Open Data Maturity
Report 2020

This study has been prepared by Capgemini Invent as part of the European Data Portal. The European Data Portal is an initiative of the European Commission, implemented with the support of a consortium led by Capgemini Invent, including Intrasoft International, Fraunhofer Fokus, con.terra, Sogeti, 52North, Time.Lex, the Lisbon Council, and the University of Southampton. The Publications Office of the European Union is responsible for contract management of the European Data Portal.

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Executive Summary

The open data maturity assessment is the European Data Portal's annual benchmark study on the development in the field of open data in Europe. This report is the sixth in the series that started in 2015 and assesses the level of open data maturity in the European Union's Member States (EU27) and the European Free Trade Association (EFTA) countries Liechtenstein, Norway, and Switzerland. For the first time in 2020, the process opened the participation to the "Eastern Partnership" countries (EaP: Azerbaijan, Georgia, Moldova, and Ukraine), as well as the United Kingdom (UK) following the withdrawal of the country from the Union. The assessment measures maturity against four dimensions of open data: policy, impact, portal, and quality.

2020 Trends

The 2020 assessment identified the following trends:

1. Peak performance: the COVID-19 pandemic emphasised the genuine need for data

Europe is well on track towards achieving the goals set at European level regarding open data and making it available so citizens can re-use it. This year, the European countries show a great increase in their maturity levels (see figure 1). The scores have increased across all dimensions compared to last year. A concentration of countries in the higher end of the results spectrum is also clear. 2020 also brought about a renewed emphasis on the importance of systematically collecting and making data available to the public due to the COVID-19 pandemic. The need to responding to the emergency led many countries to start publishing related data and developing initiatives and dashboards to make the data more easily understandable and insightful.

2. From quantity to quality: ensuring interoperability

As the open data propositions of the European countries mature, their focus has moved from the *quantity* of data made available to ensuring its *quality*, too. Moreover, quality is not seen in isolation, but as an enabler to interoperability: the ability to collaborate within the countries and across borders by making it easier for computer systems to exchange data. The intensified focus enables re-users to extract the value of the data and create new products and services and realise their benefits.

3. From publishing to creating impact: the next frontier is to systematically measure impact

Generating positive impact on society and the economy by publishing open data has always been the ultimate objective of the wide multi-year effort across Europe. Measuring impact is a complex task and there still is no shared understanding of how to do it best. Many European countries are successfully performing activities to understand and capture the extent to which open data is re-used and how value is created, by engaging with communities of re-users. The European Commission plans to build on that, by developing a shared impact framework over the upcoming years.
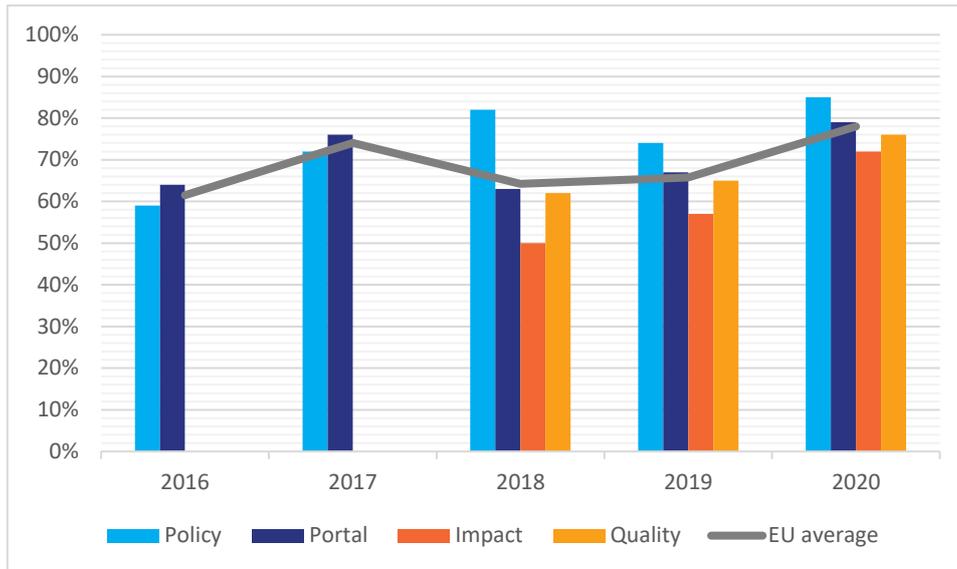
Figure 1: The Open Data Maturity scores of the European countries (used to be EU28)

Overall open data maturity scores 2020

The overall open data maturity scores of the 2020 assessment are presented in figure 2.

- European countries are becoming more mature across the board. Countries' maturity score is more concentrated in the higher end of the results spectrum.
- The average open data maturity score of the EU27 countries is 78%, an increase of 12 percentage points compared to 2019.
- Denmark for the first time is ranking first in this year's assessment. While Ireland, Spain, and France retain from last year their trend-setter position, the group is extended to Estonia, Poland, and Austria.
- The great majority (18) of the EU27 Member States score above the EU27 average.
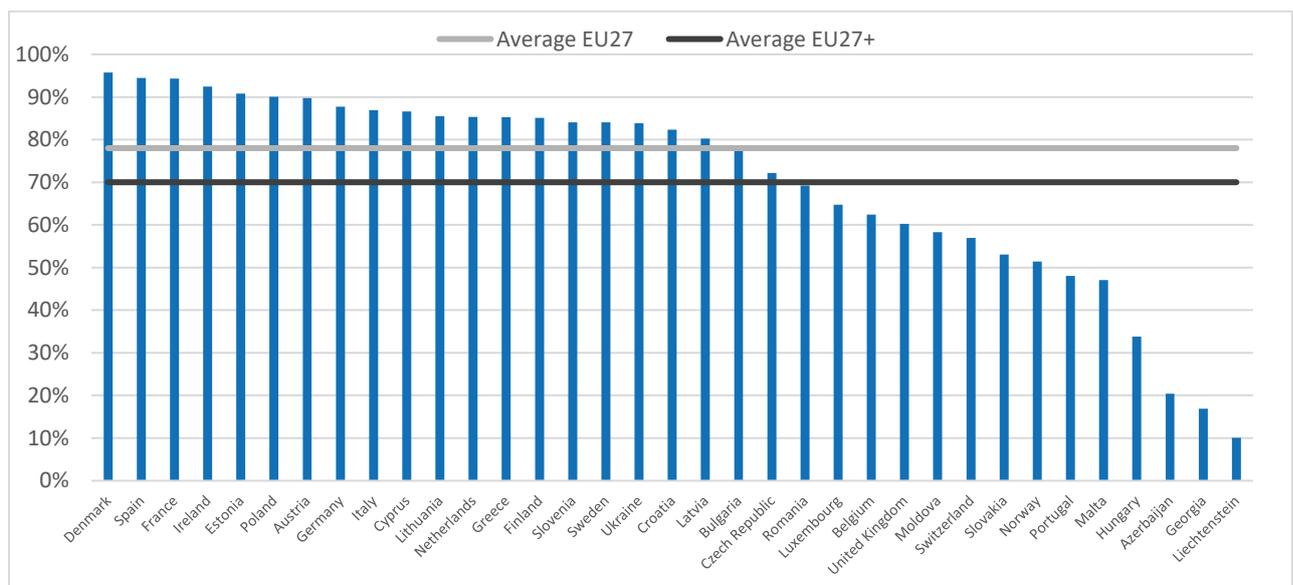
Figure 2: The overall open data maturity scores of the 2020 assessment

Clustering open data maturity scores 2020

The open data maturity clusters are presented in figure 3. The 2020 clustering exercise uses the same grouping criteria of last year and categorises countries – from high performing to low performing – as trend-setters, fast-trackers, followers, and beginners[1].

- This year, the European countries show a great increase in their maturity levels, resulting in a concentration of countries in the higher end of the results spectrum.
- The trend-setter cluster consists of 7 countries: While Ireland, Spain, and France retain their trend-setter position, the group is extended with Denmark, Estonia, Poland, and Austria.
- The fast-tracker group consists of 13 countries and is the largest group of the four clusters.
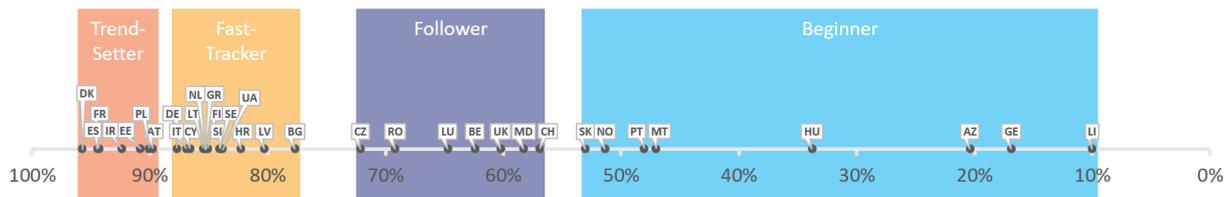
Figure 3: Clustering of participating countries

Open data maturity scores on the four dimensions in 2020

The EU27 average maturity level on each of the four dimensions are presented in figure 4.

- Policy is the most mature open data dimension with an average score of 85%.
- The national portals are getting more advanced with an average maturity of 79%.
- The average score of 76% on quality shows that there have been great improvements in ensuring quality of data and metadata.
- Impact is the least mature open data dimension with an average score of 72%. This reiterates the need for a strategic approach to monitor and measure the re-use of open data and the impact it generates.
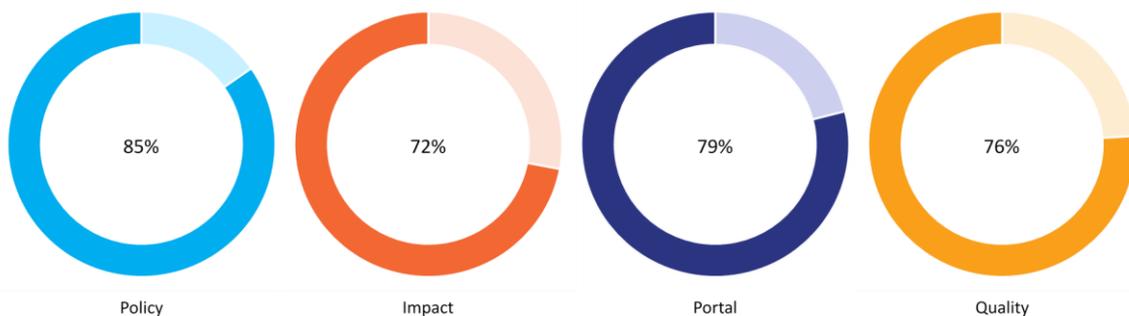
Figure 4: Average maturity scores of the EU27 countries for each dimension

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[1] The groups are specified in detail in Chapter 6 "Clustering the Countries".

Introduction

The European Data Portal (EDP) has been the main point of access at European level to find public sector information published across Europe since 2015. Its objective is to improve access to open data, foster high-quality open data publication at national, regional and local level, and increase the impact through re-use. To support the development of countries in terms of their open data practices and enable them to learn from each other, the European Data Portal has been conducting an annual benchmarking exercise providing European countries with an assessment of their maturity level and documenting their year-on-year progress.

This report provides an extensive overview of the open data maturity assessment of 2020. It supports countries to better understand their level of maturity, to capture their progress and the areas for improvement, and benchmark this 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.

Complementary to this report, the data gathered in this year's assessment – as well as previous editions – are publicly available on the Open Data Maturity Dashboard on the European Data Portal website2. In addition, country-specific factsheets are provided. The customised country factsheets provide a more detailed insight at national level into the results on the four open data dimensions (policy, impact, portal, and quality) in comparison with the average of EU Member States and the results from previous years.

The Open Data Maturity report 2020 is structured as follows:

- The "measuring open data maturity" chapter describes how open data maturity is measured.

- Chapters 1-4 provide a detailed assessment of the four open data dimensions: policy (1), portal (2), impact (3) and quality (4) in the 27 EU Member States.

- Chapter 5 offers an overview of open data maturity in the other countries participating in this year's edition of the assessment, which include EFTA countries, EaP countries, and the United Kingdom.

- Chapter 6 presents a clustering of the countries in four categories according to their performance and describes the key insights related to the grouping.

- Chapter 7 provides a set of recommendations for the countries depending on the cluster they are associated with, providing indicative guidance for policy-makers, portal owners, and other stakeholders to push the open data agenda forward.

- The concluding chapter underlines the main takeaways and reflections from the 2020 landscaping exercise.

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[2] https://www.europeandataportal.eu/dashboard

Measuring open data maturity

In the period 2015-2017 the annual open data maturity measurement was built on two key indicators: "readiness" and "maturity", covering the policy developments at country level as well as the level of sophistication of the national open data portals. To better reflect the open data developments taking place across Europe, a major update to the landscaping methodology was carried out in 2018. The 2018 methodology made the assessment more ambitious and comprehensive and set a stronger focus on the quality of open data as well as the re-use and impact derived by open data. The scope of the assessment has hence been broadened to comprise four dimensions: policy, portal, impact, and quality.

Similar to past iterations of this research, the data was collected through a questionnaire sent to the national open data representatives working in collaboration with the European Commission and the Public Sector Information Expert Group. The questionnaire was structured along the four open data dimensions as outlined below and included detailed metrics for each dimension to assess the level of maturity. The detailed metrics are presented in table 1. Dimensions and metrics were last specified at the time of the latest major revision of the methodology in 2018, and have since been maintained to improve clarity or address ambiguities in response to the open data representatives' feedback.

Open Data Policy focuses on the presence of specific policies and strategies to foster open data at national level. The dimension also analyses the existence of governance structures that allow the participation of private and third sector actors, as well as implementation measures that enable open data initiatives at national, regional, and local level. Furthermore, the dimension looks at training schemes that enhance the data literacy skills of the civil servants working with data, and harvesting mechanisms that foster the discoverability of all open data available in the country.

Open Data Impact looks at the activities performed to monitor and measure open re-use and the impact derived by such re-use. Beyond this first layer of "strategic awareness", the impact dimension focusses on four areas of sectoral impact: political, social, environmental, and economic. Within these areas, the questionnaire examines the extent to which monitoring is in place to document the re-use of open data published in these fields, the extent to which applications, products, and services have been developed to address challenges in these fields, as well as the extent to which civil society initiatives exist that are based on such open data and supported by government institutions. In addition, the dimension includes the efforts taken to commission and conduct studies that measure the impact created through open data re-use in each of the impact areas.

Open Data Portal focuses on advanced portal functions that enable both versed and less versed users to access open data via the national portal and features that enhance the interaction between publishers and re-users (via forum and discussion boards). Additionally, the dimension assesses the extent to which portal managers use web analytics tools to better understand their users' needs and behaviour and update the portals' 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 monitoring of the compliance with the DCAT-AP metadata standard as well as the quality of deployment of the published data. The fourth dimension provides impulses for portal managers and policy-makers to enable open data publication that is good quality all round: using open data formats, machine-readable, high-quality and suitable to a linked data approach.

Table 1: Open Data Maturity dimensions and dimension-specific metrics

Dimension	Metrics
Open Data Policy	Policy framework
	Governance of open data
	Open data implementation
Open Data Impact	Strategic awareness
	Political impact
	Social impact
	Environmental impact
	Economic 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

The first assessment dimension, "open data policy", focuses on the open data policies and strategies in place at national level, the governance model by which open data is managed in each country, and the measures adopted towards the implementation of these policies and/or strategies.

The policy dimension is composed of the following indicators:

Metric	Key elements
Policy framework	Open data policies and strategies are in place at a national level to provide a long-term strategic vision and action plan for open data. The strategies incentivise open data re-use in both the public and private sector.
Governance of open data	Governance models and coordination activities are in place that ensure the publication of open data at all government levels and support local and regional open data initiatives.
Open data implementation	Data publication plans exist and progress made in line with these plans is monitored. The number of public bodies that charge above marginal costs is also monitored. Training activities for civil servants working with data are in place.

1.1 Policy framework

The key piece at the centre of the European Union legal framework that regulates open data and the re-use of public sector information (PSI) is the Directive (EU) 2019/1024 of the European Parliament and of the Council[3] (further referred to as the Open Data Directive). The Open Data Directive forms the basis for the re-use of data from the public sector. It obliges the Member States to publish all suitable data and documents as open data, unless it is subject to exceptions set out in the Directive.

The Directive, which came into force in July 2019, is the latest visible output of significant and long term EU policy effort that was inaugurated in 2003 with the first directive[4]. At the moment of writing, Member States still have a few available months to meet the implementation deadline of 17 July 2021. This means that the changes driven by the Directive will start producing effects and will start being documented in this study in its next iteration in 2021. To note, our researchers have already observed significant momentum rising in the Member States that look beyond mere compliance and make this into an opportunity for their citizens and the economy.

This indicator analyses the open data policies, strategies, and action plans in the EU27 Member States and their scope. It also considers the visions and objectives around open data and the actions to implement those.

1.1.1 Open data policies

Open data policies in the EU27 Member States vary from laws that are put into effect by implementing past related EU directives, to extensive policy frameworks dedicated to open data or embedded into the broader legislative framework on data and digital developments.

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[3] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019L1024&from=EN
[4] Directive 2003/98/EC on the re-use of public sector information

In several countries, such as Cyprus, the national policy is integrated into the national PSI Law[5]. The policy establishes an "open by default" principle, sets targets for governance, publishing and quality practices, and specifies the default licence to be used.

In Austria, the basis for the national open data policy lies in the Federal Act on the Re-use of Public Sector Information[6]. A task force has been set up within the Federal Ministry for Digital and Economic Affairs to implement the new Open Data Directive as well as specifying the country's high-value datasets.

In Poland, the open data policy is pursued by the Ministry of Digital Affairs. In 2018, the first version of a document specifying the open data legal, security, technical and API standards was issued and has been updated in 2020 after an evaluation and public consultation[7].

In Sweden, the national framework for digitalisation and interoperability was updated at the end of 2019. The overarching policy for open data and data sharing is, at the moment of writing, under review and will be finalised by end of 2020. In 2021, the policy and legislation will be updated for the implementation of the new Open Data Directive.

1.1.2 Open data strategies

In 2020, 96% of the Member States indicate having adopted an open data strategy or an equivalent. Not all countries have developed a strategy exclusively focusing on open data, but rather have the open data aspect embedded into broader digital and data related strategies for open government. Moreover, the open data elements are often part of multiple strategic documents with their own dedicated focus.

In Bulgaria, the open data strategy is developed in detail in several strategic documents. The strategy is part of the "Strategy for Development of the State Administration 2014-2020"[8] and the roadmap for its implementation, as a key priority "Developing the Open Government Partnership Initiative and publishing available public information in an open format".

In France, the open data team indicates that administrations have reached a level of maturity that allows the country to focus their efforts towards quality rather than quantity of data. This called for a review of the national open data strategy, ongoing at the time of the assessment. This relies on a large-scale survey to strengthen the understanding of stakeholders' needs, including both data providers' and the re-user community's in their usage of the national portal.

In Hungary, open data is included as a part of the "2020 AI Strategy"[9]. Sections of the document are dedicated to discussing data policy and economy, in which open data plays a role.

In Italy, the national strategy emphasises the complementarity between the national, regional and local levels of government and identifies priorities and actions to be carried out and measured against specific indicators. More recently, the "Italy 2025 - The Strategy for Technological Innovation and Digitization of the Country"[10] was published, which promotes the use and sharing of data by public administrations and stakeholders.

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[5] https://ec.europa.eu/digital-single-market/en/news/cyprus-psi-legislation-2015-english-working-translation

[6] https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20004375

[7] https://dane.gov.pl/article/article-1264,standardy-otwartosci-danych-po-konsultacjach-publicznych

[8] http://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=891

[9] https://ai-hungary.com/en

[10] https://innovazione.gov.it/assets/docs/MID_Book_2025.pdf

In Luxembourg, the new national open data strategy, which is currently still in the validation process by the government, expresses a preference for dynamic data, defines what should be considered high value datasets, and stresses the importance of using interesting re-use testimonials for dissemination.

In Romania, an open data strategy has been developed in 2020, which complements the implementation of the Open Data Directive and is in the process of being submitted for public consultation.

1.1.3 Open data action plans

Clear action plans, and criteria by which their delivery is measured, support in ensuring that the vision and goals defined in the national open data strategies are reached. In 2020, all EU27 Member States indicate that they will be implementing an action plan to carry out their national open data strategy. In response to the upcoming Open Data Directive requirement to publish high-value datasets, 89% of Member States have prepared by anticipating the identification of high-value domains or datasets to be prioritised for publication.

In Slovenia, a digital strategy was being prepared at the moment of the assessment, which includes a focus on open data. In addition, a "Strategic Working Plan for Open Data 2020-2021" has been prepared and is under consultation with the country's stakeholders. The plan includes events, meetings, upgrade targets for the portal, educational activities, etc. for the next two years.

In Spain, the national open data strategy, the "Aporta" initiative, is implemented according to action plans defined at the beginning of each year. The plan sets the priority initiatives for each year in the seven focuses of action included in Aporta. The action plan for 2020-2021[11] focuses on five areas, reported below as an example of richness of detail. These are:

- *Driving solutions developed on using new technological trends (AI, data science, Internet of Things, Big Data & Analytics, 5G, etc.) in relation to open data. Specifically, in the following key sectors for the country: education, health, smart cities, public sector, and tourism;*
- *Boosting engagement with existing data communities to analyse trends, help to direct future actions and identify successful impact;*
- *Implementing the Open Data Directive;*
- *Evolving the current technical regulations on interoperability of re-use of information, regarding the terms of use, the introduction of GeoDCAT and StatDCAT, and integration of an agreed set of 40 datasets which are set as a reference for smart cities; and*
- *Enhancing the quantitative metrics used to measure impact. This will be reflected in internal dashboards and in those available at datos.gob.es, both public (datos.gob.es/es/dashboard) and private.*

In Italy, the "Open Government Partnership (OGP) Action plan 2019-2021"[12] was adopted in June 2019. In line with the principles of OGP, the Action Plan is the result of a collaboration between representatives of administrations (national, regional and local) and civil society organisations collaborating in the form of "open government forums".

In Poland, the "Open Data Programme" provides strategic tasks for 2016-2020 and a schedule for opening and sharing selected relevant datasets on the national portal. To improve the quality of, and increase the volume of data available on dane.gov.pl, the Programme specifies targets using indicators

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[11] https://datos.gob.es/sites/default/files/datosgobes/iniciativaaporta_planaccion.pdf
[12] http://open.gov.it/wp-content/uploads/2019/09/Quarto_Piano_Azione_Nazionale_OGP_Finale_06.2019-EN.pdf

such as the number of datasets available and the number of governmental administration offices using the specified standards.

1.1.4 Access to real-time and dynamic data

Real-time or "dynamic" data is information whose nature makes it the most useful when it is, without delay, provided for re-use after collection. It has become more widespread with the popularity of the Internet of Things, sensors in smart devices and the social media analysis. Examples 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 timetables, but of the actual position of the bus they're waiting for as well as the estimated time of arrival. Application Programming Interface (API) is the most popular technology used for the distribution of real-time data, and a key topic in the new Open Data Directive.

A specific focus on enabling real-time data is evident in the policies of many countries as well. 81% of Member States indicate that the national strategies and policies outline measures to incentivise the publication of and access to real-time data.

In Austria, the "Framework for Open Government Data Platforms" determines that real-time data needs to be retrievable through an API. The published records should be available to the public within an adequate period in a timely manner. They have to be published as soon as they are collected and compiled.

In Spain, the 2020-2021 open data strategy includes actions aimed at boosting real-time data and specifies applications, such as traffic and urban noise levels[13]. It also documents the impact of using real-time data to monitor the COVID-19 pandemic[14]. The strategy plans for the publication of dedicated guidelines on the value of real-time data and the mechanisms that are most suitable to make it available.

In the Netherlands, a national API strategy was published in February 2020 to incentivise the re-use of real-time data. This strategy describes the standards, design principles, and security measures that ensure that all public bodies offer their APIs in an insightful, user-friendly, and secure manner.

1.2 Governance of open data

This indicator considers the governance models in place that ensure the publication of open data at all government levels. In addition, the indicator considers the appointment of official roles in civil service that are dedicated to open data and the extent to which open data activities are organised throughout the country to foster the exchange of knowledge on the topic.

1.2.1 Governance structures

All 27 EU Member States indicate to have a governance structure in place to enable the participation and inclusion of various open data stakeholders. The governance structure mainly serves the goal of assisting data providers with their open data publication process. In many countries (89%), the governance structure and operating model are published online and accessible to the public.

The open data governance structure can take many forms. For example, there could be a strong central coordination (top-down) or a more decentralised structure in which initiatives are developed and

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[13] https://ciudades-abiertas.es/vocabularios/#Cat%C3%A1logoVocabularios
[14] For example:
https://grafcan1.maps.arcgis.com/apps/opsdashboard/index.html#/156eddd4d6fa4ff1987468d1fd70efb6

pursued at the local level, with little need for central guidance if not coordination (bottom-up). The great majority (81%) of Member States use a hybrid model for governing open data in their countries and none delegates open data matters exclusively down to the local level without central support.

In Denmark, the hybrid governance structure consists of 1) the Basic Data Programme Board[15], 2) the Coordination Committee and, since 2020, it is expanded with 3) the Committee on Architecture and Standards for Better Data Re-use[16], and 4) the Steering Group on Deployment of New Technology and Data[17]. The Danish Basic Data Programme is governed by the central state and is supported by participation from the local and regional levels. The Programme has a permanent forum[18] for stakeholders using data in their administrations or businesses. The Coordination Committee is an interdisciplinary body that acts as a channel for discussing political and strategic aspects of the data infrastructure, government policies, and management areas. The Committee promotes dialogue on key issues for the strategic development and coordination of the infrastructure for local information, both nationally and in the EU. In recent years, the Committee has, among other things, dealt with data and metadata quality in legislation, the interaction between new technologies and infrastructure, and the use of geospatial data in regulation.

In Slovenia, a top-down model is used in which the procedures for both state bodies and local bodies are set by the national PSI law. As is common for smaller countries in the EU, a simpler structure of government is mirrored by the choice of operating one national open data portal only, and no regional ones. The national open data team reports monthly to the Slovenian Project Office at the Ministry of Public Administration. They have the central editorial role regarding the open data portal and directly interact with the editors in other public sector bodies. The national data team and the Ministry collaborate regularly with NGOs and academia and in March 2020 the OPSIHub[19] was established which connects the national portal (OPSI) and stakeholders from the private sector. The participation of all these stakeholders is enabled and encouraged by organising regular meetings, educational activities, hackathons, public consultations etc.

Sweden implements a hybrid, decentralised model with government agencies, regional authorities, and local municipalities, coordinated by the Swedish Agency for Digital Government (DIGG)[20]. To speed up progress in selected domains, selected projects are centrally funded and initiated. To further incentivise local and regional open data initiatives, the national innovation agency Vinnova[21] grants funding to promote data driven projects and open data "labs". Given the country's open by default policy[22], there are many initiatives that are developed and pursued at local level or as a part of business development, with no central guidance.

1.2.2 Network of open data officers

To promote and encourage open data publication by public bodies across a country, and to ensure an active dialogue between the national open data team and public administrations, it is beneficial to set up a network of open data "ambassadors". These roles, also often called open data or PSI "liaison officers", or "data stewards", act as contact points across government for all matters related to open

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[15] https://sdfe.dk/saadan-arbejder-vi-med-data/danske-samarbejder/grunddatabestyrelsen/
[16] https://arkitektur.digst.dk/mandat-og-styring/governance/udvalget-arkitektur-og-standarder
[17] https://digst.dk/media/22193/stg-teknologi-og-data-ny-governance-2020.pdf
[18] https://confluence.datafordeler.dk/display/DML/Kommissorium+for+Anvenderforum
[19] https://www.gov.si/novice/2020-03-06-ob-dnevu-odprtih-podatkov-ustanovili-sticisce-odprtih-podatkov-slovenije/
[20] https://www.digg.se/om-oss/vart-uppdrag/regeringsuppdrag/oppna-data-datadriven-innovation-och-ai
[21] https://www.vinnova.se/en/e/datadriven-innovation/
[22] https://www.digg.se/utveckling-av-digital-forvaltning/svenskt-ramverk-for-digital-samverkan

data. Their function often entails promoting and supporting the publication of open data within their organisation, maintaining an active dialogue with other liaison officers and the national open data team, exchanging knowledge and ensuring publication on the national portal. In 2020, 93% of Member States used open data officers as part of their governance models.

In Latvia, the new national "eGovernment strategy 2021-2027" includes the requirement to have a Chief Data Officer in each of the data publishing institutions.

Romania has appointed a data steward in 2020 for each ministry and is extending the model down to all agencies. While the responsibilities of the stewards are defined centrally, it is upon each ministry to decide which person to appoint, e.g. civil servants working in IT or communications departments, depending on their understanding of the area of government where they operate.

In Poland, there are two collaboration networks: 1) the ministerial task force for the open data program, consisting of management members from each ministry, which focuses more on the policy level, and 2) the network of open data officers, consisting of civil servants appointed in each ministry, who are responsible for implementing the open data strategy and action plan. It is the open data officers' responsibility to remain in constant contact with the open data team in the Ministry of Digital Affairs and to recommend new datasets to be released on the open data portal. They also monitor the timely publication of data as well as its quality, as set by the open data programme's standards and guidelines. The officers network also has a more formalised approach in the sense that, they are annually required to file a report on the status of the implementation process. On this basis, a final report is created and made available to the public.

