Open **D**ata **M**aturity in **E**urope

Report 2018

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Executive Summary

With the emergence of data-driven innovation hubs and smarter cities across Europe, the potential of data has become beyond dispute. In particular, the value of the data collected by the public sector has gained in relevance and attention in the past years. This translated in an intensification of efforts to ensure the publication of government held data at national, regional and local levels. Open Data has served as means to foster Open Governments across Europe and a better participation of citizens in the decision-making processes of their country, to increase transparency of public spending and political handling. Open Data has sustained the development of data-driven processes and activities in the context of smarter mobility and connected cities. Open Data has enabled civil society's watchdog function by making data on public spending, ownership, public officials' wages and public spending, and led to the flourishing of a new kind of investigative journalism that is data-driven. In short, Open Data has become an enabler for innovation and knowledge in today's world.

Against this backdrop, the fourth edition of the European Open Data Maturity Landscaping sheds light into the European countries' progress with regards to their Open Data activities. The 2018 landscaping provides a tool for benchmarking this progress against the past and in the years to come. The key findings of this year's assessment summarise Europe's maturity levels on four relevant Open Data dimensions: policy, portal, data quality and impact. The findings emphasise the leading role of a few European countries that have timely understood the value that can be derived from Open Data and have taken strategic steps to capture and nourish this potential.

A new benchmarking tool. In this updated version, the 2018 report introduces deeper granularity in how Open Data maturity at country level is assessed. It captures the finer elements of the previous assessments' dimensions - policy and portals - and complements them with two new ones: impact and quality. In terms of policy maturity, the new benchmark sets a stronger focus on updates to and scope of national Open Data strategies, and on what can be described as an enabling type of coordination activities – that enables the local and regional levels to develop their own Open Data initiatives, according to their own needs and at their own pace. Additionally, the policy dimension highlights the activities that foster reuse of Open Data by both the public and private sector. In terms of portal maturity, the new benchmarking focuses on advanced portal features that help drive interaction between the supply and demand sides of Open Data and enable a more strategic publication of data. The updates capture the level of sophistication of national portals to include advanced functionality, usage analytics, variety of data available on the portal, and a strategy to ensure the portal's sustainability in time.

New horizons for strategic transformation. With its newly introduced dimensions – impact and quality, the benchmark aims at incentivising European countries to enhance their Open Data efforts in new strategic areas. Increasing the quality of both metadata and data is the natural next step to ensure that value can be derived from published Open Data. By capturing and measuring this value, the virtuous circle around Open Data publication and reuse will be strengthened and the ecosystem of advocates increased. At the same time, it will help reduce the circle of Open Data sceptics as it will provide evidence of the positive effects that Open Data can have. Working on both quality and impact represents the two natural next steps for those European countries that already have a solid foundation in place, in both terms of policy and portal.

Old and new dimensions to capture complexity of Open Data maturity. The overall results across Europe emphasise the heterogeneity in the speed of transformation and the priorities that countries have set along the road. With an **overall maturity level of 82% across the EU28 on the policy dimension,** Europe has reached maturity in terms of its policy foundation. Countries are now setting new focuses. The less advanced Open Data countries choose to take the natural next step and invest in the modernisation of their national portals as main gateways to Open Data available throughout the country. The more Open Data mature countries now shift to boosting the quality of data publication. The top performing ones are now prioritising the impact derived from Open Data and undertake activities to monitor and capture this impact. The 2018 results reflect this observation.

With a **maturity level of 63% on the portal dimension,** the EU28 average captures both the advanced level of maturity achieved by one third of Europe's national portals and the 'room for improvement' observed in the other two thirds. In terms of Open Data quality, a similar observation holds true. With an overall **level of maturity of 62% on the quality dimension,** Europe is only advancing at a sluggish pace. Only seven of Europe's 10 top performers showcased very good results of 75% and above on this dimension as well as a clear focus on improving the quality of published data and metadata.

Concerning the fourth element – Open Data impact, the results in 2018 are modest. **The overall maturity of 50% on the impact dimension** provides evidence of the very slow pace at which the EU Member States are moving, with only three of Europe's top performers recording a maturity level of 75% and above on this dimension. This underlines the need for more strategic action to help increase the awareness around the pivotal role that demonstrating impact has. The modest result also emphasises the urgency to develop a strategic approach to monitor and measure the impact derived by the use of Open Data.

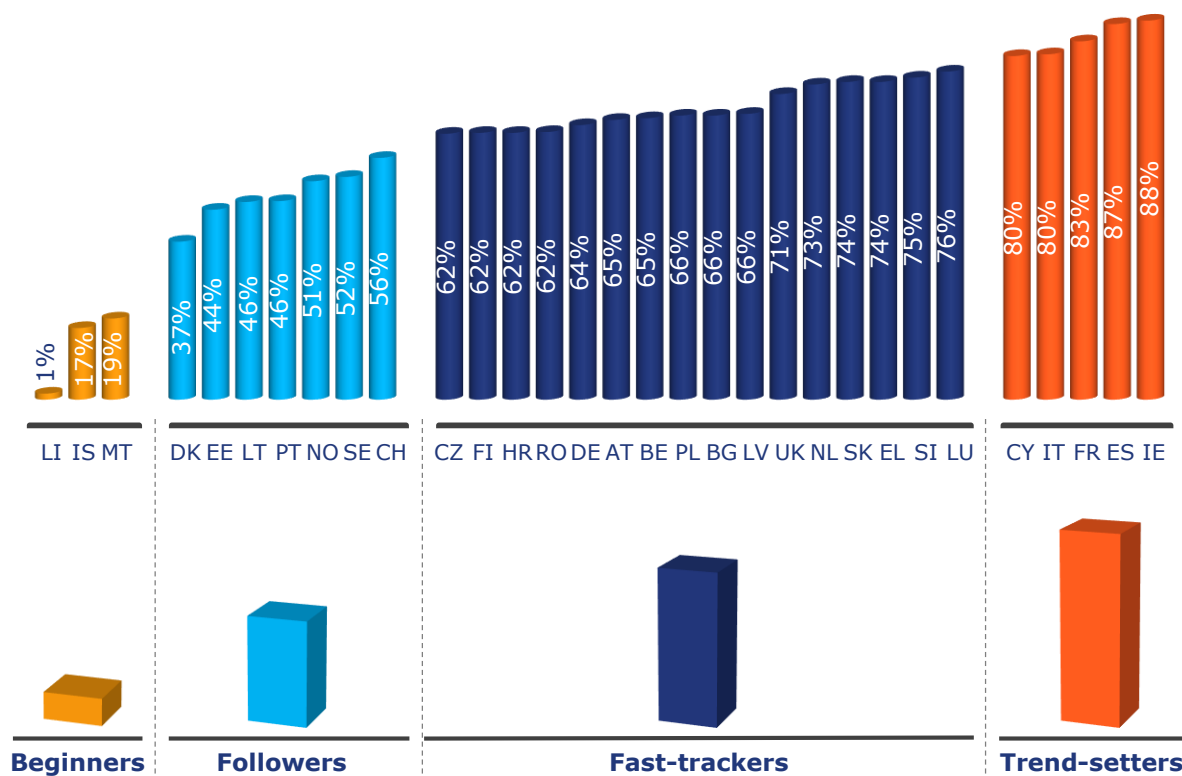*Figure 1: Open Data Maturity scores - EU28, 2018*
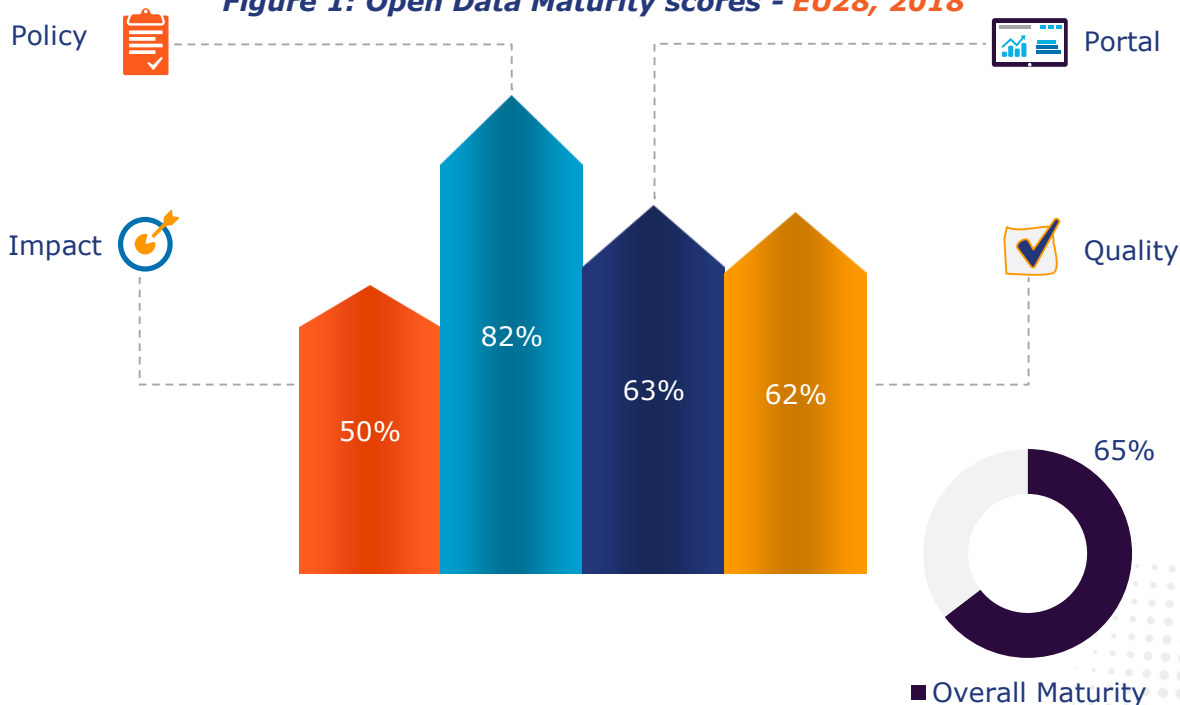
A Europe of different speeds. The heterogeneity in terms of the speed and focus that European countries show in their transformation is also reflected by this year's maturity clustering. In 2018, only five European countries qualified as 'trend-setters'. Ireland, Spain, France and Italy provided solid evidence of their sustained Open Data efforts, with scores of 80% and above. Cyprus has frog-leaped its transformation in 2018 and has now reached an overall maturity score of 79,6%. This great progress ensured Cyprus a place amongst the top 5 European best performers.

The decrease in scores of many of last year's 'trend-setters' also led to a larger group of 'fast-trackers' in 2018, with now 16 countries pertaining to this group. In general, only limited progress can be observed at Member State level, with the majority of Europe scoring around the same levels as in 2017. Only a few countries recorded significant drops in scores. This can be attributed to the fact that Open Data was deprioritised on the political agenda at national level, as well as the faster speed at which other countries have pushed progress in 2018.

This year's assessment strengthened the position of those countries that remained consistent in their efforts to drive transformation through Open Data.

Figure 2: Open Data Maturity clustering - *EU28, 2018*

	Beginners	Followers	Fast-trackers	Trend-setters
LI	1%			
IS	17%			
MT	19%			
DK		37%		
EE		44%		
LT		46%		
PT		46%		
NO		51%		
SE		52%		
CH		56%		
CZ			62%	
FI			62%	
HR			62%	
RO			62%	
DE			64%	
AT			65%	
BE			65%	
PL			66%	
BG			66%	
LV			66%	
UK			71%	
NL			73%	
SK			74%	
EL			74%	
SI			75%	
LU			76%	
CY				80%
IT				80%
FR				83%
ES				87%
IE				88%

Introduction

The Open Data landscaping exercise provides a yearly benchmark of the state-of-play of Open Data in the EU Member States (henceforth EU28) as well as the EFTA countries: Iceland, Liechtenstein, Norway and Switzerland (henceforth EU28+).

Now in its fourth iteration, the Open Data maturity assessment creates a benchmarking and learning tool for both the national and EU level. The assessment measures the maturity of countries against four dimensions: policy, impact, portals, and data quality. The benchmark highlights the different maturity levels across Europe, and showcases good practices implemented across Europe, that could serve as inspiration for other countries within and outside the European borders. The Open Data landscaping exercise offers a vehicle for bench-learning and bench-marking. It allows countries to better understand their level of maturity, to capture the progress made 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 contexts.

For the scope of this report, the following working definition for Open Data was chosen, in line with the principles for Open Data described in the Open Definition[1]: "Open (Government) Data refers to the information collected, produced or paid for by public bodies that can be freely used, modified, and shared by anyone for any purpose".

The report is grounded in the legal framework established by the Directive 2003/98/EC[2] – the Directive on the Reuse of Public Sector Information or PSI Directive. The Directive sets the frame for the publication and dissemination of information collected by public bodies across the EU. The Directive fosters internal market, by amongst others enabling the development of cross-border services, based on Public Sector Information reuse. The PSI Directive of 2003 was revised by Directive 2013/37/EU[3] that expands the scope of the previous legislative framework, by including documents – defined as "any content whatever its medium (written on paper or stored in electronic form or as a sound, visual or audio-visual recording)" -- for which libraries, including university libraries, museums and archives hold intellectual property rights. Content from educational, scientific, and broadcasting sectors was not part of the scope in the 2013 revised Directive.

The 2018 Edition of the Open Data Maturity Landscaping is structured as follows:

- **Method** highlights the main changes performed to the assessment methodology for the 2018 Open Data landscaping exercise.

- **Chapters 1-4** provide a detailed assessment of the four Open Data dimensions: policy, portal, quality and impact in the EU Member States.

- **Chapter 5** offers an overview of Open Data maturity in the EFTA countries.

- **Chapter 6** presents a clustering of the countries, according to their performance on the four dimensions, and draws the key insights from this clustering exercise

- **Chapter 7** provides a set of recommendations for each cluster, to serve both policy-makers and portal owners as guidance to push for further Open Data progress.

- **Conclusion** underlines the main take-aways and reflections from the 2018 landscaping exercise

1. http://opendefinition.org/
2. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0098&from=en
3. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0098-20130717&from=EN

The report is accompanied by factsheets detailing the situation at country level. The links to the EU28+ country factsheets are provided in Annex I. The country factsheets can be accessed via the designated section on Open Data Maturity on the European Data Portal[4].

As Hungary did not participate in the 2018 landscaping exercise, the percentages presented below are based on 27 Member States. The report will depict the participating European Union Member States as EU28 throughout its text.

Method

The Open Data landscaping methodology has been updated from the iterations of 2015 to 2017. The rationale beyond the method update is two-fold. On the one hand, the report aims to better capture and assess Open Data developments across Europe and provide a more granular reflection of the state of the art in each country. On the other hand, the added questions aim to capture progress on aspects that the European Commission is striving to push forward in the Member States.

Despite the benefits that the method update brings, the 2018 assessment reduces the opportunity to compare directly the results of this iteration with past results. Country progress from 2015 onwards is documented in the country factsheets, available on the European Data Portal. The country factsheets showcase the progress year-on-year between 2015 and 2017, as well as the results per dimension and indicator in 2018. Additionally, they provide information on the barriers for Open Data publication and reuse and showcase best practices at country level for both publication and reuse.

As for past iterations of this research, the data was collected though a questionnaire sent to national Open Data representatives. The 2018 questionnaire was structured against the new four dimensions of: Open Data Policy, Open Data Portal, Open Data Quality and Open Data Impact. While past methodology covered already Policy and Portal, the 2018 measurement is intended to give significant visibility and a stronger weight to Impact and Quality, by introducing them as stand-alone dimensions.

- **Open Data Policy** ("Policy" for short) is a dimension focusing on the presence at national level of specific policies on Open Data, licencing norms, and the extent of coordination at national level to provide guidelines and guidance to national, local and regional administrations, and set up coordinated approaches towards data publication.

- **Open Data Portal** ("Portal") looks at the development and level of sophistication of national portals to feature available Open Data, and comprises considerations around functionality, usage (user analytics), variety of data available on the portal, and the approach to ensuring the portal's sustainability.

- **Open Data Impact** ("Impact") analyses existing methodologies and the strategic awareness at national level towards capturing and measuring impact and zooms in into the impact of Open Data at country level on four dimensions: political, social, environmental and economic.

- **Open Data Quality** ("Quality") explores the extent to which national portals have a systematic and automated approach to harvesting, the currency and reliability of featured data, and the compliance level in terms of the metadata standard DCAT-AP.

4. https://www.europeandataportal.eu/en/dashboard#2018

The assessment distinguishes between the following country categories, in line with the Eurostat classification of the EU28+, based on the population size[5]:

- Small countries: Austria, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Norway, Slovakia, Slovenia, Switzerland

- Medium countries: Belgium, Czech Republic, Greece, Hungary, Netherlands, Portugal, Romania, Sweden

- Large countries: France, Germany, Italy, Poland, Spain, United Kingdom.

For a detailed illustration of the method update of 2018 please refer to the Method Paper available on the European Data Portal, in the Open Data Maturity section[6].

For a more detailed overview of the EU28 results in the years 2015 to 2017, please refer to the annual maturity reports also available on the European Data Portal.

5. https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00001&plugin=1
6. https://www.europeandataportal.eu/en/dashboard#2018

Chapter 1
Open Data Policy

The dimension **Open Data Policy** focuses on the presence of specific policies on Open Data at national level, on the existing licencing norms, and the extent of national coordination with regards to guidelines and common approaches to enable development throughout the country.

The following aspects were explored as part of the Policy dimension:

Indicator	Key elements
Policy framework	▪ The policy framework in place at national level provides a long-term strategic vision on Open Data.
Coordination at national level	▪ Coordination at national level is strong and provides guidance for local/regional levels to develop their own Open Data initiatives.
Licencing norms	▪ Comprehensive guidelines and assistance on Open Data licencing are in place at national level.

Policy framework

The first indicator of this dimension focuses on the national Open Data policies, their scope and updates since April 2017, the availability of information (e.g. lists) with the published open government data and of justifications for not opening data. In addition to 2017, the updated indicator looks at the extent to which high value data domains were defined at national level and – where applicable – updated to comprise new domains.

With regards to the availability of Open Data policies, all EU28 countries but Sweden have a dedicated Open Data policy in place. It is worth noting that Sweden has a longstanding tradition in terms of providing public access to official documents to its citizens. This principle is enshrined since the 18th century in the country's constitution. Sweden's Riksdag – the national legislature and the supreme decision-making body – provides access to approx. 300.000 documents and information dating back from 1971[7].

Since 2017, 17 Member States (63%) have updated their policy frameworks. Updates to the policy framework mainly dealt with the scope of data publication such as the definition of lists of datasets to be released, along with new priority areas and/or further specifications concerning the licencing of data. In a few countries such as Bulgaria, the updates included an obligation for public bodies to set up yearly data publication plans. In other countries such as Austria the updated legislation establishes an obligation for public administrations to assess their data against its potential to qualify as Open Data. If the case, the legislation obliges administration to publish this data by 2020. In the Czech Republic, the Free Access to Information Act empowers the national government to issue regulations stipulating the list of datasets that should be mandatorily published as Open Data. In 2017 a list of eleven new datasets were identified and published by 1 January 2018. A new Government regulation containing a list of 13 new datasets awaits Government approval and will be enforced from 31 January 2019.

