

Open Data Best Practices in Europe: Estonia, Slovenia & Ukraine

Three countries showing high growth in maturity score according to the Open Data Maturity assessment 2021.

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1 Introduction

Data.europa.eu¹ is the official portal for European open data. Open data refers to information that can be freely used, modified, and shared by anyone for any purpose. It must be available under an open licence and provided in a convenient and re-usable form that is machine readable. Open data increases government transparency and accountability as well as delivering tangible social and economic benefits for citizens, businesses and civil society.

Data.europa.eu has been conducting the annual *Open Data Maturity* assessment since 2015. This benchmarking exercise evaluates the current state of open data in the European Union countries and Europe in general. The latest edition of the report, in 2021, showed how Europe continues to grow on all dimensions of the open data sphere to reach peak performances². The assessment measures maturity against four open data dimensions, further detailed in the Open Data Maturity Report 2021:

- **Policy:** focusing on countries' open data policies and strategies
- **Impact:** looking into the activities to monitor and measure open data re-use
- **Portal:** assessing portal functions and features that enable users to access open data via the national portal and support interaction within the open data community
- **Quality:** focusing on mechanisms that ensure the quality of the (meta)data

The Open Data Maturity assessment tracks the year-on-year progress of European countries. Evidently, all countries have their own pace of growth, their own strengths and weaknesses. That is exactly what this report aims to explore. In the past, data.europa.eu has already published reports and hosted webinars to highlight the open data best practices of the top performers of the Open Data Maturity assessment. This updated edition of the 'open data best practices'-series³ focusses on three countries that, not only ranked highly in the overall scoring, but showed impressive growth in their open data maturity score of the last two years: **Estonia, Slovenia, and Ukraine**.

Data.europa.eu has reached out to the three respective open data teams and this report provides an overview of their open data best practices, what influenced the high growth in open data maturity score, and any advice the teams may have for other countries who want to improve their open data practices. Insights into these countries' open data best practices can be transferred to other national and local contexts. By sharing this knowledge, access to open data can be improved, quality of open data publication safeguarded, and impact of open data increased across Europe.

Methodology

The content of this report is based on both in-depth interviews with representatives of the national open data teams and their original responses to the extensive questionnaire that was filled out at the time of the Open Data Maturity assessment of 2021. This report starts with some advice from the three countries. The following chapters discuss the open data practices of Estonia, Slovenia, and Ukraine, respectively. Afterwards a country comparison analysis is performed, and conclusions are drawn.

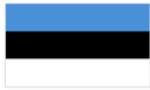
¹ [Data.europa.eu](https://data.europa.eu) is the official portal for European open data. The portal was launched in the spring of 2021, integrating the pre-existing European Data Portal and European Union Open Data Portal into a single, coherent core component of the public sector data infrastructure that has been set up by the European Union, its institutions and Member States.

² The full report, all European maturity scores and the methodology of the Open Data Maturity report 2021, or older editions, can be found on data.europa.eu: <https://data.europa.eu/en/dashboard/2021>

³ For more information see the reports on best practices of the top-performing countries we published in [2018](#) and [2019](#). Also, more about open data best practices the recordings of the webinars can be found in the [data.europa academy](https://data.europa.eu/academy).

Open Data Advice from Three Countries

ESTONIA



“What helped Estonia is that we had **concrete action plans** for open data and data governance. Create action plans for a few years only and **set doable goals**.”

“Ask yourself; **What do you expect** from agencies and data owners? You need to provide that yourself as well.”

“We try to **not request the community to do a million things**. Our portal makes data and metadata available, and that is enough for now. Every year we set some concrete goals.”

“Tie open data with actions and analytics and the value that open data brings. Why is open data important? To some degree we have been succeeding by **showing that open data matters**.”

- the Estonian open data team

SLOVENIA



“Create **a large network of stakeholders**. You cannot do it alone. Not important to have a big team. Create a good ecosystem of open data.”

“**Patience is key**.”

“**Go for low hanging fruits**. Our experience shows, do not spend too much time with institutions that are not yet mature enough to cooperate with.”

“To improve yourself, is like climbing a mountain. **You cannot do it alone**, you need support from others.”

- the Slovenian open data team

UKRAINE



“**International guidance** can help to structure your approach to open data. For example, the ‘Open Data institute skills framework’ helped to structure our training courses.”

“It is very easy to prioritise one thing and forget about other things. Once we structured our approach along all four dimensions it became easier. **It is all about structure**.”

“**Strategy is key**, especially an action plan with KPIs and ways to measure success. Revise your strategy regularly. We live in a changing world and new technologies arise every day.”

“**Creating impact and communicating it is key**. Otherwise no one will see how important open data impact is and what changes can be realised.”

- the Ukrainian open data team



Open Data in Estonia



The open data team hosts bi-monthly **working groups** for the open data community to discuss issues ranging from organisations' practical needs to strategic open data policy issues.

Over the last years, the open data team established a **large open data community** who are more enthusiastic than ever to publish data.

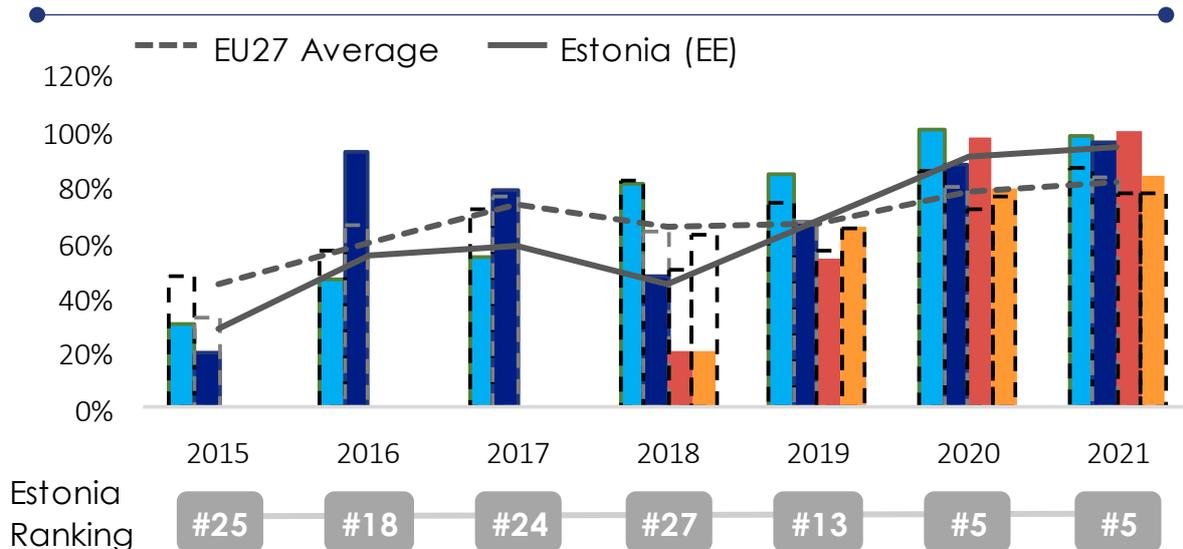


The **new open data portal** that was launched in 2020 was incomparable to the old one.

Now, the portal is user-friendly, **metadata is kept up-to-date**, and continuous feedback is being retrieved.



MATURITY LEVEL OVER TIME





2 Open data in Estonia

Estonia experienced a large growth in terms of open data maturity in recent years. It was only in 2018, when Estonia still ranked 27th in the annual Open Data Maturity assessment. According to the latest version of the annual assessment, Estonia climbed up to the 5th position, being a trend-setter for the second year in a row.

In order to gain a better understanding of this achievement, we interviewed two open data representatives from Estonia. They work together on the open data portal and open data policy from the Information System Authority⁴ and the Ministry of Economic Affairs and Communications⁵.

Recent years showed high growth in the open data community and the interest open data in Estonia. In their journey, the team learned a great deal from other countries, such as Ireland, Canada, and New Zealand. Additionally, as part of Digital Nations⁶, they are actively working together with a group of countries ranging from Mexico, Canada, Uruguay, to New Zealand and others, on topics such as open data, AI, etc. International open data colleagues are invited to join the Estonian working groups (explained in detail below) to exchange ideas. The Estonian open data team was happy to share their experiences over the last years, discussed throughout this chapter, and to serve as an example for other European countries. In this chapter you can read about Estonian open data practices within the four dimensions – policy, impact, portal, and quality.

2.1 Policy

2.1.1 Current situation and the open data journey

Open data policy and strategy

The Ministry of Economic Affairs and Communications is responsible for open data policy in Estonia. The open data policy is captured in the ‘Public Information Act’ (PIA)⁷. At the time of writing, a new PIA has been shared for review with different public agencies and will soon be sent to the Estonian Parliament to be enforced. This new PIA will include updated regulation compliant with the ‘Directive (EU) 2019/1024 of the European Parliament and of the Council’ (further referred to as the Open Data Directive)⁸.

The open data strategic goals of Estonia are described throughout a mixture of documents. The general goal, publishing public sector data as open by default, are stipulated in the PIA. The PIA also includes the goal of fostering open access to publicly funded research data, among other known principals from the Open Data Directive. Moreover, the recently published ‘Open Data and Data Management action plans for 2021-2022’⁹ outline 12 actions to be implemented in the field of open data, ranging from

⁴ <https://www.ria.ee/en.html>

⁵ <https://www.mkm.ee/en>

⁶ <https://www.leadingdigitalgovs.org/>

⁷ <https://www.riigiteataja.ee/en/eli/529032019012/consolide>

⁸ The Directive (EU) 2019/1024 of the European Parliament and of the Council (often referred to as the Open Data Directive) came into force in July 2019 and is the key piece at the centre of the European Union legal framework that regulates open data, and the re-use of public sector information (PSI). The Open Data Directive requires the adoption of a future implementing regulation by the European Commission, i.e., of a list of high-value datasets to be provided free of charge and through APIs. The procedure towards the adoption of the implementing regulation is still ongoing, and planned to be published in 2022:

<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019L1024&from=EN>

⁹ <https://avaandmed.eesti.ee/instructions/action-plans-for-open-data-and-data-management-2021-2022>

improving the open data portal to facilitating working groups (read more about working groups below). Finally, the 'Information Society Strategy 2030'¹⁰ contains a vision and action plan on how to further develop the Estonian economy, state, and society over the next decade. It states that all data that can be classified as open data should be machine-readable and actively re-used.

High-value datasets

In transposing the Open Data Directive into national law, important themes are emphasised that aim to increase the amount and quality of data being opened up, i.e., high-value datasets. While awaiting the implementing regulation from the EU, the focus in determining high-value datasets lies on data that is socially important for the EU institutions and other stakeholders. Estonia enforces supplementary high-value dataset categories, such as language resources. When it comes to the availability of high-value datasets, the Estonian open data team puts in extra effort to support the crucial ministries and agencies in publishing this data. The Estonian open data team values this proactive approach in making high-value datasets publicly available. Public sector bodies are mandated to make high-valued and socially relevant machine-readable data available on the portal, and if not yet accomplished, the team contacts and supports the concerned data holder.