1.2.3 Fostering open data initiatives throughout the country

81% of national open data policies incentivise and support open data initiatives at local or regional level. In figure 5 it is shown that in almost all countries (96%), open data initiatives are also, to some extent, conducted by public bodies on the local or regional level. These initiatives can include operating regional or local portals for municipalities or cities as well as activities to boost re-use, such as hackathons, conferences, re-user meetings, competitions and studies into benefits and challenges of publication and re-use.
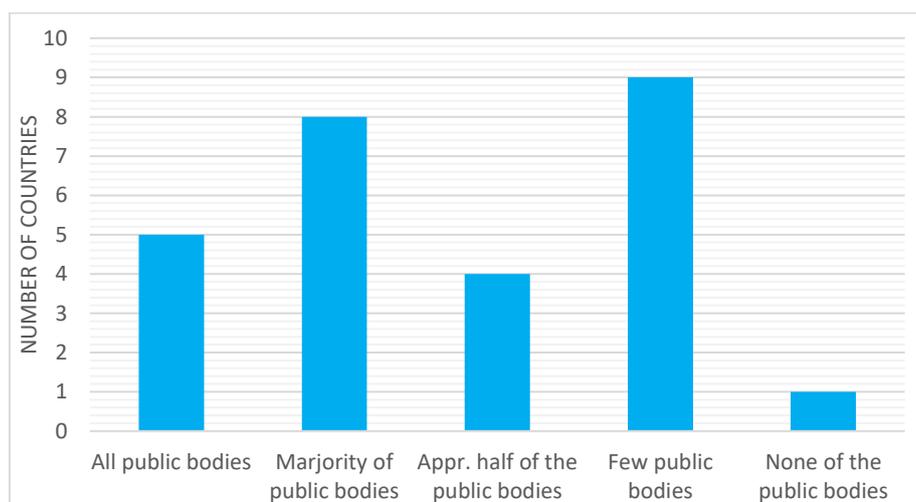

Figure 5: The amount of local of regional public bodies to conduct open data initiatives

In France, cities and local governments of more than 3500 inhabitants and 50 public servants are required by law to publish their data under an open licence. The French open data team Etalab and

OpenDataFrance[23] - a civil society organisation dedicated to opening up local government's data - assist them in the process. For example, Etalab developed the tool schema.data.gouv.fr: a referencing and support service for the creation of public data schemas that was designed specifically for local authorities. Moreover, financial support has been dedicated to supporting local authorities in open data[24].

1.3 Open data implementation

This indicator looks at implementation measures in place that enable open data initiatives at national, regional, and local level. More specifically, the indicator analyses the extent to which guidance is provided by means guidelines or guidebooks that foster the release of open data within the country, the availability of data publication plans and the monitoring of progress against these plans, and the extent to which arrangements are in place so that the data from regional and local sources can be systematically harvested by the national portals. Additionally, the indicator looks at access to real-time and dynamic data, training activities that enhance the data literacy and skills of the civil servants working with open data, and the monitoring of public bodies that still charge above marginal costs.

1.3.1 Guidelines and guidebooks

To foster publication, guidance and assistance on the implementation process of open data plans is often provided in the form of guidelines and guidebooks. All EU27 Member States indicate to have a national guidebook to assist data providers in their publication process. Often, these guidelines are published on the national open data portals.

In France, a shifting focus towards improving quality resulted in the national open data team, Etalab, to undertake special efforts to better support data producers in publication. The extensive list of guides offered covers legal, technical and organisational topics and are made available on a dedicated page[25] on the portal. Among the topics: how to publish, legal aspects, quality, data schemas, pseudonymisation, algorithms transparency, and opening up software source code. Also, additional guidance is available such as instructions for using the portal, documentation to support local and regional data providers supplied by Open Data France [26], and a practical legal guide[27] compiled by dedicated commissions such as CADA and CNIL[28].

In Slovenia, the manual on the opening of public sector information[29] is made available on the national portal. The guidelines include the following topics: definition of open data, strategic and legal basis, access and re-use, licences, metadata, linked data, etc. It has been promoted and used for the training of the editors and other civil servants by the Administrative Academy of the Ministry of Public Administration.

1.3.2 Monitoring data publication

Data publication plans and monitoring mechanisms for data publication serve as tools to oversee progress across national and local public administrations. Moreover, it helps define effective

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[23] http://www.opendatafrance.net/ressources/documents-opendata-france/
[24] https://www.etalab.gouv.fr/lancement-dun-nouvel-appel-a-projets-opendata-dans-le-cadre-du-programme-dinvestissements-davenir-pia
[25] https://guides.etalab.gouv.fr/
[26] https://opendatafrance.gitbook.io/odl-ressources
[27] https://www.cnil.fr/sites/default/files/atoms/files/guide_open_data.pdf
[28] https://www.cap-com.org/actualit%C3%A9s/open-data-et-rgpd-un-guide-pratique-publie-par-la-cnil-et-la-cada
[29] https://podatki.gov.si/posredovanje_podatkov

interventions where necessary in order to overcome barriers. In 2020, 93% of Member States indicate to have some form of processes run at the national level to ensure that the open data strategy and actions are implemented, e.g., through monitoring mechanisms. In addition, 85% of Member States have data publication plans in place and the majority (63%) indicates the status of implementation as satisfactory (see figure 6). Interesting to note here is that several countries indicated to be content of what was achieved this far, yet express the feeling of not wanting to relax, as there is always more progress to be made, further underscoring the ambition of advancing open data in their country.
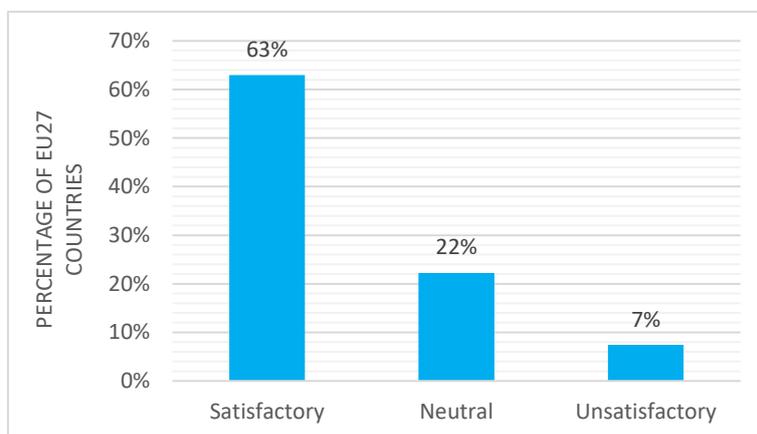

Figure 6: Level of satisfaction with the implementation status of open data plans/strategy

In Denmark, in the digital strategy 2016-2020, the status of each initiative is monitored closely by the Agency of Digitisation on a quarterly and annual basis[30]. A report in Denmark[31] is prepared annually that includes information on the coordinating structures, the use of the infrastructure for spatial information, and information on data-sharing agreements and on the costs and benefits of implementation.

1.3.3 Harvesting data from regional and local data sources

In 2020, all national portals of Member States, where applicable, harvested data from local and regional portals. In countries such as Cyprus , Malta, where there are no regional portals, all data is instead published directly on the national open data portals. In Romania, the local initiatives are not officially launched yet, but will be harvested once they are.

The degree to which existing local and regional sources are harvested by the national open data portal is shown in figure 7. 67% of Member States indicate that the majority or all datasets from local and regional sources are harvested.
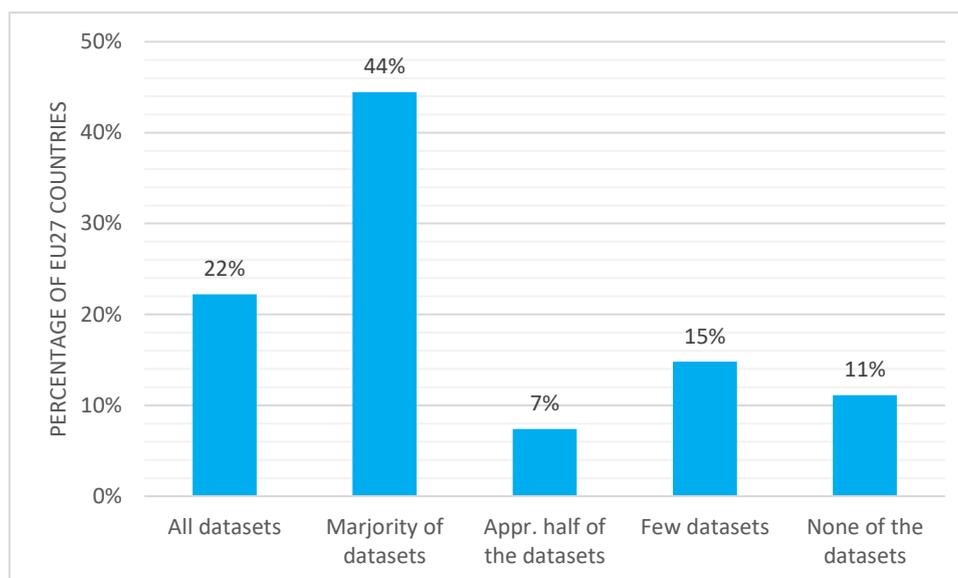
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[30] https://digst.dk/strategier/digitaliseringsstrategien/fremdrift/
[31] https://inspire-danmark.dk/english/inspire-denmark/monitoring-and-reporting/

Figure 7: The degree to which existing local or regional sources are harvested

1.3.4 Open data training

To support and enable civil servants working with open data, the great majority (93%) of Member States provide training activities to develop the necessary data literacy and skills. Of the 25 Member States that do, 19 indicate that these training activities also offer a publicly recognised certification and formal recognition as professional development training within public bodies.

In Germany, there are several programmes in place that support professional development in open data and that are part of public body training plans. Firstly, on the national level, the central Competence Centre for Open Data has developed a training concept that is implemented in collaboration with the Bundesakademie für öffentliche Verwaltung. Secondly, thematic trainings ara available, including for example the online course "OpenGeoEdu"[32]. Thirdly, trainings are offered to civil servants locally, such as "Berlin's Open Data Crash Course"[33] that is part of the Verwaltungsakademie Berlin's training plans.

In Spain, the National Public Administration Institute is the entity in charge of designing and running courses aimed at civil servants. Many of the courses focus on professional development in the field, covering during 2020, for example, "open data and the re-use of information"[34], "practical application of data protection"[35], and "European regulation and the Spanish law on data protection"[36].

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[32] https://learn.opengeoedu.de/opendata
[33] https://daten.berlin.de/interaktion/artikel/crashkurs-open-data
[34] https://buscadorcursos.inap.es/fichacurso/24245
[35] https://buscadorcursos.inap.es/fichacurso/24639
[36] https://buscadorcursos.inap.es/fichacurso/24643

1.4 Overall performance

In this final section, the overall performance of the EU27 Member States is evaluated based on the indicators of the Policy dimension discussed in this chapter. The overall maturity level of the policy dimension is 85%, which is an increase of 11 percentage points compared to last year (see figure 8).
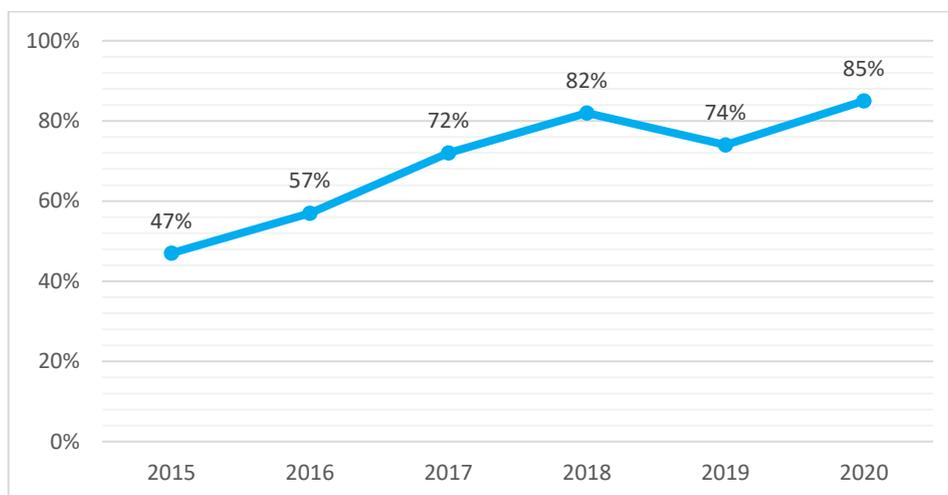

Figure 8: Development in maturity of the policy dimension over the last years (used to be EU28)

The most mature indicator within the portal dimension is the policy framework. An increasing amount of countries have set up dedicated open data policies and strategies or have incorporated them into broader strategies. To support the publication of open data and to enable the participation and inclusion of various open data stakeholders, governance structures are set up in all countries. These almost always include the set-up of a network of open data liaison officers, which also enables processes for implementing the open data strategies. In figure 9, the average scores on each of the indicators of the Policy dimension are shown.

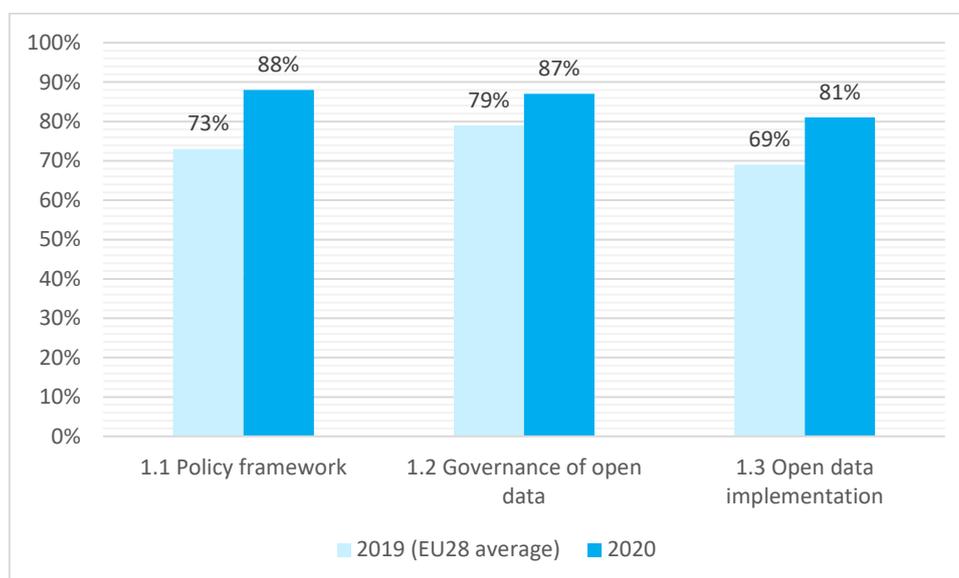*Figure 9: Maturity score per policy indicator compared to last year*

The country ranking of the policy dimension (see figure 10) shows that the majority of Member States score above the EU27 average of 85% and only 9 Member States scored below. The countries with the highest maturity levels on the portal dimension are Estonia (99%), France (99%), and Denmark (98%).
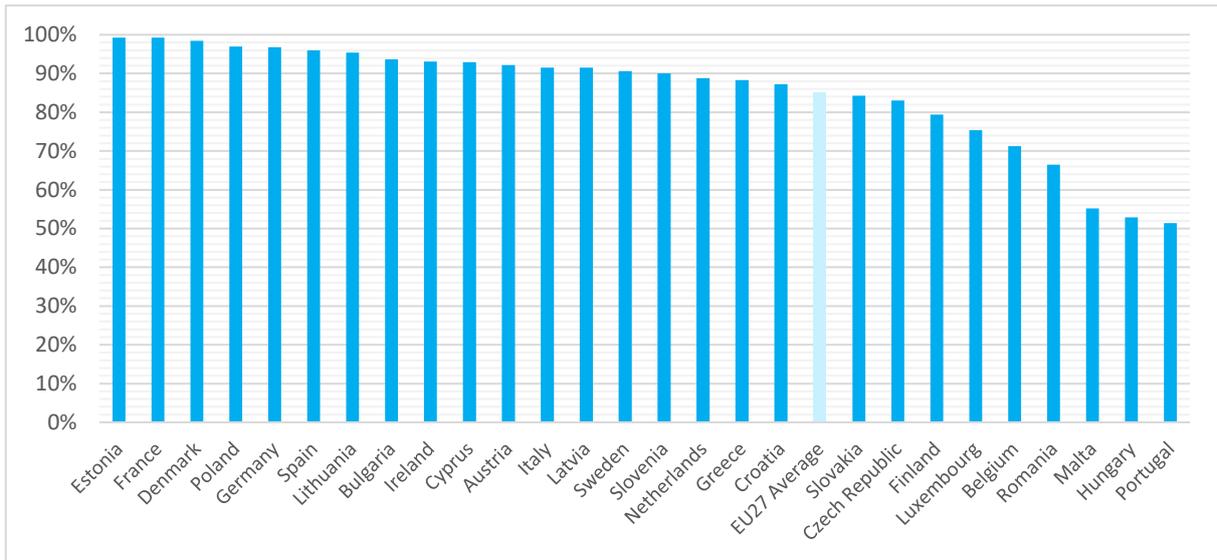
Figure 10: Country ranking for the policy dimension

Chapter 2: Open Data Impact

By re-using open data, innovative products can be developed, services to citizens can be improved, and even lives can be saved. The impact created by open data re-use generally refers to some kind of value for citizens, businesses, and society as a whole, e.g. efficiency gains through time or cost savings, or environmental benefits[37]. The third dimension, "open data impact", analyses the existing approaches and methodologies developed at country and public body level to monitor and measure the re-use and impact of open data.

The Directive on open data and the re-use of public sector information, adopted on 20 June 2019 (Directive (EU) 2019/102457), encourages Member States to facilitate the re-use of public sector data with specific focus on publishing datasets that have a high potential economic and societal impact. The re-use of open data can contribute to the growth of the European economy, and to overcoming political, societal, economic, and environmental challenges.

Measuring the impact of open data is complex, and there is no consolidated and generally accepted methodology available that enables attempting that on a large scale, e.g. at European or national level. Future European Data Portal research is planned to explore that topic. In the context of the Open Data Maturity assessment, the impact dimension focuses on the extent to which countries are *aware* of impact and systematically monitor open data re-use and attempt to measure impact created in selected fields of interest.

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

Metric	Key elements
Strategic awareness	Monitoring mechanisms are in place at national and public body level to monitor open data re-use. Methods are in place to measure the impact that can be derived from re-using open data.
Political impact	Various re-use examples can be provided and the re-use of the open data available in this field is systematically monitored.
Social impact	Various re-use examples can be provided and the re-use of the open data available in this field is systematically monitored.
Environmental impact	Various re-use examples can be provided and the re-use of the open data available in this field is systematically monitored.
Economic impact	Studies that focus on the macro and microeconomic impact of open data are commissioned or conducted by Government. Other studies that focus on the economic impact of open data in a particular sector are available.

2.1 Strategic awareness

The strategic awareness indicator emphasises the importance of a structured approach to monitoring and measuring open data re-use and impact. It provides insights into the extent to which public sector bodies measure the re-use of their data and if there are activities in place to support and incentivise public sector bodies to do so. Beyond monitoring re-use, this indicator assesses if countries have a definition of 'impact of open data' and if there is a methodology in place to measure it.

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[37] For an in-depth analysis of the impact of open data, read the European Data Portal's "The Economic Impact of Open Data" report, published in January 2020 at https://www.europeandataportal.eu/en/impact-studies/open-data-impact.

2.1.1 Monitoring and boosting open data re-use

Open data is available for anyone to re-use, from researchers and journalists to developers, public and private organisations, etc. Public sector bodies, for example, often re-use data from other public sector bodies, enabling these organisations to become more effective and efficient, to make more informed decisions, and to improve their services to citizens. Besides public sector bodies, the available data is also used by the public to develop new and innovative products and services. Measuring the extent to which data is re-used can provide insights into the purposes for which it is re-used, and what impact is created by it.

Member States recognise a strong focus on public sector bodies measuring the re-use of their own and other public sector bodies' data (63%) as well as the re-use by the public (44%). This is mainly done by using web analytic tools to gain insights into the portals' visitors and what data is being accessed, as well as through interacting with other public sector bodies and civil society re-users through partnerships, meetings, workshops or events.

There are activities in place to support and incentivise public bodies in measuring re-use of open-data by other public sector bodies (78%) and by the public (93%). These activities range from events and the public collection, and exchange of open data re-use examples to strategic documents and goals for monitoring and legal requirements.

In Cyprus, the increased importance of measuring re-use is especially evident in larger government departments that are considered "main data suppliers". These include for example the Land and Surveys Department (geodata and web-services publisher), the Department of Public Works (transport related data), the Statistical Service, etc. Re-use is measured through a number of activities such as 1) information collected by other public sector bodies that re-use their data (i.e., statistics, geodata, etc.), 2) monitoring traffic data on datasets and API usage through web analytics, and 3) co-organising events that showcase re-use cases[38].

In Czech Republic, the monitoring of open data re-use is prioritised in the national digitisation strategy. The Ministry of the Interior has launched the "Development of Data Policies in the Field of Improving the Quality and Interoperability of Public Administration Data" project which provides principles for sharing data and re-use of open data by public bodies and aims at monitoring impact. Many public bodies currently monitor the number of visitors and analyse their portals' log files. In the upcoming version of the national portal, users will be able to subscribe to a dataset as a "master user": a frequent, interested user who can provide feedback and is willing to be involved in the development of new related datasets.

In Estonia, the web analytics of the national portal is accessible to the public and allows data providers as well as citizens to monitor the usage of the more popular datasets.[39] Some organisations, such as the Road Administration, have established mechanisms to regularly monitor usage (e.g., the number of dataset views or downloads and the profiles of users) through their platforms. The Road Administration has also established communication with their key re-users (e.g., navigation and mapping service providers such as Waze, Google, TomTom, and driving schools) and receive feedback about the re-use of the data, quality issues, and the needs of the end-users.

In France, there is a strong trend in public sector bodies to increase the measurement of open data re-use. Data is no longer made available merely to comply with the country's legal framework, but with the aim of improving public action, increasing government transparency, and enabling the creation of

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[38] For example, https://circle2019.eu/ , https://t.ly/iDzC and https://t.ly/m2hf
[39] https://datastudio.google.com/s/pQosLHYYyAU

innovative services. From this perspective, there is a strong desire to understand re-use and create a community to monitor trends over time and identify their needs. Several solutions are available at a national level to help public bodies measure data re-use. It is possible to consult the views and download metrics for each dataset published on the portal. This makes it possible to understand which datasets are the most popular and to analyse how that changes over time. The portal also offers the possibility for any visitor to state that they re-use a specific dataset and indicate how they do so. This allows the data producer to be aware of the re-use cases linked to a particular dataset. In addition, the editorial and curation work on the portal highlights the re-used data and most impactful re-use cases through monthly articles.

2.1.2 Measuring open data impact

78% of Member States have a reference definition for the impact of open data, and 70% also report having a methodology in place to measure it in their country. The following text describe a few of the choices made by the Member States as they explore this space. For most countries, this is work in progress.

In Austria, the impact of open data is associated to the number of applications developed using open data.

In Cyprus, open data impact is defined as all implemented changes and improvements, or opportunities taken, direct and indirect, which occur through the re-use of open data. This impact can take many forms such as economic, social, political, environmental, etc.[40]

In Denmark, the impact of open data is defined as the value of the effect on production and efficiency in the private and public sector.[41]

In Slovenia, open data impact is associated to four main areas of application: 1) transparency of government, 2) innovative digital economy, 3) solving environmental issues, and 4) efficient functioning and data-driven decision making by public institutions.

This year, similar to last year's assessment, it is becoming clearer that most countries do not yet have a systematic approach to assess impact created by open data. Often, the methodology described aims to measure the re-use instead of the actual benefits to society that are created through open data re-use – which is arguably much more complex. This is a common approach, as measuring a "proxy" of impact rather than impact itself is sometimes the only viable option for the countries.

One of the most common proxies being mentioned is the number of dataset downloads. However, it has become generally accepted that the link between number of downloads and impact is weak. Downloading is necessary to re-users even just to explore the dataset, but is in no way a guarantee of actual re-use down the line, nor does it give insight into what it was actually used for, let alone what impact was created.

Applications created with the help of open data might have a high impact on people's daily life, but this impact remains hard to quantify. For example, measuring the number of downloads of a rail services timetable does not really measure the impact that it has on passengers using public transport applications that re-use this kind of data, but just represents the dataset's *relevance*.

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[40] https://www.data.gov.cy/open_data_impact
[41] https://sdfe.dk/data-skaber-vaerdi/nyheder/nyhedsarkiv/2017/mar/stor-stigning-i-vaerdien-af-de-frie-geografiske-grunddata/

Several countries state plans to start developing a more structural impact assessment methodology, and there seems to be a desire to collaborate across borders to create a pan-European assessment method. For example, on a Dutch initiative and with the European Data Portal as guest and contributor, France, Ireland, and the Netherlands have recently started a series of informal talks around impact that will develop over 2021.

France developed a systematic impact assessment methodology which uses a complementary combination of qualitative and quantitative measurements. Datasets in high demand and with a high number of re-use cases submitted are identified, e.g., for 2020, health data was the most active category. 2) Structured impact assessment reports are created for the identified datasets including a general description, data used, administration involved, result of re-use, and next steps. The team also engages in a dialogue with re-users to learn more about the impact of their re-use cases.

2.2 Political Impact

The indicator on political impact considers the impact of open data on the public sector and citizen engagement. It focuses on the benefits that open data has on increasing transparency, improving public sector internal processes and service delivery by data driven decision-making, and the extent to which countries are monitoring this kind of impact.

In 2020, 85% of Member States indicate that open data is used in the policy-making processes in their country, for example as evidence for problem identification and policy formulation. The same percentage of Member States also indicate that open data is used in decision-making processes, for example public administrations making use of open data in their daily operations. This highlights the importance of open data re-use for governmental institutions. Moreover, 93% of Member States state that civil society initiatives have been set up to tackle problems in the political field.

In Denmark, as in many other European countries, there has been a long tradition of collecting data and establishing data registries to enable a data-driven public sector. Data about societal matters, such as traffic and the environment, are necessary for services provided by the public sector.

In France, open data has become a key element in the development and implementation of public policies. Following the COVID-19 crisis and the developing awareness of the critical importance of data for public policy, the Interministerial Directorate for Digital Affairs launched a new programme on data-driven policy. The objective of the programme "Entrepreneur d'intérêt général"[42] is to support administrations in making the best use of their data to elaborate public policies. For example, the COVID-19 pandemic highlighted the need to publish data to guide crisis management. Data on state support to businesses by region and business activity was published and a dashboard[43] produced so that the data could be easily consulted, and local authorities and administrations could adapt their public policies accordingly.[44]

2.2.1. Monitoring the political impact of open data

In 2020, 78% of Member States have conducted some type of activities to monitor the political impact of open data in their countries. Activities range from collecting re-use examples to conversations with

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[42] https://entrepreneur-interet-general.etalab.gouv.fr/index.html
[43] https://aides-entreprises.data.gouv.fr/
[44] For more information see the blog post on France's Country Insights page on the European Data Portal https://www.europeandataportal.eu/en/impact-studies/country-insights/france/how-administrations-and-civil-society-worked-together-open

participants at events, case studies and social media monitoring. Furthermore, to more formally assess the political impact of open data, 67% of Member States indicate that they have conducted dedicated studies in this area.

In Germany, a study on the framework conditions and potentials for the provision and use of public sector data was released in 2020, supported by the Federal Ministry for Economic Affairs and Energy.[45] The study reported on the progress and impact of open data in Germany with a specific focus on the improvement of internal administrative processes and decision making as well as promoting transparency and participation.

In Spain, the "Public Administrations and the Re-use of Public Information"[46] report was published in 2020. It measured the impact of open data on the public administrations of Spain and illustrates the impact with several examples.

2.2.2. Increasing government effectiveness

Open data has the potential to help increase government effectiveness, especially in delivering higher quality public services. Public service delivery is improved by making it easier for citizens to interact with the government as well as by public administrations using open data in their daily operations, decision-making processes, problem identification and policy making. In 2020, the majority (63%) of Member States indicated to recognise a high impact of open data in increasing government effectiveness. 19% of Member States indicate a medium impact, and 7% a low impact.

In Austria, an application called "Sag's Wien"[47] offers the citizens of Vienna a platform for sharing their concerns with the city's administration. This way, the City can more effectively respond to issues that are deemed important by its citizens, such as obstructions on the road, open potholes or littering.

Similarly, in Germany, the application "Mängelmelder"[48] enables citizens to provide information that the local and regional governments can use to identify disruption to infrastructure, or identify opportunities for improvement. Also, the municipality of Moers started publishing the waiting times for its government services on "Wartezeiten Moers"[49].

In Spain, the "Energy Datahub"[50] dashboard offers detailed information about energy consumption of venues managed by the Castile and Leon Regional Government, such as educational and health centres, administrative offices, hospitals, etc., by energy type (electricity, gas, diesel) and by geographic location. The dashboard includes information on more than 1 500 venues and offers various types of visualisations to support the user's understanding of the data.

In Sweden, the "Naturvardsverket"[51] mapping tool supports decision-making in urban and road planning. It can be used to make sure that wildlife and natural habitats are protected and indicates if permits and approvals are required for building.

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[45] https://www.digitale-technologien.de/DT/Redaktion/DE/Downloads/Publikation/SSW/2020/SSW_Open_Public_Data_in_Deutschland.pdf?__blob=publicationFile&v=9
[46] https://www.ontsi.red.es/es/estudios-e-informes/Gobierno-abierto/Las-Administraciones-Publicas-ante-la-reutilizacion-de-la
[47] https://www.wien.gv.at/sagswien/
[48] https://www.xn--mngelmelder-l8a.de/bms#pageid=1
[49] http://wartezeit.tursics.de/
[50] https://analisis.datosabiertos.jcyl.es/pages/eren/centros-de-consumo#centros-de-consumo
[51] https://skyddadnatur.naturvardsverket.se/

2.2.3. Increasing government efficiency

In addition to increasing government effectiveness, opening up data can also lead to higher efficiency levels within public sector bodies, for their own re-use. Government efficiency can be boosted with open data because it helps public bodies across many dimensions, from making decisions to spending less time on certain tasks.

Publishing data under an open licence gives re-users, such as local administrations or citizens, the opportunity to obtain data without having to explicitly request it, and with the additional comfort that there will be no complications related to personal data privacy or confidentiality in general. On the other side, data providers do not have to repeatedly go through the process of dealing with data requests, thus reducing operational costs. 56% of Member States say open data has a high impact on increasing government efficiency in their country, 22% indicate a medium impact and 11% a low impact.

Also, publishing data in an open *format*, such as CSV, typical of open dataset publications of tabular data, reduces or nullifies the costs, efforts and skills required by transforming the data in a suitable destination format before it can be re-used.

In Belgium, the federal and regional policies are gathered and made available as linked data via the programme "Local policies as linked open data"[52]. Departments of the government are autonomous in publishing and retrieving the information from these policy documents, instead of having to provide or request them ad hoc.

In Germany, the initiative "Open Legal Data"[53] offers legislation, court judgements, and other legal texts without any restrictions in access and free of charge, which supports civil servants in tasks that require legal references and information.

In Spain, the "Mapa delinqüencial"[54] online interactive map describes crime in Catalonia from 2011 to date. It not only gives greater visibility of crime and the daily work done by the police forces, it also shows where crime is more of a pressing issue and is used to deploy the police forces in the most efficient way.

The Swedish Civil Contingencies Agency (SCCA) is using data from Copernicus[55] and the Copernicus Emergency Management Services (EMS)[56] into the "SSCA Gismap"[57]. In the eventuality of forest fires or floods, data can be used to create dedicated maps, for example of flooding risk areas. This is improving the efficiencies in targeted efforts in areas that are in need of support.

