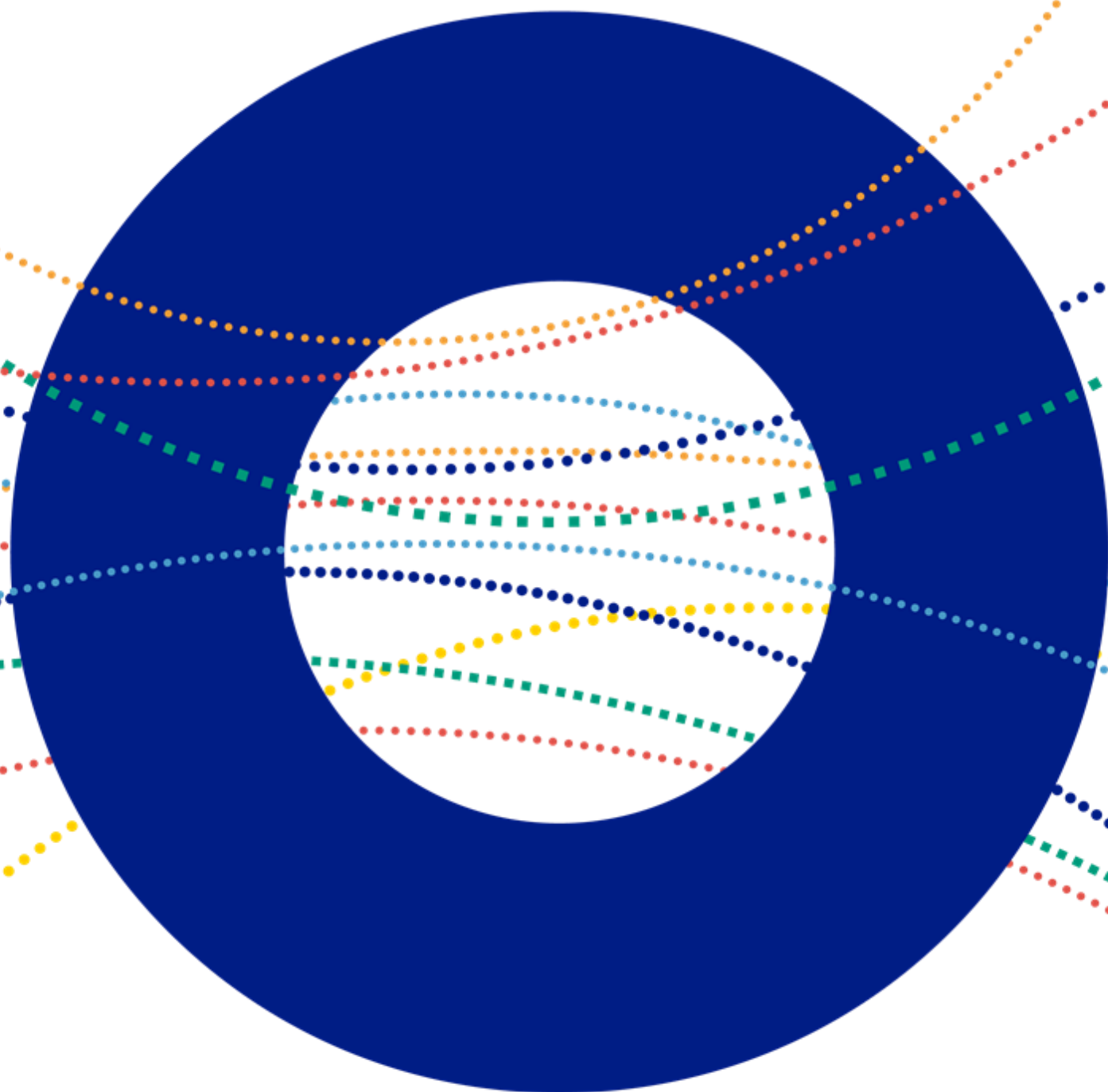




Open Data Maturity Report 2022



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Executive Summary

The *Open Data Maturity* assessment 2022 benchmarks the development of European countries in the field of open data. In this eighth consecutive annual report by data.europa.eu¹ (formerly European Data Portal), 35 countries participate, including the 27 EU Member States, 3 European Free Trade Association (EFTA) countries (Iceland, Norway, Switzerland), 4 candidate countries (Albania, Montenegro, Serbia, Ukraine) and Bosnia and Herzegovina. This report aims to help participating countries to better understand their level of maturity, to capture their progress over time, to find areas for improvement and benchmark their maturity against other countries. Additionally, the study provides an overview of best practices implemented across Europe that could be transferred to other national and local contexts.

The assessment measures maturity against four open data dimensions:

- **Policy:** focusing on countries' open data policies and strategies;
- **Impact:** looking into the activities to monitor and measure open data reuse and its impact;
- **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.

In 2022, the Open Data Maturity report methodology underwent a revision: all four dimensions were streamlined, with the indicators for the impact dimension being completely restructured. The methodological updates allowed for the better inclusion of policy changes related to the Open Data Directive and the implementation of high-value datasets², and to further integrate aspects such as the distinction between reuse and impact creation through this reuse. This new methodology aims to stimulate EU Member States and other countries to improve and grow beyond previous assessments and to ensure consistency and comparability of the results.

This year's Open Data Maturity assessment is characterised by three trends, as described below: a good level of preparedness of EU Member States with respect to the upcoming obligations relating to high-value datasets; measuring open data impact as being a priority but also still a major challenge across Europe; and some common new and old difficulties emerging post-pandemic. After detailing these three trends, this report summarises the overall ranking, country clustering, and developments per dimension.

Trends and findings of the Open Data Maturity assessment 2022

1. EU Member States are preparing for the high-value datasets implementing regulation

The Open Data Directive (Directive (EU) 2019/1024)³, which the Member States were obliged to transpose by July 2021, forms the basis for the reuse of data from the public sector and aims to overcome the barriers that still prevent the full reuse of public sector information. To achieve this, the Directive encourages EU Member States to facilitate the reuse of public sector data with a specific focus on publishing datasets that have a high potential economic and societal impact (the so-called

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 High-value datasets are datasets with a high potential economic and societal impact. The Open Data Directive encourages EU Member States to facilitate the reuse of public sector data with a specific focus on publishing the following categories of datasets: geospatial, earth observation and environment, meteorological, statistics, companies and company ownership, and mobility.

³ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L1024>

high-value datasets). This encouragement should take the form of an implementing regulation that is expected to be adopted in late 2022 or early 2023 and begin to apply 16 months later.

Although the regulation has not yet been adopted, this year's assessment provides an overview of the level of preparedness of EU Member States in complying with the requirements across the four dimensions of open data maturity. 96% of EU Member States are working on identifying high-value data domains to be prioritised for publication, especially statistics, geospatial, earth observation and environment, and meteorological data categories. 85% of the EU27 are already preparing to monitor and measure the level of reuse of high-value datasets and all of them aim to promote or are already promoting high-value datasets on their portal. Finally, 63% of EU countries are preparing to ensure the interoperability of high-value datasets alongside available datasets from other countries.

2. Measuring open data impact is a priority for EU Member States but also a big challenge

This year, the impact dimension experienced the largest decrease compared to the other dimensions, going from 78% in 2021 to 71% in 2022. This seven percentage points drop is in line with the methodological restructuring of the dimension, which also makes it difficult to perfectly compare the indicators of 2022 with the ones of previous years.

Moreover, this lower result should not so much be seen as a decrease in the maturity level of EU countries. The fact that countries are still scoring high in the strategic awareness indicator – which was also used in the 2021 assessment – proves that the EU27 are still very much interested in understanding and capturing open data reuse and value creation, as pointed out in the trends of last year's assessment. Rather, the decrease in the impact dimension provides a more accurate picture of the difficulty of EU countries to distinguish and assess reuse of open data and the impact resulting from it. While in monitoring and measuring reuse they continue to be quite advanced (EU average is 75%, similarly to last year), collecting data on the impact created, especially from an economic perspective, seems to be more difficult for countries.

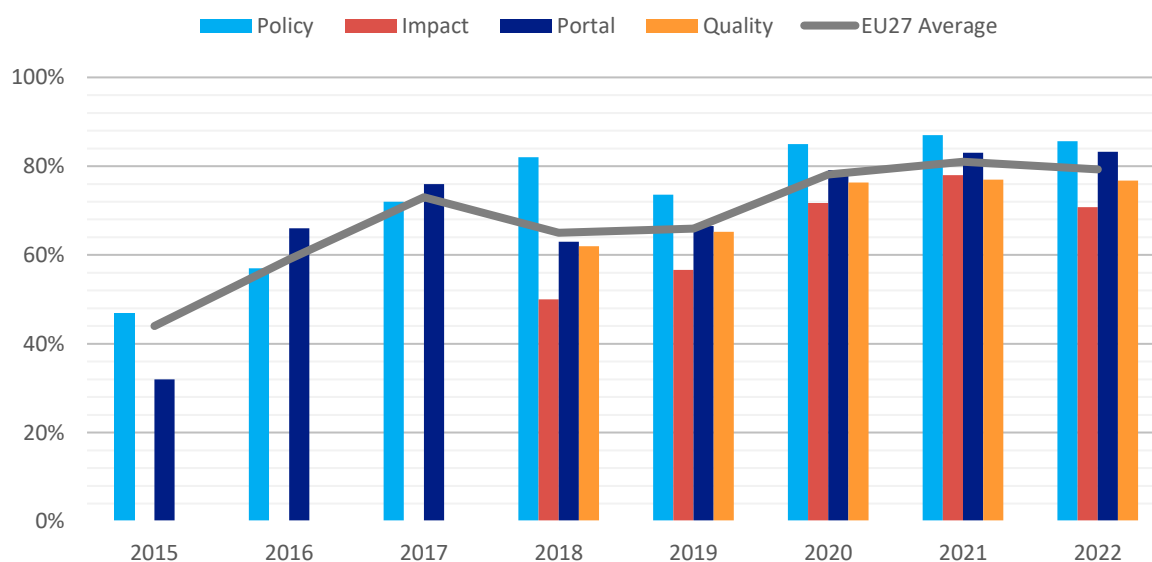


Figure 1: The Open Data Maturity scores of the EU27 (EU28 until 2022)

3. In a post-pandemic world, European countries face new and old common challenges

From year to year, EU Member States have been recovering from the pandemic, for example by leveraging open data for the development of statistics, dashboards and warning apps. This year, the Russian aggression to Ukraine and the consequences of this conflict for the European economy and energy market set the scene for new socioeconomic challenges at European level. Ukraine has reported that the war has had a significant impact on their work on open data, especially as Ukrainian internet resources (particularly state-owned ones) have been temporarily unavailable. Nevertheless, they have managed to continue improving their open data maturity level and excel in the policy dimension. The potential of open data was also leveraged by other countries in Europe to respond to the consequences of the war in Ukraine. For example, some countries have reported to rely on open data to monitor the level of energy use or to facilitate the integration of Ukrainian refugees in their labour market.

Besides the war in Ukraine, further challenges are highlighted by participating countries:

- Human resources and skills: Several countries stress the lack of human resources allocated to open data and the absence of adequate data skills and literacy among civil servants;
- Availability of financial resources: This challenge pertains, for example, to finding recurring budget for specific datasets (e.g., high-value datasets), as well as to not having a planned budget in place;
- Coordination issues: The EU27 often report difficulties in allowing a smooth data management governance across levels of government;
- Engagement with the open data topic: Incentivising different players to provide and use open data is a challenge widely spread across the EU;
- Various aspects of publishing open data: More support, in legal, technical, and financial terms, is needed when it comes to the publication of high-quality open data.

The overall Open Data Maturity scores in 2022

Figure 2 illustrates the overall open data maturity scores of all 35 participating European countries in 2022.

- European countries are investing resources to increase their maturity across the board. In this year's landscaping exercise, several of the dimensions were updated to reflect the current open data setting and to more accurately reflect countries' progress since last year. This is reflected in the slight decrease of the overall EU27 and EU27+ average.
In 2022, the average open data maturity score of the EU27 countries is 79%, a decrease of 2 percentage points compared to 2021.

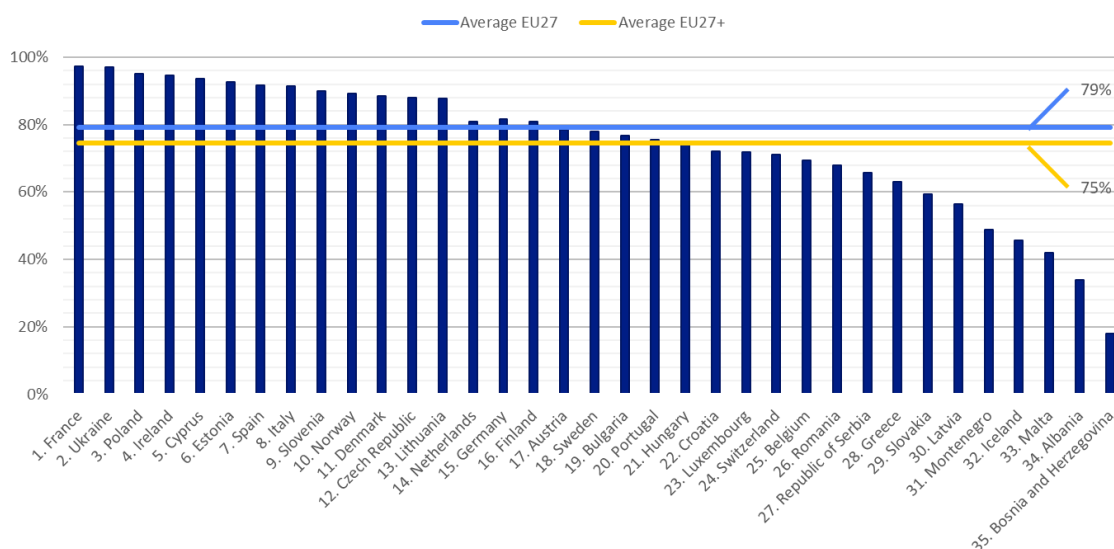


Figure 2: The overall Open Data Maturity scores of the 2022 assessment

The clustering of the countries in 2022

The Open Data Maturity clusters are presented in Figure 3. The 2022 clustering exercise categorises countries – from low performing to high performing – as beginners, followers, fast-trackers, and trend-setters. The figure shows that:

- The maturity of European countries is concentrated in the higher end of the spectrum (above 65%).
- The trend-setters cluster consists of the eight top performing countries: France, Ukraine, Poland, Ireland, Cyprus, Estonia, Spain and Italy.
- The five countries included in the fast-trackers cluster show highly similar scores, as the cluster is concentrated on a range of 3% (88 to 91 percentage points).

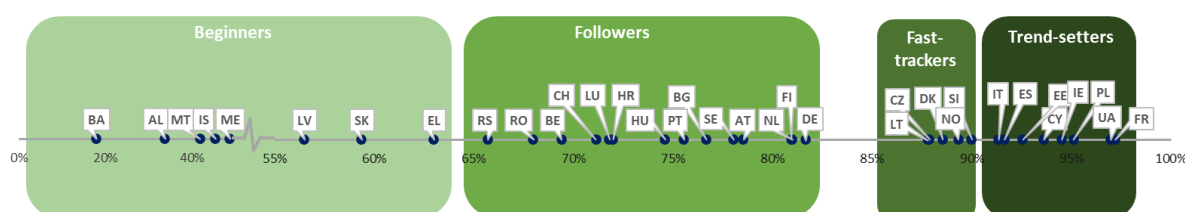


Figure 3: Clustering of the 2022 maturity scores of the participating European countries

Open Data Maturity scores on the four dimensions in 2022

Figure 4 shows the average maturity level of the EU27 on each of the four dimensions and compares it with last year's score. The figure shows that:

- All figures show a slight decrease or the same score as last year. The dimensions with a lower score than 2021 are policy and impact, which underwent several changes to the methodology.
- Similar to 2021 and 2020, policy is the most mature dimension with a score of 86%.
- The impact dimension shows a seven percentage point decrease, which reflects the updated methodology and questions targeted to more accurately gauge the different countries' progress.
- The portal dimension stays stable since last year and is the second most mature dimension.

- The quality dimension shows limited improvement and is the third most mature dimension.

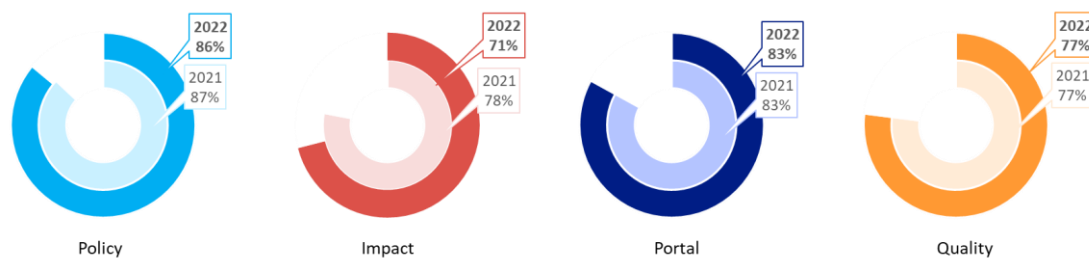


Figure 4: The 2022 maturity scores of the EU27 per dimension compared to last year

Introduction

Data.europa.eu is the main point of access for European open data and was born out of the consolidation in 2021 of the European Data Portal (focused on open data from national open data portals) and the EU Open Data Portal (focused on open data from EU Institutions and projects). Data.europa.eu aims to improve access to open data, foster high-quality open data publication at all levels, and create impact through open data reuse.

The Publications Office of the European Union and the Directorate-General for Communications Networks, Content and Technology have conducted an annual benchmarking exercise on open data since 2015. The objective of the study is to support the development of open data practices and enable them to learn from one another. This report provides an extensive assessment of the Open Data Maturity (ODM) benchmarking exercise for 2022, focusing on the maturity level of European countries for open data and documents their year-on-year progress.

The ODM report presents some best practices implemented across Europe that could inspire other public administrations, international organisations and further interested parties. Complementary to this report, the data gathered this year – as well as in previous editions – is publicly available on the Open Data Maturity Dashboard on data.europa.eu⁴. In addition, country-specific factsheets are displayed to provide a more detailed overview and showcase the results on the four open data dimensions, namely *policy*, *impact*, *portal*, and *quality*. The reader benefits from an easy-to-read comparison of the Member States' average and the results from previous years. To promote cross-learning and ensure transparency, this year's questionnaires filled by participating countries are made available on the portal. These include final scoring and textual information (except for personal data) to provide the reader with more insights into the methodology behind the results.

Countries participating in the Open Data Maturity report 2022

This year, 35 European countries responded to the Open Data Maturity self-assessment. These countries can be divided in four main groups:

- **The EU27:** Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden;
- **The European Free Trade Association (EFTA) countries:** Iceland, Norway, Switzerland;
- **Candidate countries to join the EU:** Albania, Montenegro, Serbia, Ukraine;
- **Bosnia and Herzegovina, potential candidate country.**

The structure of the Open Data Maturity report 2022

The report is clustered into several sections, namely an introduction, seven chapters on the ODM assessment, and a summary of the conclusions drawn, as follows:

- **Introduction** on 'Measuring open data maturity' summarises how open data maturity is measured within the assessment following the methodology update conducted in March 2022.
- **Chapters 1-4** provide a detailed assessment of the four open data dimensions in the 27 EU Member States, namely *policy*, *impact*, *portal*, and *quality*.
- **Chapter 5** offers an overview of open data maturity in countries outside the EU27 that participated in the 2022 edition of the assessment.

⁴ <https://data.europa.eu/en/impact-studies/open-data-maturity>

- **Chapter 6** presents the clustering of the countries into four categories according to their performance, ranging from beginner to followers, fast-trackers and trend-setters, and includes key insights into each grouping.
- **Chapter 7** outlines a set of recommendations for the countries depending on the cluster with which they are associated, with an indicative guidance for policymakers, portal owners, and other stakeholders to bring their agenda on open data forward.
- Finally, the **conclusions** underline the main takeaways and reflections from the 2022 landscaping exercise.

Measuring Open Data Maturity

This is the eighth edition of the annual open data maturity assessment. In the period 2015-2017 the ODM measurement was built on two key indicators: readiness and maturity, covering national policy developments and the corresponding level of sophistication for national open data portals. A first update to the methodology was carried out in 2018 to better reflect the open data developments taking place across Europe. The 2018 methodology became more ambitious and comprehensive and set a stronger focus on the quality of open data as well as on the reuse and impact derived from open data. The scope of the assessment has since been broadened to comprise four dimensions: policy, impact, portal, and quality.

Every year, the data is collected through a questionnaire sent to the national open data representatives working in collaboration with the European Commission and the Public Sector Information (PSI) Expert Group. While the assessment was born as an exercise focused on EU Member States, over the years it has expanded to include countries in Europe that are not part of the EU, such as EFTA countries and candidate countries.

The questionnaire sent to participating countries is structured along the four open data dimensions and includes detailed metrics for each dimension to assess the level of maturity. Dimensions and metrics have been maintained since 2018 to improve clarity or address ambiguities in response to the open data representatives' feedback. This year, a revision of the methodology was conducted. The goal was to further challenge European countries in their open data maturity level and keep pace with policy changes in the field. To this aim, all four dimensions and related questions were reviewed.

For policy, portal, and quality, no major restructuring took place, but questions were streamlined to better include regional and local realities and specific types of open data. In this latter respect, an important update of this year's methodology is a stronger focus on countries' level of preparedness for the European Commission's upcoming implementing regulation on high-value datasets. In line with this, questions regarding high-value datasets were added to all four dimensions: policy, impact, portal, and quality. These questions explicitly ask about preparatory measures that countries might have initiated in advance of the implementing regulation and the actions – taken to date.

The second major change to the 2022 methodology consists of the re-structuring of the open data impact dimension. The goal of this re-structuring is to better acknowledge the challenge countries face with assessing open data impact and to better distinguish between measuring the reuse of open data and the impact created through this reuse. In fact, as rightfully pointed out by many countries in their feedback, having a reuse case does not equal having an impact. Therefore, the new open data impact dimension is now made up of three indicators:

1. Strategic awareness, which, as in previous assessments, investigates how important it is for countries to understand the level of reuse and the impact of open data on their territory;

2. Measuring reuse, a new indicator that analyses if and how countries, based on the above-scrutinised level of strategic awareness, measure the reuse of open data in their territory;
3. Creates impact, which looks at the impact created by open data reuse on the four impact areas used in previous studies: governmental (previously called political), social, environmental, and economic impact.

The definitions of the four open data dimensions, including a more detailed description of the new impact dimension, are outlined below. The detailed metrics per dimension are presented in the table.

Open Data Policy focuses on the open data policies and strategies in place in the participating European countries. It analyses the national governance models and the measures, also at regional and local level, applied to implement those policies and strategies. To achieve this, the dimension is based on the same three indicators used for last year's assessment, namely policy framework, governance of open data, and open data implementation⁵. In line with the methodology update conducted in 2022, however, some additional questions were brought in for each indicator. The aim is to better consider federal and regional realities in Europe as well as to focus on the promotion of specific types of data, such as geospatial data, citizen-generated data, and high-value datasets. In addition, the objective of the content and order update of this dimension's questions is to investigate further the alignment of European policies and strategies with the priorities of the European Commission for 2019-2024⁶. Overarching objectives and challenges of the countries are also considered.

Open Data Impact analyses the willingness, preparedness and ability of European countries to measure both the reuse and the impact of open data. Firstly, the dimension investigates how prepared countries are to measure the level of reuse and the impact of open data within their territory. This reflects the first indicator, *strategic awareness*, which was also used in previous editions of the study. Secondly, the focus is placed on if and how countries measure the reuse of open data and with which methods. This is done through the newly added indicator *measuring reuse*. Finally, the dimension concentrates on gathering data on the impact created within the four impact areas that have been considered in previous Open Data Maturity assessments, namely the governmental (previously political), societal, environmental, and economic impact areas. This is achieved through the third indicator, *created impact*.

Open Data Portal focuses on the analysis of the national open data portal. It undertakes an in-depth analysis on the features and advanced functions, providing a successful user experience. Additionally, the dimension assesses the extent to which portal managers use web analytics tools to better understand their users' needs and behaviour and update a portal's features in line with the insights gained from these analyses. The dimension examines the open data coverage across different domains, as well as the approach and measures in place to ensure the portal's sustainability.

Open Data Quality focuses on the measures adopted by portal managers to ensure the systematic harvesting of metadata from sources across the country, as well as the currency of the available metadata and, where possible, the actual data. The dimension also monitors the compliance with the DCAT-AP metadata standard, as well as the quality of deployment of the published data. The fourth dimension provides all-round quality impulses for portal managers and policymakers: using open data

⁵ For further details on the sub-indicators, please refer to the methodological paper's section on 'Detailed dimensions and metrics'.

⁶ https://ec.europa.eu/info/strategy/priorities-2019-2024_en

formats and licenses, that data is machine-readable and of high-quality, and suitable to a linked data approach.

Dimension	Metrics
Open Data Policy	Policy framework
	Governance of open data
	Open data implementation
Open Data Impact	Strategic awareness
	Measuring reuse
	Created impact
Open Data Portal	Portal features
	Portal usage
	Data provision
	Portal sustainability
Open Data Quality	Currency
	Monitoring and measures
	DCAT-AP compliance
	Deployment quality and linked data

Chapter 1: Open Data Policy in the EU27

This dimension focuses on the open data policies and strategies in place in the EU countries, the national governance models to manage open data and the measures applied to implement those policies and strategies. To do so, the dimension is based on the same three indicators used for last year's assessment, namely policy framework, governance of open data, and open data implementation.

In line with the methodology update conducted in 2022, some additional questions were brought in for each indicator. The aim is to better consider regional and local realities in the EU as well as to focus on the promotion of specific types of data, such as geospatial data, citizen-generated data and more high-value datasets in general. In addition, the update to the content and order of this dimension's questions is designed to investigate further the alignment of EU Member States' open data policies and strategies with the priorities of the European Commission for 2019-2024⁷. Overarching objectives and challenges are also considered.

The table below summarises the indicators of the open data policy dimension:

Metric	Key elements
Policy framework	An open data policy and strategy are in place at national level to provide a long-term strategic vision and action plan for open data. The strategies incentivise open data reuse in both the public and private sectors, as well as access to real-time, geospatial and citizen-generated data. Preparatory activities regarding high-value datasets are in place and the policies and strategies align with the European Commission's priorities for 2019-2024.
Governance of open data	Governance models and regular coordination activities across public sector bodies are in place to ensure the publication of open data at all government levels and support local and regional open data initiatives. A regular exchange between open data providers and reusers from academia, business and other non-governmental organisations is also foreseen.
Open data implementation	Data publication plans and implementing processes exist. The number of public bodies that charge above marginal costs for open data is also monitored. Training activities for civil servants working with data are organised, along with society-wide open data literacy initiatives.

1.1 Policy framework

The first indicator – policy framework – analyses the open data policies, strategies, and action plans in the EU27 from a national and sub-national perspective. In particular, this indicator explores the measures in the mentioned plans and investigates whether actions exist to support access to and discoverability of specific types of data, such as real-time data, geospatial data and citizen-generated data. Furthermore, the first indicator looks into measures that are in place to incentivise the reuse of open data by both private organisations and public sector bodies, including, for example, data inventories to facilitate such reuse.

⁷ https://ec.europa.eu/info/strategy/priorities-2019-2024_en

In contrast to last year's edition, the policy framework indicator also provides an overview of whether EU Member States align the objectives of their policies with the six overarching European Commission's priorities for 2019-2024⁸, namely:

- *A European Green Deal⁹ – Transforming the EU into a modern, resource-efficient and competitive economy, while preserving Europe's natural environment, tackling climate change and making Europe carbon-neutral and resource-efficient by 2050.*
- *A Europe fit for the digital age¹⁰ – Embracing digital transformation by investing in businesses, research and innovation, reforming data protection, empowering people with the skills necessary for a new generation of technologies and designing rules to match.*
- *An economy that works for people¹¹ – Strengthening the EU economy while securing jobs and reducing inequalities, supporting businesses, deepening the economic and monetary union and completing the banking and capital markets union.*
- *A stronger Europe in the world¹² – Strengthening the EU's voice on the world stage by improving its standing as a champion of strong, open and fair trade, multilateralism and a rules-based global order. Boosting relations with neighbouring countries and partners as well as strengthening the EU's ability to manage crises based on civilian and military capabilities."*
- *Promoting our European way of life¹³ – Upholding fundamental rights and the rule of law as a bastion of equality, tolerance and social fairness. Addressing security risks, protecting and empowering consumers, as well as developing a system for legal and safe migration while effectively managing the EU's external borders, modernising the EU's asylum system and cooperating closely with partner countries.*
- *A new push for European democracy¹⁴ – Strengthening Europe's democratic processes by deepening relations with the European Parliament and national parliaments, protecting EU democracy from external interference, ensuring transparency and integrity throughout the legislative process, as well as engaging more widely with Europeans in shaping the EU's future.*

In addition, the indicator throws light on the implementation challenges met and the measures to address them by each country.

Finally, the policy framework indicator considers whether the EU27 have been taking any preparatory steps in view of the soon to be adopted implementing regulation on high-value datasets. This regulation provides a list of datasets whose reuse can have major benefits for society and the economy. It is based on the principal EU legislation regulating open data and the reuse of public sector information (PSI), also known as Open Data Directive (Directive (EU) 2019/1024)¹⁵. The Directive, which the Member States were obliged to transpose into their national legislation by July 2021, forms the basis for the reuse of data from the public sector and is the result of a significant EU policy effort that started in 2003¹⁶. The Open Data Directive aims to overcome the barriers that still prevent the full reuse of public sector information by encouraging Member States to facilitate the reuse of public

⁸ See above

⁹ https://ec.europa.eu/info/strategy/priorities-2019-2024_en

¹⁰ https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en

¹¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people_en

¹² https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world_en

¹³ https://ec.europa.eu/info/strategy/priorities-2019-2024/promoting-our-european-way-life_en

¹⁴ https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy_en

¹⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L1024>

¹⁶ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32003L0098>

sector data with a specific focus on publishing datasets that have a high potential economic and societal impact (the so-called high-value datasets).¹⁷

The adoption of the implementing regulation on high-value datasets is still an ongoing process. After adoption by the European Commission, a public consultation was open between May and June 2022. Following this, the draft was submitted for opinion to the Open Data Committee, which is composed of Member States' representatives. The implementing regulation will be adopted in late 2022 or early 2023 and begin to apply 16 months later. In sum, this indicator provides a first glimpse of the approach that Member States will use to implement the upcoming regulation, although not yet publicly available.

The following sub-paragraphs will discuss open data policies, open data strategies, action plans in the EU27, access and discoverability, plans to support the reuse of open data, and national priorities.

1.1.1 Open data policies

While all EU27 countries have an open data policy framework in place, approaches vary. Some Member States have laws transposing the Open Data Directive and previous EU Directives as the main element of their open policy framework.

In Denmark, the Act Amending the Law on the Reuse of Public Sector Information¹⁸ of 10 May 2021 (PSI-loven) implements the Open Data Directive 2019/1024 of 20 June 2019.

In Ireland, the Open Data Directive was transposed into Irish Law on 22 July 2021 through Statutory Instrument 376/2021, the European Union (Open Data and Reuse of Public Sector Information) Regulations 2021. Moreover, an official government circular¹⁹ was issued in December 2021, providing instructions and guidance for all public service organisations on implementing the Open Data Directive.

In Portugal, a law was published in August 2021 (Law No. 68/2021²⁰) to transpose the Open Data Directive 1024/2019. Among several topics, this law focuses on catalogues and inventories of documents and data available for reuse, including dynamic data and real-time data, with special attention paid to high-value datasets.

Other countries rely on extensive policy frameworks dedicated to open data, including task forces and green papers on data publishing.

In Poland, the Chancellery of the Prime Minister (CPM) pursues open data policy through the Open Data Programme and Open Data Act²¹. It also relies on open data projects, open data standards²² and its Repository for Science and Culture Resources²³ projects.

In Austria, a Task Force on Public Sector Information and Open Data²⁴ has been set up within the Federal Ministry for Digital and Economic Affairs with regard to implementing the Open Data and Public Sector Information Directive 2019/1024 and determining high-value datasets, as well as for promoting an open data policy.

¹⁷ <https://digital-strategy.ec.europa.eu/en/policies/psi-open-data>

¹⁸ <https://www.retsinformation.dk/eli/accn/A20210176429>

¹⁹ <https://www.gov.ie/en/circular/523a7-circular-202021-open-data-directive/>

²⁰ <https://dre.pt/dre/detalhe/lei/68-2021-170221042>

²¹ <https://dane.gov.pl/pl/knowledgebase/useful-materials/program-otwierania-danych-na-lata-2021-2027>

²² <https://dane.gov.pl/pl/knowledgebase/useful-materials/standardy-otwartosci-danych>

²³ <https://www.gov.pl/web/cyfrizacja/kronik-krajowe-repozytorium-obiektow-nauki-i-kultury> ; <https://kronika.gov.pl/> ; <https://konferencjakrajowa.pl/>

²⁴ <https://www.bmdw.gv.at/Themen/Europa/OesterreichinderEU/Open-Data-und-PSI.html>

In Estonia, in addition to the Public Information Act (PIA)²⁵ regulating data publishing in Estonia, including regulations regarding open data publishing, reuse of open data, and high-value datasets, there is also a green paper on machine-readable open government data²⁶, which gives guidelines on open data publishing.

Furthermore, Member States also include open data policies in broader strategic plans on data and digital government.

In Slovenia, the open data policy is included in a larger legislative framework. This is made up of provisions²⁷ to the Access to Public Information Act that implements the EU Reuse Directive and the Integrity and Prevention of Corruption Act²⁸, as well a strategic set-up, which includes the Strategy of the development of the Public Administration²⁹ and the Open Data of the Public Sector – the Strategic Working Plan for 2020-2021³⁰.

In Bulgaria, the open data principles are embedded in the National Updated eGovernment Strategy 2019-2025³¹, which provides for the implementation of a Registry reform, decreasing the use of unstructured data and setting obligatory compliance with the open data principle (data generated by the public sector shall be in an open-machine-readable format, allowing for its reuse).

1.1.2 Open data strategies

Similar to last year, 96% of respondents have adopted an open data strategy or an equivalent. Most countries have developed a dedicated strategy exclusively focusing on open data or have the open data aspect embedded into broader digital strategies.

In Belgium, the 'Projet de note stratégique pour une stratégie fédérale open data'³² focuses, among others, on the concept of 'open by default', economic aspects of open data, and the interaction with the community. To implement these concepts, 14 principles are put forward, among which are simple licencing models, five-stars-quality datasets, a task force of open data champions, etc.

In Luxembourg, the open data strategy³³ foresees the following points:

- *public sector institutions are invited to make their data available as much as possible, and to profit from existing open data;*
- *availability of complete and normalised metadata is an important factor in the open data project;*
- *datasets are to be made available online by the data producers, either at their own websites or at the level of the national open data portal, where all existing data should be registered. Links and APIs are to be used to avoid double storage of data and versioning differences and to permit access to live data;*
- *quality and precision of the tags assigned to the datasets allow for a focused search.*

²⁵ <https://www.riigiteataja.ee/en/eli/ee/510122021005/consolide/current>

²⁶ <https://www.riha.ee/api/v1/systems/eaatv/files/cdbfa8bd-2594-8ad3-6022-ff3d3dbf6781>

²⁷ <http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO3336>

²⁸ <http://www.pisrs.si/Pis.web/pregledPredpisa?id=URED6941#>

²⁹ <https://nio.gov.si/nio/asset/strategija+razvoja+javne+uprave+2015+2020>

³⁰ https://podatki.gov.si/sites/default/files/reports/Open%20Data_Strates%CC%8Cki%20delovni%20plan_julij2020.pdf

³¹ <https://bit.ly/3A0tCoR>

³² https://data.gov.be/sites/default/files/public/content/compressed_fr-strategisch-dossier.pdf

³³ <https://data.public.lu/fr/strategy/>

In Cyprus, the National Strategy 2017-2022³⁴ is based on four main pillars:

- *providing the required legal framework that promotes and encourages the supply of high quality and Public Sector Information for reuse (free or marginal cost, simple licences, dispute mechanism, etc);*
- *providing the necessary infrastructure for the dissemination of Public Sector Information in the form of a National Open Data Portal that is modern and fit for purpose;*
- *maintaining, expanding and supporting (through the provision of training, etc.) the already existing network of Public Sector Information Liaison Officers;*
- *promoting Public Sector Information in both private and public sectors through joint events and facilitating constant dialogue between suppliers and users.*

Similar to last year, 74% of Member States have updated either their strategy or their main open data policy within the past 24 months.

In Finland, the new government resolution³⁵ on the opening up and use of public data was drafted during 2021 and published in early 2022. The Ministry of Finance's 'Opening Up and Using Public Data'³⁶ is facilitating processes and creating strategic documents and recommendations. The project promotes wider and more effective use of public data throughout society, while strengthening and making concrete these information policy and strategy goals.

In Germany, the Federal Government's Open Data Strategy³⁷, adopted on 6 July 2021, provides a framework for action to improve the Federal Open Data Ecosystem. Over a five-year period, the Open Data Strategy covers three areas of action, with a total of 68 implementation measures taken by different federal ministries and authorities. It enhances the use and share of public data with information packages, webinars and other activities in order to support the data holders and publishers as well as the large number of other stakeholders. The three strands of action are: improving the provision of data and developing data infrastructures; increasing public interest and responsible use of data; and promoting data literacy and a data culture to increase the quality and usability of data provided.

In Sweden, the government proposed a new law³⁸ on making data from the public sector available. The amendments to the law entered into force on 1 August 2022.

Besides the national provisions, in 70% of the EU Member States local and regional public entities defined an open data policy or strategy.

In Lithuania, the national open data policy is mandatory, but at the same time authorities at local level are allowed to have their own strategies implementing national policy and national strategy. For instance, the Vilnius municipality has its own agenda on open data and its open data webpage³⁹.

1.1.3 Action plans

Compared to 2021, one more EU country indicated that it had an action plan to support the delivery of the policies and goals contained in the previously reported open data strategies. This means 26 out

³⁴ <https://bit.ly/3rqdWGL>

³⁵ https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164023/VN_2022_33.pdf

³⁶ <https://vm.fi/en/opening-up-and-using-public-data> ; <https://trello.com/b/acWYf1rD/tiha-hanke>

³⁷ <https://www.bmi.bund.de/SharedDocs/downloads/DE/publikationen/themen/moderne-verwaltung/open-data-strategie-der-bundesregierung.html>

³⁸ <https://www.regeringen.se/rattsliga-dokument/proposition/2022/04/prop.-202122225/>

³⁹ <https://api.vilnius.lt/>

of 27 Member States have a list of criteria and measures to be implemented in the open data field. For example:

In Slovakia, the National Strategy of the Informatisation of the Public Administration 2021⁴⁰ defines the following measures in the area of open data:

- *to transpose into legislative framework PSI Directive 2019;*
- *to ensure that public bodies will publish information primarily as open data, in open formats and register them at data.gov.sk;*
- *to publish high-value datasets via API;*
- *to provide methodological, technical, educational support to public bodies and make available reusable technical solutions that will help publish data;*
- *to support accessibility of research data by FAIR (findability, accessibility, interoperability, and reusability) principles⁴¹ incorporated into national measures;*
- *to implement measuring methodologies, tools, standards, and principles.*

Slovakia is currently working on the actualisation of this action plan with a detailed description of goals, milestones and measures. Additionally, a working paper on the strategic priority management of data is ongoing.