In 2018, 22 Member States (81%) stated to have an Open Data strategy in place for the next five years. In most countries the Open Data strategies are embedded into the

7. http://data.riksdagen.se/in-english/

broader vision of enabling an Open Government and/ or smart cities and countries. This is the case in the UK, where Open Data is part of the Government Transformation Strategy[8] as well as of the country's Digital Strategy[9].

The same applies for Belgium, where Open Data policies exist at both federal and regional level and are part of the broader strategies to enable smart cities and regions. At the federal level, Open Data is part of the 'management agreement' between public administrations and the Cabinet. At regional level, the region of Flanders developed an Open Data Charter[10] that is integrated in the Smart Flanders strategy and explicitly mentions the reuse of data for both non-commercial and commercial use.

In Wallonia, the Open Data strategy is part of the broader Strategy for Digital Wallonia. The same applies also in Germany, where the Federal State of Schleswig-Holstein has published a Digital Agenda in December 2016 in which Open Data plays a key role.

In addition to this, the membership in the Open Government Partnership (OGP) appears to push for publication of Open Data in many countries. This is the case in Cyprus, France, Germany, Italy or Romania. The Action Plans developed under the OGP framework emphasise Open Data as one key priority. They entail concrete interventions to enable the publication of high-value datasets, to foster participation and transparency, and focus additionally on measures to ensure technical assistance towards data publication at public administration level. France's new Open Government Partnership National Action Plan advocates for an expansion of the 'data public service' following two rationales: collaborating with civil society to define new 'reference data' and furthering the development of 'verticals': services such as data, APIs and open labs geared toward domains of importance, e.g. transport, energy or enterprise.

In 17 Member States (63%), the national Open Data policy is more ambitious than the PSI policy. Amongst the differences, national officials list the strengthening of governance structures (Ireland or the UK), stronger incentives for the development of Open Data standards and methodologies (UK), the promotion of Linked Open Data in the public sector (the Czech Republic) and the provision of training programmes for public servants working with Open Data. Most EU28 countries also highlight the fact that the national Open Data policies recommend a certain set of licences (in most cases from the Creative Commons licence suite). In Belgium, the federal Open Data Strategy "Digital Belgium"[11] focusses on simplifying the licencing of data and on a more proactive approach and support to and by the Open Data community.

In 25 Member States (93%), the existing Open Data legislation also presents the exceptions allowing public sector bodies not to release Open Government Data. In the Netherlands, the justifications for not opening data are transparent to the broader public, with the national portal featuring this "closed data" as such on the national portal. The national extension of the DCAT-AP standard also includes a field in which data providers are asked to state the reasons for which that data cannot be opened to the broader public.

25 Member States (except for Austria and the UK) identified priority domains for data publication. In Austria and the UK all data domains are considered equally important. In most Member States the data prioritisation was done in collaboration with the

8. https://www.gov.uk/government/publications/government-transformation-strategy-2017-to-2020
9. https://www.gov.uk/government/publications/uk-digital-strategy
10. https://smart.flanders.be/open-data-charter/
11. http://digitalbelgium.be/wp-content/uploads/2017/07/compressed_NLStrategisch-dossier.pdf

community of reusers. In Croatia, the Information Commissioner developed analytical reports addressing ten sectors – amongst which health, education, environment and tourism – which contain the lists of all registers and databases indicating which are eligible to be made available as Open Data.

In the Czech Republic, the Working Group on Digitalisation identified, together with the group of entrepreneurs from the automobile and telecommunication industry, more than 70 datasets as high-value data. In Ireland, the national Open Data team conducts periodic meetings with public bodies during which they encourage that priority be given to high-value datasets from the respective organisations.

In Latvia, the government also worked together with the Latvian Open Technology Association and Latvian Information and Communication Technologies Associations to identify priority datasets. In this process, the local NGOs helped raise attention to datasets that public administration still charge for and should be treated as high value Open Data and subsequently released as such.

Coordination at national level

The second indicator analyses the existence of initiatives and guidelines at the national level that foster the release of Open Data within the country and the extent to which efforts are made at the national level to foster the development of local and/or regional initiatives in the Open Data field. Additionally, the indicator explores the efforts undertaken by the national level to enable the interoperability of data (e.g. towards the implementation of the Once-Only Principle) as well as to boost publication and reuse. Moreover, it also assesses whether data publication plans exist and if monitoring of progress against these plans was conducted.

In 2018, 23 EU Member States were successful in enabling the development of Open Data initiatives at local or regional level. Five countries – Croatia, Greece, Ireland, Netherlands and Poland - stated that somewhere between 26% and 50% of their regions and cities conduct their own Open Data initiatives. In Denmark, France and Spain this percentage lies between 51% and 75%. In Italy, between 71% and 90% of local and regional administrations have own programmes in place. In Belgium and Bulgaria this percentage even exceeds the 90% mark.

In 2018, progress can be observed both in terms of local and regional levels running their own Data initiatives (be it policies or portals), and in terms of efforts done at national level to harvest local and regional portals. These efforts have intensified compared to 2017. In 18 of the 24 EU countries to which this question is applicable[12], the national level also ensures a systematic harvesting of local and regional portals. This number has more than doubled compared to 2017, when only 7 countries harvested regional and local portals and quadrupled compared to 2016 (4 countries).

This is a positive trend that also shows that the national portal is consolidating its position as main gateway to access the Open Data published throughout the country. In this regard, in 41% of European countries – Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France, Ireland, Lithuania, Portugal – a level of harvesting of 91%-100% of local and regional portals was achieved. In other 22% of European countries – Denmark, Germany, Netherlands, Spain, Sweden, the UK – a level of harvesting of 75% to 90% was reached.

12. The small size countries were excluded from the count, as the question was not applicable to this group.

Figure 3 shows the distributions in terms of harvesting of local and regional portals by the national Open Data portal.

Figure 3: Local and regional portals harvested by national portal - EU28, 2018
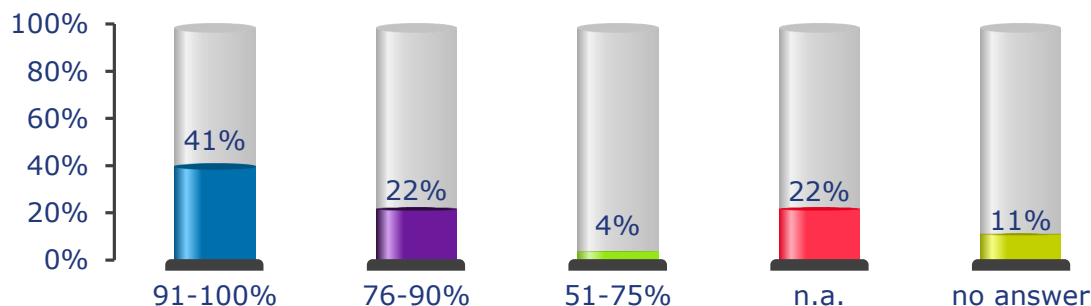
An important benefit of integrating local and/or regional portals into national portals is enhancing visibility and discoverability of, and subsequently access to datasets released by the various administrations in a country. While hyper-local portals like city portals are important players in the Open Data publication chain, the best way to ensure a high degree of discoverability of data from all over Europe is to bring the metadata together onto a central repository – the national Open Data portal – which in turn to be harvested by pan-European portals (such as the European Data Portal).

In order to do so, the national level needs to strike a balance between the need for a hands-on coordination and supervision to ensure national targets are met, and the need for a good level of freedom at local and regional levels to conduct and develop Open Data initiatives on their own terms and at their own pace. In countries with a federal structure, such coordination is constrained by the autonomy the law gives to the states. In such countries, the national level takes a more passive approach to coordinating efforts. This was the case in 2018 in Belgium and Germany, but also in less regionalised countries such as Denmark, Finland, Lithuania or Portugal. In most Member States an active coordination is preferred, with a strong guidance from the central level. In 2018, 19 countries (70%) stated that they adopt an active approach to coordinating Open Data activities in the country. The situation across the EU28 is depicted by Figure 4 below.

Figure 4: Coordination of Open Data activities at national level - EU28, 2018
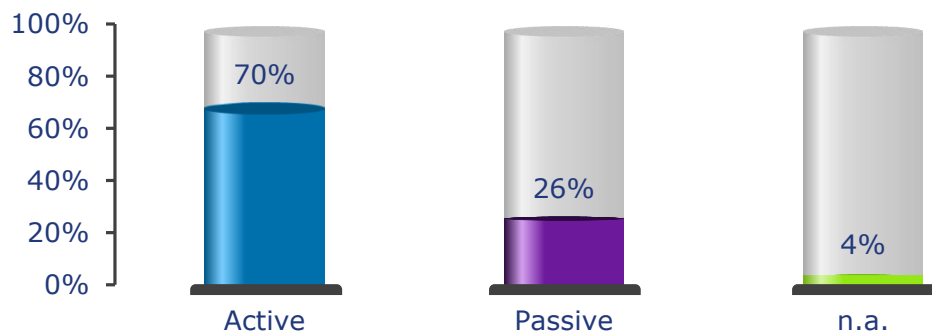
In Poland each ministry appoints civil servants responsible for the implementation of the Open Data programme in their institution. These Open Data officers are required to recommend new data sets to be released on the national portal. Such 'data stewards' monitor the timely publication of data on the portal according to a roadmap defined in the national Open Data programme. They also ensure that the data quality is in line with the standards and guidelines of data formats defined in the national Open Data Programme. Every year the Open Data officers are requested to report on the implementation process and progress. These reports are part of the Annual Report developed by the Ministry of Digital Affairs and filed to the Council of Ministers. In Romania, a similar centralised approach is adopted, with the Open Data responsibility enshrined at the level of the Secretariat General of the Government. The preference for a more active approach lies mainly in the country's efforts to push forward at a higher speed the standardisation and interoperability of data as well as publication of data on one single platform. For this reason, the country encourages publication of Open Data directly on the national portal. Guidelines are also available that support local and regional public administrations with their publication processes. Furthermore, an EU co-funded "Open Data Call" will be launched this year to enable implementation of Open Data initiatives at municipality level.

Finding the right balance – A success story from the Netherlands

In the Netherlands the national Open Data team ensures the continuous exchange between the publishing and reuse communities by organising quarterly gatherings, updating and expanding the high value lists for different layers of government, and maintaining an active user group around the data portal to bring data supply and demand together. The national expertise centre – based with the Ministry for Interior - also provides technical assistance in the form of training to encourage and teach (local) government officials to open their data. A national working group is in charge of the coordination of Open Data activities at all levels. With a Steering Committee in place, as well as political leadership in the Ministry, the country has managed to find a healthy balance between ensuring the right amount of steering from the central level to enable local governments to independently develop and coordinate their own actions, while still operating within the national strategy.

The size of countries is also a critical element determining the level of coordination that is needed at the central level. Countries such as Cyprus, Estonia, Latvia, Luxembourg, Malta and Slovenia – smaller in size and with less complex structures of government – may not need to ensure the coordination and alignment of the various regions and local levels. In most of these cases, the number of public bodies operating in the country is low and there are no other Open Data portals but the national one. A good practice to ensure coordination of efforts amongst public bodies comes from Cyprus, where PSI liaison officers are appointed in each public body. They ensure the dialogue with the central Open Data team and enable the publication of high-quality data in their institution.

The development of data publication plans and monitoring mechanisms for data publication can serve as tools to monitor progress across national and local public administrations and enable more effective interventions where applicable in order to overrun barriers to data publication.

In 22 Member States (81%) there are such data publication plans in place. A good practice comes from Ireland, where the national Open Data strategy asks that all public service organisations have publication plans in place and recommends that they should be revised every 2 years. In the Netherlands, Poland and Slovenia, over 90% of public administrations completed their publication targets, whereas in Croatia, the Czech Republic and Romania, this percentage lies in the 71%-90% range. In Italy and Spain between 51% and 70% of the publication plans were finalised. In Sweden, although there are no general data publication plans for public administrations, such plans exist in the framework of data publication in the cultural field. An example is the project for digitisation and accessibility of cultural heritage collections[13].

Completion of data publication plans - EU28, 2018

**Data publication plans at national level – EU28, 2018**
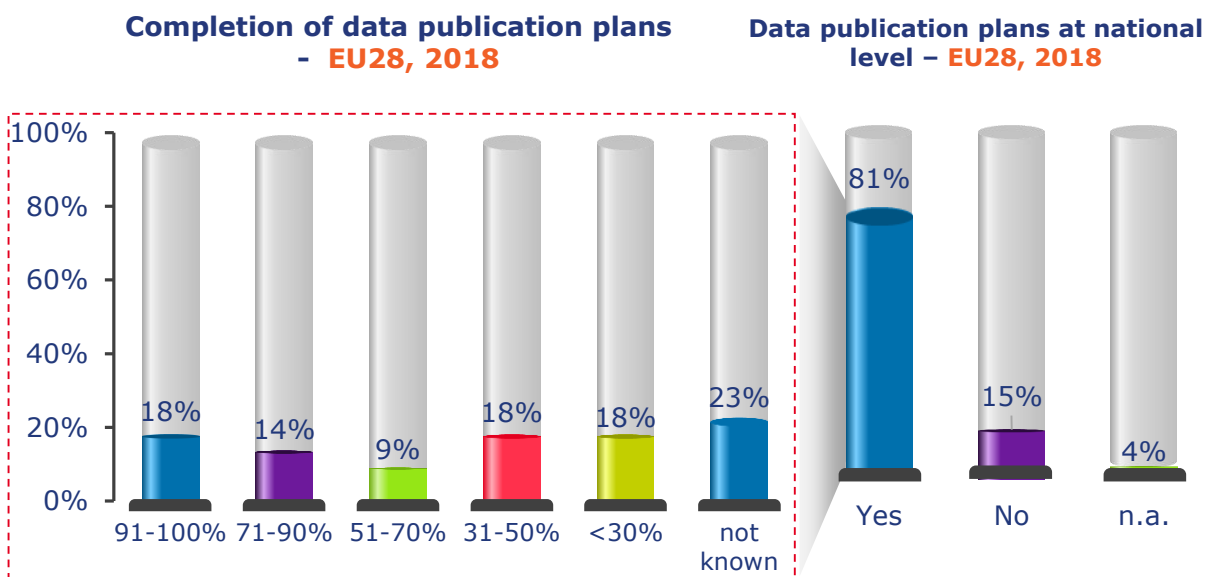
Figure 5: Monitoring of data publication - EU28, 2018

With regards to the existence of a monitoring of the public administrations that charge above marginal costs of making data available for re-use, only 16 countries (59%) – Austria, Belgium, Croatia, Cyprus, Denmark, Estonia, Finland, France, Greece, Italy, Luxembourg, Netherlands, Slovakia, Slovenia, and Sweden – had a monitoring mechanism in place in 2018 (see Figure 6 on next page). In 11 of these cases, less than 10% of public administrations still charge above marginal costs. In Denmark this percentage is slightly higher and lies between 11% and 20%. Four countries (Greece, Estonia, Luxembourg and Italy) stated in 2018 that no public body charges for the publication of their data. An exception here is still cadastre data. However, progress can be seen on this dimension as well with several European countries planning on publishing such data free of charge in the future. In Sweden, the legislation in force foresees an obligation for public sector bodies to only charge marginal cost for providing such information. The law allows some exceptions for archives, libraries and museums or for agencies which are obligated to charge fees to cover part of the costs of their activities.

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13. https://www.vr.se/english/calls-and-decisions/calls/calls/2018-06-05-research-project-grant-for-digitisation-and-accessibility-of-cultural-heritage-collections.html

Public administrations charging above marginal costs - EU28, 2018

Monitoring of data charging practices - EU28, 2018
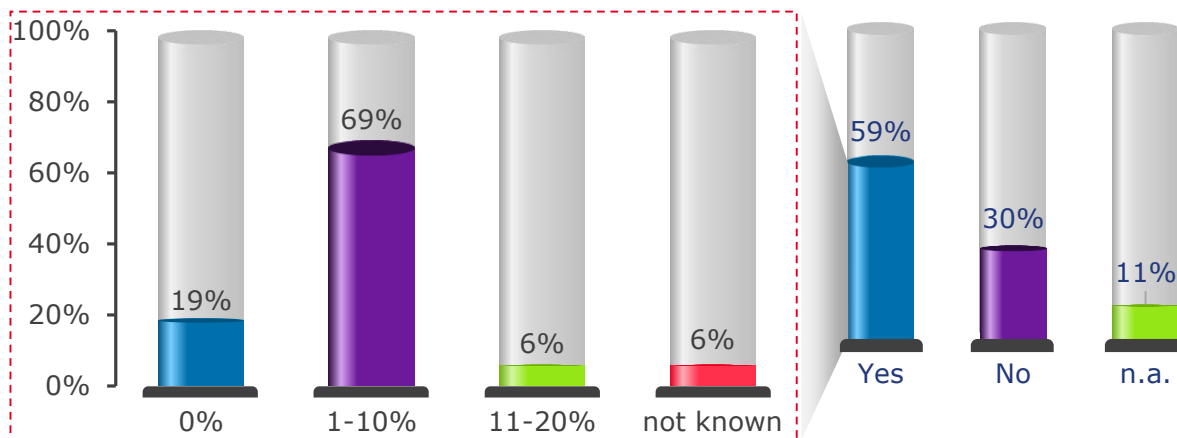
Figure 6: Data charging practices - EU28, 2018

Important steps are also taken concerning the interoperability of data. All 27 responding Member States stated that the interoperability of data is considered a priority and that efforts are made to enhance the interoperability of data across the country. The insights box below provides some examples of such country efforts.

Interoperability of data – Good practices across Europe

In Bulgaria, the State e-Government Agency has the prerogative to coordinate the interoperability efforts in four aspects – legal, organisational, technological and semantic interoperability, for data, systems and the registers maintaining them. The agency is also the body responsible for the creation and maintenance of a register of the registers. Bulgaria is also currently working on an update to its National Interoperability Framework, in line with the ISA[2] Core Vocabulary[14].

In Lithuania, the interoperability of the data collected by the public sector is ensured through the implementation of the State Information Resources Interoperability Platform. This platform is designed to help state information systems and registries (as eService providers) to exchange data in a standardised way. The platform enables new electronic services to be created much faster and in a more cost-effective manner, as individual institutions do not need to "re-invent the wheel" and develop and deploy their own individual solutions (e.g. identification of the recipient of the service, payment for services, standardisation of data exchange, etc). The tools available on the platform can easily be integrated with other systems using in public administrations across the country.

In Belgium, efforts to enhance interoperability of data span from harmonising the street and address information from the three regions (Flanders, Wallonia and Brussels-Capital Region) and making them available in the same format, to creating registers and enabling knowledge exchange within the newly created Open Standards working groups.