Public open data portals are today also a favourite source of data for those same public sector bodies that publish data. These websites, originally thought for the use of citizens, are often an easier and more convenient tool for data discovery and access than the more traditional processes, such as word of mouth or internal file servers.

2.2.4. Increasing transparency and accountability

Making public sector information publicly available increases government transparency, and enables citizens to hold their representatives accountable, but also to recognise them for their integrity and

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[52] https://lokaalbestuur.vlaanderen.be/lokale-besluiten-als-gelinkte-open-data
[53] https://de.openlegaldata.io/
[54] https://visors.icgc.cat/mapa-delinquencial/
[55] https://www.copernicus.eu/en
[56] https://emergency.copernicus.eu/
[57] https://gisapp.msb.se/apps/kartportal/CopernicusEMS/Aktiveringar_av_Copernicus/index.html

achievements. Government transparency is increased for example through documenting government spending and by providing insights into elections and the behaviour of political parties and politicians. 67% of Member States indicate a high impact of open data on increasing transparency and accountability in their country, 22% define the impact as medium, and just one country (4%) as a low impact.

In several countries, data on public tenders is made available to allow citizens to monitor public procurement. For example, in Austria the application "Tendera"[58] enables users to get an overview of public tender and search for topic-specific or new tenders.

In Estonia, the "Tree of Truth"[59] is a dashboard of Estonia's progress towards its national strategic goals. Each branch of the tree symbolises an area of societal importance, such as national security, culture and sports, energy, or education and shows the progress on specific target indicators related to that area.

The Finnish initiative Tutki Hankintoja[60] provides citizens and companies with information on state and municipal procurement. Citizens receive information about purchases made by the state and Finnish municipalities as well as how public funds are being spent.

In Portugal, the National Health System's "Transparency Area"[61] is an open data platform set up by the Ministry of Health, to make data available and provide transparency on the operational aspects of the National Health System.

In Romania, the "Geo Map Elections"[62] shows a detailed overview of the voting results of the 2019 election at ballot section level.

In Slovenia, the interactive visualisations of "Proracun"[63] enable ongoing monitoring of revenue and expenditure related to the state budget. Moreover, the service also provides detailed information on individual projects that are financed or co-financed by the state. The visualisations provide the user with a more detailed insight into specific elements of budget spending and also enable searching by region, municipality, and project value.

2.3 Social impact

The social impact indicator relates to the impact of open data on society as a whole. It considers the extent to which open data is used to address societal challenges, such the inclusion of marginalised groups in society, or housing in urban areas, and the extent to which countries monitor impact in the social field.

63% of Member States indicate that open data has a high impact on society in their respective countries. There are many civil society initiatives launched to address social challenges, recorded in 85% of Member States.

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[58] https://www.data.gv.at/anwendungen/tendera/
[59] https://tamm.stat.ee/?lang=en
[60] https://tutkihankintoja.fi/
[61] https://www.sns.gov.pt/transparencia/
[62] http://geo-spatial.org/proiecte/alegeri2019/
[63] https://proracun.gov.si/

2.3.1. Monitoring the social impact of open data

78% of Member States indicate to have conducted some type of activities to monitor the political impact of open data in their countries. This ranges from collecting re-use examples to conversations with re-users at events, to case studies, to social media monitoring. Also, to more formally assess the impact of open data on societal areas, 48% of Member States indicate to have conducted studies on the topic.

In Denmark, a project has been launched aiming at shedding light on the value of open data in municipalities.[64] The project is especially interested in emphasising its social impact, by documenting outcome and value of several use cases.

In Germany, an academic study was conducted on cultural inclusion and open data.[65] It assessed open access, open data, and open science as important pillars of a sustainable and successful digital transformation in cultural organisations and the cultural sector.

The "Our digital lives. A barometer of e-gender equality in Spain"[66] report by ONTSI was published in April 2020. It addresses the use of technology by women in their everyday lives and in their ventures, their presence in technology studies or in the various professional sectors where technology is a key innovative element.

2.3.2. Increasing the inclusion of marginalised groups in society

A wide variety of websites, applications, and services based on open data have been developed with the aim to promote the inclusion of marginalised groups into society. The focus is on addressing how individuals or entire communities, whose participation in politics and society was originally challenged, should be enabled to exercise their rights, take opportunities, and benefit from available resources to better partake in social, cultural, and political life. Marginalised groups can be, for example, elderly people, people with disabilities or minorities. In 2020 approximately half of the Member States (48%) indicate that open data has a high impact on increasing the inclusion of marginalised groups in society.

In Austria, apps such as "Stadt-Wien App"[67] support citizens or visitors with special needs in the city of Vienna. Based on the user's location, it provides information on, e.g., elevators at public transport stations and parking spaces designed for people with disabilities.

Another recent example from Germany relates to the inclusion of marginalised groups especially during the COVID-19 crisis. As part of the WirVsVirus hackathon, open data was used to develop projects[68] supporting high risk groups or individuals in quarantine to get access to groceries, for example, or to remain physically and mentally healthy with support from neighbours and volunteers.

The "Cyprus Guide App"[69] is an application co-funded by the Asylum, Migration and Integration Fund and the Republic of Cyprus which aims to provide basic essential information about services and daily life on the island to refugees and asylum applicants. The application utilises open data form various government departments and includes information and location of hospitals, citizen service centres, education, etc.

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[64] https://www.kl.dk/media/10948/34-laes-pjecen-om-de-smaa-aabne-datasucceser.pdf

[65] https://link.springer.com/chapter/10.1007%2F978-3-658-24030-1_3

[66] https://www.ontsi.red.es/sites/ontsi/files/2020-05/NuestrasVidasDigitalesEdicAbril2020.pdf

[67] https://www.wien.gv.at/live/app/

[68] For example: https://www.machbarschaft.jetzt/?lang=en

[69] https://apps.apple.com/us/app/cyprus-information-guide/id1287967597

2.3.3. Raising awareness on housing in urban areas

Websites and applications that provide information on housing, such as neighbourhood facilities and characteristics, are available in European countries to enable citizens in making informed decisions on where to live and doing business. In 2020, 56% of Member States indicate that open data had a high impact on raising awareness concerning housing in urban areas.

In Brno, Czech Republic, the "Quality of Life Checker"[70] application offers an interactive map of urbanistic aspects that contribute to the quality of life. The user can choose which indexes of quality are more important to them and change the map accordingly.

In Finland, the "Know Your Hoods"[71] platform helps the public find the most suitable neighbourhood to live in. The user chooses their most important search criteria, such as what kind of environment they want to live in, what services should be nearby and what is the appropriate price level. Based on the criteria, the search engine suggests the most suitable residential areas among the municipalities participating to the service. The user can then explore the areas in the form of images, text, statistics, maps, and residents' stories.

In Slovenia, the application "nValuta"[72] enables access to information on the real estate market for housing and business properties. For any given location, the user is shown the market value of the reference real estate on the basis of the Slovenian "Real Property Valuation Database". In addition, it provides insight into recently concluded transactions in its immediate surroundings, according to the "Real Estate Market Record".

2.4 Environmental impact

This indicator relates to the impact of open data on the environment. It considers aspects such as raising awareness on the water and air quality, noise levels in cities, waste management systems, environmental-friendly transport systems, and the extent to which the impact of open data on these aspects are monitored.

In 2020, 67% of Member States indicate that open data has a high impact on the environment. To tackle problems identified in the environmental field, open data-driven initiatives are set up in 89% of Member States.

2.4.1. Monitoring the environmental impact of open data

70% of Member States have conducted some type of activities to monitor the environmental impact of open data in their countries. Several countries also mention conferences dedicated specifically to how open data can be used for environmental purposes, such as the "Bits&Bäume Conference"[73] in Germany and the "Open Data Impact Series event on how open data can help the environment"[74] in Ireland. To assess the political impact of open data, 59% of Member States indicate to have conducted studies on the topic.

In Estonia, the "RITA kaugseire"[75] research project, funded by the European Regional Development Fund, started in 2019 and is to be concluded at the end of 2020. The project aims to assess the

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[70] http://brno.ml/
[71] https://hoods.fi/
[72] https://play.google.com/store/apps/details?id=com.mediaatlas.gis&hl=en_SG&gl=US
[73] https://okfn.de/blog/2019/07/bits-und-baeume-publikation/
[74] https://derilinx.com/odimpact-environment/
[75] https://kaugseire.ee/projektid2

possibilities and costs of using remote sensing data to monitor and prevent floods, forest fires, and monitor the agricultural use of land.

In Finland, the Helsinki Smart and Clean Foundation is in the process of conducting a study on the effects of open data on the environment linked to the air quality dataset describing the city's area that was made openly available in 2019.

In Ireland, the Irish Environmental Protection Agency collaborated with several partners to study barriers to sharing air quality open data and how it can be visualised[76]. The potential for improvement identified by the project depends on improved interoperability, the use of visualisations to communicate the insight from the data, and the availability of more and better quality metadata describing the air quality datasets and enabling their discoverability. The latter should possibly be supported by tools such as the European Data Portal's Metadata Quality Assessment (MQA), but made available to the individual data providers, so that they are autonomous in checking compliance and take action in case of issues.

In Spain, the "Real-time Open Data Report"[77] analyses re-use cases of open data and their impact on the environment with regards to public parking, public bicycles, road traffic, public transport, air quality and noise pollution in smart cities.

2.4.2. Raising awareness on water and air quality

Several initiatives across Europe are aimed at providing insights on the quality of air and water. The data and visualisations made available have made environmental phenomena more easily understandable and help to increase awareness amongst European citizens of the quality differences in a given area, as well as the impact humans have on the environment. Moreover, these insights help to guide decision-making on, for example, how to reduce water usage. 70% of Member States indicate the impact of open data on the water and air quality to be high.

In Denmark, Aarhus University monitors air pollution in the country and offers a wide range of datasets to provide insight. The "Air View"[78] service provides a map with a forecast on the air quality over the upcoming three days, geographical distribution, current and historical trends.

In Croatia, the application "Baltazar"[79] was developed to provide insight into the water quality, e.g., if water in certain areas is suitable for swimming, but also to increase awareness on environmental sustainability.

In Cyprus, the "Irrigation Calculator"[80] was developed with the use of research open data by the Agricultural Research Institute. It is a simple tool that can be used by farmers and other stakeholders to calculate the volume of irrigation needed by kind of crop and location. The tool is aimed at controlling irrigation and avoiding the waste of water, that is a scarce resource on the island and needs to be closely managed.

In Spain, La Coruña Port Authority developed "Ondas e Vento" ("Wind and Waves")[81] as an integrated management tool within the city's Environmental Dashboard. The tool is available to citizens and aims

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[76] https://project-corona.eu/Home.aspx
[77] https://datos.gob.es/es/documentacion/datos-abiertos-en-tiempo-real-casos-de-uso-para-ciudades-inteligentes
[78] https://envs.au.dk/faglige-omraader/luftforurening-udledninger-og-effekter/data-om-luftkvalitet/luftudsigten/
[79] http://baltazar.izor.hr/plazepub/kakvoca
[80] http://news.ari.gov.cy/apps/irrigation.html
[81] https://smart.coruna.es/OpenData/COR/index.html#datasets/catalog

to document the impact of wind, waves, currents and tides affecting the port and surrounding areas. Moreover, it gives insight into the environmental effects of the industrial operations and services taking place in the area, and provides information on practices and permits, with immediate access to the relevant city agencies.

2.4.3. Raising awareness on noise levels in cities

Noise pollution from roads, railways, airports, and industry can have negative effects on the well-being of citizens and wildlife. Long-term exposure to noise caused, for example, by living in residential areas close to noise sources, can lead to a variety of health issues such as sleep disturbance and mental health problems.[82] Noise problems can be assessed when countries, regions, and cities measure and collect the relevant data and document and communicate the phenomenon in ways accessible to citizens, e.g. by using maps. In 2020, 63% of Member States indicate a high impact of open data on raising awareness on the noise levels in their country.

In Lithuania, the municipalities of major cities such as Klaipėda, Kaunas, and Vilnius[83] monitor the noise levels on the streets. These initiatives indicate the levels of noise from vehicles, close to railways or an airport, as well as industrial activities both during the day and by night. Also, quiet zones or noise prevention zones are indicated. This information inform citizens' decision-making in choosing a place to live. Vilnius City Municipality estimates that, by informing the citizens about the situation of noise in certain areas, the residents' satisfaction with life in the city has improved.

In the Netherlands, the application "Noiselab"[84] provides noise mapping for the Schiphol national airport area. Data from the "Noise Monitoring System" as well as the number of airplanes taking off and landing at the airport are provided.
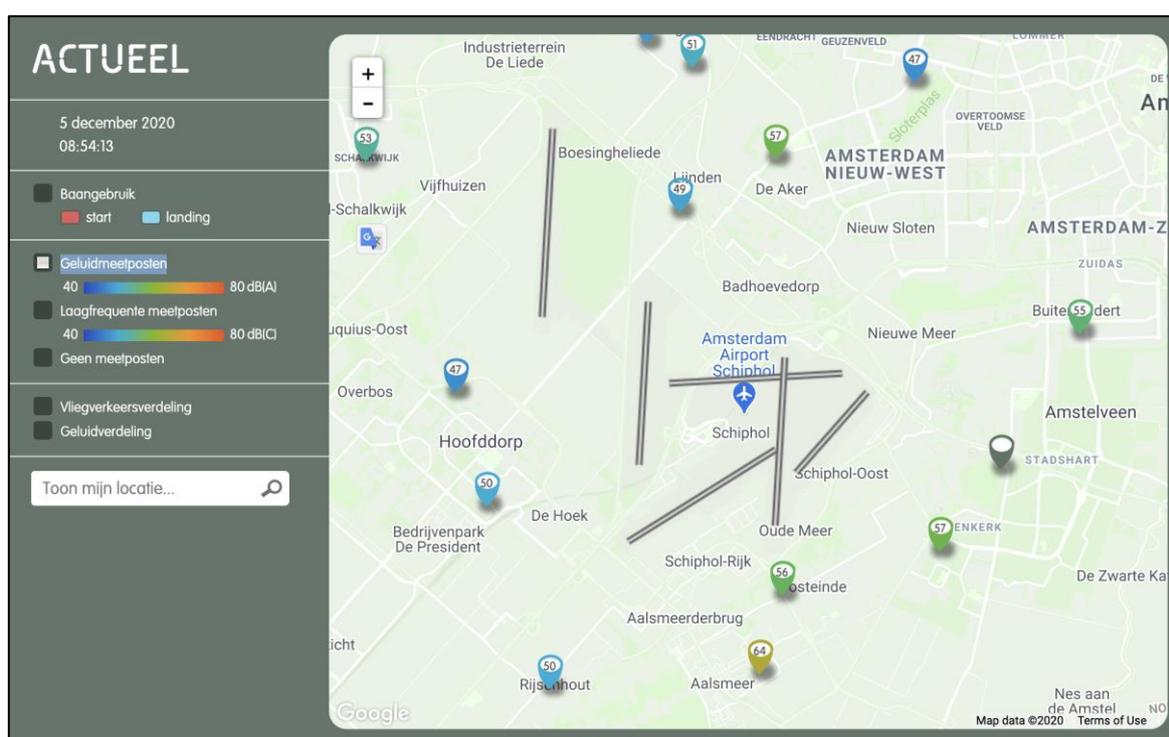

Figure 11: Noise measurement in the Schipol airport area as displayed by Noiselab

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[82] https://www.eea.europa.eu/articles/noise-pollution-is-a-major
[83] https://maps.vilnius.lt/aplinkosauga#layers
[84] https://noiselab.casper.aero/ams/

2.4.4. Waste management

Open data can be used to reduce waste and improve waste management. For example, by enabling citizens to recycle more and supporting local services such as garbage collection and disposal. In 2020, 70% of Member States indicate that open data has a high impact on dealing with waste management.

In Estonia, the application "Kuhuviia"[85] enables anyone to find options about what to do with things they don't need anymore – old clothes, used electronics, furniture, dishes or recyclable garbage such as bottles, scrap paper, packaging, construction waste etc. The map shows the nearest recycling station for each category.

In Latvia, the application "Vides SOS"[86] allows users to quickly report environmental violations to the State Environmental Service. The map shows the current status of the locations of reported dumped trash to be collected.

Figure 12: A case of littering in the city of Riga, as documented by Video SOS

2.4.5. Environmental-friendly transport systems

To promote and support environmentally friendly transport systems, applications, services and platforms based on open data are available that aim to raise awareness on the different sustainable

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[85] https://kuhuviia.ee/

[86] http://www.videssos.lv/

mobility offers. 66% of Member States indicate a high effect of open data on enabling more environmental-friendly transport systems in their countries.

In Italy, "Velobò"[87] is an application that shows the cycle paths, the bike-sharing stations, the public racks and the bicycle shops as well as repair shops in the urban area of Bologna. The data is provided by the open data portal of the municipality.

In Luxembourg, "Mobilux"[88] is a free mobile app that allows users to subscribe to real-time alerts about motorway travel times, bus delays, free access bicycle availability, and weather data.

In Slovenia, the application "Gremo Na Elektriko"[89] enables users of electric vehicles to search and use electric charging stations within the country and beyond its borders.

2.5 Economic impact

Quantifying and showcasing the economic impact of open data is a key element for countries to rally support for open data and to trigger publication and re-use. Economic impact can be measured using different approaches and indicators and go beyond the re-users' financial saving of not having to purchase specific data or produce it themselves. Indirect benefits can also be identified, for example through jobs created, resources saved, productivity gained, etc. that have to be taken into account. It is beyond the remit of this report to discuss the topic in detail; however, the European Data Portal has explored the matter in an extensive report, "The Economic Impact of Open Data", published in January 2020 and available freely.[90]

In 2020, 44% of Member States indicate a high impact of open data on the economy in the country. In addition, 26% indicate a medium impact, 15% a low impact, and another 15% do not have yet an understanding as to what extent the economy is impacted by open data. Some countries, such as Austria, the Czech Republic, and Germany, observed an increase in both the availability and re-use of open data correlated to the COVID-19 pandemic. Other countries also observed that open data can support businesses and entrepreneurs as well as the public by a more optimal allocation of resources. Also, 78% of Member States indicate that open data driven initiatives have been set up by civil society to tackle economic problems in their country.

2.5.1. Monitoring the economic impact of open data

Measuring the economic benefit is, due to its complexity, challenging. Nevertheless, most of the Member States (70%) reported activities in the past year to monitor the economic impact of open data. This is an increase of 13% compared to last year. Most activities consist of studies on economic aspects of open data related topics, such as strategy, impact or digitalisation. At least 21 of the EU27 countries commissioned or conducted studies to assess the impact of open data at a micro- or macro-economic level. The remaining countries either did not conduct such studies or are not yet aware of whether these activities took place in 2020.

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[87] https://play.google.com/store/apps/details?id=com.matteogabella.velobo
[88] https://data.public.lu/fr/reuses/mobilux/
[89] https://www.gremonaelektriko.si/aplikacija
[90] https://www.europeandataportal.eu/en/impact-studies/open-data-impact

Italy participated to the "Open Data 200"[91] - a project by international research institutions GovLab[92] and Fondazione Bruno Kessler[93]. The projects conducted the first comprehensive, internationally comparable study of Italian companies that are using open data to generate business, develop products and services, and create social value[94].

In Sweden, research was performed and a report[95] written to assess the impact of open public sector information. It was the most extensive impact assessment of open data in Sweden to date. The economic value is estimated for the about 300 datasets identified as in the high-value data categories specified in the latest Open Data Directive – which have an estimated net value of 10-21 billion SEK (~1-2 billion EUR[96]).

Also, Enterprise Ireland runs a series of "Small Business Innovation Challenges (SBIR)"[97] to enable public bodies to stimulate innovation for when goods or services are currently not available in the market place and deliver economic impact. The use of open data is key to the SBIR challenges, whose themes are designed to match the high-value categories specified in the latest Open Data Directive and relate to climate, health, biodiversity, and transport.

2.5.2. The macro-economic impact of open data

Opening up essential databases enables economic growth at the macro-economic level. In 2020, 44% of the EU27 countries indicate that open data had a high impact at macro-economic level. Furthermore, in 22% of the countries open data had a medium impact and in 11% of the countries the impact was low. For the remaining countries, it is too difficult to assess the level of economic impact.

The Estonian National Statistical Agency offers a series of interactive visualisations[98] of the country's international trade statistics, in both the English and Estonian languages. It allows users to explore topics such as import, export, trade balance, and the contries business takes place with.

In France, an interactive dashboard was created by DataFrance showing all national statistics on topics such as population, services, education, environment, and economics.[99] It offers more than 50 indicators and users can narrow down the scope of what is displayed to the specific municipality of interest to move between a comprehensive overview and the detail of a specific locality.

In Italy, an interactive map was developed to provide citizens, businesses, and administrations with transparency on public administration spending. The system uses data from the Spending Rationalisation Programme, managed by Consip[100] on behalf of the Ministry of Economy and Finance. It includes data about public sector purchases by territorial area, product sector, and supplier.

For the Spanish district of Valencia a labour market statistics map is created. Labora[101], Valencia's employment service, developed an interactive map with detailed information facilitating access,

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[91] https://italy.opendata500.com/

[92] http://thegovlab.org/

[93] http://www.fbk.eu/

[94] https://italy.opendata500.com/index.html

[95] https://www.lantmateriet.se/contentassets/e16a59e08cb744149c878776256560e6/slutrapport---tillgangliggorande-av-sarskilt-vardefulla-datamangder.pdf

[96] Using the exchange rate of 01-12-2020

[97] https://www.sbir.gov/about

[98] https://data.stat.ee/profile/country/ee/?locale=en

[99] http://map.datafrance.info/population

[100] https://www.consip.it/

[101] http://www.labora.gva.es/va/ciutadania

maintenance and improvement to employment on the basis of equality, as well as fulfilling the employment needs of employers within the Community of Valencia.

2.5.3. The micro-economic impact of open data

To explore the economic benefit of open data on a micro level, studies are set up to investigate businesses or specific sectors, such as transport, forestry, and tourism, or focus on specific data, such as geospatial. Because of the narrower focus, these studies allow for more granular results. In 2020, 33% of the Member States indicate that open data had a high impact at micro-economic level. Most countries, 37%, indicate that open data had a medium impact, and 15% indicate that the impact on micro-economic level was low.

In Belgium open data is used by the "Bureau Économique de la Province de Namur (BEP)"[102] as part of their plan to stimulate their local economy and development of their smart city proposition. Financial data is also available to create transparency within the region[103].

On micro-economic level many innovative start-ups are built on, or impacted by the availability of open data. In Germany open data leads to the rise of many new start-ups. For example, the government initiated the mFUND project, which supports research and development projects that use data from the Federal Ministry of Transport and Digital Infrastructure (BMVI) to create digital usage and networking options. At the moment of writing, 251 projects are already being funded, ranging from intelligent travel planners to high-precision weather apps.[104]

In Sweden, start-up Ymner[105] offers value added services built on and using open data, related to funding from public bodies, grants, innovation contests etc. Ymner collects funding opportunities for every stage of entrepreneurship, from early ideas to industrial research, and offers them in one place.

2.5.4. Economic benefits for public administrations

Some studies focus specifically on the economic impact of open data for the public sector. Many of the EU27 countries, 41%, say that open data has a high economic benefits for public administrations within their country. A smaller group of countries, 30%, claims that the impact is medium, and the smallest, 11%, that impact is low.

The Finnish initiative Tutki Hankintoja[106] provides citizens and companies with information on state and municipal procurement. Citizens receive information about purchases made by the state and Finnish municipalities as well as how public funds are being spent.

In Germany, the Federal Ministry for Economic Affairs and Energy published a study on the impact of open public sector data in Germany and the implementation of the PSI Directive.[107]A re-use case documented by Luxembourg shows that high-quality open data can lead to an effective impact in public administration's tasks. A Town Planning Guide[108] was created that re-uses important geospatial data such as land use, cadastre, administrative limits, etc.

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[102] https://www.bep.be/
[103] https://www.bep.be/rapport-financier-2019/
[104] https://www.bmvi.de/DE/Themen/Digitales/mFund/Projekte/mfund-projekte.html
[105] https://www.ymner.com/sv/home
[106] https://tutkihankintoja.fi/
[107] https://www.digitale-technologien.de/DT/Redaktion/DE/Downloads/Publikation/SSW/2020/SSW_Open_Public_Data_in_Deutschland.pdf?__blob=publicationFile&v=11
[108] *https://www.guide-urbanisme.lu/#/*

The Polish System Analiz Samorządowych[109] enables cities' administrations to collect and analyse data that was not previously available in other online systems, and to assists them in managing public services and their development.

2.6 Overall performance

The overall performance of the EU27 Member States on the impact dimension has greatly increased since last year. On average, the maturity level of the impact dimension is 72%, which is an increase of 15 percentage points compared to last year (see figure 13).
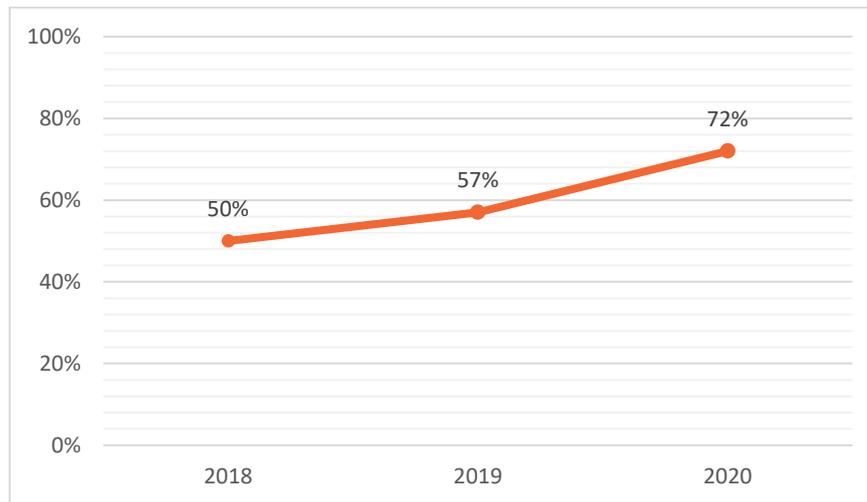
Figure 13: Development in maturity of the impact dimension over the last years (used to be EU28)

In figure 14, the average scores on each of the indicators of the impact dimension are shown. The EU27 Member States show increasing scores on all indicators. Overall, the countries show a greater strategic awareness to monitor the re-use of open data and the impact that is created through it. Many countries showcase re-use cases on their portal and foster interaction with re-users to better grasp the impact of the re-use cases.

A notable trend this year could be seen in the way data on COVID-19 was systematically made available and re-used to create a better understanding of the pandemic by means of dashboards and other initiatives. In several countries, studies were commissioned to assess the impact of open data in general or specific to a certain area, e.g., political and environmental.
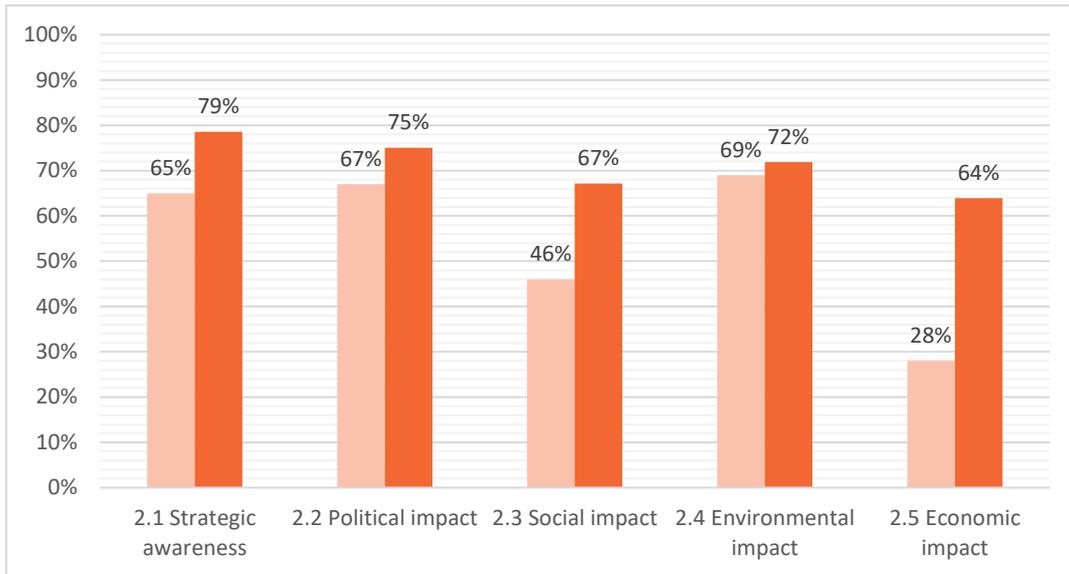
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[109] https://systemanaliz.pl/

Figure 14: Maturity score per impact indicator compared to last year

The country ranking of the policy dimension (see figure 15) shows that the majority of Member States score above the EU27 average of 72%. The countries with the highest maturity levels on the portal dimension are Denmark (100%), Spain (100%), and Estonia (97%).
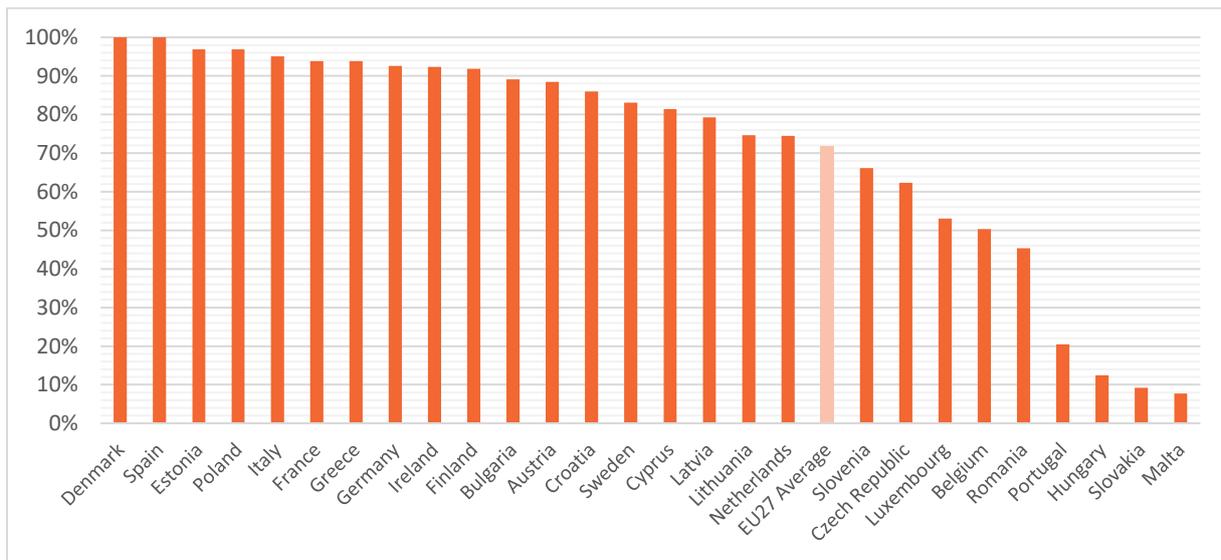

Figure 15: Country ranking for the impact dimension

Chapter 3: Open Data Portal

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 varying 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 if, 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 assessment 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:

Metric	Key elements
Portal features	Portal features ensure access to datasets and relevant content, including more advanced features such as SPARQL search, discussion forum, rating of datasets, requesting datasets, and providing transparency on the progress status of requested datasets.
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 API's 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 reviewing process of improving the portal.