In France, in a circular⁴² in April 2021, the Prime Minister underlined that the national data policy must be a strategic priority for the state and its relations with local authorities and private actors. The circular mandates that:

- *all ministries, as well as all regional state authorities (préfets), have to nominate a Chief Data Officer (CDO) in order to ensure open data governance at the highest hierarchical level;*
- *the Interministerial Director for Digital Affairs, acting as General Data Administrator, will coordinate the network of CDOs;*
- *an 'ombudsman for general interest data' will be nominated to negotiate with private actors that have data deemed to be of general interest;*
- *the Ministry of Research will set up a charter to speed up the processing of requests from researchers wishing to access data;*
- *each ministry will need to animate the ecosystems of data and source code reusers in order to identify high value-added datasets, define possible standards and encourage sharing, with a focus on the Open Government Partnership forum as an arena for such exchanges;*
- *each ministry will have to set up a roadmap for data, algorithms and source code strategy, with actions and deadlines. The roadmap will also list the skills in those fields within the personnel of the ministries;*
- *open data will be referenced in the national portal data.gouv.fr.*

Moreover, the French Government made a commitment to open more high-impact key datasets, APIs, and source codes in the near future⁴³.

⁴⁰ <https://www.mirri.gov.sk/wp-content/uploads/2021/12/Narodna-koncepcia-informatizacie-verejnej-spravy-2021.pdf>

⁴¹ <https://www.go-fair.org/fair-principles/>

⁴² <https://www.legifrance.gouv.fr/circulaire/id/45162>

⁴³ <https://www.data.gouv.fr/fr/datasets/tableau-de-suivi-des-ouvertures-de-donnees-codes-sources-et-api-publics-avril-2021/>

In Hungary, more than 30 actions related to open data were proposed in the white paper on national data policy, which the government is currently deciding on. Furthermore, the adopted AI strategy has dedicated actions of data policy and data economy⁴⁴.

1.1.4 Access to and discoverability of real-time, geospatial, and citizen-generated data

Real-time and geospatial

Real-time data is information that changes and needs updating at very frequent intervals, in most cases several times a minute. This data can be either dynamic (e.g., a variable indicating current location) or static (e.g., a fresh log entry indicating location at a specific time). Access to real-time and dynamic data is most commonly provided via an application programming interface (API). Examples of real-time and dynamic data could be a weather system, which automatically retrieves real-time data from weather stations to continuously improve and update its forecast, or a public transport app that informs passengers not just of the timetables, but of the actual position of the bus they are waiting for and the estimated time of arrival.

Geospatial data is data that contains information on properties that are linked to a position, a specific address, on earth. Geospatial data can, but does not need to be, real-time. Examples of geospatial data include satellite imagery, and cell phone data based on GPS location coordinates, but also census data tied to specific geographic areas.

Both geospatial and real-time/dynamic data are a key topic in the Open Data Directive⁴⁵. It is therefore not surprising that 89% of EU Member States state that their national strategies and policies outline measures incentivising the publication of and access to real-time or dynamic data. This is 4 percentage points more than last year. Similarly, 81% of the EU27 affirm the same when it comes to geospatial data.

In Malta, the national data strategy under consultation and the previous one⁴⁶ require APIs to facilitate integration with the National Data Portal. At the same time, Malta is working on an official APIs Guidelines and Standards document to facilitate interoperability. On the other hand, real-time or dynamic data update frequency schedules are the responsibility of the register owners.

In Romania, the law transposing the Open Data Directive⁴⁷ includes provisions on the obligation to publish real-time data, as well as geospatial data, with the requirement to provide geo-location to all published data, where available.

In Denmark, the implementation of the Open Data Directive⁴⁸ requires that dynamic data, when made available, is done so through API access and, if relevant, mass download. Moreover, the federal strategy for digitisation⁴⁹ launched in May 2022 includes a national plan for mobility data (action 18) and a test of intelligent transport systems (action 40). These will increase the access to and usability of real-time traffic data.

In France, in the Ministry of Ecological Transition's data, algorithms and source codes policy roadmap⁵⁰, the latter explicitly commits to build the 'Géoplateforme', a public geospatial data space in the form of an open and mutualised geographical data platform with shared governance. In the roadmap of the

⁴⁴ <https://ai-hungary.com/files/e8/dd/e8dd79bd380a40c9890dd2fb01dd771b.pdf>

⁴⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L1024>

⁴⁶ <https://mita.gov.mt/wp-content/uploads/2020/07/Data-Driven-Public-Administration-Malta.pdf>

⁴⁷ <https://legislatie.just.ro/Public/DetaliuDocument/256414>

⁴⁸ <https://www.retsinformation.dk/eli/lt/2021/176>

⁴⁹ https://fm.dk/media/25845/danmarks-digitaliseringsstrategi-sammen-om-den-digitale-udvikling_web.pdf

⁵⁰ https://www.numerique.gouv.fr/uploads/feuillederoute_mte_mer.pdf

Ministry of Territorial Cohesion⁵¹, action 1 is centred around geospatial data with the objective to provide territories with a tool for observing and steering territorial dynamics. The territorial information system must gather different sources of data (GIS, business data, data on the management of public policies, etc.) to have a 360° vision of the whole territory.

In the Czech Republic, the amendment of the Free Access to Information Act No. 106/1999 Sb⁵² empowers public bodies to publish geospatial data as open data (free of charge, machine readable, via API) in accordance with the Open Data Directive. Moreover, the objective of the Information Conception fosters the development and operation of information systems managing geospatial data with the further development of geospatial information as open data.

Citizen-generated data

Citizen-generated data is the data that people, or their organisations, produce to directly monitor, demand or drive change on issues that affect them. In other words, citizen-generated data is data produced 'by people for people'. Among the concrete use cases are open street maps, which allow citizens to annotate maps with data on physical features like buildings and infrastructure, as well as data on incidents or violations.

Only 33% of EU Member States report to have measures that incentivise the publication of and access to citizen-generated data in their national policies or strategies. This is in line with the results of the data.europa.eu publication 'Data.europa.eu and Citizen generated Data'⁵³, which states these types of data sources are not widely represented in open data portals as, by design, they have been mainly focused on data directly generated and managed by public administrations.

In Austria, the Open Science Policy Austria⁵⁴ adopted in 2022 is geared towards enhancing the contribution of citizen science and citizen-generated data.

In Cyprus, it is possible to publish on the national open data portal citizen-generated data that was initially based on government open data in the form of related content. An example is provided by the declarations of assets of Certain Publicly Exposed Persons and Certain Officials of the Republic of Cyprus, based on the legislation on 'Pothen Esches'⁵⁵.

In Estonia, one item of the Digital Agenda 2030⁵⁶ is achieving human-centric digital government. Therefore, Estonia plans to educate people on data-related topics (e.g., data publishing) through different events like open data forums. In addition, Estonia is working on making the national data portal even more user-friendly to allow open data publication to become even easier.

20 out of the EU27 respondents also affirm that their policies and strategies foster the discoverability of the aforementioned types of data from their country on data.europa.eu.

1.1.5 Supporting the reuse of open data

Key for the Open Data Directive is stimulating open data reuse, which is visible in the national open data instruments of the Member States. As in 2021, 89% of the EU Member States report in 2022 that their open data policies and strategies outline measures to support the reuse of open data by the

⁵¹ https://www.numerique.gouv.fr/uploads/feuilleteroute_mctrct.pdf

⁵² <https://www.mvcr.cz/soubor/act-on-free-access-to-information-1999-pdf.aspx>

⁵³ https://data.europa.eu/sites/default/files/report/data.europa.eu_Report_Citizen-generateddataondata_europa_eu.pdf

⁵⁴ <https://www.bmbwf.gv.at/Themen/HS-Uni/Hochschulgovernance/Leitthemen/Digitalisierung/Open-Science/Open-Science-Policy-Austria.html>

⁵⁵ <https://bit.ly/3NZdnNe>

⁵⁶ <https://www.mkm.ee/media/6970/download>

public sector. 85% state that these measures are expected to foster reuse of open data by the private sector. For example:

In the Netherlands, several measures are present in the national data strategy⁵⁷ to support open data and data-driven policymaking. For example, governmental organisations working with data can receive technical, ethical and legal advice on how to use and reuse data in their projects in a responsible manner. Furthermore, the government is working on a 'Data Manifest' that aims to collect the most important principles surrounding data-driven work from civil servants and citizens.

In Greece, the General Secretariat for Digital Governance and Process Simplification organises an annual competition for the Digital Governance Awards⁵⁸. The purpose of the competition is to reward civil servants and officials whose actions and ideas have contributed to the digital transformation of the Greek Public Administration, including through reuse of open data.

In Ireland, theme 4 of the Open Data Strategy specifies the supports to be put in place to encourage businesses in the reuse of open data. These supporting initiatives include to:

- *develop business strategies to exploit open data and develop products and services to improve quality of life and create jobs;*
- *identify data domains to be released where potential economic benefits may be delivered;*
- *build analytics and usage capacity;*
- *consider ways to support SMEs and start-ups to use open data.*

In Croatia, the reuse of open data by the private sector is mostly incentivised through the organisation of public events for different target groups and by providing online education (e.g., webinars) about the reuse of open data.

Similar to last year, to facilitate open data reuse, 93% of EU countries have open data strategies that make the carrying out and maintaining of a data inventory by public bodies mandatory, whether this is at national or local level. Within this group of respondents, 88% indicate that these data inventories also include the data collected by public bodies that cannot be published as open data.

Prioritising high-value datasets

As previously mentioned, the European Commission is in the process of developing an EU regulation concerning a list of high-value datasets held by the public sector, i.e., datasets with a high potential economic and societal impact. This year, 96% of EU Member States affirm that they are working on identifying high-value data domains to be prioritised for publication. In particular, as shown in Figure 5: High-value dataset categories most prioritised by the EU27, all EU27 countries are prioritising statistics. Specific data categories that Member States are prioritising are geospatial (96%), earth observation and environment (92%), and meteorological data (88%).

⁵⁷ <https://www.digitaleoverheid.nl/document/interbestuurlijke-datastrategie-2021/>

⁵⁸ <https://www.secdigital.gov.gr/diagonismos-vraveion-psifiakis-diaky/>

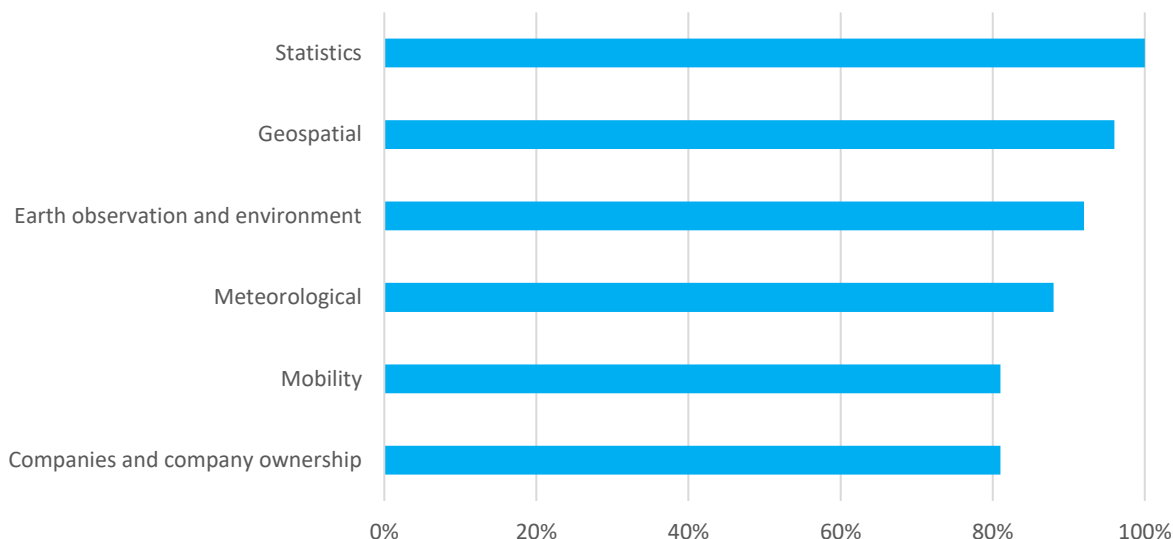


Figure 5: High-value dataset categories most prioritised by the EU27

96% of Member States also report to have measures in place to assist other stakeholders' involvement in this prioritisation process. In 81% of the cases, these measures take the form of regular consultations. 15% of respondents also indicate other measures. For example:

In Lithuania, besides regular consultations, the Open Data Board⁵⁹ was established by the Ministry of Economy and Innovations to reflect and understand users' needs. It brings together representatives from public sector bodies, business, academia, and society. One of the Open Data Board meetings was dedicated to the evaluation of prioritized open datasets.

In Luxembourg, a strategic collaboration with statistic administration STATEC is in place to define the dataset structure and options for metadata harvesting, as well as script creation to harvest the entire contents of the country's national statistics.

Finally, 93% of EU countries confirm that they are preparing for public bodies holding high-value datasets to denote those datasets in their metadata following the publication of the related EU implementing regulation.

In Italy, the guidelines⁶⁰ for implementation of the Legislative Decree No. 36/2006 (amended by the Legislative Decree No. 200/2021 transposing the Open Data Directive), which are currently under public consultation, also underline that the national metadata profile guidance (for both spatial and open data) will be updated in order to provide specific requirements and recommendations for denoting the high-value datasets as such in their metadata, also following common indications given at EU level (such as in the INSPIRE context geospatial category).

In Poland, the Chancellery of the Prime Minister started a consultation with all Polish ministries, subordinate units, and Statistics Poland on the draft implementing regulation on high-value datasets. A constant exchange of information with key stakeholders and the network of Open Data Officers is also ensured. Moreover, high-value datasets can already be marked on the national open data portal.

⁵⁹ <https://sirex.lt/posts/2021/atviru-duomenu-poreikis/>

⁶⁰ <https://docs.italia.it/AgID/documenti-in-consultazione/lg-opendata-docs/it/bozza/principi-general/serie-di-dati-di-elevato-valore.html>

1.1.6 Priorities

25 out of 27 EU Member States indicate that the objectives and actions of their national open data policies or strategies align with one or more of the European Commission priorities for 2019-2024⁶¹ (Figure 6).

Unsurprisingly, 'A Europe fit for the digital age' is the priority that most closely aligns with the policy approach of the respondents (84%). This is followed by 'An economy that works for people' (80%), a result that fits well into the recovery phase in which European economies find themselves post COVID-19. The priority 'A new push for European democracy' seems also to be a common point (76%), as proved by the fact that several Member States have transparency, anti-corruption, or citizens as key words for their overarching policy priorities. More than half of respondents (60%) report policies and strategies aligning with the European Commission's priority for 'A European Green Deal'.

In France, the actions in the ministerial roadmaps include the digitalisation of public services (e.g., 50 actions in the roadmap of the Ministry of Civil Service and Public Transformation, including actions on the 'once-only' principle, opening data on the efficacy of public services through 'Services Publics +'). Among all the actions, 68 focus on training civil servants.

In Germany, the main idea behind the amendment of Section 12a of the EGovG (2nd open data Act) and the data use Act in 2021 was to improve the provision of open data for a broad user field, quoted in the explanatory memorandum: 'Open machine-readable data, especially in real time, offer great potential for innovative business models for the private sector, especially for small and medium-sized enterprises (SMEs) and start-ups. At the same time, open data means that administrative processes become more effective, transparent and comprehensible. Open data has a positive impact focus on civic participation and civil society, fosters trust in governance and forms the basis for value creation and innovation. Science and research also benefit from the improved provision and use of public sector data.'

In Portugal, the CTIC Strategy 2021-2026 focuses, among others, on increasing the transparency of the main services and essential areas of the state through the provision of dashboards from the reuse of open data available on the national open data portal. Moreover, the Strategy for Innovation and Modernization of the State and Public Administration 2020-2023 mentions as its strategic objective 10 the intention to manage the data ecosystem with security and transparency. In fact, using data to improve analytics, including ethically supported by artificial intelligence, is essential for informed decision making. For this, it is crucial to promote trust when developing secure systems at each stage of the digital transformation. This takes into account the maximum requirement of information assurance, meaning the permanent verification of the properties of integrity, availability, authenticity, non-repudiation and confidentiality.

⁶¹ See above

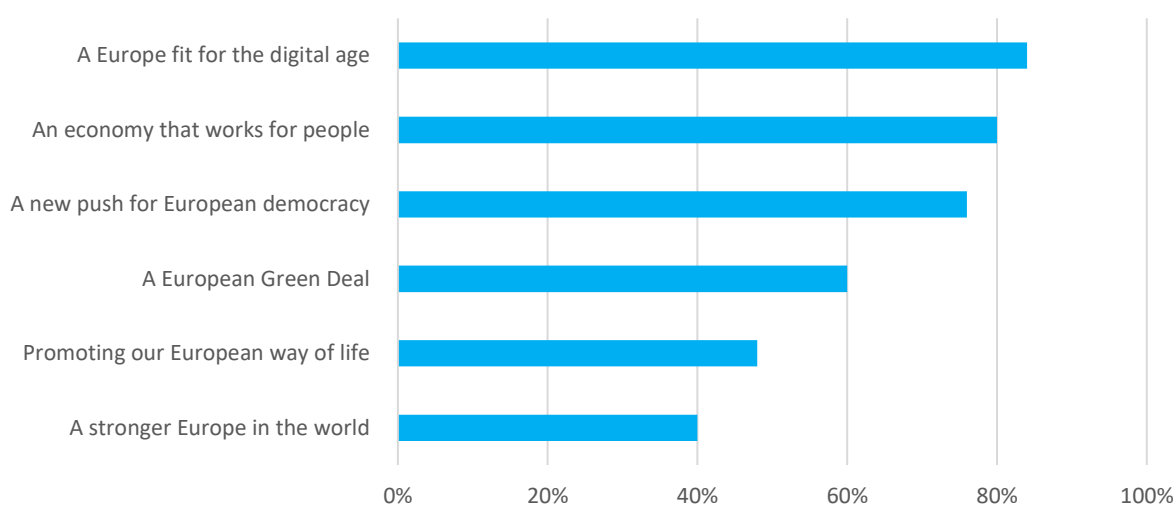


Figure 6: EU27 alignment with one or more of the European Commission priorities for 2019-2024

1.2 Governance of open data

The second indicator – governance of open data – considers both the governance structure and availability in place for the publication of open data at governmental levels (including regional and local ones). In addition, the indicator considers the appointment of official roles in civil service that are dedicated to open data. It also looks at the regular exchange of knowledge and experiences within the public sector, meaning between the national open data team and the wider network of open data officers, as well as between public bodies as open data providers and academia, businesses, and citizens as open data reusers.

The following sub-paragraphs will discuss governance structures and the network of open data officers and reusers.

1.2.1 Governance structures

All 27 EU Member States indicate that they have a governance structure in place to enable the participation and inclusion of various open data stakeholders. This means that actors are engaged at different public body and government level (national, local, regional) and private and third sector actors active in the open data field are involved.

The governance structure can follow different models. For example, there could be a strong central coordination (top-down approach) or a more decentralised structure in which initiatives are developed and pursued from the bottom-up, i.e., starting with the local level and with little central guidance. A mix of these approaches is also possible.

The majority (70%) of Member States use a hybrid model for governing open data in their countries. Among these countries, count federal states, like Austria, Belgium and Germany. The remaining 30% of EU27 countries implement a top-down approach. For example, this is the case in less populated countries, such as Malta, Estonia, and Slovenia. Like last year, none of the Member States follow exclusively a bottom-up governance structure.

Whether hybrid or top-down, the open data governance structure of 25 out of 27 EU Member States ensures that local and regional open data initiatives are facilitated and supported at the national level.

48% of countries report that this is done for all open data initiatives, while 22% affirm this includes most or some initiatives.

In almost all Member States, at least some local and regional public bodies conduct open data initiatives. With respect to last year, a slight decrease can be seen in Figure 7, which shows that two fewer EU countries report 'approximately half of the public bodies' at regional or local level initiate open data activities. We also see that there has been an increase of two Member States who indicate 'few [local or regional] public bodies' doing this.

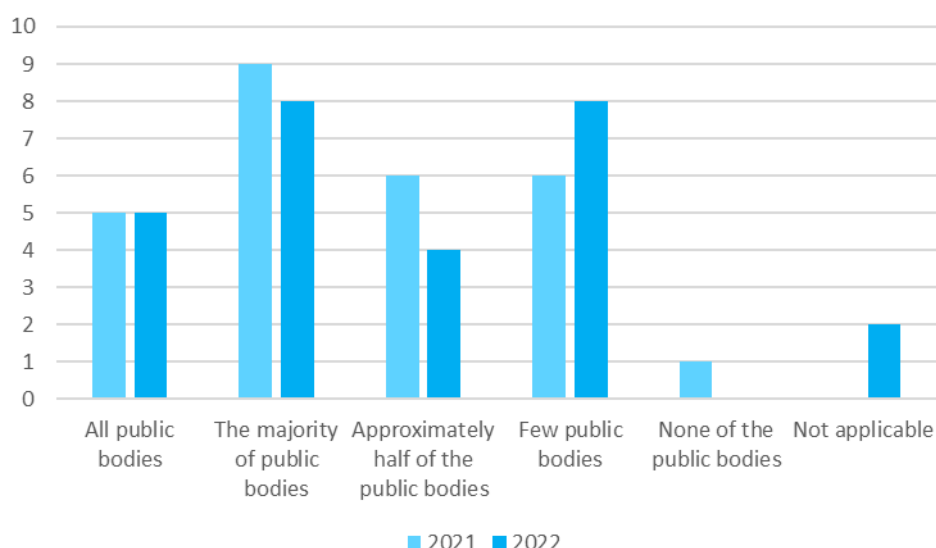


Figure 7: The amount of local or regional public bodies that conduct open data initiatives compared to 2021

70% of EU Member States report that both the governance structure and their operating model, including the people and the team responsible for open data activities, are published online and accessible to the public. For 78% of countries in the EU, a document describing the responsibilities and working approach of the national, and eventually regional and/or local, open data team exists and is retrievable online.

1.2.2 Network of open data officers and reusers

To promote and encourage open data publication by the different public bodies in a country and across the different levels of governance, it may be beneficial to have a network of open data officers acting as contact points for all matters related to open data. Similar to last year, 23 out of 27 Member States foresee such roles in their governance structures.

In Cyprus, these figures are called Open Data Liaison Officers and their duties include:

- *support and advise public sector bodies on open data and Public Sector Information issues (e.g., legislation, licensing, formats, etc);*
- *identify, collect and upload public sector bodies' new datasets to www.data.gov.cy;*
- *be responsible for updating datasets of public sector bodies;*
- *handle data requests;*
- *promote an open data culture in their organisation.*

In Luxembourg, the freedom of information law mandates every public sector body to name responsible people for the publication of documents ('agents chargés de la communication de documents'). They are also responsible for the publication of these documents on the national open data portal as the central access point for open data, in line with the Prime Minister's circular letter from 2018.

In Ireland, a network of Open Data Liaison Officers⁶² has been established within public service organisations who act as a point of contact for open data. Their function is to promote the publication of open data and promote the availability of open data training, etc. within their respective organisations. More than 90 such officers are now in place, actively promoting open data and the publication of open data within their organisation.

In Slovakia, the Resolution of the Government of the Slovak republic no. 346/2017 defines the obligation for the ministries to appoint the position of data steward (curator) within their organisations⁶³. The resolution also provides a recommended job description for data stewards and more precise definitions of the role and obligations are currently being drafted. In general, data stewards meet on a regular basis within dedicated working groups and are in touch with the open data team to resolve ad hoc issues. They keep track of goals and obligations in the area of open data and steer their achievement.

Besides ensuring an active dialogue amongst open data officers, open data governance also means nurturing a regular exchange with all the open data stakeholders: the national team for open data policy, the team dedicated to the open data portal, and the open data reusers from academia, business, and other non-governmental organisations.

In this regard, 96% of the EU27 report a regular exchange of knowledge and experiences between the national open data team and the team maintaining the national portal, as it is often the case that this is the same team. Similarly, 96% of Member States also indicate that the national open data (portal) team and the wider network of open data officers regularly meet, discuss, and align.

In Spain, the team leading the national open data initiative has established mechanisms to facilitate two-way communication of news items. The permanent mechanisms open for communicating news from the national team to the open data community (known as RISP) managers include:

- *monthly relevant information campaigns aimed specifically at the network of open data managers;*
- *fortnightly newsletter with news in the field of open data – a newsletter to which many of these managers are subscribed;*
- *monthly meeting of the General State Administration Data Group, which discusses new issues regarding open data, among other topics;*
- *sectoral meetings with those responsible for open data from the regional governments.*

The communication channels for those responsible for RISP with the national team are a mailbox specifically for collecting new items these managers want to report, as well as for any type of feedback; a mailbox in which RISP managers can post technical and methodological queries, as well as communication channels open to any type of suggestion. In addition to these communication channels, work meetings are held to exchange open data practices between the RISP managers of certain public bodies and the national team.

In Hungary, the National Data Asset Management Agency responsible for the national data portal regularly exchanges knowledge and experiences with various public bodies dealing and managing with

⁶² https://data.gov.ie/uploads/page_images/2018-05-23-105914.556125Role-of-Open-Data-Liaison-Officer-final.pdf

⁶³ <https://data.gov.sk/dataset/datovi-kuratori-2022-05-26>

public data. In light of this, the Agency has several cooperation agreements with significant Hungarian organisations, e.g., Hungarian Central Statistical Office, Educational Authority, Hungarian State Treasury, etc.

A regular exchange between public sector bodies (i.e., the data providers) and open data reusers (e.g., academia, citizens, businesses) is also ensured by Member States, as proved by the examples below.

In Finland, the Digital and Population Data Services Agency, with its open data team and national open data portal, conducts active information exchange with players and data owners in the field. At regional level, further networks and groups share information and experiences, such as the Regional Council of Southwest Finland's facilitated regional Open Data Network⁶⁴.

In Latvia, the national open data portal offers a form for each dataset where users can ask questions and give recommendations to data publishers. Events and discussion organised by NGOs in the field of open data are also often supported by the experts from the Ministry of Environmental Protection and Regional Development (MEPRD) and other public institutions. The wider society is involved in policy planning and MEPRD consults stakeholders when deciding on open data policies and reports.

In Sweden, this exchange takes place in several venues, such as within 'Hack for Sweden', through multiple events and meetups for knowledge sharing within the open data and innovation field. Another example is the NSÖD project (National scale open data), which is open for all municipalities as a two-year-programme for open data, including knowledge exchange, education, and toolkits.

1.3 Open data implementation

The third indicator – open data implementation – considers the level of implementation of the open data policies and strategies undertaken by the EU27. It also assesses whether implementation plans and monitoring measures are in place to enable open data initiatives at the national, regional and local level. In this respect, challenges encountered by the EU Member States in the implementation process are also analysed, along with the mitigating measures. In terms of implementation, the indicator further investigates planned activities to support data holders in their publication process. Finally, some perspective is given on training activities expected to enhance the data skills of civil servants dealing with open data, as well as on multi-scale events promoting open data and open data literacy for the broader public.

The following sub-paragraphs will discuss the implementation plans and monitoring processes of the EU27, activities to support the publication process, and available data literacy trainings and events.

1.3.1 Implementation plans and monitoring processes

Data publication plans and related monitoring mechanisms are needed to oversee progress across national and local public administrations and to plan interventions in the event of barriers. Most EU countries (23) provide evidence of the existence of such plans at central and/or individual public body level.

In the Czech Republic⁶⁵, one of the main tasks of the public body open data coordinators is to prepare an open data publication list (plan) with selected datasets with identified risks and benefits, along with a time framework for publication.

⁶⁴ <https://kumppanuusfoorumi.fi/foorumi/avoimen-tiedon-verkosto/>; <https://kumppanuusfoorumi.fi/posts/tervetuloa-aluetietofoorumiin-25-3-2021/>; <https://kumppanuusfoorumi.fi/posts/tervetuloa-avoimen-tiedon-verkoston-etatapaamiseen/>

⁶⁵ <https://opendata.gov.cz/standardy:vytvoreni-publikacniho-planu>

In Poland, two types of plans currently exist:

- *Opening Data Schedules⁶⁶ – Open Data Officers monitor the timely publication of public data on the dane.gov.pl portal according to a defined roadmap and quality of data. Schedules are published on dane.gov.pl;*
- *APIs development plan⁶⁷ – Open Data Programme 2021-2027 has an APIs development plan with datasets, data providers and deadlines.*

In the Netherlands, there are standard publication plans at both national and local level provided by the national data portal and biggest cities. These plans also implement the DCAT standardised value list for mandatory fields to fill during publication. Further, there is a staged publication process, with the biggest data owning organisations first publishing data in internal catalogues, before it is published in the public and national data portals.

In addition, 78% of EU countries have processes in place at the national level to ensure that the open data strategy and actions are implemented, for example in the form of monitoring mechanisms. Among these processes, 74% of the EU27 implement ways – often via national laws and ad-hoc authorities – to assess if public bodies are charging above marginal cost for the data they provide. Most Member States (76%), however, underline that the majority of datasets provided by public sector bodies are free of charge.

In France, data, algorithms and source codes policy is coordinated at the interministerial level by the Interministerial Directorate for Digital Affairs (Direction interministérielle du numérique, DINUM). The director of the DINUM is the Chief Data, Algorithms and Source Codes Officer (Administrateur général des données, algorithmes et codes sources, AGDAC). In order to coordinate this policy, a series of dedicated committees have been established and are led by the Etalab department.

In Bulgaria, annual reports⁶⁸ are prepared to track progress of data publication against the implementation plans. Each administration fulfils an online form for its progress which is verified by the national open data team. The following elements are monitored:

- *the administration has published new datasets in open machine-readable format for the relevant year;*
- *datasets are included in annual priority lists or are published proactively by the administrations;*
- *datasets are included in an approved schedule for publishing;*
- *datasets are published within the deadline, with delay, or are not published at all.*

In 2021-2022, the focus was on identification of a high-value datasets list based on the categories prioritised at EU level.

In Denmark, for the implementation of the Open Data Directive, the Agency for Digital Government⁶⁹ maintains a list of the public sector bodies that have made use of the exclusion clause and are allowed to charge beyond marginal costs for data.

In Cyprus, according to the national open data legislation, public sector bodies that wish to charge must gain prior approval from the Charging Body, a technical committee responsible for overseeing charging issues and approving any charges. In those cases where charges existed prior to 2015, if a

⁶⁶ <https://dane.gov.pl/pl/knowledgebase/useful-materials/harmonogramy-udostepniania-danych>

⁶⁷ <https://dane.gov.pl/pl/knowledgebase/useful-materials/program-otwierania-danych-na-lata-2021-2027>

⁶⁸ <https://e-gov.bg/wps/portal/agency/home/data/opendata/opendata-activities/opendata-report>

⁶⁹ <https://digst.dk/data/videreanvendelse-af-offentlige-data/betaling-for-data/>

public sector body charges above marginal cost, the open data team can take the issue to the Charging Body, which shall issue a decision for the removal of charges.

Overall, 56% of respondents in the EU indicate the status of implementation as satisfactory, 37% as neutral, and the remaining 7% as unsatisfactory. Similar to last year, countries recognise what has been achieved so far, but are also aware of the challenges ahead. A few categories of common challenges can be identified:

- Human resources and skills: Several countries stress the lack of human resources allocated to open data and the absence of adequate data skills and literacy among civil servants;
- Availability of financial resources: This challenge pertains, for example, to finding recurring budget for specific datasets (e.g., high-value datasets), as well as to not having a planned budget in place;
- Coordination issues: The EU27 often report difficulties in allowing a smooth data management governance across levels of government;
- Engagement with the open data topic: Incentivising different players to provide and use open data is a challenge widely spread across the EU;
- Various aspects of publishing open data: More support, in legal, technical, and financial terms, is needed when it comes to the publication of high-quality open data.

1.3.2 Activities to support the publication process

All EU countries have activities in place to assist data providers with their open data publication process. 89% and 85%, respectively, show processes to support real-time and/or dynamic data and geospatial data holders in publishing their data.

In Italy, the new release of the national open data portal allows dynamic data to be denoted as such through keywords that are monitored in relation to the provisions of the 2021-2023 Three-Year Plan where there is a specific action. Further activities to support dynamic and real-time data holders are: regular contact and support from the agency for digital Italy (Agenzia per l'Italie Digitale), a webinar series, and a FAQs page⁷⁰ with issues on dynamic data addressed; and a set of documentation with specific arrangements (requirements and recommendations) on dynamic and real-time data⁷¹.

In Germany, the Spatial Data Infrastructure Germany (SDI Germany) is a joint project by the Federal Government, the states (Länder) and municipalities to provide their spatial data via the internet in a standardised and simple way. In May 2022, they carried out a hackathon on open spatial data⁷².

In Greece, the Ministry of Digital Governance's department of Open Government and Transparency provides a specific helpdesk to offer support with data publishing issues.

In Lithuania, tools⁷³ are provided to inspect databases and recognise geospatial data. Data holders are also asked to properly describe metadata using specialised 'geometry' type instead of x, y coordinates⁷⁴. Finally, publishing via an API service is available⁷⁵, where geospatial data is naturally supported.

⁷⁰ <https://dati.gov.it/faq>

⁷¹ <https://docs.italia.it/AgID/documenti-in-consultazione/lg-opendata-docs/it/bozza/principi-general/dati-dinamici.html> ; https://trasparenza.agid.gov.it/moduli/downloadFile.php?file=oggetto_allegati/2128012151100_OLinee+Guida+interoperabilit%26%23224%3B+tecnica+PA.pdf

⁷² https://www.gdi-de.org/hack4GDI_DESDI

⁷³ <https://atviriduomenys.readthedocs.io/spinta.html>

⁷⁴ <https://atviriduomenys.readthedocs.io/dsa/duomenu-tipai.html#erdviniai-duomenys>

⁷⁵ <https://get.data.gov.lt/datasets/gov/lhmt/hidrologija/VandensMatavimoStotis>

Similar to the results of the *policy framework* indicator, supportive activities for citizen-generated data are the least represented, with only 17 out of 27 Member States reporting them.

In Ireland, the Open Data Engagement Fund has been developed in conjunction with the Open Data Governance Board (ODGB). This is a competitive fund designed to provide support towards promoting the use of open data. The fund is open to all and has assisted the publication of citizen-generated data. The 2021/2022 Fund supported citizen projects such as 'Unlocking Galway Graveyards Heritage Data'.

1.3.3 Data literacy training and events

As in 2021, 26 of the 27 Member States in 2022 affirm that they have set up training activities to refine the data skills of civil servants working with open data. Out of this group, as in the previous two editions, 19 countries indicate that these training activities also offer a formally recognised certification.

In Cyprus, a programme is available only for Public Sector Liaison Officers and is delivered by the Open Data Team in collaboration with the Open University of Cyprus. The programme includes modules on data audits and selection of data for publication, preparing data for publication (formats), licensing, data and metadata quality, publication processes, releasing data APIs. Participants in the Open Data training programmes offered by the Open Data Team receive a formal certification, which can then be submitted to the Public Service Commission.

In Portugal, as part of programme INCoDe.2030 (national digital competencies programme)⁷⁶, the Portuguese government has launched an initiative for the digital qualification of public servants to promote coherent execution of digital and open data policies. For instance, there are short term courses on several ICT domains, including open data, provided by the national institute for competencies in public administration.

To raise awareness about open data and increase data literacy beyond public sector bodies, events, such as hackathons and conferences, focused on open data are held annually at national, regional or local level across the EU. Just over half of EU Member States (52%) organise more than 9 events every year. In many cases (74%), the event offer is a joint product of different open data stakeholders, from national public bodies to local and regional entities, non-governmental organisations, and the private sector.

In Sweden, more than 9 events per year are organised. There are events arranged by the Agency for Digital Government, for example concerning information about the new data law⁷⁷ and events arranged by the Network Open Source and Data⁷⁸.

Slovenia also organises more than 9 annual events. Among these are: the OPSI HUB workshop⁷⁹ – Harnessing the power of open data; and the Green Hack⁸⁰ – with open data to a green future.

In Belgium, 6 to 9 events are organized a year. Examples include OpenBelgium⁸¹, OpenSummerOfCode⁸² and the BootCamp Open Cultural Data⁸³.

⁷⁶ <https://www.ina.pt/index.php/centro-de-formacao-oferta-formativa>

⁷⁷ <https://www.dataportal.se/sv/nyheter/15/digg-bjuder-in-till-informationstraffar-om-den-foreslagna-datalagen>

⁷⁸ <https://nosad.se/>

⁷⁹ <https://dih.um.si/oglejte-si-posnetek-delavnice-opsi-hub-izkoristimo-moc-odprtih-podatkov/>

⁸⁰ <https://www.tp-lj.si/en/events/events-list/greenhack-with-open-data-to-a-green-future-2021-10-18>

⁸¹ <https://2022.openbelgium.be>

⁸² <https://osoc.be/editions/2021>

⁸³ <https://meemoo.be/nl/vormingen-en-events/bootcamp-open-culturele-data-2022-5de-editie>

In Luxembourg, collaborative hackathons in the Government's GovTecLab⁸⁴ were organised concerning the use and reuse of housing data and other relevant data.

In Croatia, the Open Data Day⁸⁵ is an annual event that has been held since 2014. This year, after the conference, an online weekend hackathon was organized by Gong⁸⁶ and the group of civil hackers Code for Croatia⁸⁷. In September 2021, the National Open Data Conference NODC2021⁸⁸ also took place in hybrid format.

1.4 Overall performance

In this final section, the overall performance of the 27 Member States is evaluated based on the indicators of the policy dimension highlighted in this chapter. Similar to previous years, the policy dimension is the most mature measurement of the assessment. In 2022, the overall maturity in the policy dimension of the Member States is 86%, which is in line with the results of the previous two years (see Figure 8).

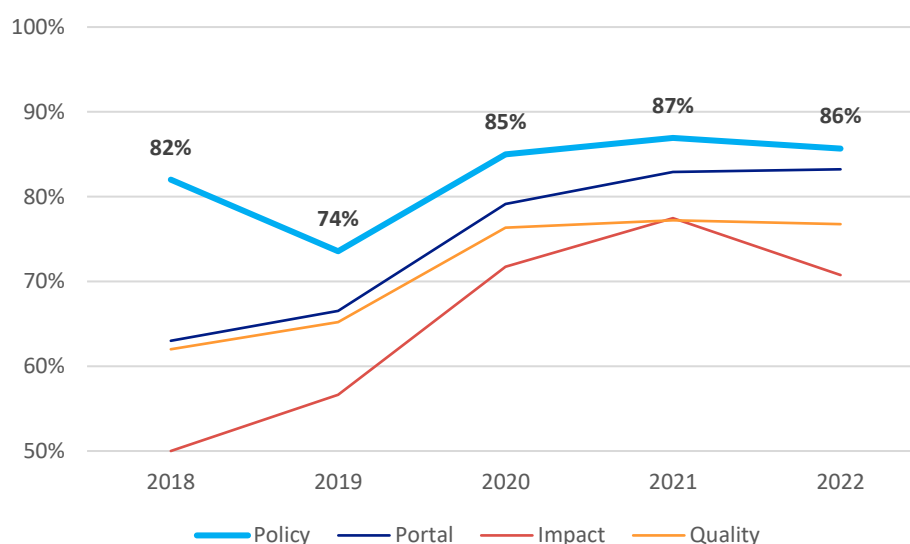


Figure 8: Development in maturity of the EU27 in the policy dimension over recent years

Figure 9 shows the average scores on each of the policy indicators compared to last year. Interestingly, the most mature indicator is again the *governance of open data*, together with *policy framework*. While the latter stayed the same as last year in terms of scoring, the slight drop in the *governance of open data* and the *open data implementation* indicator can be easily explained in light of the methodology update and the change of content or scope of some questions. For example, for the implementation indicator, compared to last year, more attention was given to support mechanisms for data publishing, with specific questions on geospatial, real-time/dynamic, and citizen-generated data. Also, implementation challenges and countermeasures were more closely analysed with respect to last year.

⁸⁴ <https://govtechlab.public.lu/en/agenda/2022/hackathon-opendata1.html>

⁸⁵ <https://codeforcroatia.org/t/open-data-day-hrvatska-2022/890>

⁸⁶ <https://gong.hr/en/>

⁸⁷ <https://codeforcroatia.org/>

⁸⁸ <https://todo-project.eu/en/news/national-open-data-conference-nodc2021-successfully-completed>

Moreover, the decrease in the indicator for governance of open data seems in line with the common challenge previously reported for Member States, namely enabling a coherent governance across various governmental levels.