The Estonian open data community

Over the last years, the team established a large network of people who work with open data, such as public sector bodies, ministries, data stewards (responsible for open data governance), data enthusiasts, or academia. This network is continuously encouraged to share feedback on the open data policy, portal, and other open data-related activities. By keeping their network well-informed on recent developments, the team witnessed a trend where the ministries involved with opening up data seem more enthusiastic than ever to publish data. Where the 2020 impact assessment still showed that open data was not high on the priority list, recent findings show the exact opposite. This is proven by the significant increase in number of agencies and data stewards in 2021.

Open data working groups

To ensure that all stakeholders are aligned and working towards to the same goal, a public sector inter-departmental open data working group has been established. This group meets bi-monthly and involves members from different interested ministries and other public sector organisations, for example, the National Audit Office¹¹ or the City of Tallinn¹². Participation to these meetings is also open to non-members, such as civil society, private companies, or academia. The working group discusses broad issues, ranging from organisations' practical needs to strategic open data policy issues. The open data team experienced a significant increase in the interest and attendance of these working groups over the years, underlining the increased focus on open data in Estonia.

Additionally, the open data governance structure closely collaborates with a public sector data management working group, which is coordinated by the Ministry of Economic Affairs and Communications and Statistics Estonia¹³. Other stakeholders can participate in the governance process through stakeholder discussion events, such as an annual open data forum or smaller workshops throughout the year devoted to specific open data related topics.

¹⁰ https://mkm.ee/sites/default/files/eesti_digiuhiskond_2030.pdf

¹¹ <https://www.riigikontroll.ee/?nomobi=True>

¹² <https://www.tallinn.ee/eng/>

¹³ <https://www.stat.ee/en>

2.1.2 Future outlook

Providing transparency in governmental studies

As discussed, the adoption of the new open data policy captured in the 'Public Information Act' is forthcoming, transposing the Open Data Directive into their national law. Additionally, the governmental organisation responsible for public procurement, especially centrally funded projects, have established that all audio recordings of their workshops and lectures will be made publicly available in the near future. Also, using an educational system, all governmental studies and analysis, including the data used, will be findable on the national open data portal in the future. The aim is to centrally support and enable accessibility to different data. Specifically, Estonia enforces additional high-value dataset categories, such as language resources, as listed in the 'Green Paper on Machine-Readable Open Government Data'¹⁴.

2.2 Impact

2.2.1 Current situation and the open data journey

The growing importance of open data impact

The open data field in Estonia changed drastically after 2018, which is visible by the great improvements in their maturity score on the impact dimension¹⁵. This was highly influenced by the fact that open data became a strategic priority for the Ministry of Economic Affairs and Communications, as for example listed in the 'Digital Agenda 2020 for Estonia'¹⁶. Aforementioned topics, such as facilitating working groups, were all initiated within the last three years.

Another influence of growth is that - through activities initiated by the national open data team - the private sector is becoming more involved in the field of open data. Earlier, there was a significant gap between the data enthusiasts and the private sector, where mostly the former group used open data in their daily lives. The private sector, on the other hand, had difficulty with accessing and using open data. Now, this gap has been bridged by the open data team by bringing businesses in touch with the data enthusiasts. Examples of bridging the gap are found in the variety of courses Estonia offers to data providers, such as thematic workshops, targeted workshops for different user groups, or reaching out to universities to include open data in their courses.

Monitoring and measuring open data re-use

In Estonia, there is a high level of interest in understanding the level of re-use of open data. Most public bodies request and re-use data from other public bodies using the secure national data exchange infrastructure X-tee (which relies on the X-Road technology¹⁷). The X-tee allows for tracking the exact number of data requests coming from each organisation.¹⁸ There is also a strong focus on re-use of private government held data as stated in 'Statistics Estonia's data governance strategy 2018-2022'¹⁹.

¹⁴ https://www.mkm.ee/sites/default/files/avaliku-teabe-masinloetava-avalikustamise-roheline-raamat-20141125_0.odt

¹⁵ The maturity score on the impact dimension grew explosively over recent years: From 21% (2018) - 54% (2019) - 97% (2020) to 100% (2021). See: <https://data.europa.eu/en/dashboard/2021>

¹⁶ https://www.mkm.ee/sites/default/files/digital_agenda_2020_web_eng_04.06.19.pdf

¹⁷ <https://www.ria.ee/en/state-information-system/x-tee.html>

¹⁸ The general usage statistics of the X-tee (including frequency of data exchange between different organizations) is publicly available here: <https://logs.x-tee.ee/visualizer/EE/>

¹⁹ https://www.stat.ee/sites/default/files/2021-07/C6_Development%20Plan%20of%20SE%202018-2022_0.pdf

To showcase how data can be re-used and the value that can be created with re-use, the Estonian open data portal regularly publishes re-use cases²⁰. Additionally, public bodies promote their open datasets at events, such as the public sector working group, at AI use case events²¹, or thematic events²².

Open data re-use example

The Estonian Environmental Research Center²³ created the air quality portal²⁴, see figure 1. This interactive dashboard displays real-time measured concentrations of ambient air pollutants and modelled air quality levels in major cities. In addition to concentrations of pollutants, the measured levels are characterized on a five-point scale - very good, good, average, bad and very bad. The underlying data can be downloaded from the air quality portal. Additionally, the source data is also available in downloadable formats.

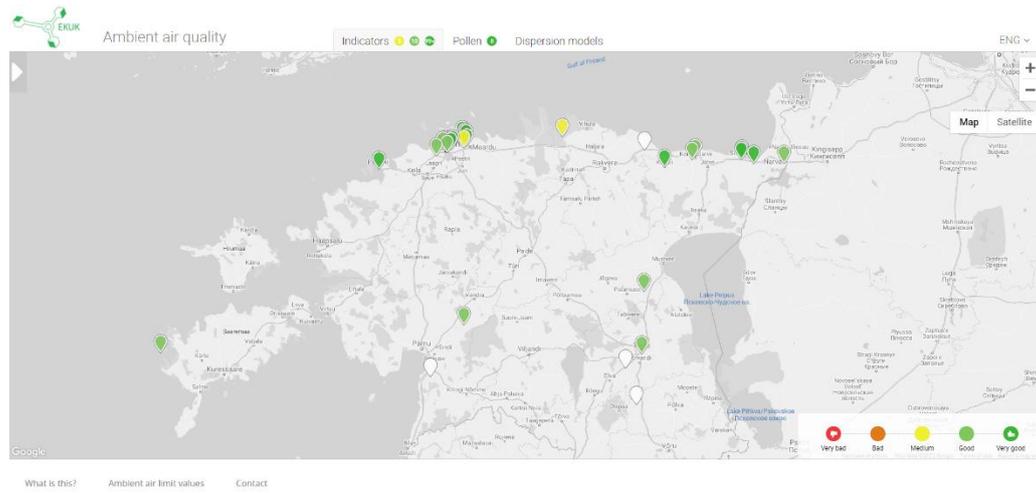


Figure 1: The Estonian Environmental Research Center's air quality portal

Open data impact studies

The Estonian open data team acknowledges the difficulty in measuring the actual impact of open data. Especially the economic impact of open data, as “it is difficult to set ‘a price’ to a dataset”. Although data providers aim to understand who their users are, this can be challenging as data re-users are not obliged to inform the data providers of the re-use.

The Ministry of Economic Affairs and Communications together with Statistics Estonia conduct an annual impact assessment amongst central government's public bodies²⁵. They have defined impact by use cases, where opening up data has made impact. The methodology consists of conducting a questionnaire with questions ranging from defining the profile of a data re-users, to actual re-use examples produced with their agency's datasets. Asking participants to provide examples of how and for which purpose open data has been re-used aims to incentivise data re-users to inform the data providers of re-use in the future.

²⁰ <https://avaandmed.eesti.ee/usage-stories>

²¹ For example: <https://www.youtube.com/watch?v=a17VwyXNj6c&t=11s>

²² For example, the Geoportal of the Land Board (<https://geoportaal.maaamet.ee/eng/>) has promoted their data and GIS portal at the annual GIS Days: <http://www.gispaev.ee>

²³ <http://www.klab.ee/>

²⁴ <http://www.ohuseire.ee/en?zoomLevel=8&lat=58.88711&lng=25.569944>

²⁵ Currently only available in Estonian: <https://avaandmed.eesti.ee/instructions/avaandmete-teemalise-mojuhinnangu-tulemused>

Additionally, recently an impact assessment of Estonia's open data market has been conducted²⁶. The methodology used for the analyses was based on data.europa.eu's report 'The Economic Impact of Open Data: Opportunities for value creation in Europe'²⁷. The analysis showed that the potential market size of open data in Estonia for the years 2021-2025 reaches between 396 and 445 million euro in the upcoming years.

2.2.2 Future outlook

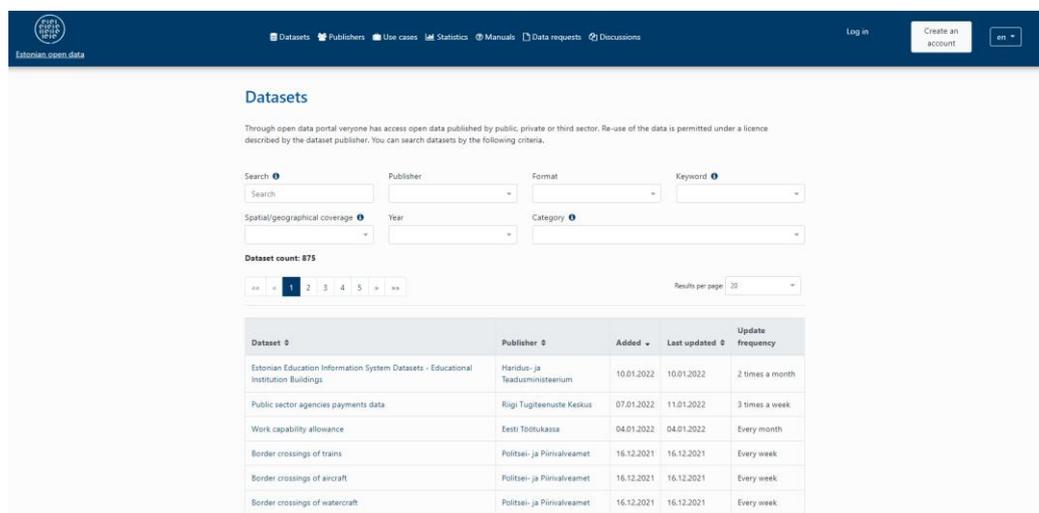
In 2022, the team will continue their journey on finding the right message in approaching different sectors and businesses. The data is now available through their open data portal, the next step is to attract more users and address different potential target groups.

Another upcoming event that the open data team is currently preparing, is a 'donate your speech' campaign. This campaign offers the opportunity to link open data to other topics, such as AI or preserving the Estonian language, by showing businesses and citizens the relevance of open data and provide concrete examples. As the open data team explains "open data is there for your business need. Data itself does not have any value, integrating that in practical life events is key".

2.3 Portal

2.3.1 Current situation and the open data journey

The Ministry of Economic Affairs and Communications is the owner of the Estonian open data portal²⁸ and they have signed a framework contract with the company Avatud Lahendused OÜ²⁹ for the development and maintenance of the portal until 2023³⁰. The open data portal offers a user-friendly way of accessing open data, by offering an advanced set of filtering options. For all datasets, the portal displays the data publisher, when the dataset was added to the portal, when it was last updated, and the frequency at which the data is being updated (see figure 2).