All EU27 countries have a national data portal in place, and all of them are suitable to be used from both desktop computers and mobile devices. Furthermore, countries are putting more focus on ensuring web accessibility[110] for people with disabilities. For example, Sweden launched a new version of their portal in September 2020, which was also driven by this need.

Most countries choose to only have one centralised national data portal, with the exception of Denmark. On the side of a central open government data portal that provides the most essential data, the Danish government offers a variety of smaller, specialised portals that focus on different areas.

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[110] Read more at https://ec.europa.eu/digital-single-market/en/web-accessibility .

3.1 Portal features

This first indicator evaluates the functionalities on the national open data portals and investigates both basic features as well as more advanced features. Basic portal features include, for isntance, search functions that enable filtering, searching by one of the many characteristics of datasets described in their metadata, or by 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. Furthermore, this indicator examines portal features, such as the possibility for visitors to request and rate datasets, and studies whether portals offer use cases, whether originated by research performed by the national open data teams' research or submitted by the users themselves. More advanced portals often additionally 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 re-users, such as discussion forums, feedback channels, and the possibility of notifications when new datasets become available.

3.1.1 Searching for datasets

All EU27 national portals offer an advanced data search function with features such as multiple field search and filter options. Additionally, the national portals allow users to download datasets from the portal and search for datasets per data domain. A majority of national portals (93%) enable users to search for datasets by file format. The national portals of Estonia and Hungary chose not to offer this function.

In order to address more advanced search needs, the presence of a SPARQL search query function was examined. SPARQL is a semantic query language for databases that enables the more advanced users to search deeply and precisely in the metadata offered - whether from the original source portals or the European Data Portal 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, e.g. to identify the availability of new datasets.

In terms of the availability of a SPARQL search query feature, an improvement is observed compared to last year, though most countries still lack this feature. In 2019, only 5 portals (18%) offered this feature. This rose in 2020 to 9 portals (33%). Countries that launched the more advanced feature in 2020 include Germany, Greece, Lithuania, and Romania. In addition, Estonia expects to implement the feature at the end of 2020.

The Spanish national portal's SPARQL endpoin, for example, enables the user to both interrogate the entire data catalogue but also the primary sector taxonomy and the identification of geographical coverage. Additionally, they included a detailed manual[111] on how to use it.

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. In 2020, Austria was added to the list of portals that offer this possibility, leaving Hungary as the only country ub the EU27 without the ability to request datasets on the national portal yet.

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[111] https://datos.gob.es/en/accessible-sparql

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 responding to the portals' general contact information.

Estonia created a dedicated 'ask here' data request button on the portal, which links to the GitHub discussion forum where users can start a new issue to ask for data.

Bulgaria also provides a great example on how users can request data. On their portal there is direct link a data request form. Users can explain in detail what they are looking for or think the public could benefit from. They have the opportunity to include an example or specific information on where to find the data.

Out of the 26 national portals that offer a data request functionality, 25 countries keep track of the frequency by which requests come in. An overview of the frequency of incoming data requests can be found in figure 16a. In 2019, the largest share of national portals in EU27 received data request at least once per month (48%), which is an increase compared to last year when the largest share of portals (40%) received requests less frequently.

Additionally, all 26 national portals that offer the data request functionality, also monitor the extent to which these requests result, down the line, in the publication of data. 25 of these portals reported the degree to which the incoming data request leads to publication, illustrated in figure 16b. Unfortunately, no country is in the condition to publish all the requested data. 24% indicate that they publish the majority of the requested datasets. The Netherlands and Spain indicate to receive data request on a daily basis and are able to publish the majority of it. In contrast, Portugal and Slovenia receive data requests less frequently than once a month and only a few of those lead to publication.
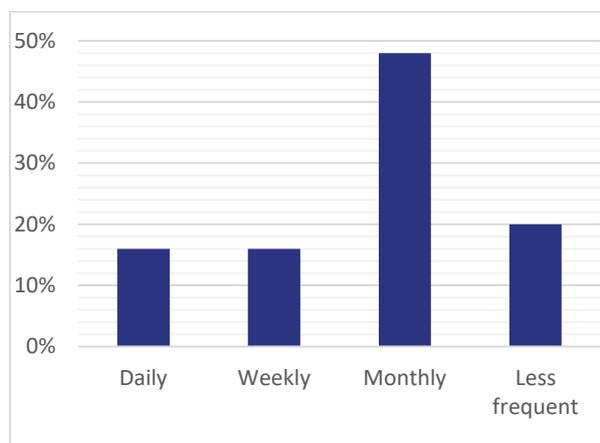

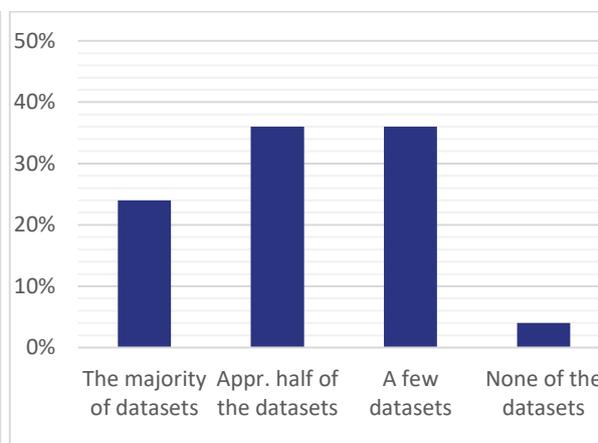*Figure 16a: Frequency of incoming data requests*

Figure 16b: Data requests that result in publication

3.1.3 Providing transparency

From the 26 national portals that offer a data request functionality, 18 portals showcase these requests in a transparent way on their portal.

For example, Romania offers a link on their homepage that lead to a dedicated dataset request page, where people can explain their request in detail. On that page, all currently open and recently closed requests are visible for everyone and people can filter the request based on institutions or request condition, see figure 17.

Figure 17: Data request section of the Romanian data portal

Another interesting approach is found in Latvia. The Latvian national portal showcases a list with all data requests[112]. On this page they implemented the opportunity for others to vote for their favourite requests. The number of votes is displayed on the page providing information on what datasets are most popular among the public to have openly available.

Additionally, in order to enhance transparency, 16 national portals allow users to see what data exists but cannot be made available as open data due to varying reasons, e.g. confidentiality or privacy.

The Czech Republic, for example, created a list of all requested datasets[113] and split it into 5 categories. Category 1 includes datasets that are mandatory by law to be openly available. Category 2 includes requests that can be made open. Category 3 includes datasets that can be made open, but only at the discretion of the data owner. Finally, category 4 and 5 include data requests that cannot be made open, including the identification of the problem.

3.1.4 Enabling interaction

In order to enable interaction between the national portals and their users to ensure both parties can benefit, 25 portals of the EU27 countries offer a feedback channel. The most popular way of requesting feedback is done using a contact form or the general contact email address. This feedback is then

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[112] https://data.gov.lv/lv/iesaki-datu-kopu
[113] https://opendata.gov.cz/dokumenty:anal%C3%BDza-opendata-wishlist

manually forwarded to the responsible person or public body. Some countries created a dedicated section on their portal where users can give feedback.

For example, Sweden offers a complete timeline explaining when certain features and updates are scheduled for integration in the portal[114]. Users are invited to send comments on the data portal, which can be submitted anonymously in both Swedish and English, to reduce friction as much as possible.

Interaction between re-users and data publishers is highly valued by the national portals. Rather than establishing a direct connection between the data re-user and its source, it can be useful for the national portals to be involved in support as an intermediary, as it enables them 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.

Therefore, 24 national portals of the EU27 countries allow users to provide feedback on a dataset level. In most cases this can be done in one of two ways. Either by using the dataset specific contact details 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 data provider. Many portals even go a step further regarding opportunities to respond to datasets.

Ireland, for example, recently implemented a comment section under each dataset including a 'like'-button and a five-star rating functionality. Users can filter the datasets based on 'likes' or ratings. Similar rating approaches are available for 11 of the EU27 national data portals. Registration is commonly required in order to be able to comment to datasets, rate them, or provide feedback in general.

In line with fostering interaction between data publishers and data re-users or between re-users themselves, 18 of the EU27 portals offer a discussion forum for registered users. The most common forum type is the aforementioned comment section available for each dataset. Some Member States, such as the Cyprus, France or Netherlands, do not only offer a discussion forum attached to each dataset, but also a general forum where users can discuss issues and express their opinions that are not related to a specific dataset.

The Dutch data portal also developed, besides the general discussion forum, three additional thematic communities: education, energy, and mobility. An overview of the forums can be found in figure 18. Re-users and data providers have a dedicated space for those topics, where they are able request data, search for data, share and discuss new ideas, and ask others for help.

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[114] https://www.dataportal.se/en/about-webpage

Figure 18: Overview of the Dutch discussion forums

Finally, to increase interaction, 24 national portals offer the possibility for users to receive notifications when new datasets are made available using for example RSS/ ATOM feeds or email. This is an increase of 20% compared to last year. In most cases users can follow datasets or data publishing organisations and will receive notifications when new data is published, or existing data is updated.

3.1.5 Providing examples of open data re-use

All national data portals promote and support open data re-use. 23 of EU27 portals have a designated section to promote applications based on open data. Additionally, 24 national portals indicate that they offer the possibility for users to submit their own open data re-use examples. Last year most use cases needed to be submitted using a general contact or feedback form, while this year most portals created a dedicated channel for submission, making it more convenient for users.

Regarding open data re-use, 21 national portals offer a mapping between the use cases and the datasets that the use cases are based on. Although Estonia currently does not have this function, they plan to have this implemented by the end of 2020. France, for example, has the option to submit a use case per dataset.

A nice example is found in Luxembourg where people are not only able to find links to all the data that was used to create the use case, but can also contact the creator of the use case in addition to the data publisher.

When looking at more advanced features it is observed that 21 portals have a preview feature for tabular data, and 15 portals a visualisation feature for geospatial data. The functionality is perceived to be an important way to engage non-expert users, whose skills do not extend into being able to process the data for themselves. Through previewing and visualisations users can experience and

explore the data interactively. Most portals offering a visualisation feature for geospatial data include three visualisation options: a data table, a graph, or a map. A good example is shown on the national portal of Poland (see figure 19).
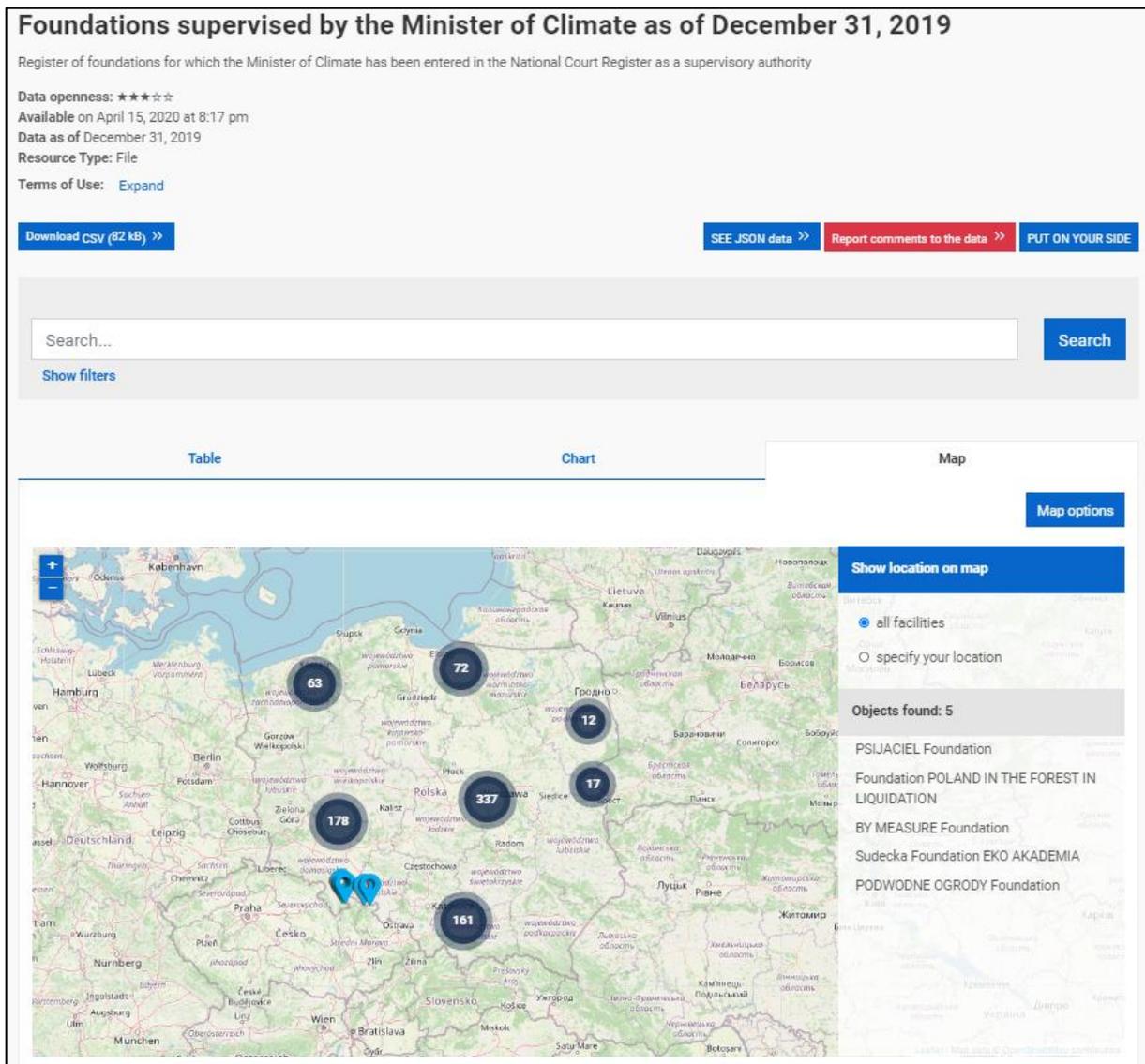
Figure 19: Visualisation of Polish data on foundations supervised by the Ministry of Climate

3.2 Portal usage

Portal managers need to regularly assess if the portal design and features, as well as the available data, meet the user's need. The direct 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. Examples of data collected this way and enabling the analysis of the need of the users are the number of unique visitors, the 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 what is examined by this second indicator.

3.2.1 User analytics

A majority of 25 of the EU27 countries use web analytics on their national data portals to better understand the visitor profiles and capture the extent to which the portals meet the needs of their visitors. The most frequently mentioned tools are Google Analytics and Matomo.

Spain, for example, uses a set of tools to analyse different aspect of the portal's usage. Their main tool is Google Analytics, which they use in combination with Google Data Studio to visualise the analysis. They use social media analytics from both Twitter and LinkedIn to monitor published content and user behaviour. In addition, the Spanish data portal uses Talkwalker[115] to measure social impact, Hotjar[116] for web analytics and usability, and SEMrush[117] for monitoring their Search Engine Optimization (SEO) positioning.

Most countries, 21 of the EU27, use the insights gained from the performed log analytics to improve their data portal.

For instance, Estonia learned that most portal visitors find their portal through Google searches and increase their effort on visibility on Google. Users that visit the Estonian portal, mostly reach it by searching for a specific dataset name or dataset provider. These insights show that there is a lot of potential to increase visitor numbers.

France identified and analysed the top 80 most downloaded datasets to increase their knowledge on what makes a dataset popular. They learned that popularity is not only related to quality, update frequency, and usefulness, but also to the extent that a certain dataset is related to other datasets on the portal. Since reutilisation and promotion are importance factors for the popularity of a dataset, the French national portal initiated editorial work on these datasets to highlight them and propose related datasets. France continuously tries to improve their search engine either by analysing the most frequently searched datasets and make them better discoverable, or by using AB Testing results which are guided by user behaviour.

What stands out in 2020 is that the COVID-19 pandemic drastically increased the number of visitors. This is mainly due to the high number of COVID-19-related datasets and the high demand for this kind of data.

In Austria, for example, recent visitor statistics show that the national data portal's sub-area "COVID-19 Open Data Infoportal" doubled the number of visitors.

Also, Ireland extensively used Google Analytics to demonstrate the impact of the COVID-19 open data and the significant traffic this generated to the portal. This resulted that the overall number of users became a motivator for public bodies to publish more datasets, with a better quality. The number of views helped Irish organisations to understand how popular their datasets are, and they use this for future decision-making.

Several Member States' representatives raised with the EDP team concerns about the feasibility of ensuring their users' privacy under GDPR, particularly following decisions by the Court of Justice of the European Union for more strict use of web "cookies"[118] or, more recently, to declare the so-called "EU-

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[115] https://www.talkwalker.com/
[116] https://www.hotjar.com/
[117] https://www.semrush.com/
[118] Judgment of the Court (Grand Chamber) of 1 October 2019, Case C-673/17

US Privacy Shield framework" invalid[119]. This can be considered an important issue for the many portals that still use Google Analytics, that requires Google to have visibility of users' behaviour in order to create its reports. Also, in response to these concerns, Italy, for example, has moved from Google Analytics to Matomo during 2020 and Sweden plans to do the same in 2021.

Other Member States have also shared how users are becoming more privacy-conscious and proactively taking measures in their web browsers not to be tracked. These measures do not generally discriminate between "good" and "evil" websites and can end up invalidating the insight available to the national open data teams, including basic metrics such as the number of visitors, described in the following section.

3.2.2 Portal visitors

When trying to better capture portal usage, the number of unique visitors[120] per month is one of the most common measures used. Apart from the Czech Republic and Slovakia, national data portals keep track of the average unique visitors per month, shown in figure 20. The figure shows that the French data portal attracts the most unique visitors per month relative to its population[121]. They attract on average approximately 1 million unique visitor per month. Cyprus is second on the list, which is the same ranking as last year.[122]
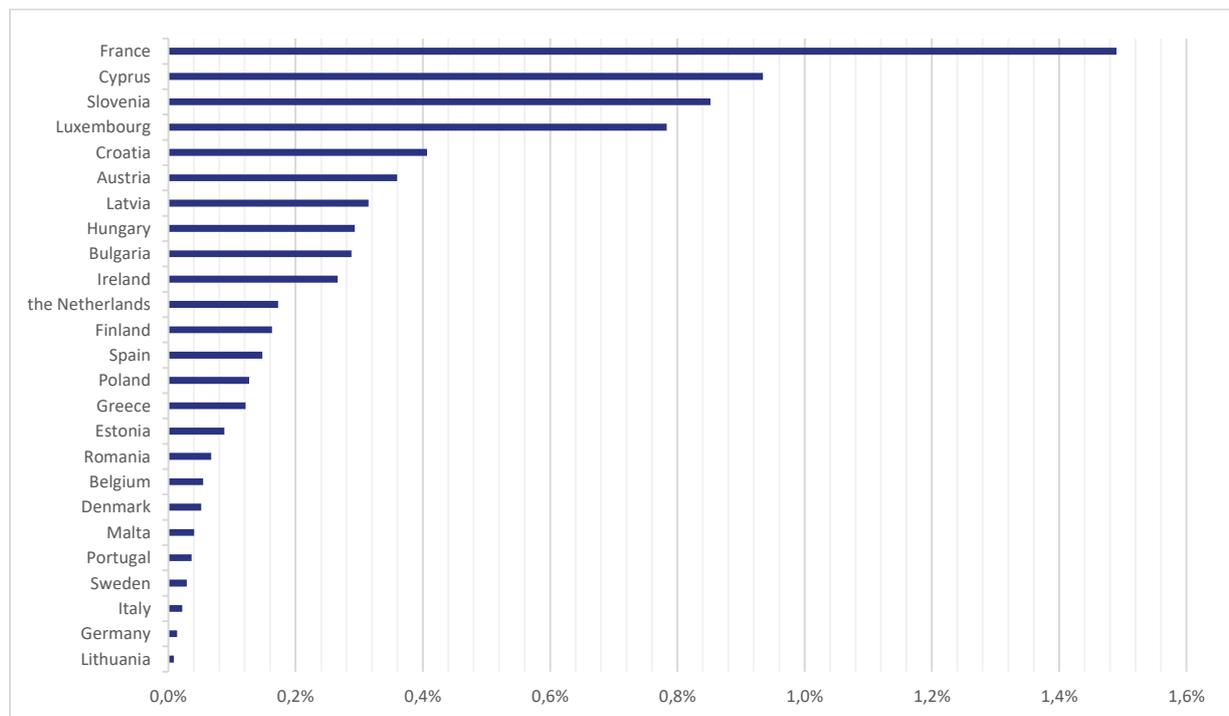
Figure 20: The share of unique visitors per month reported as percentage of total population

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[119] Vera Jourová, "Commissioner Jourová's remarks on Safe Harbour EU Court of Justice judgement before the Committee on Civil Liberties, Justice and Home Affairs (LIBE)", 26 October 2015

[120] '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 the given period. 'Visits' refer to the number of times a website is visited, independent of the numbers of visitors that access the website.

[121] EU27 population statistics as of 1 January 2020, retrieved from Eurostat news release: https://ec.europa.eu/eurostat/documents/2995521/11081093/3-10072020-AP-EN.pdf/d2f799bf-4412-05cc-a357-7b49b93615f1

[122] Note that the magnitude of the figures differs substantially from last year's because of a mistake in the calculations made for the 2019 report and visualisations. The mistake affected all countries equally, and had no impact on the scoring.

Besides the number of unique visitors, 24 countries also monitor the share of the visitors from foreign countries (see figure 21). The numbers depicted in the figure show that both Estonia and Austria have at least half of their portal visits from abroad. Denmark, on the other hand, only reports 2% of their visitors as coming from foreign countries.
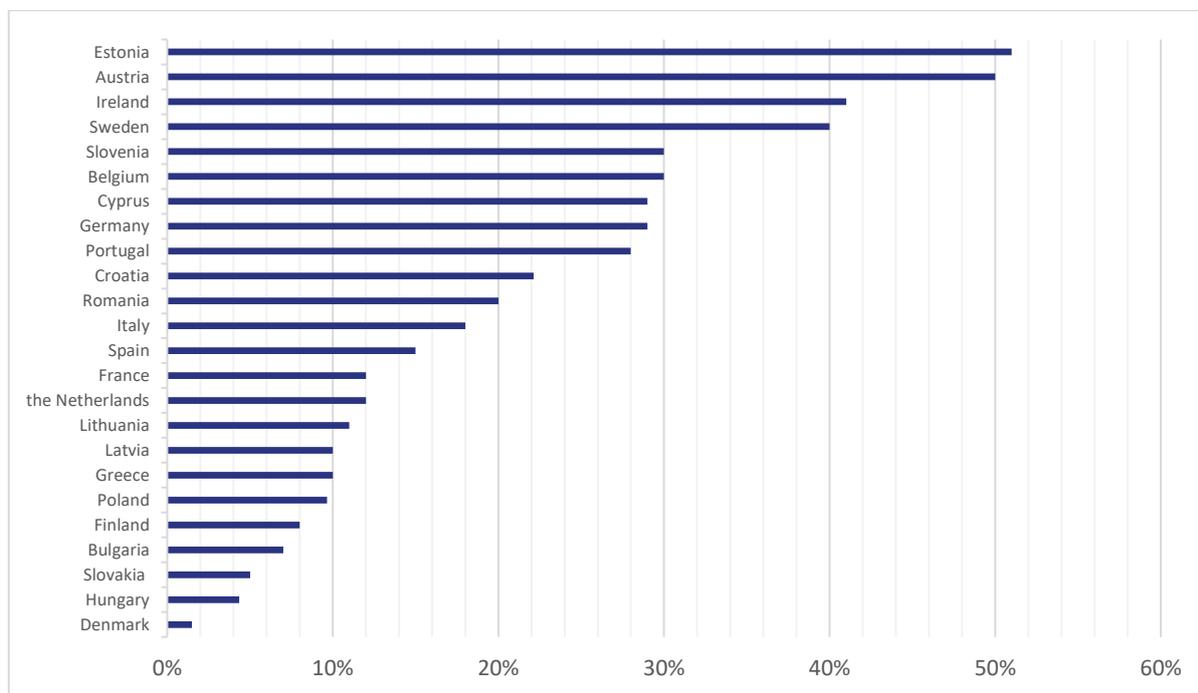

Figure 21: The share of portal visitors that visited the portal from a foreign country

Usage from abroad shows how advanced and entrepreneurial data re-users take the opportunity to discover data internationally and seek to gather datasets as close to the sources as they can reasonably get. Sources such as ministries and bodies of government are recognised for their authoritativeness internationally, despite the language barrier. At the moment of writing, in fact, only the European Data Portal is known to be performing systematic language translation of the metadata that describes the datasets, thanks to the European Union's e-translation services available to the Member States and EU institutions.[123]

Their national data portals act also as reliable directories to those ministries and bodies of government and make finding these institutions easier for re-users worldwide. This is particularly true when the national portals are offered in multiple languages. This aspect is not yet captured by this assessment, but our researchers are informed anecdotally of many countries spending significant effort in this direction. E.g. the Czech Republic, the Netherlands and Poland offer already partial support for languages different from their national language. The English version of the Polish data section can be found in figure 22.

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[123] https://ec.europa.eu/info/resources-partners/machine-translation-public-administrations-etranslation_en

Figure 22: The Polish national data portal's data section in English

Most national portals are aware of the profile or background of their portal visitors. For most countries, 24 of the EU27, there is no dominant profile type among visitors. For Malta the largest group of visitors come from the public sector, Sweden's portal is most frequently visited by citizens, and Portugal is not able to specify a profile type of their visitors. Additionally, 22 national portals indicate that the profiles of the users they attract to their portals entirely matches with the audience they want to cater for. The remaining countries, consisting of Germany, Lithuania, Malta, Portugal and Sweden, claim to have a preference for a broader audience and would like to attract more citizens, businesses and/or students to their portals.

3.2.3 Most popular data domains

Out of the EU27, 21 national portals monitor what keywords visitors use to search for data and content on the portals. Additionally, 23 national portals monitor the most and least consulted pages. Insights into the popularity of data domains allow portal teams to research the causes and stimulate better data re-use in the less popular ones.

There are 20 national portals that take measures to optimise the search and discoverability of both data and editorial content. Most countries mention that they are continuously putting effort into improving Search Engine Optimisation (SEO) or into providing more structured data and better metadata quality. Romania, for example, implemented Google Dataset Search[124] indexing within the portal, news features, and social media post. They offer support to publishers to encourage them to

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[124] Find out more at https://datasetsearch.research.google.com/ or by watching European Data Portal's Data Talk video interview with Google Dataset Search's prof. Natasha Noy at https://www.youtube.com/watch?v=W-9HMaAi78g .

improve their metadata. Also, Poland launched a new multifunctional search engine that enables searching according to multiple criteria, both in the resource metadata and in the content of structured data.

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 categories are the ones specified in the DCAT-AP standard. The frequency of categories being listed in the top 5 is used to create figure 23[125]. The most frequently consulted category is 'Environment', referenced by 16 national portals. The growth in popularity is recent, because 'Government & Public Sector' was the most popular data category in the previous two years. Striking for the result in 2020 is the 'Health' category, whose popularity increased drastically, likely due to the COVID-19 pandemic, especially in France and the Netherlands[126].
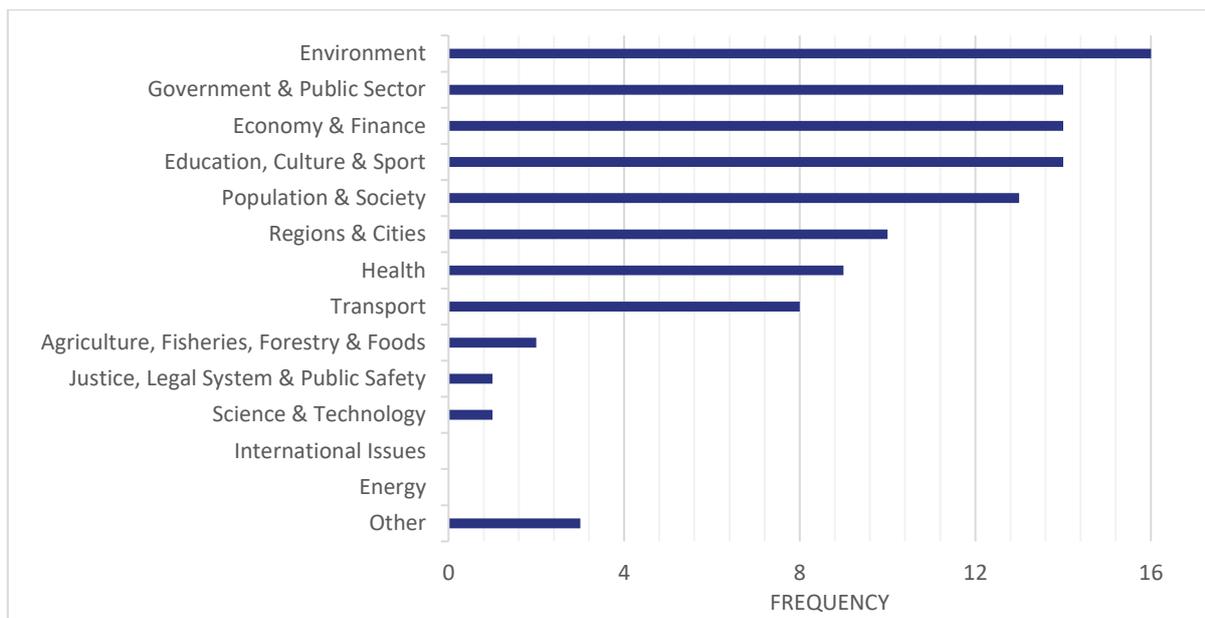
Figure 23: Most popular data domains[127]

It is important to note that there is no way to discern whether one category is "unpopular" because the portals' audience is uninterested in it, or because the countries are not in condition to offer enough relevant and valuable data on those topics.