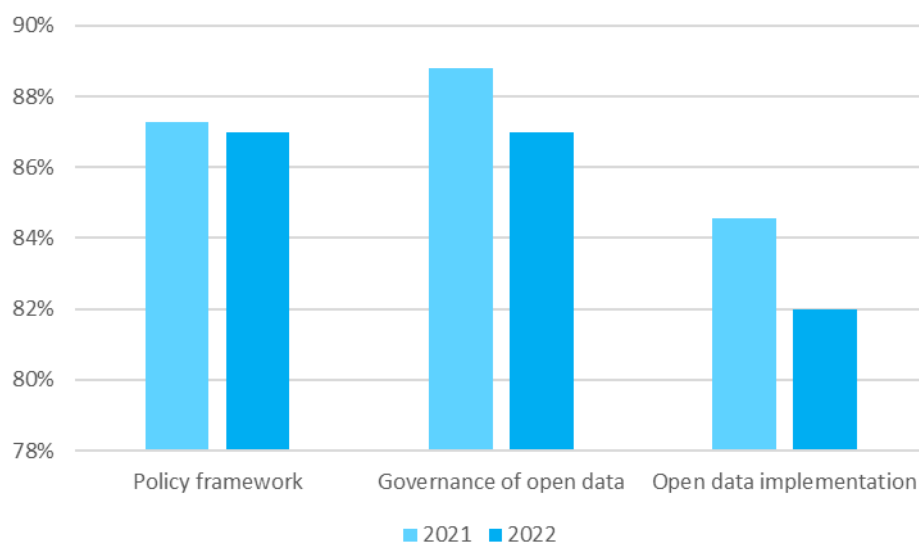


Figure 9: Maturity score per policy indicator compared to 2021

Finally, Figure 10 shows the EU27 country ranking for the policy dimension. 16 Member States score above the EU27 average of 86%, while only 11 countries score below. Cyprus, Spain, Ireland, Poland, Italy, France, Slovenia and Estonia all score above 95%, indicating their maturity when it comes to open data policy. Belgium and Slovakia showed most progress, with improvements of 19% and 14% respectively. Both countries are taking rapid steps towards the European average.

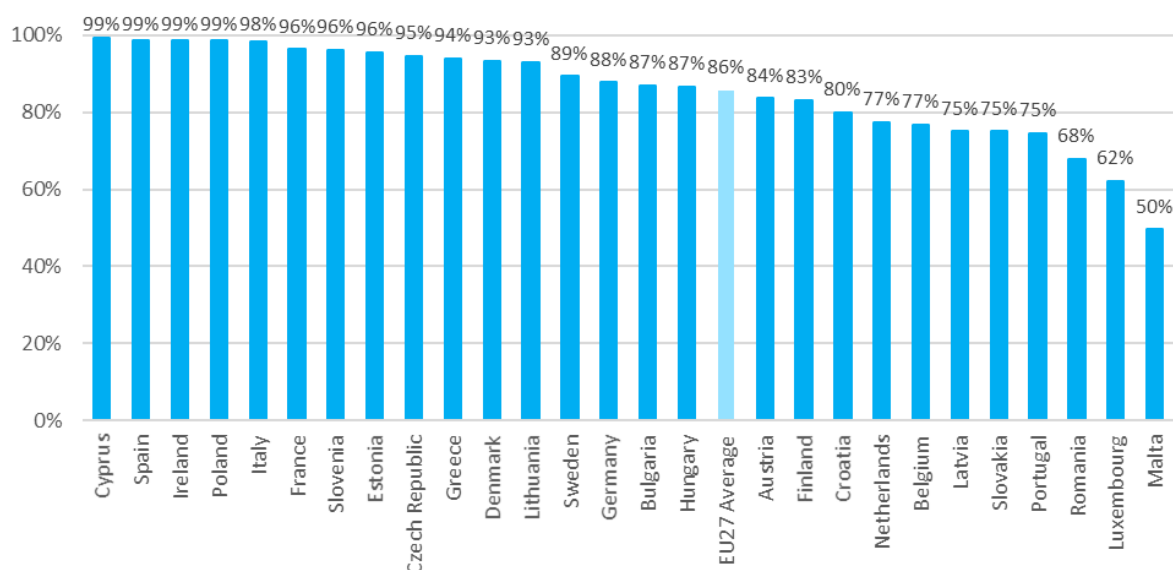


Figure 10: Country ranking for the policy dimension

Chapter 2: Open Data Impact in the EU27

Within the framework of the methodology update of this year's Open Data Maturity assessment, the second dimension of open data impact has undergone an important restructuring. This was dictated by a twofold need. Firstly, it was necessary to better acknowledge that assessing open data impact still represents a challenge in the EU – as proved, for example, by the absence of a single standard methodology used across the EU Member States. Secondly, a clearer distinction between measuring reuse and assessing the impact created through it was needed.

As a matter of fact, and as mentioned in the previous chapter, the Open Data Directive⁸⁹ encourages EU countries to facilitate the reuse of public sector data and to publish datasets that have a high potential to create economic and social impact – the so-called high-value datasets⁹⁰. It is therefore essential for countries to track and foster reuse. Yet, it is also crucial to investigate how this reuse – be it in the form of mobile applications or data-driven reuse cases – is transformed into value for citizens, businesses, and society, such as efficiency gains through time or cost savings or any environmental benefit.

In light of this, the 2022 open data impact dimension analyses the willingness, preparedness, and ability of EU countries to measure both the reuse and the impact created through this reuse.

- 1) In a first step, the dimension investigates how aware and prepared countries are to understand the level of reuse and the impact of open data within their territory. This reflects the first indicator, *strategic awareness*, which was also used in previous editions of the study.
- 2) In a second step, the focus is placed on if and how countries measure the reuse of open data and with which methods. This is done through the newly added indicator *measuring reuse*.
- 3) Finally, this year's open data impact dimension concentrates on gathering data on the impact created within the four impact areas that have been considered in previous Open Data Maturity assessments, namely the governmental (previously political), societal, environmental, and economic impact areas. This is achieved through the third indicator, *created impact*.

The table below reports the key elements of the open data impact dimension and the above-described indicators.

Metric	Key elements
Strategic awareness	Monitoring mechanisms are in place at national, regional, or local level to monitor open data reuse and foster it, including with respect to high-value datasets. A methodology exists to measure either the impact that can be derived from reusing open data or whether first steps in this direction have been taken.
Measuring reuse	Tools are in place to understand which and how datasets are reused. Activities are in place to better understand reusers' needs.

⁸⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L1024>

⁹⁰ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12111-Open-data-availability-of-public-datasets_en

Created impact	Data on the impact created by open data on impact area's specific challenges is available.
<ul style="list-style-type: none"> • Governmental impact • Social impact • Environmental impact • Economic impact 	Various reuse examples exist that showcase the impact of open data in the field.

2.1 Strategic awareness

The first indicator, strategic awareness, underlines the importance of a structured approach to monitoring and measuring open data reuse and its impact. The indicator investigates the extent to which EU countries define reuse and are prepared to measure it, for example by encouraging public bodies to implement monitoring mechanisms. The indicator also aims to understand whether EU Member States know how to define open data impact and have a methodology in place to assess it. Finally, in line with the second major methodology update for the 2022 Open Data Maturity study – i.e., attesting countries' level of preparedness with respect to the upcoming high-value datasets implementing regulation – the strategic awareness indicator asks about potential steps already taken by EU countries to prepare for the monitoring and measuring of high-value datasets in their country.

The following sub-paragraphs will discuss the definition and processes of open data reuse, including for high-value datasets, as well as the definition and methodologies of open data impact.

2.1.1 Open data reuse: Definition and processes

All EU Member States are aware of the term open data reuse. Yet, the approaches towards defining it differs: Some countries have explicit definitions of reuse included in laws (e.g., Spain⁹¹), while others derive it from strategic documents defining open data and related activities (e.g., Slovakia⁹²). However, some common elements can be recognised: Reuse means any use of public sector information by natural or legal persons, for commercial or non-commercial reasons, that differ from the original purpose for which the information was created. This includes the copying, dissemination, modification, adaptation, extraction, or the exploitation of this data, for example for the development of new data-driven applications and services.

Beyond their awareness, 93% of EU Member States responded that they have an interest in observing the national level of reuse of open data, whether this is a stronger – in the case of 67% of the respondents – or a more limited focus, as for 30% of the respondents. Furthermore, 22 out of the 27 EU Member States responded that they have processes in place to monitor the level of reuse of their open data.

Cyprus uses a combination of web analytics of traffic on the national portal, catalogues of applications that use their open data and surveys, as well as community gatherings and events to further engage the national ecosystem of open data stakeholders.⁹³

⁹¹ <https://www.boe.es/buscar/act.php?id=BOE-A-2007-19814>

⁹² https://www.mirri.gov.sk/wp-content/uploads/2018/10/SP_Otvorene_udaje_schvalena-2.pdf

⁹³ <https://bit.ly/2TjEk7f>; <https://www.data.gov.cy/application-showcases>; https://www.data.gov.cy/Studies-Publications_EL;

Similarly, while creating a national data portal through which the metrics of reuse can be easily tracked and visualised and reuse cases promoted, France affirms that they also rely on the animation of communities to measure the reuse. These animation activities, which include sharing of best practices and the organisation of ad-hoc events, are carried out at the level of an administration or with an interdepartmental scope and generally revolve around a data theme.

For 18 out of the 27 EU countries, the monitoring of open data reuse is also fostered through mandatory or voluntary encouragements towards public sector bodies.

In Poland, open data officers⁹⁴ in each national ministry have monitoring obligations regarding the data their institutions provide, including the quality and usefulness of the reuse. These officers report annually to the Chancellery of the Prime Minister.

In Ireland, a number of tools are in place to support and incentivise public bodies in measuring the reuse of their own datasets and those of other public bodies. One of these tools is the KPI tool⁹⁵ that has been developed to allow data publishers to monitor their datasets, show when the data is uploaded, what was deleted, and the currency of their data. The KPI tool allows public bodies to compare the quality of their data with each other and monitor their own progress over time.

Open data reuse and high-value datasets

Although the high-value datasets implementing regulation is not yet published, 85% of EU Member States are already preparing to monitor and measure the level of reuse of high-value datasets. Here, several countries have stated that they intend to integrate specific functionalities in their national open data portals to track the reuse of high-value datasets.

The Czech Republic will enable individual datasets – including those labelled as high-value datasets – to be directly linked to the list of reuse examples on their national open data portal (which will also be in open data format). For that reason, when reading the metadata for datasets that will be labelled as high-value datasets, it will be possible to see examples of their practical reuse.

Some other EU Member States plan to focus on the reuse of high-value datasets through ad-hoc studies.

In Romania, there will be a yearly impact study to identify the extent to which the reuse of public sector documents has increased, particularly by small- and medium-sized enterprises (SMEs) and in connection to high-value datasets.

In Croatia, the central state office has developed a methodology for the evaluation of high-value dataset before and after their implementation⁹⁶.

For some EU Member States, preparing for the monitoring of high-value datasets' reuse also means remaining in close contact with all important stakeholders that can be affected by these datasets and the implementing regulation.

2.1.2 Open data impact: Definition and methodologies

Most EU Member States (74%) have a definition of open data impact. Some countries, such as Lithuania, define open data impact in a broader way as any added value of open data initiatives to the

⁹⁴ <https://www.gov.pl/web/cyfryzacja/pelnomocnicy-ds-otwartosci-danych>

⁹⁵ <https://data.gov.ie/kpi-report> ; <https://data.gov.ie/qa-report>

⁹⁶ <https://rdd.gov.hr/projekti-i-eu-projekti/eu-projekti/prilagodba-informacijskih-sustava-tijela-javnog-sektora-portalu-otvorenih-podataka-open-data/provedba-projekta/1445>

country's economic, social and political environment⁹⁷. Other EU countries provide definitions that are more focused on listing the specific positive effects of making public sector data available.

In Slovenia,⁹⁸ open data has an impact on transparency of the work of public institutions (anti-corruption; political impact), innovation of the digital economy, environment-related problems, and efficiency and decision-making of public institutions.

In Sweden⁹⁹, the impact of open data is all the positive effects driven by data that strengthen the welfare of society, research and the private sector.

A one-size-fits-all approach does not seem possible when it comes to defining a methodology for assessing open data impact. Among the 20 EU Member States that reported they had a methodology in place to measure the impact of open data, the approaches vary from more extensive and general, to more country- or data-specific.

An example is the Portuguese project 'Dados Abertos - Definição de modelo de avaliação de impacto' (i.e., open data impact assessment model definition). This methodology includes several steps, such as the creation of a benchmark of international methodologies, use cases and best practices, the definition of metrics for impact assessment and monitoring, and the development of dashboard metrics.

In France, the methodology adopts a staged approach. Firstly, the data.gouv.fr team estimates the impact through the analysis of metrics (e.g., datasets published, downloaded, etc.). Secondly, they calculate the number of direct reuses and (thirdly) indirect reuses. Finally, the team considers externalities of these uses on society.

In Germany, the open data portal team applies different methodologies according to the level of governance. On the national level, the implementation and corresponding impact of the open data law is measured through an online questionnaire and in the writing of a bi-annual 'Fortschrittsbericht' by the national government (i.e., progress report)¹⁰⁰. At a state level, the Land Nordrhein-Westfalen developed an evaluation for its overall open government strategy, which includes measuring its open-data-goals and the associated impact¹⁰¹.

Similarly, the approach followed in Denmark varies depending on which kind of open data impact is being analysed, for example geodata¹⁰².

In Poland, the open data portal team uses a combination of a specific and general approach. Here, the Polish open data team produced a study¹⁰³ that defines and measures the parameters of the impact of open data on the area of entrepreneurship through a quantitative survey, which – after some modifications and further tests – is intended to be used to measure the impact of open data on other social groups.

⁹⁷ https://ivpk.lrv.lt/uploads/ivpk/documents/files/Poveikio%20vertinimo%20metodika_%20Projektas.docx

⁹⁸ https://podatki.gov.si/sites/default/files/reports/Open%20Data_Strates%CC%8Cki%20delovni%20plan_julij2020.pdf

⁹⁹ <https://www.regeringen.se/pressmeddelanden/2021/10/ny-nationell-strategi-ska-gora-sverige-ledande-i-delning-av-data/>

¹⁰⁰ <https://dip21.bundestag.de/dip21/btd/19/141/1914140.pdf>

¹⁰¹ <https://www-open-nrw.prod-drupal.nrw.de/system/files/media/document/file/opennrtw1web.pdf>

¹⁰² <https://kefm.dk/media/6500/erhvervslivets-brug-af-kortforsyningen.pdf>

¹⁰³ <https://dane.gov.pl/pl/knowledgebase/useful-materials/raport-z-badania-wsrod-przedsiębiorców-na-temat-wielkości-i-charakterystyki-rynku-ponownego-wykorzystania-danych-publicznych-w-polsce>

2.2 Measuring reuse

The second indicator, measuring reuse, deep dives into the concrete activities performed by EU countries to measure reuse. More specifically, the indicator lists the methods used by Member States to map datasets that are reused and to better understand the needs of reusers. Furthermore, it provides an overview of systematic ways of gathering and classifying reuse cases across the EU.

The following sub-paragraphs will discuss the reuse of datasets and reusers' needs and gathering and classifying reuse cases.

2.2.1 The reuse of datasets and reusers' needs

Understanding reuse is a priority for EU Member States. In fact, 81% of respondents affirm to have launched or performed activities in the last year to map which and how datasets were reused.

As shown in Figure 11:, the most common method within countries that launched or performed activities to identify the most reused datasets and their purpose(s) is by conducting interviews and organising workshops with reusers (82% of the countries that launched activities in the past year). 73% of EU Member States also rely on automated feedback mechanisms to track users' access to datasets and therefore better understand the reuse of such datasets. Surveys and analysis of log files – for example via Google¹⁰⁴, Matomo¹⁰⁵ Analytics or PIWIK PRO¹⁰⁶ – are used by 68% of respondents. Moreover, 36% of EU countries also mentioned 'other' methods to measure the reuse of datasets.

Further methods mentioned to map datasets reuse are meetings with not-for-profit organisations (NGOs) and private companies, as well as the tracking and showcasing of reuse cases developed on specific datasets, for example as carried out in Austria and Finland.

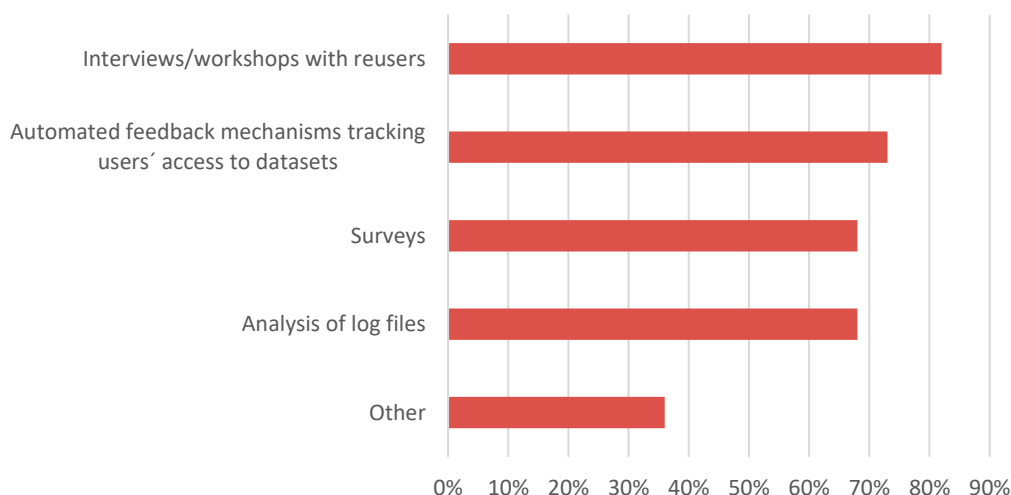


Figure 11: Activities performed by the EU27 to map which datasets are reused

78% of the countries launched or performed some kind of activity in the past year to better understand reusers' needs. As shown in Figure 12, most EU Member States (76% of the countries that launched activities) often participate in regular feedback sessions. This can be in the form of external events,

¹⁰⁴ <https://analytics.google.com/analytics/web/>

¹⁰⁵ <https://matomo.org/>

¹⁰⁶ <https://piwik.pro/>

internal meetings, and test practices with users of their national open data portals. Moreover, 71% of EU countries also leverage other methods to grasp reusers' needs, such as statistics (e.g., Belgium¹⁰⁷), surveys (e.g., Czech Republic¹⁰⁸, Slovakia), webinars and hackathons (e.g., Denmark¹⁰⁹, Portugal). EU countries also gather reusers' needs and requests via contact and request forms (e.g., Spain, Finland) and ad-hoc sections in their open data portals.

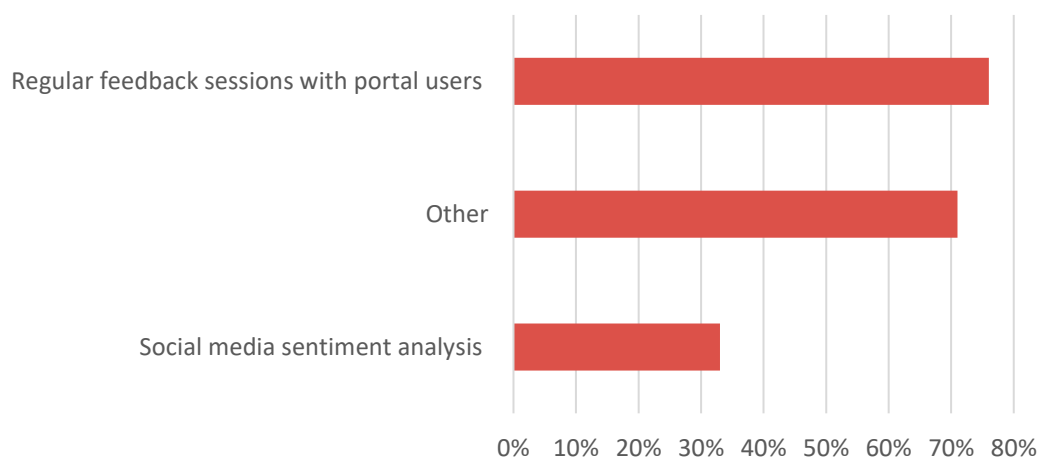


Figure 12: Activities in place in the EU27 to better understand reusers' needs

This is the case in Sweden¹¹⁰, which is developing, as part of a new government assignment around data sharing and data use, a systematic method for collecting reusers' need of data. This work is ongoing and will be reported at the beginning of 2023¹¹¹.

2.2.2 Gathering and classifying reuse cases

Most EU countries (70%) stated that they have at least one systematic way of gathering reuse cases.

In Lithuania, for example, reuse cases are gathered through annual open data surveys, during events, and following public information published via institution websites.

Luxembourg has linked APIs for live mobility data and for the geoportal (public sector geodata) to a user key system, which enables the administration to know the users and their reuse cases.

Portugal's open data portal has established ad-hoc collaborations with civil society and academic entities to systematically gather its reuses¹¹².

In many cases, however, the gathering takes place through a combination of multiple approaches, mostly related to research (including surveys), the features of national open data portals, or community engagement.

¹⁰⁷ <https://statbel.fgov.be/en/news/statbel-datalab>

¹⁰⁸ <https://data.gov.cz/kodi/>

¹⁰⁹ <https://erhvervsstyrelsen.dk/kan-data-forebygge-arbejdssulykker> ; <https://erhvervsstyrelsen.dk/invitation-kom-til-hackathon-med-data-fra-naevnernes-hus>

¹¹⁰ <https://community.dataportal.se/topic/26/om-kategorin-efterfr%C3%A5ga-data-och-api-er>

¹¹¹ <https://www.digg.se/ledning-och-samordning/vara-regeringsuppdrag/regeringsuppdrag/2022-03-23-uppdrag-att-framja-delning-och-nyttiggjorande-av-data>

¹¹² <https://urbandatalab.pt/index.php>

In Cyprus, the open data portal team gathers reuse cases via a desktop study, interviews with main reusers, social media groups that encourage the showcase of reuse cases, and submission forms at the level of open data portals.

Similarly, Spain relies on dashboards monitoring datasets downloads, tracks applications and companies, conducts quantitative analyses, and fosters the creation of data communities for reuse and knowledge exchange.

When it comes to classifying the reuse cases collected, only a few respondents (37%) have a systematic way of doing so. Some EU Member States classify reuse cases according to impact areas (e.g., political, environmental, social, economic – as in the case of Cyprus). Some other countries use categories related to the type of service provided, like applications, web-services and others (e.g., Czech Republic, Poland). Finally, other categories refer to different sectors of activity, such as science and technology, trade, culture, education, etc. (e.g., Spain, Estonia).

In Ireland, a combination of these categories is used. In fact, reuses are classified according to whether a respondent was a user, creator, both, or facilitator of open data; the sector in which the data was to be utilised, (i.e., economic, social, academic, political or civic); the activities for which open data could be used (e.g., to make new data products and services, for organisational optimisation, to improve knowledge and capacity building etc.); and the type of data of interest, be it real time, statistical, spatial, historic, or relating to government services.

2.3 Created impact

Building on the previous indicators, the third indicator, created impact, focuses on the benefits generated by the existing open data and its reuse on government, society, the environment, and the economy, respectively. For each of these four impact areas, the indicator gathers existing data proving the impact that opening up data has had on the general impact area (e.g., in the form of a report or statistics) and with respect to specific challenges (e.g., through reuse cases addressing these challenges).

The following sub-paragraphs will discuss the governmental impact, social impact, environmental impact, and economic impact of open data.

2.3.1 Governmental impact

For the governmental impact area, the impact of open data is investigated in relation to the following challenges:

- Increasing government efficiency and effectiveness in delivering public services;
- Increasing transparency and accountability of public administrations;
- Enabling better policymaking, e.g., use of open data by public administrations as evidence for the problem identification and policy formulation;
- Supporting decision-making, e.g., use of open data by public administrations to guide their daily operations.

41% of EU Member States stated that they have gathered data on the impact created by open data on the government and related challenges. This data is mostly in the form of quantitative studies.

The 2021 Cyprus Open Data Impact Study¹¹³ found that 79% of the participating organisations and companies stated open data had a very positive or positive impact on the quality of services offered by the state and that 89% of respondents thought that open data had a very positive or positive impact on the transparency of the public sector.

Another example comes from the Spanish study 'The value of open data and use cases'¹¹⁴, which includes conclusions on the impact of some open data reuse carried out by civil society through the CIVIO organisation. The study reports positive effects of open data on governmental transparency and decision-making, such as more than 17 million people in Spain being able to monitor what their taxes are used for and 3.5 million being informed about management and decisions in public life.

On average, 84% of respondents think that the use of open data in their countries is having an impact on the governmental challenges being considered and several reuse cases are mentioned in support of this across Member States (Figure).

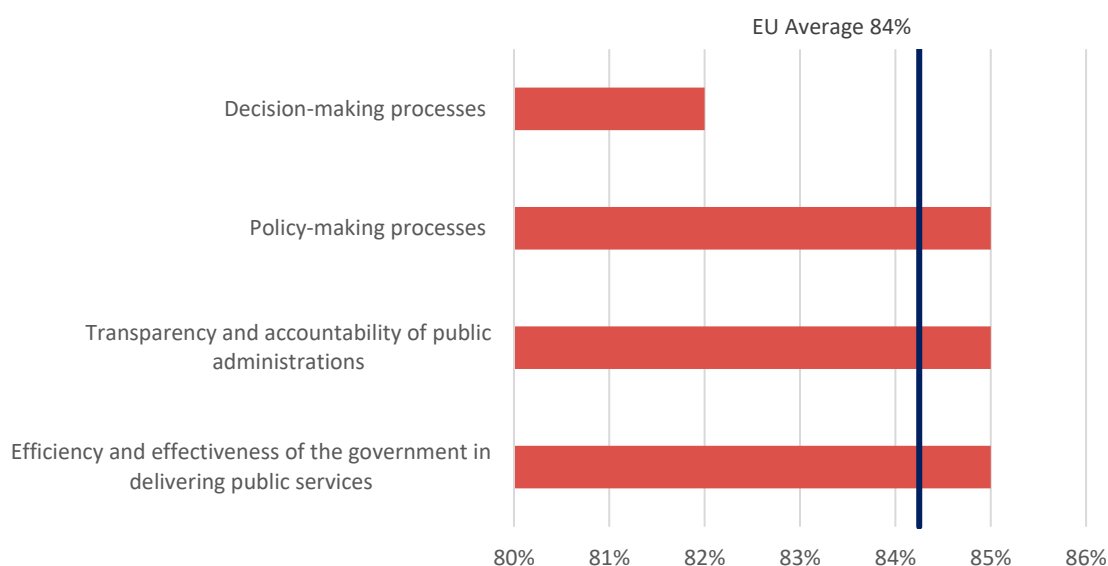


Figure 13: Impact of the use of open data on governmental challenges

Increasing government efficiency and effectiveness in delivering public services

In Italy, the application 'Pronto Soccorso Lazio Ospedali'¹¹⁵ developed from the data of the Open Data Lazio portal makes it possible to estimate how many people are waiting in the Emergency Room of the nearest hospital and thus identify the one with fewer patients. This prevents long patient waiting times and helps deliver healthcare more effectively.

In Spain, the Valencia City Council has developed a data inventory tool to measure the efficiency in the application¹¹⁶ of public policies and eventually support their improvement. This tool also allows citizens to have faster access to public information.

¹¹³ <https://bit.ly/3QiyTOM>

¹¹⁴ https://governobert.gencat.cat/web/.content/01_Qu_e_es/04_Publicacions/colleccio_govern_obert/GovernObert_8/Govern-Obert_8_cast.pdf

¹¹⁵ <https://dati.lazio.it/cerca-app>

¹¹⁶ <https://www.valencia.es/es/-/inventario-datos>

Increasing transparency and accountability of public administrations

In Bulgaria, the system for electronic budget payments (SEBRA)¹¹⁷ monitors the payments initiated by the legal entities included in it and manages payments within predetermined limits. In accordance with the Ordinance on determining the order, manner, terms and scope of the information subject to publication by SEBRA, information is published for each working day, helping increase accountability and transparency.

In Romania, there is significant use of open data by NGOs focusing on anti-corruption, public procurement, public expenditure or election data, leading to increased transparency and accountability. Such examples include the platform 'BaniPartide.ro'¹¹⁸ through which it is possible to follow the evolution of the financing of electoral campaigns, the sources of income and the expenses of political parties, and to search the list of donors, companies / individuals.

Enabling better policymaking

In Belgium, the dashboard 'Provinces in figures'¹¹⁹ combines various open data sources to allow citizens and local politicians to compare statistics on different socio-economic parameters (e.g., demographics, housing, poverty, vacant real estate, energy use) across municipalities so they can launch plans to improve the local economy and society.

In Germany, Pegel-Online¹²⁰ is a highly successful open data app and online platform of the National Water and Shipping Authority. It provides information on the water level gauge of more than 7300 km rivers and canals in the German territory. Among other use cases, the app is used as the basis for policymaking by public agencies and officials working on water-related issues in Germany (e.g., construction, flooding emergency response, etc.).

Supporting decision-making

In Luxembourg, data about roadworks¹²¹ published by the Administration des Ponts et Chaussées is used by many public services actors, such as postal and other delivery services, to take decisions on their delivery planning and transport schemes.

In Sweden, county administrative boards in the north of the country use a data-driven map¹²² of protected natural areas to support their daily processes and make decisions related to events, investments and building projects, as well as the approval or rejection of permits.

2.3.2 Social impact

For the social impact area, the impact of open data is investigated with respect to the following issues faced within societies:

- Better inclusion of marginalised groups and reducing inequality;
- Increasing awareness on housing issues;
- Raising awareness on health- and wellbeing-related issues;
- Raising awareness on education issues.

¹¹⁷ <https://www.minfin.bg/bg/transparency>

¹¹⁸ <https://www.banipartide.ro/>

¹¹⁹ <https://provinces.inciifers.be/dashboard>

¹²⁰ <http://pegelonline.wsv.de/gast/start>

¹²¹ <https://data.public.lu/fr/datasets/pch-les-chantiers-actuels/>

¹²² <https://www.dataportal.se/sv/datasets?p=1&q=skyddad%20natur&s=2&f=> ; <https://www.artdatabanken.se/>

Only 26% of EU Member States stated that they report on the impact created by open data on society and related challenges. Due to the nature of social challenges, data on their resolution and how open data may define or effect challenges in this impact area seems to be rather subjective and qualitative.

In Ireland, open data is increasingly recognised as a force for positive social change, as proved by the fact that figures on deprivation or lack of social services are more accessible and both journalists and the public become more competent in finding and interpreting source data.

In Cyprus, there is a reliance on quantitative figures. For example, 46% of organisations and companies that took part in the 2021 Cyprus Open Data Impact Study¹²³ see a positive impact of open data on the inclusion of marginalised social groups.

In Portugal, there is a quantitative approach that measures the impact of open data initiatives by looking at the differences between annual statistics related to social mobility in higher education¹²⁴ and social security statistics¹²⁵.

Across all four social challenges considered, an average of 81% of EU Member States report that the use of open data in their countries is having an impact on them, as proved by the following reuse cases (Figure).

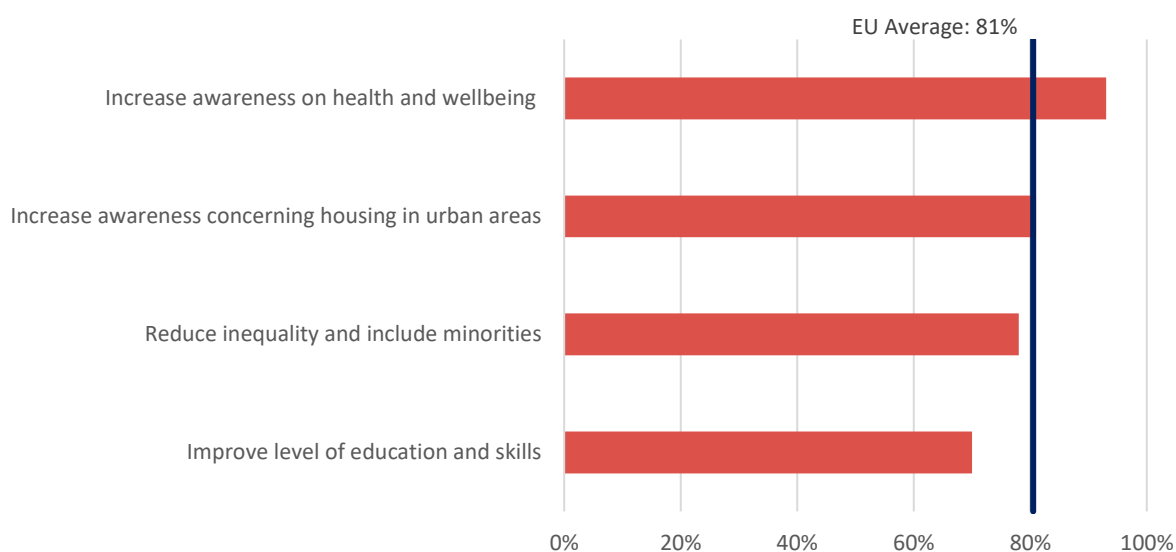


Figure 14: Impact of the use of open data on social challenges

Better inclusion of marginalised groups and reducing inequality

In Austria, apps such as 'Restroom map app'¹²⁶ map the location of restrooms. Other apps¹²⁷ in the country are also based on the real-time location of working elevators at public transport stations to help include marginalised people and those with disabilities in everyday societal challenges.

¹²³ <https://bit.ly/3QiyTOM>

¹²⁴ <https://www.dgeec.mec.pt/np4/68.html>

¹²⁵ <https://www.seg-social.pt/estatisticas>

¹²⁶ <https://www.data.gv.at/katalog/dataset/d9f5e582-3773-4f0b-8403-5d34718f6cf7>

¹²⁷ <https://www.data.gv.at/katalog/dataset/aac2629e-495d-4468-9c8b-cd9649bd7b5d>

In Denmark, the Partnership for the employment of Ukrainians, which is a collaboration between the public sector and employers' and employees' associations, has launched a website¹²⁸ that provides links to relevant resources for Ukrainian job seekers, helping them to integrate into the local labour market.

Increasing awareness of housing issues

In Poland, the City of Wałbrzych developed a financial efficiency calculator¹²⁹ for buildings run by housing communities or cooperatives. The idea of the calculator is to offer illustrative information before starting investments regarding the revitalisation of residential buildings, in particular regarding financial efficiency and thermal modernisation.

In Lithuania, a service¹³⁰ collects and analyses all the relevant information from local governments, public authorities, heat supply companies and other institutions about the real estate and living environment. This allows citizens to easily find information about utility taxes, real estate market value, crime rate, air pollution, noise level, distances, demographic situation of specific districts, school rankings and similar information.

Raising awareness on health- and wellbeing-related issues

In Slovakia, visualisations and dashboards based on COVID-19 and vaccination data were developed by several municipalities and self-governing regions¹³¹ to inform citizens and to handle the crisis. Moreover, open data was used to develop the government app 'Covid automat'¹³² aiming to inform citizens about restrictions based on where they lived.

In Estonia, the Estonian Health Board created an application called 'weight calculator'¹³³, which compares an individual's weight to the weight of other Estonians, Europeans and Americans, raising awareness on obesity as an important risk factor for heart diseases and facilitating more rational health-related decisions.

Raising awareness on education issues

In Hungary, the Graduate Career Pathway System¹³⁴ run by the National Education Authority makes a significant contribution to informing the higher education career choices of young Hungarians by publishing data on salary bands and gender distribution.

In the Czech Republic, the project 'Mapa vzdělávacího neúspěchu'¹³⁵ focuses on the links between the level of education and social issues, raising awareness on regional education inequalities that need to be addressed.

¹²⁸ <https://jobguideukraine.dk/>

¹²⁹ <https://kalkulator.rewitalizacja.walbrzych.pl/dzial/instrukcje/>

¹³⁰ <https://kurgyvenu.lt/>

¹³¹ <https://www.uniamiest.sk/zaockovanost-mesta> ; <https://geopresovregion.sk/home/2020/12/16/prinasame-novu-prehľadnu-appku-o-covid-19-vychadza-z-otvorených-dat-mz-sr/>

¹³² <https://data.gov.sk/apps/detail?id=ab3cefe4-f615-4ed0-9e1e-37251ac60bf9>

¹³³ <https://www.haigekassa.ee/kaalukalkulaator>

¹³⁴ <https://www.diplomantul.hu/>

¹³⁵ <https://www.mapavzdelavani.cz/>

2.3.3 Environmental impact

For the environmental impact area, the impact of open data is investigated in relation to the following challenges connected to the environment:

- Increasing awareness on biodiversity-related topics (e.g., air and water quality);
- Enabling more environmental-friendly cities;
- Raising awareness on climate change and connected disasters;
- Encouraging a lower consumption of energy based on fuel and the switch to renewables.

Only 8 out of the 27 EU Member States stated that they held data on the impact of open data on the environment and connected issues. Most of this data comes from ongoing projects and studies.

Until 2023, the Czech Republic will run a project called 'National Environmental Reporting Platform' that focuses on available sources of environmental open data and analyses their impact on the social, political and legislative requirements caused by the climate and environmental changes.

Similarly, in Ireland the open data unit has engaged a research fellow to assess the impact of open data in the social, economic and environmental spheres. They are currently studying both open data producers and consumers and looking at how open data is being used and adding value in these areas.

Similar studies considering the impact of open data, but not only on the environment, are also conducted by Estonia¹³⁶, France¹³⁷, and Cyprus. The latter reports that, on average, 80% of the respondents to their 2021 Cyprus Open Data Impact Study¹³⁸ recognise the positive effect of open data on environmental awareness.

75% of EU Member States reported that they see the use of open data in their countries as having an impact on the above-mentioned environmental issues and report several reuse cases aimed at addressing them (Figure).

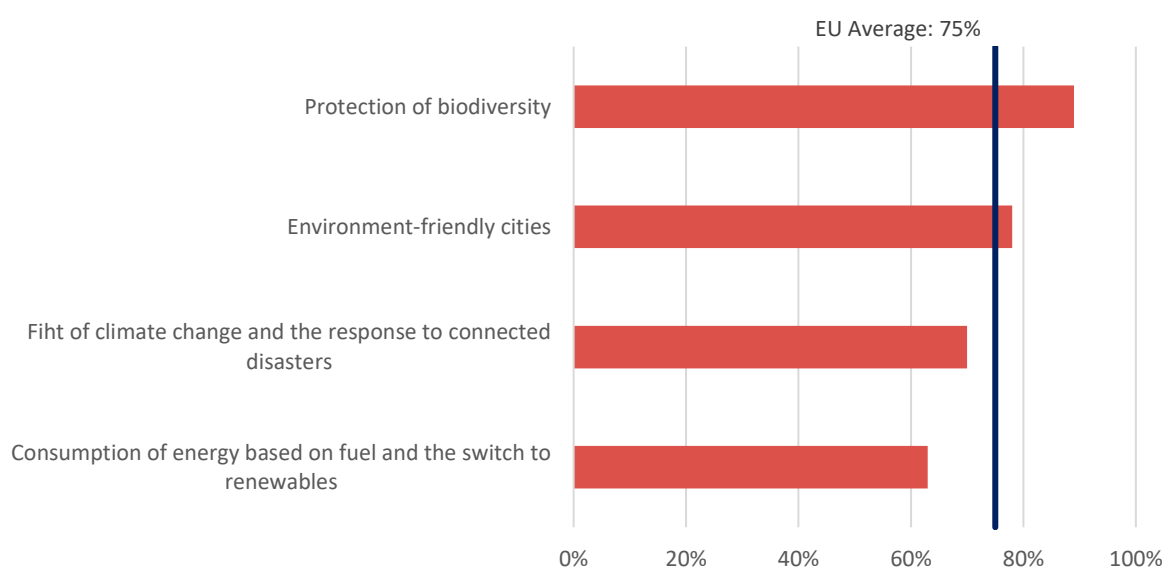


Figure 15: Impact of the use of open data on environmental challenges

¹³⁶ <https://avaandmed.eesti.ee/instructions/teistkordne-avaandmete-mojuhinnang-avalikus-sektoris>

¹³⁷ <https://www.data.gouv.fr/fr/datasets/r/a61e1fcc-cd61-46bd-a6c5-af94cb9f8459>

¹³⁸ <https://bit.ly/3QiyTOM>

Increasing awareness on biodiversity-related topics

In Sweden, the app 'Biologg'¹³⁹ allows the user to gather different observations in nature as part of a game. This enhances learning about animals and wild arts, e.g., the more insects or mushrooms one is able to log and identify, the more points are accumulated. The game is based on a database from the Swedish Species Information Centre. The logged information about species in nature is also shared with scientists in order to better understand how to protect biodiversity.