14. https://ec.europa.eu/isa2/solutions/core-vocabulariesen

In Malta, a holistic approach to data is adopted that has the interoperability of data at its core. The country focuses on enabling and assisting the Once-Only Principle requirements as part of the government KPIs. In this regard, Malta has set up a strategy and legal instruments (policy) that give the necessary mandate and legal basis to information and data sharing. The legal instrument mandates the classification of each register and dataset based on an established 'comprehensive data classification scheme'. It also entails the obligation to link to a central person base register. The reuse of data by other public administrations is ensured in this way, with data with classified as 'open' as default position. However, when person identifiable data is involved, the reuse is subject to the 'data minimisation' and 'purpose limitation' principles and subject to the approval of the designated Information Commissioner who will ensure that the purpose is legitimate and lawful.

In the UK, efforts are undertaken to define machine readable levels of attribute setting and metadata to ensure interoperability of common data sets.

In Slovenia, the government is currently working on creating the Slovenian Central Vocabulary (CNB). The CNB will provide a unique taxonomy of the key concepts or terminology used within the Slovenian public administration. It will provide a consistent language and represent a reference for information system designers, databases, registers; drafters of legislative texts; users or data clients other than the administrators of a specific area (e.g. other public administration bodies, Open Data users, business analysts, application developers). The CNB is intended for both internal users (public administration bodies) and external users (business users - the economy, interested public, etc.). A distributed organisation of CNB maintenance is planned. In doing so, an administrator of a basic register, supported by a central body, would independently maintain its domain of CNB.

The coordination efforts at national level also refer to the extent to which the national level undertakes action to foster dialogue and exchange between the Open Data communities in the country. This exchange can be best achieved throughout events that involve both publishers and reusers. When it comes to the amount of Open Data events organised across the EU in 2018, countries maintained the same pace as in 2017, with an impressive number of events organised. Such events took different formats, from annual conferences at national level and cross-national conferences, to hackathons and data challenges at both national and city level.

All large size countries (France, Germany, Italy, Poland, Spain and the UK) were able to list 5 or more events. In the medium size countries, the same trend can be observed, with more than 4 events in Belgium, Czech Republic, Romania, Sweden and the Netherlands, and between 3 and 4 annual events organised in Greece, and Portugal. The same can be seen in smaller countries, where more than 3 events were organised in the past year. Austria, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, Ireland, Latvia, Luxembourg and Slovenia also provided great examples and were able to list more than 3 events organised in the past 12 months. Lithuania and Malta follow closely with 2 to 3 events.

In Portugal various informal meet-ups are regularly organised. Public servants often participate in activities with data reusers that run under the catchy name of "Date with Data". For an overview of the various Open Data events organised across Europe in 2018, please refer to the footnote[15].

As in previous years, most Open Data events were organised by national public administrations (10 countries, 37%). In six other countries (22%) – Belgium, Estonia, Greece, Ireland, Italy and Poland – most Open Data events are organised by local administrations. In Finland and the Czech Republic events are organised by the private sector whereas in Bulgaria, Germany and Portugal it is mainly the civil society that organises such events. In Spain events are organised in collaborative effort between the local administration and the civil society.

With regards to boosting data publication, in both terms of quantity and quality, 22 Member States have conducted training activities for public administrations since 2017. The variety of training ranges from information sessions for public servants, workshops and training sessions at public body level, to online tutorials that deal with the main aspects of data publication. Additionally, national teams in some countries (such as Italy) have conducted webinars for both public administrations and the broader Open Data community to raise further awareness around Open Data.

Promoting the culture of 'open' – A success story from Italy

In Italy, great effort was made by the editorial staff of the national Open Data portal (dati.gov.it) to promote the topic of Open Data, with over 10 free online seminars organised. The webinars had a total of more than 2500 participants. Not only the national level in Italy appears to provide information and training sessions extensively, but many municipalities have carried out training initiatives, too. The city of Milan has created a distance training course called "Open Data" involving the internal staff of the institution and the municipalities of its territorial district. The Municipality of Genoa created courses for officers and managers as well as for the representatives of the various city councils on Open Data and the concept of transparency and openness in local government. The RAS - Open Data of the Sardinia region developed a project open for participation of local administrations, citizens, associations, schools, universities and businesses of the European Union to raise awareness around Open Data and encourage the development of innovative services based on reuse of Open Data.

15. Large countries: Paris, March 2017, #DataFin, Paris, May 2018, Datensummit 17, Berlin, April 2017, 4th International Open Data Conference 2016, #NRWHack, North Rhine-Westphalia, November 2017, Accountability Hack 2016, Madrid, October 2016, Data Journalism and Open Data Workshop, Madrid, April 2018, Air Hack 2017, London, November 2016, Leeds, February 2017, Transport Hack DFT, Reading, March 2016, Homeless Hack 2017, London, June 2017, Data Hack: Digging Public Procurement in the UK, London, April 2018, Public Data Hackathon, Warsaw, September 2016, Global Legal Hackathon 2018, Warsaw, February 2018;
Medium size countries: Prague Data Cities Congress, Prague, June 2018, City Challenge Crowdhackathon, Athens, April 2017, Stuiveling Open Data Award, Rotterdam, October 2018, Hack for Sweden, Stockholm, April 2018, Open Belgium 2018, Louvain-la-Neuve, March 2018, Open Data Day Portugal, Porto, March 2018;
Small size countries: Cyta Smartcity Crowdhackathon, Nicosia, February 2018, From Data to Business Opportunities, Odense, November 2017, Open Data Impact Seminar, Dublin, September 2017, GameOfCode hackathon, Luxembourg, March 2019, hARTckathon, Vilnius, April 2018, Data Hackathon, Latvia, October 2018, Cultural Adventure at Hand, Ljubljana, October 2018

The insights boxes below showcase some examples of efforts conducted at national level to enhance knowledge amongst civil servants around Open Data publication.

Providing training to public administrations – Success stories from across Europe

In Bulgaria, a series of trainings was provided for public administrations. The Bulgarian Public Administration Institute conducted a total of 12 trainings in the period of June 2017 to June 2018, in which over 280 employees from the central and local administration participated.

In Cyprus, the established PSI liaison officers participate in two annual workshops. The workshops include training sessions on new portal features, as well as exchange sessions in which developments concerning the Government Open Data Policy are discussed. Additionally, the PSI officers are invited to show best practices in publishing data and present applications developed based on Open Data stemming from their administration. Local start-ups are invited to present their use cases in these workshops. Additionally, the Public Administration and Personnel Department in charge of the Open Data activities in Cyprus conducts frequent hands-on workshops where the PSI Liaison Officers are trained on issues that relate to metadata, formats, data standards etc.

In Romania, training is part of the broader coordination activities undertaken by the national level. As the Open Data concept is still new and rather unknown among civil servants from both central and local level, strong guidance from the national level is still a prerequisite at this point to advance the process in a coordinated and successful manner. Thirteen training sessions were conducted at the central level, with over 40 beneficiary institutions and 200 public servants trained, 90% of which pertaining to the central government and 10% to the local government. Discussions are currently taking place with the National Public Administration Academy to introduce an Open Data training programme into their professional development curriculum. A set of five training modules are also currently being developed. The set of materials is available online on the Romanian Open Data portal[16].

In Ireland, a dedicated training is available to public administrations. The Open Data Unit in Ireland regularly arranges meetings with public bodies which are not publishing to talk them through the process, to explain the benefits of Open Data and to help where required. Around 20 such meetings have taken place since July 2017 when the strategy was launched, and further meetings are planned for 2018 and 2019. One of such success stories is Met Eireann, Ireland's National Meteorological Service, that has started publishing since April 2018 and now features 2000 datasets on the national portal.

In Slovenia, training on the Open Data and the Portal OPSI was provided at the central level by the Administrative Academy of the Ministry of Public Administration and involved the civil servants working with Open Data from the municipalities in Slovenia.

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16. http://ogp.gov.ro/resurse-date-deschise/

Licencing norms

The third indicator refers to the extent to which guidelines are in place to ensure that the published data complies with the definition of "open" in both terms of the data being free from fees and it being released under an open licence. Publishing data under an open licence, and, most importantly, providing clear information on the terms and conditions under which the data can be reused, alleviates the uncertainty from the reusers' side and fosters immediate reuse. With the transposition of the PSI Directive of 2003 (2003/98/EC) into national laws, many different licencing norms were developed at national level. To align practices across the EU and make them more transparent and predictable for potential reusers, the assessment rewards countries that recommend the Creative Commons (CC) licences suite, or that align their licences to the CC suite.

15 Member States (56%) stated in 2018 that all their published Open Data can be accessed free of charge (Austria, Croatia, Cyprus, Czech Republic, Denmark Estonia, Finland, France, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, and Slovenia). In another 9 EU countries amounting to 33% (Belgium, Bulgaria, Greece, Ireland, Lithuania, Romania, Slovakia, Spain and Sweden) 90-99% of data can be accessed free of charge. In the UK and Germany this percentage is slightly lower and ranges between 75% and 89%.

Figure 7: Open Data published free of charge - EU28, 2018
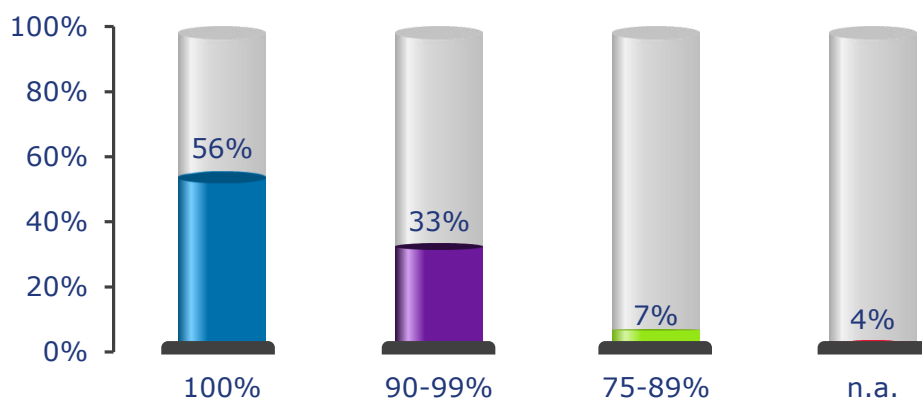
Furthermore, only 12 countries (44%) published all their data under an open licence (Croatia, Cyprus, Czech Republic, Finland, France, Germany, Italy, Latvia, Poland, Slovakia, Spain and the UK). Another 12 countries (Austria, Belgium, Bulgaria, Estonia, Greece, Ireland, Lithuania, Luxembourg, Netherlands, Portugal, Romania and Slovenia) stated that 90-99% of data is available under an open licence. Figure 7 below provides an overview of the EU28 in this regard.

In terms of recommended licences, while some Member States developed their own licencing terms (Germany, France, Romania or the UK), others promote the use of CC licencing suite. The insights box provides some examples of European practices with regards to open licences developed for publication of Open Data.

Licencing practices in Europe – examples from France, Germany, Romania and the UK

In France, legislation requires the use of the Open Database Licence (ODbL) as well as the "Licence ouverte de réutilisation d'informations publiques" developed by Etalab, the French Task Force for Open Data. These licences are considered to be better aligned with the principles of openness than the CC licences.

In Germany, the custom licence "Datenlizenz Deutschland"[17] was developed for open government data and declared conformant by the Open Definition[18]. The current version (v2.0) of the "Datenlizenz Deutschland" is available in two variants: „Datenlizenz Deutschland Attribution" variant obliges the data user to name the respective data provider. The variant " Datenlizenz Deutschland Zero" allows an unrestricted further use.

In Romania, the custom OGL-RO licence was developed, which is a CC derivative and similar to the OGL-UK licence. The OGL-RO licence has slightly more restrictive conditions that the CC, as it was considered to be a better fit to the specificities of the public sector in the country. Developed in 2013, the OGL-RO licence was seen back then as the needed impulse for public bodies to publish collected data.

In the UK, the Government Licencing Framework requires the "Open Government Licence" as the default licence. The Open Government Licence terms are compatible with the Creative Commons Attribution License 4.0 and the Open Data Commons Attribution License, both of which license copyright and database rights. OGL adds to general attribution terms a series of exemptions that can constraint usage and become an issue for reuse (e.g. the publisher gives no warranties on 'third party rights').

In 2018, 21 EU Member States recommended the use of CC licences. An advantage of using standard licences such as CC's is that they are 'ready-to-use': public sector bodies can simply download the licence text or refer to the licence via a link. The attribution requirement of the CC-0 licence allows for PSI to be reused under the condition that the reusers acknowledge the original source of the documents and or data (i.e. a public sector body) by including a suitable attribution statement, preferably with a link[19].

Countries are making efforts to publish against a narrower, less complex set of licences on their portals. The data on 12 of EU28 portals (Austria, Croatia, Cyprus, Czech Republic, Ireland, Latvia, Luxembourg, Romania, Slovakia, Slovenia, Spain and Sweden) is licensed, using between 1 and up to maximum 5 licences. Another five countries (Finland, France, Italy, Netherlands and Portugal) provide between 6 to 10 licences on their portals. countries have either developed own guidelines that target the licensing of Open Data or have embedded the licencing conditions in legislation that targets Open Data publication.

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17. http://dcat-ap.de/def/licenses/dl-by-de/2.0; http://dcat-ap.de/def/licenses/dl-zero-de/2.0
18. http://opendefinition.org/licenses/
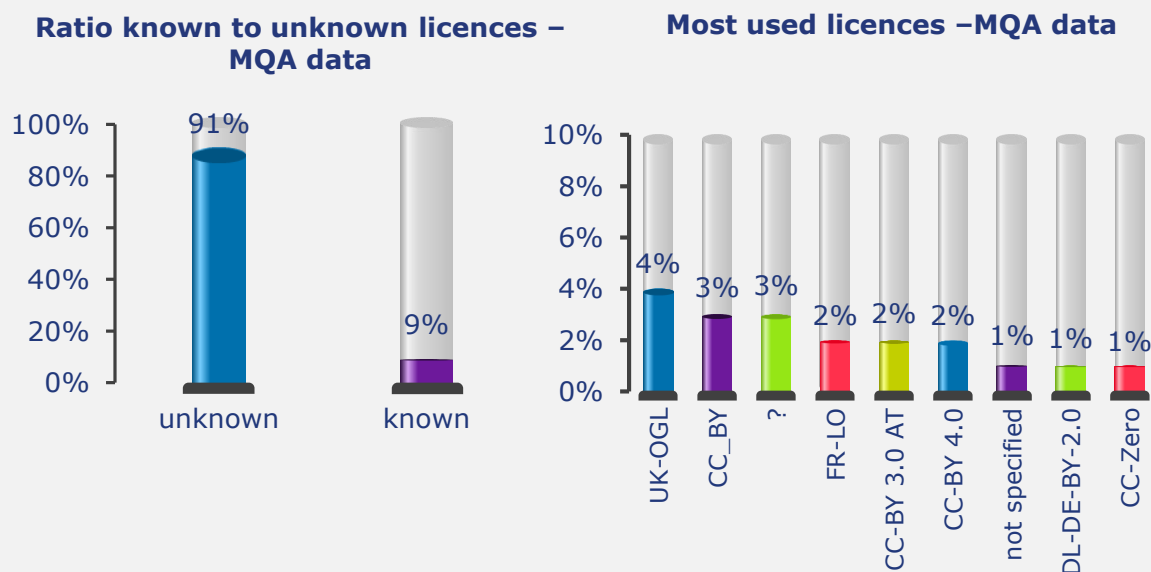19. European Commission Memo, FAQ: 'PSI guidelines', Brussels, 17 July 2014

In Sweden, the Guidelines for Licensing Data[20] recommends publishing Open Data in the 'Public Domain'. In Spain, the general conditions for standard licences are stipulated in the Royal Decree 1495/2011 and its Appendix[21].

With the exception on Lithuania and Malta[22], Member States also provide support to licencing data to publishers in the form of guidelines or FAQs on the portal.

MQA Insights: The licencing of Open Data across Europe

The Metadata Quality Assurance functionality of the European Data Portal provides information on the ratio of datasets that are published using a known licence (according to the CKAN list of known licences) versus licences that are not featured by CKAN. Currently, only 9% of datasets made discoverable by EDP are using a known licence. The list of known licences and their description is available on the EDP, in the Licencing Assistant section[23].

When looking at the distribution of used licences, the CC licences prevail, as shown in the figures below. However, it is worth highlighting that there are still violations in terms of compliance with the DCAT-AP specifications when it comes to the metadata field 'dct: licence'. In some cases, this field is not compliant. An often-encountered violation is that a standard literal is used in that field, and not the licence document. This leads to the fact that the EDP cannot show any licencing information of the linked datasets, although the original dataset is accompanied by a licence for distribution and reuse.

Ratio known to unknown licences – MQA data

Most used licences –MQA data

Figure 8: Licencing of Open Data across Europe – MQA data, 2018

20. https://oppnadata.se/juridik-och-rekommendationer/tillgangligorande-pa-natet-huvudalternativet/vilka-informationsresurser-bor-finnas-tillgangliga/myndighetens-villkor-for-vidareutnyttjande-etc/
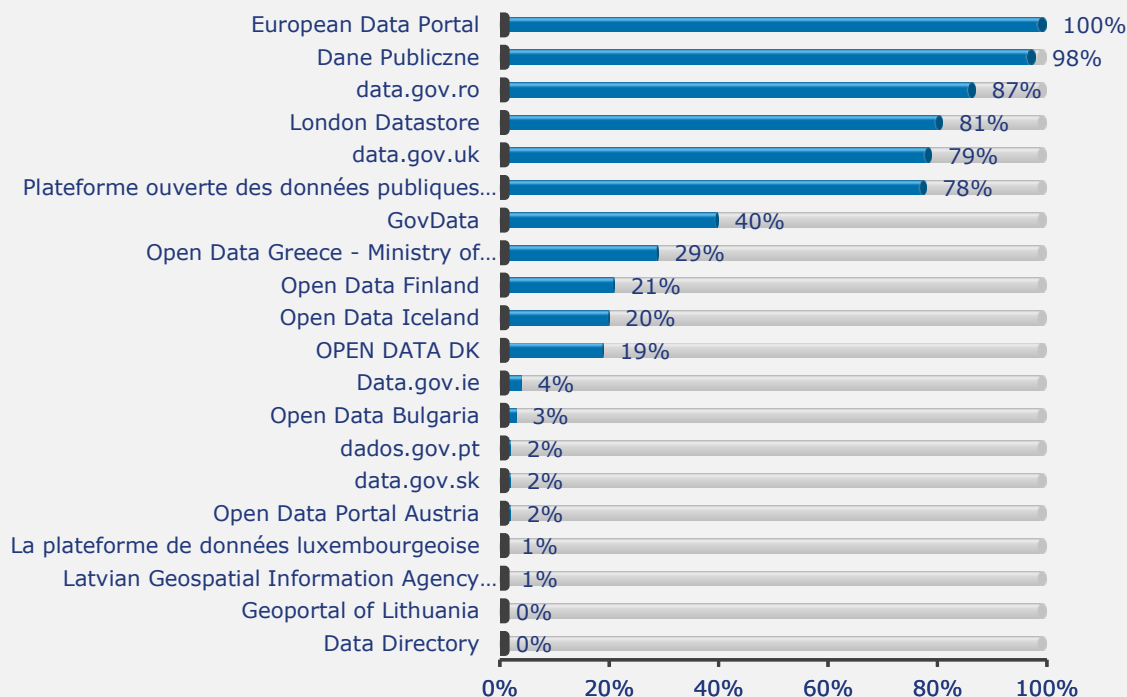21. http://datos.gob.es/en/legal-notice
22. In the case of Malta, this question was non-applicable in 2018.
23. https://www.europeandataportal.eu/en/licence-assistant

The European Data Portal statistics provide further insights into the data catalogues that have the highest volume of datasets with known licences. The chart below[24] shows the best performers in this regard: the national Open Data catalogues from Poland, Romania, UK and France, with an overall level of compliance of 75% and above.