The screenshot shows the 'Estonian open data' portal interface. At the top, there are navigation links for Datasets, Publishers, Use cases, Statistics, Manuals, Data requests, and Discussions. A search bar is present with a search icon. Below the search bar, there are filters for Publisher, Format, Keyword, Spatial/geographical coverage, Year, and Category. The 'Dataset count' is 875. A pagination bar shows '1 2 3 4 5' and 'Results per page: 20'. Below the filters, a table lists datasets with columns for Dataset, Publisher, Added, Last updated, and Update frequency.

Dataset	Publisher	Added	Last updated	Update frequency
Estonian Education Information System Datasets - Educational Institution Buildings	Haridus- ja Teadusministeerium	10.01.2022	10.01.2022	2 times a month
Public sector agencies payments data	Riigi Tugiteenuste Keskus	07.01.2022	11.01.2022	3 times a week
Work capability allowance	Eesti Töötukassa	04.01.2022	04.01.2022	Every month
Border crossings of trains	Politsei- ja Piirivalveamet	16.12.2021	16.12.2021	Every week
Border crossings of aircraft	Politsei- ja Piirivalveamet	16.12.2021	16.12.2021	Every week
Border crossings of watercraft	Politsei- ja Piirivalveamet	16.12.2021	16.12.2021	Every week

Figure 2: Data catalogue of the Estonian open data portal

²⁶ <https://data.europa.eu/en/impact-studies/country-insights/estonia/open-data-market-size-estonia-could-amount-445-million-euro>

²⁷ <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

²⁸ <https://avaandmed.eesti.ee/>

²⁹ <https://avalah.ee/>

³⁰ <https://riigihanked.riik.ee/rhr-web/#/procurement/1706292/contracts/2412150>

The re-launch of the national open data portal

In 2020, the Estonian open data portal was fully reinvented, making the old portal almost incomparable to the current one. Before 2020, the portal was mainly a community-driven registry for people (mostly the community itself) to submit data using a required Github account. It was a simple platform, without features such as a log-in advantages or metadata. The new open data portal automatically integrates different data portals, such as the Land Board's Geoportal³¹, therefore increasing user-friendliness and enabling the team to reach a wider audience. In the future they aim to harvest from Statistics Estonia and the Institute for National Health Development³² as well. In developing the new portal, existing data portals served as an example, such as the Comprehensive Knowledge Archive Network (CKAN)³³. Nevertheless, they also shaped the portal by including the support and feedback from the community. A great way the team collected feedback for the development of the new portal was by hosting a training programme for data stewards. During this programme, the participants were requested to use the test environment of the portal and provide the team with feedback on the go.

Feedback and user statistics

The development team conducted interviews with a few government agencies to ask for feedback and ideas for the portal. Moreover, everyone is invited to provide feedback about the portal and this information is openly available on the portal. Besides feedback statistics, the open data portal also provides other user statistics in a transparent manner, such as dataset downloads, dataset availability per category, and dataset ratings. An interactive dashboard using data gathered by Google Analytics allows users to most used search terms, user locations and number of unique visitors, see figure 3.

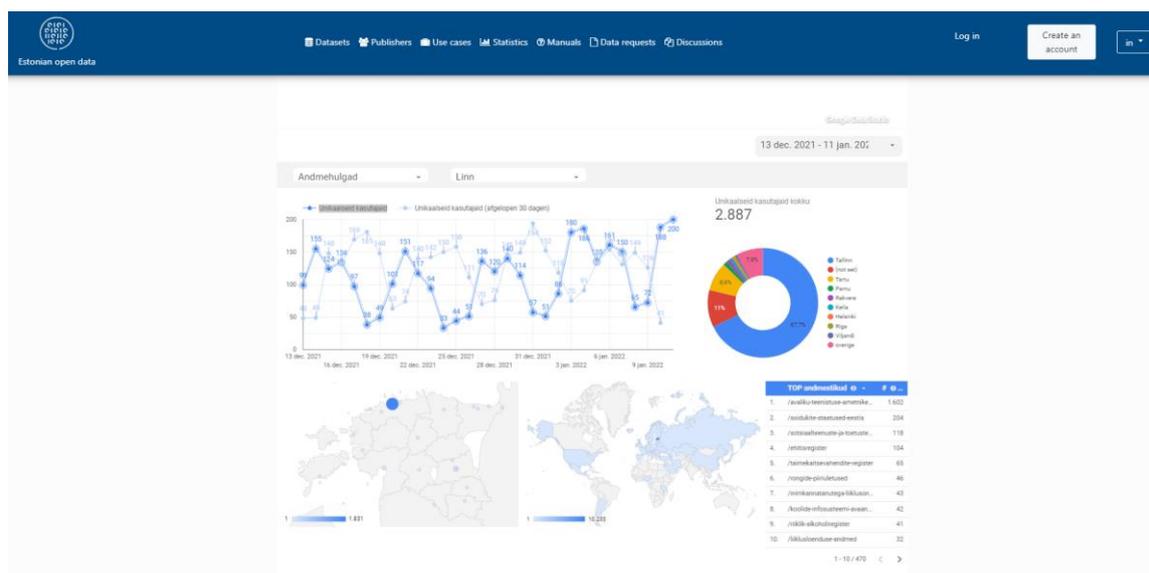


Figure 3: Google Analytics dashboard visualising user statistics

2.3.2 Future outlook

The most important topic that the team will work on in the future is to make data publishing easier and more comfortable by enabling automatic integration of other data portals. As mentioned, this process has already started, but it will continue to progress in 2022.

For data re-users the open data portal is already relatively advanced. However, for the future, the team aims to increase findability, searchability and user-friendliness. For example, they will add a separate

³¹ <https://geoportaal.maaamet.ee/eng/>

³² https://www.eesti.ee/eng/contacts/instituudid/tervise_arengu_instituut

³³ <https://ckan.org/>

filtering option for high-value datasets once the implementing regulation is live. Moreover, high-value datasets will be covered by multiple blog posts and there will be group meetings concentrating on raising awareness of these datasets.

2.4 Quality

2.4.1 Current situation and the open data journey

Metadata

It is mandatory by law for all data publishers to add their open datasets to the national open data portal as well and therefore adding complete and accurate metadata. The new open data portal is DCAT-AP compliant. The metadata is added manually to the datasets. The development team simplified this process as much as possible to make sure a minimum amount of time is requested from the data publishers, for example using the guidelines summarised below.

When launching the new open data portal, all datasets were migrated into it. During the working group meetings, data publishers are asked and reminded to review all existing data and metadata. All migrated datasets that have not yet been modified to DCAT-AP compliance by the publisher have a warning sign added to them to inform users. Latest statistics show that 70% of the metadata is updated. The main obstacles in this challenge are related to language issues and lack of time.

Guidelines

To support data providers with the publication process, a large set of guidelines are available:

- The 'Green Paper on Open Data' introduces the principles of open data, the architecture of interoperability, the most important policy options and the action plan. For data providers, it contains specific answers and recommendations to many practical questions related to disclosure³⁴.
- The Ministry of Economic Affairs and Communications has published guidelines for describing good quality metadata for database owners and data publishers³⁵.
- The open data portal offers a detailed instruction overview where data publishers learn to add, edit, and delete data, therefore improving the quality of their files³⁶.
- The open data portal offers a 'manuals' section where information is provided on DCAT-AP compliance and the benefit of using 'Open Data API'³⁷. Within this section, users can visit a FAQ section where additional recommendations on the formats and licenses of open data are provided.

Ensuring high-quality data

The Estonian open data team collaborates with their government to create a comprehensive overview of what data the government holds to evaluate what can be made available as open data. They reach out to the local governments who need support in publishing open data. The Ministry of Economic Affairs and Communications also provides assistance to organisations on a need basis, for example, when organisations reach out via the contact details on the portal.

³⁴ https://www.mkm.ee/sites/default/files/avaliku-teabe-masinloetava-avalikustamise-roheline-raamat-20141125_0.odt

³⁵ https://www.ria.ee/sites/default/files/content-editors/publikatsioonid/avaandmete_loomise_juhend.pdf

³⁶ <https://avaandmed.eesti.ee/instructions/andmestiku-lisamine-muutmise-ja-kustutamine>

³⁷ <https://avaandmed.eesti.ee/instructions>

Introducing DCAT-AP standards made it possible to ensure high-quality data. Also, it makes it easier to identify for which datasets accurate information is still lacking. The DCAT-AP standard provided a structured way of requesting important and relevant information to users. However, a challenge with manually adding metadata, is that it can result in manual error. The automatic integration of other portals that the team is currently working on, can remove this manual error.

2.4.2 Future outlook

In 2022, the main objective is to partner up with Statistics Estonia and finalise the remaining datasets that have yet to be updated and provide sufficient metadata, while at the same time ensure a data quality check. If completed, all datasets are DCAT-AP compliant and have relevant metadata.

Currently, for the Information System Authority (RIHA)³⁸ - a catalogue for all the information systems and dataset descriptions of the public sector - a tool is being developed called 'RIHAKE'³⁹. This tool helps to describe datasets and information systems, which can be beneficial for the RIHA. There are plans to integrate the RIHA with the national open data portal to offer the extensive data descriptions of the harvested data there as well.

³⁸ <https://www.riha.ee/Avaleht>

³⁹ <https://opener.ee/procurements/EE:216277>



Open Data in Slovenia



Slovenia achieved a **near-perfect score** on the policy dimension: **99%**.

The **network of data users and publishers** is very valuable for Slovenia's open data team and a large part of their success.

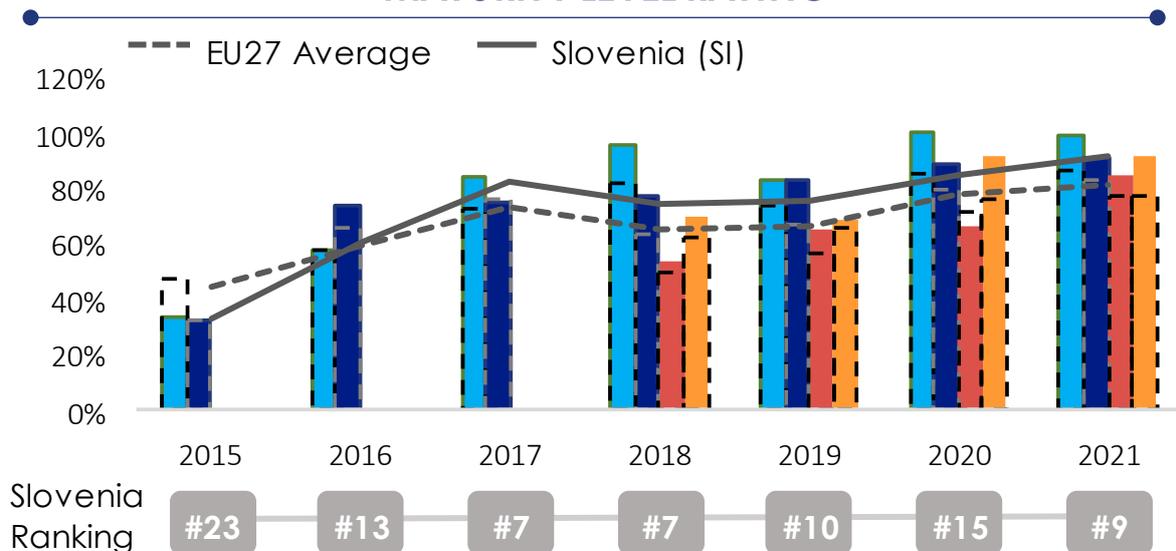


A new tool for the portal is planned: the **"open data laboratory"** tool will enable users to perform more advanced analyses.