3.2.4 Application Programming Interface (API)

On all 27 national data portals metadata is available in clear plain language to enable humans to search, read and understand it. For 25 of these portals the metadata describing the datasets is also accessible via a publicly available API. The API enables advanced users to access the metadata programmatically, e.g. by writing software that performs searches automatically, to identify new datasets.

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[125] Only 21 countries were in condition to report the top 5, and Malta only reported 2. All submissions were used to create figure 8. The Czech Republic and Luxembourg did not participate. Denmark focuses on the popularity of individual datasets rather than of categories. Slovakia uses different categories than the DCAT-AP standard, hence their submission could not be integrated in the results. Sweden recently implemented a new analytics tool that will gather this data, but the results are not yet available.

[126] The Netherlands created a new 'Corona' category in 2020, which made it to their top 5 most popular data domains. It was integrated in 'Health' to create this figure.

[127] The category 'Other' refers to categories that were listed by countries but are not part of the DCAT-AP 13 categories. The categories are: 'Built-up areas & Infrastructure, 'Housing', and 'Mobility'.

Additionally, 18 (72%) of the open data teams also monitor API usage, e.g. by running analytics on the respective log files. Estonia is working towards a new portal that integrates API statistics and plans to launch by the end of 2020. Furthermore, 13 countries were able to share what percentage of outgoing portal traffic is generated by API usage alone, shown in figure 24. It can be seen from the figure that at least half of the portal traffic in Denmark and France comes from API usage alone. The result is counter-intuitive and suggests that substantial open data re-use is taking place programmatically. The topic will be investigated further in next year's assessment.
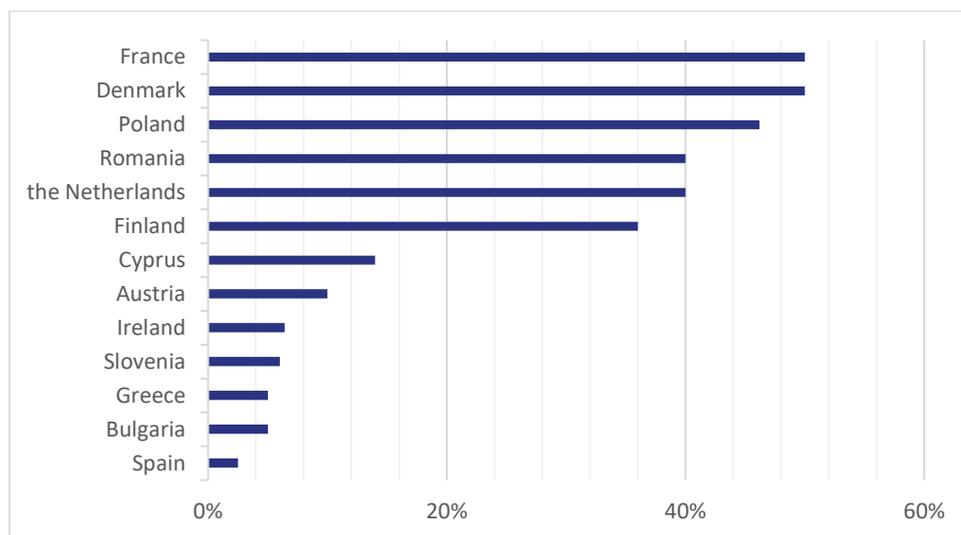
Figure 24: Percentage of outgoing portal traffic generated by API usage

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 indicator looks at challenges that countries face in order to harvest all national open data and the methods they use overcome these challenges.

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 12 (44%) of EU27 report that all data publishers in the country make use of the national portal to showcase their data. Nevertheless, of the remaining 15 national data portals, 14 did identify the data providers that are not yet publishing data on the national portal. In many countries, data publishers are not obligated to publish their data on the national portal but are encouraged to do so.

Additionally, 12 of the EU27 Member States offer the possibility to publish non-official data – that is data that does not stem from official sources, e.g. crowdsourced or community-contributed data. Most of these national portals have a separate section where, for example, private enterprises or NGO's can publish their data. Countries not offering this possibility argue that their main focus is public sector data and to ensure a good quality of the current data on their portal.

Austria even created a parallel Open Data Portal[128] where businesses and NGO's can publish non-official data, which is managed by the official data portal's team.

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[128] www.opendataportal.at

3.3.2 Challenges in data provision

The main challenges that the EU27 Member States mention regarding data providers contributing to national portals are that countries often fall short on the technical expertise, the available resources, and the awareness of the staff of public sector bodies to publish their data. Not all public sector bodies and institutions prioritise open data publication and even when they are willing to contribute to the national portal, it might be a challenge in terms of technical, human and financial resources. Especially smaller public bodies and institutions often lack the capacity to invest in open data publication.

Spain, for example, collects data at all levels of the Spanish administration (state, regional, and local), which can be done either manually or with the aggregator. However, the smaller Spanish municipalities with less than 10.000 inhabitants, do not have the personnel or technical resources to publish open data.

3.3.3 Overcoming challenges in data provision

Several steps can be taken to help data publishers contribute to the national data portal. Almost all countries, 26 of the EU27, provide support to data publishers, for example by providing trainings, helping with legal and technical questions, or supporting with the production of DCAT-AP metadata. Countries such as Latvia and the Netherlands, identified the data owners that are currently not publishing their data and communicates directly with them and support them if necessary. In addition, countries organise webinars and meetings on advantages, opportunities and benefits of opening up data and contributing to the national data portal.

A great practice example can be found in Finland. They mapped all public bodies that should be able to publish open data and met with an initial set of providers. They organised a series of meetings with data publishers to increase awareness of their national data portal. Finally, the Finish data portal offers an example dataset using the Company Register open API to provide a sample implementation of what could constitute a high-value dataset that uses an open API. The guide dedicated to support data publishers with the publishing process can be found in figure 25.

Figure 25: Data Opener Guide created by the Finish data portal

Another great effort to enhance the publication of data is found in Estonia. Although, the majority of public sector organizations already contribute to the portal – mainly because it is mandatory by the Public Information Act[129] (guidelines on data publication) – a few organisations are still not where they should be. Efforts to support data publication are twofold. First, the Ministry of Economic Affairs and Communications (MoEAC) actively works to encourage data providers to publish their data on the portal. This is done through a public sector open data working group, a data management working group and communicating with organizations holding the data. Furthermore, the most common reasons why organisations (often in smaller municipalities) do not publish their data are technical or resource problems and the lack of knowledge about GitHub. Currently, a new version of the portal is being developed, which will be launched by the end of 2020. The new portal will be more user-friendly because it will be less depended on GitHub.

3.3.4 Access to real-time and dynamic data

Another aspect assessed under this dimension is the level at which the national open data infrastructure also provides access to real-time and dynamic data. Currently, 23 (85%) of the national portals offer real-time data on their portal. This is an improvement compared to last year, since Bulgaria and Croatia recently implemented this feature as well. This improvement could be attributed to the strong promotion of space of real-time and dynamic data by the latest Open Data and Public Sector Information directive. The 23 portals that offer real-time and dynamic data were asked what percentage of the metadata on their portal links to such data, the results are shown in figure 26. It shows that the majority of countries (13) only have a small percentage of their metadata linked to real-time or dynamic data. Noteworthy are the two countries, Denmark and Latvia, who have more than 30% of their metadata linked to real-time or dynamic data.
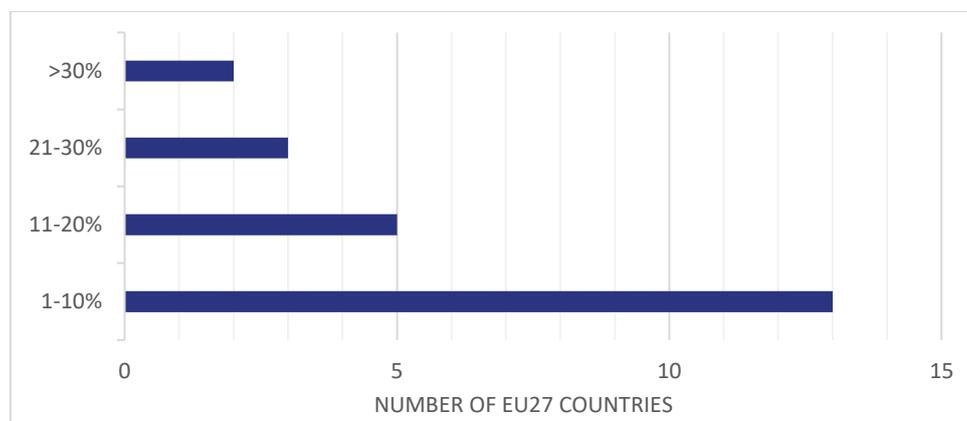
Figure 26: Percentage of the portal's metadata that links to real-time or dynamic data

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, and the measures in place to ensure that the portal caters to the needs and brings an added value to the main audience.

In 2020, 23 (85%) of the EU27 national open data portals have a strategy in place that ensures the portal's sustainability. Only Belgium, Hungary, Portugal, and Romania did not report sustainability strategy, but Romania's strategy is currently under development and they hope to adopt the strategy by the end of 2020. For 21 of these portals the sustainability strategy includes a description of the

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[129] https://www.riigiteataja.ee/en/eli/514112013001/consolide

target audience and measures on how to reach the audience. As in previous years, in most cases, the sustainability strategy seems to be limited to the portal being recognised as a necessary and instrumental function of government operations in the broader open data strategy or digital agenda of the country – in the cases in which open data is integrated into this strategy. The budget to maintain and improve the portals is, hence, part of the budget dedicated to the national open data teams' operations.

3.4.1 Enhancing visibility

To ensure the sustainability of the portals it is important to make sure that visitors are coming back and that new visitors are being attracted to portal. All 27 Member States of the EU27 indicate that they enhance the visibility of the portal by promoting their available features and data. Promoting the portals is mostly done by using social media, attending or hosting events, conferences and hackathons, or sending newsletters. In terms of social media, the national data portals, apart from Hungary, Lithuania and Malta, have an active social media account to assist with communication and awareness-raising.

Germany demonstrated a great way to promote their data portal in 2020. They took part in the biggest worldwide hackathon #WirVsVirus[130] on finding solutions to the challenges caused by the COVID-19 pandemic.

Another way in which national portals enhance the visibility of their work is the use of source code sharing platforms such as GitLab or GitHub to publish their source code, other useful software artefacts, and to ask for the community's feedback on those elements. In 2020, 24 (89%) national teams reported that they used such platforms in their daily work, where GitHub appears to be the most popular option.

3.4.2 Gathering insights into user satisfaction

In 2020, 20 national portal teams have conducted a user satisfaction survey on the national portals, which in an increase of 8 portals compared to last year. These surveys refer to a good, though not significant, number of surveys, representing opportunities for the portals to improve upon. Some countries, for example, Croatia, Cyprus, Denmark, the Netherlands, and Poland conduct an annual survey. Other countries, such as Estonia, Ireland, and Spain offer a user satisfaction survey on their portal which is available all year round.

France makes use of both options listed above. They offer contact details where users can ask for support for technical support, improvements to the portal, or other requests related to research of the use of open data all year long. Additionally, a large survey was launched in the beginning of 2020[131] aimed to strengthen the understanding of the stakeholder usage of the portal.

Lithuania made drastic changes based on the user satisfaction survey results. After evaluating the complaints of potential open data users and the evaluations of the representatives of public organizations, a decision was made to update the old portal. A new portal was launched on 1st July of 2020.

Spain also used the results of the conducted surveys to their advantage. The survey gathered insights into the performance of new functionalities of the portal, visitor profiles, the highest-valued and most requested datasets, re-use cases, and public bodies' approach to monitor the re-use of their own

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[130] https://wirvsvirus.org/
[131] https://www.etalab.gouv.fr/participez-a-lelaboration-de-la-nouvelle-feuille-de-route-open-data-detalab

datasets. All these insights are already, or are currently in the process of being, integrated in the development of the portal.

3.4.3 Reviewing and improving the national portals

A way to make sure portals cater the user's need is by reviewing and continuously improve the portal and its functionality. Regarding the practices used to review and improve the portals, 26 of the EU27 national portals have a process in place by which portals are reviewed and improved on a regular basis.

For example, the Czech national open data portal is consulted every year by their Chief Architect in order to discuss new technical standards and features. For every year there is clear schedule being created with a package of new features which are then implemented according to plan.

Sweden has two processes in place for reviewing the portal. They go through the user feedback from the beta-footer tracker every two weeks and gather and prioritise the activities using sprint-planning. Furthermore, they receive quarterly updates with reviews of the portal, metadata statistics, and information on new publishers from their service provider.

The frequency by which these processes are ran differs per country and are illustrated in figure 27. Most national open data portals (42%) are reviewed quarterly. Others are reviewed bi-annually (23%) or annually (31%). Only, Luxembourg reviews their portals less frequently.
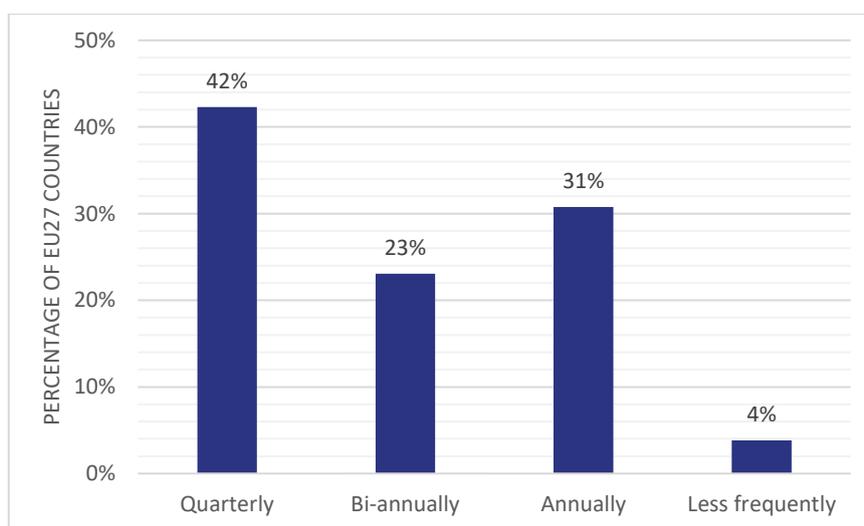
Figure 27: Frequency of reviewing and improving the national portals

3.4.4 Monitoring performance

The awareness of the portal's 55performance and usage can be used to prove the importance of the continuity of activities. Portal teams can use that information to ensure a continuous flow of sufficient funding from their governments to continue their efforts. In order to monitor the portals' performance, 23 (85%) of EU27 portals offer a monitoring tool such as a dashboard to showcase the main key performance indexes related, 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 licences.

An interesting practice example is found in Spain. They created a user-friendly dashboard[132] that provides an overview of the portal's numbers using interactive graphics. The graphics showcase the

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[132] https://datos.gob.es/en/dashboard

number of global visitors, the number of datasets and other content that was published per administration level and category, and the most popular datasets and download format. Also, the graphs can be downloaded, including comments, in multiple formats.

Another good example is found in Estonia. They created a dashboard[133] that visualises information about, for example, number of datasets, portal users, and the regions where the portals visitors come from. Estonia's data portal experienced a major expansion last year. The portal's number of datasets increased by more than 400%. A screenshot of Estonia's dashboard can be found in figure 28.
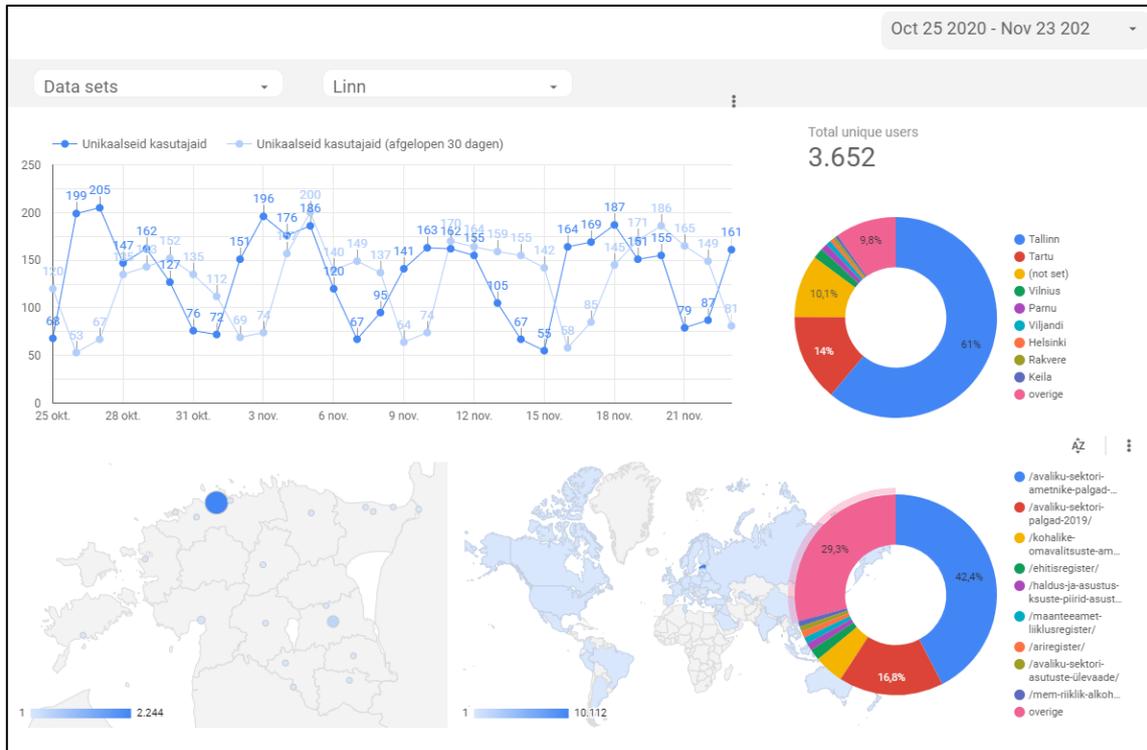
Figure 28: Estonia's interactive dashboard showcasing the portal's performance

Going one step further, 20 (74%) of EU27 national portals offer additional features that allow also data publishers to monitor their own activity on the portal, which is an increase of 17% compared to last year. This type of monitoring tools can create a "positive competition" amongst public bodies and nudge the lesser performers to improve the volume and quality of their publication. At the same time, such feature 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 requires the users to log-in before they can see the statistics.

A great example of statistics on data publishers can be found on the Italian data portal. They provide an administrations list[134] where the data publishers are listed with their number of datasets published. Additionally, they provide a list of the source catalogues[135] harvested by the national portal with the number of datasets included in each catalogue. Furthermore, a validator was implemented in order to

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[133] https://datastudio.google.com/u/0/reporting/d10802f8-1f5c-4bca-a374-6ce4f0d5be44/page/LuBV?s=pQosLHYYyAU

[134] https://dati.gov.it/amministrazioni

[135] https://dati.gov.it/elenco-harvest-sources

let the data providers know about the metadata quality and the conformance to the mandatory and strongly recommended properties, such as point of contact.

3.5 Overall performance

In this final section the overall performance of the EU27 Member States is evaluated based on the dimension listed throughout this chapter. When looking at the maturity development over the years, figure 29 shows that the portal dimension increased each year except for 2018. In the early years, countries were starting from scratch, it was relatively easy for Member States to improve their performance by setting up their national open data portals in the first place, in most cases relying on mainstream dedicated software like CKAN or DKAN. Their basic functionalities have been implemented thoroughly in the early years to make data available and accessible to the public.

It is meaningful to observe how their overall performance increased by 12 percentage points in 2020 alone, without changes in the survey from the previous year. It is presumed that the desire to respond to the open data demand related to the COVID-19 pandemic stimulated and accelerated development. Portals had to adapt quickly and cater the users need to the best of their abilities. The pandemic has put open data on the map. Over time, and with the overall open data maturity in Europe increasing, and re-users demanding for more, portals have to meet higher expectations to serve the needs of their communities.
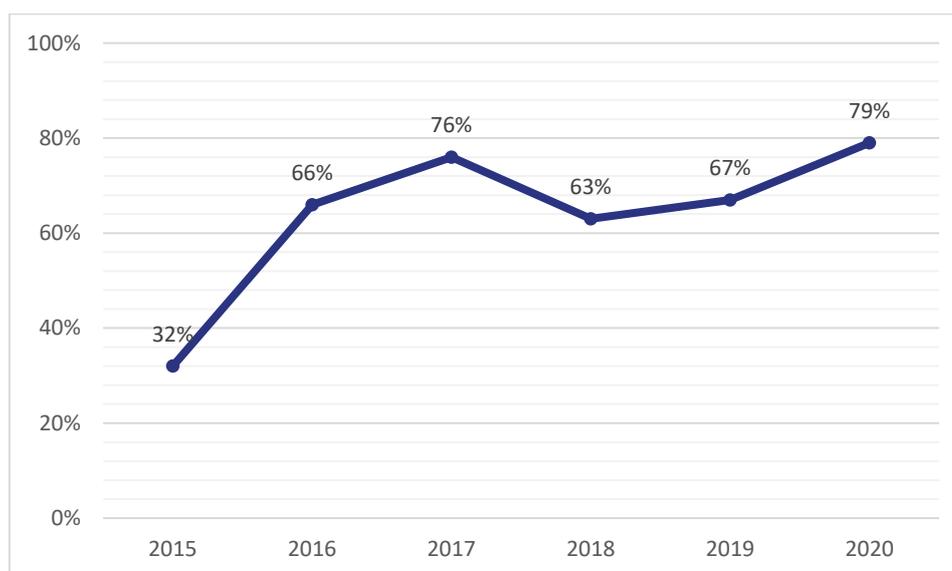
Figure 29: Development in maturity of the portal dimension over the last years (used to be EU28)

Figure 30 shows the EU27 average maturity on each of the 4 indicators of the open data portal dimension. The most mature indicator within the portal dimension is deriving insights into portal usage (86%). This is followed by the activities taken by portals to ensure portal sustainability (81%). This indicator showed the biggest improvements since last year, since it increased by 22 percentage points. It is followed by the features that the portals offer to ensure discoverability and access to datasets and relevant content (79%), and lastly the indicator on the provision of data by data publishers (66%).
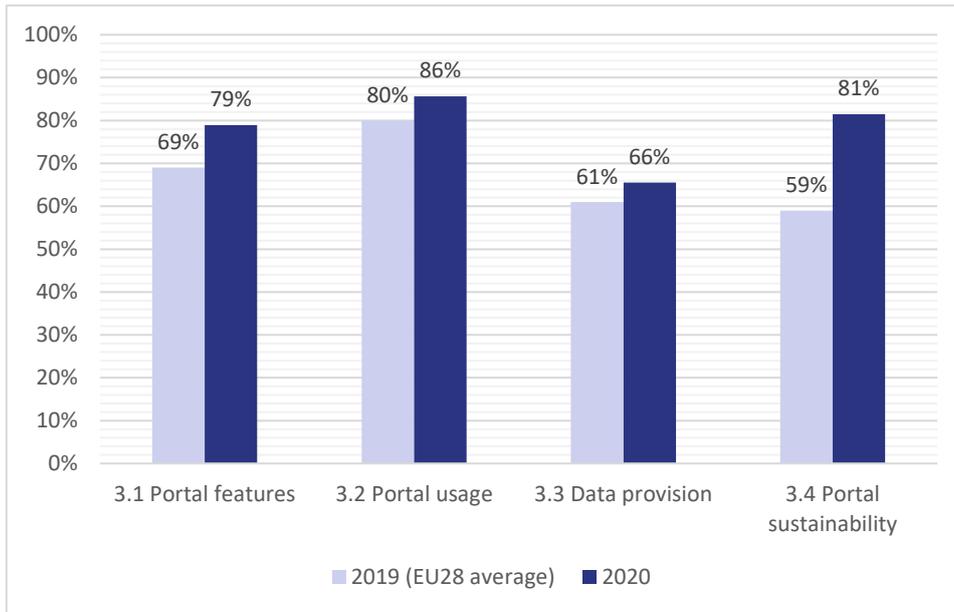
Figure 30: Maturity score per policy indicator compared to last year

The country ranking of the portal dimension can be observed in figure 31. The figure shows that the majority of 18 Member States score above the EU27 average of 79% and only 9 Member States scored below. The countries with the highest maturity levels on the portal dimension are France (93%), Ireland (92%), and Denmark (91%).
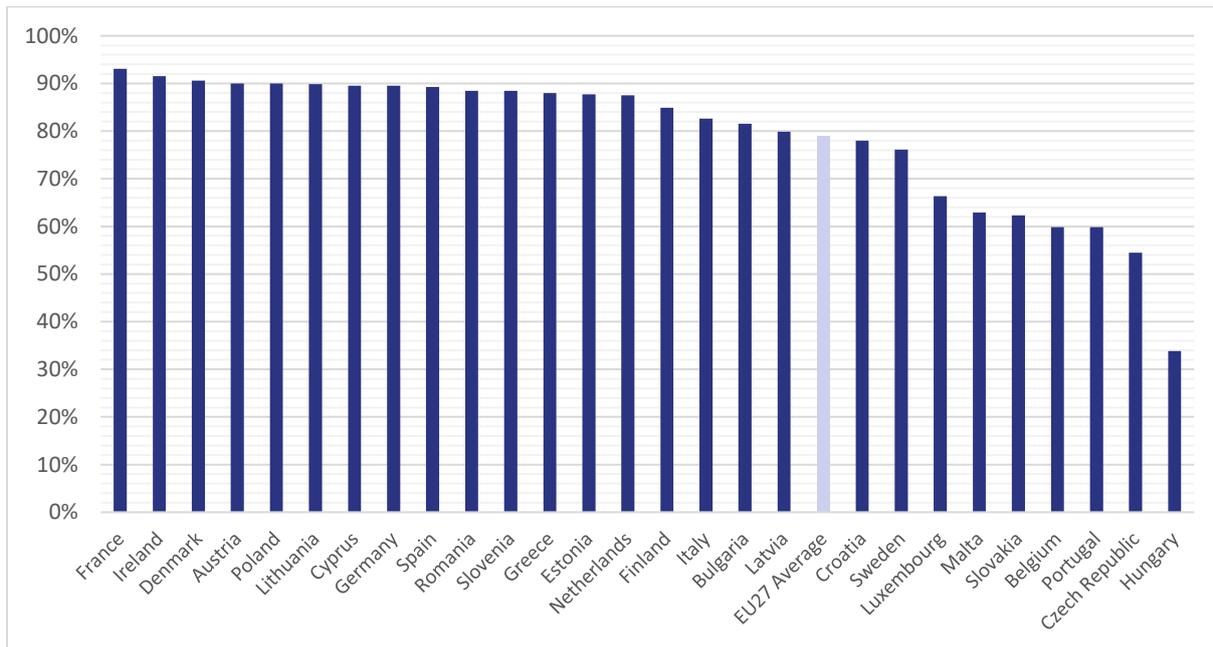
Figure 31: Country ranking for the portal dimension

Chapter 4: Open Data Quality

In addition to the quantity of data being made publicly available, the quality of the data and metadata is becoming increasingly important. Merely focusing on the sheer quantity of data is simply not enough any longer, rather the quality of publicly made available data is essential moving forward, and the degree by which quality enables the application of data to create insight and build 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 monitoring mechanisms that are in place to ensure high-quality publication of metadata, compliant with the DCAT-AP standard and compliant with several deployment quality requirements. Deployment quality refers to using open data licences, open and machine-readable data formats, using Unique Resource Identifiers, and suitable to 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.
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 in 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. Percentage of published open data that complies with certain deployment quality requirements.

4.1 (Meta)data Currency and Completeness

This indicator analyses to what extent 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 the national portal.

30% of Member States indicate that all metadata describing the datasets available on the national portal is updated within 1 day from the moment its primary source is updated. This is ensured by having a pre-defined approach for updating metadata and aided by automatic harvesting processes.

4.1.1 Up-to-date metadata

78% of Member States have a pre-defined approach in place to ensure that the metadata is kept up to date. Up-to-date metadata on the national portals is critical for users to obtain the correct information about the data that it describes. Some countries already indicate that it is the responsibility of the original sources and suppliers of datasets – government bodies institutions at all levels, agencies, public undertakings etc. - to ensure up-to-date metadata. Up to date metadata is then propagated through the many publishing venues, including the national data portals.

In several countries, such as Denmark and Greece, it is defined by law that every time data changes the metadata must be updated.

In Poland, part of the data is harvested automatically from suppliers. Their metadata is updated automatically with a frequency specified by the portal administrator for each of the data sources (at the moment all data downloaded automatically is updated daily).

In Ireland, the national data portal harvests a defined set of 16 sources automatically on a nightly basis. These are public bodies with a large number of datasets or with data that is frequently updated, so automatic harvesting is logical. Moreover, an increasing number of datasets (+600) are available by APIs. On the other hand, public bodies with few datasets or which are at the early stages of data publishing, upload manually – in this case, the upload process ensures that metadata needs to be supplied.

In Slovenia, the approach is defined in the Governmental decision on Editorial Policy[136] which obliges all ministries and public bodies (sectoral editors) to publish and maintain data. The datasets to be published must first be approved by the Sectoral Editor and after that also by the Chief Editor. The task of the editors is also to maintain data, i.e., making sure the data is up to date. In addition, the Manual on Open Data[137] dictates as one of the main principles, the principle that the data provided must be up to date.

In Romania, each public body is required to specify a publication plan that includes the update interval. Monitoring is done manually, though on a regular basis. This will be automated in new versions of the portal.