Figure 9: Top 20 catalogues with most datasets with known licences - MQA data, 2018

Catalogue	Percentage
European Data Portal	100%
Dane Publiczne	98%
data.gov.ro	87%
London Datastore	81%
data.gov.uk	79%
Plateforme ouverte des données publiques…	78%
GovData	40%
Open Data Greece - Ministry of…	29%
Open Data Finland	21%
Open Data Iceland	20%
OPEN DATA DK	19%
Data.gov.ie	4%
Open Data Bulgaria	3%
dados.gov.pt	2%
data.gov.sk	2%
Open Data Portal Austria	2%
La plateforme de données luxembourgeoise	1%
Latvian Geospatial Information Agency…	1%
Geoportal of Lithuania	0%
Data Directory	0%

Overall performance – Policy dimension

Looking at the EU28 averages per indicator, the following results were observed.

Figure 10: Policy – scores break-down per indicator – EU28, 2018
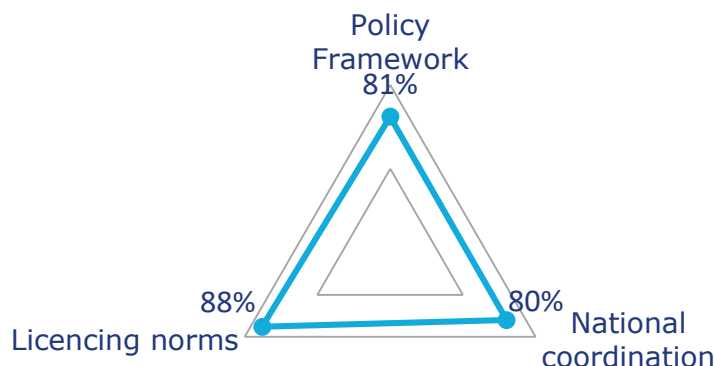

On average, Europe Member States score very high on average on this dimension with an overall maturity level of 82%. In terms of the policy frameworks set for Open Data at country level, the EU28 score very well with a result of 81%. In terms of national coordination that enables Open Data activities throughout the country the EU28 recorded a maturity of 80% in 2018. In terms of licencing norms, the EU28 average is even higher, at 88%. This shows the very good foundation that Member States have set up to help alleviate the legal barriers to data publication and reuse.

Figures 11 to 13 below show the results per country per indicator. As depicted by the scales, the top performers per indicator differ, with some top performers in 2018 (France and Italy) reaching or being very close to the 100%-mark on all three indicators.

Figure 11: Indicator Policy framework - EU28 ranking, 2018
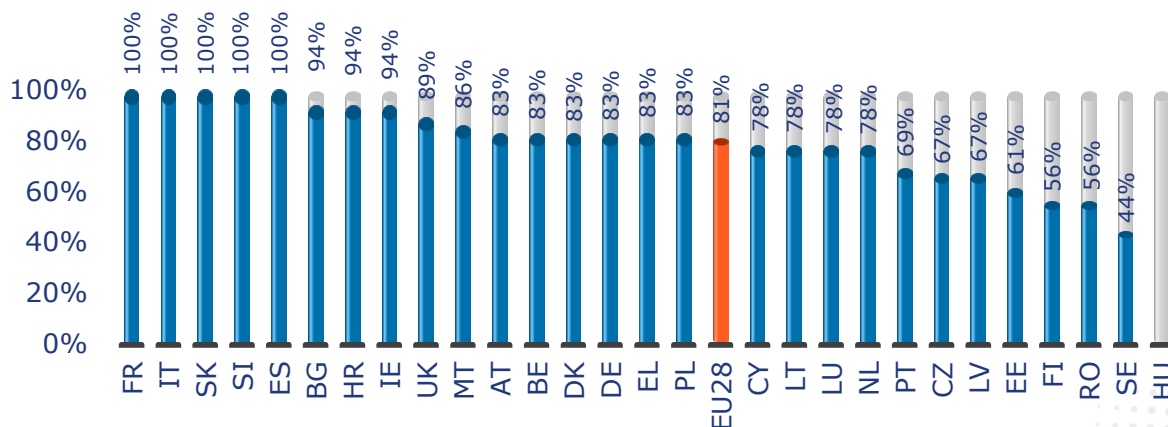
Figure 12: Indicator National coordination - EU28 ranking, 2018
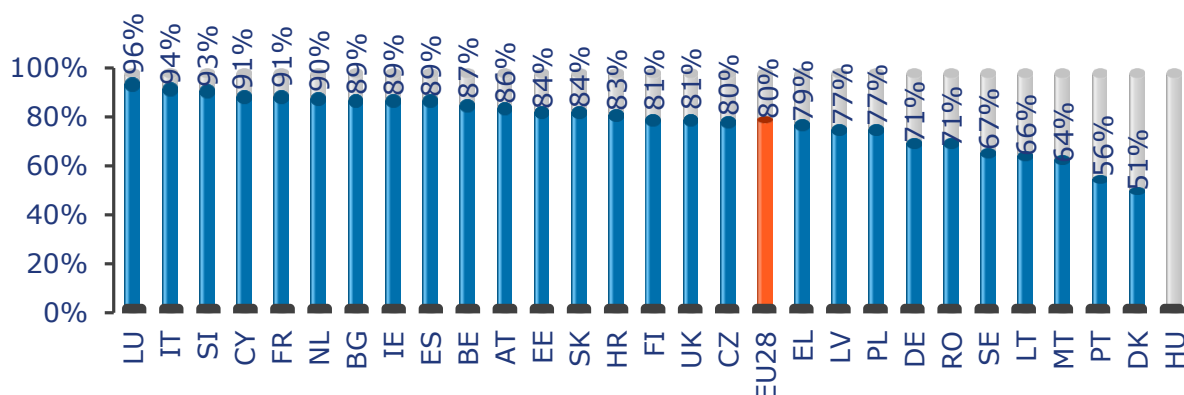

Figure 13: Indicator Licencing norms - EU28 ranking, 2018
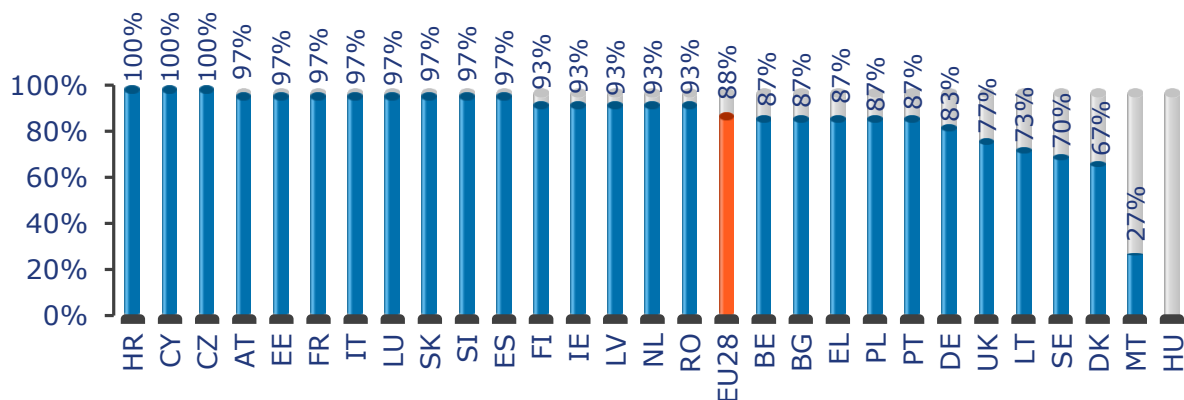
In terms of the overall results on the policy dimension, the following country ranking can be observed in 2018 (see Figure 14). Italy and Slovenia score best with an overall maturity of 97%, followed by France (96%), Spain (95%), Slovakia (94%), and Ireland and Croatia (92%). Bulgaria, Cyprus and Luxembourg also recorded high scores, with results at the 90%-mark. Overall Europe scores high on this dimension with an overall average of 82%. Malta could only reach a 59% score in 2018. It is worth highlighting that the assessment does not fully align with the country's strategy which focuses on the implementation of the Once-Only principle.

Figure 14: Policy dimension - EU28 ranking, 2018
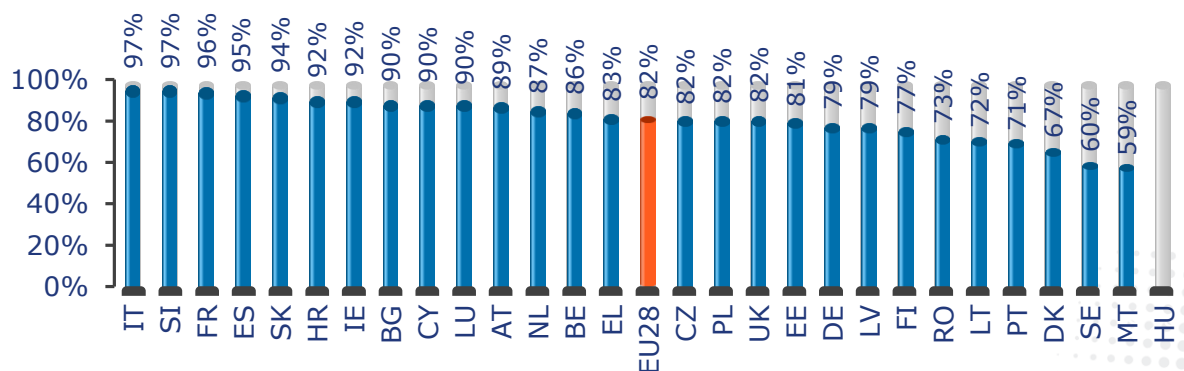
Chapter 2
Open Data Portal

The dimension **Open Data Portal** analyses the 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 aspects were explored as part of the Portal dimension:

Indicator	Key elements
Portal features	▪ The national Open Portal shows features that ensure a coverage of both basic and more advanced needs of its users, and enable the interaction between publishers and reusers.
Portal usage	▪ The portal owners systematically monitor the portal's use and prioritise updates to meet users' needs. ▪ Analytics tools are employed by portal team to enable further insights into visitors' profiles, percentage of foreign visits to portal, and the traffic generated via the API.
Data provision	▪ The data featured on the portal comes from various data publishers and covers a variety of data domains. Actions are taken to ensure the promotion of real-time data on the national portal. ▪ The most and least popular data categories are known. The team is taking steps to promote the data featured on the national portal and enhance popularity of available data.
Portal sustainability	▪ A sustainable funding approach is in place. The funding model is known and other funding models for the national portal have been explored. ▪ The portal performs user satisfaction surveys regularly. The portal ensures the national portal is promoted on a regular basis at offline and online events (e.g. webinars).

In 2018, 26 of EU28 had a national Open Data portal. Malta is currently in the process of developing a portal, as part of the wider framework of the Enterprise Data Management Strategy that is currently implemented in the country. Hungary did not participate in the 2018 exercise. Hence, the percentages presented in the following sections only account for 26 Member States.

Portal features

The first indicator analyses the functionalities that national Open Data portals provide to the users. It looks at both standard and more advanced portal features. With regards to the former, the indicator examines the existence of portal functionalities such as search functions that enable filtering, the download and access to datasets, the existence of a news section or the possibility for users to subscribe to a newsletter. In addition to these functions, the portals were examined in terms of their more advanced functionalities. The evaluation included the possibility for contribution and feedback to datasets, SPARQL query access to data, subscription to a RSS-feed to inform on availability of datasets, submission of requests for data publication, submission of reuse cases, login to dedicated areas for advanced users, preview

functions (for both tabular and geographical data), the mapping of use cases to the used datasets, as well as availability of tools to enable both easier publication and reuse of the data.

In 2018, all 26 examined Open Data national portals have an advanced search function that enables visitors to search per data domain or file format. Moreover, all portals provide the possibility for users to download the datasets linked on the portal. An increase compared to 2017 can be seen here, with the national portals in Denmark and Cyprus now showcasing such features as well.

Additionally, 24 of 26 EU portals have a designated news and/or blog section in 2018. While in Greece such section was introduced in 2018, in the UK this section was dropped, as part of a major redesign that the national portal underwent this year. In the UK, an extensive research (both qualitative and quantitative) was carried out over the last 12 months to examine what the areas of improvement for the portal should be. As a result, the focus has been on simplifying the design, removing unneeded detail and focussing on core metadata for datasets. The portal team plans on conducting further feedback loops with users and embed this input into future updates.

Not only news/blog sections can be a good way of keeping the community informed on the latest Open Data developments, but also newsletters that are sent at regular intervals. While this information channel might seem trivial and quite easy to implement, only 8 of 26 portals (31%) provide a newsletter subscription option. This number did not increase compared to 2017. It appears that such communication channel is not seen as important by the vast majority of portal owners in Europe.

Going one step further, the portal maturity assessment also looked at the more advanced features that national portals provide. In terms of a more advanced access to available datasets, only 9 of the 26 portals (35%) provide a SPARQL-search function. In only 18 cases (69%) national portals offer the possibility for users to receive notifications on the availability of new datasets (e.g. RSS or ATON feeds).

With regards to enabling users to provide feedback to existing datasets, 25 of the examined portals had such mechanism in place in 2018. The exception in this case is Cyprus, which for the moment has not enabled the feedback function on their newly updated national portal. Such mechanisms are key to ensuring a continuous communication between portal owners, data publishers and the broader Open Data community. Portal users can report on missing or low-quality data, broken download or access links or provide more general feedback regarding datasets (e.g. further information that the dataset can include). It enables data providers and portal owners to better understand the "demand side" of Open Data and efficiently target reusers' needs.

Concerning the availability of a log-in area for portal users, only 10 of 26 national portals (38%) provide a designated area. In similar lines, only 21 portals (81%) have a designated area to promote Open Data use cases. In 20 of these cases, the portal allows reusers to upload their reuse examples. The exception here is the Netherlands, where an upload function for use cases is not yet available on the national portal. Moreover, only 17 of 26 examined portals (65%) offer a mapping between the showcased use cases and the datasets that the applications are based on.

National Open Data portals seem to be reluctant to enable the broader involvement of the Open Data community on the national portal. Only 4 national portals – Luxembourg, Finland, France and Portugal – support a function for visitors to upload their own datasets onto the national portal.

