012.716740>
3. Open Data Institute. Publisher's Guide to Open Data Licensing. <https://theodi.org/article/publishers-guide-to-open-data-licensing/>. Accessed 25 Dec 2021
4. Verhulst, S.G., Young, A., Zahuranec, A.J., Ariel Aaronson, S., Calderon, A., Gee, M.: The Emergence of a Third Wave of Open Data. <https://opendatapolicylab.org/images/odpl/third-wave-of-opendata.pdf>. Accessed 20 Dec 2021
5. State of Open Data. Open Data Stakeholders. <https://www.stateofopendata.od4d.net/chapters/stakeholders/introduction.html>. Accessed 20 Dec 2021
6. Data.gov. The home of the U.S. Government's open data. <https://www.data.gov/>. Accessed 10 Dec 2021

7. Data.europa.eu. The official portal for European data. <https://data.europa.eu/en>. Accessed 10 Dec 2021
8. Geoportal.de. The Spatial Data Infrastructure Germany. <https://www.geoportal.de/>. Accessed 10 Dec 2021
9. north. Spatial Information Research. <https://52north.org/>. Accessed 10 Dec 2021
10. D. Lee. Success Factors for Open Data Initiatives. <https://www.linkedin.com/pulse/success-factors-open-data-initiatives-deirdre-lee/>. Accessed 20 Dec 2021
11. European Commission. EUSALP, Alpine Space Programme and Alpine Convention. https://ec.europa.eu/regional_policy/sources/cooperate/alpine/eusalp_alpine_space_alpine_convention.pdf. Accessed 15 Dec 2021
12. Data.gov.ie. Open Data Strategy 2017–2022. <https://data.gov.ie/pages/open-data-strategy-2017-2022>. Accessed 10 Dec 2021