In Malta, the Environment and Resource Authority provides real time data regarding air quality online, which is widely reused to produce air pollution visualisations maps¹⁴⁰, air quality indexes¹⁴¹, and street-level air quality, pollen and wildfire intelligence¹⁴².

Enabling more environmental-friendly cities

In Latvia, the app 'Vides SOS'¹⁴³ allows everyone to quickly and easily record environmental violations, report them to the relevant authorities and get feedback on the progress of their remediation.

In the Netherlands, the city of The Hague developed a Datalab¹⁴⁴ to support the transition towards cleaner energy.

Raising awareness on climate change and connected disasters

In Spain, the Ministry of Ecological Transition and the Demographic Challenge launched the project 'Climate Change Scenario Viewer'¹⁴⁵, a useful tool for viewing and downloading data related to plausible representations of future climate. The data available in the Climate Change Scenarios Viewer is fed by the specific projections provided by the AEMET (State Meteorological Agency) and the grid projections from the international Euro-CORDEX initiative.

In Denmark, water and surface maps¹⁴⁶ support climate change adaptation as they can be used to calculate areas at risk of flooding as well as to plan water drainage.

Encouraging a lower consumption of energy based on fuel and the switch to renewables

In Germany, the mFUND-Project 'ChargePlanner'¹⁴⁷ aims to develop a prototype for calculating charging recommendations for electric cars along a route and for forecasting the capacity utilisation of public charging stations. For this purpose, suitable data sources are first identified and then processed or merged. The resulting data will be made available in a smartphone app. The app will then be expanded to include a capacity utilisation forecast for charging stations.

¹³⁹ <https://www.biologg.se/>

¹⁴⁰ <https://aqicn.org/map/malta/>

¹⁴¹ <https://www.eea.europa.eu/themes/air/air-quality-index/index>

¹⁴² <https://breezometer.com/air-quality-map/search?lat=35.88333&lon=14.5>

¹⁴³ <http://www.videssos.lv/>

¹⁴⁴ <https://www.datalab.nl/>

¹⁴⁵ https://escenarios.adaptecca.es/#&model=EURO-CORDEX-EQM.average&variable=tasmax&scenario=rcp85&temporalFilter=year&layers=AREAS&period=MEDIUM_FUTURE&anomaly=RAW_VALUE

¹⁴⁶ <https://podtail.com/da/podcast/edb-5-0/-40-sdfe-understottelse-af-klimaforandringer-ved-b/> ; <https://www.geodanmark.dk/anvend-geodata/kurser-og-workshops/tidligere-afholdte-kurser/befaestelseskort-i-geodanmark/>

¹⁴⁷ <https://www.bmvi.de/SharedDocs/DE/Artikel/DG/mfund-projekte/chargeplanner.html>

In Estonia, 'Sunly'¹⁴⁸ analyses good wind resources, the amount of open space, the availability of transmission lines and lack of different constraints based on real-time data and modelling. Once verified that the plot is attractive for renewable energy production, Sunly offers landowners competitive land leases.

2.3.4 Economic impact

For the economic impact area, how open data is impacting the following indicators of economic growth is considered:

- Employment;
- Innovation and adoption of new technologies;
- Entrepreneurship and business creation, especially of women and minorities and SMEs.

Almost a half of EU Member States (48%) have collected data on the impact of open data on the economy and the above-mentioned economic indicators. This has been done through research based on the approach used by the European Data Portal's (now data.europa.eu) study on the economic impact of open data¹⁴⁹ or following a survey methodology.

Slovenia's report on the economic-social impact of open data in the country¹⁵⁰ revealed an estimated potential of € 293 million for Slovenia's open data market size growth until 2025 and estimated 7,441 open data employees in 2025, according to optimistic scenario forecasts.

In Spain, ASEDIE, a multisectoral information association, annually analyses the economic and social value of companies that reuse data from the public (and private) sector to develop value-added products. According to the 2022 edition of its report¹⁵¹, thanks to this use of data, these companies generated a sales volume of more than € 2,000 million, offering employment to almost 23,000 professionals.

Some EU Member States reported that their economic studies are in relation to specific types of data and dataset.

In Germany, the German Federal Ministry for Economic Affairs and Climate published a study¹⁵² that examined, inter alia, the economic impact of high-value datasets on the German economy.

In Denmark, several reports and analyses¹⁵³ have indicated that the value of open geodata and basic open data ranges in billions of DKK.

¹⁴⁸ <https://sunly.ee/>

¹⁴⁹ <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

¹⁵⁰ <https://podatki.gov.si/sites/default/files/reports/Economic-social%20impact%20of%20open%20data%20in%20Slovenia.pdf>

¹⁵¹ <https://static1.squarespace.com/static/600a99c4d2a8133c3599fc67/t/625ff870bdc4cd5114333794/1650456698859/Asedie+Report+10%C2%AA+Edition+.pdf>

¹⁵² https://www.bmwk.de/Redaktion/DE/Publikationen/Studien/studie-hochwertige-datensaetze-in-deutschland.pdf?__blob=publicationFile&v=16

¹⁵³ <https://gst.dk/media/2916790/de-frie-geodata-eftermaalning.pdf>; <https://sdfe.dk/media/2917052/20170317-the-impact-of-the-open-geographical-data-management-summary-version-13-pwc-grkvdr.pdf>; <https://sdfe.dk/data-skaber-vaerdi/nyheder/nyhedsarkiv/2017/mar/stor-stigning-i-vaerdien-af-de-frie-geografiske-grunddata/>; <https://sdfe.dk/media/2917052/20170317-the-impact-of-the-open-geographical-data-management-summary-version-13-pwc-grkvdr.pdf>

On average, 62% of EU Member States consider the use of open data as having an impact on employment, technology and innovation, as well as on entrepreneurship and business creation. Some interesting reuse cases support the claim (Figure).

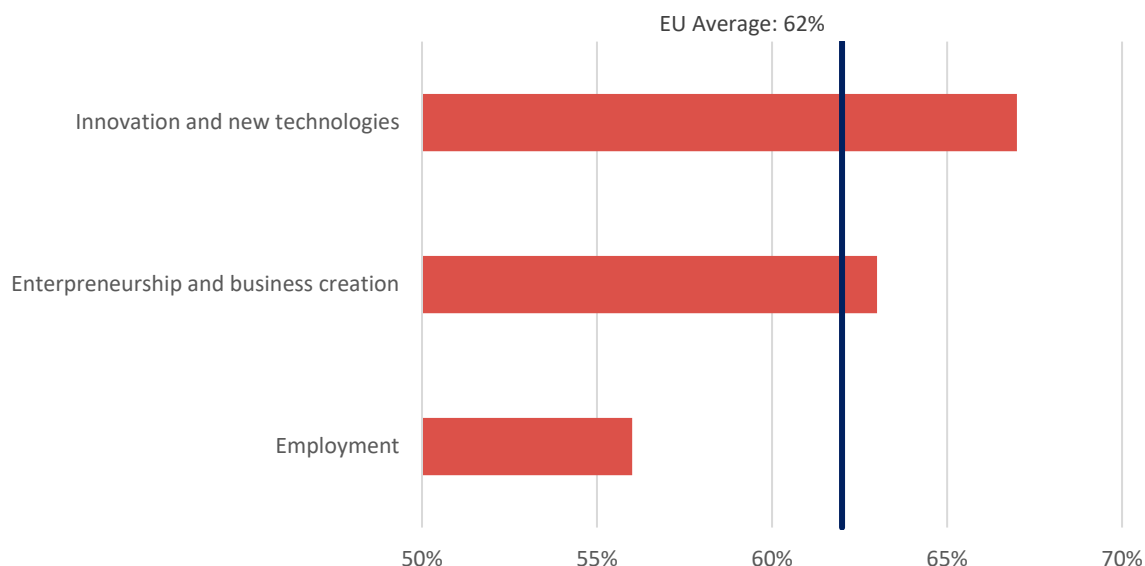


Figure 16: Impact of the use of open data on economic factors

Employment

In Lithuania, the Neurotechnology solution¹⁵⁴ enables the automatic collection of freely available data to draw conclusions about the labour market situation and future needs. The solution provides a comprehensive and systematic forecast of the region's labour market needs, allowing for the targeted organisation of local vocational guidance services and the formulation of training and retraining services. The solution requires fewer human and financial resources.

In Italy, open data enabled the analysis and identification of appropriate measures to promote long lasting, inclusive and sustainable economic growth, full and productive employment and decent work for all¹⁵⁵.

Technology and innovation

In Luxembourg, several projects¹⁵⁶ aimed at implementing AI-based technologies in governmental organisations have been relying on data available as open data.

In Spain, 'Gijón in one click'¹⁵⁷ is a free mobile app that uses open data and augmented reality to display content. The app makes three routes available to visitors. During the tours, plaques have been installed in the ground from where tourists can launch augmented reality recreations with their own mobile phone.

Entrepreneurship and business creation

¹⁵⁴ <https://www.neurotechnology.com>

¹⁵⁵ <https://www.istat.it/storage/rapporti-tematici/sdgs/2021/goal8.pdf>

¹⁵⁶ https://gouvernement.lu/de/dossiers/gouv_digitalisation%2Bde%2Bdossiers%2B2021%2BAI4Gov.html#bloub-3

¹⁵⁷ <https://www.gijon.es/es/turismo/gijonxixon-en-un-clic>

In the Czech Republic, the organisation ‘Czechitas’¹⁵⁸ organises the ‘Digital Academy project’, which, among other things, focuses on data analysis using open data. This fosters the IT skilling of women and their subsequent integration into the IT labour market.

In France, open business data made it possible to develop the national company directory ‘annuaire entreprises’¹⁵⁹, which relies on the open APIs exposing business data to facilitate the provision of services to companies. Another example that relies on the company identification number is the service ‘mon entreprise’¹⁶⁰ that provides simulators, calculators, and tools to help entrepreneurs.

2.4 Overall performance

In this final section, the overall performance of the EU27 is evaluated based on the indicators of the impact dimension discussed throughout the chapter. Due to the restructuring of the open data impact dimension, it is not possible to perfectly compare the results of this year’s Open Data Maturity assessment with those of the 2021 edition. It is true in fact that in 2021 the maturity level for the impact dimension stood at 77%, while in 2022 the average score among the EU27 lies at 71% (Figure). Moreover, the impact dimension remains the dimension with the most room for improvement. Only once since 2018 has the impact dimension not been the lowest scoring subdimension.

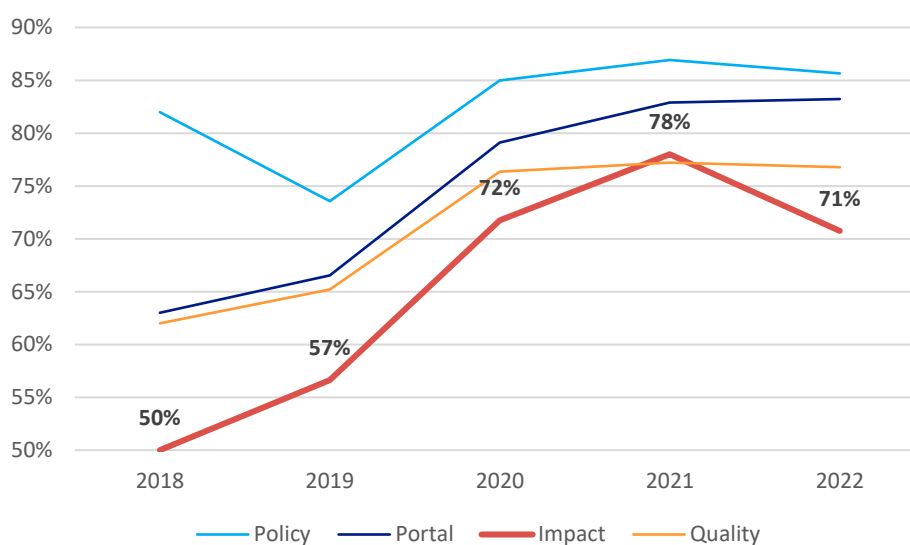


Figure 17: Development in maturity of the impact dimension over the last years

However, this latter result does not represent so much a decrease in maturity level, but rather provides a more accurate picture of the difficulty in assessing the impact resulting from measuring open data reuse. In other words, this year’s results seem to be in line with the twofold motivation behind the methodology update, as proved by the fact that the EU countries are still scoring high in the strategic awareness indicator (EU average is 78%) – which was also used in the 2021 assessment – and in the

¹⁵⁸ <https://www.czechitas.cz/o-czechitas>

¹⁵⁹ <https://annuaire-entreprises.data.gouv.fr/>

¹⁶⁰ <https://mon-entreprise.urssaf.fr/>

indicator related to measuring reuse (EU average is 75%), where countries showed an advance on previous assessments.

The created impact indicator was newly added this year and is a composite indicator of governmental impact, social impact, environmental impact and economic impact. The impact of open data is felt strongest in government (EU average 73%) through improved transparency and government efficiency. The social domain (EU average 67%) also benefits from open data mainly through an increased awareness of health and wellbeing. Notably, the economic impact is currently lowest (EU average 58%). Although open data is already used regularly for innovation and new technologies, further improvements are required to bring the economic impact of open data to fruition. This is illustrated in Figure 18.

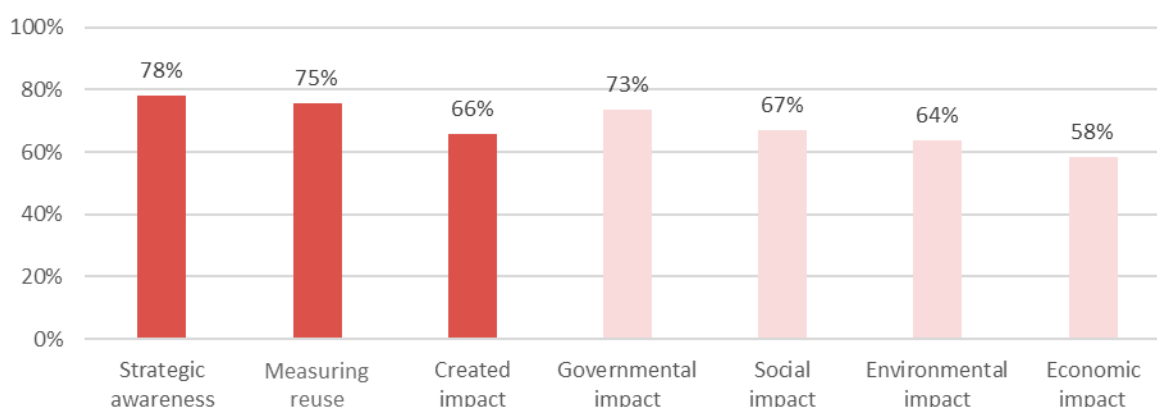


Figure 18: Maturity score per impact indicator and for each of the created impact sub-indicators

Figure 19 shows the country ranking of the impact dimension. Five countries – Cyprus, the Czech Republic, Estonia, France and Ireland – score maximum points for strategic awareness, measuring impact and created impact. They are closely followed by Spain, Poland and Italy who all score above 90%. Most countries are already focused on the impact that open data has, as 16 EU member states score above 70%. Notable risers are Hungary and the Czech Republic, with score improvements of 42% and 30% respectively.

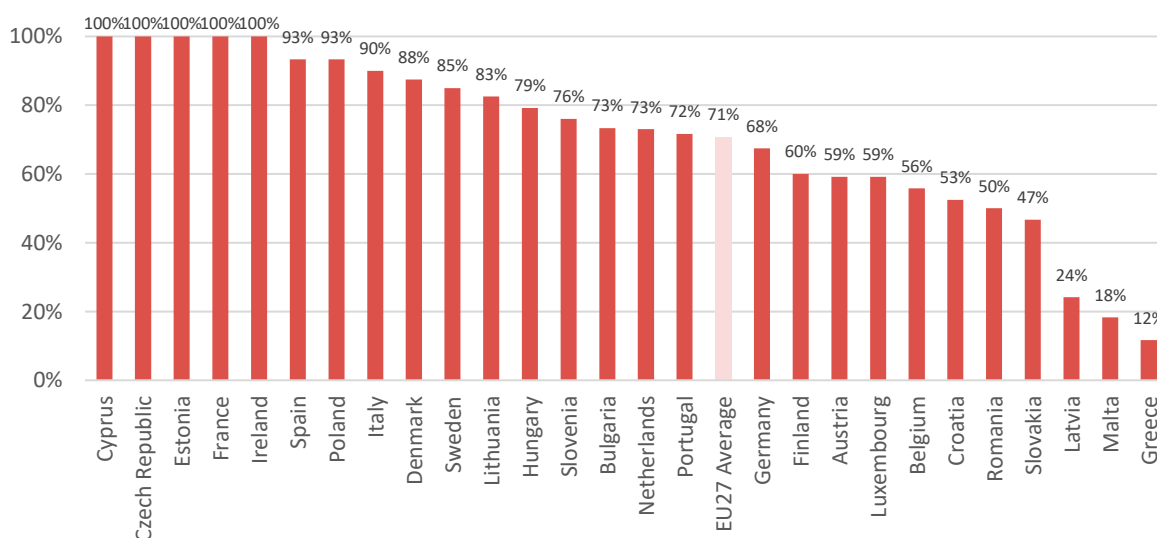


Figure 19: Country ranking for the impact dimension

Chapter 3: Open Data Portal in the EU27

To enable people to easily find openly available datasets, European countries have national data portals in place. EU Member States offer open data at all levels of government, through numerous and heterogeneous data sources, publication points and arrangements in general. Though this is not always optimal, it is also a natural consequence of how rich and varied the spectrum of government bodies and agencies producing and offering data are. The complexity of making data available and discoverable often grows with the size of government or the levels of it. For example, states in a federation are highly autonomous in dealing with their own data. National open data portals address this complexity and ensure that the richness and diversity of this data is discoverable from the original source and via a single, coherent central gateway. The third dimension of this study, 'open data portal', focuses on the level of maturity of the national open data portals, including considerations around their functionality, usage (user analytics), variety of data featured, and the approach to ensuring the portal's sustainability. The following key elements are explored as part of the portal dimension:

Metrix	Key elements
Portal features	Portal features ensure access to datasets and relevant content, including more advanced features such as SPARQL search, discussion forums, rating of datasets, requesting datasets, and providing transparency on the progress status of requested datasets. Activities to promote the visibility and reuse of high-value datasets via the portal are planned.
Portal usage	Traffic to the portal is monitored and analytics tools are used to gain insights into users' behaviour and the most and least consulted data categories. In addition, the portal offers APIs through which advanced users can access the metadata programmatically.
Data provision	The majority of data publishers can contribute data and its metadata to the national portal and actions are taken to enable publication from data publishers. In addition, access to real-time data is enabled via the portal and data that does not stem from official sources can be uploaded.
Portal sustainability	A sustainability strategy for the portal has been defined and activities are conducted to ensure the portal's visibility, including social media presence. In addition, user surveys are conducted regularly, and feed into the reviewing process of improving the portal.

All EU27 countries have a centralised national portal in place with the exception of Denmark. Denmark has a data distribution platform called Datafordeler¹⁶¹ that acts as a central open government data portal and distributes the most essential public data to users. The Danish government offers a variety of smaller, specialised portals that focus on different areas. For example, they are creating an environmental portal, a portal that provides geodata, and a portal for the country's official statistics. Moreover, a national metadata portal that will exhibit metadata from the aforementioned portals is expected to be launched by Denmark at the end of 2022.

3.1 Portal features

The first indicator evaluates the functionalities on the national open data portals and investigates both basic features and more advanced features. Portal features include, for example, an advanced data

¹⁶¹ Datafordeler: <https://datafordeler.dk>

search function, the possibility to download datasets, and to search by file format or data domain, such as “agriculture” or “economy”. The more advanced portals also enable users to search data via more complex tools, such as SPARQL queries. By adding, for example, filtering features, editorial features or changes to navigation, countries can also promote the availability of high-value datasets on the portals. Furthermore, this indicator examines whether it is possible for visitors to request and rate datasets, and whether portals offer use cases. These use cases may derive from research performed by the national open data teams’ research or submitted by the users themselves. The more advanced portals often provide a higher degree of transparency towards visitors by presenting the progress status of data requests. The indicator also examines whether portals have features in place that foster the online interaction between publishers and reusers, such as discussion forums, feedback channels, and the possibility of notifications when new datasets become available.

The following sub-paragraphs will discuss searching for datasets in the EU27, requesting datasets, providing transparency, enabling (user) interaction, and providing examples of open data reuse.

3.1.1 Searching for datasets

The EU27 national portals offer advanced data search functions with features such as filter options, and multiple field search, and allow users to download datasets from the portal. As of 2022, all national portals stated that they now enable users to search for datasets by file format and data domain. Moreover, since last year, Malta has added the possibility to search for datasets by file format, and it is possible to search for datasets by data domains in Hungary and Estonia.

To address more advanced search needs, the presence of a SPARQL search function was assessed. SPARQL is a semantic query language for databases that enable the more advanced users to search deeply and precisely in the metadata offered – whether from the original source portals or data.europa.eu itself. Moreover, it can enable access to metadata that is not directly visible to users by using the website interactively. Users can also use SPARQL as an API and embed the query into their own software to automatically interrogate the data portal, for example, to identify the availability of new datasets. In 2022, 25 Member States (93%), apart from Latvia and Slovakia, responded that they have a SPARQL endpoint in place. This is an increase from 78% in 2021 and demonstrates that Member States have made substantial progress in terms of data searchability in recent years.

High-value datasets

As mentioned in chapter 1.1 Open data policy, the Open Data Directive requires the publication of a series of high-value datasets (i.e., datasets whose reuse can have major benefits for society and the economy) according to specifications in an upcoming implementing regulation by the European Commission. All EU27 Member States indicated that they aim to promote or are already promoting high-value datasets. This promotion is often in the form of labelling datasets to make them easier to find or by providing editorial content illustrating their contents and value.

In Bulgaria, high-value datasets will be assigned to a dedicated category on the portal, which will also be selectable through filters in the general section of the available datasets.

In Finland, the national data portal team has designed a symbol to use as an icon to highlight the high-value datasets and help users to differentiate them from other open data¹⁶².

The Romanian national portal is promoting the publication of high-value datasets through its editorial features (blog and social media).

¹⁶² https://www.betaavoindata.fi/data/en_GB/dataset/testiabckorkeailisaarvo

Spain plans to implement a functionality that will highlight brief lists of high-value datasets in a prominent part of the home page of the portal. In this list, there will be an option to 'see more' by applying specific parameters of the general catalogue search engine.

Other countries stated that they are still considering or evaluating the different options available to enable users to search for high-value datasets. The European Commission's view on a unified process will help the EU27 Member States to make decisions on, for example, which terms and DCAT-AP field to use.

3.1.2 Requesting datasets

The search functions discussed above support users in finding what they are looking for. When a specific dataset is not (yet) published on the national portal, users can send in a request. With the exception of Germany and Greece, all national portals offer the possibility for users to request a dataset. Most portals regularly receive datasets requests. 36% receives these kinds of requests on a monthly basis and respectively 12% and 20% of the portals receive dataset requests on a daily or weekly basis. This is similar to last year, when 37% of the dataset was requested monthly, 26% weekly and 11% daily. For a full overview of the frequency of incoming data requests, see Figure . The approach on how users can place their request differs per portal. Nevertheless, the most common way is by using a designated request form. Another frequently used method is by writing to a portal's general contacts.

Of the 25 national portals that stated they offer the data request functionality, 21 portals also responded that they monitor the extent to which these requests result in the publication of data. Examples of how they monitor the publication of data include by contacting the designated person(s) (for example by e-mail), or through internal tools.

Croatia's portal team regularly checks if there is any improvement by contacting public sector bodies.

In Ireland, the Open Data team emails the data request to the relevant public body, follows up on the requests, and monitors the request's progress. When requests are unsuccessful, it advises the requester and reminds them of their right of appeal to the Information Commissioner under the PSI directive.

Portugal makes use of internal tools, such as Excel spreadsheets. By doing so, they can keep track of the request by monitoring information, such as when the requests were made, if an answer has been given, and if the requested datasets were published. Portugal has a special team to follow up on the information generated by this tool.¹⁶³

None of the European countries publish all user requested datasets. Half of the portals that monitor user requested datasets publish the majority of requested datasets, which is a clear improvement compared to last year (26%). Moreover, almost one in three countries (32%) report that approximately half of the requested datasets are published eventually. Interestingly, all countries that monitor user requested datasets also publish at least some of the requested datasets. None of the countries that facilitate dataset requests reported to publish zero datasets. The proportions of datasets that are eventually published following a data request are illustrated in Figure .

¹⁶³ <https://dados.gov.pt/stats>

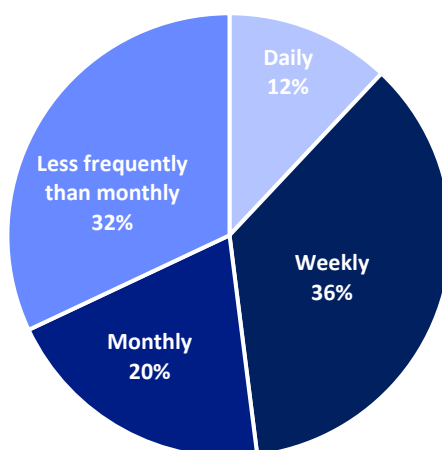


Figure 20: Frequency of user requests across the EU27 Member States

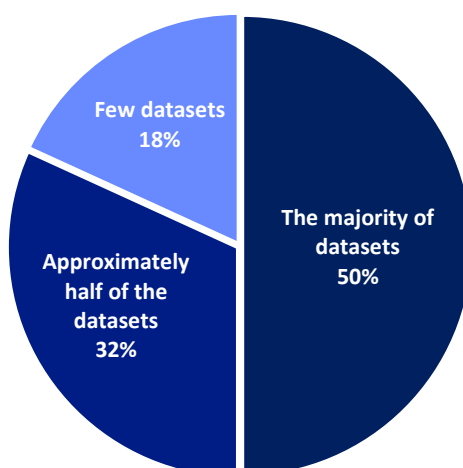


Figure 21: Number of user-requested datasets that are published on the respective national portals

3.1.3 Providing transparency

From the 25 national portals that offer a data request functionality, 18 portals transparently showcase these requests by publishing the request and response on the national open data portal. This is similar to last year.

*The Netherlands, for instance, offers an overview of all data requests, responses, and status. Their national portal provides an overview of the requests, organised by theme and status of the request, see Figure . The body responsible for publishing the dataset will respond to the request and update its status, which is all visible to the user. The data published is sanitised of any personal data.*¹⁶⁴

¹⁶⁴ [Dataverzoeken](#) | [Data overheid](#)

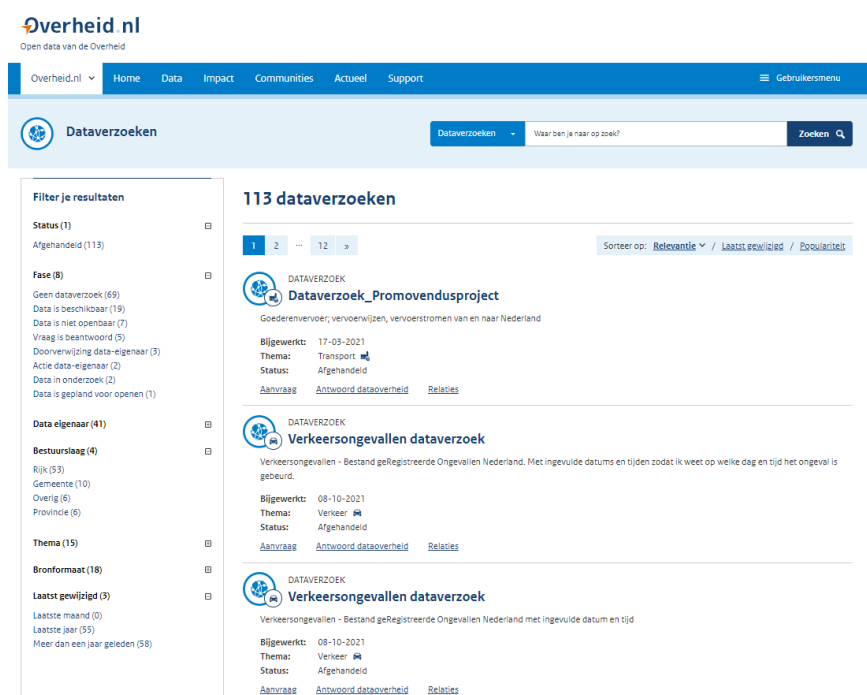


Figure 22: Data request section of the Dutch open data portal

3.1.4 Enabling interaction

To meaningfully interact with their users, Member States often offer tools for collecting feedback, or input. Interaction between reusers and data publishers is highly valued by the national portals.

There are pros and cons to the involvement of the national portal in the dialogue between the reusers and the sources of the datasets. On one side, acting as intermediary can be useful for the national portals to monitor the feedback that comes in, identify patterns, and develop a better understanding of their users' and the general open data community's needs. On the other side, an intermediary may inadvertently prevent that same insight from being visible to the actual data provider. In general, the intermediary-based support model cannot scale as reuse grows.

Feedback

Providing feedback can be done in different ways, for example by using a contact form or by responding to a dedicated commenting section at the bottom of the dataset information page. Especially the latter allows users to express their opinions about the published dataset and make it possible to report areas for improvement to the portal owners and the data providers.

Similar to last year, 26 of the 27 Member States provide a general feedback mechanism for users. 24 of the 26 Member States (89%) who stated that they offer this service also have a mechanism in place that allows for feedback loop to the publishing institution on a specific dataset.

Many portals even offer the capability for users to rate datasets. This can be done through "likes" or numerical ratings. 15 national portals (56%) responded that they offer such a functionality compared to 12 (44%) last year. In addition to ratings and commentary, 19 portals (70%) shared that they allow users to link documentation and supporting materials to a given dataset. This number is significantly lower than last year, when 24 portals (89%) allowed users to do so. The researchers do not have a hypothesis as to what could have caused this change.

Community engagement

To engage with the open data community and interact with the portal users, 18 Member States (67%) responded that they offer a general forum where users can discuss a variety of topics and express their opinions that are not related to a specific dataset. This is a decrease from 21 Member States (78%) in 2021. Depending on the portal teams' choice, forums are made accessible to any anonymous user, or are subject to registration.

*The Belgium data portal offers a public chat room where open discussions can take place.*¹⁶⁵

*In Germany, there is a closed discussion forum for registered data providers only.*¹⁶⁶

Additionally, to increase user interaction, 21 national portals (78%) offer the possibility for users to receive notifications when new datasets are made available using, for example, RSS and ATOM feeds, or e-mail notifications. This is a decrease from 25 (93%) in 2021, that we presume is due to RSS and ATOM becoming less popular. In most cases users can follow datasets or data publishers and receive notifications whenever new data is published, or existing data is updated.

3.1.5 Providing examples of open data reuse

All national data portals promote and support open data reuse. Similarly to last year, 25 of the EU27 national portals (93%) shared that they have a designated section to promote applications that make use of open data. Additionally, 21 Member States (78%) responded that they provide the possibility for users to submit their own use case examples. 24 of these 25 national portals stated that they also have a dedicated use case section on the portal that indicates which datasets the use cases are based on.

In 2022, 21 Member States (78%) reported that they had implemented a dedicated page for users to submit their use cases, rather than referring them to a general contact form. This is a significant increase from 16 national portals (59%) in 2021.

In terms of more advanced previewing features and data viewing options, 20 portals (74%) reported that they have a preview feature for tabular data, and 15 portals (56%) stated that they also have a preview function for geospatial data, typically in the form of an interactive map. The results are a decrease from 22 (81%) and 19 (70%) in 2021 respectively. The researchers do not have a justification of the reason for the loss of these features, although our hypothesis is that it may be driven by the attempt to simplify the portal technology and reduce maintenance costs. The preview feature is important for a portal as it allows all users, experts and non-experts alike, to visualise the data and get an initial understanding of it. Through previewing and visualisations, users can experience and explore data interactively.

Although the national portal of Germany does not have a preview function for tabular data and geospatial data yet, they expect to have this feature by the end of 2022.

3.2 Portal usage

Portal managers need to regularly assess if the portal design and features, as well as the available data, meet the users' needs. The feedback received directly by users is valuable, though anecdotal. Deeper insight is created by observing systematically the usage of the portal to better understand users' behaviour. The analysis of users' needs is enabled by monitoring the number of unique visitors, the

¹⁶⁵ <https://app.element.io/#/room/#data.gov.be:matrix.org>

¹⁶⁶ <https://github.com/GovDataOfficial/DCAT-AP.de>

typical user profiles, the most consulted datasets, the most popular data domains, or traffic generated via the portal's API. The effort spent in this direction is examined by this second indicator.

The following sub-paragraphs will discuss user analytics of the EU27 national open data portals, the number of portal visitors, the most popular data domains, and Application Programming Interface (API).

3.2.1 User analytics

24 portals (89%) responded that they monitor the portal's usage through analytical tools such as Matomo or Google Analytics. 20 of them indicated that these insights are used to improve the portal. Some countries found interesting insights from these analyses.

In Finland, statistics are used to improve portal usability and optimise the content of opendata.fi support materials. The support materials on the national portal are continuously developed based on user feedback and usage statistics. Statistics help to improve the content and are used when planning the future service development. For example, the development of the most visited pages will be given priority, and the website's search usability is improved based on data about popular search terms. Additionally, statistics are used to ensure that all pages work correctly.

Thanks to user analytics, Slovenia gains information about the datasets that are the most popular amongst users. With this information, they prioritise attention on ensuring that those datasets are up to date and their quality preserved.

3.2.2 Portal visitors

When trying to capture portal usage, the number of unique visitors¹⁶⁷ per month is one of the most common measures used. 22 national data portals (81%) reported that they keep track of the average unique visitors per month, with the exceptions being the Czech Republic, Greece, Hungary, Malta and the Netherlands.

The EU27 Member States are vastly different when it comes to the number of visitors on the portals.

The French national portal reported the highest number of unique visitors by far (1.4 million per month). This is an increase from 1 million in 2021.

The Lithuanian national portal recorded the lowest number compared to the other Member States (3 k per month), which is an increase from 1.4 k. They are followed by Estonia (4 k per month) and Sweden (4,5 k per month).

Though this is an interesting finding for drawing cross-country comparisons, the indicator is more meaningful when taking population numbers into account. If we correct for population, we find the numbers as shown in Figure . As illustrated, Luxembourg has the highest number of unique visitors relative to the population size. Italy has the lowest number of unique visitors.

¹⁶⁷ 'Unique visitors' refer to the number of distinct individuals accessing pages of a website during a given period, regardless of how often they visit that website in a given period.

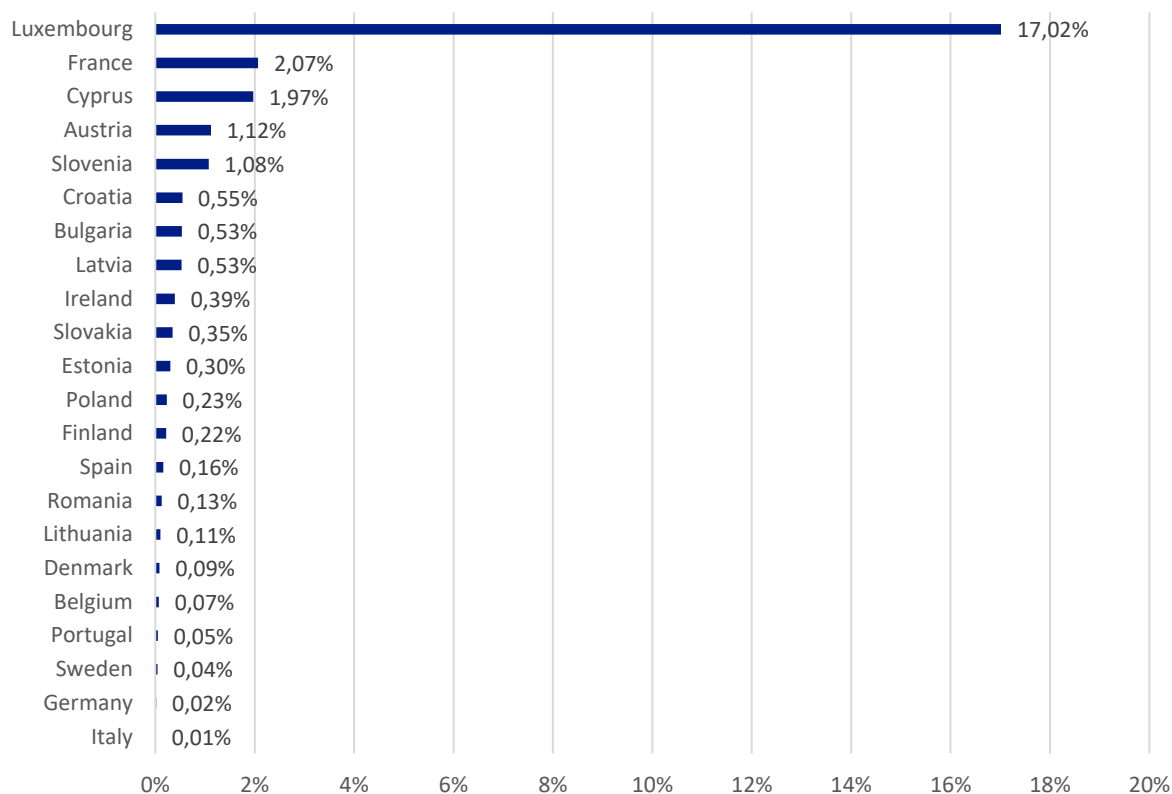


Figure 23: The share of unique visitors per month reported as percentage of the total population

Additionally, 24 Member States (89%) monitor the share of portal visits¹⁶⁸ that come in from abroad. Usage from abroad shows how advanced and entrepreneurial data reusers take the opportunity to discover data internationally and seek to gather datasets as close to the sources as they can reasonably get.

In Figure , a full overview of the proportion of foreign visits is displayed. This year, Slovakia reported the highest share of foreign visitors (69%). Slovenia and Austria also see a majority of their visitors coming from foreign countries. Denmark has the lowest number of foreign visits (<2%) and also the Netherlands, Bulgaria, Latvia and Finland receive 10% or less of their visits from foreign users.

¹⁶⁸ 'Visits' refer to the number of times a website is visited, independent of the numbers of visitors that access the website.