## Enabling community contributions – Best practice examples from France, Luxembourg, Portugal and Finland

With their feature "Contribute" the portals of Luxembourg, France and Portugal enable an unrestricted contribution of all portal visitors. All three portals are running of the uData open source infrastructure.
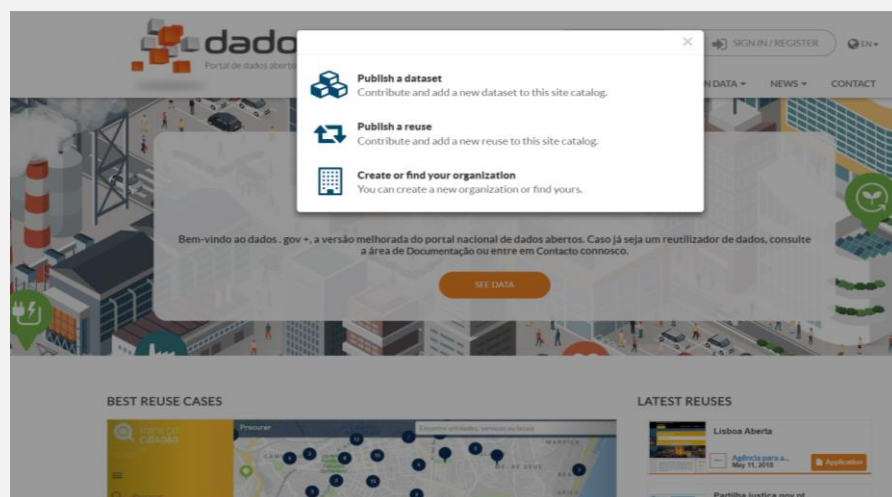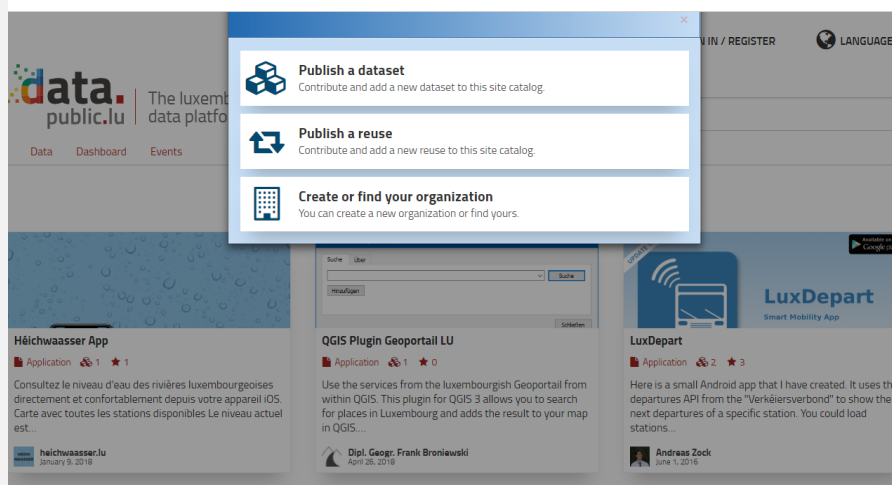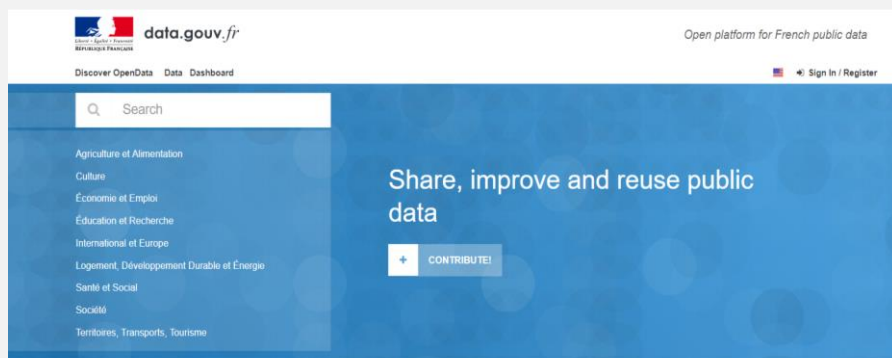
The Finish Open Data portal – running on the CKAN infrastructure – provides a similar feature. Datatsets can be published as a private person or under an organisation.
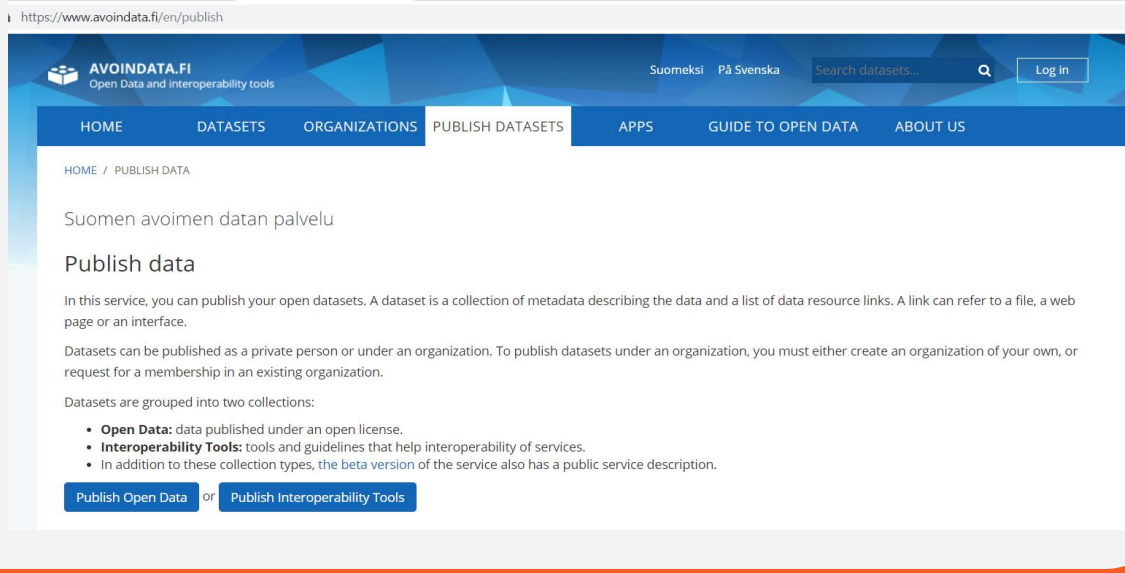
When it comes to enabling requests for data publication, 21 of 26 existing portals (81%) provide a 'data request' function. Furthermore, only in 13 of the 21 cases does the national portal team monitor the percentage of requests that end up with requested data being published. These numbers are also depicted in Figure 15 below.
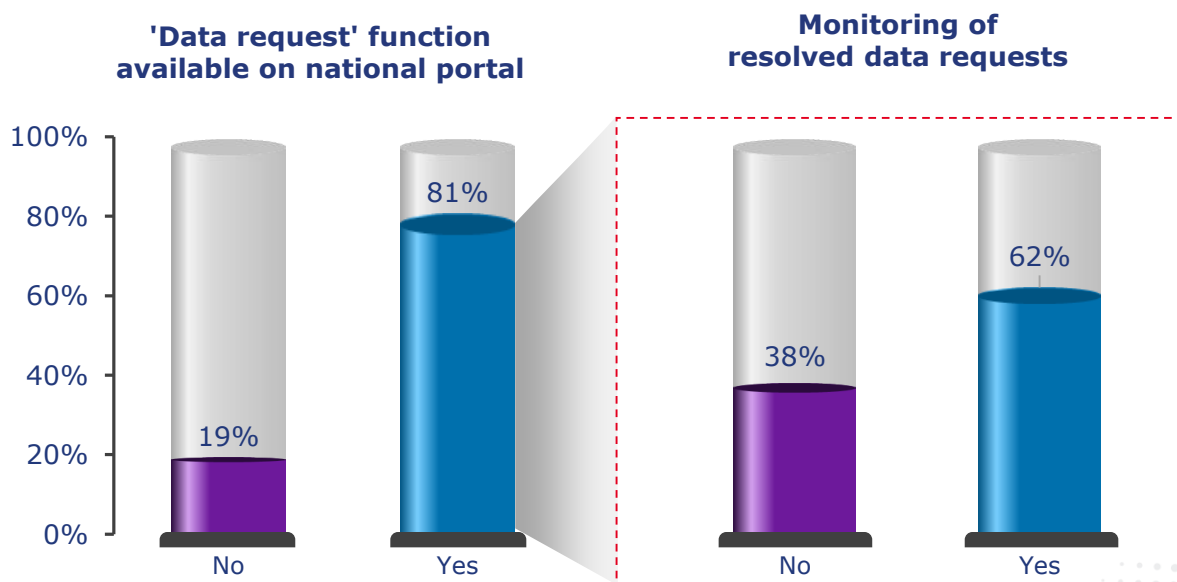
Figure 15: Data requests on the national portal - EU28, 2018

Looking at the percentage of requests that trigger the publication of data, the numbers are quite modest. Only in Finland does the national Open Data officer mention a resolution of such requests that reaches 90%, followed by Latvia and Luxembourg with a percentage of resolved requests ranging between 71 and 90%.

In Slovakia this percentage ranges between 51 and 70%. In Cyprus, Greece, Ireland and Romania the amount of resolved requests lies somewhere between 10 and 30%, whereas in the Czech Republic, Poland, Sweden and UK only 10% of requests lead to requested data actually being published.

Having such monitoring mechanisms in place can provide portal owners with further insights into the existing demand for data and the extent to which data providers cover this demand. Additionally, it might prove useful for portal owners to inquire data holders about the reasons for data requests not resulting into data publication. Ideally, and where possible, portal owners can help data holders overrun their barriers to publication.

Portal usage

The second indicator on the 'Portal' dimension looks at portal use metrics such as the number of unique visitors, the percentage of foreign visitors, typical user profiles, most consulted datasets and popular data domains, the traffic generated via the portal's API etc. It also investigates the extent to which the insights gained via analytics tools are used in the portal updating process.

Monitoring these numbers is important to better understand the portal users and their behaviour when accessing the portal as well as to get insights into the general type of visitors that the portal attracts. It enables portal owners to check if the current portal design and features, as well as available data meet users' needs. In an ideal scenario, the analytics insights gained (e.g. the traffic via API, SPARQL-queries carried out, number of visits to certain sections of the portal and duration of stay) can be used in decisions concerning what features should be included or potentially dropped.

In 2018, portal owners seem to have become more aware of the importance of understanding their portal's audience. While in 2017 only 39% of portals were using analytics tool to gain insights, in 2018 the number more than doubled to reach 92% (23 of 26 portals, except for the Czech Republic, Denmark and Portugal).

Going one step further, 20 of the 23 portal owners that do use analytics tools stated that the gained insights also flow into the portal updating process (exceptions: Belgium, Croatia, and Lithuania). This is an encouraging insight, as it shows that portal owners have become more aware of the importance of understanding their audiences and trying to cater their needs.

There results are captured in Figure 16 on the next page.

**Use of analytics
tools on the national portal**

**Use of analytics insights for
portal updating**
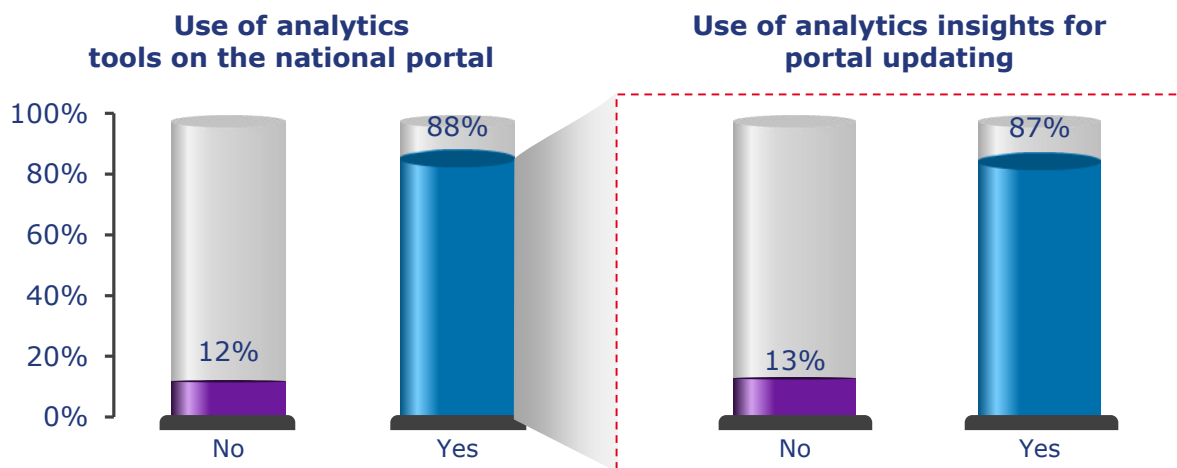
Figure 16: Use of analytics tools on the national portal - EU28, 2018

In addition to this, the availability and access to data via an API was investigated. In 2018, 25 of 26 examined portals enable the access to the main features and data via an API as well. The exception here is Lithuania, which is currently in the process of developing a new national portal, to be launched in 2020. Nevertheless, when it comes to monitoring the use of the API, only 14 from the 25 portals that do enable access via an API, actually track the percentage of traffic to their portal that occurs via the API (see Figure 17 below). This number stagnated compared to 2017.

**API-access
to national portal**

**Monitoring of
traffic generated via API**
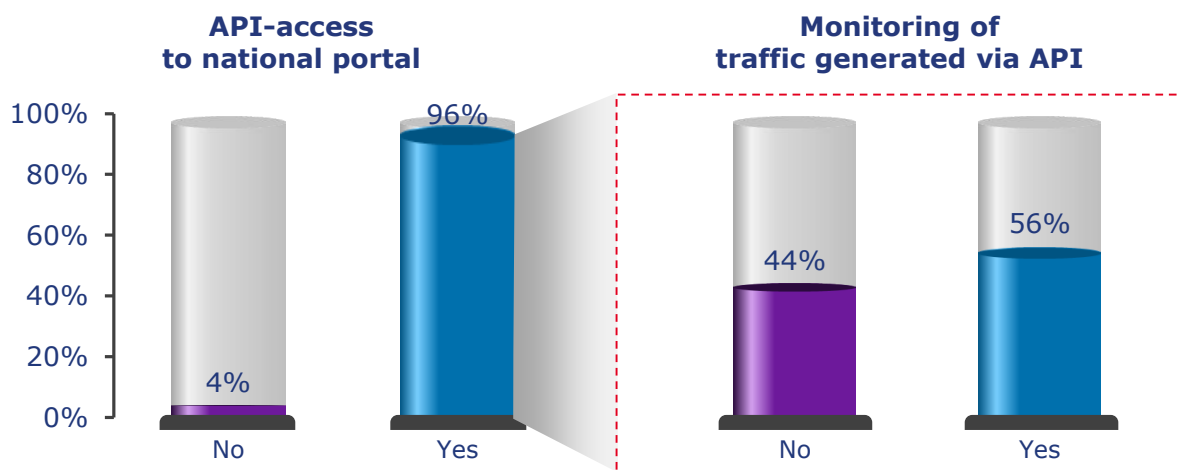
*Figure 17: API-traffic on the national portal - EU28, 2018*

In addition, there seems to be no correlation between the level of maturity of a country (and implicitly the maturity of its Open Data ecosystem) and the percentage of traffic occurring via API. Only in France (ranked 3rd in 2018) a positive correlation can be seen, with a generated traffic via API that reaches 65%.

Looking at the broader picture across the EU Member States, the traffic generated via API differs significantly across Europe, ranging from 65% in France and 50% in Romania, to 28% in Cyprus and 20% in the Netherlands. In Austria, Bulgaria and Luxembourg the numbers only reach 10%, whereas in Spain (ranked 2nd in 2018) the API-traffic represents only 1%. Going further, only 15 of 25 portals that provide API access keep API logs. Given the costs of the development and maintenance of an API, it seems reasonable to assume that portal owners would want to better understand who and how their APIs are used by means of such API logs.

Furthermore, when trying to better capture a portal's use, it is also important to look at the number of unique visitors per month[25]. In 2018 only Denmark, the Czech Republic and Portugal that could not provide such statistics.

Compared to the 2017 numbers, where 57% of EU28 registered a share of visitors reported to population[26] of around 0.0005%, in 2018 only 31% of portals can be counted in the distribution "0.0005% or less". Looking at the numbers depicted by the chart below, it becomes clear that more people are finding their way to the national Open Data portals. Impressive numbers were registered in France (245,000 unique visitors; accounting for 0.38% of population) and the UK (200,000; 0.50% of population), and Spain (85,000 unique visitors; accounting for 0.18% of population). The high numbers can be explained by the strong Open Data ecosystems in these countries.

Figure 18: Number of visitors to the national portal vs. population size - EU28, 2018
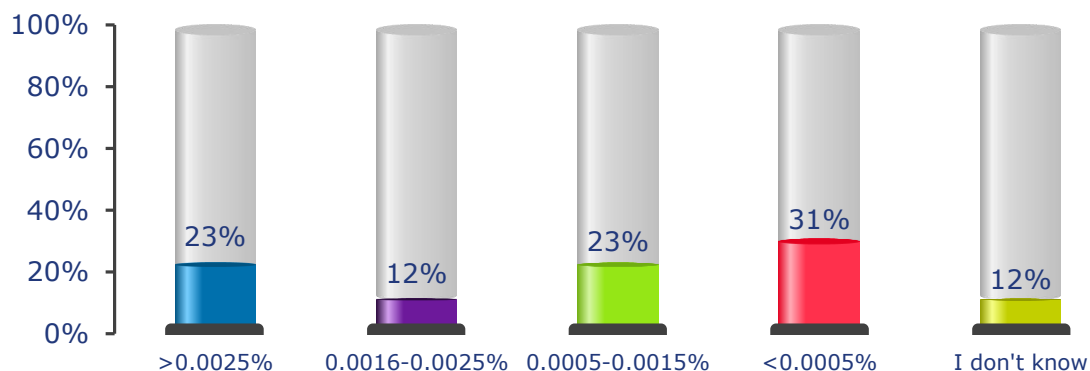
In terms of how the number of unique visitors relates to the population size, Luxembourg registers a very good number of 3,000 visitors, accounting for 0.005% of its population size. Very good results were also registered in Croatia (12,000; 0.0029% of population), Ireland (13,500; 0.0028% of population), Austria (22,800 unique visitors; 0.0026% of population), Finland (18,000; 0.0025% of population), France (245,000 visitors; 0.0036% of population) or the UK (200,000; 0,003% of population).

In terms of information regarding the visitors' profile, only 16 of 26 respondents were able to provide such insights. In 14 countries, the profile of visitors to the national portal was described as mixed. In 2 other countries (Bulgaria and the UK) the visitors mainly come from public sector institutions.

In addition, more foreign visitors are finding their way to portals from other countries. Apart from 4 countries (the Czech Republic, Denmark, Lithuania, Portugal) all respondents were able to provide a rough estimate of the share of foreign visitors to their portal. Luxembourg remains the country with the highest percentage (90%), and a spectacular increase compared to 2017 (60%). In Estonia, Ireland and Austria the percentage of foreign visits amount to approximately 50% of total visits, while in Belgium, Cyprus, Germany, the Netherlands and Slovenia the percentage of visitors ranges somewhere between 25 and 40%. A reason for this might be the increased interest in data and Open Data activities in neighbouring countries. Amongst the Open Data reusers, there might also be an increased interest in combining data from different countries for their reuse or research.
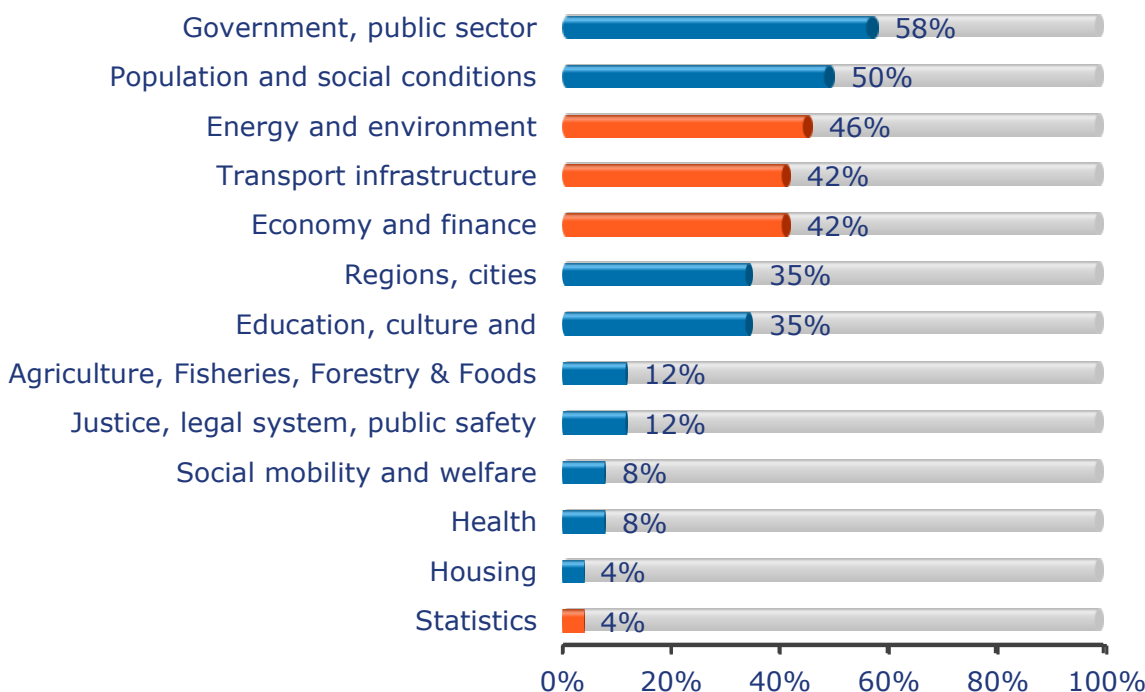
Data provision

This indicator looks at the variety of data available on the national portal reflected by the number of publishers, the available data domains, and the extent to which the portal also provides access to real-time and gender-aggregated data. The indicator also examines the popularity of available datasets and data domains, as well as the reasons behind the popularity of certain datasets.

In terms of variety of data provided, the 2018 results are very good and show the positive developments in the countries compared to previous years. In terms of data providers that publish data on the national portal, all 26 examined portals provide data that stems from more than 10 data holders. In terms of number of data domains available, 24 of 26 national portals (92%), exceptions Croatia and France, stated in 2018 that the national portal provides more than 10 data domains. In 20 cases (77%), portal owners were able to provide statistics on the top 5 most consulted data domains on their portal. This represents an increase compared to 2017, when only 16 portal owners were able to provide such information.

Based on the collected data, the following data domains were most popular in the EU Member States in 2018 (see Figure 19). The high priority domains, as identified by the European Commission in the Guidelines to the Revised PSI Directive of July 2014[27], are highlighted in orange.