Automatic metadata sourcing

The ability to keep the metadata up to date depends, among others, on the extent to which metadata is obtained from its source automatically.
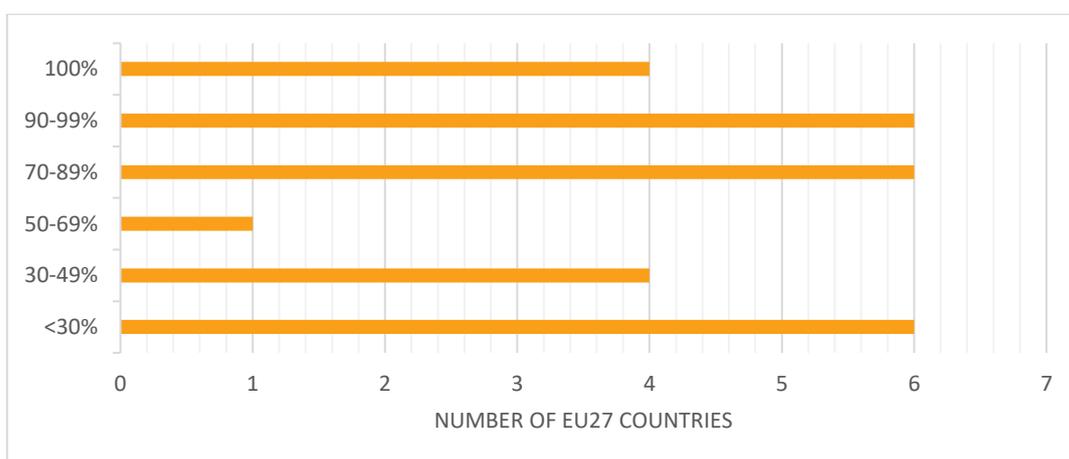
Figure 32: Percentage of metadata obtained automatically

Figure 32 shows the percentage of the metadata that is obtained from its source automatically by each country. Only in 4 (15%) countries – Belgium, Denmark, Italy, and Sweden – all metadata is uploaded in an automated way to the national portal. Additionally, 6 (22%) countries obtain between 90% and

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[136] Gov. decision n.b.38200-17/2013/3 http://vrs-3.vlada.si/MANDAT13/vladnagradiva.nsf/71d4985ffda5de89c12572c3003716c4/384a4d9329d25d8fc1257c4400332ab0?OpenDocument

[137] *the principle No. 3: »Ažurnost«* https://podatki.gov.si/posredovanje-podatkov/principi-odprtih-podatkov

99% of their metadata from the source automatically. Looking at the right side of the figure, however, it is shown that 6 (22%) countries obtain less than 30% of their metadata from its source automatically. The distribution shows clearly two clusters of countries: the ones who are investing significantly in automation and the ones that – for any reason, whether lack of funding, skills etc. – are lagging behind. This means that most of the metadata in the latter group is edited manually to some degree, which is more time consuming and may create friction to scale up as the amount and complexity of data grows. Moreover, manual editing of metadata easily allows for human error.

4.1.2 Up-to-date datasets

Together with the metadata, the currency of the data itself if also critical for re-users. Ideally, datasets are up to date if they represent fairly *in time* the phenomenon they are intended to describe and enable application. E.g. data describing live weather or traffic needs to be updated in real-time, by the hour – possibly by the minute or by the second – to enable complex applications such as forecasting. On the other side, data from a population census that is run every 10 years does need to be updated only following completion, or when mistakes are found and corrections issued.

Also, gaps in the time series compromise significantly its usability. In case of annual data, for example, the dataset is considered up to date in case it contains data until last year. In case of daily data, a dataset is up to date in case it included data until yesterday.

Figure 33 shows the degree to which datasets cover the full period from when they were first published until today. Only 2 Member States indicated that all datasets on their portal cover the full period from when they were first published until today – Latvia and Lithuania. 11 Member States indicate the majority of datasets and 8 Member States indicate approximately half of the datasets, whereas 6 say only few datasets available on their portal are up to date.
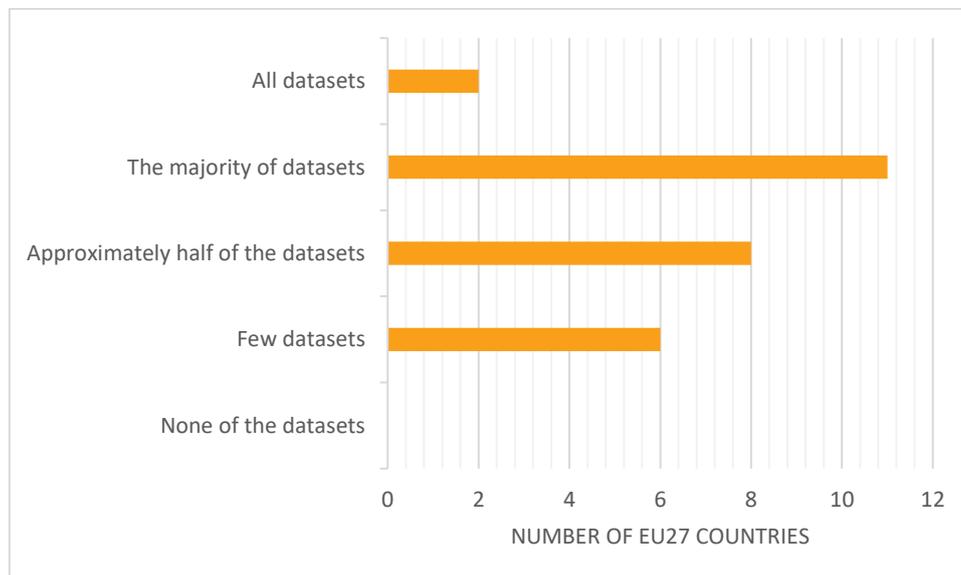
Figure 33: The extent to which datasets are up to date

4.2 Monitoring and measures

This indicator analyses the extent to which mechanisms are in place to assess and boost the quality of metadata and the compliance level in terms of correct licensing information. In addition, the indicator looks at 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.

4.2.1 Monitoring the quality of metadata

At the time of the survey, the great majority (89%) of Member States monitored the quality of metadata on their national portals. Countries indicate using a variety of tools to monitor and validate the metadata.

In Bulgaria, a daily review of the updated datasets for the current day is carried out in order to improve their quality by giving feedback and guidance to take the necessary action.

In Sweden, a new feature was launched providing each data provider with a "metadata health checker dashboard" to check statistics such as quality and completeness[138]. This data is also aggregated to give portal administrators at the Agency for Digital Government a general, aggregated view. Complementary to the dashboard, the Agency also gets quarterly reports on qualitative and quantitative status on the portal including metadata status, new publishers, errors etc.

In Italy, a validator tool has been implemented to verify the consistency of the metadata entered with the mandatory and the main recommended elements of the Italian DCAT-AP profile extension (DCAT-AP_IT). Similarly, in Ireland, the metadata is validated programmatically by the harvester according to DCAT-AP – which standards and requirements are set out in the country's Technical Framework[139].

Even though the great majority monitors the quality of the metadata, just over half of the Member States (55%) also publishes that information on their portal.

In France, a catalogue of all published datasets and associated metadata is published, which enables the national open data team and the public to monitor the quality of the metadata.

In Spain, a public dashboard[140] and an annual report[141] on the quality of the metadata is made available. In addition to the public dashboard, data providers have also access to dedicated dashboards with greater details about their datasets.

In Czech Republic, information on the metadata quality is available on the Statistics page of their national portal.

Some countries, such as Germany and Estonia, are at the time of writing also working on implementing these kinds of dashboards.

4.2.2 Support in publishing high-quality metadata

In order for data to be open, it should be accessible and licensed for anyone to access, use, and share. 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.

Guidelines

In 2020, 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 aware of the importance of providing licensing information, as all Member States assist publishers in choosing appropriate licences by publishing guidelines.

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[138] For more information see https://registrera.oppnadata.se/organization/174/statistics
[139] For more information see https://data.gov.ie/pages/opendatatechnicalframework
[140] https://datos.gob.es/es/dashboard
[141] https://datos.gob.es/sites/default/files/datosgobes/informe_calidad_metadatos_2020.pdf

In Austria, a page on the national portal provides guidance using plain language, accompanied with further publication guidelines and helpful links.

In addition to offering guidelines as PDF booklets, in Slovakia, a video was created, too, to guide publishers to how to publish open data.

Recommending standard licences

In the vast majority of Member States (81%) the guidelines provide recommendations for the use of standard licences, such as the Creative Commons (CC) ones. In some countries, the use of standard licences is prescribed by law, while in others it is just a recommendation.

The spectrum of choices varies significantly between countries. The focus of this assessment in evaluating the countries' maturity is on the effort spent on promoting licence *standardisation*, rather than on the choice of a licence rather than another. The objective is streamlining open data re-use, without the added complication of non-standard licences that need to be investigated by re-users on a case by case basis.

The Austrian Framework for Open Government Platforms[142] serves as the official, formal agreement between the federal and state levels of government. According to this agreement, CC-BY 4.0 is mandatory for Austrian public sector bodies for the publication of open government data.

In Cyprus, according to Article 12 of the Cypriot Public Sector Information Law[143]: "Public sector bodies permit the re-use of documents, information and data through an open standard licence without any restriction, other than the obligation to provide acknowledgment of source and acknowledgment of whether the document, data or information have been modified in any way or impose conditions through obtaining a special individual licence or through imposing charges: these conditions shall not unnecessarily restrict possibilities for re-use and shall not be used to restrict competition". These open standard licences are defined as the CC-BY 4.0 and CC-BY-SA 4.0 in Cyprus' national Technical Guidelines to Publishers of Data[144]. Using one of these licences is required to publish on Cyprus's national open data portal, unless an exemption is obtained.

In several countries, such as Estonia, the use of CC licenses is not prescribed by law but recommended. Also, in Lithuania, the preference for standard licences is explicit. Though not prescribed by Lithuanian law, a CC- BY 4.0 licence is used as a default when publishing data.

Some countries have introduced national licences in the past, yet have started promoting the use of CC licences more recently.

In Italy, a national licence, IODL[145] (Italian Open Data Licence), was developed. More recently, in line with the recommendations of the European Commission, the use of CC licences is promoted.

Similarly, in Spain, a national licence[146] was developed based on a decree[147] published in 2011, when the use of CC licences was not yet common practice for data. Therefore, simple conditions of use were specifically designed for reusing public sector information. The conditions of the national licence are similar to CC-BY 4.0. Currently, the use of CC licences for public sector information is promoted in the

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[142] https://go.gv.at/ogdocs
[143] https://bit.ly/2s2dhgr
[144] https://www.data.gov.cy/technical-guidelines
[145] https://www.dati.gov.it/content/italian-open-data-license-v20
[146] https://datos.gob.es/es/avisolegal
[147] https://www.boe.es/diario_boe/txt.php?id=BOE-A-2011-17560

publishing guidelines, though these provide information about both the Spanish and the CC licences, so that data managers can establish the most suitable option.

Support activities

In addition to providing guidelines, 85% of Member States conduct regular activities to incentivise and assist data providers in the publication of data in machine readable formats accompanied by high-quality metadata. These include among others, regular meetings, trainings, workshops, webinars or other events to establish a common understanding on the importance of high-quality data publication.

In Bulgaria, regular online meetings were started at the beginning of 2019 to support open data providers with increasing the quality of the data published on the Open Data Portal, including the move to machine-readable formats. Coordination was put in place to support the publication of high value datasets, providing national contact points on priority topics with regular exchanges of knowledge. For example, a working group was established jointly with the Association of Car Manufactures, the Executive Agency Road Transport Administration, the Ministry of Interior – as a data holder, and the State e-Government Agency in order to improve the quality of the data published on the portal on registered road vehicles.

In Estonia, machine-readability is promoted as part of key policy documents (see the Green Paper on Machine-Readable Public Sector Data) and at open data-related events, e.g. at the public sector working group that convenes 3-4 times per year, and at the yearly Open Data Forum. The Public Information Act mandates certain key datasets to be published as machine-readable open data by default.

In Sweden, the agency for digital government (DIGG)[148] has established an open data task force to provide technical user with support in the publication of metadata on the national portal. DIGG has established guidelines including in-depth recommendations on metadata quality and harvesting, as well as answers to frequently asked questions, and examples on mandatory and recommended classes in the most common formats[149]. Moreover, a meetup series was set up by DIGG[150], with several seminars with specific focus on open data and API governance including metadata publication and quality.

In Finland, The Data Owners' Guide encourages making data available in machine-readable format and provides guidelines and instructions on what constitutes high-quality metadata. Additionally, if the portal team identifies an interesting piece of data/information that should be opened up, e.g. in the news, they follow up with the publisher and request the use of a machine-readable format in addition to any pre-existing proprietary formats. Additionally, the team also conducts occasional searches in their own portal. They send email reminders to update the data and the related descriptions/metadata fields to owners of data sets with an insufficient quality score.

In Greece, support is provided via multiple meetings, training, roundtables, official communications etc. Currently an AI tool is being explored to assist users in providing metadata that describes their dataset and/or to improve the metadata already submitted to the portal.

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[148] https://www.digg.se/utveckling-av-digital-forvaltning/sveriges-dataportal
[149] https://diggsweden.github.io/DCAT-AP-SE/ (to be transferred to docs.dataportal.se).
[150] https://gitlab.com/open-data-knowledge-sharing/wiki/-/wikis/home

4.3 DCAT-AP compliance

DCAT is a W3C standard designed to facilitate interoperability between data catalogues published on the web.[151] DCAT-AP is an extension to DCAT – an "application profile" – that was developed by the European Commission specifically to improve interoperability and foster discoverability and re-use of open data across European catalogues.[152] Compliance to DCAT-AP is increasingly recognised among the Member States. The DCAT-AP compliance indicator examines 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 ensuring compliance with DCAT-AP. Also, the availability of recommended and optional classes are considered.

4.3.1 Assisting data providers to be DCAT-AP compliant

89% of Member States provide data suppliers with documentation on DCAT-AP. This documentation can consist of Member States' own developed documentation, factsheets provided by the European Data Portal or materials published on websites hosted by the European Commission, such as the JoinUp Platform[153].

In Portugal, in addition to documentation available on the portal, during the data upload process help buttons explain to the user how to add metadata compliant with DCAT-AP.

In Poland, the technical standard published on dane.gov.pl has been supplemented with the implementation of the standardised DCAT-AP metadata schema.

In Ireland, documentation on DCAT-AP is provided on the Portal in a number of ways. Documentation[154] explains the DCAT-AP standard and links to further information and material on DCAT-AP and other standards are provided. The Publication Guide[155] sets out the main elements of DCAT-AP and provides links to the DCAT AP and DCAT reference documentation. The Technical Framework[156] sets out the standards for the publication of data to the portal. It ensures that the publication of datasets on Data.Gov.ie is done in a consistent persistent and open way. The process to publish data on the portal, assists users through fulfilling the DCAT-AP requirements ensuring full compliance. The Open Data Audit Tool[157] also assists publishers through the process to achieve DCAT-AP compliance.

4.3.2 Investigating causes for a lack of DCAT-AP compliance

The importance of DCAT-AP for national data portals is also evident from the efforts taken to investigate the most common causes for lack of compliance. 75% of Member States investigate this and some examples of the main causes are included below.

In Italy, one of the main causes for lack of DCAT-AP compliance is that data providers indicate different licences for each distribution format, that is a contradiction as the licence to re-use should be independent of the format of distribution. In Sweden, a lack of technical skills and understanding to set up the DCAT-AP RDF metadata is indicated as the main cause for non-compliance. This is the prime reason why they have developed the Swedish DCAT-AP extension (DCAT-AP_SE) and established a

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[151] https://www.w3.org/TR/vocab-dcat-2/ .

[152] For more information see https://joinup.ec.europa.eu/collection/semantic-interoperability-community-semic/solution/dcat-application-profile-data-portals-europe and the European Data Portal's own Open Data Goldbook for Data Managers and Data Holders at https://www.europeandataportal.eu/en/training/data-providers-guide .

[153] https://joinup.ec.europa.eu/

[154] https://data.gov.ie/pages/opendatatechnicalframework#recommended-standards-for-open-data

[155] https://data.gov.ie/pages/guideforpublishers

[156] https://data.gov.ie/pages/opendatatechnicalframework

[157] 'Add a dataset' at http://audit.data.gov.ie/

technical framework and all the related documentation, recommendations, and a sandbox environment.

In Romania, the lack of available skills in using controlled vocabularies and of standardised management of data create friction to structured and compliant publication.

In Finland, there are several reasons for a lack of compliance. Older data sets that were published before DCAT-AP 1.1 may have not been updated since. Several data owners provide minimum metadata only. The Finnish portal does not mandate filling in some of the recommended fields, nor any of the optional fields when submitting new datasets. Also, for some of the harvested datasets (e.g. geospatial data), the metadata available does not exactly match what is required by DCAT-AP metadata, and a translation from one format to the other is not performed or possible.

4.3.3 Compliance with DCAT-AP Mandatory, Recommended, and Optional Classes

Figure 34 shows the percentage of metadata on national data portals in Europe declared to be DCAT-AP compliant and that provide recommended and optional classes.
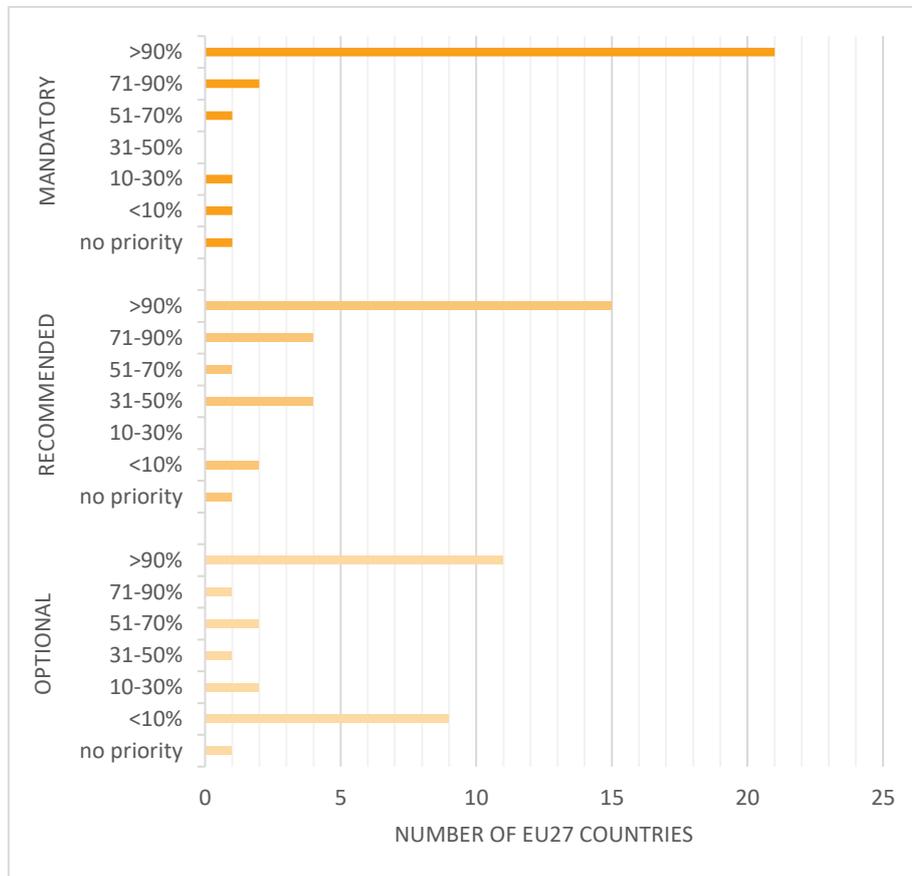
Figure 34: Percentage of metadata compliant with DCAT-AP and using recommended or optional classes

The figure shows that in 20 (74%) countries more than 90% of the metadata is declared by respondents to be compliant to mandatory classes (agent, catalogue, dataset, literal, resource). In 15 (56%) countries, more than 90% of the metadata is assumed to meet the standards of recommended classes (category, category scheme, distribution, license document), and in 11 (41%) countries, more than 90% of the metadata meets the standards of optional classes (catalogue record, checksum, document,

frequency). Similar to last year, countries are focusing on compliance by providing metadata for the mandatory classes but investing limited effort in recommended and 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"[158] or the "FAIR Principles"[159], to assess the quality of data deployment. This indicator assesses to what extent data is available online under an open licence, in the form of structured data, machine-readable, using Uniform Resource Identifiers (URIs), and including links to other data sources.

4.4.1 Deployment Quality Models

78% of Member States use a model to assess the quality of data deployment. Most countries mention using the 5-Star Open Data model to the point of occasionally using it as a decision-making tool to determine which datasets are allowed to be published on their portal. The same number of Member States (78%) also conducts activities to promote and familiarise data providers with ways to ensure higher quality data, such as promoting their chosen model.

In Cyprus, the 5-star model is adopted through the National Technical Guidelines for publishing datasets on the portal. As a general rule, only datasets with a 3-star rating or above are published. Exceptions are allowed only in the case that the publishing public sector body provides a plan to achieve 3-star rating (see national technical guidelines).

In the Czech Republic, the FAIR principles are used. It is first assessed whether a dataset uses non-linked open format (CSV, XML, JSON, etc.) or is linked data (RDF and outgoing links). Findability is assessed by the dataset's presence in the national catalogue. Accessibility is given by publication of the dataset on the web and usage of open formats. Interoperability is assessed by usage of DCAT-AP for metadata and open formal norms (open specifications) for data. Reusability is assessed by the quality of data documentation and machine-readable schemas.

A few countries, such as Germany, do not yet use a model to assess the quality of data deployment, but are planning to do so by the end of the year.

4.4.2 Deployment quality

Below, an overview is given on extent to which data is available online under an open licence, in the form of structured data, machine-readable, using URIs, and including links to other data sources.

Open licence

This indicator examines if data is accompanied by open licensing information. The majority of Member States (78%) have more than 90% of the published data made available under an open licence (see figure 35).

In some countries the national open data portal does not only make open data available, but also documents the availability of more "closed" data - pursuing a more holistic approach to data sharing. The data may be available to citizens and organisations under more restrictive terms that need to be assessed on a case by case basis. Countries such as the Netherlands also document the existence of

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[158] For more information: http://5stardata.info/en/ or https://joinup.ec.europa.eu/sites/default/files/inline-files/W3C04.pdf
[159] https://www.go-fair.org/fair-principles/

datasets that are completely confidential, to help re-user understand that the data does exist but simply can't be made available, for any reason.
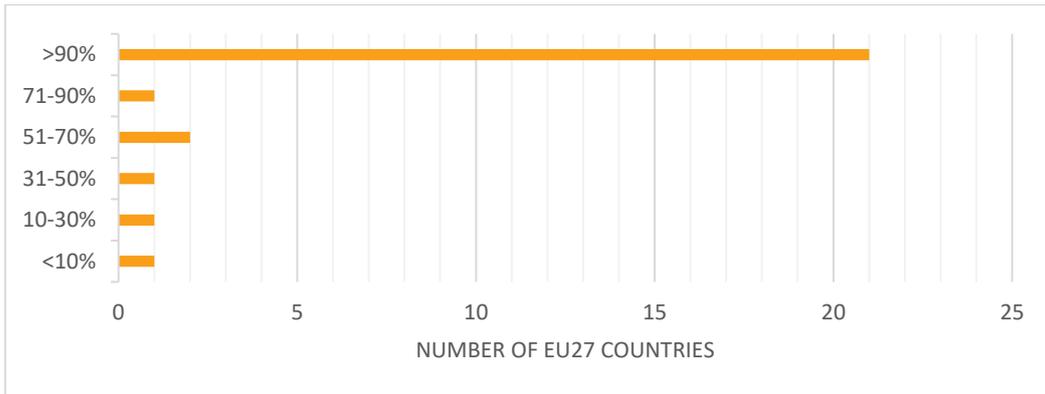
Figure 35: Percentage of data available with open license

Structured format

51% of Member States offer more than 90% of the published data available in a structured format in addition to having an open licence. In Figure 36 the distribution of the percentage of published data available in a structured format is shown.
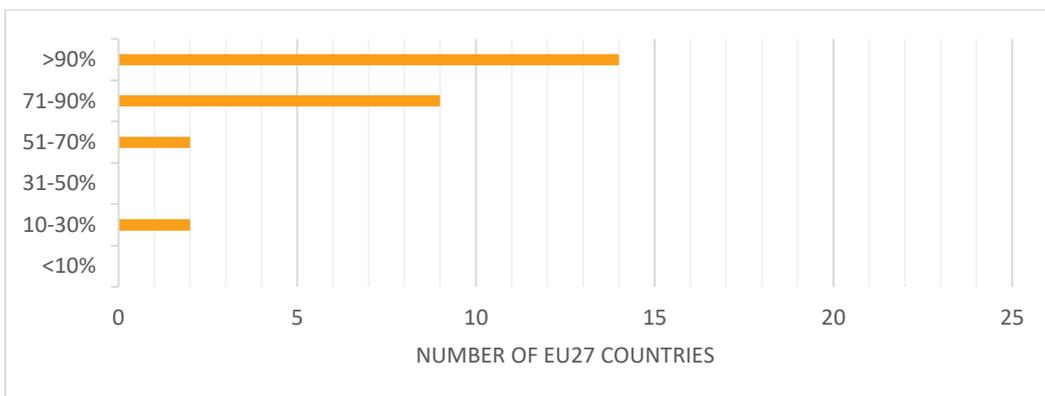
Figure 36: Percentae of data available in a structured format

Machine-readable format

In figure 37 the distribution of the percentage of published data available in a machine-readable format is shown. 44% of Member States offer more than 90% of the published data available in a machine-readable format in addition to having a structured format and an open licence.
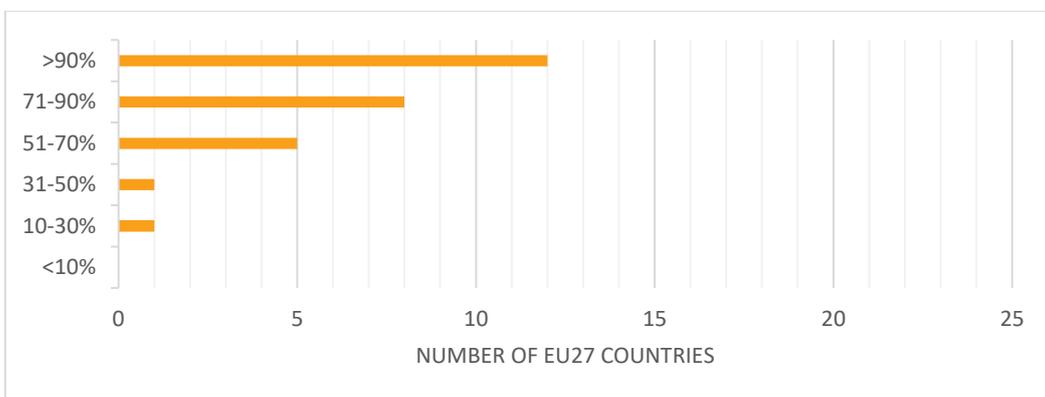
Figure 37: Percentage of datasets available in machine-readable format

Uniform Resource Identifiers

In figure 38 the distribution of the percentage of published data available using URIs is shown. 22% of Member States offer more than 90% of the published data available that consistently use URIs in addition to being in a machine-readable, structured format with an open licence.
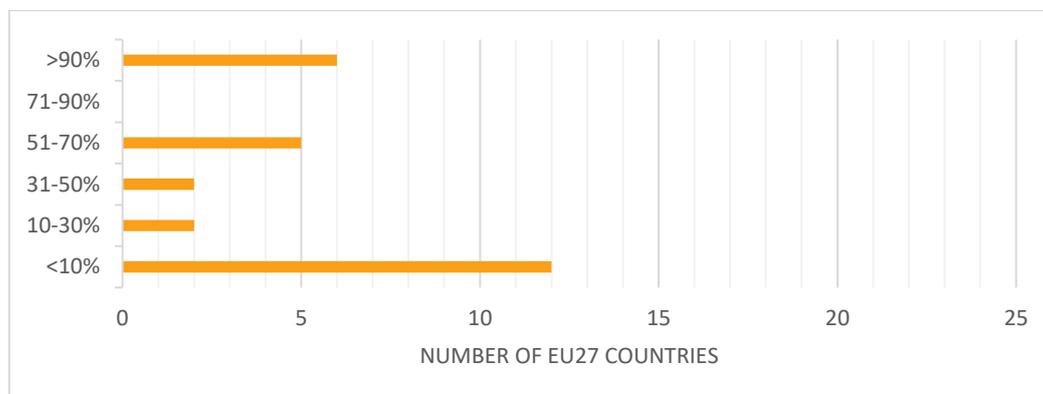
Figure 38: Percentage of datasets available using URIs

Linked data

Finally, figure 39 shows the distribution of the percentage of published data that is also linked to other renowned sources. Only 2 (7%) Member States have more than 90% of the published data available that as linked data in addition to consistently using URIs, in a machine-readable, structured format, and with an open licence.
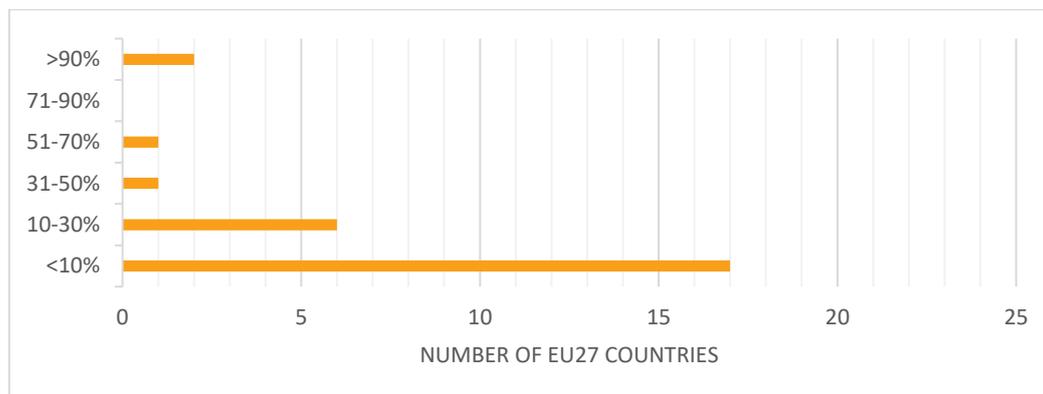
Figure 39: Percentage of datasets available as linked data

4.5 Overall performance

The maturity score on the quality dimension has greatly increased since last year. With an average score of 76% the Member States show the desire to not just consider the quantitity of open data that is made available, but also a focus on the quality of the data that is published.
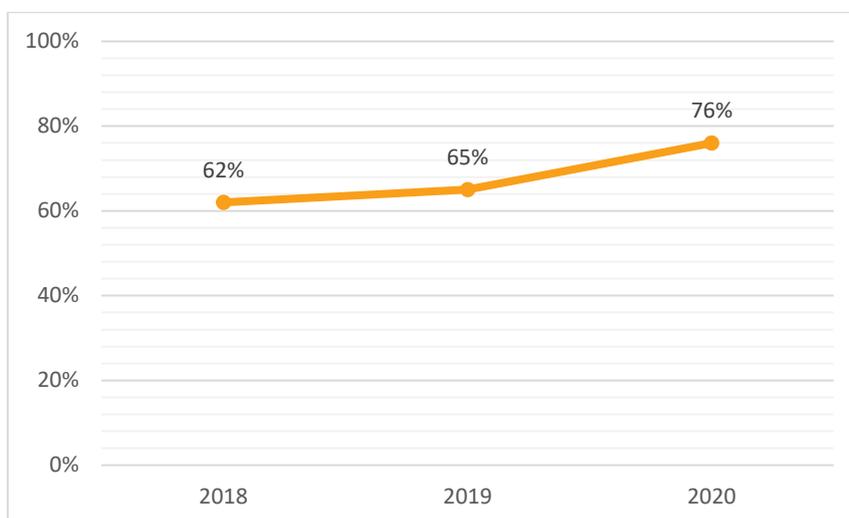
Figure 40: Development in maturity of the quality dimension over the last years (used to be EU28)