Educating publishers to provide high-quality data is high on the priorities list.



MATURITY LEVEL RATING





3 Open data in Slovenia

Slovenia jumped from 15th to 9th place in the ranking of the 2021 Open Data Maturity Assessment. This is an impressive climb considering most European countries experienced growth in maturity score according to the assessment. With an overall score of 92%, the country scores well above the EU27 average (81%) and belongs to the group of fast-trackers.

To learn what drives their success, we interviewed three open data representatives from Slovenia. They represent the Department of Transparency, Integrity, and the Political System as well as the open data team at the Ministry of Public Administration of Slovenia⁴⁰.

The Slovenian open data team stresses that ‘collaboration is key’ in path to success. As the team states *“To improve yourself is like climbing a mountain, you need someone to spar with, to talk to, and to climb together with”*. In their open data journey, Ireland was a big inspiration to Slovenia as these two teams regularly exchange ideas and best practices to enable each other to grow. Additionally, the United States also served as an example, as the team states *“they are three to four years ahead of Europe in terms of open data, especially how they established their portal”*.

In this chapter you can read what drove the success of Slovenia’s open data practices within four dimensions – policy, impact, portal, and quality.

3.1 Policy

3.1.1 Current situation and the open data journey

The open data policy and strategy

Slovenia achieved a near-perfect score on the policy dimension (99%). In Slovenia, the legislative basis for open data policy is outlined in the ‘Access to Public Information Act’^{41,42}. This act specifies that public sector bodies should publish public sector information in open and machine-readable formats together with metadata. Additionally, public sector bodies should provide an overview of all databases that contain this information, and where to find it.

Slovenia only has two governance levels, i.e., the state and municipalities. This makes it easy for legislation to be implemented. If a decision is made on national level, such as the ‘Access to Public Information Act’, municipalities can immediately implement this locally, without interference of other government intermediaries or bureaucracy.

In 2015, the Slovenian government adopted the ‘Public Administration Development Strategy 2015-2020’⁴³. This strategy document has a special section devoted to a transparent functioning of the public sector information. On the basis of this strategy, the ‘Action Plan of the Slovenian Government 2018-

⁴⁰ <https://www.gov.si/en/state-authorities/ministries/ministry-of-public-administration/>

⁴¹ <https://www.legislationline.org/documents/id/23289>

⁴² With this Act, the following two EU Directives are adopted into Slovenian law: (1) [Directive 2003/4/ES of the European parliament and of the Council](#), of 28 January 2003, on public access to environmental information and repealing Council Directive 90/313/EEC, and (2) [Directive 2003/98/EC of the European Parliament and of the Council](#), of 17 November 2003, on the re-use of public sector information.

⁴³ https://www.gov.si/assets/ministrstva/MJU/Kakovost-in-inovativnost-v-javni-upravi/Strategija/Strategija_razvoja_ANG_final_web.pdf

2019⁴⁴ was developed, providing actionable measures to support the online publication of open data, i.e., data in open, machine-readable formats, which enables citizens, non-governmental organisations, media, etc. to further re-use it. In addition, Slovenia adopted the 'Open public sector information – strategic working plan 2020 – 2021'⁴⁵. This plan includes an upgrade to the national portal, updating the APIs, the creation of a data lake, and the definition of high-value datasets, to align with the Open Data Directive⁴⁶. Currently, the new Slovenian Digital Strategy (2021 – 2030) is being drafted, including a special section on the digital data economy and open data.

The Ministry of Publication Administration (MPA) is responsible for ensuring the implementation of the open data policy and for the national open data portal: OPSI⁴⁷. The MPA is active in setting up legal frameworks, providing guidelines for publishers, organising hackathons and data challenges and opening consultations to ensure that public bodies open their data for re-use. Together with other public bodies, they operate, maintain, and update the portal.

Network of stakeholders

Slovenia's open data activities are collaboratively performed by a network of stakeholders. These stakeholders include data providers at different ministries and public sector institutions, data users such as citizens, and data editors working at the Ministry of Publication Administration (MPA).

Information requests by the open data community are handled autonomously by the network of stakeholders at different ministries and public sector institutions. Together, this network makes sure that data is continuously published, updated, and responsive to user requests.

This collaborative network is considered to be crucial by the open data team. So, they aim to keep in touch through, for example, regular meetings. Additionally, to keep the stakeholders up to date, the MPA offers several data governance courses to encourage open data publication and educate civil servants, for instance on creating a data opening plan, decision-making from questionnaire data, basic statistical methods, and more advanced data science topics such as text mining.

3.1.2 Future outlook

For the upcoming year, the Slovenian open data team aims to not only continue but also expand the collaboration with the open data network by including more universities as encouragers of open data re-use. To that end, dedicated meetings are in the pipeline.

Furthermore, Slovenia has plans to include real-time and dynamic data-related goals in the future into their open data policy and strategy. An interesting strategic development is the IoT (Internet of Things) call for smart cities. This call will encourage local communities to establish a real-time data flow through IoT sensors. In addition, the current legislation is in the consultation process to include dynamic data as well. Public bodies that create or obtain dynamic data must enable re-use after the data is collected and enable its mass transfer or transfer via application programming interfaces (APIs).

⁴⁴ <https://nio.gov.si/nio/asset/letno+porocilo+o+izvedbi+ukrepov+iz+dvoletnega+akcijskega+nacrt+izvedbe+strategije+razvoja+javne>

⁴⁵ https://podatki.gov.si/sites/default/files/reports/Open%20Data_Strates%CC%8Cki%20delovni%20plan_julij2020.pdf

⁴⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561563110433&uri=CELEX:32019L1024>

3.2 Impact

3.2.1 Current situation and open data journey

Increasing public visibility of open data

Slovenia's open data team indicates that the large, established network of data publishers and re-users is of immense value. It is considered to be a crucial driver for successful impact creation with open data in Slovenia. The team aims to increase the visibility of open data by participating at events and being active in the media. This draws attention to the topic of open data and increases the public's interest to re-use data. This also affects other sectors, such as academia. Once picked up by the public, professors will also start including the topic of open data in their curricula, which in turn creates more attention for the topic amongst students, creating a positive reinforcing mechanism of attention and stressing its importance. This is in line with the Open Data Directive⁴⁸, where the impact and importance of open data and open data re-use is increasingly recognised.

Together with academia, the MPA regularly organises hackathons, presentations on open data for students, and leads open data projects with students. Aside from the collaboration with academia, the MPA is actively pulling in the private sector. In 2019 they established a collaboration with the Chamber of Commerce and in March 2020 to establish the 'Open Data Hub'⁴⁹, designed to promote use of open data by companies. Under this umbrella, the 'Open Data Conference - Accelerators of the Digital Economy'⁵⁰ was hosted to show how open data accelerates the data economy.

On European level, Slovenia was an active partner of the European Union's Open Data Days⁵¹, as both OPSI and the Slovenian Presidency of the Council⁵² contributed. Moreover, the Minister of Public Administration, Boštjan Koritnik, gave a [welcome speech](#) in the latest edition of the event⁵³.

Monitoring and measuring open data re-use

The MPA encourages data providers to monitor and measure re-use of their data. In doing so, a central web analytics system is adopted, which is used by all organisations that publish data on the OPSI portal. Although this system is for internal use only, the open data team publishes reports on the gathered statistics annually⁵⁴. In addition, data providers can reach out, via a helpdesk, to the team responsible for the national OPSI portal to gain insights into data usage.

The Slovenian open data portal regularly publishes open data re-use examples on the portal to showcase how data can be re-used and the value that can be created⁵⁵. There is a great deal of Slovenian open data applications that provide transparency on public procurement⁵⁶. In fact, according to the 'Governance at Glance 2019'⁵⁷ from the OECD Slovenia is one of the countries that makes the most information about the procurement process available to the public⁵⁸. This information includes,

⁴⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561563110433&uri=CELEX:32019L1024>

⁴⁹ <https://www.gov.si/novice/2020-03-06-ob-dnevu-odprtih-podatkov-ustanovili-sticisce-odprtih-podatkov-slovenije/>

⁵⁰ <https://www.gov.si/novice/2020-05-07-konferenca-odprti-podatki-pospesevalci-digitalne-ekonomije/>

⁵¹ <https://op.europa.eu/en/web/euopendatadays/home>

⁵² <https://slovenian-presidency.consilium.europa.eu/en/>

⁵³ https://www.youtube.com/watch?v=im8ygB958r8&list=PLT5rARDev_rn6f6x9PwlpO7rvxeBBZnr-

⁵⁴ <https://podatki.gov.si/knjiznica/porocila>

⁵⁵ <https://podatki.gov.si/aplikacije/vse>

⁵⁶ <https://www.enarocanje.si/>

⁵⁷ <http://www.oecd.org/gov/govataglace.htm>

⁵⁸ <https://www.oecd.org/gov/gov-at-a-glance-2019-slovenia.pdf>

for example, tender notices, evaluation criteria, award notices, signed contracts, and bidding documents. Metadata on all public procurements is published as open data and can be freely downloaded for further re-use⁵⁹.

Open data re-use example

In January 2020, the 'Budget of the Republic of Slovenia'⁶⁰ was launched, see figure 4. These interactive visualisations enable ongoing monitoring of revenues and expenditures of the state budget and contain more detailed information on individual projects that are financed or co-financed with the state budget. It provides the user with a more detailed insight into an individual segment of budget spending and enables the search for data by region, municipality, and the value of projects, a big step towards greater transparency in the use of public sector budget.