Figure 19: Most popular data domains on national portals - *EU28, 2018*

Domain	Percentage
Government, public sector	58%
Population and social conditions	50%
Energy and environment	46%
Transport infrastructure	42%
Economy and finance	42%
Regions, cities	35%
Education, culture and	35%
Agriculture, Fisheries, Forestry & Foods	12%
Justice, legal system, public safety	12%
Social mobility and welfare	8%
Health	8%
Housing	4%
Statistics	4%

In 2018, the most popular data domain was Government and Public Sector with 58% of countries mentioning it in their top 5, followed by Population and Social conditions, mentioned by 50% of countries. Following closely is the Energy and Environment data domain. Given the abundance of applications that countries listed in the economic impact section, the popularity of domains such as government or environment, transport (ranked 4th, 42%) or regions and cities (rank 6th, 35%) come as no surprise. Surprisingly however, the data domain Environment has frog-leaped compared to 2017, where it was ranked 11th to now 3rd. The data domain Statistics however has dropped in ranking, from rank 2 in 2017 to now 12. The reason for this might not be the lack of popularity of the domain per se, but the fact that many national Open Data portals do not feature such data domain to begin with.

18 countries were able to explain the popularity or lack thereof of the data domains featured by their portals. The reasons for the high popularity of the domains range from data being very versatile given its multiple reuse possibilities (Austria, Latvia, France, Italy), to data being relevant to a particular group or a 'hot topic' for the general public, such as use of public funds (Bulgaria), air and water quality (Cyprus) or housing (Ireland).

27. European Commission (2014) Commission Notice: 'Guidelines on recommended standard licences, datasets and charging for the reuse of documents': https://ec.europa.eu/digital-single-market/news/commission-notice-guidelines-recommended-standard-licences-datasets-and-charging-re-use

As a pattern, one can note that the most consulted datasets are what is called 'high-value datasets' – datasets with national coverage, stemming from domains that are of broad public interest, such as public spending and procurement, mobility, social-economic numbers, in particular housing and environment data.

Another matter that gains more and more attention in many countries in Europe and across the world are gender-related disparities. To better understand if such disparities exist and how they evolved in countries over time, gender aggregated data is needed. In 2018, only 16 national portals had such data linked on their portal – a moderate result that will hopefully improve in 2019.

Furthermore, with more interest from the broader public in applications that enable users to access real-time information (in the context of mobility), portal owners were asked in 2018 about the availability of such data on their national portal. Only 69% of national Open Data portals showcase such data. In half of these cases (Austria, Italy, Luxembourg, Netherlands, Poland, Romania, Slovenia or Spain, only a very low percentage (1-5%) is represented by real-time data. In Belgium, France and Ireland the percentage is slightly higher and ranges between 6 and 10%. In Latvia and Greece this percentage reaches 20%.

Access to real-time data via the national portal

Real-time data as share of total data on the national portal
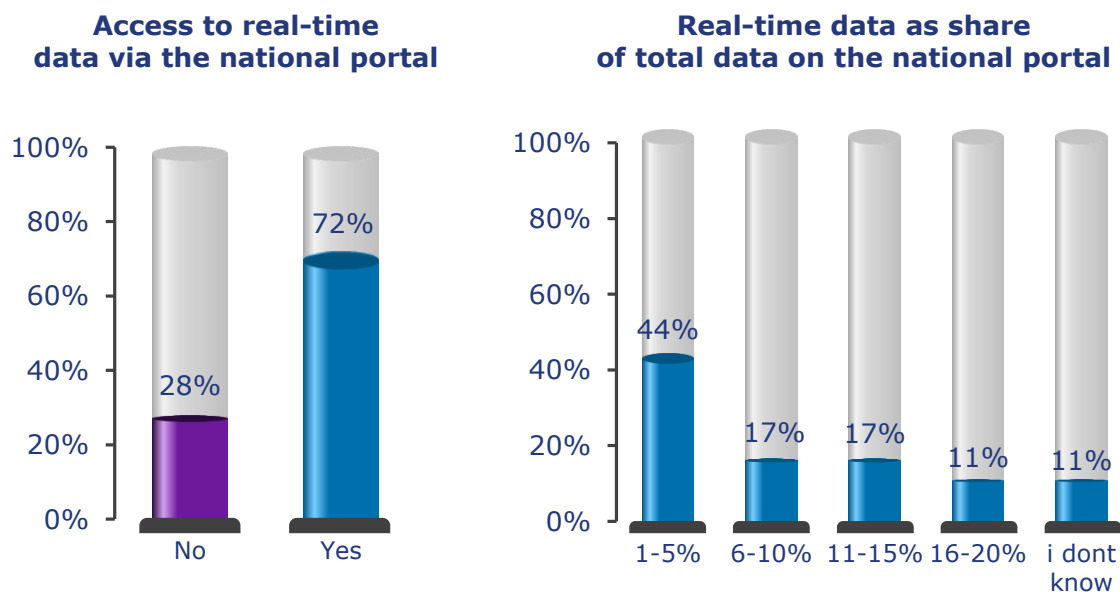
Figure 20: Real-time data on the national portal – EU28, 2018

With two exceptions (Denmark and the UK), all responding EU Member States plan on providing access to real-time data via their portal in the coming year. It remains to be seen if these plans also realise by 2019. Understood in the broader context of enabling smart cities and countries, providing easier access to real-time data represents a valuable contribution that national portals can bring to enabling smart cities in their country.

Portal sustainability

The fourth indicator on this dimension looks at the extent to which there is a strategy in place to ensure sustainability of the portal, the type of cost recovery model selected and the extent to which alternative funding models for the national portal were considered. In addition, the indicator explores whether regular promotion activities of the portal are conducted and the extent to which surveys are conducted on the portal to measure the level of satisfaction with the portal's design and functions.

19 of 26 portal owners (73%) state that such strategy exists at national level. However, this strategy seems to limit itself to the mentioning of the portal in the broader Open Data strategy of the country. A separate strategy that sets out the measures to be taken to ensure the portal's sustainability over time does not yet exist in any Member State.

In the UK, a strategy to better make use of the gov.uk infrastructure is planned over the next 12 months to increase the sustainability of the portal. In Luxembourg, one way that portal owners tackle the sustainability aspect is by ensuring that the national portal caters to the needs of its reusers and providing functions that allow for a high degree of interaction between publishers and reusers on the national portal. By doing this, the portal owners aim to keep a high level of traffic and interest in the national portal and ensure that the portal is used as main access point for data published in the country.

When looking at the funding model used, all existing national portals are based on exclusive funding from the state budget. In addition, only 4 portal owners stated that alternative funding models were explored (Austria, the Czech Republic, Greece and Poland). In 24 cases, the national portal operates under a marginal or zero-cost recovery model.

In terms of the activities to enhance the visibility and use of the portal, only 17 of 26 portal owners state that they organise or attend events and conferences at which they promote the national portal. Moreover, only 12 portal owners or managers have conducted a user satisfaction survey in the past year. Another 2 portal owners stated that they have plans to conduct such survey on their portal in the coming year. These numbers are quite modest and depict that there is a lack of awareness and potentially a lack of additional resources to enable such activities.

In light of the above and given the secured funding provided by the state budget, the question of sustainability does not seem to have reached the agenda of the national portal owners across Europe.

Overall performance – Portal dimension

When looking at the EU28 average scores for the four indicators of the dimension Portal, following results were recorded in 2018.

Figure 21: Portal – scores break-down per indicator – EU28, 2018
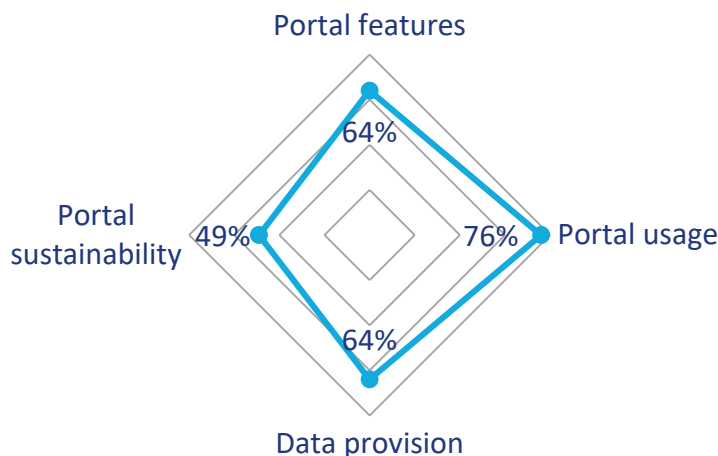
Although European portal owners increasingly understand their portals as main 'interaction nodes' between the supply and demand side of Open Data in their country, there is some significant room for improvement. Portal owners need to intensify their efforts and catch up, in order to reflect this new mindset.

The moderate results of 64% on the indicator 'Portal features' show that national Open Data portals still need to work on features that better support and sustain the interaction between publishers and reusers, as well as amongst reusers. Similar results were captured on the indicator 'Data provision', with a moderate EU average score of 64%. In this regard as well, portal managers and owners need to focus more on ensuring that the national portals enable the access to a variety of data. It seems that there is still room for improvement to ensure a better match between the supply and demand side at country level. This match can be best achieved by triggering the publication of data that is aligned with the actual needs of reusers. This alignment can only be achieved if a good foundation for interaction between the two side is ensured.

Results are more optimistic in terms of the actual use of the portal, with an EU average of 76% on the indicator 'Portal usage'. In 2018 portals across Europe have attracted more visitors, from both within and outside country borders. At the same time, portal owners have become more aware of the kind of audience their portal attracts and seemed to be more willing to understand their users' needs. The very good maturity level recorded here reflects these positive developments.

The least encouraging results were registered on the indicator 'portal sustainability' with a modest 49% EU28 average. Portal owners might need to consider a more strategic approach to ensuring their platform's sustainability for the years to come. Looking into additional funding sources to increase the activity range of the portal teams might be beneficial. Attracting additional funding might help develop resources to conduct both regular portal updates and the needed promotion and awareness raising campaigns around Open Data, that many portal teams still lack resources for.

The latter aspect is particularly important, as it helps increase the volume of published data on the one side, and fosters the reuse of the data on the other side. Ideally, such activities would be embedded into an Action Plan to ensure the portal's sustainability, that lays out the measures to be taken in the short, medium and long-term.

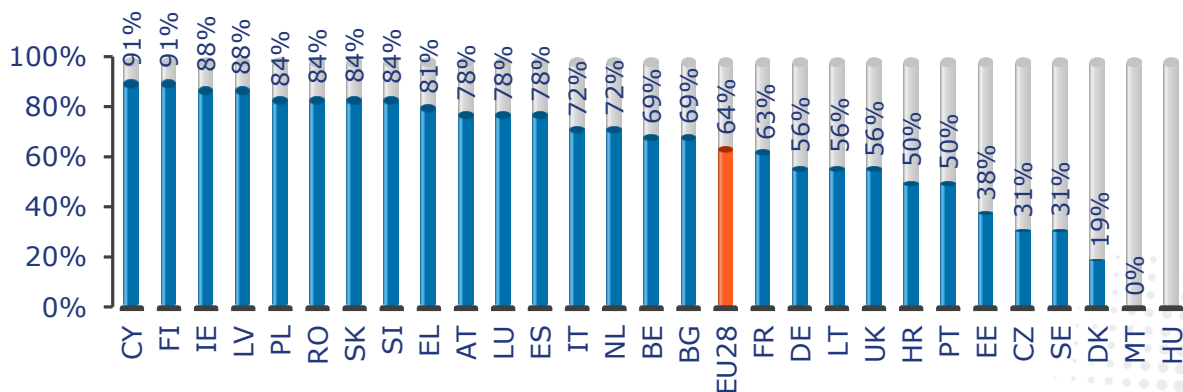Looking at the results per each of the four indicators comprising the dimension Portal, following country rankings can be observed.

Figure 22: Indicator Portal features – EU28 ranking, 2018
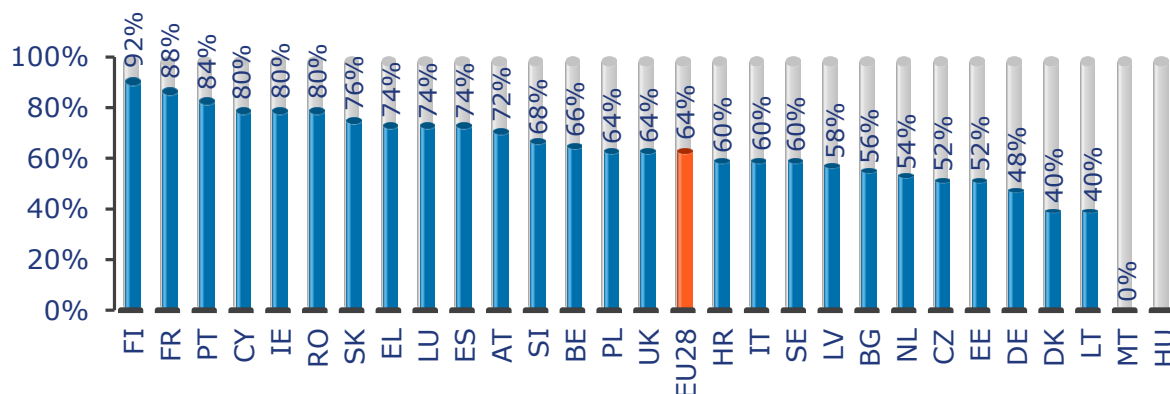
Figure 23: Indicator Portal usage – EU28 ranking, 2018
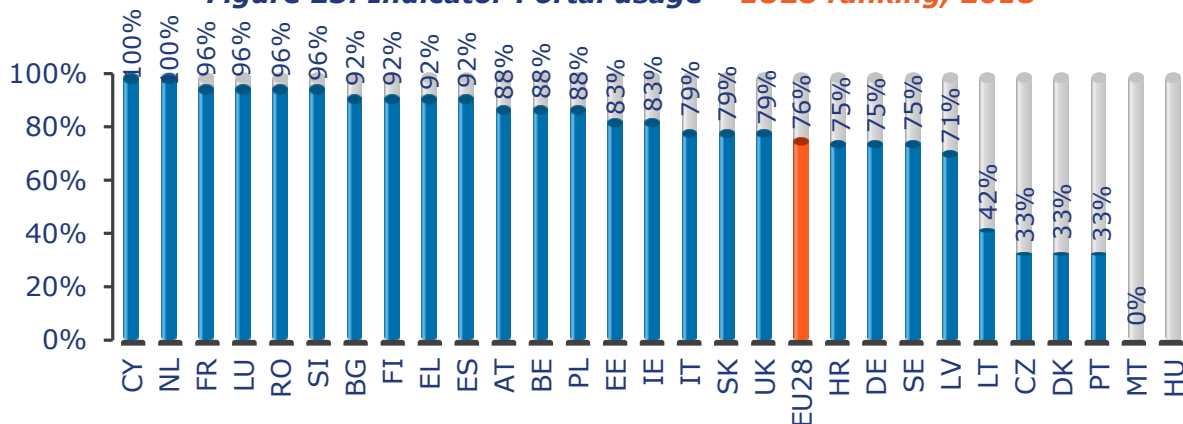
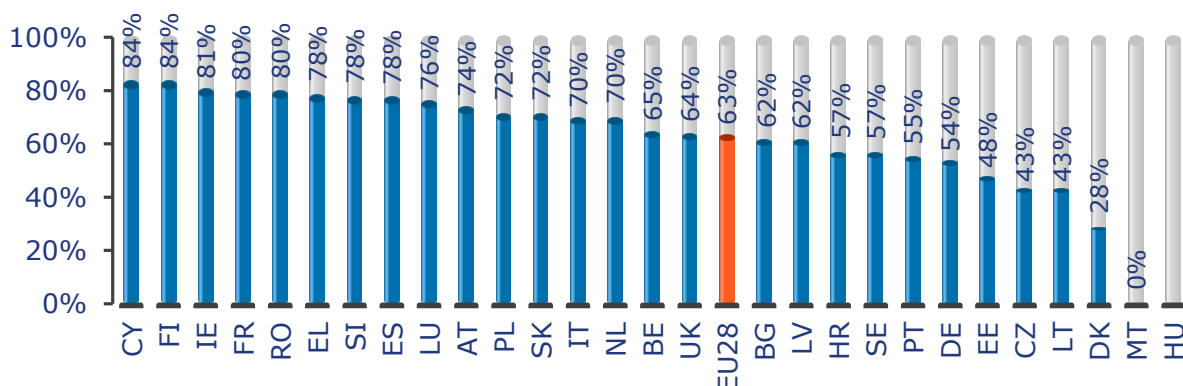*Figure 24: Indicator Data provision – EU28 ranking, 2018*

Figure 25: Indicator Portal sustainability – EU28 ranking, 2018

Bars (left to right): IT 79%, FR 71%, EL 71%, IE 71%, NL 71%, SI 71%, ES 71%, CY 67%, SE 67%, AT 58%, LU 58%, RO 58%, UK 58%, PL 54%, CZ 50%, FI 50%, EU28 49%, HR 42%, DE 42%, SK 38%, BE 33%, BG 33%, LT 33%, LV 25%, PT 25%, EE 17%, DK 13%, MT 0%, HU
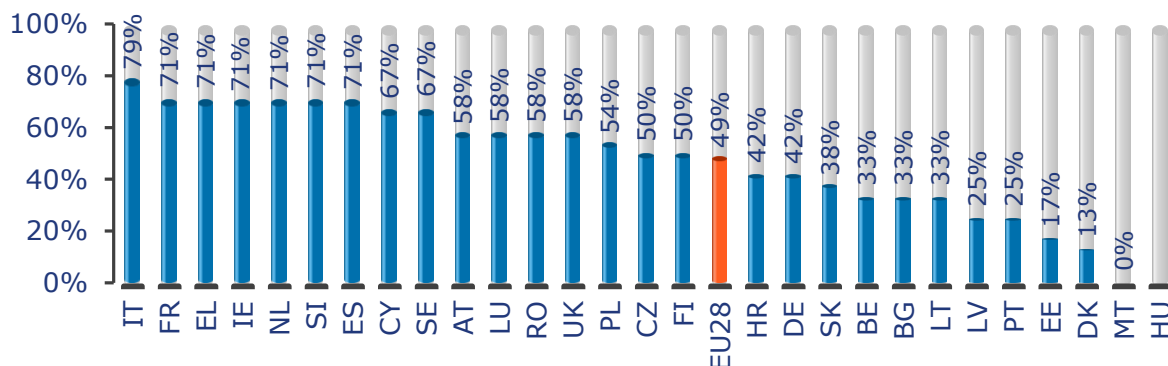
The overall results on this dimension show the following country ranking in terms of the maturity level of national Open Data portals in the EU28.