Only the currency and completeness indicator remained on average the same as last year. However, the other three indicators show steep increases (see figure 41). Monitoring and measurement of open data quality is becoming an important focus for many countries. Countries monitor the quality of the metadata and increasingly make this information available. They also provide guidance on licensing and assist data providers in the publication of high-quality metadata. Also, the average score on DCAT-AP compliance has increased. Information on the importance of DCAT-AP compliance is provided to data publishers and several countries have developed their own national extensions of the DCAT-AP standard. Countries also often investigate what the common causes are for lack of compliance are, and take action where necessary. The EU27 Member States increasingly use models to assess the quality of data deployment and conduct activities to promote and familiarise data providers with ways to ensure higher quality data.
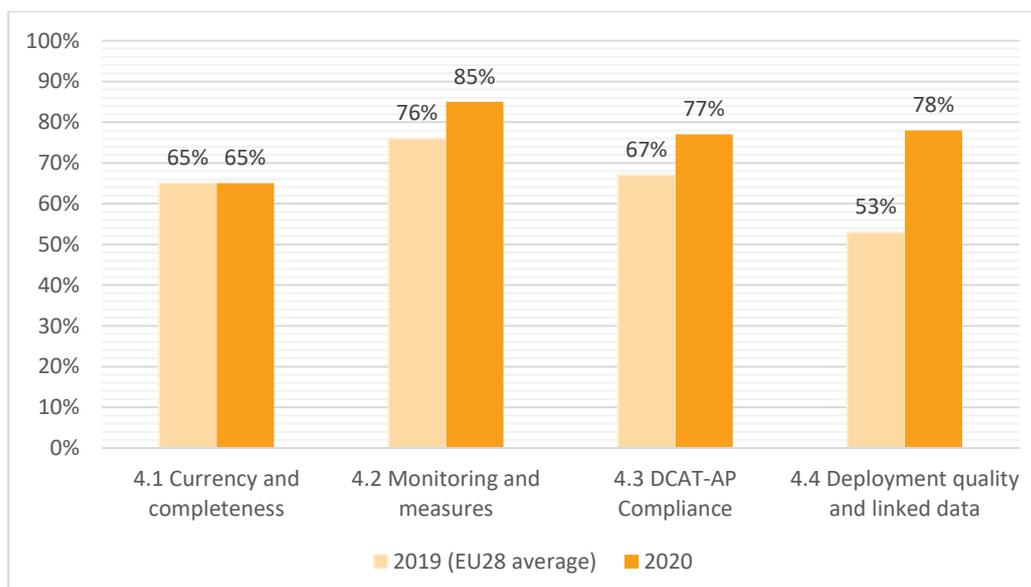
Figure 41: Maturity score per quality indicator compared to last year

The country ranking of the quality dimension can be observed in figure 42. The figure shows that 16 Member States score above the EU27 average of 76% and 11 Member States scored below. The countries with the highest maturity levels on the portal dimension are Denmark (94%), Ireland (93%), and Spain (93%).
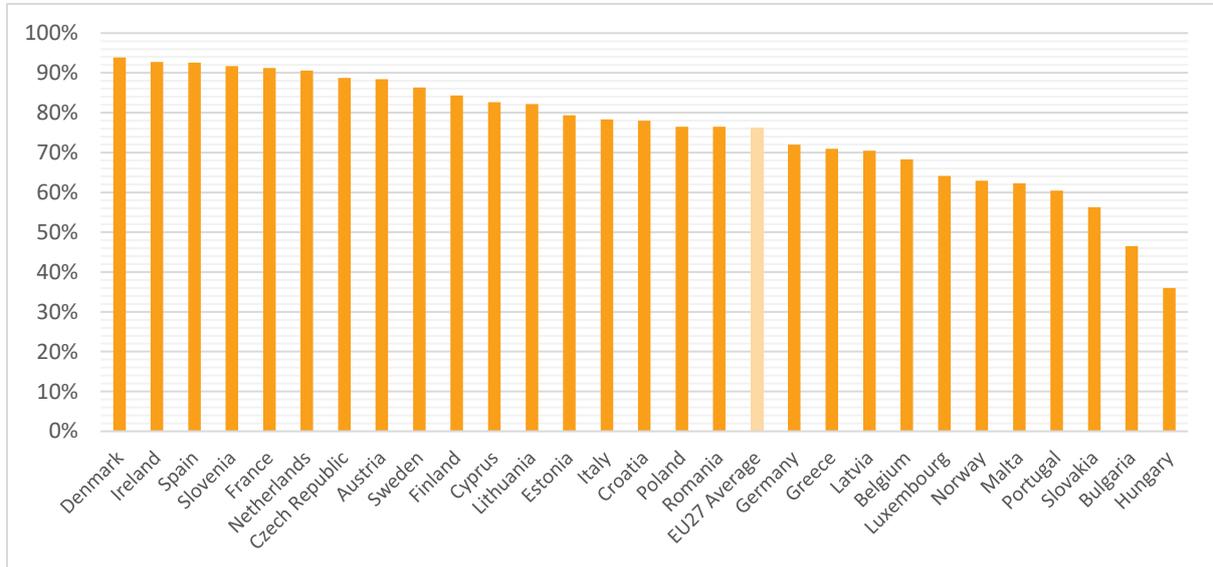
Figure 42: Country ranking for the quality dimension

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

Similar to previous years, the open data landscaping exercise also assesses the open data maturity in European countries outside the EU27.

Each section in this chapter provides a brief overview on the open data maturity of two groups of countries. The first group focuses on the European Free Trade Association (EFTA) and the three countries that participated this year: Liechtenstein, Norway, and Switzerland.[160] The second group is made of the "Eastern Partnership" countries (EaP): Azerbaijan, Georgia, Moldova, and Ukraine, that, for the first time in 2020, were invited to participate. This second group also includes the United Kingdom (UK), following the country's withdrawal from the Union. This chapter follows the same structure of the four open data maturity dimensions: policy, impact, portal, and quality.

5.1 Open data policy

5.1.1 EFTA countries

Policy framework

Two of the EFTA countries have a policy framework in place to foster open data - Liechtenstein and Norway. All participating EFTA countries have an open data policy or strategy in place, that were all implemented within the last two years, and have an action plan on how to implement them.

In Liechtenstein, the open data strategy is described in the "Digital Agenda for Liechtenstein"[161]. Their strategy focusses on ensuring the availability of high-quality official geospatial data and to facilitate easy access to it. Liechtenstein wants to ensure the datasets' long-term availability and provides the data in machine-readable and open formats.

In Norway, the Ministry of Local Government and Modernisation published guidelines for making public data available[162] to make sure that technical, organisational, and legal conditions are in place for its optimal re-use. Additionally, their open data strategy is captured the "Digital Strategy for the Public Sector"[163], as discussed in the ODM assessment in 2019. The goals expressed in this document range from 2019-2025 and focus on both increasing data sharing and encouraging the re-use of open data. The "Digital Agenda"[164] specifies that the country will continue with and build upon existing tools for open data. Sectoral strategies will be prepared in the culture, education, transport, mapping and government spending sectors.

Furthermore, Norway is the only country that worked on identifying and prioritising high-value datasets and domains. However, there are no specific measures in place to assist other stakeholders' involvement in the process of prioritisation.

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[160] Iceland has not participated to the landscaping exercise of 2020.
[161] https://www.regierung.li/media/attachments/ikr-DigitaleAgendaFL-A4-Einzelseiten-200dpi.pdf?t=636924885232021692
[162] https://www.regjeringen.no/no/dokumenter/retningslinjer-ved-tilgjengeliggjoring-av-offentlige-data/id2536870/
[163] https://www.regjeringen.no/contentassets/db9bf2bf10594ab88a470db40da0d10f/en-gb/pdfs/digital_strategy.pdf
[164] https://www.digdir.no/digitalisering-og-samordning/handlingsplan-regjeringens-digitaliseringsstrategi/1229

Switzerland uses a decentralised approach for their open data policy framework and have their objectives embedded within the national eGovernment[165] and Digital Switzerland Strategy[166]. Specifically, the country's "Open Government Data" strategy[167] provides a detailed description of the plan for the years 2019-2023. In 2020, the Federal Department of Home Affairs took charge of the strategy. Several initiatives where launched, such as 'open by default' introducing machine-readable and non-proprietary formats. Data executives are assigned in every department with a strategic role in data management, and a process to define an open-data-supportive legal framework is specified.

Governance of open data

In the field of the governance of open data is Switzerland the only country to have a structure in place that enables the participation of various open data stakeholders. Their governance structure uses a bottom-up approach in order to assists data provides in their open data publication process.

The Swiss governance structure in embedded in the Open Government Data (OGD). The OGD's activities are implemented through various bodies such as the interdepartmental OGD committee, the OGD forum and the OGD round table. As mentioned before, Switzerland appointed data executives to offices with a strategic role in the data domain.

Altough, Norway does not have a governance structure in place, theyimplemented some initiatives to support and stimulate data providers in publishing data, such as the 'Sharing of Data'[168] project. Also,the Norwegian Digitalisation Agency[169] guides organisation with their 'Information Management'[170].

In Norway and Switzerland, a knowledge exchange takes place on a regular basis between different public sector bodies that are active in the field op open data. In Switzerland there is also a regular knowledge exchange between public sector bodies and open data re-users, called the 'Open Government Data Round Table'[171]. In order to promote open data within their country, Norway and Switzerland organise events. Norway hosted events such as a hackathon and a digitalisation conference. Switzerland has a dedicated website with a full agenda on open data events[172].

Open data implementation

In order to assist data providers in their publication process, Norway and Switzerland offer an openly available guidebook. The Swiss handbook is operated by the OGD office as a measure to support the implementations of their open data strategy. In Norway the guidelines are created by the Norwegian Digital Agency. Nevertheless, Liechtenstein has publication plans defined in their 'eGovernment Strategy'[173] from 2019 on open data projects for the upcoming years. In both Liechtenstein and Switzerland, the government monitors the processes at national level to ensure the plans are being implemented. However, none of the EFTA countries have a professional development plan in place for civil servants working with data.

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[165] https://www.egovernment.ch/en/

[166] https://www.digitaldialog.swiss/en/key-objectives

[167] https://www.bfs.admin.ch/bfs/de/home/dienstleistungen/ogd/strategie.html

[168] https://www.difi.no/artikkel/2019/03/deling-av-data

[169] https://www.difi.no/

[170] https://www.difi.no/fagomrader-og-tjenester/digitalisering-og-samordning/nasjonal-arkitektur/informasjonsforvaltning

[171] https://www.bfs.admin.ch/bfs/en/home/services/ogd/activities.html

[172] https://opendata.ch/events/

[173] https://www.regierung.li/media/attachments/ikr-eGovernmentStrategie-A4-D.PDF?t=636911057729590704

5.1.2 EaP countries and the UK

Policy framework

Moldova, the UK, and Ukraine have an open data policy framework in their country, including an action plan with measures to be implemented in the field of open data. In addition, the UK and Ukraine also have an open data strategy in place.

The parliament of Moldova implemented a law on the re-use of public sector information[174], creating the necessary framework for the application of the Open Data Directive. It aims to facilitate the re-use of documents held by public authorities and institutions, which can be used for commercial or non-commercial purposes. In terms of strategy adopted, the Moldavian govern issued the "Open Government Data Decision"[175] in 2014. The decision contains references to all laws and governmental decisions regarding the publication and use of the open data. Finally, Moldova creates yearly an updated action plan[176] that covers open data initiatives, too.

The "Open Data White Paper"[177] of 2012, outlines both the open data policy framework as well as the open data strategy of the UK government. In order to create a transparent society, the strategy consists of three steps: enhancing access to data, building trust, and making smarter use of data. The document serves as a basis for a revised open data strategy that the country will publish by the end of 2020.

In 2015, Ukraine integrated their open data policy into the "Law and Decrees by the Cabinet of Ministers"[178]. The law obliged public authorities to provide on request public information in the form of open data, and also to publish regular updates of the data on the national open data portal. In 2018 Ukraine adopted the "Open Data Strategy 2018-2020".[179] The strategy is based on the principles of the International Open Data Charter[180].

The policies of the three countries all outline measures to support the re-use of open data by public sector bodies. Additionally, the policies of Moldova and the UK include measures to incentivise the publication of real-time data. Georgia and Moldova identified and prioritised high-value datasets and data domains, and both countries have measures in place to assist stakeholders' involvement in this prioritisation process.

Governance of open data

Azerbaijan, Georgia, the UK, and Ukraine have a governance structure in place that enables the participation of open data stakeholders.. All governance structures assist data provides with their open data publication process. Azerbaijan uses a bottom-up approach, while the other countries with a governance structure in place use a hybrid approach between bottom-up and top-down. Furthermore, only the governance models of the UK and Ukraine include the appointment of official roles in civil service that are dedicated to open data. The UK introduced data governance officials, data sharing experts, data publishers, and data scientist roles. Ukraine introduced the Chief Digital Transformation Officer in 2019, who is responsible for the coordination of all open data operations.

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[174] https://www.legis.md/cautare/getResults?doc_id=106313&lang=ro#

[175] https://www.legis.md/cautare/getResults?doc_id=18535&lang=ro

[176] https://www.legis.md/cautare/getResults?doc_id=109961&lang=ro

[177]

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/78946/CM8353_acc.pdf

[178] https://zakon.rada.gov.ua/laws/show/835-2015-%D0%BF

[179] https://zakon.rada.gov.ua/laws/show/900-2018-%D1%80

[180] https://opendatacharter.net/

In all countries, except for Azerbaijan, there is a regular exchange of knowledge and experience between the public sector bodies active in the open data field. Only in Moldova and Ukraine are there also regular knowledge exchanges between public sector bodies and open data re-users. All countries organise national, regional, or local events, such as hackathons or conferences, to promote open data in their country. In Azerbaijan, these events are mainly hosted by public bodies, while in the other countries they are hosted by a mixture of local, regional, and national public sector bodies or by universities and non-profit organisations.

Open data implementation

Azerbaijan, Moldova, the UK, and Ukraine maintain a guidebook at national level to assist data publishers in the publication process. Moldova, the UK and Ukraine have processes in place to ensure that their open data strategy is implemented, in the form of annual, semi-annual, and quarterly monitoring. In Azerbaijan, the UK, and Ukraine, local and regional data sources are discoverable on their national open data portals. Moldova and Ukraine also assist data holders in publishing real-time and dynamic data. Finally, the UK and Ukraine make training activities available to civil servants working with data. These trainings offer a publicly recognised certification within the public bodies.

In Ukraine, the National Agency for Civil Service[181] in collaboration with the EU4PAR[182] project provided offline training to more than 120 holders of the Reform Staff Posts in civil service.

The UK created a "Capability Framework" [183], which describes the job roles in the Digital, Data and Technology (DDaT)[184] Profession and provides details of the skills needed to work at each role level.

5.2 Open data impact

5.2.1 EFTA countries

Strategic awareness

In none of the EFTA countries a process is in place by which public bodies measure the re-use of their own data. While Liechtenstein and Norway do not observe an increasing trend in measuring the re-use of their data, Switzerland does indeed observe this trend, but the focus of these public bodies is still limited. None of the EFTA countries have a clear definition of the impact of open data and, therefore, also no methodology in place to measure it. Switzerland, however, is currently developing an impact framework, including a methodology for measurement, which they plan to publish in 2021.

Political impact

In none of the EFTA countries activities have been carried out to monitor the political impact of open data. Nevertheless, in Norway and Switzerland open data is used in policy-making processes, and in Norway also for decision-making. A great example is the use of data to formulate regulations and guidelines to respond to the COVID-19 pandemic.

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[181] http://www.center.gov.ua/en/
[182] http://www.eu4par.eu/
[183] https://www.gov.uk/government/collections/digital-data-and-technology-profession-capability-framework
[184] https://www.gov.uk/government/organisations/digital-data-and-technology-profession

the table below represents the components that influenced the level of political impact of open data in the EFTA countries.

Level of Political Impact			
	Liechtenstein	Norway	Switzerland
Increasing government efficiency	Low	High	Medium
Increasing government effectiveness	Low	Medium	--
Increasing transparency and accountability	Low	High	Medium

In Norway, an initiative called "Statsregnkapet"[185], operated by the Directorate for Public Administration and Financial Management (DFØ)[186], visualises the central government's budget based on open government statistics. It breaks down all components where money came from and where the money went to and includes the option to download all underlying data.

Social impact

None of the EFTA countries launched any activities during the past year to monitor the social impact of open data. There have not been studies conducted that focus on assessing the social impact of open data. Nevertheless, the perceived level of social impact was low in Liechtenstein, medium in Norway, while Switzerland is not in condition to make an assessment.

This table represents the components that influenced the level of social impact of open data in the EFTA countries.

Level of Social Impact			
	Liechtenstein	Norway	Switzerland
Increasing the inclusion of marginalised groups in society	Low	Low	--
Raising awareness on housing in urban areas	Low	High	--

Statistics Norway (SSB)[187] is an independent institution responsible for collecting, producing, and publishing official statistics related to the economy, population, and society. To raise awareness about housing SSB published house market data and data about Norwegian living condiditons[188], which provides an overview of the housing market.

Environmental impact

None of the EFTA countries launched activities or conducted studies dedicated to measuring the environmental impact of open data. Overall, the level of impact indicated by the countries is low in Liechtenstein, and medium in Norway and Switzerland.

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[185] https://statsregnskapet.dfo.no/
[186] https://dfo.no/
[187] https://www.ssb.no/
[188] https://www.ssb.no/bygg-bolig-og-eiendom

This table represents the components that influenced the level of environmental impact of open data in the EFTA countries.

Level of Environmental Impact			
	Liechtenstein	**Norway**	**Switzerland**
Raising awareness on water and air quality	Low	Medium	Medium
Raising awareness on noise level in cities	Low	Medium	Medium
Waste management	Low	Medium	Medium
Environmental-friendly transport systems	Low	Medium	High

In Switzerland, open data is being used for scheduling and ticketing apps and is expected to be a key enabler to multimodal transport services in the near future. The Swiss Federal Council published a press release[189] stating that they want to make it easier to combine different modes of transport. They will do this by creating a "National Mobility Data Infrastructure" enabling companies to develop appropriate apps and services.

Economic impact

In none of the EFTA countries studies were conducted, or activities initiated, to measure the economic impact of open data. Overall, Liechtenstein estimated the economic impact of open data to be low, Norway is not sure about the level of impact, and Switzerland estimated it to be medium.

This table represents the components that influenced the level of economic impact of open data in the EFTA countries.

Level of Economic Impact			
	Liechtenstein	**Norway**	**Switzerland**
Macro-economic impact of open data	Low	Medium	--
Micro-economic impact of open data	Low	--	--
Economic benefits for public administrations	Low	--	Medium

In Switzerland, "IntelliProcure"[190] is a platform built for suppliers to the government at all levels, procurement agencies and consulting companies and shows all upcoming tenders and projects within the country. The website provides a dashboard and the corresponding statistics on topics such as open tenders.

5.2.2 EaP countries and the UK

Strategic awareness

In Azerbaijan and the UK, a strong focus is on increasing public bodies' effort on measuring the re-use of open data, and both countries have processes in place. In Azerbaijan public sector data is often presented at several international conferences to raise awareness. In the UK public bodies have increasingly been calling for means to measure the impact and scale of open data re-use, data maturity models, and best practices. In Moldova and Ukraine focus is also observed on measuring the re-use of open data, but in a limited amount. Both countries hosted events to create new use cases and raise

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[189] https://www.bav.admin.ch/bav/de/home/publikationen/medienmitteilungen.msg-id-79690.html/
[190] https://intelliprocure.ch/

awareness of the opportunities arising from open data re-use. Georgia is currently not measuring open data re-use.

Only Moldova and Ukraine have a definition in place for the impact of open data. The Moldavian definition is outlined in their policy document "the Open Government Data Decision"[191]. At a micro-economic level Ukraine does define the impact of open data as the level of use of services by citizens, measured by, for example, the number of dataset views, the number of use cases based on open dataset, or number of users. At a macro-economic level Ukraine does define the impact in terms of the rise in GDP, economic gain, and the number of new jobs created. Additionally, the Ukrainian Ministry of Digital Transformation[192] and TAPAS[193] formulated a methodology on how to measure the impact of open data based on research performed by institutions such as GovLab[194].

Political impact

Ukraine is the only country where public bodies performed activities in the past year to monitor the political impact of open data, mainly in the form of case studies. In Moldova and Ukraine open data is used in policy-making processes. Additionally, Moldova, the UK, and Ukraine use open data for decision-making, mainly based on country statistics and dashboards.

This table represents the components that influenced the level of political impact of open data in the EaP countries and the UK.

Level of Political Impact					
	Azerbaijan	Georgia	Moldova	Ukraine	UK
Increasing government efficiency	--	--	Medium	High	Medium
Increasing government effectiveness	Low	--	Medium	High	Medium
Increasing transparency and accountability	--	--	Medium	High	Medium

In Ukraine, as a way to increase transparency, a tool was developed that enables an easy analysis of political finances. It tracks the funding of political parties, analyses what money is spent on, and visualises the data to make analysing more accessible.

Social impact

The UK and Ukraine performed activities in the past year to monitor the social impact of open data. Ukraine conducted a study specifically to assess social impact, that is scheduled to be published by the end of 2020[195]. All countries, except for Azerbaijan, had open data-driven civil society initiatives that aim to tackle issues in the social field. Overall, Ukraine estimates the level of social impact of open data as high, Moldova and the UK as medium, Georgia as low, and Azerbaijan is not in condition to evaluate.

This table represents the components that influenced the level of social impact of open data in the EaP countries and the UK.

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[191] https://www.legis.md/cautare/getResults?doc_id=18535&lang=ro
[192] https://www.kmu.gov.ua/en
[193] http://tapas.org.ua/en/
[194] https://odimpact.org/
[195] http://tapas.org.ua/all-uk/news-uk/konkurs-dlia-vyiavlennia-potentsijnoho-vykonavtsia-posluh-na-provedennia-doslidzhennia-shchodo-sotsialnoho-vplyvu-vidkrytykh-danykh-orhaniv-mistsevoho-samovriaduvannia-v-ukraini/

Level of Social Impact					
	Azerbaijan	Georgia	Moldova	Ukraine	UK
Increasing the inclusion of marginalised groups in society	--	--	Medium	Medium	Medium
Raising awareness on housing in urban areas	--	--	Medium	High	Medium

In Ukraine, start-ups and large housing search services integrated open data into their services to showcase all information available to them. An example is Monitor.Estate, who automated the collection of information about new buildings and developments from seven different state registers to provide comprehensive information to potential buyers.

Environmental impact

Ukraine is the only country to have taken action in order to monitor the environmental impact of open data in the form of a study. Overall, environmental impact is estimated to be high in Ukraine, medium in Moldova and the UK, low in Georgia, while Azerbaijan is not in condition to evaluate.

This table represents the components that influenced the level of environmental impact of open data in the EaP countries and the UK.

Level of Environmental Impact					
	Azerbaijan	Georgia	Moldova	Ukraine	UK
Raising awareness on water and air quality	--	Low	Medium	High	Medium
Raising awareness on noise level in cities	--	Low	--	Medium	Medium
Waste management	--	Low	Medium	High	Medium
Environmental-friendly transport systems	--	Low	Medium	Medium	Medium

In the UK, London has been publishing the municipality's transport data for many years as open data and in an open format, enabling passengers to better navigate the city using public transport. England was also the European Data Portal's guests in 2020 to describe the release of the new Bus Open Data Service.[196] Citymapper[197] is an example of a known private sector application that also utilises the UK's open data to provide its services.

In Ukraine, the Ministry of Environmental Protection and Natural Resources created an interactive map[198] that collects geo-referenced and photographic materials about the unsanctioned landfills. The Ministry uses this map to ensure the prompt receipt of such information by the local authorities responsible for their timely management. Information about the processing status of the appeal and relevant local government activities are also displayed on the map.

Economic impact

Only the UK launched activities to monitor the economic impact of open data. These activities are embedded in the National Data Strategy to establish its economic value. Moldova and Ukraine conducted studies to assess the economic impact. Furthermore, Moldova and Ukraine have open data driven civil society initiatives in place to tackle economic problems using open resources.

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[196] https://www.europeandataportal.eu/en/impact-studies/country-insights/united-kingdom/bus-open-data-service
[197] https://citymapper.com/cmi
[198] https://ecomapa.gov.ua/

Overall, open data has a high economic impact in Ukraine, a medium impact in Moldova and the UK, and for Azerbaijan and Georgia it is not possible to evaluate.

This table represents the components that influenced the level of economic impact of open data in the EaP countries and the UK.

Level of Economic Impact					
	Azerbaijan	Georgia	Moldova	Ukraine	UK
Macro-economic impact of open data	--	--	Medium	High	Medium
Micro-economic impact of open data	--	--	Medium	High	Medium
Economic benefits for public administrations	--	--	Low	High	Medium

In the Ukraine, Bihus.info[199] acts as a collection of anti-corruption projects. They created on online tool to monitor government data such as procurement, spending, budget, public officials' declarations, business and beneficial ownership registers, different kinds of licences and permits. They compare, monitor, and analyse available data to provide a comprehensive overview of potential situations of corruption.

5.3 Open data portal

5.3.1 EFTA countries

Of the EFTA countries that participated to the landscaping exercise, Liechtenstein does not yet have a national open data portal. Therefore, the following section will only discuss the maturity of the national portals of Norway and Switzerland.

Portal features

In terms of portal features, both open data portals offer advanced data search functions, the possibility to search by data domain, and the possibility to download datasets. Only Switzerland offers the possibility to search by file format as well as a preview function for tabular and geospatial data. Both open data portals provide guidelines and tools for data publishers to improve the quality of their data publication.

Both portals offer information about datasets that do exists but cannot be made available as open data because of restrictions. Norway also offers the possibility to receive notifications when new datasets become available. Switzerland's open data portal allows users to request datasets. Requests are received regularly and about half of them result in a publication on their portal.

Switzerland offers a designated area to showcase use cases, where the data used to create them is also referenced. Users can submit their own use case using the general contact details. Neither Norway nor Switzerland have either a general feedback mechanism or a feedback mechanism at dataset level. They also do not offer a discussion forum for data providers and re-users.

Portal usage

Both national portals are suitable to be accessed using mobile devices. Both countries perform log analytics to gain insights into the portals usage and use it to improve the portal. Switzerland uses

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[199] https://declarations.com.ua/en/

Matomo and Norway uses Google Analytics. Switzerland reports approximately 14 000 unique visitors per month (0,16% of the total population) and Norway have approximately 3 200 unique visitors per month (0,06% of the total population)[200]. When comparing these numbers to the EU27 countries that responded to this question, Switzerland would enter the list on position 13 and Norway on position 19. Although both countries monitor the most consulted pages, only Norway was able to list the most popular datasets and data domains, with 'Government and Public Sector' at the top. In both countries the metadata is accessible via a publicly available API, but none is running analytics on API usage.

Data provision

In both Norway and Switzerland not all public sector data providers contribute their data to the portal. In Switzerland, the 'open by default' initiative was only recently launched at the time of the Open Data Maturity assessment, and the level of contribution will most likely change by the time of the next assessment. In Norway, the absence of contribution can mainly be attributed to low awareness and technical incompatibilities. Both countries take concrete actions to assist data providers in publishing data, mostly done using direct contact with the providers. Only Norway offers real-time datasets, which entails more than 30% of their catalogue. None of the open data portals include a section where non-official data (e.g. crowdsourced or community contributed data) can be published.

Portal sustainability

Finally, in terms of portal sustainability, only Switzerland indicates to have a strategy in place to ensure the portal's sustainability. However, this document is not publicly available. Both countries take actions to promote the portal's activities and the available open data, for example using social media, attending events, hosting meetings, etc. Both are active on social media to promote their national open data portal. Both portals use GitHub to provide access the portal's source code as well as relevant documentation. None of the countries offer a user satisfaction survey.

5.3.2 EaP countries and the UK

Portal features

All these portals offer advanced data search functions, allow users to search by file format, and offer the possibilities for users to download datasets. All data portals, except from Azerbaijan's, offer the possibility to search by data domain. Only the UK and Ukraine offer a SPARQL search query feature. Furthermore, Moldova, the UK, and Ukraine offer a preview function for tabular and geospatial data.

Ukraine is the only country that allows users to 'follow' datasets or data providers and receive notifications when updates or new data becomes available. Furthermore, all countries offer a general feedback mechanism through either the contact details or a feedback section provided on their portals. Georgia, the UK, and Ukraine also offer the possibility to give feedback at a dataset level.

All countries, except from Azerbaijan, offer the possibility to request data on their portal. The UK combined some features in a support page where users can give feedback, request datasets, and report issues. Moldova, the UK, and Ukraine monitor the extent to which data requests result in publication on their portal. In Moldova, most requests end up in publication, while for the UK and Ukraine it is approximately half of the requests. Moldova and Ukraine are the only two countries that present the status of the data requests in a transparent manner.

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[200] Population statistics as of 1 January 2020, retrieved from Eurostat news release:
https://ec.europa.eu/eurostat/documents/2995521/11081093/3-10072020-AP-EN.pdf/d2f799bf-4412-05cc-a357-7b49b93615f1

Additionally, Moldova and Ukraine's portals host a discussion forum where both data providers and re-users can contribute. Currently, Moldova is the only country that allows users to see what datasets exist but are not yet available on the portal because of constraints. Ukraine is working on adjustments to legislation in order to publish all public information in open data format.

When looking at use cases, Azerbaijan, Moldova, and Ukraine offer designated areas on the portals to showcase them. Ukraine is the only country that references the datasets used in the uses cases and that offers the possibility for users to submit their own use cases.