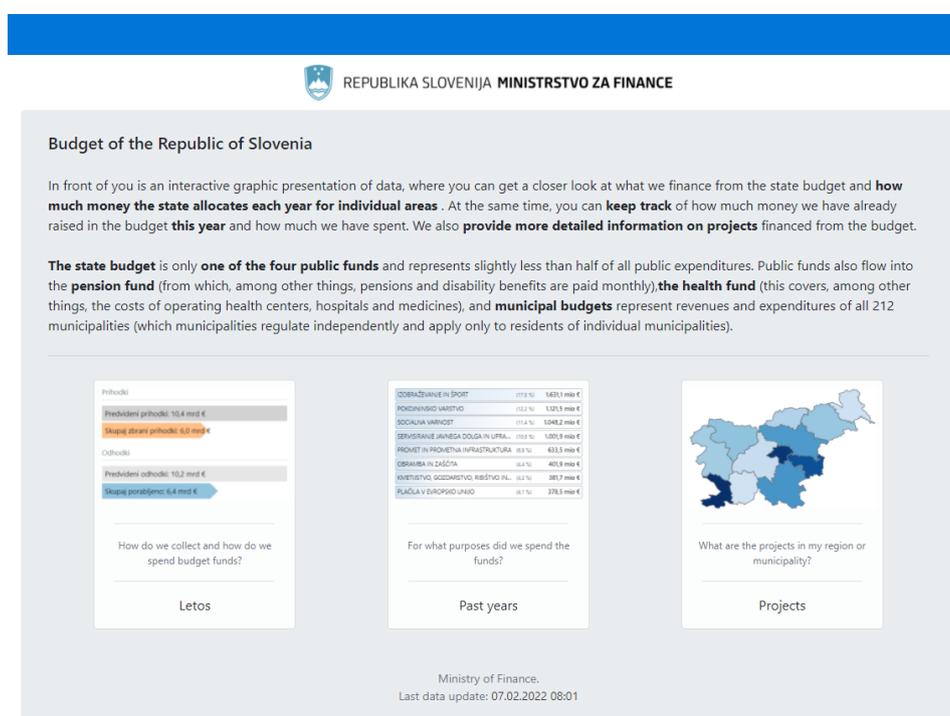


Figure 4: Interactive visualisations regarding the 'Budget of the Republic of Slovenia'

Open data re-use example

In 2016, Slovenia was one of the first EU Member States to implement the 'EU Directive on prevention of the use of the financial system for the purposes of money laundering or terrorist financing'⁶¹. For this purpose, the register of beneficial owners⁶² was created. The register makes it possible to identify a physical person, i.e., an individual that manages a company, which is one of preconditions for effectively combatting money laundering. The register gathers data from three

⁵⁹ <https://www.enarocanje.si/objavaPogodb/1007Avozi.aspx>

⁶⁰ <https://proracun.gov.si/>

⁶¹ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A230804_1

⁶² https://www.ajpes.si/Registri/Drugi_registri/Register_dejanskih_lastnikov/Splosno

other registers: the business register, the central register of inhabitants, and the tax register. The name and address of the owner and its role within the company are data publicly available. In addition, law enforcement can access data on the individual owner's tax number, birth date, and citizenship.

Measuring open data impact

Though the societal benefits of re-using open data are often clear, it is hard to quantify the economic impact. Inspired by data.europa.eu's report 'The Economic Impact of Open Data: Opportunities for value creation in Europe'⁶³, a team of the MPA's representatives and technology experts from Technology Park Ljubljana⁶⁴ published a report that quantitatively estimates the economic-social impact of open data in Slovenia. The study reveals an estimated potential of €293 million for Slovenia's open data market size by 2025 and estimated 7.441 open data employees in 2025 according to optimistic scenario forecasts.

Additionally, at the moment of writing, several reports are being conducted within the Interreg ODEON group⁶⁵. For instance, a report on the strategic role of open data for growth in the Mediterranean region, and a model of protocols to strengthen the effectiveness of the Open Data Hub⁶⁶.

The Open Data Day

Since 2019, Slovenia hosts the annual Open Data Day⁶⁷. The Open Data Day is an opportunity to show the benefits of open data and encourage the adoption of open data policies in government, businesses, and civil society. During the event, the Slovenian open data team organises a meeting for open data stakeholders to share their experiences, connect with peers from different countries, and showcase best practices. This is also an opportunity for the open data team to learn how they can improve the open data portal's user experience, and to present past and upcoming developments of the portal. In some years, these events were targeted to specific groups, such as NGOs or the private sector, to provide tailored support for their sector-specific issues. There have also been hackathons where public institutions and technological partners, such as Microsoft and Oracle, were present to create a new solution or innovative tool.

3.2.2 Future outlook

For 2022, the Slovenian open data team aims to perform the study on the economic impact of open data again, with updated numbers and forecasts. An update to the methodology is being prepared in cooperation with Faculty of Organizational Sciences⁶⁸.

In addition, the team is looking to establish a network of data stewards to gain a better understanding of the value of data. Understanding its value will support the discussion on how to create more impact

⁶³ <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

⁶⁴ <https://www.tp-lj.si/en>

⁶⁵ <https://odeon.interreg-med.eu/our-story/who-we-are/>

⁶⁶ <https://www.gov.si/novice/2020-03-06-ob-dnevu-odprtih-podatkov-ustanovili-sticisce-odprtih-podatkov-slovenije/>

⁶⁷ <https://opendataday.org/>

⁶⁸ <https://fov.um.si/en>

with open data. Moreover, it will encourage the public sector to make more information available and keep this information accurate and up to date.

3.3 Portal

3.3.1 Current situation and open data journey

Publishing open data to the portal

In 2016, the Ministry of Public Administration (MPA) launched the Slovenian open data portal, OPSI⁶⁹. All public sector bodies publish data on the portal in various categories, see figure 5. There are two options for datasets to be added to the portal. The first is by automatically harvesting the datasets from data provider's servers or services. This is in place, for example, for the Statistical Office⁷⁰, the Bank of Slovenia⁷¹, and the Ministry of Foreign Affairs⁷². The second method is for data providers to publish datasets manually. Organisations can appoint an 'editor' who collects all data and metadata, and this person will be granted to right publishes directly on the national portal. The open data team organises meetings with all public sector bodies individually to assess what would be the best approach to publishing for them, either harvesting or for editors to manually publish the data, and if necessary, help them step-by-step. Apart from direct publication by or harvesting from government bodies, datasets are also added to the portal in response to user requests.

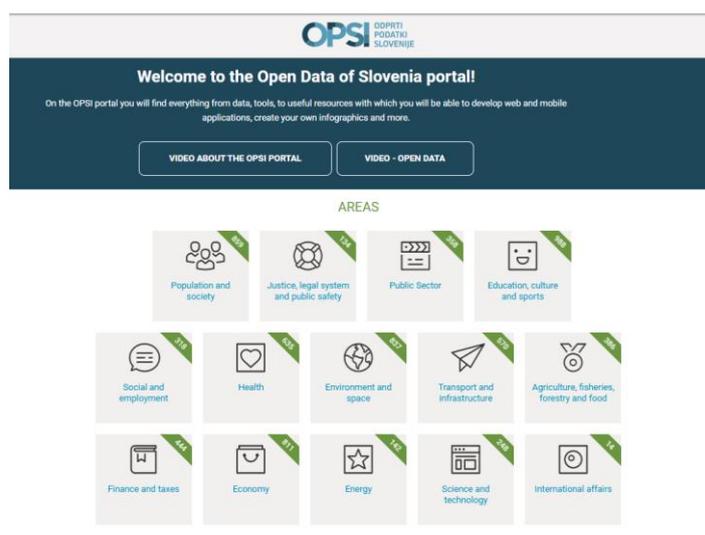


Figure 5: The Odprti Podatki Slovenije (OPSI) portal - the Slovenian open data portal

The experience of the user and the data provider

OPSI offers a user-friendly way of accessing open data, by offering an advanced set of filtering options, and showing the number of views and likes for a dataset. For all datasets, the portal displays the data publisher, when the dataset was added to the portal, when it was last updated, and the frequency at which the data is being updated. Each dataset features the option for data providers to provide additional documentation and supporting materials and each dataset has a 'like'-button. The portal

⁶⁹ <https://podatki.gov.si/>

⁷⁰ <https://www.stat.si/statweb/en>

⁷¹ <https://www.bsi.si/en>

⁷² <https://www.gov.si/en/state-authorities/ministries/ministry-of-foreign-affairs/>

additionally offers the possibility for users to receive notifications when new datasets are available via an RSS feed, which makes staying up to date with data effortless.

The Slovenian data portal has API integration in place, meaning the portal harvests data automatically. Not having to add data to the portal manually simplifies the process for the data providers, decreases bureaucracy, and lowers the barrier for data publishers to provide data.

User analytics and feedback

The open data team uses Matomo⁷³ to gain insights into the portal's usage. Information is gained about which datasets are popular amongst users. Using this information, the open data team is able to ensure those datasets are always up to date, and regularly checked for quality and timeliness.

Insights into the user needs are also gathered by collecting feedback. Besides a general way of collecting feedback through the contact form, the Slovenian data portal offers a feedback button for every dataset.

3.3.2 Future outlook

In 2022, the open data team is planning to continue to improve the portal, including upgrades to APIs and the development of data lake. In addition, the launch of a new data analysis tool is planned for the portal. The expected 'open data laboratory' is a tool that users can make use of to perform more advanced analyses. Via a Jupiter notebook, users get access to software on a virtual server and can perform analyses and create visualisations using open data. The code that a user creates (i.e., the notebook) can be re-used by other users.

3.4 Quality

3.4.1 Current situation and open data journey

Keeping metadata up to date

Slovenia has created the 'Decree on the transmission and re-use of public information'⁷⁴, which explicitly defines in how metadata should be published. This decree obliges all ministries and public bodies to publish and maintain the metadata. The data or datasets to be published must first be approved by editors of the team responsible for the open data portal. Afterwards the harvested data is updated every night and the editors periodically check all datasets.

To incentivise and assist data providers in the publication of data in machine-readable formats, the team promotes high-quality datasets and provides tailored support to all the data providers if they need help converting data to open formats. In rare cases when a data provider cannot independently publish the data, the team of main editors of the MPA publish it for them.

Guidelines and the OPSI Manual

The open data team support data providers in their publication process in two ways. First, to support data providers with the publication process and encourage the opening of data, an extensive manual is available on the portal⁷⁵. This manual introduces general concepts such as databases, open data, personal data, and re-use of data. It provides guidance on how to select a dataset that is suitable for opening, indicating several criteria and opening options. The manual also includes examples of

⁷³ <https://matomo.org/>

⁷⁴ <http://www.pisrs.si/Pis.web/pregledPredpisa?id=URED6941>

⁷⁵ <https://podatki.gov.si/posredovanje-podatkov/uvodnik>

scenarios for opening existing publications, files, and databases. It shows how data can be published on a national portal, and how to provide metadata that is clear and descriptive. Finally, it includes recommendations for evaluating datasets for administrators, and improving the quality of data.

Secondly, the open data team at the MPA organises seminars and workshops for civil servants at the 'Administrative Academy'⁷⁶. For example, a seminar is hosted where the aforementioned manual is thoroughly explained⁷⁷. Also, the team of editors supports local authorities, who publish data at OPSI, in the form of workshops. For example, the workshop in relation to Internet of Things (IoT) for smart cities that will encourage local communities to establish a real-time data flow through IoT sensors⁷⁸.

3.4.2 Future outlook

For the upcoming year, the open data team aims to continue to educate both the editors of the portal and the open data publishers about the importance of publishing regularly and to help them understand how this is also beneficial for themselves as they may get fewer user demands. Educating them to be as descriptive as possible in terms of metadata and keeping the community up to date in terms of current legislation and regulation is also high on the team's priority list.

⁷⁶ <https://podatki.gov.si/posredovanje-podatkov>

⁷⁷ <https://ua.gov.si/aktivnosti/detajli/?ID=f9c4fb66-da54-eb11-9c63-005056818ee6&Tag=459,456>

⁷⁸ <https://skupnostobcin.si/tedenske-novice/tedenske-novice-sos-st-9-26-2-2021-5-3-2021/#post-38852>



Open Data in Ukraine



The regularly revised and updated '[Decree 835](#)' lies at the centre of the Ukrainian open data policy.

The platform '[Diia Open Data](#)' aims to increase the level of knowledge about open data, its **impact** and benefits for everyone and help Ukraine to become more transparent.