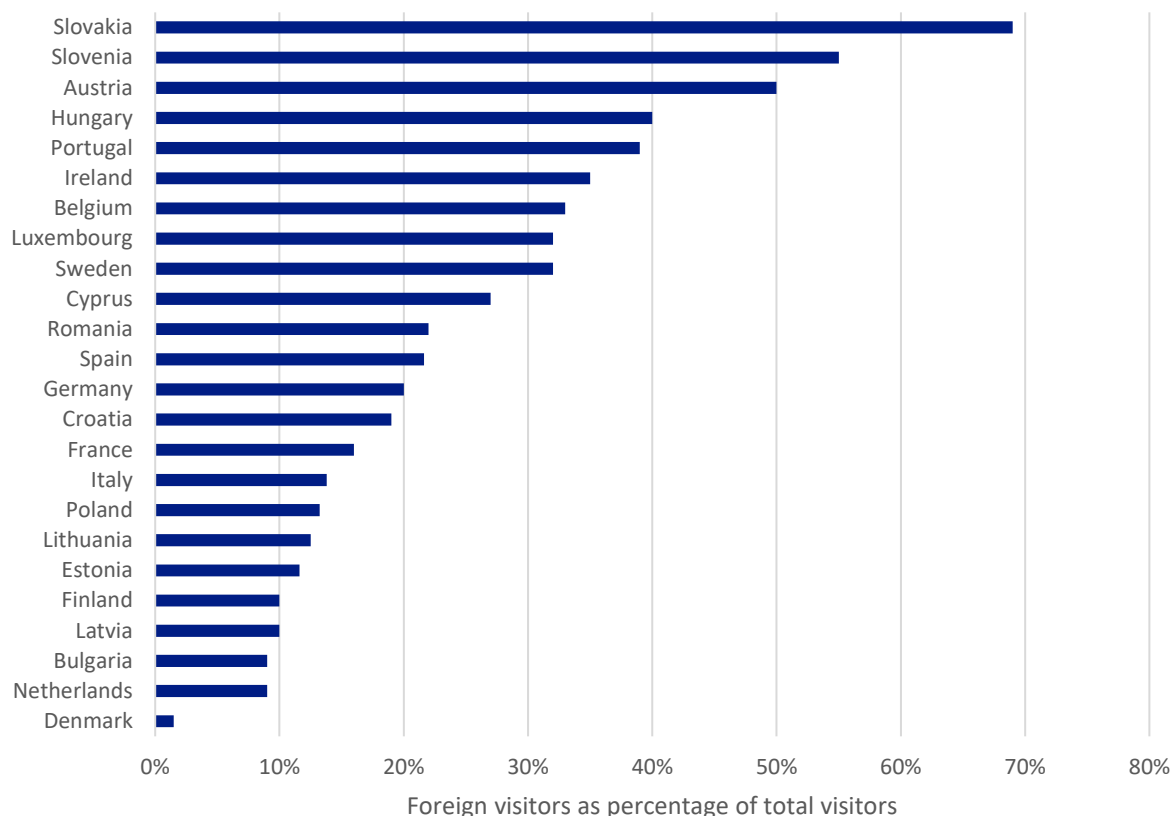


Figure 24: The proportion of open data portal visitors from abroad

With the exception of Slovakia, the national portals claim to be aware of the typical profile of portal visitors. 22 portals (81%) indicated that the typical profile of the portal visitor is diverse and includes businesses, public administration, scientists, journalists, NGOs, and developers, for example. Moreover, Estonia, Hungary and Malta indicated that most of their audience has a background in the public sector, whereas Bulgaria's portal visitors are mostly citizens with an interest in open data.

3.2.3 Most popular data domains

Of the EU27 countries, 22 national portals (81%) monitored what keywords are used to search data and content, which is similar to 2021. Moreover, 23 portals (85%) also take measures to optimise the search and discoverability of content. Some national portals do this by integrating third-party functionality on the portal itself, for instance through Google Dataset Search indexing or through search engine optimisation (SEO). Other portals regularly discuss optimising the search and discoverability of content based on user feedback with one another.

The national portal of Austria uses a plugin for SEO optimisation that handles metatags for keywords, descriptions, etc. Also, it uses a machine-readable sitemap that makes the website easier to interpret by the algorithms of third-party search engines.

Portugal informs publishers about the importance of providing a detailed description of the published datasets and of using tags that well represent them.

22 national portals (81%) reported that they monitor the most and least consulted pages, a slight decrease from 23 (85%) in 2021, that the researchers consider insignificant. In order to assess the most

popular data domains, the assessment asked countries to provide the top 5 data categories consulted on the portal. The full set of possible categories is the ones specified in the DCAT-AP standard. Similar to last year, the top category was “Health”. 5 national portals (19%) reported this as the most popular category, compared with last year when “Health” was the top category for 9 national portals. This decrease is most likely the result of less attention being paid to the COVID-19 pandemic. “Government and public sector” and “Environment” were both mentioned by 3 national portals as the top category of visited datasets. Together, these categories are the top category for 22% of the portals (i.e., 6 national portals).

It is important to note that there is no way to discern whether one category is “unpopular”, because the portals’ audiences are uninterested in it, or because the countries do not provide sufficient relevant and valuable data on those topics.

For those portals who report “Health” as the most popular category, COVID-19 related datasets make up most of the top-five popular datasets. Other popular datasets across Europe include, among others, traffic information, registers for companies, and financial indicators.

3.2.4 Application Programming Interface (API)

APIs enable advanced users to access the metadata programmatically, for example by writing software that performs searches automatically, to identify new datasets.

On 26 of the EU27 national portals (96%), the metadata is written in a language that is understandable to humans and machines. This is an increase from 25 (93%) last year. In 2022, only Slovakia indicated that metadata in clear plain language is not available on the national portal. Contrary to last year, Bulgaria and Portugal are now sharing metadata in clear plain language.

22 of the open data teams (81%) monitor API usage by, for instance, running analytics on the respective log files. This is an increase from 21 (78%) in 2021. API usage can increase the traffic on the portal, and 18 national portals (67%) reported that they monitor if this is indeed the case. This number is higher compared to last year, when 15 national portals (55%) did so. This year, Greece reported the highest number of outgoing portal traffic due to the use of APIs (>90%), and Spain the lowest (0,8%). For Denmark, Ireland, Lithuania, Luxembourg, and Poland, at least half of the portal traffic results from API usage alone. This suggests that substantial open data reuse is taking place programmatically. The full overview of portal traffic resulting from API usage is displayed in Figure .

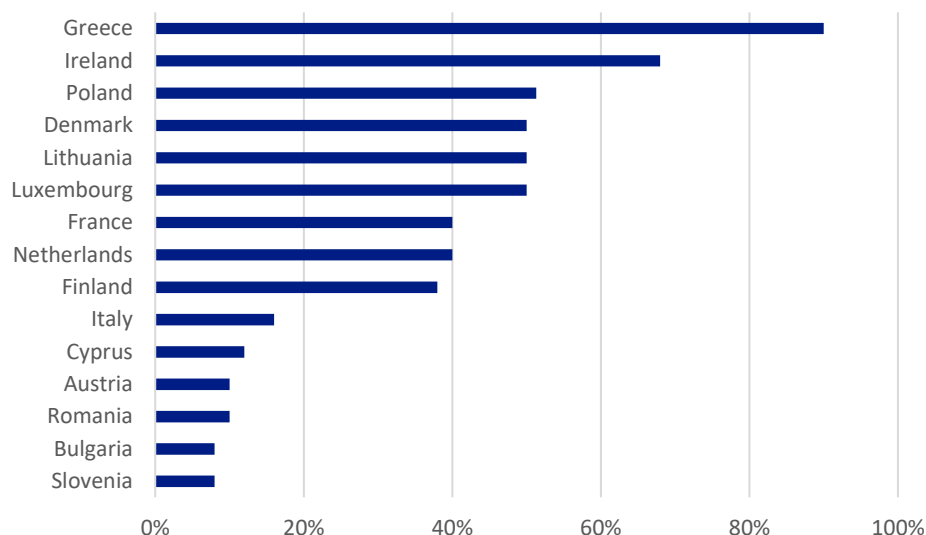


Figure 25: Percentage of outgoing portal traffic generated by API usage

In Finland, there is no significant change from the last two years. Finland reports that, on average, 38% of the portal traffic results from API usage. However, the percentage strongly depends on the dataset. API traffic can be as high as 76% of the access for a particular dataset.

3.3 Data provision

This indicator analyses the extent to which data publishers contribute to the national open data portals and what actions are taken to foster their contribution. This also looks at challenges that countries face in order to harvest all national open data and the methods they use overcome these challenges. Another aspect assessed under this dimension is the level at which the national open data infrastructure provides access to real-time and dynamic data.

The following sub-paragraphs will discuss the share of data publishers making data discoverable via open data portals, the challenges and support required for data provision, and access to real-time and dynamic data in the EU27.

3.3.1 Data publishers

In terms of the share of data publishers that make their data discoverable via the national portal – be it by harvesting of the metadata or direct upload mechanisms – only 7 countries (26%) report that all data publishers in the country contribute to the portal. This is the same as last year. 14 national portals find that the majority but not all of data publishers in their country contribute to the portal. These publishers cover a wide spectrum of public administration (state, regional, local), but also research institutes like universities. 5 of the EU27 Member States (19%) indicate that only few data publishers contribute to the portal. In many countries, data publishers are not obliged to publish their data on the national portal but are encouraged to do so. This will be impacted by the implementation of the high-value datasets. The spread of data publishers contributing data to the national data portals is shown in Figure 26.

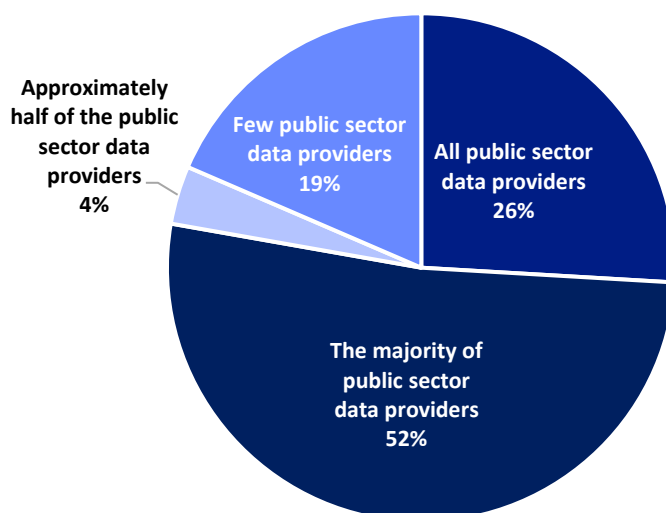


Figure 26: Number of data publishers that contribute to the national portals

Non-official data publishers

Additionally, 11 (41%) of the EU27 Member States responded that they offer the possibility to publish non-official data – that is data not stemming from official sources, for instance crowdsourced or community-contributed. Most of these national portals offer a separate section where, for example, private enterprises or NGOs can publish.

Most of the countries not offering this possibility on their national portal do so to better ensure reusers are aware that all their data is provided exclusively by official and government organisations. However, doing so may limit the user in discovering datasets by other suitable and legit sources.¹⁶⁹

Spain states that they do not offer this possibility because the service promotes the publication of data from public sources with guarantees on the veracity and objectivity of the published data.

In the Netherlands, the policy is to only allow verified governmental data on the portal.

¹⁶⁹ Since at least 2020, the official portal for European data data.europa.eu made the choice of offering datasets from publishers that are unrelated to the European Union, such as the European Patent Office, by selecting “International Data” in the “Data Scope” facet of the datasets browser, at <https://data.europa.eu/data/datasets?locale=en&dataScope=io&country=io&page=1>.

3.3.2 Challenges and support regarding data provision

As stated, 19% of Member States reported that only a few national public sector data providers contribute data to the portal. This is due to difficulties in publishing data, where many countries report that these difficulties stem from a lack of funding, governance, or awareness. Responses state that this is especially true in smaller public bodies and institutions as they often lack the capacity to invest in open data publication. Aside from these issues, technical difficulties are also often reported as a concern by the Member States.

Some publishers choose to only publish their datasets on regional or local portals. 25 Member States (93%) reported that besides the national open data portal, there are other regional and local portals that data publishers often use, with only Luxembourg and Latvia answering that they have no other regional and local portals, but this may be justified by the simpler administrative geography of countries with a smaller territory. These existing regional and local sources are not always harvested automatically by the national portal, which means that not all publicly available data can be found on one portal. For 7 Member States (26%) this is the case.

With the exception of Slovakia, all countries identify which data providers are not yet publishing data on the national portal. Contrary to last year, Belgium now performs these checks as well. To assist those data providers with their publication process, Member States offer a variety of solutions. For example, providing documentation such as handbooks, individual support, tailored workshops and training, technical integration, or events that promote open data and its reuse.

Austria assists data providers that are not yet publishing data on the national portal in various ways. This includes providing a handbook, organising bilateral meetups with ministries, integrating new data providers in the Cooperation OGD Austria and offering individual assistance.

Cyprus' open data team supports the community either by their own initiative or in response to providers who want to publish data. The open data team takes several actions to help potential providers with data publication, including site visits to potential publishers, presenting the advantages and opportunities of opening up data, and offering support and training.

In the Czech Republic, the national open data team provides several means of support to the publication process. There are various seminars and webinars that can be found on the open data portal¹⁷⁰, and the portal offers an e-learning section.¹⁷¹ Moreover, the national open data team carries out consultations for all those interested in data publishing. There are also detailed instructions on how to publish data, including examples of good and bad practices.

Sweden organises seminars and learning sessions and offers guidelines and recommendations. The recent national data strategy, and a new law implementing the open data directive and the high-value datasets implementation, will also foster the data provision on the national portal.

3.3.3 Access to real-time and dynamic data

The level at which the national open data infrastructure provides access to real-time and dynamic data is similar to 2021. 25 of the EU27 Member States (93%) responded that they offer real-time or dynamic data on their portal. This can include, for example, air quality data, live weather data, transport and traffic information. These 25 portals were asked what percentage of the metadata on their portal links to such data. The results can be found in Figure . The figure shows that 13 of the EU27 Member States (48%), have between 1 and 10% real-time or dynamic datasets. 5 Member States (19%) report having

¹⁷⁰ <https://data.gov.cz/vzdělávání/prezenční>; <https://data.gov.cz/vzdělávání/on-line>

¹⁷¹ <https://data.gov.cz/vzdělávání/e-learning>

more than 30% of real-time or dynamic datasets. This is more than last year, when only 3 Member States (11%) reported so.

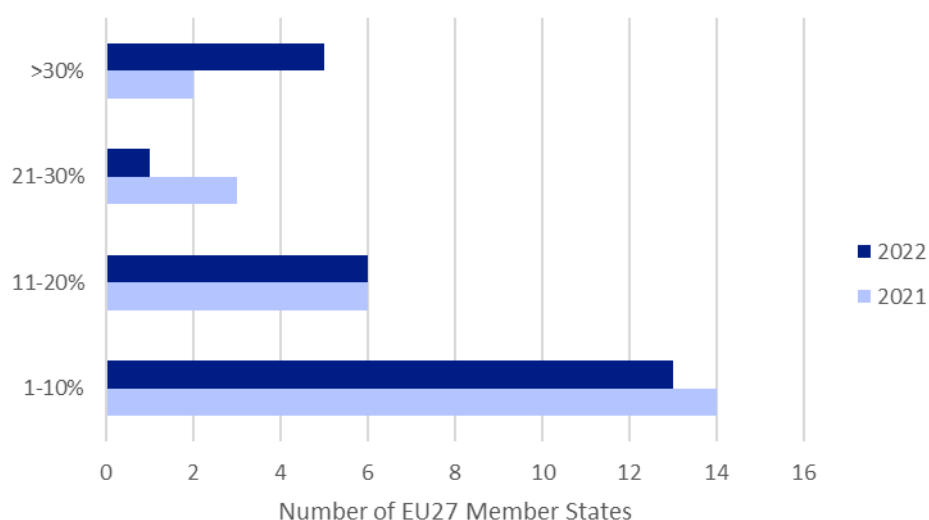


Figure 27: Share of real-time or dynamic data as share of total metadata

3.4 Portal sustainability

This indicator analyses the extent to which the national open data teams have set up a strategy to ensure the long-term sustainability of the portal – e.g., funding, talent retention in the team, preserving public engagement, etc. – and the measures in place to ensure that the portal caters to the needs and brings an added value to the main audience. In 2022, all Member States report that they have a strategy in place ensuring the portal’s sustainability, with Belgium implementing theirs over the past year. Of the Member States, 21 (78%) include a description of the portal’s target audience and measures to reach this audience.

The following sub-paragraphs will discuss enhancing visibility of the national portals in the EU27, tracking user satisfaction, and monitoring the national open data portal’s performance.

3.4.1 Enhancing visibility

To ensure the sustainability of the national portals, it is important to attract new visitors and engage with them to make sure the portal stays relevant and interesting for them. All portals except Malta’s indicated that they take actions to enhance the visibility of the portal by promoting their available features and data. These activities mostly include events such as conferences, webinars, interviews, hackathons, and working groups, but also embrace editorial content such as news pieces, newsletters, promotion campaigns, success stories, press releases, and social media.

Estonia promotes the national data portal by organising AI-related events, on social media pages, and through the newsletter. Also, the newest and recently modified datasets are advertised on the very first page on the portal.¹⁷²

In France, the national portal team highlights the key datasets published on the national portal by offering editorial content. Here, they publish a monthly article to showcase the most important

¹⁷² <https://avaandmed.eesti.ee>

publications (datasets or reuses) during the last month¹⁷³, they offer a subscription to the newsletter¹⁷⁴, publish a blog to make popular publications visible¹⁷⁵, post other articles about new datasets¹⁷⁶, and send out notifications when new datasets are available on the national portal. Moreover, the national portal is active on social media and events are organised to promote the visibility of the portal, including hackathons¹⁷⁷.

The Irish Open Data Initiative¹⁷⁸ organises several events each year to inform and raise awareness of the open data portal, including webinars¹⁷⁹, conferences¹⁸⁰, workshops¹⁸¹, and lectures¹⁸². The initiative also takes numerous opportunities to give presentations at events and conferences to promote the portal and to encourage the reuse of data.

In terms of social media, 21 of the EU27 national data portals (78%) have an active social media account to assist with communication and awareness-raising. This is a decrease compared to last year from 24 national portals (89%).

- 16 Member States reported that they use Twitter.
- 11 Member States stated that they use Facebook.
- 7 Member States shared that they use LinkedIn.
- 2 Member States said they use platforms such as YouTube or Instagram.
- Spain mentioned that the team uses SlideShare¹⁸³ and Flickr¹⁸⁴.

Similar to last year, 25 of the EU27 national portals (93%) also enhance the visibility of their work through publishing source code, and other relevant documentation and artifacts. 23 of those countries use sharing platforms such as GitLab or GitHub to publish the content and get in touch with developers in the field. Only Poland and Slovenia report the use of different platforms, including Dane and Podadki.

3.4.2 User satisfaction

To understand users' needs and gauge satisfaction with the portal, 12 of the EU27 national portals (44%) conducted a satisfaction survey in the past year. This is a significant decrease in comparison to the last two years, when respectively 16 (in 2021) and 20 (in 2020) national portals conducted a satisfaction survey. By means of the satisfaction surveys, the audience can be asked questions on specific issues.

¹⁷³ <https://www.data.gouv.fr/fr/posts/suivi-des-sorties-mai-2020>

¹⁷⁴ <https://infolettres.etalab.gouv.fr/subscribe/r1aq92xni>

¹⁷⁵ <https://www.etalab.gouv.fr>

¹⁷⁶ <https://www.data.gouv.fr/fr/posts>

¹⁷⁷ <https://www.data.gouv.fr/fr/posts/les-jeux-de-donnees-des-associations>; <https://www.etalab.gouv.fr/hackathon-datafin-participez-a-l'exploitation-des-donnees-financieres-des-collectivites-locales>; <https://www.hackathon-renovation.fr/program/hackathon>

¹⁷⁸ Ireland's Open Data Initiative - Observatory of Public Sector Innovation (oecd-opsi.org)

¹⁷⁹ <https://derilinx.com/webinar-time-to-open-2-publish-open-data-effectively>

¹⁸⁰ <https://data.gov.ie/blog/annual-open-data-conference>

¹⁸¹ <https://www.eventbrite.ie/e/open-data-publishers-technical-workshop-tickets-193568477527>

¹⁸² <https://www.youtube.com/watch?v=-3Fxi5IOf1g>

¹⁸³ <https://es.slideshare.net/datosgob>

¹⁸⁴ <https://www.flickr.com/photos/datosgob>

France, for example, asks questions about different topics, including the search engine¹⁸⁵, data quality¹⁸⁶ and about the newsletter and communication¹⁸⁷.

Most surveys show that, in general, national portals score well in terms of user-friendliness, but there are aspects that may be improved, for example regarding the number of open data use cases or UX design. Apart from surveys, gauging satisfaction can also be achieved through interviews, contact forms, and mailboxes.

A way to make sure portals cater to users' needs is by reviewing and continuously improving the portal and its functionality. Similar to last year, 25 Member States (93%) indicated that they had a process in place for reviewing and improving the portal. 12 Member States reported that they do this quarterly. None of the Member States do this less than annually. Figure shows the frequency that countries review and improve their national portal.

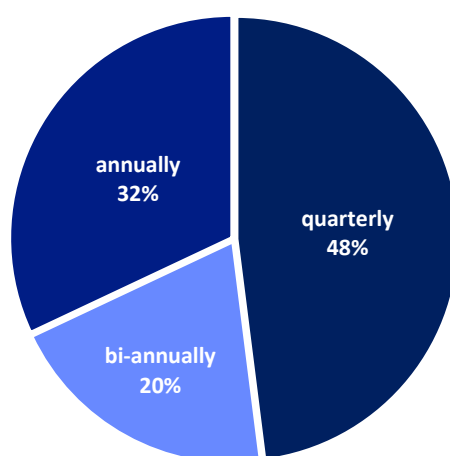


Figure 28: Frequency of reviewing and improving the national portal

22 of the EU27 Member States (81%) consider users' feedback in the review process. The review process can be strategic and focus on general improvements or be more pragmatic and focus on specific issues raised by users. In many cases, there is a combination of both.

The Finnish portal team continuously evaluates questions, development suggestions and feedback on portal bugs. If there is a strong business case, or if something seems to be trending over a period of time, it is prioritised in the development plan and, if needed, identified as part of the relevant value stream.

Italy considers all users' feedback in their review process. Feedback is collected through the form on the portal, the discussions in the dedicated platforms, in meetings and webinars.

In Romania, user feedback received via e-mail, portal discussions, direct discussions with the portal team or during joint meetings, is gathered by the portal team and either implemented on the spot (such

¹⁸⁵

<https://app.evalandgo.com/reports/250064/show?token=61b85c851b5d91>(<https://app.evalandgo.com/reports/250064/show?token=61b85c851b5d91>)

¹⁸⁶

<https://app.evalandgo.com/reports/262288/show?token=6231e9c76097c1>(<https://app.evalandgo.com/reports/262288/show?token=6231e9c76097c1>)

¹⁸⁷ https://app.evalandgo.com/reports/251848/show?_locale=fr&token=61cde43925c5a

as improving usability, clarifying texts), or centralised to be implemented when resources are available for major updates.

Sweden mentions that the web development team regularly examines user feedback from the community feedback sessions. They decide on the priorities, which are split up in agile sprint planning. However, bugs and errors can be adapted immediately, based on the severity. On top of user feedback, they plan, together with the API and basic data team and in collaboration with other public agencies, improvements.

3.4.3 Monitoring performance

Reporting about the portal's performance and usage can be used to prove the outcome and impact of the ongoing activities. Portal teams can use that information to ensure a continuous flow of sufficient funding from their governments to continue their efforts. To monitor the portals' performance, 21 of EU27 portals (78%) offer a monitoring tool, such as a dashboard, to showcase the main key performance indexes related to, for example, the number of datasets published, the distribution across categories, the number of visitors or how these number change over time. In some cases, elaborated dashboards are created showcasing results on various levels, such as increase in metadata over time, broken links, metadata formats and distribution of licenses.

The Croatian national portal monitors and presents the following data to the public: the number of datasets published, the distribution of datasets across the categories, the number of datasets per institution, and the datasets' ratings against Tim Berners-Lee's 5-star model of openness. The number of visitors and how this number has changed over time, as well as what datasets are most popular, is monitored via Google Analytics and only available to the administrators of the portal.

In Ireland, there is a dashboard of metrics displaying the characteristics of the data on the portal¹⁸⁸. The QA Validator¹⁸⁹ and KPI tool¹⁹⁰ provide data publishers with the ability to view the quality of their data, and identify issues such as broken links or missing metadata.

To monitor the activity of data publishers on the portal, rather than the portal's performance in general as described above, 22 of EU27 national portals (81%) offer features that also allow data publishers to monitor their performance. These types of monitoring tool can create "positive competition" amongst public bodies and nudge the lesser performers to improve the volume and quality of their publication. At the same time, such features can also help identify data providers that are top performers and enable the creation of channels for knowledge transfer between them and other publishers. In some cases, such features also enable publishers to see the popularity of their own datasets and inform them about the applications that are based on their data. Many portals offering this feature require the users to log-in before they can see the statistics.

In Cyprus, publishers can see statistics such as datasets per category, datasets per licence and datasets per format¹⁹¹. They can also see the views for each of their datasets through the Google Analytics integrated module, which requires them to log-in.

Germany uses the SHACL Validator, which allows data providers to receive feedback on metadata quality and broken links in their database. Furthermore, the validator provides information on troubleshooting.

¹⁸⁸ <https://data.gov.ie/stats>

¹⁸⁹ <https://data.gov.ie/qa-report>

¹⁹⁰ <https://data.gov.ie/kpi-report>

¹⁹¹ https://www.data.gov.cy/dashboard_EL

In Portugal, users need to be logged into the administration area to access updates and statistics on (meta)data, followers, visualisations, use cases referencing data publishers' data and problems with the data. This also shows discussions regarding datasets published by these data publishers.

3.5 Overall performance

In this final section, the overall performance of the EU27 Member States is evaluated based on the indicators of the open data portal dimension discussed throughout the chapter. Figure 29 shows that the European average maturity level of the impact dimension of the EU27 is 83%. Between 2018 and 2021 the European average grew steadily from 63% to 83%. In 2022 this growth has stagnated.

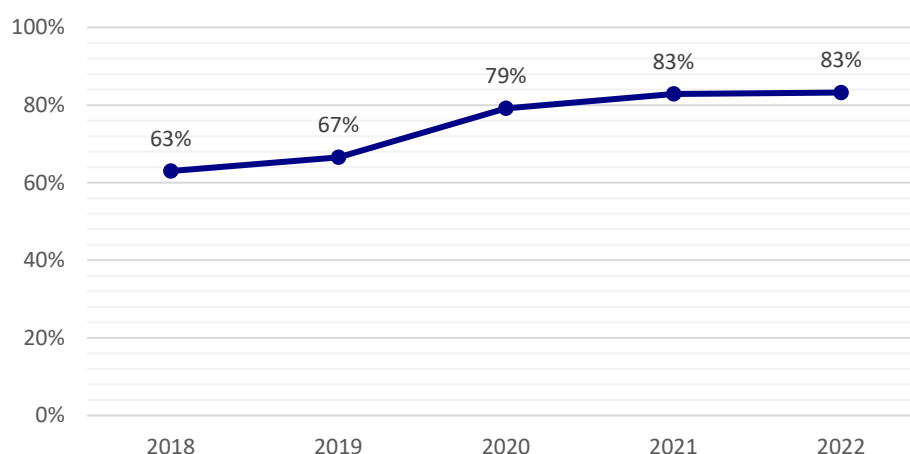


Figure 29: Development in maturity of the portal dimension between 2018 and 2022

Figure presents the results of 2021 and 2022 for each of the indicators that comprise the portal dimension. All indicators are remarkably consistent. Portal features improved slightly in 2022, from 82% to 83%. The data provision indicator improved as well, showing that more and more data is made available to reusers on open data portals. Portal usage is the highest scoring indicator for the portal dimension at 88%. This result indicates that countries have a solid understanding of who their users are and for what purposes the portal is being visited.

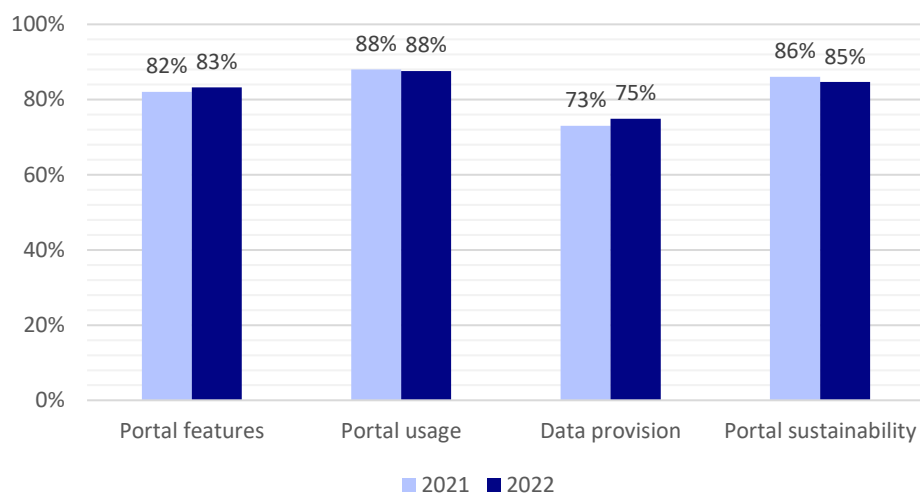


Figure 30: Maturity score per portal indicator compared to last year

France is the only member state that obtained a maximum score for the portal dimension. However, almost half of the member states (thirteen countries) are already above 90%, as shown in Figure . These scores indicate that many countries run mature data portals that account for the wishes and needs of reusers. Belgium and Finland improved most on this dimension. Their scores increased by 22% and 16% respectively. Finland's improvements are especially impressive, since the country's data portal scored below the European average in 2021 and has now entered the top ten.

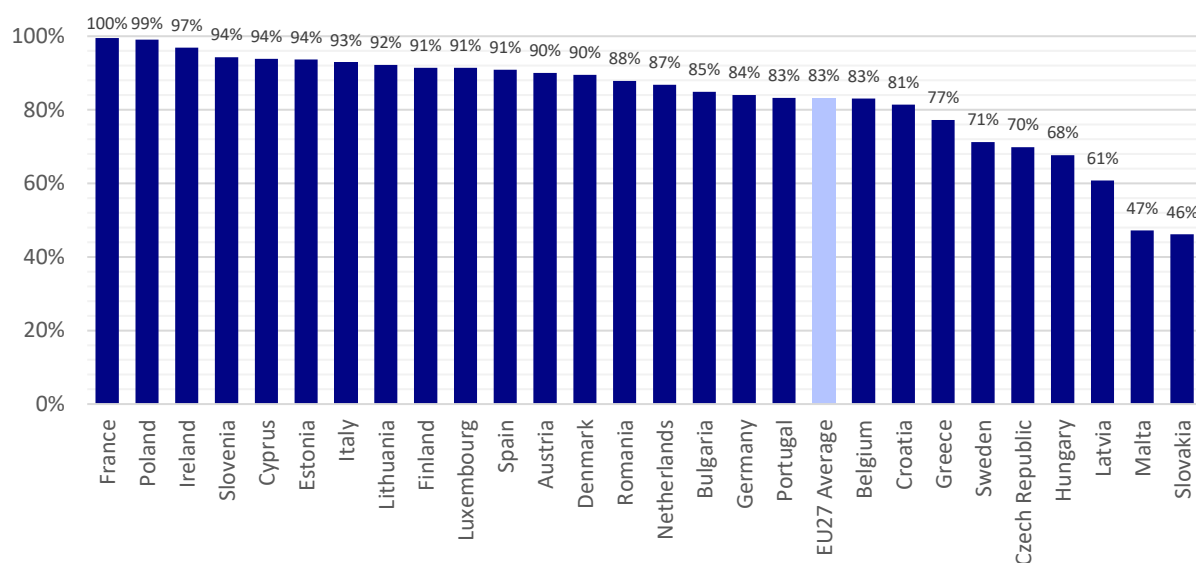


Figure 31: Country ranking for the portal dimension

Chapter 4: Open Data Quality in the EU27

The quality of data and metadata being made publicly available is more important than the quantity of data that used to be a key index of performance in the early years of the Public Sector Information (PSI) efforts. As such, data quality is a key focus area in many European countries, and institutions such as the Publication Office have issued guidelines to support countries in delivery high-quality data¹⁹². This quality focus aims to enable the proper application and reuse of data for the distillation of insights and creation of new services. The fourth assessment dimension “open data quality” focuses on measures and monitoring mechanisms adopted to ensure the quality of data and metadata. This includes the measures adopted to ensure the systematic and timely harvesting of metadata, as well as the monitoring mechanisms in place to ensure publication of high-quality metadata, compliant with both the DCAT-AP standard and several deployment quality requirements. Deployment quality refers to using open data licences, open and machine-readable data formats, using Unique Resource Identifiers, and enabling a linked data approach.

The following key elements are explored as part of the quality dimension:

Metric	Key elements
(Meta)data currency and completeness	A systematic approach in place to ensure that metadata is up to date. Harvesters are programmed to ensure that changes at the source are reflected with the least amount of delay on the national portal. The portal provides access to a vast range of data, both historical and current along with the datasets of other countries.
Monitoring and measures	Mechanisms are in place to monitor the quality of the metadata and the compliance level in terms of correct licensing information. Measures are in place to assist publishers in publishing high-quality metadata and choosing the right type of licence for their data.
DCAT-AP compliance	Compliance to the DCAT-AP standard in terms of mandatory, recommended and optional classes is monitored. Guidelines and learning materials help publishers in ensuring compliance with DCAT-AP.
Deployment and linked data	An open data model is used to assess the quality of data deployment. The percentage of published open data that complies with certain deployment quality requirements is known and improvements in terms of deployment are monitored.

4.1 (Meta)data currency and completeness

This indicator focuses on the extent to which countries have a systematic approach in place to ensure that metadata and, where applicable, the actual data, is up to date. The indicator looks specifically at automatic harvesting processes to ensure that changes at the source of the data are reflected with the least amount of delay on all portals where the dataset is made discoverable and, ultimately, on the national open data portals and on data.europa.eu.

The following sub-paragraphs will discuss up-to-date metadata, including automatic metadata sourcing and high-value datasets, and up-to-date datasets.

¹⁹² <https://op.europa.eu/en/publication-detail/-/publication/b601d9cc-b3c0-11ec-9d96-01aa75ed71a1/language-en/format-PDF/source-276052107>

4.1.1 Up-to-date metadata

In 2022, 70% of Member States indicated that, on average, the metadata describing the datasets available on the national portal is updated within a day from the moment its primary source is updated. 22% responded that this is, on average, updated within one week. This is ensured by having a pre-defined approach for updating metadata and is aided by automatic harvesting processes. This is a decrease from 74% and 26% respectively in 2021. The small change does not necessarily imply that the harvesting processes have become less effective. It is more likely that more sources of data are available today than the previous year and the necessary processes have not yet been established.

89% of Member States have a pre-defined approach in place to ensure that the metadata is kept up to date, a slight increase from 85% last year. Here, up-to-date metadata on national portals is critical for users to obtain correct information about the data. Some countries indicate that it is the responsibility of the original sources and providers of datasets, namely government body institutions with the support of national teams, to ensure that the metadata is up to date.

In Latvia, to ensure that metadata is kept up to date, the Cabinet of Ministers set the Regulation Nr.611 "Procedures by which Institutions Place Information on the Internet"¹⁹³. Paragraph 5 of the Regulation regulates the work and usage of the official Latvian open data portal and obligates national authorities to publish the open data that they own in the Latvian national open data portal (data.gov.lv¹⁹⁴). Moreover, the Regulation requires the national authorities to update data and metadata according to a target frequency.

In Slovenia, all ministries and public (sectoral) bodies are required to publish and maintain data. Here, the published data or datasets must align with the principles of open data¹⁹⁵ and be approved by the Sectoral Editor in the various public bodies before being verified by the Chief Editor. Moreover, following the data and datasets publication, the editors are required to maintain data and ensure that it is up to date. This approach is defined in the Governmental decision on Editorial Policy.¹⁹⁶

Automatic metadata sourcing

Ensuring that metadata is kept up to date is dependent on, for example, the extent to which metadata is obtained from its source automatically.

¹⁹³ Regulations of the Cabinet of Ministers No. 611: <https://likumi.lv/ta/id/301865-kartiba-kada-iestades-ievieto-informaciju-interneta>

¹⁹⁴ Latvian national open data portal: <https://data.gov.lv/lv>

¹⁹⁵ Principi odprtih podatkov: <https://podatki.gov.si/posredovanje-podatkov/principi-odprtih-podatkov>

¹⁹⁶ Slovenia Government decision on Editorial Policy, n.b.38200-17/2013/3: <http://vrs-3.vlada.si/MANDAT13/vladnagradaiva.nsf/71d4985ffda5de89c12572c3003716c4/384a4d9329d25d8fc1257c4400332ab0?OpenDocument>

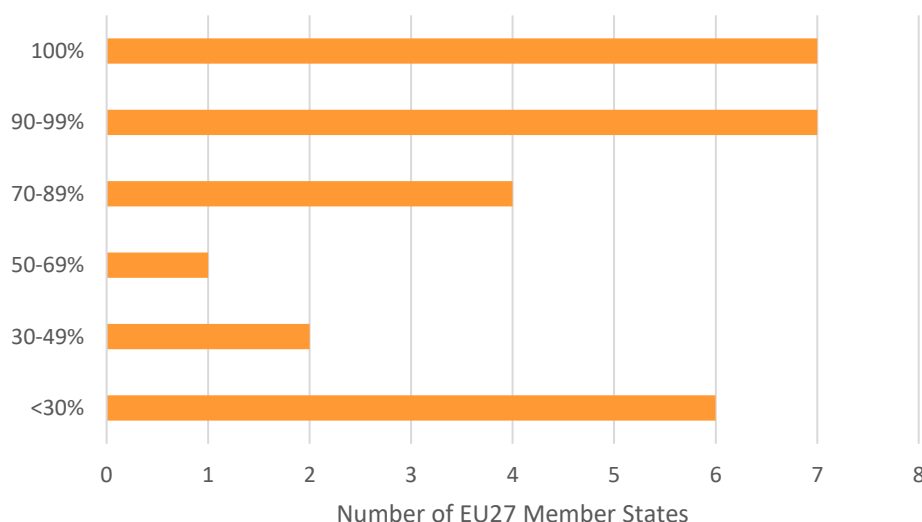


Figure 32: Percentage of metadata obtained automatically by the EU27

Figure shows the percentage of metadata that is obtained from its source automatically for the Member States. In 7 countries (26%) – Belgium, France, Croatia, Italy, Malta, Poland and Sweden – all metadata is uploaded in an automated way to the national portal. This is an increase from 20% (6 countries) in 2021. Additionally, 7 countries (26%) obtained between 90% and 99% of their metadata from the source automatically. It is also shown that 6 countries (22%) obtain less than 30% of their metadata from its sources automatically. The distribution illustrated in Figure highlights that there are two primary clusters of countries: those who are significantly investing in automation and those that, for any reason, such as lack of funding and skills, are lagging behind. This implies that most of the metadata in the latter group is manually edited to some degree, which is more time consuming and can create friction in the short and long term as the amount and complexity of data increases. Furthermore, editing metadata manually easily allows for human error.

High-value datasets

In EU Directive 2019/1024 on open data and the reuse of public sector information,¹⁹⁷ the concept of high-value datasets was introduced. In the Directive, the European Commission tasks Member States to make select (high-value) datasets available free of charge, in machine-readable format and through APIs and, where relevant, as a bulk download. The selection of concrete high-value datasets was extensively discussed and Member States have been encouraged to begin preparing for their implementation.

In 2022, 63% of Member States responded that they are preparing to ensure the interoperability of high-value datasets alongside available datasets from other countries. Several countries, such as Hungary and Slovakia, are closely following the European Commission's proposal and are now waiting for the European Commission to publish their methodology on high-value datasets. Some countries are already in conversation with other countries for inspiration. In France, for example, the data.gouv.fr team has been in exchange with countries such as Canada to learn what types of data

¹⁹⁷ Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the reuse of public sector information (recast): https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.172.01.0056.01.ENG

infrastructure, data matching, and data schemas, such as frictionless data¹⁹⁸, will be helpful for the conversation to implement high-value datasets.¹⁹⁹

4.1.2 Up-to-date datasets

Having accurate and up-to-date data is critical for reusers. In an ideal situation, datasets are up to date if they represent the phenomenon they are intended to describe fairly *in time* or *live* for the application or product. An example of this is data for traffic and public transport, such as buses and trains. This data needs to be updated in real-time, where possible by the minute or second, to enable complex applications. On the other hand, data from a population census that is run every 10 years, for example, need only to be updated following completion, or when mistakes are discovered and corrections issued.