Figure 26: Portal dimension – EU28 ranking, 2018

Bars (left to right): CY 84%, FI 84%, IE 81%, FR 80%, RO 80%, EL 78%, SI 78%, ES 78%, LU 76%, AT 74%, PL 72%, SK 72%, IT 70%, NL 70%, BE 65%, UK 64%, EU28 63%, BG 62%, LV 62%, HR 57%, SE 57%, PT 55%, DE 54%, EE 48%, CZ 43%, LT 43%, DK 28%, MT 0%, HU

In 2018, Cyprus and Finland scored highest on the portal maturity dimension and rank at the top with an 84% maturity level. With its major update, the national portal of Cyprus managed to frog-leap from 62% in 2017 to 84% in 2018. Finland managed to secure a forerunner position in 2018, and leaped from rank 6 in 2017 to a shared rank 1. With its advanced features, the Irish Open Data ranks third in 2018 with an overall score of 81%. France ranks fourth on this dimension with an overall results of 80%. The French Open Data portal's advanced UI as well as the variety of features that the uData infrastructure provides, enabled the French portal to secure its position as one of Europe's best practices. With the same score of 80%, the Romanian Open Data Portal managed to secure its spot amongst the 5 top portals in Europe. Convincing features were also showcased by the national portals of Spain, Slovenia, Greece and Luxembourg, all managing to exceed the 75%-mark.

Overall one can observe a significant drop in scores across the board, with the EU28 average on the portal maturity dimension decreasing by 15 percentage points to now 63%. This drop can be explained by the more challenging assessment of 2018 with the various new aspects that were introduced to capture the maturity of Open Data portals across Europe.

Chapter 3
Open Data Impact

The dimension **Open Data Impact** analyses the existing approaches and methodology developed at country level to monitor and measure Open Data reuse and impact, as well as the impact of Open Data at country level on four dimensions: political, social, environmental and economic.

In 2018, the "Impact" dimension was introduced as a stand-alone assessment pillar. This update to the landscaping method aims to underline the increased importance of analysing and measuring Open Data impact. At the same time, this aims to create an incentive for national governments to allocate resources to measure the impact derived from Open Data.

The objective of generating impact – whether political, economic or societal – is the driver behind most Open Data initiatives. Demonstrating impact helps create a virtuous circle for further data publication and reuse and provides additional motivation for public administrations to release more data, as they can see first-hand the ways in which data can be transformed into value for citizens, business and society as a whole. This also provides a 'business case' for decision-makers in public administrations to allocate resources (financial and human) to enable the publication of high-quality data. Demonstrating impact also provides inspiration for reusers in terms of the innovative products and services that can be developed based on Open Data.

The following aspects were explored as part of the Impact dimension:

| Indicator	Key elements
Strategic awareness	▪ An approach and methodology are in place to ensure sustained monitoring and measurement of Open Data reuse and impact.
Political	▪ Various reuse examples can be provided and the reuse of the Open Data available in this field is systematically monitored.
Social	▪ Various reuse examples can be provided and the reuse of the Open Data available in this field is systematically monitored.
Environmental	▪ Various reuse examples can be provided and the reuse of the Open Data available in this field is systematically monitored.
Economic	▪ 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.

Strategic awareness

With the newly introduced section on strategic awareness, the 2018 landscaping research emphasises the importance for national Open Data teams to have a clear vision on what they are trying to achieve, a strategy on how to get there, and ways to measure their performance in the process. Metrics help capture the value that Open Data creates. The use of such metrics by the national Open Data teams suggests their awareness of the importance of a structured approach to monitoring and measuring impact. Additionally, by systematically monitoring development, positive and negative

trends can be identified. Insights on these aspects then enable political decision makers to steer Open Data initiatives, boost the positive elements and mitigate the negative ones. The strategic awareness section provides insights into the extent to which national portal owners track the increases in published data in the country, the reuse of data by public sector, and undertake efforts to monitor and measure impact.

In 2018, 23 EU Member States (85%) were monitoring the increase in volume of published data. In 12 countries (Austria, Bulgaria, Czech Republic, Greece, Ireland, Latvia, Luxembourg, Poland, Portugal, Slovakia, Slovenia, and Sweden) an increase of over 50% was observed. In other countries – particularly the more mature Open Data countries such as Spain, Finland, France, Netherlands and Italy – the increase was more moderate and ranged between 21 and 30%. In Croatia, Denmark, Estonia and Malta (that has no Open Data portal) there is no monitoring in place yet.

*Figure 27: Metadata increase national portals 2017/2018 – EU28, 2018*
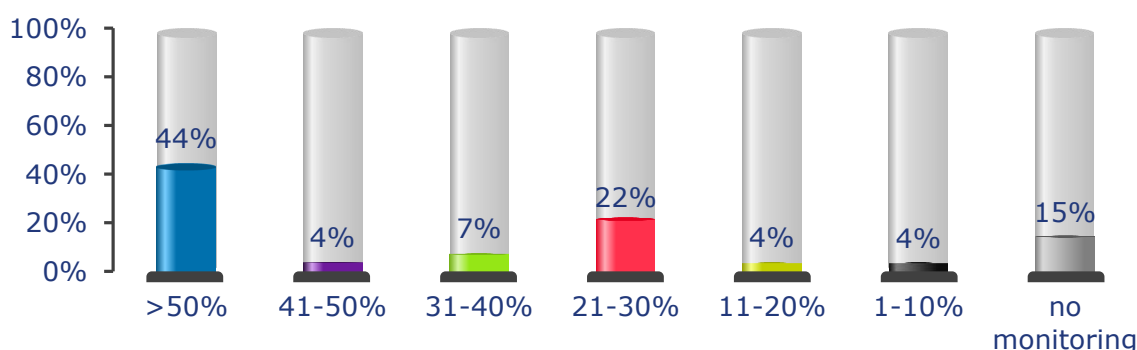
In 2018, only 11 Member States (Austria, Bulgaria, Cyprus, Finland, France, Greece, Latvia, Luxembourg, Poland, Slovakia and Spain) indicated that they monitor the reuse of Open Data by the public sector. In Spain an in-depth analysis on how public administration reuse Open Data is currently conducted, as part of the broader activities to measure Open Data impact in the country. In Poland, Open Data officers appointed at ministry level report yearly on the reuse of Open Data by their institutions. This reporting flows into an annual report published by the Ministry of Digital Affairs. In Greece, the national Open Data team monitors the number of applications and visualisations created by public sector bodies, uploaded to the national Open Data portal.

Looking at whether the understanding of Open Data reuse represents a priority within public administrations in Europe, only 10 countries (37%) – Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Slovakia and Spain) states that understanding reuse of published data is high on the agenda of public bodies in the country. In the majority of EU Member States (52%) the topic is not a current focus. Three Member States state that there is a very limited concern with this matter within the public bodies in their country.

Figure 28: Public administrations focus on understanding Open Data reuse – EU28, 2018
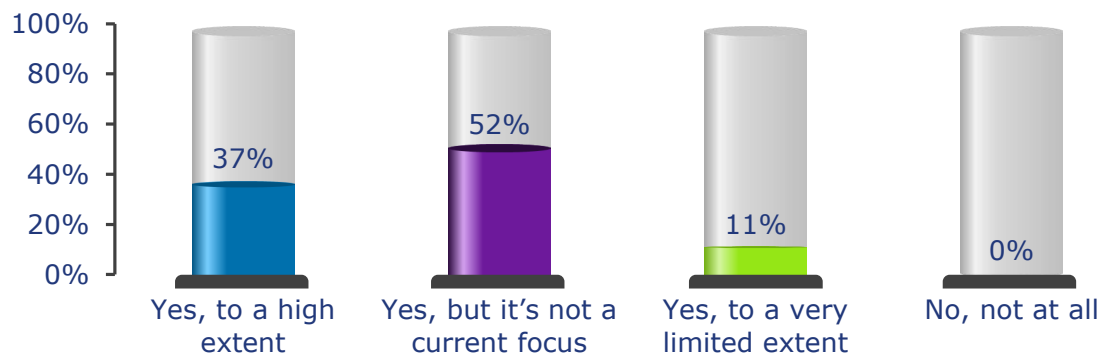
Amongst the national Open Data teams, however, understanding Open Data reuse is a priority. 21 of 27 countries monitor the reuse of Open Data in their country and have noticed changes in reuse patterns in the recent year. The main changes revolve around the development of more applications in already established data ecosystems, such as transport and mobility, or the emergence of new areas in which Open Data is more intensively used, such as data journalism.

17 EU countries (63%) stated to have supported projects that aimed at identifying solutions to public policy challenges based on Open Data. In most countries such projects refer to challenges or hackathons organised by civil society. Interesting examples are The Open Mind Award 2017 organised in Austria[28], the Smart City Hackathon in Cyprus[29], the Mobilux Project in Luxembourg[30]. It is worth underlining that such hackathons and challenges to help foster reuse are widely popular across all Member States, with 93% of countries stating that they conduct activities of such kind.

Furthermore, 25 Member States are conducting general activities to foster reuse, while only 17 Member States are carryout our activities that focus on systematically recording and documenting reuse. In other 3 countries such activities are planned for the coming year. While in a few Member States the Open Data teams actively search for reuse cases by conducting extensive desk research (Czech Republic, Cyprus, Latvia) and interviews with organisations active in the data field (e.g. Spain), in other countries reuse is captured via the regular meetings with the community of reusers (e.g. Austria, Netherlands, UK and Greece). In Greece, over 20 round-tables with publishers and reusers were organised in the past year.

Despite the active exchange with the community of reusers, it comes as a surprise that only 10 countries monitor the year-on-year evolution in the number of data start-ups in the country. The lack of resources within the national Open Data teams appear to be the main reasons for this, as well as the fact that the data itself either does not exist or it is not published by the Chambers of Commerce and Industry. On a similar note, 12 Member States (44%) have started activities to define an approach for measuring Open Data impact. There are early efforts to define methodologies to measure impact. In some countries, such as Austria, surveys were conducted with businesses to assess the impact of open government data[31].

28. *https://www.openminds.at/open-minds-award-2017*
29. *https://bit.ly/2IO9TjO*
30. *https://data.public.lu/fr/reuses/mobilux/*
31. *https://www.data.gv.at/2018/01/19/umfrage-open-government-wien/*

In Greece, a study was conducted for the Hellenic Ministry of Administrative Reconstruction on impact and use of Open Data. Following this study, a set of actions and proposals were agreed for 2018/2019. In addition, a proposal was submitted for approval to ESPON[32] to target an Assessment of the implementation of the PSI Directive by specific EU regions, mainly focusing on economic, social, political and environmental objectives. In Luxembourg, an approach to measure impact was elaborated by the Luxembourg Institute for Science and Technology (LIST). The Government of Luxembourg commissioned a study on the Impact of Open Data in Luxembourg and the Greater Region[33]. The results were published on 28 September 2018. The study sheds light into the macro-economic impact of Open Data in Luxembourg and provided estimations for the direct and indirect market size of Open Data, numbers of direct and indirect jobs created as well as the cost savings for public administrations. It provides insights into the barriers that civil servants and companies face when working with data, as well as the key patterns in reuse in the country.

An overview of the methodology used is provided in the insights box below.

Measuring the economic impact of Open Data in Luxembourg

The 2018 Luxembourg Institute of Science and Technology's (LIST) "Study on Open Data Impact" in Luxembourg consisted of 4 elements:

1. A macro-economic study - based on ex-ante indicators that provide information on four types of metrics defined by the European Data Portal Report on "Creating Value Through Open Data": market size and value added as percentage of GDP; number of jobs created; cost savings for the public sector, efficiency gains or productivity gains.

2. Semi-structured interviews with civil servants - The objective was to assess whether changes appear in the frequency and nature of data use, if new services to citizens are emerging, and whether existing services are rendered more efficiently. In a second step, the interviews were meant to evaluate cultural changes within the public bodies interviewed.

3. Questionnaire to gather data on Open Data reusers - The survey aimed to provide figures on the emergence of new companies, business models, products, on productivity gains, as well as figures on increased geographical coverage, customers, turnover, and profitability. The answers feed a metric aggregating the various figures, that provided estimates on the share of Open Data in the turnover of companies. The figures allowed a comparison with the macroeconomic estimates of the share of Open Data in GDP.

4. Log analysis - Log analyses were performed to test how they can help develop hypotheses on reusers' behaviour and on the impact of the Open Data. Query (or search) logs, combined with entry pages allowed assumptions on what datasets are sought by reusers and to assess if they find this easily. Access and downloads logs also allow to assess what type of data is in high demand by what type of portal users' group. Logs related to the API make it possible to draw more advanced hypotheses. Here, one main interest was to allow public data providers to trace directly the reuse of the data they published.

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32. European Territorial Observatory Network (https://www.espon.eu/)
33. https://download.data.public.lu/resources/study-impacts-of-open-data-in-luxembourg-and-the-greater-region-2018/20181004-093205/impacts-of-open-data-in-luxembourg-and-the-greater-region-2018.pdf

Political impact

The indicator "Political impact" looks at the benefits that Open Data has on increasing transparency, improving government efficiency and public service delivery, as well as the extent to which Open Data is used to drive decision-making processes.

In 2018, 14 EU Member States (52%) have conducted some type of activity to monitor and showcase the political impact of Open Data in their country. This number did not change compared to 2017. In Latvia, reports on political impact are presented to the Information Society Council that is chaired by the Prime-Minister. In Romania surveys were conducted in the forms of questionnaires (1,100 respondents) and interviews (200 respondents) to assess the Open Data awareness as well as the reuse level of Open Data within public administrations. Similar activities were undertaken in Bulgaria, where the national government carried out a series of case-studies, interviews and surveys to assess the positive effects of data publication.

In Spain regular research is conducted with an online questionnaire on different public administration entities, requesting them to identify use cases in which reuse had political impact.

In Greece a proposal for an "Assessment of the implementation of the EU Directive 2013/37/EU by specific EU regions", mainly focusing on economic, social, political and environmental impact was submitted for approval to the ESPON programme running under the EU Cohesion Policy 2014-2020. In Cyprus the assessment of political impact revolved around the feedback collected in meet-ups with civil society groups that use Open Data to enhance transparency of the government. In Italy the monitoring of Open Data impact on the political level is strongly interlinked with the commitment the country made as part of their Open Government Partnership membership and the established Action Plan for the years 2016-2018.

In the Czech Republic, a more systematic approach is in place, with an Annual Report on the State of Publication of Open Data that is annually published, which provides information – amongst others – on the developments, reuse and impact of Open Data in the country within the course of the year. In Poland a similar structured approach is pursued, with a yearly report on the Open Data Programme implementation being submitted for approval to this body and then filed to the Council of Ministers. The 2017 implementation Report included observations and recommendations with regards to legal, organisational and technical aspects of Open Data.

In France, the strong political leadership in the Open Data field is highly beneficial to increasing the visibility of the topic, and to placing it high on the political agenda in the country. References to impact appear in many political speeches by the President of the Republic, the Prime Minister and several other ministers. Political support from the highest level builds a strong sponsorship for Open Data and underlines its prominence amongst the decision-makers at public administration level.

Another example in France was the launch of the Great Plan for Investment in September 2017, with an amount of 57 Billion Euro. 700 million Euro of this plan have been dedicated to a fund for transformation of public administration via technology and data-driven innovation. For seven years now, public administrations progressively started to implement specific initiatives related to the use of their data such as Open Data Labs and hackathons. The last of these series was an event organised by the Ministry of Finance on public spending[34].

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34. https://datafin.fr/

Government efficiency

In terms of the impact of Open Data on government efficiency, 8 countries estimated the impact of Open Data on the political level as 'high', namely Cyprus, France, Greece, Ireland, Luxembourg, Slovenia, Spain, and the UK. 13 Member States describe the impact as medium: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Latvia, Lithuania and the Netherlands. In 5 other countries: Malta, Poland, Portugal, Romania and Slovakia the impact was depicted as low. Figure 29 below provides an overview of these distributions.

Figure 29: Open Data impact on government efficiency – EU28, 2018
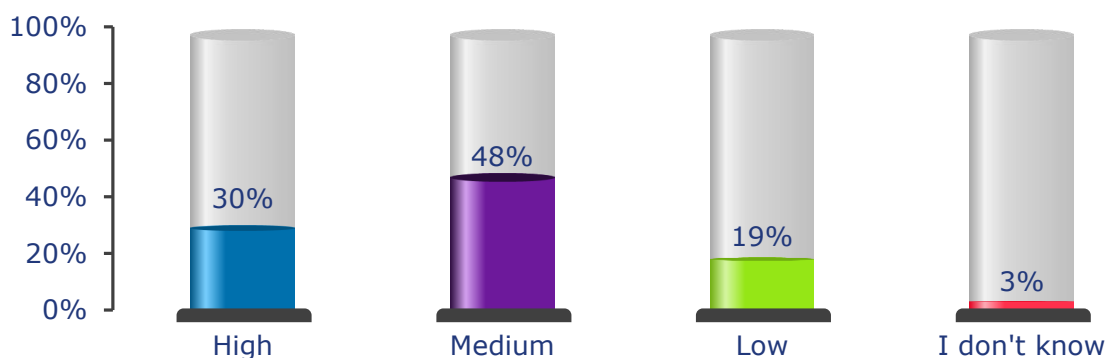
In terms of efficiency and effectiveness, several Open Data-based applications were developed throughout Europe that help streamline bureaucracy between citizens and government, promote self-management and free up resources within public administrations.

In Bulgaria and Croatia, the obligation for public administrations to publish Open Data has resulted in improved government efficiency and effectiveness. It created an additional incentive for administrations to work towards improving their service delivery.

In Spain, several public bodies have created applications to report on the municipal services they offer. AppValència[35], for example, is an application developed by Valencia City Council that includes information on topics such as transport, festivals and cultural events. It also provides direct access to the Valencia City Council e-Office and the municipal register. Another example is ApparkB[36], an application created by Barcelona City Council to pay for regulated parking spaces in an easy and practical way, saving users both time and money. Additionally, the Jaume I University in Castellón designed 'Smart Beetles': a 3D virtual reality video game to publicise smart city services in a fun and engaging way[37].

In Cyprus, the online platform Diavlos[38] provides real-time information on road traffic and availability of parking places in Nicosia that help improve the coordination between the Department of Public Works and the local authorities in charge of traffic management.

35. https://www.valencia.es/ayuntamiento/atencion_ciudadano.nsf/vDocumentosTituloAux/Aplicaciones%20m%C3%B3viles?opendocument&lang=1
36. https://www.areaverda.cat/en/apparkb
37. https://play.google.com/store/apps/details?id=com.pixelder.smartbeetles&hl=es
38. http://www.traffic4cyprus.org.cy/trafficapp/?wp=index-gr

Also in Cyprus, an online service was developed by the Pan Cyprian Bar Association CyLaw[39] that offers free access to Cypriot and international sources of law. CyLaw uses Open Government Data on legislation and court rulings which is organised in a number of searchable online databases. It is widely used by public sector bodies when dealing with legal issues or searching for court decisions is needed.

In Germany, the city of Hamburg started using data from the city's Transparency Portal[40] instead of requesting it through traditional channels from the competent authority, hence saving time and resources. In Berlin, Open Data is currently used in a project to better tailor the catchment areas of primary schools ("Schuleinzugsgebieterechner")[41]. In addition, a Government Bot (GovBot) was developed to assist citizens with their requests and integrates public sector information with machine learning[42].