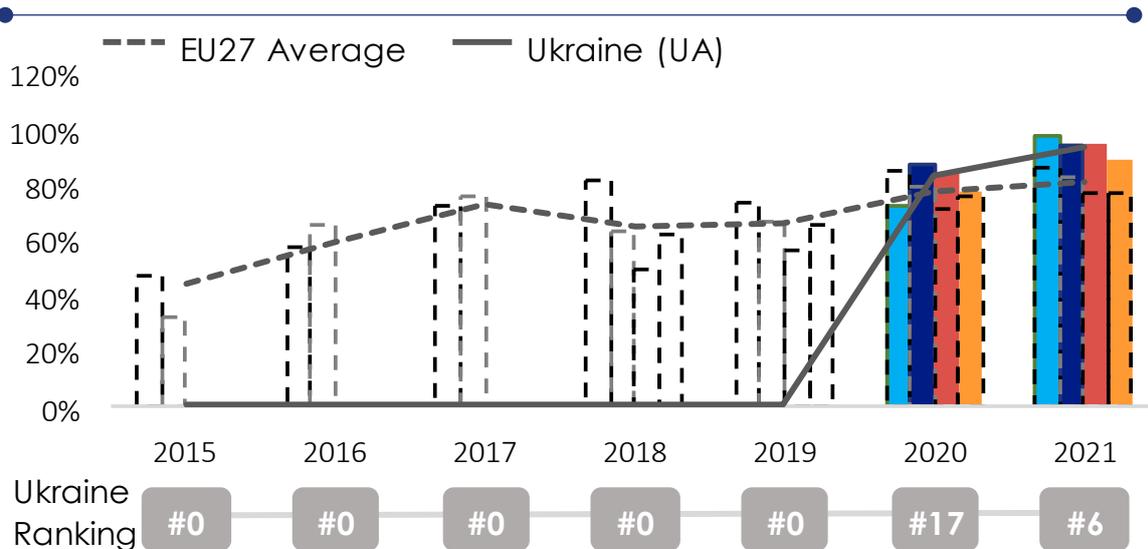


The Ukrainian open data team always bases decisions on **open data portal updates** solely on **user feedback** and user statistics.

All **metadata is frequently checked for accuracy** using an automatic validations mechanism. In case of errors, data providers are notified.



MATURITY LEVEL RATING





4 Open data in Ukraine

Ukraine participated twice in the annual Open Data Maturity assessment, in 2020 and 2021. In those two years they realised exponential growth in their maturity score. Where in 2020, they ranked 17th, they currently rank 6th out of 34 participating European countries, being the newest trend-setter of the pack.

We interviewed two open data representatives from Ukraine to gain a better understanding of the growth Ukraine experienced. Both are working for the Ministry of Digital Transformation, which is responsible for the open data policy and open data portal. Valuable for data.europa.eu to learn was that the Ukrainian open data team have used previous versions of this report on ‘Open data best practices in Europe’⁷⁹ to learn about leading countries such as Ireland, Spain and France. The team has also directly learned from other countries’ open data practices. Especially, the open data strategy of Ireland together with the user-friendliness of the open data portal of the United Kingdom set a great example for the team. By participating in this report, they hope they can serve the same purpose for other countries.

The team indicates that the main driver of their success over the past year was a change in mindset and to focus more on the sustainability of their activities. Initially, the main goal within the Ukrainian field of open data was to combat corruption. Instead of focusing on anti-corruption alone, they adopted a more overarching perspective by involving all users across all sectors, as open data can solve any many everyday problems. Additionally, the Ministry of Digital Transformation experienced a growth, which gave the team the authority to achieve more. *“Actually, the president of Ukraine was speaking at an event and congratulated the open data team in reaching a great result in the Open Data Maturity assessment 2020.”* This showed the team the difference that they make and motivated them to continue their great work.

The open data team provided many insights into open data practices of a European country that is not part of the European Union, meaning that Ukraine is not obliged to comply with all EU legislation. Nevertheless, Ukraine hosts a department that works on matters related to European integration. Last year, they transposed the main features of the Open Data Directive into their strategy, which was a big commitment for the team. Before implementing the recent changes, an analysis was conducted comparing Ukrainian and EU legislation and recommendations were provided that guided their work. The adoption and integration of the EU legislation in Ukraine is hard and a long-term process. Some of the revisions of EU legislation is not applicable for Ukraine, due to information sharing restrictions in the Ukrainian law.

In this chapter you can read what drove the success of Ukraine’s open data practices within four dimensions – policy, impact, portal, and quality.

⁷⁹ The data.europa.eu team has conducted the report on ‘Open data best practices in Europe’ twice, in 2018 and 2019. In 2018, Ireland, Spain, and France participated, see:

https://data.europa.eu/sites/default/files/analytical_report_13_open-data-best-practices-top-performers.pdf.

In 2019, Cyprus, France, and Ireland participated, see:

https://www.europeandataportal.eu/sites/default/files/analytical_report_16_top-performing-countries.pdf

4.1 Policy

4.1.1 Current situation and the open data journey

Open data policy

The Ministry of Digital Transformation⁸⁰ is responsible for the open data policy. Also, the Ministry is responsible for the development and functioning of the national open data portal. In 2011, the Ukrainian Parliament introduced the law 'About access to public information'⁸¹. The law obliged public authorities to provide public information in the form of open data on request and to publish and regularly update it on the national open data portal⁸². A little later, in 2015, the Cabinet of Ministers of Ukraine approved Decree 835 'On approval of the Regulations on data sets to be published in the form of open data'⁸³, which is the key document in the Ukrainian open data sphere. This document is continuously updated, based on user needs (see the engagement mechanism below), the last update was in March 2021. The objective of the open data policy is to increase the transparency of government activities, prevent and detect corruption, as well as to develop innovations based on open data.

The Ukrainian government operates in a decentralised system. Therefore, the Ministry of Digital Transformation emphasises on strengthening regional open data policy and enabling all local municipalities to easily deploy, adopt and use a solution for a local open data portal⁸⁴. These local datasets are then harvested by the national open data portal. Municipalities can more effectively control the process of open data publication within their region, and thus increase the number and quality of datasets. Also, this model makes it possible for the national open data portal to harvest all regional datasets automatically, avoiding the duplication of datasets.

Open data strategy and CDTOs

In 2018, Ukraine adopted the 'Open Data Strategy 2018-2020'⁸⁵, based on the six principles of the 'International Open Data Charter'⁸⁶. At the moment of writing, a new 'Open Data Strategy 2021-2025' is being created. A draft of the strategy⁸⁷ is shared for review and the final strategy document will be adopted in early 2022. As open data is a complex topic, the new open data strategy aims to comprehensively describe and explain the nature of open data. It will include definitions of fundamental terms (e.g. open data impact), goals to be reached, instruments of the open data policy, and an analysis of problems and obstacles in the field of open data. The three main goals of the open data strategy are:

1. All available public information is published in the form of open data. This is also referred to as the "Open by Design Principle".
2. The published datasets are of high quality.
3. The level of re-use of public information in the form of open data is high.

The Ministry of Digital Transformation is responsible for coordinating all open data stakeholders and public bodies in achieving the goals of the open data strategy. In 2016, Chief Digital Transformation

⁸⁰ <https://www.kmu.gov.ua/en/yevropejska-integraciya/coordination/cifrova-transformaciya>

⁸¹ <https://zakon.rada.gov.ua/laws/show/2939-17>

⁸² <https://data.gov.ua/en/>

⁸³ <https://zakon.rada.gov.ua/laws/show/835-2015-%D0%BF>

⁸⁴ <https://zakon.rada.gov.ua/laws/show/900-2018-%D1%80>

⁸⁵ <https://zakon.rada.gov.ua/laws/show/900-2018-%D1%80>

⁸⁶ <https://opendatacharter.net/>

⁸⁷

https://docs.google.com/document/d/1r8KK3_GqEbfYkIPrBiQGmEuJ8CaMqQnvfgEXlvAXK0I/edit?usp=sharing

Officers (CDTOs) were introduced in all public bodies on national, regional and local level. CDTOs all have specific goals related to open data, such as e-government or e-learning.

The engagement mechanism

The Ukrainian open data team indicate to not have the resources to focus on all municipalities and datasets simultaneously. Instead of spreading all resources over all datasets, they focus on the most important information for civil society and public bodies. To still ensure the relevance of the available open datasets, they use an 'engagement mechanism' to prioritise datasets and topics.

The 'engagement mechanism' is a triangular structure between the Ministry of Digital Transformation, data publishers and open data re-users. This mechanism aims to ensure the availability of highly valued datasets, similar to the upcoming EU regulation act regarding high-value datasets. As mentioned, the Decree 835 is the vital document in the Ukrainian open data sphere. This document defines, among other aspects, which datasets have a high priority to be opened up by data publishers. Open data re-users, such as civil society or general businesses, are invited to request data that is not yet open. The Ministry of Digital Transformation will evaluate the requests regularly and, if appropriate, add the dataset to the Decree 835 as high-priority datasets. Once the dataset is confirmed a high priority, publishers must publish the concerned data and users are able to keep track of the progress. This mechanism offers insights in user demand in a sustainable way where user feedback is key.

4.1.2 Future outlook

The year 2022 will be an eventful year for the Ukrainian open data sphere. The new 'Open Data Strategy 2021-2025' will be authorised and adopted. Additionally, a new version of the Decree 835 will be adopted by the Cabinet of Ministers, including standards for data publication. The decentralised approach of the Ukrainian government generates a large group of open data publishers, containing of more than 9000 local governments, who all publish data. These new standards aim to support the governments in publishing more high-quality information and datasets.

After the release of the high-value datasets regulation act, the open data team will develop some additional standards in order to include those datasets as well by the end of 2022.

4.2 Impact

4.2.1 Current situation and the open data journey

Monitoring and understanding open data re-use

Understanding the level of re-use of Ukrainian open data has been the key highlight of the past year. Central government bodies focus on monitoring and communicating the re-use of open data, as the number of requests from public bodies to understand the level of re-use is increasing. As a result, a catalogue of apps that use open data are available at Diia Open Data⁸⁸ (see more information below) which is regularly updated by users and the Ministry of the Digital Transformation.

The key measuring mechanism of open data development across ministries and cities is institutionalised in the Decree 835. This mechanism has four key chapters - policy, capacity, publishing the data, and quality and re-use. Since the measuring mechanism is institutionalised in the Decree 835, all public bodies are obligated to monitor their open data programs, including the re-use of their own or other public bodies' open data.

⁸⁸ <https://diia.data.gov.ua/services>

Open data re-use example

From 2017 until 2020, an open data survey was conducted by the USREOU to gain insights into men and women in leadership positions. In 2020, the study "Women and Men in Management Positions in Ukraine"⁸⁹ was published, highlighting gender-related trends in management positions, such as regional or sectorial differences and the development over time. The researchers created an 'interactive story'⁹⁰, which explains the main conclusions of the study by scrolling through different diagrams, see figure 6. Additionally, an 'interactive map' and an 'interactive scatter diagram' allow users to analyse the data themselves.