Moreover, gaps in an in-time series can significantly compromise the datasets' usability. In cases of data collected annually, a dataset is considered up to date on the condition that it contains data covering at least up to last year. In cases of data collected daily, a dataset is up to date on the condition that it includes data up to the day previous to publication.

Figure below illustrates the degree to which datasets cover the full period from when they were first published until the present. As illustrated, 1 Member State indicated that all datasets on their portal cover the full period from when they were first published to the present day – Slovenia. This is a decrease from 2021 where two Member States reported that their portal covered the full period from when they were first published until the present day. 15 Member States indicated that the majority of datasets cover this range, and 4 Member States indicated that approximately half of the datasets cover the time span. 7 Member States responded that only a few datasets that are available on the portal are up to date and cover the full period.

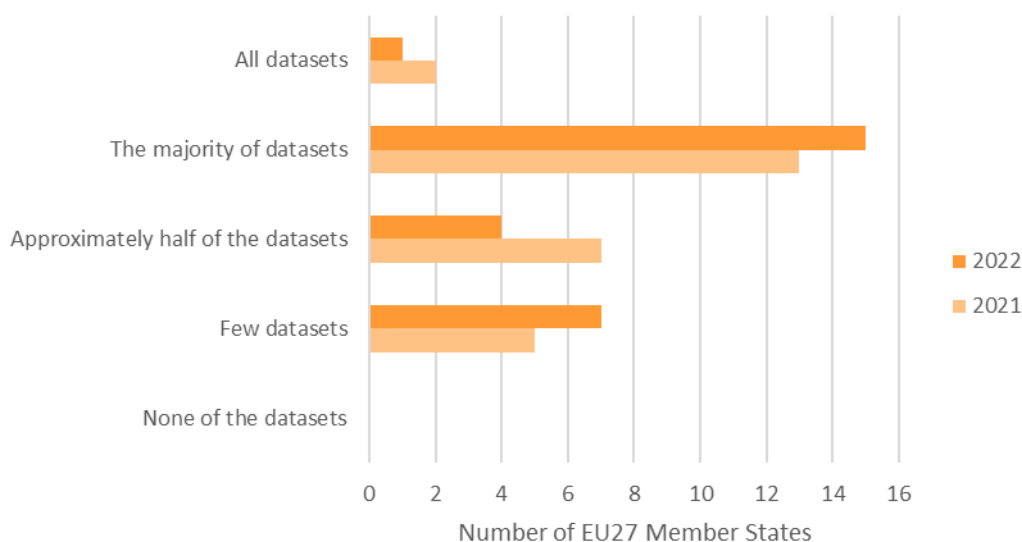


Figure 33: The extent to which datasets are up to date

¹⁹⁸ Frictionless data: <https://frictionlessdata.io/>

¹⁹⁹ Webinar discussing implementing high-value datasets:

https://www.youtube.com/watch?v=UleHrNak78U&list=PLP_slWJtq8Ex6XUwVLTliHBVI2uxGij10&index=30&ab_channel=CCanadianOpenDataSociety

4.2 Monitoring and measures

This indicator analyses the extent to which mechanisms are in place to assess and improve the quality of metadata and the compliance level in terms of correct licensing information. Moreover, the indicator looks at the support, guidelines and tools available to assist data publishers in publishing high-quality metadata and in choosing the right type of licence for their data.

The following sub-paragraphs will discuss monitoring the quality of metadata in the EU27 and various types of licenses to publish data, including supporting activities.

4.2.1 Monitoring the quality of metadata

In 2022, 96% of the Member States responded that they monitor the quality of metadata on their portals – only Malta indicates that metadata quality is not monitored. This is the same result as 2021. The majority (67%) of Member States also publish information on the quality of the metadata on their portals. Countries use a variety of tools to monitor and validate the metadata.

In the Czech Republic, metadata quality measurements are displayed on the National Open Data Portal (opendata.gov.cz)²⁰⁰ and downloadable as CSV files. Moreover, the metrics that are used to measure quality are included in the SPARQL endpoint of the portal and are part of the UI for each individual metadata item in the portal. Furthermore, a dashboard²⁰¹ to check metadata quality is available for the (meta)data publishers and users of the portal to better understand potential deficiencies.

In France, the French National Open Data Portal (data.gouv.fr) publishes a catalogue of data to help publishers and users monitor and validate metadata.²⁰² Here, publishers and users can find a list of published datasets, a list of files published, a list of reused published cases, a list of organisations created, a list of tags created and a list of opened discussions. For each list, metadata has been associated to the title, url, update, spatial granularity, creation date and last modification date. This information enables the team at data.gouv.fr to monitor the quality of datasets, including the number of missing metadata, the number of inaccurate metadata and the number of datasets that have not been updated. The team at data.gouv.fr reported that they are currently working on attributing a metadata quality score on every dataset inspired by the 5-star model²⁰³.

4.2.2 Licences

For data to be classified as open, it should be accessible and licensed for anyone to access, use, and share, free of charge. An open data licence provides users with certainty that the data can be used and shared for a wide range of purposes. Without a licence, data may be publicly available, but users will not have clarity around what permission they have to access, use and share it under copyright or database laws.

In 2022, 81% of Member States indicate that more than 90% of open data available on the national portal is accompanied by licensing information. Member States are already aware of the importance of providing licensing information, as all Member States assist publishers in choosing appropriate licences by publishing guidelines. Moreover, the majority of Member States (81%) provide guideline

²⁰⁰ Czech Republic national open data portal: <https://opendata.gov.cz/statistika:datova-kvalita>

²⁰¹ Dashboard for metadata quality, Czech Republic: [https://oha01.mvcr.gov.cz/kibana/app/dashboards#/view/43389e30-3335-11ec-aeb4-71177d02ba9a?_g=\(filters:!\(\),refreshInterval:\(pause:!t,value:0\),time:\(from:now-1d%2Fd,to:now-1d%2Fd\)\)](https://oha01.mvcr.gov.cz/kibana/app/dashboards#/view/43389e30-3335-11ec-aeb4-71177d02ba9a?_g=(filters:!(),refreshInterval:(pause:!t,value:0),time:(from:now-1d%2Fd,to:now-1d%2Fd)))

²⁰² French National Open Data Portal: <https://www.data.gouv.fr/fr/datasets/catalogue-des-donnees-de-data-gouv-fr/>

²⁰³ 5 Stars principles of Linked Open Data: <https://joinup.ec.europa.eu/sites/default/files/inline-files/W3CO4.pdf>

recommendations for the use of standard licences, such as the Creative Commons (CC) licence²⁰⁴. The Member States' performance against this dimension has decreased to 85% from 89% in 2021. As for metadata being up to date, our hypothesis is that the change was caused by an increase in the volume of datasets and sources whose licence information is not up to standard.

The spectrum of licence choices varies between countries. This assessment focuses on evaluating the level of maturity based on a country's effort spent promoting the licence *standardisation* instead of on the choice of one licence over another. The objective here is to streamline open data reuse without the added complication of non-standard licences that need to be investigated by reusers on a case-by-case basis.

In several countries, the use of standard licences is prescribed by law, whilst in others it is through a recommendation.

In Austria, the Austrian Framework for Open Government Platforms²⁰⁵ serves as an official agreement between the federal and state levels. CC-BY 4.0 makes it mandatory for Austrian public sector bodies to publish open government data.

In Luxembourg, whilst not mandatory, the use of the CC-0 license is recommended for publishing open data.

In Belgium, the use of CC licences is not prescribed by law but is preferred for use, especially for federal sources, by Royal Decree. Here, local sources often use their own licences, which are intended to be equivalent to the corresponding CC-licences.

In Finland, the CC 4.0 licensing suite, more specifically CC0 or CC-BY, is recommended for open data licensing. However, JHS-189 (Public Sector Recommendation #189) is still applicable for licensing open data.²⁰⁶

In some countries, CC licences are the only option to publish open data.

In Slovenia, it is mandatory to use any open CC licence.

In Latvia, only the CC-0 licence is admissible for publishing open data.

Some countries (11%) have introduced national licences.

In Germany, the "Datenlizenz Deutschland 2.0"²⁰⁷ is a specific licence and is recommended for use by all public bodies.

Support activities

In addition to providing guidelines, similarly to last year 96% of Member States regularly conduct activities to motivate and assist data providers in publishing data that is accompanied by high-quality metadata. These include regular meetings, training sessions, webinars, workshops, or other events, for example, to establish a common understanding of the importance of high-quality data publication.

²⁰⁴ <https://creativecommons.org>

²⁰⁵ Austrian Framework for Open Government Data platforms: [https://neu.ref.wien.gv.at/at.gv.wien.ref-live/documents/20189/68315/Framework for Open Government Data Platforms 1.3 fin.pdf/0cfc7d99-feca-447b-8628-e6106ffc84ad](https://neu.ref.wien.gv.at/at.gv.wien.ref-live/documents/20189/68315/Framework%20for%20Open%20Government%20Data%20Platforms%201.3%20fin.pdf/0cfc7d99-feca-447b-8628-e6106ffc84ad)

²⁰⁶ JHS 189 License to use open data: <https://www.suomidigi.fi/ohjeet-ja-tuki/jhs-suositukset/jhs-189-avoimen-tietoaaineiston-kayttolupa>

²⁰⁷ Datenlizenz Deutschland 2.0: <https://www.govdata.de/dl-de/by-2-0>

In Luxembourg, there are regular training sessions on topics such as transparency, interoperability, open data, and data management.²⁰⁸ The Luxembourgish National Open Data Portal (data.public.lu) insists on the importance of machine-readable formats to foster (open) data reuse and the real-life impact of data. The data.public.lu open data team also assists data providers in practice, for example with harvesting scripts and data conversion.

In Italy, machine-readable format is made mandatory by the Digital Administration Code and the legislation for open data and reuse of public sector information. Moreover, it is supported by the Guidelines for the implementation of the Legislative Decree no. 36/2006, as amended by Legislative Decree no. 200 of 8 November 2021²⁰⁹, transposing Directive (EU) 2019/1024²¹⁰, which provides guidance and specific agreements for making datasets available in a machine-readable format.

In Poland, the Polish National Open Data Portal (dane.gov.pl) includes multimedia training on open data and preparation of data in open formats.²¹¹ This training includes tutorials on, for example, how to make data available on the portal, the automatic impact of data to the dane.gov.pl portal based on XML files, and how to add data(sets) and resources.

4.3 DCAT-AP compliance

DCAT is a W3C standard design to facilitate interoperability between data catalogues published on the web.²¹² DCAT-AP is an extension to DCAT – an “application profile” – developed by the European Commission with the intent to improve interoperability and foster discoverability and reuse of open data across European catalogues²¹³. Compliance with DCAT-AP has been increasingly recognised amongst the Member States. The DCAT-AP compliance indicator analyses the extent to which metadata complies with the DCAT-AP standard for describing public sector datasets and what efforts are taken to assist data publishers in guaranteeing that they comply with DCAT-AP. Moreover, the indicator considers the availability of recommended and optional classes.

The following sub-paragraphs will discuss how the EU27 countries are assisting data providers to be DCAT-AP compliant, investigating causes for a lack of DCAT-AP compliance, and how they are increasing DCAT-AP compliance through mandatory, recommended and optional classes.

4.3.1 Assisting data providers to be DCAT-AP compliant

In 2022, 81% of Member States stated that they provide their data suppliers with documentation on DCAT-AP, a decrease from 85% in 2021. Here, documentation can consist of Member States’ own developed documentation, factsheets provided by data.europa.eu, or materials that are published on websites hosted by the European Commission, such as the JoinUp platform²¹⁴.

²⁰⁸ Luxembourg National Open Data Portal training sessions: https://fonction-publique.public.lu/fr/formation-developpement/catalogue-formations/secteur-etatique/06compdig/06-1-digbase/et_06-1-1-161.html

²⁰⁹ Council of Europe: <https://www.coe.int/en/web/european-social-charter/-/no-200-2021-associazione-professionale-e-sindacale-anief-v-italy>

²¹⁰ Open data and reuse of public sector information: <https://eur-lex.europa.eu/EN/legal-content/summary/open-data-and-reuse-of-public-sector-information.html>

²¹¹ Polish National Open Data Portal open data and open formats training: <https://dane.gov.pl/knowledgebase/multimedia-training>

²¹² <https://www.w3.org/TR/vocab-dcat-2/>

²¹³ For more information see <https://joinup.ec.europa.eu/collection/semantic-interoperability-community-semantic/solution/dcat-application-profile-data-portals-europe> and data.europa.eu’s (formerly European Data Portal) Open Data Goldbook for Data Managers and Data Holders at <https://data.europa.eu/en/training/data-providers-guide>

²¹⁴ <https://joinup.ec.europa.eu/>

In Croatia, the Croatian National Open Data Portal (data.gov.hr) provides a metadata quality assurance service for data providers through documentation and their MQA service²¹⁵. The text in the documentation also links to the JoinUp platform.

In Lithuania, data providers primarily use the Lithuanian Open Data Portal (data.gov.lt) as a reference, as the portal provides all learning and methodological information about DCAT-AP.²¹⁶ More specifically, the portal provides data providers with DCAT-AP documentation and a direct link to the aforementioned JoinUp platform. Moreover, the data.gov.lt team plans to upgrade the portal to the latest DCAT-AP version.

4.3.2 Investigating causes for a lack of DCAT-AP compliance

As stated, DCAT-AP is important for national data portals. Evidence of this can be seen in the high level of effort taken by Member States to investigate the most common causes of non-compliance. In 2022, 78% of Member States reported that they actively investigate issues. This is the same result as last year.

In the Netherlands, one of the identified issues leading to non-compliance is the conversion to DCAT-AP from other standards, such as INSPIRE²¹⁷. To prevent issues caused by wrongful mapping from one format to the other, the Dutch National Open Data Portal (data.overheid.nl)²¹⁸ does not accept datasets that are not compliant with DCAT-AP and supports organisations in mapping the formats. One of the methods used to support organisations is through documentation and showcasing how DCAT can be used and what advantages it offers.

In Romania, the lack of DCAT-AP compliance is due to low awareness of controlled vocabularies, lack of standardised management of data to enable structured publication, and a lack of resources for portal development.

In Sweden, it was found that one of the reasons is the lack of native support for DCAT-AP in some of the IT systems. This is preventing automatic conversion from the source metadata format to DCAT-AP and causing similar issues as described for the Netherlands, above.

4.3.3 Compliance with DCAT-AP mandatory, recommended, and optional classes

This section focuses on how many Member States comply with the three types of DCAT-AP classes: mandatory, recommended, and optional.

There has been an increase in DCAT-AP compliance since 2021. 74% of Member States declared that more than 90% of the metadata is compliant with the mandatory DCAT-AP classes (agent, catalogue, dataset, literal, resource), as compared to 70% in 2021. 70% of Member States stated that more than 90% of the metadata is assumed to meet the standards of recommended classes (category, category scheme, distribution, licence document), an increase from 56% in 2021. 48% of Member States said more than 90% of the metadata meets the standards of optional classes (catalogue record, checksum, document, frequency), a rise from 41% in 2021.

As with the previous years, countries are focusing on compliance by providing metadata for the mandatory classes, whilst investing less effort in recommended and optional classes. Figure below

²¹⁵ Croatia MQA service: <https://data.gov.hr/mqa-service/hrln>

²¹⁶ Lithuanian National Open Data Portal learnings and methodological information: <https://data.gov.lt/opening/learningmaterial?lang=en>

²¹⁷ INSPIRE: <https://inspire.ec.europa.eu/>

²¹⁸ Dutch National Open Data Portal: <https://data.overheid.nl/en>

illustrates the percentage of metadata on national data portals in Europe declared to be DCAT-AP compliant and that use recommended or optional classes.

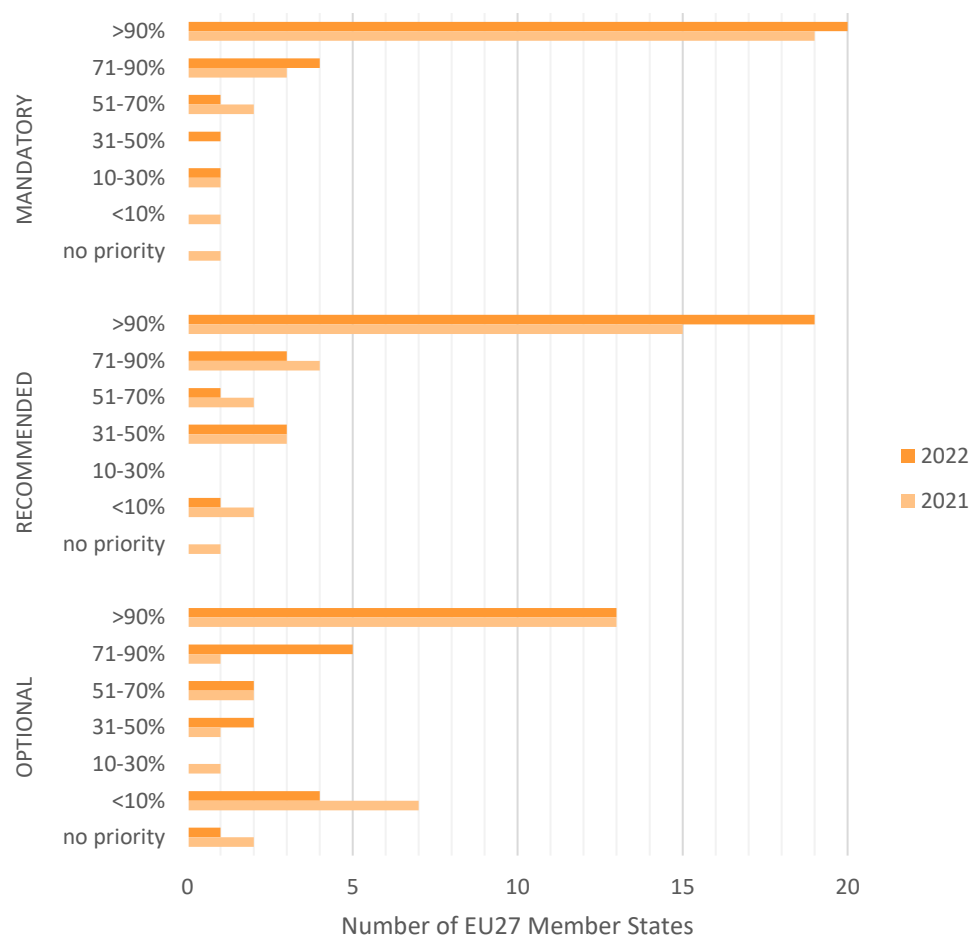


Figure 34: Percentage of metadata compliant with DCAT-AP and using recommended or optional classes

4.4 Deployment quality and linked data

This indicator examines the extent to which countries use a model, for example the “5-Star Open Data”²¹⁹ or the “FAIR Principles”²²⁰, to assess the quality of data deployment. This indicator assesses to what extent data is available under an open licence, in the form of structured data, machine-readable, using Uniform Resource Identifiers (URIs), and including links to other data sources.

The following sub-paragraphs will discuss the deployment of quality models in the EU27, and the deployment of quality, including open licenses, structured format, machine-readable format, Uniform Resource Indicators (URIs), and linked data.

4.4.1 Deployment quality models

78% of Member States use a model to assess the quality of data deployment. This is the same score as 2021. Countries are using the 5-Star Open Data model to the point of consulting it as a decision-making tool to determine which datasets are allowed to be published on their portal. 89% of Member States

²¹⁹ For more information: <http://5stardata.info/en/> or <https://joinup.ec.europa.eu/sites/default/files/inline-files/W3C04.pdf>

²²⁰ <https://www.go-fair.org/fair-principles/>

also conduct activities to promote and familiarise data providers with methods to ensure higher quality data, a slight increase from 83% in 2021. An example of this is to promote their chosen quality assessment model.

Most countries, such as Greece, Ireland, Italy, Malta, Poland, Romania, and Slovenia, use the 5-star Open Data model.

In Cyprus, the 5-star model is adopted through the National Technical Guidelines for publishing datasets on the portal. Generally, only datasets with a 3-star rating or above are published on the portal. Exceptions are allowed only in the event that the publishing public sector body provides a plan for the provision of those datasets in a 3-star rating.

In Lithuania, the data.gov.lt team uses the 5-star Open Data Model, where they assign stars based on the distribution format. At individual field levels, stars from 0 to 3 are assigned manually. At 4 and 5, stars are detected automatically by checking if a data model has a primary key field, if there is a reference to another data model, and if an association with external vocabulary is provided.

In Luxembourg, metadata quality is assessed via an inherent KPI system, which is available on the data.public.lu portal. The main objective of this system is to improve the quality of the metadata and the machine readability of the data.

4.4.2 Deployment quality

In this section, an overview is given regarding the extent that data is available under an open licence, in the form of structured data, a machine-readable format, using URIs, and if it includes links to other data sources.

Open licence

This indicator focuses on whether data is accompanied by information about open licensing. 23 Member States (85%) responded that more than 90% of the published data is available under an open licence, an increase from 81% last year. The percentage of data available under an open licence in the various Member States is highlighted in Figure below.

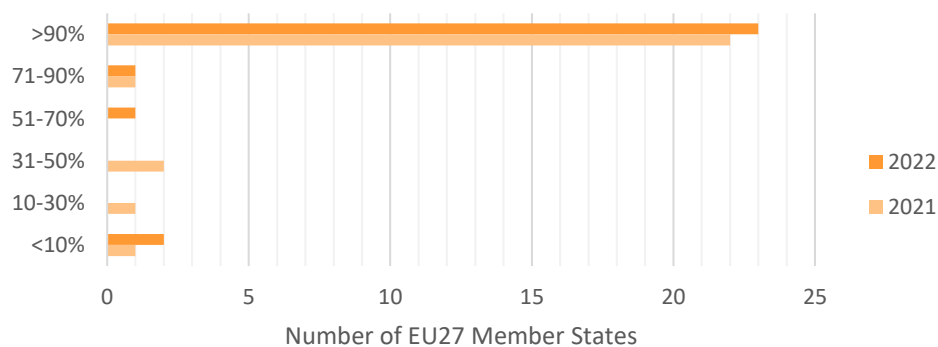


Figure 35: Percentage of datasets available with open license

In some countries, such as Estonia and the Netherlands, the national data portal publishes open data and documents the availability of more “closed” data. By doing this, they are pursuing a more holistic approach to data sharing. This means that whilst data is available to citizens and organisations, it can be under more restrictive terms that need to be assessed on a case-by-case basis.

Structured format

63% of Member States in 2022, as compared to 56% in 2021, offer more than 90% of the published data available in a structured format next to having an open licence. Figure below shows the distribution of published data available in a structured format by EU Member States.

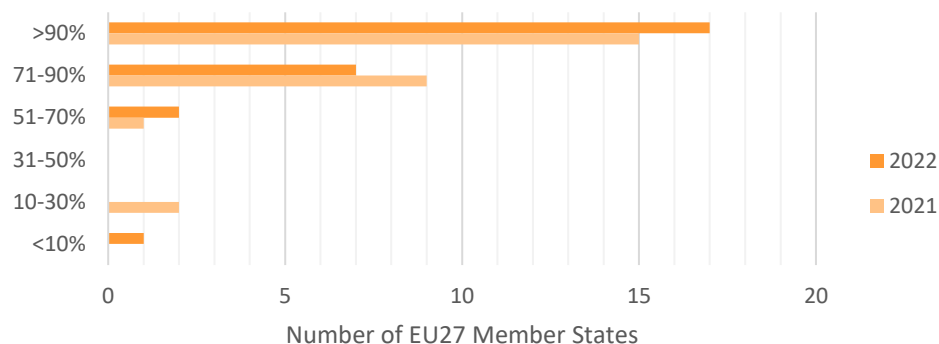


Figure 36: Percentage of datasets available in a structured format

Machine-readable format

Figure shows the distribution of the percentage of published data available in a machine-readable format. 56% of Member States stated that they offer more than 90% of the published data available in a machine-readable format, an increase from 44% last year. Moreover, this is complemented by having a structured format and an open licence.

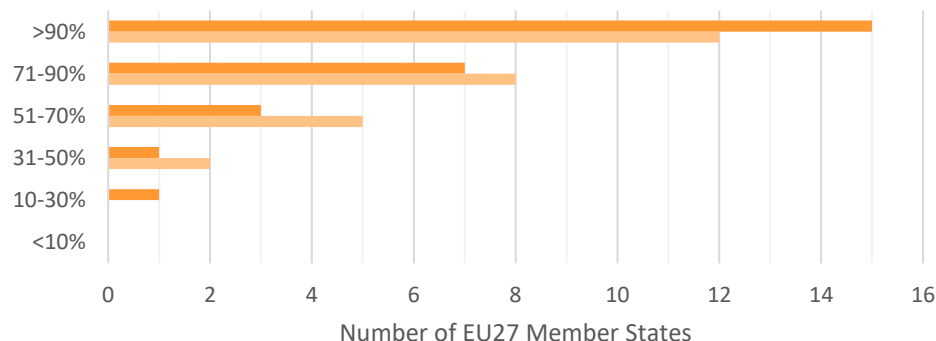


Figure 37: Percentage of datasets available in machine-readable format

Uniform Resource Identifiers (URIs)

Figure shows the distribution of the percentage of published data available by using Unique Resource Identifiers (URIs). As illustrated, 30% of Member States offer more than 90% of the published data available that consistently uses URIs in addition to being in a machine-readable format, structured format, and an open licence. This is an increase from 22% last year.

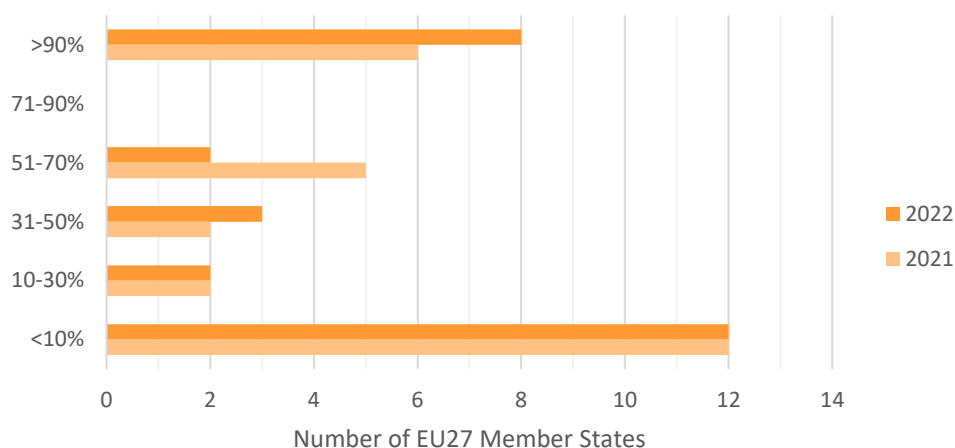


Figure 38: Percentage of datasets available using URIs

Linked data

Figure 39 shows the distribution of the percentage of published data that is linked to other renowned sources. In 2022, 3 Member States (11%), an increase from 2 in 2021, have more than 90% of the published data available as linked data in addition to consistently using URIs, being machine-readable, using structured formats, and having an open licence.

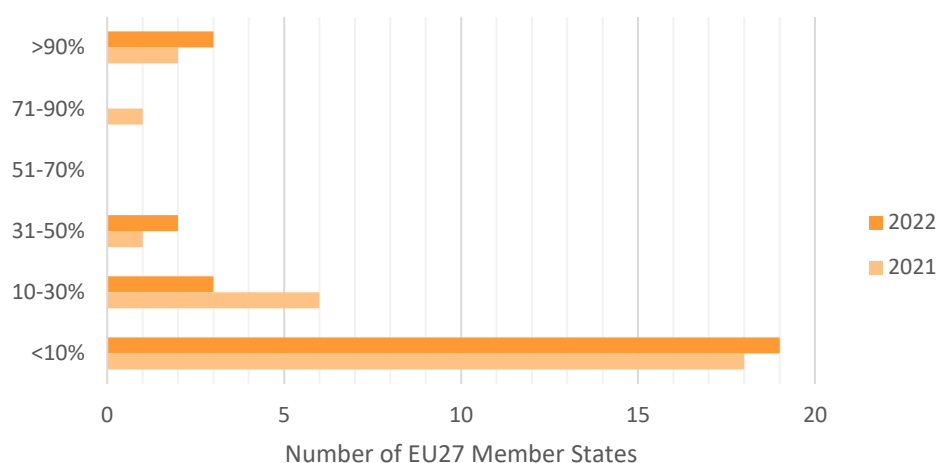


Figure 39: Percentage of datasets available as linked data

4.5 Overall performance

In 2022, the EU27 average maturity score on the quality dimension is 77%. As illustrated in Figure below, this is the same score as 2021 and only slightly higher than the score in 2020 (76%). The average score shows that Member States go beyond considering the quantity of open data made available to focus on the quality of the data published as well. Nevertheless, a new push is required to improve data quality in the years to come.

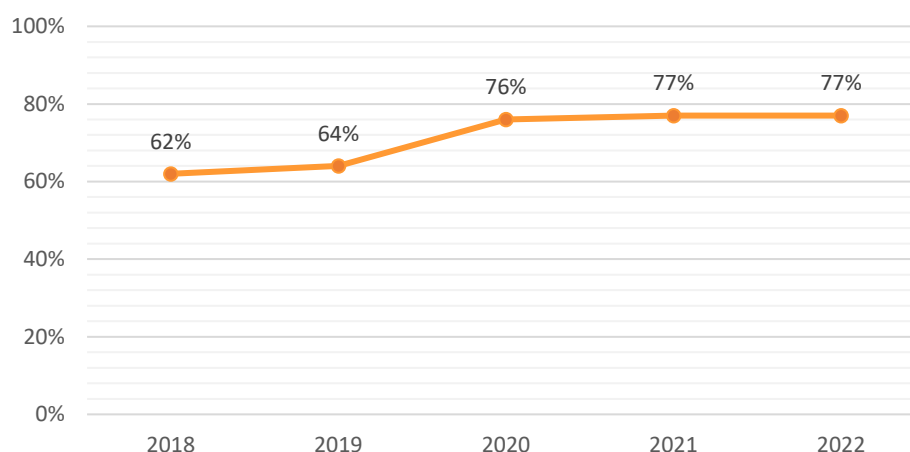


Figure 40: Development in maturity of the quality dimension over recent years

Figure 41 below illustrates the score per indicator of the quality dimension as compared to 2021. Both the Currency and completeness indicator and the Monitoring and measures indicator show a decreased average score compared to last year. Member States need a renewed focus to ensure timely and complete data and metadata.

Promisingly, the indicators for DCAT-AP compliance improved. Information on the importance of DCAT-AP compliance is increasingly provided to data publishers and several countries have developed their own national extensions of the DCAT-AP standard. The indicator Deployment quality and linked data has also improved. For instance, most countries provide most of their datasets under an open license in a structured format, enhancing its usability.

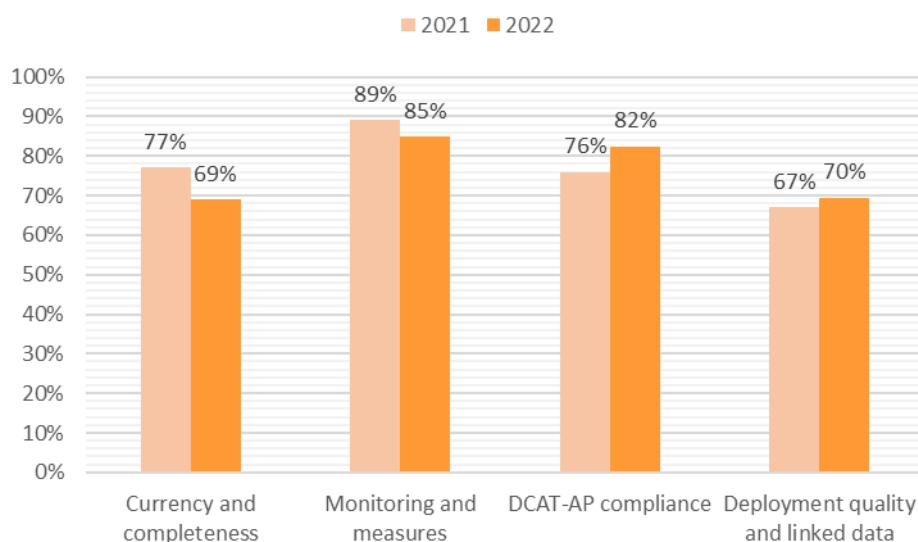


Figure 41: Maturity score per quality indicator compared to last year

The country ranking for the quality dimension across the Member States can be observed in Figure 42. The figure highlights that 15 Member States score above the EU27 average of 77%, and 12 Member States scored below.

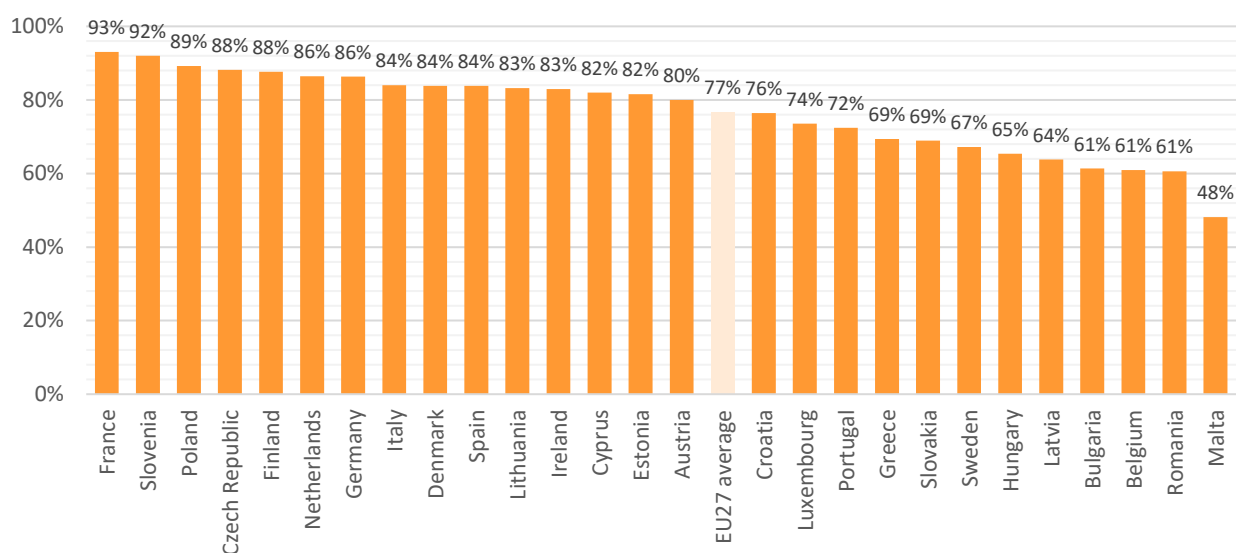


Figure 42: Country ranking for the quality dimension in the Member States

Chapter 5: Open Data Maturity in the EFTA and Other Countries

As in previous years, the open data landscape also assesses the open data maturity in European countries outside the EU27. This is both to bring awareness about the upstreaming nature of open data policies, which expand beyond the EU borders, and to acknowledge the great efforts of non-EU countries in the field of open data.

This chapter gives a brief open data maturity overview of two such groups of countries. The first group focuses on the European Free Trade Association (EFTA) and includes Iceland, Norway, Switzerland. The second group comprises four countries with EU membership candidacy, namely Albania, Montenegro, Serbia, and Ukraine, and additionally Bosnia and Herzegovina, which submitted its application to join the EU in 2016 but has yet to have its candidate status recognised. This chapter follows the same four open data maturity dimensions structure: policy, impact, portal and quality.

It is important to note that Ukraine has reported that the war has had a significant impact on the country, including on the open data sphere and the implementation of related strategies. Due to the war, for example, Ukrainian internet resources (particularly state-owned ones) have been temporarily unavailable. Despite this, as in 2021, Ukraine has provided a high-quality self-assessment, which allowed them to improve their overall maturity level and excel in the policy dimension.

5.1 Open data policy

5.1.1 EFTA countries

Policy framework

In 2022, all three participating EFTA countries stated that they have an open data policy. Moreover, they responded that they have an open data strategy or digital strategies including open data, with an action plan, to complement their policy framework. Switzerland also reports a multitude of open government data strategies at local level.

The Open Government Data 2030 strategy of the city of Zurich²²¹ (OGD strategy) describes the long-term vision that Zurich wants to achieve with OGD and defines its most important goals and values in this domain.

Iceland and Norway indicated here that their national strategy/policy outlines measures to incentivise the publication of and access to real-time or dynamic data.

In Norway, real-time and dynamic data is an important part of the future data driven economy. Contributing to the development of standards for the collection and making available of real-time data from the public sector for further use is part of the government's follow-up points.²²²

Additionally, the three participating EFTA countries indicated that the national strategy or policy measures aim to incentivise the publication of and access to geospatial data. None of the three countries indicated this is the case for citizen-generated data. This is a tendency in line with what was reported for EU Member States.

In Switzerland, there is a separate strategy specifically for geodata.²²³

²²¹ www.stadt-zuerich.ch

²²² <https://www.regjeringen.no/no/dokumenter/meld.-st.-22-20202021/id2841118/?ch=5#kap5-6>

²²³ <https://www.geo.admin.ch/en/about-swiss-geoportal/task-and-responsibilities/strategy-and-implementation.html>

Iceland has a special law regarding geospatial data and an institution responsible for the publication.²²⁴

Norway has a national geospatial strategy that outlines the responsibility of public sector bodies to implement measures in accordance with the Spatial Data Act.²²⁵

All EFTA countries indicated that their open data policy or strategy measures support the reuse of open data by both the public and the private sector.

In Iceland²²⁶, there is an action to make data transfers easier between the public sector (i.e., x-road) as well as a portal where public bodies can retrieve various data and compare it amongst themselves.

Finally, in all participating EFTA countries, high-value domains or datasets have been identified and will be prioritised for publication. While Switzerland and Norway report interest for the prioritisation of all data categories in Figure 43, Iceland focuses in particular on 'earth observation and environment' and 'companies and company ownership'.

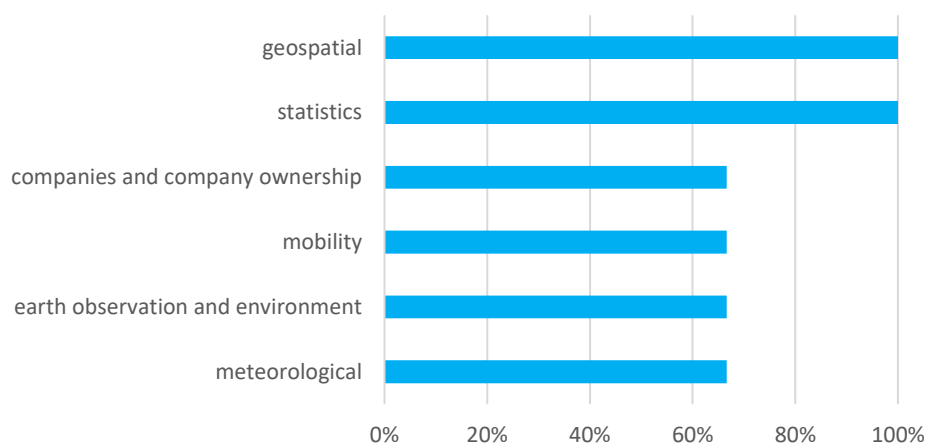


Figure 43: High-value dataset categories most prioritised by EFTA countries

Both Switzerland and Norway have measures in place to involve relevant stakeholders in this prioritisation process.

Switzerland has planned different measures to involve relevant stakeholders in the prioritisation process. These include, amongst others, open consultation with representatives of data users and civil servants. A survey, that also includes questions on this topic, is planned for June 2023.

Despite not being part of the EU, both Iceland and Norway are preparing to make sure that public bodies holding high-value datasets will denote those datasets as such in their metadata, following the publication of the related EU implementing regulation. More generally, some of the objectives and actions of these countries' open data policies and strategies seem to align with the European Commission's priorities for 2019-2024, especially when it comes to 'A Europe fit for the digital age' and 'A European Green Deal'.