Portal usage
Apart from Azerbaijan, all portals are suitable to be used on mobile devices and perform web analytics to gain insights into the portals' usage and potential improvements. Besides Georgia, all countries monitor the amount of unique visitors to their portal; Azerbaijan has 482 000 unique visitors (4,8% of total population), Moldova has 11 657 unique visitors (0,4% of the population), the UK has 350 000 unique visitors (0,5% of the population[201]), and Ukraine has approximately 77 500 unique visitors (0,2% of the population)[202]. Moldova, the UK, and Ukraine monitor the number of visitors from abroad, with the UK reporting that 47% of their visitors come from foreign countries. The same three countries monitor the most and least consulted datasets and data domains. The most visited data domain in Moldova is 'Economy and Private Sector', in the UK it is 'Environment', and in Ukraine it is 'Transport'. Furthermore, all 5 portals ensure that the metadata on the portal is available in clear plain language to enable humans to read and understand it. In Azerbaijan, the UK, and Ukraine the metadata is accessible via publicly available APIs. The UK and Ukraine run analytics on the API usage, observing approximately 7% of the Ukrainian outgoing portal traffic to be generated by APIs, up to 73% including downloads.

Data provision
In terms of data provision, only in the UK all public sector data providers contribute to the national portal. All other countries are aware of the data providers that are not yet contributing. The main reasons for not contributing are technical incompatibility, low awareness and lack of personnel. All countries take actions to assist the data providers with their publication process. Furthermore, the data portal of Moldova and Ukraine enable access to real-time data. In Moldova, more than 30% and in Ukraine between 1 and 10% of the catalogues offer such data. No country provides a section where non-official data (e.g. community contributions) can be published.

Portal sustainability
Finally, diving into portal sustainability, the national portals of Moldova, the UK, and Ukraine have a strategy in place to ensure their portal's sustainability. Azerbaijan, Moldova, and Ukraine take actions to promote the portals' activities and open data, for example by organising hackathons and attending events. Only Ukraine reports that their national data portal is active on social media. While the Ukrainian portal does not have its own social media account, they promote open data through the social media accounts of the Ministry of Digital Transformation. All countries, apart from Azerbaijan, have a process in place by which the portal is regularly reviewed and improved, but Ukraine is the only country that held a user satisfaction survey to discover further opportunities.

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[201] Population statistics for the UK as of 1 January 2020, retrieved from Eurostat news release: https://ec.europa.eu/eurostat/documents/2995521/11081093/3-10072020-AP-EN.pdf/d2f799bf-4412-05cc-a357-7b49b93615f1
[202] Population statistics for the Easter Parnership countries from 2019, retrieved from the World Bank: https://data.worldbank.org/?locations=AZ-GE-MD-UA

5.4 Open data quality

5.4.1 EFTA countries

Currency and completeness

Since Liechtenstein does not have a national open data portal yet, this dimension only assesses the open data quality and the efforts to increase quality in Norway and Switzerland.

Although Norway does not have a pre-defined approach to ensure that the metadata is up-to-date, the country manages to update the metadata of the all its datasets within one day after the primary source is updated. Approximately 30-49% of their metadata is obtained its source automatically, rather than edited manually. Only a few datasets cover the full period from the day the source started to collect data until the most recent publication.

Switzerland has a pre-defined approach to ensure that their metadata is kept up-to-date. 70-89% of their metadata is obtained from sources automatically. For the majority of their datasets, the metadata is updated within one day after the primary source makes an update. Furthermore, the majority of datasets covers the full period from when they were first published until the most recent publication.

Monitoring and measures

Switzerland is the only EFTA country that monitors the quality of the metadata available on their national portal. None of the EFTA countries publish information on the quality of the metadata of their portal. Both countries published guidelines to assist data publishers in choosing an appropriate licence for their data. Also, both countries developed their own licence to foster the publication of data in their country. The result of this is that, in both countries, more than 90% of the open data on the national portal is accompanied by licensing information, which is similar to last years' performance.

Furthermore, Norway and Switzerland have mechanisms in place to assist data providers in the publication of machine-readable formats and high-quality metadata. Switzerland uses online documentation, where they provide definitions, best practices and standards. Norway organises weekly meetings to support their data providers where necessary.

DCAT-AP compliance

Norway and Switzerland both supply data providers with documentation on DCAT-AP. In Norway, the guide for describing a dataset[203] is published by the Norwegian Digitalisation Agency. In Switzerland the DCAT application profile[204] is part of their eGovernment standards. In Norway, more than 90% of the metadata is DCAT-AP compliant, between 71%-90% uses recommended classes, and between 31%-50% uses optional classes. In Switzerland, 71%-90% of the portal's metadata is DCAT-AP compliant, between 51%-70% uses recommended classes, and between 10%-30% uses optional classes. Both countries developed a national extension of the DCAT-AP standard to better fit their national context. Norway extended the DCAT-AP standard to support the portal's scope that goes beyond open data.

Deployment quality and linked data

In order to assess the quality of deployment of data, Switzerland implements the 5-Star Open Data principles. The country also conducts other activities to promote and familiarise data providers with ways to ensure higher quality data. Data suppliers have the option to apply for the national team to perform a review of their data.

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[203] https://data.norge.no/guide/veileder-beskrivelse-av-datasett/
[204] https://www.ech.ch/en/standards/39919

In Norway, between 71%-90% of their datasets is available under an open licence, including text documents, which is a decrease compared to last year. More than 90% of Norwegian open datasets are also made available in a structured format. In Switzerland, more than 90% of datasets is available under an open licence, which is similar to last year's performance. Out of this group, between 51%-70% is also made available in a structured format.

5.4.2 EaP countries and the UK

Currency and completeness

Except for Azerbaijan, all EaP countries have a pre-defined approach to ensure that metadata is kept up to date. In Georgia and Moldova, public institutions determine the frequency of updating for each dataset. In Ukraine, the portal additionally checks if the metadata is updated in time, and sends the provider a reminder if the metadata is not updated. Datasets that are not up to date are marked accordingly on the portal. The UK has a decentralised approach similar to Georgia and Moldova, in which governmental departments each have their own approach to ensure up-to-date metadata.

None of the EaP countries automatically harvests metadata from the data source. In the UK, only a limited amount of metadata is obtained from the source automatically, resulting in mainly transport metadata being updated within one day from the moment its primary source is updated.

Monitoring and measures

Moldova, Ukraine, and the UK monitor the quality of the metadata on their national portals and Ukraine and UK also make this publicly available. In Ukraine, the completeness of metadata fields that are filled in by data publishers is checked before datasets are published. In addition, the national portal also offers a business intelligence tool for monitoring metadata[205] and recommendations for data providers to improve the quality of publishing metadata are provided as well[206].

Only the UK developed its own licence, the Open Government Licence[207], which is compatible with the Creative Commons Attribution License 4.0 and the Open Data Commons Attribution License.

DCAT-AP compliance

Only Ukraine's portal supports the DCAT-AP standard. More than 90% of the metadata on the portal is compliant. Data providers are also provided with documentation on DCAT-AP and requirements for data harvesting[208]. Also, the reasons for a lack of DCAT-AP compliance are investigated, and include: poor support of DCAT in the software used by data providers (e.g. it may not be supported by the regional open data portals), and the current lack of support for DCAT in Ukraine's legislation. The Ministry of Digital Transformation is, however, planning to add such requirements to the legislation.

Deployment quality and linked data

Ukraine is the only country indicating to use a model to assess the quality of open data deployment, specifically the 5-Star Open Data one. To promote and familiarise data providers with ways to ensure higher quality data, several activities take place such as trainings for data providers[209] and individual consultation to data providers via phone, e-mail, and meetings.

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[205] https://data.gov.ua/pages/analityka
[206] https://data.gov.ua/pages/835-rec-index
[207] http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
[208] https://data.gov.ua/uploads/files/2018-08-27-090121.57665910.2.-.pdf
[209] For example: https://data.gov.ua/blog/prezentatsiia-treninhu-po-roboti-z-vidkrytymy-danymy and https://data.gov.ua/blog/navchannia-polipshuiemo-iakist-vidkrytykh-danykh

5.5 Overall performance

5.5.1 EFTA countries

Figure 43 shows the average maturity level of the EFTA countries for each of the open data maturity dimensions. While, last year, policy and portal where the most mature dimensions, it can now be observed that quality took the lead in terms of maturity. The impact dimension is falling behind compared to the other dimensions. As impact, portal and quality cannot be assessed for Liechtenstein, it is difficult to benchmark the country vs its group.
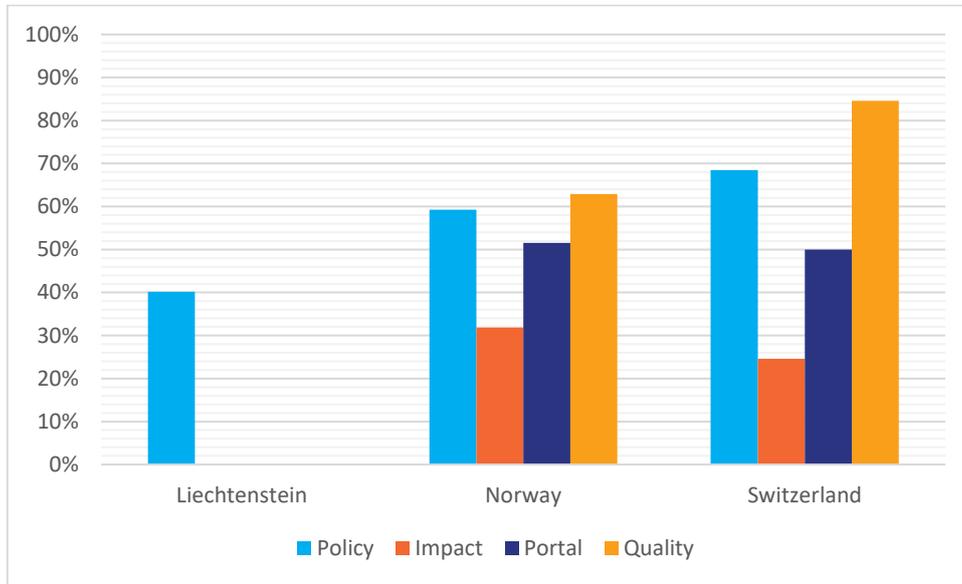
Figure 43: The EFTA countries' scores on the four open data maturity dimensions

The overall maturity scores of the EFTA countries are shown in figure 44. The figure shows that all EFTA countries score below the both EU27 average and the overall average in terms of maturity. However, both Liechtenstein and Switzerland did improve their maturity score compared to last year. Norway lost 14 percentage points on their total score.

Figure 44: Total open data maturity scores of the EFTA countries

85

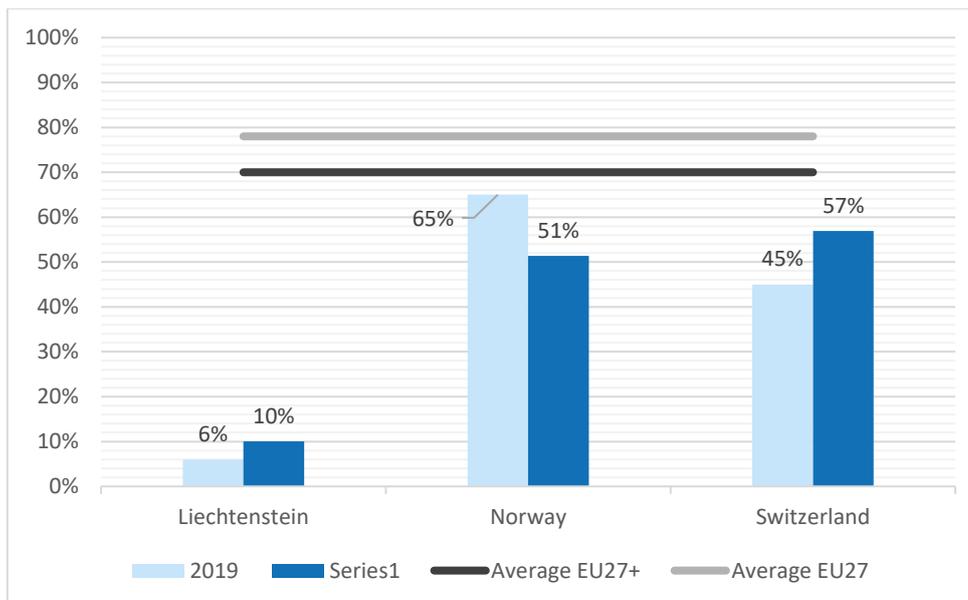## 5.5.2 Other countries

The scores on the four open data maturity dimensions of the EaP countries and the UK are shown in figure 43. Policy and portal are the most mature dimensions, while impact and quality are not progressing as much. This is only the first year that the EaP countries participate in the open data maturity assessment, so it is difficult to provide a perspective on their results. Noteworthy are the high scores of Ukraine.
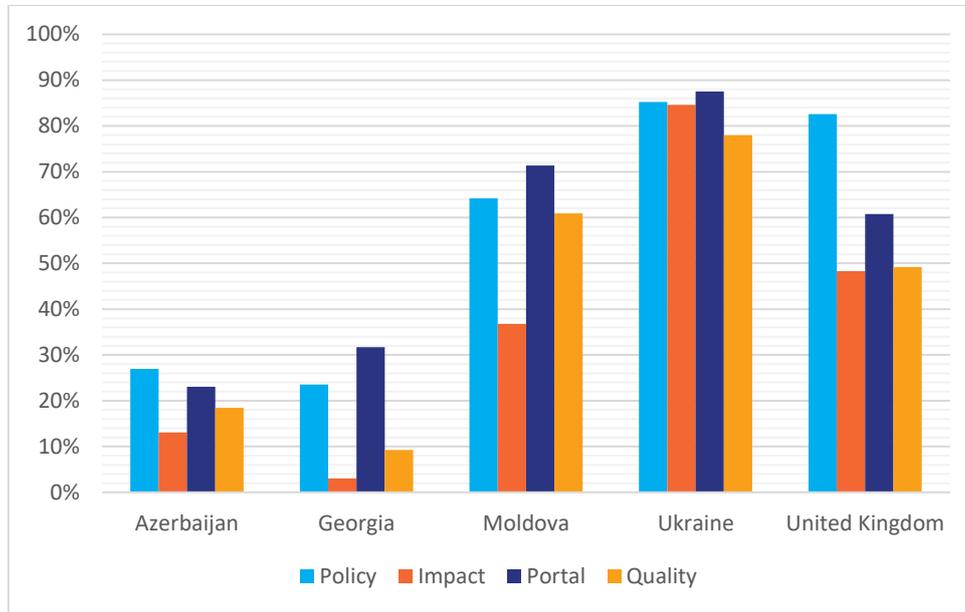
Figure 45: The maturity scores on the four dimensions from the EaP countries and the UK

The overall maturity levels of the EaP countries and the UK are shown in figure 46. It shows that Ukraine is the only country with an overall score above the EU27 average. Moldova and the UK are slightly falling behind the EU27+ average, while Azerbaijan and Georgia show modest results in their first participation in the assessment. The UK did participate in the open data maturity assessment in previous years as they were still part of the European Union. In 2020, they scored the exact same score as they did last year.

Figure 46: Total open data maturity scores of the EaP countries and the UK

Chapter 6: Clustering the Countries

The 2020 clustering exercise follows the grouping of countries in four clusters as in previous years of the 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 over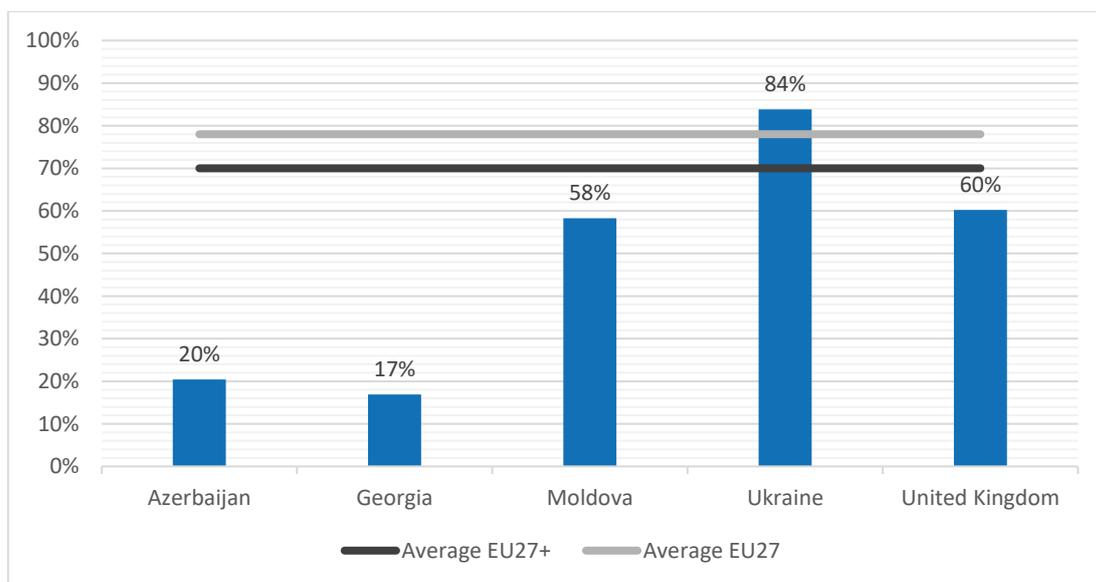come challenges they are facing and learn the countries in more mature clusters. Clustering also enables us to provide more focused advice for each of the clusters.

From the highest performing to the lowest, these clusters are named: trend-setters, fast-trackers, followers, and beginners. Notable developments this year can be seen in the great overall increase of open data maturity scores for the majority of countries, without the methodology and scoring being changed. This resulted in larger trend-setter and fast-tracker clusters as compared to last year.

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.

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, e.g. 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-setter	The country has an advanced open data policy in place with a 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 re-use are conducted, with methodologies in place to assess the impact in different domains. Little to no limitations to publication or re-use are observable.
Fast-tracker	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 re-use. Some issues can still be observed, but measures are in place to tackle them.
Follower	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 re-use and measure the impact of open data are performed. A fair number of limitations in terms of data publication and re-use still exist.
Beginner	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 counties 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 to ensure the adoption of DCAT-AP. Visible limitations in terms of open data publication exist, with limited reuse examples.

6.2 The 2020 clustering

Compared to previous year, the 2020 clustering is less obvious to recognise visually, as we represent the countries' scores on an axis. Many countries have made great progress, which results in the top performing scores being closer, and the clusters denser.

As for the previous years, clusters are specified top to bottom, targeting the identification of four clusters, and splitting the clusters where a significant gap in the overall scores is found. The result is in figure 47.
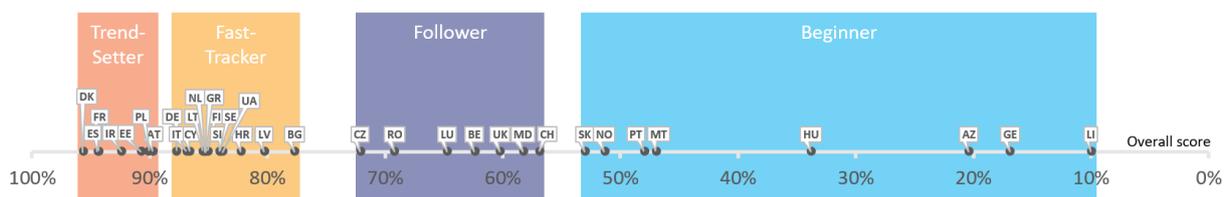
Figure 47: The 2020 Open Data Maturity clustering of the participating countries

The same is captured in the list below. Countries marked with an asterisk (*) are not part of the EU.

- **Trend-setters (90%-96%):** Denmark, Spain, France, Ireland, Estonia, Poland, Austria

- **Fast-trackers (78%-88%):** Germany, Italy, Cyprus, Lithuania, Netherlands, Greece, Finland, Slovenia, Sweden, Ukraine*, Croatia, Latvia, Bulgaria

- **Followers (57%-72%):** Czech Republic, Romania, Luxembourg, Belgium, United Kingdom*, Moldova*, Switzerland*

- **Beginners (10-53%):** Slovakia, Norway*, Portugal, Malta, Hungary, Azerbaijan*, Georgia*, Liechtenstein*

The significant progress from 2019 also suggests the need for a re-calibration of the methodology. That would incentivise the countries to perform even better, highlight and reward appropriately their achievements, and enable better observing and learning from the choices that make them different.

6.2.1 Open Data Trend-setters

In 2020, the trend-setters cluster consists of 7 countries with overall maturity scores of 90% and beyond. The cluster was expanded in size, especially at the top of the ranking, to represent the overall performance growth of most countries. Trend-setter scores ranged between 89%-91% in 2019, and 80%-88% in 2018.

The countries' maturity scores are extremely close to each other, with less than 1.9% difference from one to the next in this cluster. Denmark showed the highest overall score of 96% and took the lead in the assessment. Spain, France, and Ireland retain their trend-setter position with scores of 94%, 94%, and 92% respectively. Each of these countries also improved their score from last year (+4%, +5%, and +1%). Also part of this year's trend-setter cluster are Estonia (91%), Poland (90%), and Austria (90%). These countries indicated impressive increases in their open data maturity score. Estonia and Austria jumped from last year's followers cluster to the trend-setter cluster. Poland was promoted from fast-tracker to trend-setter.

6.2.2 Open Data Fast-trackers

With overall maturity scores ranging between 78% and 88%, the fast-tracker cluster consists of 13 countries. This is a steep increase compared to last year, when the cluster consisted of 8 countries.

Once again, the countries' maturity scores are extremely close. All fast-tracker countries are less than 2.6% points difference from each other. Ranked from the highest to lowest scores, the fast-trackers are: Germany (88%), Italy (87%), Cyprus (87%), Lithuania (86%), Netherlands (85%), Greece (85%), Finland (85%), Slovenia (84%), Sweden (84%), Ukraine (84%), Croatia (82%), Latvia (80%), and Bulgaria (78%). Germany, Lithuania, Greece, Sweden, Croatia, and Bulgaria moved up from the followers cluster to the fast-trackers. Last year, the score of countries in this cluster ranged from 75%-80%, whereas this year the range spans 78%-88%. This further emphasises the general consolidation of countries in the higher scoring segments of the assessment.

6.2.3 Open Data Followers

This year, the followers cluster consists of just 7 countries, with overall maturity scores ranging between 57% and 72%. Ranked from the highest to lowest scores, the followers are: Czech Republic (72%), Romania (69%), Luxembourg (65%), Belgium (62%), United Kingdom (60%), Moldova (58%), and Switzerland (57%). Switzerland increased their score with 12% compared to last year, leading them to jump from Beginners to the Followers cluster. Last year, the Followers group of 14 countries the largest cluster. This year, even though the overall score range increased from 53%-69% to 57%-72%, it is the least numerous cluster.

6.2.3 Open Data Beginners

The beginners cluster consists of just 8 countries, with scores below 53%. Ranked from the highest to lowest scores, the beginners are: Slovakia (53%), Norway (51%), Portugal (48%), Malta (47%), Hungary (38%), Azerbaijan (20%), Georgia (17%), and Liechtenstein (10%). Due to the speed of open data transformation in other countries and the corresponding increases in the overall open data maturity scores, these countries remain in the Beginners cluster even when they may have showed improvement, because they are not progressing as fast as others.

6.3 Development of the clusters 2015-2020

The development of the clusters can be seen in figure 48. Compared to last two years, the trend-setter group has increased. Also compared to last year, there is a much larger group of fast-trackers. The number of countries in the followers cluster decreased each year until 2018 but increased for the first

time in 2019, while this year it again is the smallest cluster. The beginners cluster increased this year, mainly due to the inclusion of Eastern Partnership Countries Azerbaijan and Georgia.
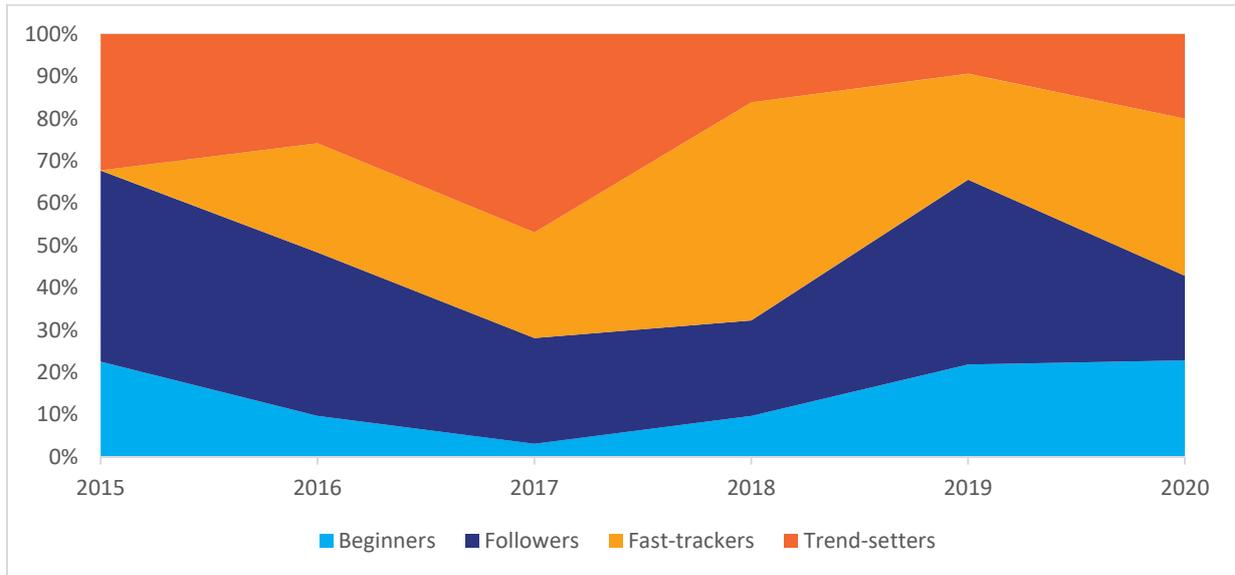
Figure 48: EU27 average open data maturity per dimension for the period 2015-2020

Another interesting development is the increase of minimal scores across the clusters. Compared to 2019, the scores show an increase from 89%-91% to 90%-96% for the Trend-setters, 75%-80% to 78%-88% for Fast-trackers, 53%-69% to 57%-72% for the Followers, and 0-45% to 0-53% for the Beginners cluster. This further emphasizes the progress made by countries across the board.

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 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 re-users. Prioritise the categories specified for the high-value datasets in the Open Data Directive. Particularly in this time of pandemic, invest 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.

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 open data teams, universities and research institutions, and the European Data Portal to develop an experimental impact assessment framework. Also start developing country-specific metrics to measure impact. 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. Conduct research to assess the economic impact of open data, at both micro and macro levels, for example by following the methodology of the European Data Portal's latest "Economic Impact of Open Data: Opportunities for value creation in Europe" (2020). 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 re-users 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 re-users' feedback and ratings.

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 notify them of issues. Provide tools to enable data conversion into alternative formats, possibly replacing non-machine-readable, proprietary formats. Invest into the portal to use new workflows and tools that enable the best understanding of your re-users' profiles and needs, while preserving their privacy.

8. As the Open Data Directive is implemented in your country, adapt the national portal to give clear visibility of the datasets. 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 curriculum to involve more advanced topics. Make such courses formally recognised and provide certification upon successful completion.

10. Share your knowledge and results of your experimentation with other countries and enable them to learn from your best practices and contribute to your research, e.g. in areas of focus you share, or where you experience similar barriers. Reach out and cooperate with other countries on developing solutions to common challenges, including basic, re-usable 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.

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 to be 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 privilege enabling 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 re-use 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 re-users. Increase your knowledge on the publication and re-use 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 re-users. Showcase re-use 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 re-users' 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 portals features, the access to data and improve the variety of data published in your country.

8. Address the requirements of the implementation of the Open Data Directive in your country 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.

9. Think of ways to ensure the portal's sustainability by enabling more contributions from the open data community (e.g. in terms of submitted datasets, developed use cases, news and blog items written by the community), by providing value-added features, as well as 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, both in terms of 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 re-use groups (e.g. data companies, research institutions, NGO's) into 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 re-use 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 portals responsibly, ensuring their privacy and being explicit about how that insight will be used. Identify communities of re-users 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 re-use 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 re-users 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 Open Data Directive is implemented 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.

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 to 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 trainings 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. Rally support to the open data programme and political leadership from top level of government. Showcase international research around the value of open data, such as the European Data Portal's latest "Economic Impact of Open Data: Opportunities for value creation in Europe" report (2020), to emphasise economic benefits of data exploitation.

2. 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.)

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 re-users in your country. Prioritise the promotion of data publication best practices and re-use 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, in this time of pandemic (meetings, online forums etc.)

6. Identify the main data holders in the country and understand the main concerns and barriers to data publication. Take the first steps to overrun 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 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 main data publishers around the importance of metadata and promote the DCAT-AP standard, specifications, and existing guidelines developed at European level.

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 as well as to showcase re-use. 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 to be carried out. Ensure that sufficient resources are allocated to open data awareness-raising activities with both publishers and potential re-users.

Conclusions

This report offered an extensive record of the 2020 edition of the European Data Portal'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 Liechtenstein, Norway, and Switzerland, the Eastern Partnership countries Azerbaijan, Georgia, Moldova, and Ukraine, as well as the United Kingdom.

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 policy-makers 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.

Europe is well on track towards achieving the goals set at European level regarding open data and making it available so that citizens can re-use it. This year, the European countries showed a great increase in their maturity levels, across all dimensions. 2020 also brought about a renewed emphasis on the importance of systematically collecting and making data available to the public due to the COVID-19 pandemic. The need to responding to the emergency led many countries to start publishing related data and developing initiatives and dashboards to make the data more easily understandable and insightful.

As the open data propositions of the European countries mature, their focus has moved from the *quantity* of data made available to ensuring its *quality*, too. Moreover, quality is not seen in isolation, but as an enabler to interoperability: the ability to collaborate within the countries and across borders by making it easier for computer systems to exchange data. The intensified focus enables re-users to extract the value of the data and create new products and services and realise their benefits.

Generating positive impact on society and the economy by publishing open data has always been the ultimate objective of efforts across Europe. Many European countries are successfully performing activities to understand and capture the extent to which open data is re-used and how value is created, by engaging with communities of re-users. Measuring impact, however, is a complex task and there still is no shared understanding of how to do it best. Several countries indicate to have plans to start developing a more structural impact assessment methodology, and there seems to be a desire to collaborate across borders to create a pan-European assessment method. The European Commission plans to build on that, by developing a shared impact framework over the upcoming years.

The report and the numerous examples and best practices from the countries can inspire the national open data teams but, also, anybody fostering open data availability and re-use, enabling them to learn from each other, and to spark initiatives for further cross-border collaboration. This is of pivotal importance to reach the full potential of open data in Europe.