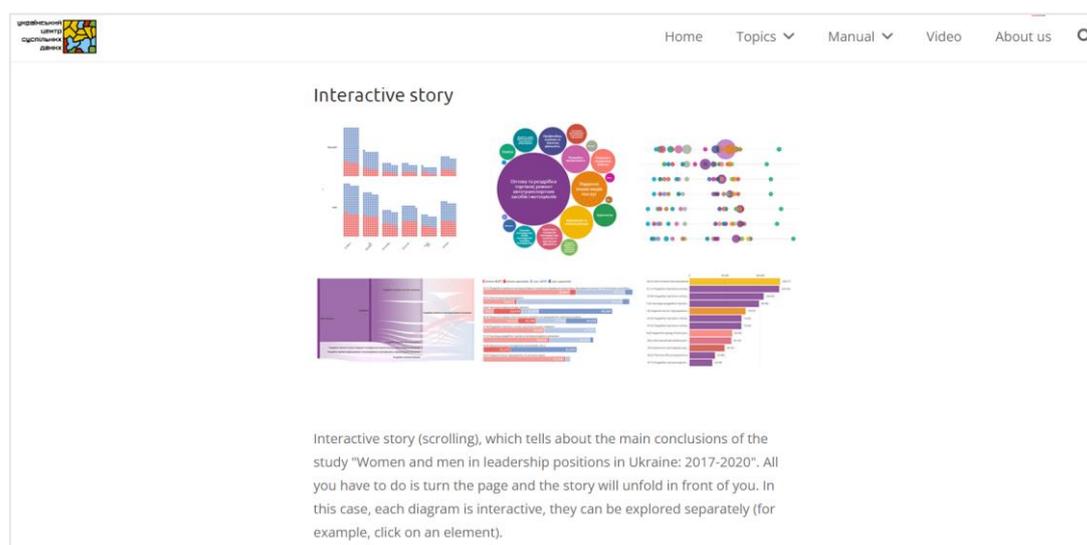


Figure 6: Interactive story on the study "Women and Men in Management Positions in Ukraine"

The 'Diia Open Data' (Action Open Data)

The Ministry of Digital Transformation launched 'Diia Open Data'⁹¹, as part of the national open data portal. This is a centre of competence in the field of open data, which aims to increase the level of knowledge about open data, its impact and benefits for everyone and help Ukraine to become more transparent. The platform offers a dedicated 'impact of open data' section⁹², see figure 7. This section offers various focus areas, such as ecology, construction, health, etc. For each focus area there is description of the benefits of open data, examples of open data re-use, and how exactly open data creates impact. New features of the portal are continuously shared with users, to boost the re-use of open data.

⁸⁹ <https://socialdata.org.ua/napryamki/doslidzhennya/edrpou-gender-2020/>

⁹⁰ <http://socialdata.org.ua/projects/edrpou-statistics/gender-story/>

⁹¹ <https://diia.data.gov.ua/>

⁹² <https://diia.data.gov.ua/value>

The screenshot shows the 'Impact of open data' catalogue on the Diia Open Data website. The page has a clean, modern design with a white background and blue accents. At the top, there is a navigation menu with links for 'About the project', 'Influence', 'News', 'Join', 'Team', 'OpenData', 'Topics and courses', 'Portal', and 'Use of open data'. A 'Register' button and a 'Log in' button are also visible. The main content area is divided into four columns, each representing a different sector: Construction, Infrastructure, Health, and Ecology. Each column contains a brief description of the impact of open data in that sector. On the right side, there is a 'Join' section with a light blue background, which includes a call to action: 'Want even more data available? Do you use open data, have an idea, but do not know how to implement? Tell us about it' and a 'Go to the forum' button.

Figure 7: The 'impact of open data' catalogue of Diia Open Data

Measuring open data impact

Measuring the impact of open data has been a topic of great interest in the past year. In the past, impact was being created, but there was not a structure in place on how to measure it. Therefore, the impact of open data will be specified in more detail in the upcoming 'Open Data Strategy 2021-2025'. To support interested parties, such as public bodies, in conducting research to open data impact, the Ministry of Digital Transformation offer guidelines for both a qualitative⁹³ and quantitative⁹⁴ approach to assessing the impact of open data.

Each study conducted by the open data team focusses on one of the three main pillars of open data impact in Ukraine: anti-corruption, economic impact, or social impact. The structure of the studies is threefold; (1) describe the problem that exists in the society, (2) explain how open data can solve this problem, and (3) collect re-use cases and stories from different organisations to provide concrete examples of the impact. This structure supports the team to learn more about open data impact, but also goes beyond this. By communicating the results via the media, it allows the team to have a tangible story to share with citizens, journalists and government officials, in order to show the potential value of open data.

Additionally, the Ministry of Digital Transformation in collaboration with the Transparency and Accountability in Public Administration and Services (TAPAS)⁹⁵ employ a framework to measure the impact of open data, utilising international best practices such as NYU's GovLab project⁹⁶. As a result, they launched a series of research on anti-corruption and social impact of open data in different sectors in Ukraine.⁹⁷

Within their efforts, the Ukrainian team experienced similar challenges as Estonia and Slovenia in measuring open data impact. There are many open data re-users, but it is difficult to know who exactly

⁹³ <https://diia.data.gov.ua/info-center/valuequality>

⁹⁴ <https://diia.data.gov.ua/info-center/valueqaunt>

⁹⁵ <https://tapas.org.ua/en/about-project/>

⁹⁶ <https://odimpact.org/>

⁹⁷ For example, within the healthcare sector: https://tapas.org.ua/wp-content/uploads/2021/01/Healthcare-OD-impact-study_ed.pdf, or within local government: https://tapas.org.ua/wp-content/uploads/2021/05/Open-Data-Impact-Report_Municipalities.pdf

is using what data. As users are free to use any datasets, data providers are not aware of all re-use examples.

Interacting with the open data community

There are different initiatives hosted in Ukraine to promote open data. For example, the fourth annual Open Data Forum (ODF)⁹⁸ took place in September 2020. The Open Data Forum is an annual Ukrainian nationwide event that brings together representatives of central and local authorities, Ukrainian and international experts, civil society, and start-up communities. The topic of development and re-using open data in Ukraine are at the centre of the event.

In March 2021, the Public Council at the Ministry of Digital Transformation of Ukraine initiated a round table 'Open data to every community'. During the event, participants discussed promising areas of open data development and effective re-use in the community's everyday life. The event was attended by experts, representatives of the Ministry, local governments, civil society organisations involved in the development of open data and anti-corruption activities.⁹⁹

The Ukrainian open data team also collaborates with academia. The online course 'Open Data for Civil Servants' offered on the national platform for digital education includes a lesson on the understanding of open data re-use¹⁰⁰. Already 18.000 government officials followed the course and learned on how to understand and measure re-use.

4.2.2 Future outlook

Ukraine experienced some wins in terms of creating open data, but more challenges are upcoming. For 2022, the Ukrainian open data team plans to open up more datasets and develop standards for the high-priority datasets. The number of data requests from users are increasing. Currently the demand is so high that political pressure is used to push government bodies to publish their data. When the initial list of high priority datasets was published, it was a matter of days before some services integrated the datasets and re-use example arose. Unfortunately, some datasets that can have major impact are not yet public for (potentially) political reasons. The team continues to advocate for these datasets to be published. The more publicly available datasets, the more impact can be created, and the more the demand for open data will increase.

At the moment of writing, Ukraine is conducting a new study to measure open data impact. The methodology is based on data.europa.eu's report 'The Economic Impact of Open Data: Opportunities for value creation in Europe'¹⁰¹. The full research, conducted by TAPAS, is planned for publication in March 2022.

4.3 Portal

4.3.1 Current situation and the open data journey

The Ministry of Digital Transformation of Ukraine is creating and ensuring the functioning of the national open data portal¹⁰². In 2015, the portal has been established within the TAPAS programme, with the support of the United States Agency for International Development (USAID)¹⁰³ and the UK

⁹⁸ <https://odf.data.gov.ua/en/>

⁹⁹ <https://diia.data.gov.ua/news/kruhlyi-stil-open-data-v-kozhnu-hromadu>

¹⁰⁰ <https://osvita.diia.gov.ua/courses/open-data>

¹⁰¹ <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

¹⁰² <https://data.gov.ua/>

¹⁰³ <https://www.usaid.gov/>

aid¹⁰⁴ from the UK government. The aim of the portal is to ensure timely publishing of information and data that meet the definition of public information, provide interaction between users and data providers, offer feedback channel.

Ukrainian open datasets

The portal hosts a data catalogue containing more than 42.000 datasets. The structure of the open dataset includes a description of the dataset, its format, parameters, and purpose. Using the filtering options users can search through the catalogue. In addition, the portal offers a dedicated 'groups' page¹⁰⁵. The groups include the high-value datasets categories indicated in 'Decree 835' see section 5.1.1 for more information. After the adoption of high-value datasets, a new group will be added. Users can use groups to create and manage dataset collections for a specific project or on a selected topic. It can also be an easy way for data providers to and find their own published datasets.

All public sector data providers have to publish their data on the portal. On the central level, approximately 80% of providers already publish data, and pro-actively reach out to others. The main reason why not all the required datasets are published are technical incompatibilities of publishers and lack of human resources.

Analytics and Feedback

Every month, around 5-7 million users visit the open data portal generating a large amount of user statistics from which valuable insights into user needs can be retrieved. All portal features are being monitored to understand its popularity and gain insights into user needs. The portal usage is traced using Google Analytics and the insights are displayed on the portal in a transparent manner, see figure 8. This dedicated section provides insights into most popular pages and search terms, the API usage, or the development of the available datasets. Tracking user analytics is a crucial source of information for the open data team in order to continue to improve the portal.



Dynamics of creating new data sets

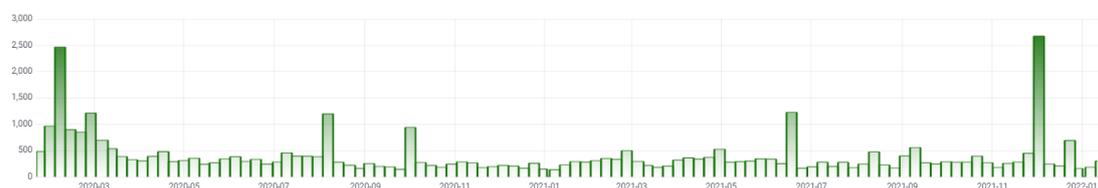


Figure 8: Analytics section of the Ukrainian open data portal

Improving the portal does not solely depend on analytics, it is complemented by, maybe an even more important source of information, user feedback. The Ukrainian open data team highlights that they

¹⁰⁴ <https://www.ukaidirect.org/>

¹⁰⁵ <https://data.gov.ua/group>

never make decisions regarding the portal themselves, updates are always based on user feedback and usage.

User feedback is collected in multiple ways. First of all, there is a general feedback form available for all users¹⁰⁶. Also, each dataset provides a feedback mechanism for authorised users. Additionally, an annual user survey is being conducted to learn more about their users' needs. The most recent survey took place in March 2021¹⁰⁷, and the analysis of the survey was published in May 2021¹⁰⁸. To accompany the continuous collection of feedback, last year, a poll was created where users were asked how the portal could be improved for both data re-users and data holders. The feedback collected there formed the basis for the upcoming modernisation of the data portal.