²²⁴ <https://www.lmi.is>

²²⁵ <https://www.regjeringen.no/en/dokumenter/national-geospatial-strategy-towards-2025/id2617560/?ch=1>

²²⁶ <https://rikisreikningur.is/>

In Iceland, the digital strategy²²⁷ has a special goal to decrease the carbon footprint of public services by for example transferring data to institutions instead of people.

Governance of open data

Switzerland and Norway, but not Iceland, have an open data governance structure in place to enable the inclusion of open data stakeholders. All EFTA open data governance structures apply a hybrid model of both bottom-up and top-down approaches, similar to the less populated EU states.

In Norway, several governance structures co-exist for different data sharing areas. These governance structures are implemented by various stakeholders from both the public and private sector.

This hybrid approach ensures that there is a level of local and regional governance to open data initiatives and that at least some of these initiatives are facilitated and supported at a national level. In all three EFTA countries, in fact, local and/or regional open data public bodies conduct open data initiatives, with Norway reporting most of them.

All three EFTA countries also publish their governance structure and operating model online, with Switzerland and Iceland also providing a document describing the responsibilities and working approach of the national, and eventually regional and/or local, open data teams.

Additionally, the governance model of Switzerland also includes the appointment of official civil service roles that are dedicated to open data.

Switzerland has an Open Government Data (OGD) office that encourages different open data stakeholders to be active on various topics (including data management, development of the portal and legal questions). In addition, there are concrete bodies – such as the Interdepartmental OGD Committee (IDA OGD), the Public Administration and Open Government Data Forum (OGD Forum), Round Table, the Legal working Group and the Portal working Group – that bring together national and regional stakeholders.²²⁸

Furthermore, all EFTA countries report a regular exchange between public sector bodies and the national open data team, as well as between the latter and open data reusers. To allow this exchange, multiple events, such as roundtables and seminars, are organised.

Digital Iceland holds, for example, various seminars²²⁹ during the year and the Ministry of Finance has performed several hackathons²³⁰.

Open data implementation

The three EFTA countries each have a document or tool at the national level to assist data providers in their publication process. Additionally, all EFTA countries have processes in place to monitor the implementation of the open data plans, such as studies and recurring gatherings.

In Norway, a study of the Norwegian data economy has been carried out over the past year. Its purpose has been to identify key challenges and opportunities related to the public sector's role and tasks that

²²⁷ <https://island.is/en/o/digital-iceland/digital-strategy>

²²⁸ <https://www.bfs.admin.ch/bfs/en/home/services/ogd/activities.html>

²²⁹ <https://island.is/en/o/digital-iceland/conferences>

²³⁰ <https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2020/08/12/Gagnathon-fyrir-umhverfid-hefst-i-dag/>

manage and provide public data for further use. The issue of charging for data above marginal cost is discussed and some measures proposed.

The three countries publish an annual report to monitor the implementation of the open data policies or strategies.

In Switzerland, the OGD office delivers a yearly progress report to the government. Iceland has a yearly publication²³¹.

Norway publishes an annual report that includes deviations from the allocation letter and the digitalisation circular.

While Switzerland and Iceland describe the status of open data implementation in their countries as satisfactory, Norway highlights challenges in incentivising various data providers to make their datasets openly available. In line with findings from the EU countries, further challenges reported by the EFTA group are difficult coordination and governance, lack of human resources, and legal issues when it comes to the use and publication of data.

All three EFTA countries have activities to assist real-time/dynamic and geospatial data holders in the publication process, but only Norway reports the same effort for citizen-generated data.

Switzerland and Norway offer professional development or training plans for civil servants working with open data.

In Switzerland, the training activities are integrated in some of the universities' curricula and therefore receive a publicly recognised certificate after completion.

Finally, all three participating EFTA countries annually organise national, regional or local events to promote open data and open data literacy in their country beyond public servants, including hackathons and conferences.

5.1.2 Candidate countries and Bosnia and Herzegovina

Policy framework

All countries, with the exception of Bosnia and Herzegovina, have an open data policy in place with an action plan for measures to support the publication and reuse of open data. Moreover, most countries have either a dedicated open data strategy – as in the case of Ukraine – or embed strategic measures in other documents focusing on the public sector and its digitalisation. Ukraine is the only country reporting further local open data strategies (e.g., Lviv²³² and Vinnytsya²³³).

In Ukraine, the new open data strategy²³⁴, entered into force in June 2022, covers the following aims:

- *decision-making by citizens, politicians and civil servants based on complete information on the issue;*
- *increasing the transparency of the government's activities, ensuring confidence in its decisions and fighting corruption;*

²³¹ <https://www.stjornarradid.is/verkefni/efnahagsmal-og-opinber-fjarmal/opinber-fjarmal/arsskyrslur-radherra>

²³² [https://www8.city-](https://www8.city-adm.lviv.ua/Pool/Info/doclmr_1.NSF/(SearchForWeb)/7676F23B77FA4D95C22581790030B9C7?OpenDocument)

[adm.lviv.ua/Pool/Info/doclmr_1.NSF/\(SearchForWeb\)/7676F23B77FA4D95C22581790030B9C7?OpenDocument](https://www8.city-adm.lviv.ua/Pool/Info/doclmr_1.NSF/(SearchForWeb)/7676F23B77FA4D95C22581790030B9C7?OpenDocument)

²³³ <http://www.vmr.gov.ua/Docs/MajorOrdersR/2017/%E2%84%96181-%D1%80%2018-10-2017%20%D0%9F%D1%80%D0%BE%20%D0%B7%D0%B0%D1%85%D0%BE%D0%B4%D0%B8.pdf>

²³⁴ <https://data.gov.ua/uploads/files/2022-06-15-102752.7196282150222.pdf>

- *introduction of innovative products based on open data.*

With the exception of Bosnia and Herzegovina and Montenegro, all countries provide evidence that their national strategy or policy outlines measures to incentivise the publication of, and access to, real-time or dynamic data. Furthermore, all countries indicate that there are policies in place to support the publication of, and access to, geospatial data. Similar to EU and EFTA countries, only two states, namely Bosnia and Herzegovina and Ukraine, cover national strategy or policy outlines measures to incentivise the publication of and access to citizen-generated data.

In Bosnia and Herzegovina's action plan, point 4.2.9.2. outlines the intention to 'Ensure that citizens and the business community can make correction of their own data by implementing all identified key prerequisites through online authentication and access'.²³⁵

Bosnia and Herzegovina and Ukraine indicate that their open data policy and/or strategic measures support the reuse of open data by both the public and the private sector. For Montenegro and Serbia, the open data policy and/or strategic measures support the reuse of open data by the private sector only.

Montenegro encourages the use of open data for the development of start-ups, business communities, and various business models through the organisation of events, such as competitions for digital solutions and hackathons.

Among other things, Serbia plans an analysis of how to engage the private sector in the open data initiative and give support to public sector organisations and higher education institutions for projects that are focused on open data reuse and the promotion of open data.

In all countries with the exception of Bosnia and Herzegovina, high-value domains or datasets have been identified and prioritised for publication. Geospatial data is being prioritised by all four respondent countries that have identified high-value datasets (Figure).

Except for Bosnia and Herzegovina, all countries indicate that they involve relevant stakeholders in this prioritisation process. Albania, Montenegro and Ukraine affirm that they are preparing to make sure that public bodies holding high-value datasets will denote those datasets as such in their metadata, following the publication of the related EU implementing regulation.

²³⁵ https://parco.gov.ba/wp-content/uploads/2021/12/action_plan_par_eng1.pdf

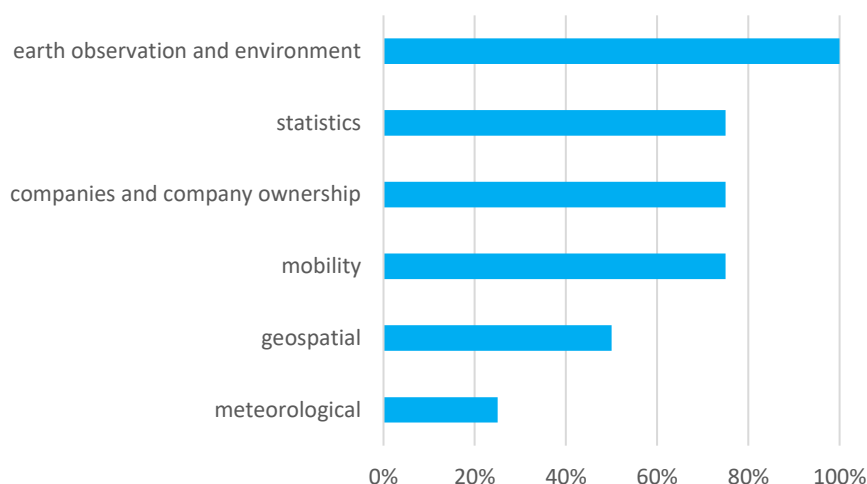


Figure 44: High-value datasets being prepared by candidate countries

The same tendency to follow EU policymaking can be seen in the fact that all candidate countries, as well as Bosnia and Herzegovina, indicate their open data policies and/or strategies align with the European Commission's priorities for 2019-2024, especially when it comes to 'A Europe fit for the digital age'.

Governance of open data

All candidate countries – hence excluding Bosnia and Herzegovina – have a governance structure in place that enables the participation and inclusion of various open data stakeholders. All countries report that they use a hybrid model comprising a top-down and bottom-up approach to govern open data. In 3 of the 5 countries (Montenegro, Serbia, and Ukraine) the governance structure ensures that all local and regional open data initiatives are facilitated and supported at the national level. Also, in 3 of the 5 countries (Albania, Montenegro, and Ukraine) the governance structure appoints official civil services roles dedicated to open data.

The Council for open data management in Montenegro is currently being reformed and will consist of representatives of the public sector, the chamber of commerce, civil sector and academic institutions.

In Serbia, there was an Open Data Working Group, which included stakeholders from the public sector, academia, Central Statistics Office, and the tech community. However, the mandate has finished and will be continued at a later date. In the meantime, the aforementioned groups continue to meet through informal meetups.

Serbia and Ukraine say they publish their open data governance structure and its operating model online and have a publicly available document describing the working approach.

All countries, with the exception of Bosnia and Herzegovina and Montenegro, state that a regular exchange of knowledge and experiences takes place between the different public sector bodies related to open data. In Montenegro, Serbia, and Ukraine, this exchange also takes place between public sector bodies and open data reusers. In all countries, open data is promoted through events.

In Montenegro, this exchange of knowledge and information takes place mainly through online workshops and webinars. Another example comes from the Chamber of Commerce of Montenegro that prepared an online lecture on 'Open Data and Entrepreneurship' within the 'Open Data for Open European Innovation' project.

Open data implementation

In all candidate countries and Bosnia and Herzegovina, activities are in place at the national level to assist data providers in their publication process. For example, a rulebook on how to publish information in an open format with a manual (e.g., Montenegro), and training on different topics (e.g., Serbia). With the exception of Bosnia and Herzegovina, all countries report that there are processes to ensure that the open data policies or strategies are implemented, such as quarterly or yearly reporting. Montenegro and Ukraine also have ways of assessing if public sector bodies are charging for data above marginal cost.

In Bosnia and Herzegovina, various activities are being organised and planned to help data providers publish and promote their open data, such as a training programme to open data for officials in institutions across Bosnia and Herzegovina.

All candidate countries – thus excluding Bosnia and Herzegovina – are satisfied with the measures implemented to date. In terms of challenges, most countries see the necessity to further raise awareness about open data in their territory and to better organise legal and governance aspects around it. Human and financial resources are also among the most frequently mentioned issues. Ukraine, in particular, underlines that the present war with Russia has a significant impact on the open data sphere and the implementation of strategies and plans for its development.

In fact, in the interests of national security and defence, the work of national and local portals in Ukraine was suspended, as well as activities related to improving the level of skills in open data. Funding for IT development, including open data, was also significantly reduced.

All candidate countries, with the exception of Bosnia and Herzegovina, report activities in place to support real-time/dynamic data. Serbia, Ukraine, and Montenegro mention support also for geospatial data holders. Only Serbia and Ukraine indicate activities to support the publication effort of holders of citizen-generated data.

Finally, in 3 of the 5 countries (Montenegro, Serbia, and Ukraine), a professional development or training plan is offered to civil servants working with data. After completing these plans or training activities, certification is offered that is recognised within public bodies.

Montenegro, Serbia, and Ukraine offer annually national, regional or local events (e.g., hackathons, courses, conferences, user meet-ups, summer/winter schools) to promote open data and open data literacy in their country, also in cooperation with the civil society and private sector.

In Serbia, every year, the National Open Data Week²³⁶ is organised in collaboration with the open data community of users.

5.2 Open data impact

As stated in the main Open Data Impact chapter, this section has undergone an important restructuring. In light of these changes, this dimension will focus on the willingness, preparedness and ability of the participating countries to measure the reuse and impact created through open data reuse.

5.2.1 EFTA countries

Strategic awareness

²³⁶ <https://hub.data.gov.rs/en/2022/03/18/open-data-week-begins/>

In 2022, Iceland and Norway state that they have a definition of open data reuse, with Norway having a strong focus and interest at national level in observing the level of open data reuse. Norway is also the only country saying that there are several processes in place to monitor the level of open data reuse in the country.²³⁷

The Norwegian Digitalisation Agency is working on a methodology for measuring the impact of reuse. Moreover, the national portal provides crowdsourced examples of reuse²³⁸, which are also automatically linked to the datasets in play and can be integrated with the dataset catalogue²³⁹.

Regarding high-value datasets, Switzerland is the only country claiming to be preparing to monitor and measure the reuse of these datasets. They predict that this will mainly consist of analysing the number of downloads and are exploring other ways to measure impact.

Norway and Switzerland reported that their national governments have specified what open data impact means, with Norway stating that they also have a methodology in place to measure the impact of open data.

In a published study on the economic impact of Open Government Data (OGD) in Switzerland²⁴⁰, the economic impact of OGD is defined as 'the benefits accruing to suppliers, users and reusers of data and information in terms of profits generated and jobs created and supported, as well as the wider benefits to society from it'.

In Norway, there is a focus on the impact of sharing data between the public and private sector. The policy emphasises how data is an economic resource and contributes to economic growth and the creation of new activities.²⁴¹ Regarding methodology, the Norwegian Institute of Transport Economics (TØI)²⁴² conducted a study where an open science methodology was used. The national open data portal team is investigating whether this method can be the starting point for a national framework.

Norway and Switzerland both state that studies have been conducted in the past year focusing on assessing open data impact in their country²⁴³, and that there is collaboration between government and civil society or academia to create open data impact²⁴⁴.

Measuring reuse

While Norway and Switzerland indicate public bodies have launched or are performing activities mapping 'which' and 'how' datasets are (re)used since 2021, Iceland is not aware of any.

The Norwegian Digitalisation Agency is in constant contact with its (re)users. There are open weekly meetings about data sharing titled "Arena for data sharing and information management"²⁴⁵. Moreover, the national data catalogue has a new beta for services and events, which are linked to specific datasets.²⁴⁶

²³⁷ <https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/kmd/pressemeldinger/2021/utvalg-for-en-helhetlig-regulering-av-viderebruk-av-offentlig-informasjon/id2874012/>

²³⁸ <https://datalandsbyen.norge.no/category/2/gode-eksempler-p%C3%A5-bruk>

²³⁹ <https://data.norge.no/datasets/68d08f28-a16d-4fab-a953-ed4ab08ce2e2>

²⁴⁰ <https://www.bfs.admin.ch/bfs/de/home/dienstleistungen/ogd/dokumentation.assetdetail.11147089.html>

²⁴¹ <https://www.regjeringen.no/no/dokumenter/meld.-st.-22-20202021/id2841118/?ch=1>

²⁴² <https://www.toi.no/about-toi/category26.html>

²⁴³ <https://www.bfs.admin.ch/bfs/de/home/dienstleistungen/ogd/dokumentation.assetdetail.11147089.html>

²⁴⁴ <https://opendata.ch/events/>

²⁴⁵ <https://www.digdir.no/informasjonsforvaltning/faglig-arena-datadeling-og-informasjonsforvaltning/2120>

²⁴⁶ <https://data.norge.no/public-services/d5d0c07c-c14f-3741-9aa3-126960958cf0>

Norway and Switzerland also report that they have launched or performed activities since 2021 to better understand (re)users' needs. Moreover, public bodies in each country are developing a systematic way to gather data reuse cases, with Norway also investigating ways of classifying the reuse cases.

In Norway, in addition to the work done by the Norwegian Digitalisation Agency, several sectors have their own initiatives and measure the use of datasets within their sector, such as the fishing sector²⁴⁷. Furthermore, several sectors are also investigating the use of data and measures to increase data sharing. For example, in the environmental sector.²⁴⁸

Governmental impact

In 2022, Norway is the only EFTA country to report it has data on the impact created by open data on governmental challenges.

The table below represents the components that influence the level of governmental impact of open data in the EFTA countries. As can be seen, all countries state that open data has improved the decision-making processes in their country.

Governmental Impact			
	Iceland	Norway	Switzerland
Availability of data on open data impact on governmental challenges		x	
Open data increasing government efficiency and effectiveness		x	x
Open data increasing transparency and accountability		x	x
Open data improving policy-making processes	x	x	
Open data improving decision-making processes	x	x	x

In Norway, the national statistics bank is freely and openly available and utilised by organisations in their decision-making processes.²⁴⁹ For example, the Norwegian Public Roads Administration and other organisations collect data on the road, environment, and weather, which contributes to planning traffic, environmental and fiscal policies or measures.

Social impact

In 2022, as in 2021, Norway scores the highest for social impact in the EFTA countries and is the only one reporting to have data (e.g., in the form of reports) on the impact of open data on social challenges.

The table below represents the components that influence the level of social impact of open data in the EFTA countries. As can be seen, all countries indicate that open data has had an impact on raising awareness on health and well-being related issues, similarly to 2021.

Social Impact			
	Iceland	Norway	Switzerland
Availability of data on open data impact on societal challenges		x	
Open data including marginalised groups		x	
Open data raising awareness concerning housing in the city		x	x

²⁴⁷ <https://www.barentswatch.no/>

²⁴⁸ <https://www.menon.no/wp-content/uploads/2021-153-Hovedrapport-KVU-Fremtidens-miljodata.pdf>

²⁴⁹ <https://data.norge.no/datasets/e74957b7-d052-4d93-9afb-4a2fce65882f>

Open data raising awareness on health and well-being	x	x	x
Open data raising awareness on education and skills			x

In Iceland, statistics on COVID-19 infections and vaccinations are shared on a dashboard.²⁵⁰ The dashboard has been extensively consulted by journalists and the general population, especially during the peak of the pandemic.

Environmental impact

Norway is the only participating EFTA country performing activities that monitor the level of environmental impact of open data.

The table below represents the availability of data on the impact of open data on the environment and related challenges in the EFTA countries.

Environmental Impact			
	Iceland	Norway	Switzerland
Availability of data on open data impact on environmental challenges		x	
Open data raising awareness on water and/or air quality		x	
Open data promoting environmental-friendly transport systems in cities		x	x
Open data fighting climate change and connected disasters		x	x
Open data reducing energy consumption and promoting the switch to renewables			x

In Norway, there are several initiatives that monitor the different environmental aspects listed above. Regarding air quality, the national open data portal team monitors air quality²⁵¹, predicts upcoming air quality²⁵², and provides a calculator to test the effect of specific measures to reduce air pollution²⁵³. Moreover, the team monitors the progress of the fight against climate change and showcases the effects of the connect disaster on Norway.²⁵⁴

Economic impact

Norway is the only participating EFTA country to provide evidence of data on the economic impact of open data.

The table below represents the availability of data on the impact of open data on the economy and related challenges in the EFTA countries.

Economic Impact			
	Iceland	Norway	Switzerland
Availability of data on open data impact on economic challenges		x	
Open data increasing the level of employment			
Open data increasing adoption of new technologies			

²⁵⁰ <https://www.covid.is/tolulegar-upplysinga>

²⁵¹ <https://luftkvalitet.nilu.no/>

²⁵² <https://luftkvalitet.miljodirektoratet.no/>

²⁵³ <https://www.miljodirektoratet.no/tjenester/tiltakskalkulator-for-luftkvalitet/>

²⁵⁴ <https://energiogklima.no/klimavakten/>

Open data increasing level of entrepreneurship and business creation		x	
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In Norway, the national open data portal team uses open data on the fishing industry to create a sustainable flow of employment within the business sector.²⁵⁵

5.2.2 Candidate countries and Bosnia and Herzegovina

Strategic awareness

In 2022, all candidate countries – excluding Bosnia and Herzegovina – say they have a definition of open data reuse. Of the 4 countries, 3 have either a strong or limited focus on observing the level of open data reuse in their country, with Albania stating that there is currently no focus, and it will be part of the open readiness assessment conducted in 2023.

Serbia has processes in place to monitor the level of open data reuse through the country's national open data portal. Moreover, activities are either launched or planned to encourage public bodies to monitor the reuse of their own published data.

In Serbia, public sector bodies are regularly invited to be partners in the Data Innovation Challenges, which support the use of their datasets. For example, the last Data Innovation Challenge partnered up with the Ministry of Health to reuse their data on diabetes.²⁵⁶

All candidate countries and Bosnia and Herzegovina state that they are either already in the process of preparing to monitor and measure the level of reuse of high-value datasets in their country, or that they plan to do so in the coming year.

Both Serbia and Ukraine have a methodology in place to measure the impact of open data and those studies were conducted in the past year focusing on assessing the impact of open data in their country.

In Ukraine, during the past year the Ministry of Digital Transformation conducted 4 studies on assessing the impact of open data. This includes the economic impact of open data²⁵⁷, anti-corruption and social impact of open data in the sphere of state supervision (control)²⁵⁸, anti-corruption and social impact of state open data in the field of financial transparency of Ukraine²⁵⁹, and anti-corruption and social impact of open data in the field of forestry²⁶⁰.

All countries, with the exception of Albania, report that there is collaboration between public government bodies and civil society or academia to create open data impact in their country.

In Bosnia and Herzegovina, the Open Government Partnership Council involves representatives from NGOs in their activities. Moreover, during the development of an open data pilot portal for the country's Council of Ministers, separate workshops and consultation with NGOS, academia and IT industry representatives took place to discuss plans, critical success factors and views on open data.²⁶¹

Measuring reuse

²⁵⁵ <https://www.barentswatch.no/havbruk/sysselsetting>

²⁵⁶ <https://hub.data.gov.rs/2022/02/02/odgovori-na-izazov-otvorenih-podataka-i-obezbedi-budzet-za-razvoj-svoje-ideje/>

²⁵⁷ <https://docs.google.com/document/d/1cLUg477uBJuDRbTQYngKW383iRdM273N/edit>

²⁵⁸ <https://diia.data.gov.ua/value/derzh-nahliad>

²⁵⁹ <https://diia.data.gov.ua/value/finansova%20prosorist>

²⁶⁰ <https://diia.data.gov.ua/value/forest>

²⁶¹ <https://parco.gov.ba/hr/2021/10/06/prezentiran-prvi-portal-otvorenih-podataka-u-bih/>

In 2022, all candidate countries, with the exception of Bosnia and Herzegovina, state that public bodies in their country have launched, or are already performing, activities to map which and how datasets are reused. Examples of activities are:

- analysing log files to generate statistics on the number of downloads of each of the datasets published on the open data portal (e.g., Albania and Ukraine);
- analysing the automated feedback mechanism to track how many users are accessing which datasets (e.g., Serbia);
- conducting surveys and interviews or workshops with data (re)users (e.g., Montenegro and Ukraine²⁶²);
- regularly communicating with the open data community through events or webinars (e.g., Serbia).

Montenegro, Serbia, and Ukraine also conduct activities to better understand users' needs.

In Ukraine, the national open data portal team conducts annual surveys of portal users to gauge, for example, what datasets can be improved to create additional impact. Moreover, they use social networks (especially Facebook) to communicate with public authorities, and host thematic events throughout the year with representatives of public sector bodies and open data reusers to exchange knowledge.

Ukraine is the only country stating there are public bodies that have developed a systematic way of gathering reuse cases. Here, the Ukrainian Ministry of Digital Transformation²⁶³ maintains a complete list of all applications, visualisations, dashboard and analytical panels in a dedicated section of their website.

Governmental impact

In Serbia and Ukraine, public bodies have launched activities to assess the political impact of open data, such as research studies.

The table below represents the availability of data on the impact of open data on the government and related challenges in candidate countries and Bosnia and Herzegovina.

Governmental Impact					
	Albania	Bosnia and Herzegovina	Montenegro	Serbia	Ukraine
Availability of data on open data impact on governmental challenges					X
Open data increasing government efficiency and effectiveness					X
Open data increasing transparency and accountability				X	X

²⁶² <https://diia.data.gov.ua/news/openup-datatalk-vidkriti-dani-finzvitrnosti-shho-ce-take-i-shho-z-cim-robiti>

²⁶³ <https://www.kmu.gov.ua/en>

Open data improving policy-making processes				X	X
Open data improving decision-making processes			X	X	X

In Serbia, open data helps local self-governments (LSGs) to make better policies around, for example, subventions from the local budget²⁶⁴, contributing to more accountable and transparent public spending in the local level.

Ukraine's Ministry of Finance implemented the BOOST tool to analyse budget indicators. Its purpose is to support the effective use of budget funds, improve decision-making processes, and increase transparency and accountability.²⁶⁵

Social impact

In both Serbia and Ukraine, public sector stakeholders are actively monitoring the social impact of open data through activities such as conducting research, or by incorporating the social impact of open data into their data strategy document.

The table below represents the availability of data on the impact of open data on the society and related challenges in candidate countries and Bosnia and Herzegovina.

Social Impact					
	Albania	Bosnia and Herzegovina	Montenegro	Serbia	Ukraine
Availability of data on open data impact on societal challenges					X
Open data including marginalised groups					X
Open data raising awareness concerning housing in the city					X
Open data raising awareness on health and well-being				X	X
Open data raising awareness on education and skills					X

²⁶⁴ <https://app.powerbi.com/view?r=eyJrIjoizjQwNjk2MmEtOGFwMi00OGQxLWE1ZTItYTU3ZjUyZjBjMDY0IiwidCI6ImU5ODY5ZDIILTVmMTYtNDE1Ni04OWIwLWQ1MTYzMGZmNzAwMCIsmMiOiI9&pageName=ReportSection>

²⁶⁵ <https://openbudget.gov.ua/analytics/incomes>

In Serbia, several applications have been developed in the area of healthcare. For example, Mediatly²⁶⁶ is a service used by medical staff and citizens to check the instructions for medicine. Another example is the Diabetes app²⁶⁷, which includes a BI dashboard offering analysis on diabetes in Serbia and contributes to better policy planning in this area.

Environmental impact

In Montenegro, Serbia and Ukraine, public sector stakeholders are actively performing activities to monitor the environmental impact of open data through, for example, conducting research or having their national environmental agency publish and monitor the (re)use of their data.

The table below represents the availability of data on the impact of open data on the environment and related challenges in candidate countries and Bosnia and Herzegovina.

Environmental Impact					
	Albania	Bosnia and Herzegovina	Montenegro	Serbia	Ukraine
Availability of data on open data impact on environmental challenges					X
Open data raising awareness on water and/or air quality			X	X	X
Open data promoting environmentally friendly transport systems in cities			X	X	X
Open data fighting climate change and connected disasters			X	X	X
Open data reducing energy consumption and promoting the switch to renewables					X

In Serbia, the national open data portal developed the “Forest and climate” application to show the best locations for forestation with certain species based on satellite and geospatial data and analysis.²⁶⁸

²⁶⁶ <https://mediately.co/rs/drugs?q=18>

²⁶⁷ www.open-dijabetes.rs

²⁶⁸ <http://sumeiklima.org/>

In Ukraine, open energy data is used to increase transparency in the energy industry. Projects such as Low Carbon Ukraine²⁶⁹ and Save Dnipro NGO²⁷⁰ are creating analytical materials on electricity production based on open data to monitor the market, identify problems, prepare recommendations for their solutions, and further develop and reform the energy industry.

Economic impact

In Montenegro, Serbia, and Ukraine, several public sector stakeholders are actively monitoring the economic impact of open data by either conducting research on the topic, or by embedding the economic impact of open data into their data strategy document.

The table below represents the availability of data on the impact of open data on the economy and related challenges in candidate countries and Bosnia and Herzegovina.

Economic Impact					
	Albania	Bosnia and Herzegovina	Montenegro	Serbia	Ukraine
Availability of data on open data impact on economic challenges					X
Open data increasing the level of employment			X	X	X
Open data increasing adoption of new technologies			X	X	X
Open data increasing level of entrepreneurship and business creation			X	X	X

In Serbia, open data has contributed to raising the level of entrepreneurship, especially in regard to women. For example, the association Sister Analyst²⁷¹ was created to support young women on their journey to become data scientists.

5.3 Open data portal

5.3.1 EFTA countries

Portal features

All three participating EFTA countries – Switzerland, Iceland and Norway – have a national open data portal in place. These offer an advanced data search function and the possibility to search by file format

²⁶⁹ <https://www.lowcarbonukraine.com/uk/frontpage-uk/>

²⁷⁰ <https://www.savednipro.org/>

²⁷¹ <https://sisteranalyst.org/>

or data domain. With the exception of Iceland, the national data portals also offer users the possibility to download datasets. Additionally, all EFTA countries offer users a way to programmatically query metadata. Switzerland and Norway offer both a preview function for geospatial data and for tabular data. This year, Norway introduced a preview function for tabular data.

Similar to 2021, Iceland and Norway stated that they have a general feedback mechanism for users, as well as a feedback mechanism at dataset level. All three countries stated that their national portals do not provide a mechanism for users to rate datasets. Iceland and Norway offer users the possibility to request datasets, although this occurs less frequently than monthly. Norway is the only country that reported they transparently present the request on the national portal.

Switzerland and Norway have a dedicated section on their national portal to showcase use cases and the dataset used. Users can share their own use case for publication. This differs from last year, where Norway stated that they did not reference the dataset.

Portal usage

All participating EFTA countries perform activities to gain insight into the national portal's usage and use these insights to improve the portal. Switzerland uses Matomo; in Iceland, the team uses the web analytics tool Plausible; and in Norway, Google Analytics. The Swiss national portal has, on average, 17,000 unique visitors per month. The Icelandic portal hosts approximately 230,000 visitors per month. The Norwegian portal has more than 11,500 visitors per month.

The three national portal teams monitor what keywords are used to search for data and content, as well as what the most and least frequently consulted pages are. This feature was introduced in Iceland at the end of 2021 and measures all words listed in 'search' with the purpose to add content if it is not yet present on the national portal. In Iceland and Switzerland, the most frequently consulted data category is 'health'. In Norway, it is 'traffic and transport'.

On the open data portals of all EFTA countries, metadata is available in a clear language that is readable and understandable to humans and machines. Moreover, Iceland and Norway run analytics on API usage and whether metadata describing the datasets is accessible via an API. Of the Icelandic portal traffic, 100% is generated by API usage only. For the Swiss and Norwegian data portals, the traffic generated by API usage is unknown.

Data provision

Similar to 2021, approximately half of the public sector data providers contribute to the national portal in Switzerland and Norway. In Iceland, only a few public sector data providers contribute, which may be due to the fact that the Icelandic national open data portal was only launched in 2021. All EFTA countries assist data providers with their publication process.

The EFTA countries also stated that they harvest local or regional data sources on their national open data portal. Furthermore, all open data portals include datasets that are real-time or dynamic. In Iceland and Norway, more than 30% of the metadata links to such data. In Switzerland, this number is between 1% and 10%.

Portal sustainability

Similar to last year, each participating EFTA countries has a strategy in place to ensure their national portal's sustainability. The Icelandic and Norwegian strategy documents include a description of the target audience group and how to reach this audience. All EFTA countries take actions to promote the national data portals' activities and the available open data, for example by being active on social

media. Each country also made their portal's source code and relevant documentation available to the public.

With the exception of Iceland, the EFTA countries have a process in place to review and improve their national open data portals on a regular basis. In Switzerland, the frequency of these reviews is bi-annually and in Norway the review activities take place on a quarterly basis.

5.3.2 Candidate countries and Bosnia and Herzegovina

Portal features

With the exception of Bosnia and Herzegovina and Montenegro, the countries in this group state that they each have a national open data portal in place. These portals offer an advanced data search function, the possibility to download datasets, and the possibility to search by file format. Only Albania does not allow users to search by data domain. Additionally, Serbia and Ukraine offer users a way to programmatically query the metadata, for example via an API or SPARQL access point.

Of the 5 countries, 3 (Albania, Serbia and Ukraine) offer a general feedback mechanism on their national portals, including the 2 whose portal is not an open data one. A feedback mechanism at the dataset level on the national open data portal is only offered by Serbia and Ukraine. Ukraine is the only country that reported it was incorporating a mechanism on its national portal allowing users to rate datasets and is the only national portal that offers the possibility for users to request datasets.

Serbia and Ukraine have a designated area on their national portal to showcase use cases and to allow users to submit their own use cases. Additionally, these two countries offer a discussion forum where data providers and data reusers can interact with one another.

Portal usage

All countries perform activities giving them insight into portal usage in the form of web analytics. Montenegro, Serbia and Ukraine use these insights to improve their national portals. Albania and Bosnia and Herzegovina do not measure the number of visitors per month. The Montenegrin portal has, on average, 1,200 unique visitors per month. Serbia's portal has approximately 28,000 visitors and Ukraine's has 180,000 visitors.

Albania, Montenegro and Ukraine monitor what keywords are used to search for data on the portal, as well as to identify the most and least consulted pages. In all countries, the metadata on the national portals is available in language that is readable and understandable by humans and machines.

Similar to last year, only Montenegro and Ukraine run analytics on API usage. Around 50% of the Montenegrin portal traffic is generated by API usage, and approximately 80% of the Ukrainian portal traffic.

Data provision

In Ukraine, all public sector data providers contribute to the portal. In Albania and Serbia, approximately half of the public sector data providers contribute to the portal. In Bosnia and Herzegovina and Montenegro, only a few public sector data providers contribute to the portal. All countries perform activities to support data providers with their publication process.

With the exception of Montenegro, all countries have, besides the national open data portal, other regional and local portals. Only the regional and local portals of Serbia and Ukraine are also discoverable via the national portal.

In Albania, Serbia and Ukraine only, the national data portal includes datasets that are real-time or dynamic. This accounts for between 11%-20% of the metadata in Albania and Ukraine, and between 1%-10% of the metadata in Serbia.

Portal sustainability

Ukraine is the only country that reports they have a strategy in place to ensure the open data portal's sustainability. With the exception of Bosnia and Herzegovina, the other countries perform activities to promote the availability of data on their portal. The Albanian and Ukrainian national data portal teams are active on social media.

In 3 of the 5 countries (Albania, Montenegro and Ukraine) a user satisfaction survey has been conducted in the past year. Also, these three countries, along with Serbia, indicate they have a process in place in which the portal is reviewed regularly. For Montenegro, Serbia and Ukraine, the revision of the portal occurs annually, while this happens less frequently for Albania.

5.4 Open data quality

5.4.1 EFTA countries

Currency and completeness

All participating EFTA countries have a pre-defined approach in place to ensure that the metadata is kept up to date. As in 2021, Iceland and Norway report that 100% of the metadata on the portal is obtained from the source automatically, rather than edited manually. Similarly, the Swiss national open data portal team reports that this percentage is between 90%-99%. All countries state that the metadata on the national portals is updated within one day in the event that the metadata at the source changes. Moreover, in Iceland the majority of datasets cover the full period from when it was first published up to the present day; in Norway this is approximately half of the datasets; and in Switzerland just a few datasets.

Monitoring and measures

In 2022, Norway and Switzerland state that they monitor the quality of the metadata available on their portal through tools such as the data.europa.eu MQA²⁷² or the Swiss OGD office. The Norwegian data portal team also publishes an assessment of the metadata on their portal.²⁷³

All participating EFTA countries have guidelines in place to assist publishers in choosing an appropriate license for their data. For example, Norway has a guide on data licensing²⁷⁴. Similarly to 2021, Norway and Switzerland report that they developed their own license to foster the publication of open data. All countries' guidelines also provide recommendations for the use of either Creative Commons (CC) licenses (Norway and Iceland) or their own license (Switzerland). Unlike last year, 2 out of the 3 countries (Switzerland and Norway) reported that 90% or more of the open data available on the national portal is accompanied by licensing information. This year, Iceland responds that this is less than 10%.

²⁷² <https://gitlab.com/dataeuropa/mqa>

²⁷³ <https://data.norge.no/guidance/metadata>

²⁷⁴ https://data.norge.no/guide/veileder-apne-data# lisensiering_av_data

Similarly to 2021, all EFTA countries conduct regular activities to incentivise or assist data providers in the publication of machine-readable formats and high-quality metadata. This is usually in the form of regular webinars or weekly meetings.

DCAT-AP compliance

As in 2021, Norway and Switzerland offer documentation on DCAT-AP to the data providers on their national portal. Iceland currently does not consider it a priority because their website is new and they still need to get institutions involved to start the DCAT-AP documentation process.

Norway and Switzerland report that more than 90% of the metadata is DCAT-AP compliant and that more than 90% of the metadata uses recommended classes. Switzerland reports that between 51%-70% of the metadata uses optional classes, with Norway reporting between 31%-50%. Moreover, the two countries state that there is a national extension of the DCAT-AP standard in their country.

In Norway, the national open data portal team has expanded the portal scope to apply to more than open data.²⁷⁵

Both Norway and Switzerland have investigated the main causes for the lack of DCAT-AP compliance.

In Norway, the national open data portal does not allow registrations where mandatory classes are missing. For optional classes, metadata quality is measured and displayed for each individual dataset.

In Switzerland, lack of compliance is due to complex data catalogue structures from data publishers and its mapping to Postgres, the database management system. Here, even if they are DCAT-AP compliant, datasets get lost because of classes and properties that are not used on opendata.swiss.

In both countries, metadata has a reference to where it can be downloaded or accessed by its API. This is over 90% in Switzerland, and between 31%-50% in Norway. Norway and Switzerland both report that over 90% of meta datasets provide a reference to a web page where the data can be accessed.

Deployment quality and linked data

Norway and Switzerland have both implemented a model to assess the quality of data deployment. Norway uses the FAIR-principles²⁷⁶ and Switzerland uses the 5-star model. Moreover, the three EFTA countries conduct activities to promote and familiarise data providers with ways to ensure higher quality data.

All participating EFTA countries indicate that several of their datasets are available under a standard open license, or an explicit custom open license. In Switzerland, this is for more than 90% of the datasets, in Norway it is between 71%-90%, and less than 10% in Iceland. Over 90% of these datasets are available in a structured data format in all three countries. Moreover, Norway affirms that over 90% of their data is also published in an open and machine-readable format, uses URIs, and is linked to other renowned sources to provide additional context for the users. In Switzerland, between 51% and 70% is also published in an open and machine-readable format, between 10%-30% uses URIs, and less than 10% is linked to other renowned sources. Iceland reports that over 90% is in an open and machine-readable format, while less than 10% use URIs and are linked to other renowned sources.

Candidate countries and Bosnia and Herzegovina

Currency and completeness

All countries, with the exception of Bosnia and Herzegovina, have a pre-defined approach in place to ensure that the metadata of their national portal is kept up to date. 50%-69% of Ukraine's metadata

²⁷⁵ <https://data.norge.no/specification/dcat-ap-no/#Avvik-fra-EU-Standard>

²⁷⁶ <https://data.norge.no/guidance/metadata>

is obtained from sources automatically, rather than edited manually. The other 4 countries report that this is less than 30%. Moreover, 3 of the 5 countries state that the metadata is updated within a day. Montenegro updates metadata once a week, and in Bosnia and Herzegovina, it can take longer than a month.

All countries, with the exception of Bosnia and Herzegovina, report that the published data covers the full period from when it was published until the present day. In Ukraine, this is true for all datasets; in Serbia, for the majority of datasets; for Montenegro, it is approximately half of the datasets; and in Albania, just a few datasets.

Monitoring and measures

Montenegro, Serbia and Ukraine monitor the quality of metadata on their portals. For example, Ukraine uses a Business Intelligence tool to monitor metadata²⁷⁷ and is the only country to publish complementary information on the quality of available metadata.²⁷⁸ Z

Serbia and Ukraine publish guidelines and have tools in place to assist publishers in choosing an appropriate license for their datasets. Further, along with Bosnia and Herzegovina, they provide recommendations for the use of the CC licenses or one of their own licensing suites. Here, both Serbia and Ukraine report that over 90% of the open data available on the national portal is accompanied by licensing information. Furthermore, along with Montenegro, a range of 1-4 licenses are used on the portal.

All countries, with the exception of Bosnia and Herzegovina, indicate that there are regular activities conducted, or mechanisms in place, to incentivise and assist data providers in publishing data in a machine-readable format. Of these four countries, three – Montenegro, Serbia and Ukraine – state that they also do this for high-quality metadata.

DCAT-AP compliance

Ukraine is the only country reporting that they supply data providers with documentation on DCAT-AP.²⁷⁹ Together with Montenegro and Serbia, they report that over 90% of the metadata on their portal is DCAT-AP compliant. Of the three countries, Montenegro and Ukraine state that over 90% of the metadata on their portal uses DCAT-AP recommended classes and optional classes. No country has a national extension of the DCAT-AP standard. Ukraine is also the only country that investigates the most common causes for the lack of DCAT-AP compliance.

In Ukraine, there is poor support of DCAT-AP in data providers' software. For example, the open data portal of the Ukrainian parliament²⁸⁰ and a few local open data portals^{281,282} do not support DCAT-AP.

In Montenegro, Serbia, and Ukraine, over 90% of the meta datasets have a reference to where the data can be downloaded. Both Montenegro and Ukraine state that over 90% of these meta datasets also provide a reference to a webpage from where the data can be accessed.

Deployment quality and linked data

²⁷⁷ <https://data.gov.ua/pages/analitika>

²⁷⁸ <https://data.gov.ua/uploads/files/2021-10-11-151345.820104--2020.pdf>

²⁷⁹ <https://diiia.data.gov.ua/info-center/dcat>

²⁸⁰ <https://data.rada.gov.ua/>

²⁸¹ <http://odata.rada-poltava.gov.ua/>

²⁸² <https://od.kr.gov.ua/>

Montenegro²⁸³ and Ukraine²⁸⁴ both use a 5-star model to assess the quality of data deployment in their country. They, along with Serbia, conduct regular activities to promote and familiarise data providers to ensure higher quality data. This is done in several ways: by using the 5-star model, by sharing standards for quality datasets, or through programmes provided by public organisations²⁸⁵.

Montenegro, Serbia, and Ukraine indicate that over 90% of the datasets are made available under a standard open licence, or an explicit custom open licence. In Montenegro, over 90% of datasets are available in a structured data format, in an open and machine-readable format, and consistently use URIs.

Serbia and Ukraine monitor the improvements on their portal in terms of open data quality deployment. One example in Serbia is through a dashboard^{286,287}.

5.5 Overall performance

5.5.1 EFTA countries

In Figure , the scores of the EFTA countries are shown per open data maturity dimension. Norway outperforms the other EFTA countries on all dimensions. This is especially the case in terms of Norway's maturity when it comes to their open data portal and the quality of their open data: on both dimensions Norway's score is higher than 90%. Similar to last year, Switzerland's most mature dimension is quality, while they are falling behind in impact compared to the other dimensions. Iceland has most room for improvement among the participating EFTA countries. The scores for open data impact and open data quality in Iceland lie (far) below 50%.

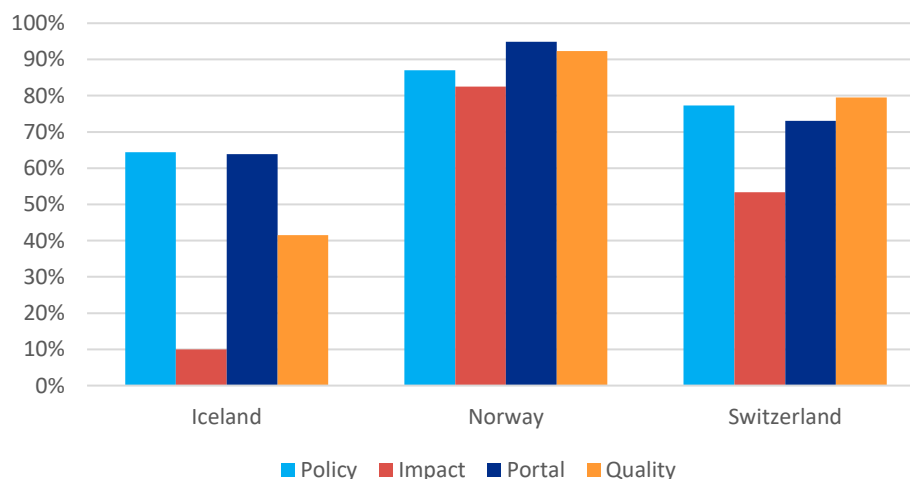


Figure 45: Score per dimension for EFTA countries

²⁸³ <https://5stardata.info/hr/>

²⁸⁴ <https://data.gov.ua/dataset/1c7f3815-3259-45e0-bdf1-64dca07ddc10>

²⁸⁵ <https://pdp.nacs.gov.ua/courses/vidkryti-dani-dlia-derzhsluzhbovtziv-praktychnyi-kurs>

²⁸⁶ <https://app.powerbi.com/view?r=eyJrIjoibWZlZGRmMTUtYWNmYi00ODFkNTkzZGY3ZjllZjA0YjYiwiwidCI6ImU5ODY5ZDIjLTVmMTYtNDE1Ni04OWIwLWQ1MTYzMGZmNzAwMCIsmMiOjI9&embedImagePlaceholder=true&pageName=ReportSection4f901c371aea6dfb859>

²⁸⁷ <https://app.powerbi.com/view?r=eyJrIjoibWZlZGRmMTUtYWNmYi00ODFkNTkzZGY3ZjllZjA0YjYiwiwidCI6ImU5ODY5ZDIjLTVmMTYtNDE1Ni04OWIwLWQ1MTYzMGZmNzAwMCIsmMiOjI9&embedImagePlaceholder=true&pageName=ReportSection>

Figure 46 shows the trends in the EFTA countries' open data maturity (ODM) scores between 2020 and 2022. Iceland did not participate in the 2020 edition and its score declined by 15% between 2021 and 2022. This decline can mainly be attributed to the poor score on the impact dimension, a 39% decrease compared to last year. Norway saw an impressive step upwards from 2020 to 2021 but experienced a small step back this year. However, a score of 89% still puts Norway in the European top ten. Switzerland has shown steady improvement, with an 8% jump between 2020 and 2021 and a further 6% improvement between 2021 and 2022, contributing to the 71% overall score.

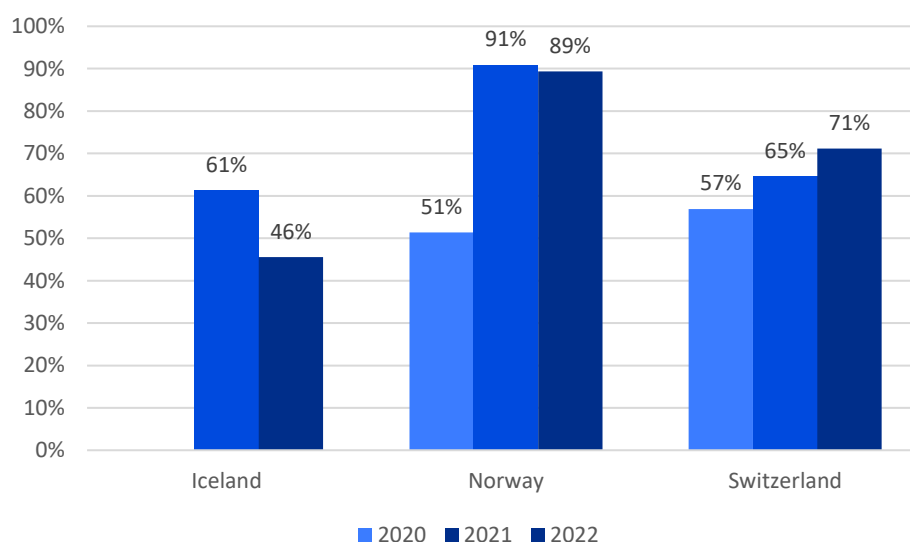


Figure 46: Open data maturity score of the EFTA countries between 2020-2022

5.5.2 Candidate countries and Bosnia and Herzegovina

In 2022, four candidate countries and Bosnia and Herzegovina were also part of the ODM evaluation. Figure shows how the five countries score on the different ODM dimensions. Ukraine stands out with scores above 90% for all subdimensions. Moreover, Ukraine scored 100% for both policy and impact. Serbia is the second best of the candidate countries and scores above 50% for all indicators. Montenegro only scores above 50% for open data policy and open data quality. Albania and Bosnia and Herzegovina struggle to create impact with open data and to provide open data of sufficient quality for reuse.

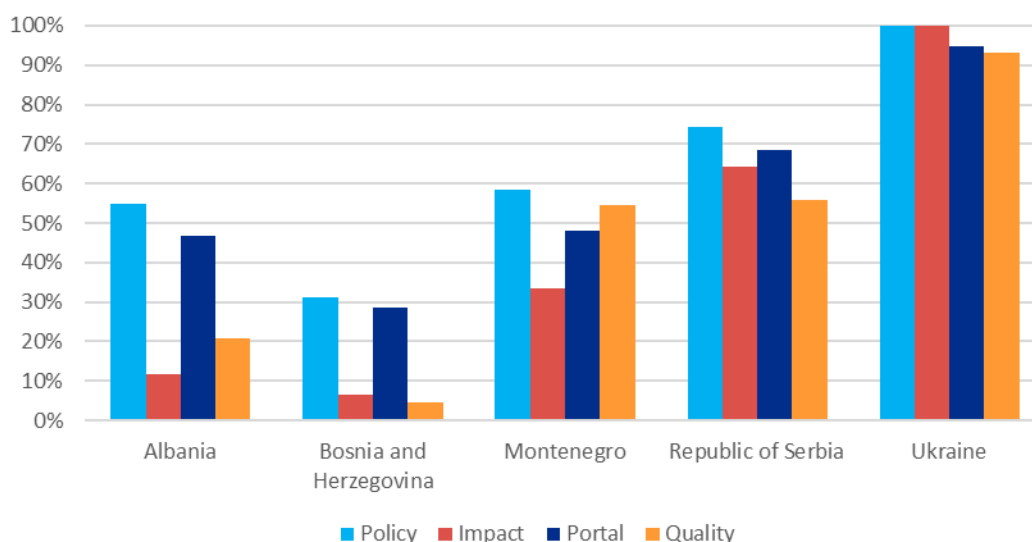


Figure 47: Score per dimension for candidate countries and Bosnia and Herzegovina

2022 was the first year in which Bosnia and Herzegovina participated in the open data maturity assessment, whereas all other countries had participated in at least one previous edition. Montenegro and Ukraine participated in last year's edition. Figure shows the overall open data maturity score of both 2021 and 2022. Ukraine improved by 3% from 94% to 97% and was the Europe's number two in this year's ODM evaluation. Serbia comes second of the candidate countries at 66%, followed by Montenegro at 49%. Albania and Bosnia and Herzegovina obtained the lowest scores with respectively 34% and 18%. The two countries are also the two lowest-ranking countries in the overall 2022 ODM evaluation.

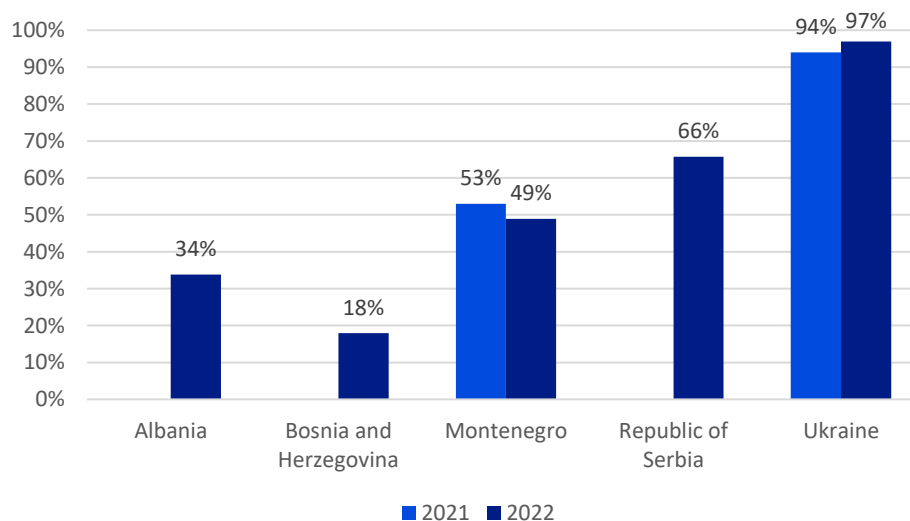


Figure 48: Open data maturity score of candidate countries and Bosnia and Herzegovina in 2021 and 2022

Chapter 6: Clustering the Countries

As part of the benchmarking exercise, all participating countries are grouped into four clusters based on the 2022 Open Data Maturity assessment. Clustering the countries based on their level of maturity helps to identify affinities between their progress and challenges. Countries in the same cluster can share and discuss strategies on how to overcome the challenges they are facing, while those in lower clusters can learn from the countries in more mature clusters. Clustering also enables us to provide more focused advice for each of the clusters.

From the lowest to the highest performing, these clusters are named: beginners, followers, fast-trackers, and trend-setters. Most countries are in the followers cluster.

6.1 Clustering profiles

The indicative profiles that exemplify the level of maturity one may expect from the countries according to the cluster they belong to are specified below. The clustering profiles have not changed in recent years.

Note that the names of the clusters are an exemplification and do not intend to generalise nor to represent literally the achievements and history of open data developments in the respective countries. For example, you may find countries in the beginners cluster that have been investing in open data for years, though with less significant results emerging from the survey than others.

Trend-setters	The country has an advanced open data policy in place with strong coordination of open data activities throughout at all levels of government. The national portal provides a wide range of features and caters for the needs of advanced users and publishers. The level of quality of open data in the country is very good, with various initiatives in place to ensure the publication of high-quality data and compliance with DCAT-AP. There are different open data ecosystems developed around data domains, with a high level of interaction and reuse within these domains. Activities to measure reuse are conducted, with methodologies in place to assess the impact in different domains. Little to no limitations to publication or reuse are observable.
Fast-trackers	The country shows a good level of maturity against all dimensions. Overall, the country showcases activities to boost data publication, with a strategic approach to increase the quality of published data and a high level of compliance with standards is achieved. The national portal provides a good level of functionalities to cover the needs of advanced and basic users. Limited efforts are made to monitor the impact of open data. However, a stronger focus is given to tracking and boosting reuse. Some issues can still be observed, but measures are in place to tackle them.
Followers	The country already has an open data policy in place and is conducting activities to ensure a fair level of coordination of open data activities. The portal showcases standard features, but also a limited number of features that cater for the needs of more advanced users. There are a few activities conducted to boost the publication of high-quality data from different providers, however, there is no systematic approach to ensure a higher quality of publication across the board. Only very limited activities to monitor reuse and measure the impact of open data are performed. A fair number of limitations in terms of data publication and reuse still exist.

Beginners

The country shows an early stage of maturity on the four dimensions or – alternatively – was not able to develop at the same pace as the countries in other, better performing clusters. Progress is more prominent in the open data policy dimension. There is no open data portal or, if existent, the portal showcases limited features or a limited number of datasets, compared to the country's potential. None or very limited activities are performed to monitor the reuse of open data in the country and no monitoring is done to assess impact. In terms of data quality, the country is taking little action to enable the publication of data in higher quality, and little effort is spent on ensuring the adoption of DCAT-AP. Visible limitations in terms of open data publication exist, with limited reuse examples.

6.2 The 2022 clustering

In order to cluster the countries, the scores are plotted from low to high and groups are defined where a significant gap in the overall scores is found. Interestingly, compared to the 2021 assessment, all cluster intervals shifted downwards on the scale, meaning that a lower score is needed to belong to a certain cluster. The results of the clustering can be found in Figure 49.

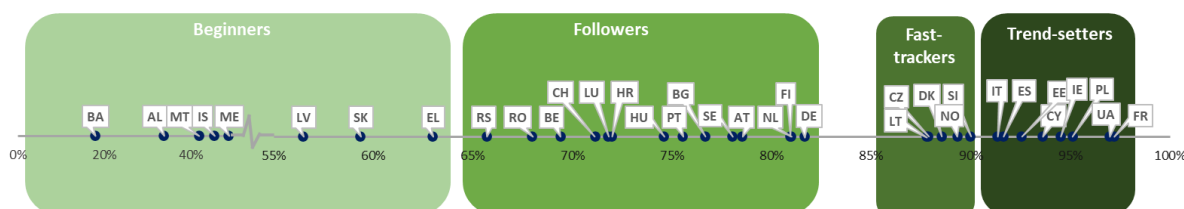


Figure 49: Clustering of the 2022 maturity score of the participating European countries

The results, including the cut-off points of the clusters, are listed below. Countries marked with an asterisk (*) are not part of the EU27.

- **Trend-setters (91%-97%):** Cyprus, Estonia, Spain, France, Ireland, Italy, Poland, Ukraine*
- **Fast-trackers (87%-90%):** Czech Republic, Denmark, Lithuania, Slovenia, Norway*
- **Followers (66%-82%):** Austria, Belgium, Bulgaria, Croatia, Finland, Germany, Hungary, Luxembourg, the Netherlands, Portugal, Romania, Sweden, Switzerland*, Serbia*
- **Beginners (18%-63%):** Greece, Latvia, Malta, Slovakia, Iceland, Albania*, Bosnia and Herzegovina*, Montenegro*

Open data trend-setters

The trend-setters cluster consists of 8 countries with an overall maturity score of 91% or higher. The interval of the trend-setter cluster shifted 3 percentage points downwards in 2022, as the scores in 2022 ranged between 91%-97%, while in 2021 the scores ranged between 94%-98%. This decrease in scores can be attributed to the update of the methodology that made it more challenging for countries to achieve high maturity scores.

As it did in 2021, France recorded the highest maturity level in 2022 with a score of 97% (98% in 2021). Despite the current war, Ukraine reported a high-quality self-assessment, which allowed them to improve their overall score from 94% to 97%. Italy and Cyprus were part of the fast-trackers cluster

last year and took the final step towards the trend-setters this year. The remaining 4 countries (Poland, Ireland, Estonia and Spain) were already part of the trend-setters and scored between 92% and 95% in the 2022 evaluation.

Open data fast-trackers

In 2022, the fast-trackers cluster consists of 5 countries who have an overall maturity score between 87%-90%. This is a small decrease compared to last year when the interval of the fast-trackers was still 89%-92%. The number of countries in the fast-trackers cluster declined from 9 countries in 2021 to 5 countries in 2022, although we should reiterate that two from last year have moved up a cluster.

The fast-trackers countries' maturity scores are close to each other. In 2022, 4 out of the 5 fast-trackers' scores fall within a range of 1,7%. The fast-trackers cluster consists of Slovenia scoring 90%, Norway and Denmark scoring 89%, and the Czech Republic and Lithuania scoring 88%. The Czech Republic improved substantially by 14% and has stepped up from the followers cluster last year. While Italy and Cyprus moved up to the trend-setters cluster, Austria (79%), the Netherlands (81%) and Germany (82%) moved down to the followers cluster.

Open data followers

The followers cluster is the most numerous cluster in the 2022 report and consists of 14 countries, with overall maturity scores ranging between 66%-82%. Similar to the trend-setters and the fast-trackers, this cluster declined slightly compared to last year as a result of the new methodology. The followers-interval in 2021 was between 74%-86%, showing that both the lower and the upper boundaries decreased. The number of countries in the followers cluster grew substantially from 8 to 14.

Five of the countries – Belgium (69%), Hungary (75%), Luxembourg (72%), Portugal (76%) and Switzerland (71%) – moved up from beginners to followers compared to last year. Hungary stood at 58% last year, showing impressive growth of 17%. Serbia (66%) did not participate in last year's edition and is also part of the followers cluster. The countries remaining in the cluster from last year were: Finland (81%), Sweden (78%), Croatia (72%), Bulgaria (77%) and Romania (68%).

Open data beginners

The beginners cluster consists of 8 countries with an overall maturity score below 64%. This threshold is 2% lower than for last year's beginners cluster. In summary, this means that, for all clusters, the lower and upper boundaries have shifted downwards as a consequence of the updated methodology. Ranked from the highest to lowest scores, countries in the beginners cluster are: Greece (63%), Slovakia (59%), Latvia (56%), Montenegro (49%), Iceland (46%), Malta (42%), Albania (34%), and Bosnia and Herzegovina (18%). Slovakia improved by 9% and if they were to continue this trend could become part of the followers next year. Latvia and Greece moved down from the followers to the beginners cluster. Albania and Bosnia and Herzegovina did not participate in last year's assessment and entered this year in the beginners cluster.

6.3 Differences between clusters

Figure 50 shows the average score per open data dimension for each of the four clusters. The trend-setters cluster has the highest average score for the policy, impact and portal dimension, but the data quality is on average slightly better for fast-trackers (86% vs 88%). The difference between the trend-setters and the beginners is smallest for the policy dimension, which shows that the beginners already have policies in place that can help them improve in future editions. The largest difference between the trend-setters and the beginners can be observed at the impact dimension. The trend-setters score

97% on average, whereas the beginners only score 20%. This shows that the impact dimension is the main differentiator between the beginners (and to a lesser extent the followers) and the trend-setters.

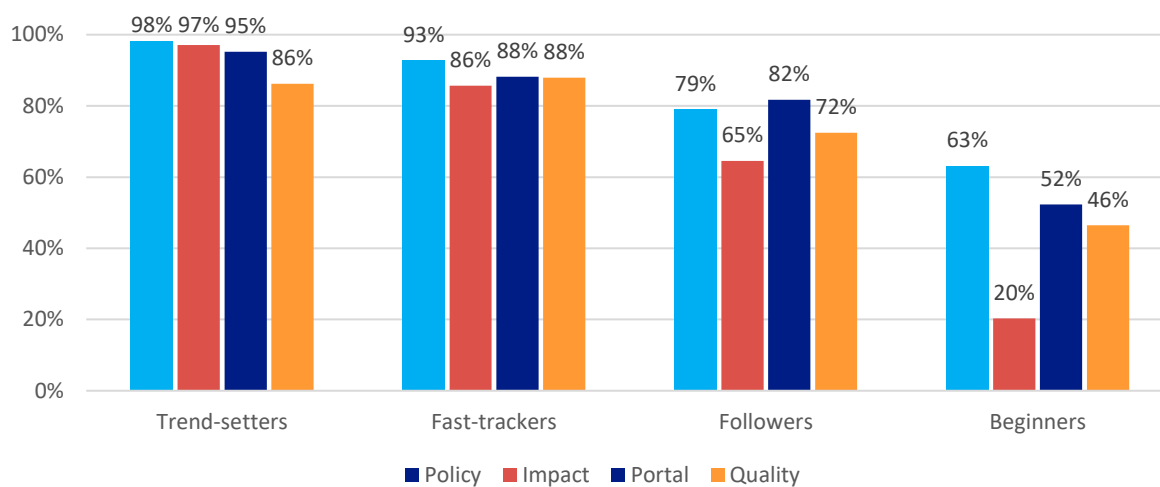


Figure 50: Average scores per open data dimension for each of the four clusters

Chapter 7: Recommendations for the Countries

The researchers' recommendations for the countries, by cluster, are collected in this section. These have not changed substantially from the previous year, as the clusters' profile have not changed, and the trends observed last year were mostly confirmed.

7.1 Trend-setters

Maintain the ecosystem, experiment, and share the knowledge

1. Enhance and consolidate the open data ecosystems you support by developing thematic communities of providers and reusers. Continue to prioritise the categories specified for the high-value datasets in the Open Data Directive. Learning from the experience developed during the COVID-19 pandemic, continue investing into online channels and tools that enable continuing the exchange of knowledge and experience, such as periodic videoconference meetings, wikis on topics of interest, etc. Online channels are not just more environmentally sustainable but also have the benefit of being accessible to a more diverse audience, e.g., the ones who cannot afford the time or cost of travelling.
2. Steer the network of open data officers to enable data-driven policymaking at their level of government, delegating and decentralising monitoring activities. Keep consistent the connection between the national strategy and objectives and the needs of the agencies and local authorities that will gain prominence over time.
3. Define and/or develop a strategy to ensure the sustainability of the national and local open data portal infrastructure. Experiment with alternative funding models beyond state funding, e.g., pay for value-added services on the portal. Share the outcome of your experimentation with the other countries.
4. Collaborate with other national data teams, universities, and research institutions, and data.europa.eu to develop an experimental impact assessment framework. Also, start developing country-specific metrics to measure impact. Consider options to assess both open data and data altruism initiatives. Operationalise monitoring the metrics and assessing impact. Rely on a mix of methods (e.g., ex-ante and ex-post analyses, structured/semi-structured interviews, use cases, log analyses from the national portal, etc.) to ensure a variety of insights. Improve the method iteratively over time.
5. Continue to conduct research to assess the economic impact of open data, at both micro and macro levels.²⁸⁸ Iterate annually or biannually to observe change and refine activities and goals. Leverage the momentum created by showcasing the results and rally stronger political support.
6. Harness the wisdom of the crowd by enabling the broader open data community to contribute more to the national open data programmes. Enable reusers to upload their own data and showcase their ideas and creations on the national portal. Enable users to comment on and rate datasets and embed their feedback and ratings in the search algorithms. Enable publishers to improve their data publication, based on reusers' feedback and ratings.

²⁸⁸ For example, by following the methodology of data.europa.eu's report 'Economic Impact of Open Data: Opportunities for value creation in Europe' (2020). Available at <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

7. Continue the work on improving the quality of both metadata and data by boosting the use of tools on your portal (e.g., for the validation of metadata). Enable automated notifications to publishers to alert them of issues. Provide tools to enable data conversion into alternative formats, possibly replacing non-machine-readable, proprietary formats. Invest in the portal to use new workflows and tools that enable the best understanding of your reusers' profiles and needs, while preserving their privacy.
8. Prepare for the Data Governance Act (DGA) by evaluating options to extend the portals to take the role of public register of data-altruism organisations, or – alternatively – advise your governments as to which formula would best support the new initiatives. The assessment covered in this report focused on the implementation of the Open Data and Public Sector Information, with special attention to the adoption of high-value datasets. However, other EU legislation, such as the DGA and Data Act, still have a heavy impact on European countries. This is especially true for the DGA as it needs to be implemented across all Member States by September 2023. Moreover, by preparing for the DGA, European countries can continue their effort to improve the visibility of public data resources on the portals. Particularly with regards to real-time data, link to a variety of sources and evaluate means of incentivising custodians of real-time data to publish beyond the minimum legislative requirements.
9. Work with training institutions on providing advanced open data courses and training and tailor training curricula to involve more advanced topics. Make such courses formally recognised and provide certification upon successful completion.
10. Share your knowledge and the results of your experimentation with other countries and enable them to learn from your best practices and contribute to your research, e.g., in shared areas of focus, or where you experience similar barriers. Reach out and cooperate with other countries on developing solutions to common challenges, including basic, reusable elements such as open source software that your platforms share (e.g., portal extensions).

7.2 Fast-trackers

Graduate from traction to impact

1. Assist the development of open data initiatives at local and regional level and coordinate more with the local and regional open data teams. Learning from the experience developed during the COVID-19 pandemic, invest in online channels and tools that enable the exchange of knowledge and experience to be continued, such as periodic videoconference meetings, and wikis on topics of interest etc.
2. Activate the network of open data officers and enable them to set up monitoring activities within their organisation (e.g., develop plans for data publication and monitor charging practice). Track progress against these plans and assist open data officers to alleviate barriers to data publication identified in their organisations.
3. Ensure that existing open data courses and training materials are promoted and used. Cooperate with training organisations to develop new course offerings tailored to the needs of your national, regional and local administrations. Make such courses formally recognised and provide certification upon successful completion. Ensure financial resources are allocated at all administrative levels to enable more civil servants to benefit from training.

4. Focus on organising activities that better target the delivery of sustainable solutions. Move beyond creativity-stimulating formats (e.g., hackathons) to formats that enable business opportunities for medium- to long-term engagement (e.g. data challenges). Ensure funding and political sponsorship (e.g., an organisation as 'patron') for winning ideas.
5. Promote and follow-up on the performance of products and services built on open data. Develop strategic awareness of reuse and impact. Focus resources on a relevant field or sector, to start demonstrating impact, and use the high-value datasets for prioritisation. Set up thematic work groups in these areas. Create a framework for knowledge exchange and enable the development of a community of practice between providers and reusers. Increase your knowledge on the publication and reuse of data in that domain and start thinking of a definition of impact in that field that can be operationalised into metrics.
6. As the Open Data Directive is implemented in your country, adapt the national portal to give clear visibility of the datasets. Update the portal to better engage your audience. Include features that enable online interaction between data publishers and reusers. Showcase reuse examples prominently on the national portal and promote the datasets used to develop those use cases. Consider the opportunity to promote the developers as well.
7. Monitor access and usage of the portal and enhance knowledge in your team around the profiles of your portal's typical users. Ensure the reusers' privacy in doing web analytics and be explicit with them about how that insight will be used. Enable such insights to flow into improving the portal features, the access to data and improving the variety of data published in your country.
8. Address any requirements of the implementation of the Open Data Directive in your country that are not yet addressed or lag behind feature-wise, by revising and enhancing the portal's support for real-time data sources. Identify the main real-time data holders and promote the publication of their data beyond the minimum requirements specified by law. Understand the concerns and costs of publication and work together with publishers to enable the data publication process. Became aware of the requirements of the new DGA and start exploring options to address them.
9. Think of ways to ensure the portal's sustainability by enabling more contributions from the open data community (e.g., submitted datasets, developed use cases, news and blog items written by the community), by providing value-added features, and by exploring additional funding options.
10. Enforce minimum standards to the quality of metadata and data by using analytics tools to monitor data publication – at both metadata (compliance with the DCAT-AP schema) and data (formats of publication) level. Develop validation schemas for your national portal and report back to data providers. Act on the findings and provide tailored assistance to publishers to increase the quality of publication, in terms of both metadata and data.

7.3 Followers

Strengthen governance, boost engagement

1. Update the national strategy for open data to reflect technical and policy developments at EU level. In particular, address the requirements of the latest Open Data Directive by identifying high-priority domains and high-value datasets for publication, through APIs and free whenever possible. Support publication through legislation where suitable.

2. Set up a governance structure that accounts for the characteristics of your country. Engage potential reuse groups (e.g., data companies, research institutions, NGOs) in the open data governance in your country. This will enable a co-ownership around a common vision and buy-in on the actions for each sector.
3. Develop a yearly plan for online activities (e.g., events, conferences...) to promote open data. Focus on formats that promote publication as well as reuse by both public and private sector. Experiment with formats that both leverage creativity (e.g., hackathons) and enable the development of business opportunities on medium- to long-term engagements (e.g., data challenges). Ensure funding and political sponsorship for the winning ideas. Promote and follow up on the performance of developed products and/or services.
4. Analyse user behaviour on the data portal(s) responsibly, ensuring their privacy and being explicit about how that insight will be used. Identify communities of reusers and conduct awareness-raising activities around open data within these groups (e.g., universities, data start-ups and data companies, research institutes, NGOs, journalists).
5. Encourage the network of open data liaison officers to set up data publication plans and monitor progress against these plans. Enable the open data officers to monitor charging practices within their organisation and exchange within the network on practices to alleviate such barriers. Deepen the understanding within the network of open data officers of the benefits of open data reuse by the public sector.
6. Ensure that pre-existing open data courses and training materials are used and cooperate with public administrations and training organisations to develop open data training curricula for national, regional and local administrations. Enable such courses to be formally recognised and provide certification upon completion. Ensure financial resources are allocated at all administrative levels to training activities for civil servants working with data.
7. Enable meet-ups and engagement between reusers and publishers. Develop a deeper understanding of open data demand side and work together with data publishers to prioritise data publication in line with this demand. Focus on fostering open data reuse by both public and private sector and encourage the community to share their reuse cases. Promote these open data use cases more prominently on the national portal, ideally in a section directly accessible from the homepage.
8. As the implementation of the Open Data Directive gets close to completion in your country, adapt the national portal to give clear visibility of the datasets. Conduct regular updates to the portal to reflect the users' needs. Include features such as feedback and interaction mechanisms at dataset level, designated login areas for users, access via SPARQL query or/and API in general. Consider integrating data visualisation and analytics tools to allow portal visitors to gain insights from data via interactive charts and other visualisation tools. Monitor access and usage of the portal. Draw insights from this data and enhance awareness around it within your team. Became aware of the requirements of the new DGA.
9. Increase understanding of the variety of data that your portal features (historical vs. current data) and work towards improving it. Identify data holders that do not publish their data or do not reach

their full potential, understand what friction they are experiencing and plan to address it. Think of the future and on enabling publication of real-time data in your country.

10. Provide training and online materials that focus on metadata and data quality. Promote the DCAT-AP standard and existing guidelines to foster compliance. Create understanding around the importance of publishing data in machine-readable, non-proprietary formats as well as regarding the licensing of data. Develop knowledge around existing open source tools to clean up data and validators for metadata compliance.

7.4 Beginners

Think big, act small

1. Develop a national strategy for open data and align it with broader strategies at national level (e.g., digital strategies, strategies for the modernisation of public sector etc.)
2. Rally support to the open data programme and political leadership from top level of government. Showcase international research around the value of open data, to emphasise economic benefits of data exploitation.²⁸⁹
3. Set up a team at national level in charge of open data to ensure coordination of activities within the country and set up 'road-shows' to promote the team's scope and activities with the main public administrations. Include all levels of government in this process.
4. Organise a series of open data events at national level and focus on engaging both data publishers and reusers in your country. Prioritise the promotion of data publication best practices and reuse cases during such events.
5. Set up relevant communication channels and contact persons for data publication within public administrations (e.g., open data liaison officers). Maintain an active dialogue with the officers and enable regular exchange of knowledge amongst them, focusing on efficient online channels and face-to-face meetings.
6. Identify the main data holders in the country and understand the main concerns and barriers to data publication. Take the first steps to overturn these barriers and unlock the publication of data.
7. Organise workshops and awareness-raising sessions with the main data holders. Use materials already developed in other countries and at European level for content and as a source of inspiration.
8. Develop guidelines to enable publication of data, of its metadata and the take-up of suitable licensing conditions. If standard licences are not suitable, as a last resort evaluate developing a custom national licence. Learn from European best practices and reach out to colleagues in other countries when setting out to develop such guidelines. Raise awareness amongst the main data publishers around the importance of metadata and promote the DCAT-AP standard, specifications, and existing guidelines developed at European level.

²⁸⁹ For example, by following the methodology of data.europa.eu's report "Economic Impact of Open Data: Opportunities for value creation in Europe" (2020). Available at <https://data.europa.eu/sites/default/files/the-economic-impact-of-open-data.pdf>

9. Make sure you run and maintain a modern portal that enables publication and discoverability of open data. Scout for European best practices and compare solutions to choose the most adequate to support your scope and mission. Set up dedicated news and blog sections to promote relevant developments and to showcase reuse. Ensure feedback channels are seamlessly integrated into the national portal. Be aware of users' rights and privacy as you perform web analytics, and choose your technology carefully, particularly following the invalidation of the EU-U.S. Privacy Shield.
10. Ensure that the national open data strategy guarantees scoping, management, and funding of the portal. Use action plans with actions and responsible entities or persons to ensure the strategy can be carried out. Ensure that sufficient resources are allocated to open data awareness-raising activities with both publishers and potential reusers.

Conclusions

This report offers an extensive view into the 2022 edition of data.europa.eu's annual Open Data Maturity benchmarking exercise. It provides insight into the developments in the open data field in European countries, including the 27 EU Member States, participating EFTA countries Iceland, Norway, and Switzerland, participating EU Candidate countries Albania, Montenegro, Serbia and Ukraine, and additionally Bosnia and Herzegovina, which submitted its application to join the EU in 2016 but has yet to have its candidate status recognised.

The assessment measured open data maturity against four dimensions: policy, impact, portal, and quality. Maturity was scored against these dimensions, forming an overall open data maturity score for each country. The countries were clustered into four groups, from the most mature to the least: trend-setters, fast-trackers, followers, and beginners. For each, recommendations tailored to the level of maturity and characteristics of the clusters have been provided. By doing so, the report provides policymakers and national open data teams with actionable guidance to continue their development in the field of open data, in turn, enabling the creation of meaningful and sustainable benefits for the citizens of their countries.

As stated, the Member States refer to the Open Data Directive for their open data policies, which aims, among other things, to reap the full potential of open data reuse. In this regard, the Open Data Directive requires the adoption, via a Commission's implementing regulation, of a list of high-value datasets. The first draft of the implementing regulation underwent a public consultation between May and June 2022. Following this, the draft was submitted for opinion to the Open Data Committee, which is composed of Member States' representatives. In view of the future adoption – expected in late 2022 or early 2023, with its obligations beginning to apply 16 months later – this landscaping exercise only gives an overview of the level of preparedness of Member States to implement the upcoming regulation's requirements.

As indicated in last year's report, a revision of the methodology was needed to further challenge European countries in their open data maturity level and keep pace with policy changes in the field. This year, all four dimensions and related questions were reviewed. For policy, portal, and quality, no major restructuring took place, but questions were streamlined to better include regional and local realities and specific types of open data, in line with the upcoming publication of the high-value datasets implementing regulation. A major re-structuring was instead applied to the impact chapter with the aim of better acknowledging the challenge countries face when assessing open data impact and distinguish between measuring the reuse of open data and the impact creation through this reuse.

While the portal and quality dimension stayed the same, both policy and impact experienced a decrease compared to last year. The average EU score for the policy dimension only dropped by one percentage point, from 87% to 86%. This can be easily explained in light of the methodology update and the change of content or scope of some questions. Not surprisingly, the impact dimension experienced the largest decrease compared to the other dimensions, going from 78% in 2021 to 71% in 2022. This seven percentage points drop is in line with the major re-structuring of the dimension and its indicators, which makes it difficult to perfectly compare this year's performance with the one of 2021. Moreover, this impact result does not represent so much a decrease in maturity level, but rather provides a more accurate picture of the difficulty in assessing the impact resulting from measuring open data reuse, as aimed by the methodological update.

The centrality of COVID-19 as a challenge has decreased. From year to year, EU Member States have been recovering from the pandemic, also by leveraging open data for the development of statistics,

dashboards, and warning apps. This year, the Russian aggression of Ukraine and the consequences of this conflict on the European economy and energy market set the scene for new challenges, but also opportunities to use open data for the common good. While in Ukraine the war with Russia has a significant impact on the open data sphere and the implementation of strategies and plans for its development, in some EU Member States open data could already be leveraged to support the integration of Ukrainian refugees and citizens.

Besides the war in Ukraine, common challenges experienced by countries in Europe relate to the lack of human resources allocated to open data and their skills; the scarcity of financial tools; coordination issues across levels of government; as well as the difficulty of incentivising the broader community to make use of open data. While some of these challenges are already being addressed by countries and related recommendations can be found in the previous section, it is clear that a cross-border exchange of experience and knowledge among European countries could only benefit the resolution of these common issues.

Looking ahead, the new methodology will aim to stimulate the EU Member States to continue to improve and grow beyond the current performance, especially when it comes to assessing open data impact, another common challenge in Europe. Moreover, given the upcoming adoption of the implementing regulation (in late 2022 or early 2023, with its obligations beginning to apply 16 months later), the assessment shall also help countries to monitor, no longer their preparedness to implement, but their compliance with the requirements of the Open Data Directive.

This report, the numerous best practices from the countries, as well as the publication of the completed questionnaires and final results aim to inspire the national open data teams, as well as anybody fostering open data availability and reuse. Cross-border collaboration will be stimulated ever further throughout 2023, enabling the open data community to learn from each other, and to spark new initiatives. This is of pivotal importance to reach the full potential of open data in Europe.