4.3.2 Future outlook

In 2022, they plan to implement a great revision of the portal. The open data team hopes that the open data portal will be even more user-friendly for their users.

4.4 Quality

4.4.1 Current situation and the open data journey

Complements and accuracy of metadata

The Ukrainian open data portal uses European legislation and guidelines to structure their approach to open data as mentioned before. This is also visible in the open data quality dimension. The law 'Access to Public Information'¹⁰⁹ states that all open data in Ukraine corresponds to Creative Commons Attribution 4.0 International license. Additionally, the Ukrainian open data portal supports DCAT-AP standards. More than 90% of the portal's metadata is compliant with the mandatory and recommended classes of DCAT-AP.

When publishing datasets on the Ukrainian open data portal, a team of moderators validate the correctness of the metadata. Once published, the metadata is frequently checked for accuracy. A mechanism of automatic validation of datasets is introduced on the portal. If errors are found in the metadata, the validator notifies the data providers. All non-updated datasets are marked accordingly.

Additionally, the portal implemented a Business Intelligence (BI) tool for monitoring metadata, the 'Analytical module of the Unified State Web Portal of Open Data'¹¹⁰. This extensive analytics module is designed to analyse the quality of datasets and its metadata using interactive visualisations. Topics that are covered by the dashboard include dynamics of updating the datasets, the quantitative characteristics of the metadata, the use of licenses, and a comparison of dataset formats.

¹⁰⁶ <https://data.gov.ua/en/feedback>

¹⁰⁷ <https://diia.data.gov.ua/news/do-uvahy-korystuvachiv-datagovua>

¹⁰⁸ <https://diia.data.gov.ua/news/provedeno-opituvannya-koristuvaciv-jedinogo-derzavnogo-veb-portalu-vidkritix-danix>

¹⁰⁹ <https://zakon.rada.gov.ua/laws/show/2939-17#Text>

¹¹⁰ <https://data.gov.ua/pages/analytyka>

Guidance

The Ukrainian open data team support the data providers in publishing high-quality data in multiple ways. First, there are guidelines published by the Ministry of Digital Transformation:

- General instructions for data publishers¹¹¹
- Recommendations for data publishers to improve the quality of their data and metadata¹¹²

Additionally, the Ministry of Digital Transformation in partnership with the National Agency of Ukraine for Civil Service Affairs¹¹³, the TAPAS project, and the Eastern Europe Foundation¹¹⁴ have created a training programme containing all necessary components to support data publishing. The goal of this programme is to provide civil servants and local government officials with the necessary skills to publish datasets, understand open data policy, and learn about its impact.¹¹⁵

Finally, when a new digital service is being created, for example on the portal, the open data team analyses what data can be collected after the system is realised. This data will then be published in the form of open data. In other words, every new digital service has the feature to generate high-quality open data without human interaction. This system is compliant with one of the main strategic goals, 'Open by Default'.

4.4.2 Future outlook

The Ukrainian open team recognises that the quality of datasets is one of the main challenges in Europe. This is also confirmed by the latest Open Data Maturity assessment, where the quality dimension, for the first time, matured the least compared to other dimensions. Therefore, this will be the main focus point for Ukraine in 2022. As the team states: *"Machine-readable data is hard to produce, but easy to use"*. To improve open data quality, the team will develop new standards for typical and high-value datasets and continue to always ensure close communication with their data providers. Also, with the upcoming revision of the open data portal, the team aims to improve the quality of open data even more.

¹¹¹ <https://data.gov.ua/uploads/files/2018-08-27-090121.57665910.2.-.pdf>

¹¹² <https://data.gov.ua/pages/835-rec-index>

¹¹³ <https://nads.gov.ua/>

¹¹⁴ <https://eef.org.ua/en/>

¹¹⁵ <https://diia.data.gov.ua/news/navchalna-prohrama-vidkryti-dani-dlia-derzhsluzhbovtsiv-praktychnyi-kurs>

5 Country comparison

Throughout the report, the open data practices have been discussed of Estonia, Slovenia, and Ukraine across the four open data dimensions – policy, impact, portal, and quality. The approaches of these three countries have many similarities, but also some differences. These are described below, structured along the four dimensions.

Policy

A clear commonality of the three open data approaches is that they all have a dedicated open data policy and strategy in place. Moreover, they have an implementation plan through which the strategy is made actionable, and all stakeholders can understand their responsibilities. The open data teams drive the national efforts on open data even further, by acting as a safekeeper of the strategy and following up on the actions from other stakeholders. Instead of being reactive, the open data teams' proactive attitude towards supporting public sector bodies in opening up their data has a game-changing positive effect on the amount of data that is available on their national data portals. Additionally, it leads to a more and more enthusiastic attitude within their open data community towards open data and the potential value it can generate.

There are also differences visible in the three approaches. The Ukrainian government operates in a decentralised system. The focus therefore lies on strengthening regional open data policy and enabling all local municipalities to easily deploy, adopt and use a solution for a local open data portal. This is different from Estonia and Slovenia who implemented a more centralised way of working. For example, Estonia organises working groups to bi-monthly gather all relevant stakeholders and discuss action points, the open data policy and strategy, upcoming events, etc. The Slovenian government operates on a two-level system, the state and the municipalities. Using centrally organised stakeholder group meetings, they easily keep oversight on all open data publishers. Both systems have proven to be successful as long as a clear open data policy and strategy is set in place.

To continue their path of growth, regular updates and additions to the existing policies, strategies, and action plans are vital. With the upcoming release of the implementing regulation regarding the high-value datasets, updates can be expected on all three fronts.

Impact

Several common ways of monitoring, measuring, and creating impact can be observed from the three countries. First, all countries closely monitor the activity on the portal, such as dataset downloads, popular search terms, etc. This offers insights into sectors and topics where demand is high, and impact is already being created or can be created in the future. Secondly, there is a large focus by each of the open data teams on community engagement through events such as conferences, seminars, hackathons, etc. At these events, the open data teams can get to know the different types of re-users as well as explore why and how they re-use the datasets – which is oftentimes difficult. Moreover, these events as well as setting up communities around specific data topics open the dialogue between the re-users and data providers. Thirdly and finally, the countries follow the growing trend towards conducting in-depth research, such as desk research or surveys, in order to quantify and verify the open data impact. All three countries indicate to have either re-used themselves or requested support to deploy the methodology developed by data.europa.eu in the 'The Economic Impact of Open Data Opportunities for value creation in Europe' report to measure open data impact within their country.

Measuring open data impact is a multifaced and complex topic, which all three countries recognise, as it is difficult to track who uses data for what purposes. Ukraine is the most developed within this field as they have conducted multiple impact studies already, offer both a generic and re-usable

quantitative and qualitative approach to measuring open data, and additionally created a dedicated 'impact of open data' section on their portal. Both Estonia and Slovenia define open data impact mostly by open data re-use cases but have conducted studies in the past to measure the impact of open data. Estonia takes it a step further by conducting an annual survey to gain a deeper understanding of where and how impact is being created.

The shift in focus from simply monitoring portal usage into gaining a deeper understanding will continue and offer more reliable insights in the future. With the increasingly enthusiastic open data community, impact is expected to increase even more over time.

Portal

The three countries envision their portal to become a one-stop-shop for open data, including both public and private datasets as well as different types of useful information such as guidelines, trainings etc. A common focus is the interaction between data publishers and re-users through the portal, by enabling dataset-specific and general feedback systems, options to request data, and rating systems. All countries have a system in place to track user statistics and indicate to use these insights to improve the portal. It shows that the way to success is to continuously evaluate the portal. Estonia implemented a big relaunch in 2018 which increased the user friendliness of the portal, and this progress is visible in their maturity score. Ukraine and Slovenia also indicate that a relaunch of the portal is upcoming in the near future.

The countries use different approaches to involve the user in the development of the portal. The Ukrainian open data team states to never make decisions regarding the portal themselves, updates are always based on user feedback and usage. They offer an annual user satisfaction survey to gain a deeper understanding of user demand. Slovenia learns about user demand mostly by hosting events such as stakeholder group meetings. Similarly, Estonia learns about their users by hosting a training programme and test the portal and gain feedback on the go.

The positive user experience is expected to further increase as it becomes easier to find all the necessary information regarding open data in one place. Continuous updates of the portal are crucial in order to keep the leading position within the open data sphere. As discussed, Ukraine and Slovenia are planning a big revision in the near future. Slovenia will host a tool, the 'open data laboratory' to perform more advanced analyses. All these efforts have the aim to, among others, enhance the user experience.

Quality

A common focus on safeguarding the quality of the data and metadata can be observed in each country. In doing so, all countries make manuals and technical guidelines available to support data providers in the publication process. In addition, data publishers are also actively trained by the national open data teams through workshops and training programmes. All national open data portals are DCAT-AP compliant and have proper licensing regulation in place. Finally, the aforementioned proactive attitude towards supporting data providers is also applicable in making sure the metadata is accurate and complete. For example, Estonia uses the working groups to inform and remind data providers about missing or incomplete metadata.

A minor difference is found in the way metadata is being added to new datasets on the open data portal. In Estonia this is performed manually, while in Slovenia and Ukraine this is harvested automatically. Nevertheless, a manual validation is being performed by the open data team of Slovenia and Ukraine in case of new datasets. After the initial publication and justification, the metadata is automatically being validated and incomplete datasets are marked accordingly in all three countries.

Currently the open data quality dimension is the least mature dimension of the Open Data Maturity assessment across Europe, and the open data teams recognise the European focus on increasing quality. A shift is being made from improving on the quantity of data to the quality of data, for example by establishing new standards to increase interoperability of the data and encourage open data re-use even more.

6 Conclusion

This report dived into the open data practices of three countries that showed impressive growth in their maturity score according to the 2021 edition of the Open Data Maturity assessment: *Estonia*, *Slovenia*, and *Ukraine*. Each chapter focused on countries' open data best practices structured along the four open data dimensions – policy, impact, portal, and quality. The insights represented throughout this report were collected via both in-depth interviews with the respective open data teams and using the extensive questionnaire the teams filled out as part of the Open Data Maturity assessment 2021.

All three countries show some similarities and differences in their approach but prove that there are multiple ways to success. What stands out is that all three countries have a clear open data policy and strategy including a concrete and realistic action plan. All countries focus on establishing a large and enthusiastic open data community consisting of both data providers as well as data re-users. This, in combination with a continuously revised and updated national open data portal taking into account user feedback and user statistics, allows for these three countries to create impact – economic, social, political, or environmental – by appropriately re-using open data.

For the future, it is important that the open data teams continue to drive forwards and set an example in the ever-changing market of open data. It can be expected that especially open data quality will show an increase in the short-term. The national open data portals are in place and most public sector bodies contribute to the platform. The challenge is to accommodate accurate and complete metadata, which is continuously monitored, and allows for interoperability. Beside a push on the quality dimension, a trend can already be observed within the impact dimension. Monitoring and measuring open data impact is becoming increasingly important. New research on open data impact will be published soon, while at the same time the increasing size of the open data community are enthusiastic to create more impactful re-use cases.

The best practices on each of the open data maturity dimensions explored in this report can be of great benefit for all countries in Europe and beyond to be inspired, learn from, and implement to improve their own practices.