Government transparency

In terms of the use of Open Data to foster transparency of the government, 13 Member States (48%) (Cyprus, France, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Slovakia, Slovenia, Spain and the UK) assessed the impact as 'high' in 2018. Ten EU countries (37%) (Austria, Belgium, Bulgaria, Croatia, Estonia, Finland, Germany, Poland, Portugal and Romania) evaluated the impact as 'medium', while only two countries described it as 'low' (Czech Republic and Malta).

Figure 30: Open Data impact on government transparency – EU28, 2018
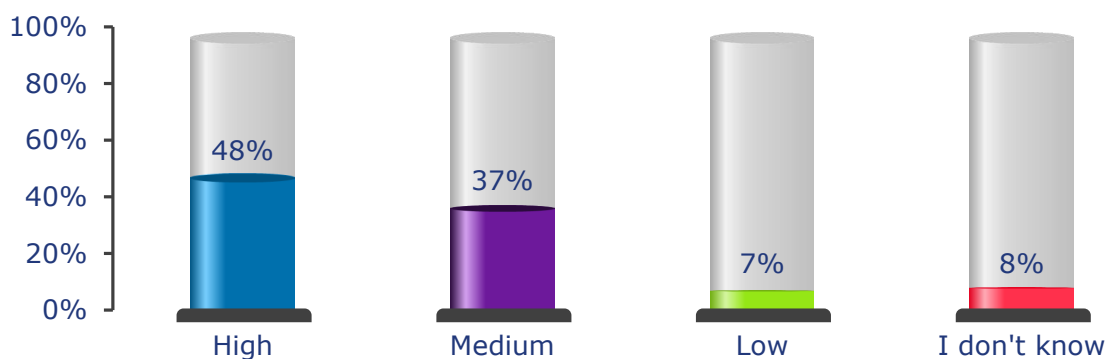
In Greece several activities are currently running to increase transparency and prevent corruption[43]. Based on evidence from the data uploaded to the Transparency Portal[44], investigative journalists have uncovered and raise public attention around some irregularities. In addition to this, the Hellenic Parliament set up a transparency programme[45] as well as a registry of the subsidised organisations[46] to increase transparency of public spending and decision-making.

39. http://www.cylaw.org/
40. http://transparenz.hamburg.de/
41. https://codefor.de/blog/open-data-verwaltung-grundschuleinzugsgebiete.html
42. https://www.govbot.io/
43. https://www.transparency.org/news/feature/tackling_corruption_in_greece
44. Greek Transparency Portal
45. http://diafaneia.hellenicparliament.gr/
46. https://mef.diavgeia.gov.gr/

In Croatia, an application was developed to show how public money is spent[47]. This application is currently being upgraded to enable the extraction of Open Data and enable a searchable database of all budget payments (salaries for civil servants as well as the payments in social welfare will be offered at an aggregate level).

In Poland, Open Data is widely and actively reused by NGOs and businesses to enhance transparency of legislative decisions, public spending at national and local levels, as well as information on politicians and candidates in general or local elections. For example, the portal Moje Państwo ("My state")[48] publishes public sector information regarding central, regional and local authorities concerning legal acts, budget and registered companies. The portal Mam Prawo Wiedzieć ("I have a right to know")[49] gathers and processes data on candidates in elections and acting politicians at all levels. The Sonar website[50] analyses and compares credibility, consistency and reliability of politicians using also Open Data provided by Parliament. The project Na Co Idą Moje Pieniądze ("What is my money spent on?")[51] aims to document in an accessible way the budgets of cities and municipalities. It takes the citizen point of view and illustrates how much he contributes to the development of his city by paying taxes.

Similar applications exist in Slovenia, such as Erar[52] (an application developed by the Commission for Prevention of Corruption, also showcased in the 2017 edition of this report), Statist (an application for transparency of public procurement) and Portal Plač[53] (an application for transparency of public spending and wages) were developed in the past years.

In Germany, cooperation between the central government and the Open Knowledge Foundation has been beneficial in enabling more transparency of decision-making processes and accountability concerning public spending. Applications such as O-Parl, FragdenStaat.de, OpenBudgets or DigiWhist – Digital Whistleblower are best practices in this regard[54]. The platform FragdenStaat.de (AskTheState) provides access to thousands of government documents. With projects such as OpenBudgets and DigiWhist, Germany is increasing the transparency of its public spending and public procurement. The Open Knowledge Foundation is working on developing a standard for publication of budgetary statistics at federal, state or local level. With platforms such as OffenerHaushalt.de tax payers are enabled to track how their taxes are spent by the government.

In France a similar application was developed to enhance transparency and prevent corruption. Within the context of the "Réserve Parlementaire" that each MP receives annually to support NGOs or other civic organisations (local sports clubs etc.), an open database was created to provide insights into these donations. This data was used to highlight who the recipients of these funds were and to detect potential cases of corruption[55].

In the UK, a national commitment was made concerning Open Contracting Data, with the publication of data concerning the entire process of awarding public sector contracts - from tender to implementation. The UK is also one of the first countries to

47. http://www.drzavna-riznica.hr/upit_po_dobavljacima/
48. https://mojepanstwo.pl/kto_tu_rzadzi
49. https://mamprawowiedziec.pl/
50. http://sonar.wyborcza.pl/sonar/0,0.html
51. https://nacoidamojepieniadze.pl/
52. https://erar.si/
53. http://www.pportal.gov.si/
54. The detailed description of these applications can be found in the 2017 Annual Report 2017 of the Open Knowledge Foundation Germany under https://okfn.de/files/verein/OKFDE-Taetigkeitsbericht-2017.pdf
55. https://www.data.gouv.fr/fr/reuses/reserve-parlementaire-le-moteur-de-recherche-du-monde/

create an open register of "beneficial ownership", publishing the names of owners and controllers of companies, open to the broad public.

Moreover, reusable unique identifiers to the UK's published government grants data and central procurement data were introduced. This represents a step change in how people can monitor how the government is spending taxpayers' money.

In Portugal, the Health Ministry's Open Data Portal now publishes a series of datasets regarding key indicators of performance, which help increase accountability of politicians and public managers.

Decision-making

19 Member States used Open Data in their policy- and decision-making processes in 2018 – Austria, Bulgaria, Cyprus, Denmark, Estonia, France, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and the UK. This number seems to be stagnating from 2017. In 17 EU countries (Austria, Cyprus, Denmark, France, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and the UK) activities are currently conducted to further boost evidence-based policy making.

Open Data use in decision-making   **Activities to enable data-driven decision-making in public administrations**
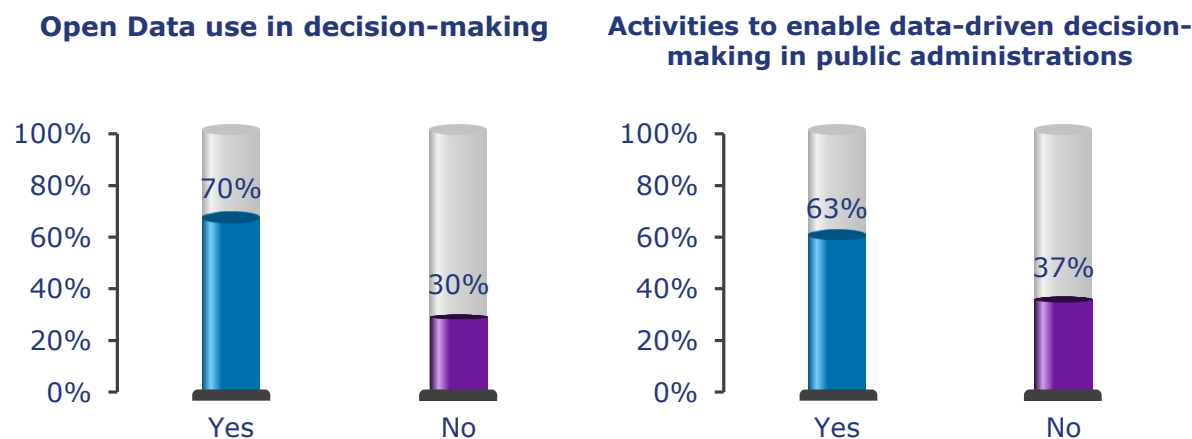
Figure 31: Evidence based policy making – EU28, 2018

In Denmark, geospatial Open Data is used to calculate real-estate taxes, where parameters such as ocean view and nearby access to recreation areas are fed into the algorithm. Geospatial Open Data is used to a very high degree in the public sector decision-making in the country, for example in municipal planning and regulation.

In Germany, the BORIS Plus Portal[56] of the federal state Nordrhein-Westfalen (NRW) provides public access to key indicators on the regional real estate market. Several city administrations (e.g. the city of Wiesbaden or Mönchengladbach) use Open Data on parking violations to better steer the parking controls[57]. The WEKOVI project[58] (funded by the Federal Ministry of Mobility and Infrastructure) develops tools for benchmarking geographical regions based on several indicators such as mobility, by using Open Data sources, to support political decision making.

56. https://www.boris.nrw.de/borisplus/?lang=de
57. https://www.wegeheld.org/
58. https://www.bmvi.de/SharedDocs/DE/Artikel/DG/mfund-projekte/werkzeuge-erstellung-komplexer-vergleichsindizes-wekovi.html

In the Netherlands, Open Data is an important source of information that is used in evidence-based policy making. For example, open environmental data is used in refining environmental and climate policies. Spatial policy-making on the national level and city planning on the local level make extensive use of various Open Data resources. Netherlands is also active in the European context and leads an OECD Thematic Working Group on data-driven public sector. The international involvement helped place the topic higher on the political agenda of the country. In Slovenia, the administrative unit responsible for approving building permits uses Open Data as part of their everyday processes.

In Spain the Ministry of Public Works uses Prisma: a computer system that analyses data and helps make decisions in maritime emergency situations[59]. It also analyses data on citizen mobility to better understand and cater to their needs[60]. A further use case is provided by the successful use of visualisation of data from the national healthcare system, which helped raise public awareness around the current situation in the health sector and analyse the effectiveness of health policies. Furthermore, different Spanish public organisations launched public consultations on their transparency portals to involve citizens in deciding about policies to be implemented[61].

In Ireland, hospital waiting lists have become a hot topic with over 700,000 people on waiting lists to be treated. The publication of such information caused political and societal debate and showed how the availability of Open Data on hospital performances creates awareness of the situation across the country and engenders political accountability[62].

In the UK, the Churchill application is a digital data service developed by the Department for Work and Pensions (DWP) that is run entirely on Open Data from UK government sources. The application aims to help develop and deliver data-driven and evidence-based policies[63] by enabling policy-makers to easily look up statistical data instead of having to go through endless documents. It also generates clear, easy-to-understand visualisations, which make communicating evidence a lot easier[64].

Social impact

The indicator examines the activities undertaken to monitor the impact that Open Data has on society in general and on the inclusion of marginalised groups[65] in particular. The indicator examines how Open Data helps individuals and groups (e.g. elderly people, people with disabilities or minority groups) to better partake in social, cultural and political life. In 2018, only 11 Member States (41%) have conducted activities to monitor the social impact of Open Data.

59. http://bit.ly/2M0aDjv.
60. http://bit.ly/2HVcwfK
61. https://participacio.lapobladevallbona.es/es/resultados/
62. https://data.gov.ie/dataset/ipdc-waiting-list-by-group-hospital; https://data.gov.ie/blog/1stirishcitizenworkshoponopendataandhospitalwaitinglistsandlaunchingworkshopno2-openknowledgeireland
63. https://www.youtube.com/watch?v=hn-Utxqjthg
64. https://apolitical.co/solution_article/can-policymakers-get-data-ask-churchill/
65. Inclusion of marginalised groups describes the process in which individuals or entire communities of people that were prevented from fully participating in politics, enjoy now full rights, opportunities and resources and can participate in society.

Marginalised groups

When looking at the assessment of social impact enabled by Open Data aimed at improving inclusion of marginalised communities, only 8 countries (Cyprus, France, Greece, Ireland, Italy, Slovenia, Spain and the UK) assessed the contribution of Open Data as 'high'. Another 9 countries (Bulgaria, Croatia, Germany, Latvia, Luxembourg, Netherlands, Poland, Romania and Slovakia) assessed it as 'medium', whereas 4 other Member States (Austria, Belgium, Czech Republic and Finland) described it as 'low'. There seems to be a slight drop compared to 2017, when 9 countries evaluated the impact of Open Data on improving social inclusion as 'high'. In 2016 only 2 countries assessed this impact as 'high'.

Figure 32: Open Data impact on social inclusion – EU28, 2018
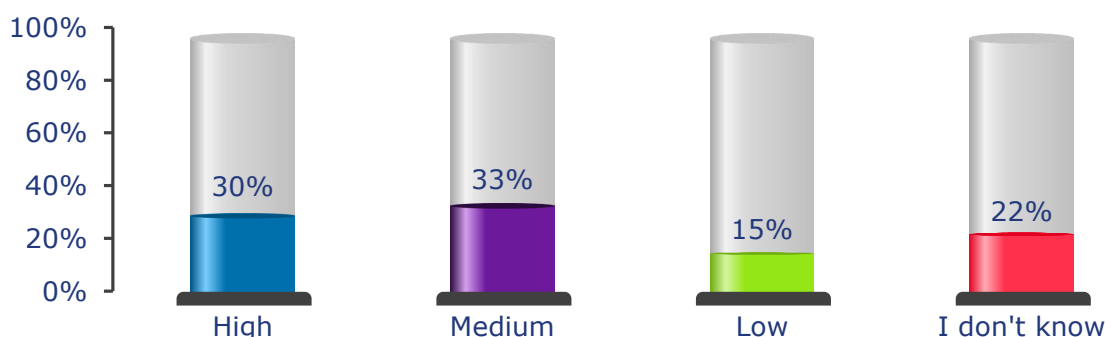
Interesting examples of activities undertaken to foster social impact derived through Open Data come from Ireland. Here, the Department of Education provides funding for a range of initiatives and projects aimed at identifying policy solutions for marginalised groups, such as projects targeted at the integration and employment of migrants, and the promotion of gender equality. They base their policy decisions on relevant data and statistics (although this may not necessarily be Open Data).

Some project examples are the Social Inclusion and Community Activation Programme[66]; the Ability Programme[67]; Integration and Employment of Migrants[68] or Gender equality[69]. There are also plans for the publication of Building Information Management (BIM) data as Open Data. This has the potential, down the line, to improve the living condition of people with disabilities, such as wheelchair users and those with sight problems, when accessing services in buildings.

In Germany, in cooperation with local authorities, Code for Germany launched several activities to support the integration of refugees, using open government data, e.g. Volunteer Planner[70]. The Anti-Discrimination Office of the city of Karlsruhe cooperates with Code for Germany to develop web- and app-based solutions for identifying and prosecuting acts of discrimination ("Schau hin")[71].

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66. https://www.pobal.ie/programmes/social-inclusion-and-community-activation-programme-sicap-2018-2022/
67. https://www.pobal.ie/programmes/ability-programme/
68. http://eufunding.justice.ie/en/eufunding/pages/integrationemployment
69. http://eufunding.justice.ie/en/eufunding/pages/genderequality
70. https://codefor.de/digitalrefugeelabs/
71. http://schau-hin-karlsruhe.de/

In the German Federal State of North-Rhine Westphalia, the application "Welcome to North-Rhine-Westphalia" was developed to provide useful information for refugees by using public sector information[72]. In terms of accessible routing for the physically impaired, the city of Heidelberg developed a service for accessible routing (Barrierefreies Routing)[73] based on Open Data.

In Italy, various Open Data resources are available to provide information on elderly community centres and local services. These centres aim at developing interpersonal relationships among the elderly, eliminating, or at least containing, isolation, abandonment and marginalisation. Several such services exit in the territory of Lecce, in the region of Lombardia or Friuli Venezia Giulia[74].

Society

With regards to the general impact of Open Data on society, 11 countries assess this impact as 'high'. These countries were Bulgaria, Cyprus, France, Greece, Ireland, Italy, Luxembourg, Slovakia, Slovenia, Spain and the UK. Another 9 Member States (Austria, Belgium, Croatia, Estonia, Germany, Latvia, Netherlands, Poland and Romania) describe the overall impact of Open Data as 'medium'. In Finland and the Czech Republic this impact is estimated as being relatively 'low'.

Figure 33: Open Data impact on society – EU28, 2018
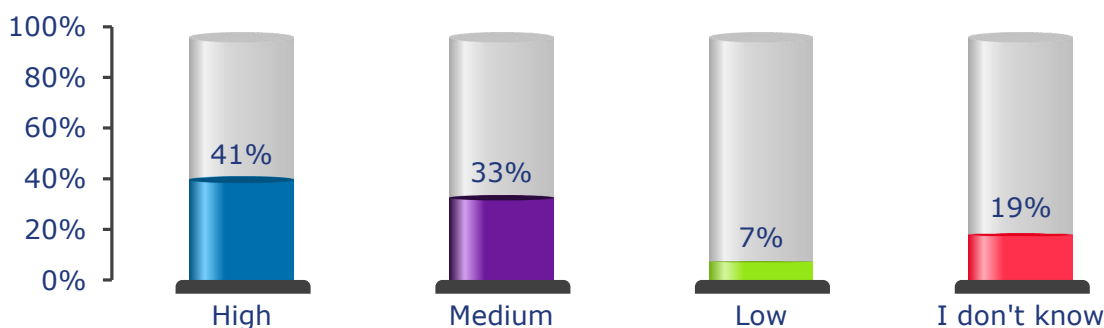
A good example of commitment towards enabling broader social impact via Open Data can also be found in France. The country is committed to "Data for Good" initiatives, characterised by communities of data scientists, developers and volunteers who offer their digital skills to serve social projects[75]. Within this context, a tool to highlight impact of Open Data on the social dimension was developed and presented early 2018, with the occasion of the Open Data Day[76].

In the UK, multiple deprivation indices are a major Open Data resource used by several public sector bodies to deal with major issues in society[77]. In addition, many businesses are required by law to publish data on gender pay differences[78] and the Prime Minister developed for the first time an extensive range of Open Data resources

72. www.welcome-to.nrw
73. https://www.heidelberg.de/hd,Lde/HD/nachrichten+in+einfacher+sprache/08_02_2018+barrierefreier+routenplaner.html
74. http://dati.comune.lecce.it/dataset/centri-sociali-anziani (Lecce); List of residential facilities for the elderly: https://bit.ly/2RJcImG (Friuli Venezia Giulia Region); https://bit.ly/2A3MtAO (Lombardi)
75. http://www.dataforgood.fr/
76. https://www.data.gouv.fr/fr/posts/data-story-1-handisco-nancy/
77. http://opendatacommunities.org/data/societal-wellbeing/imd/indices
78. https://gender-pay-gap.service.gov.uk/Viewing/search-results

documenting ethnic diversity to be published on a dedicated government website, in easy to consume formats[79].

The social impact of Open Data can also be seen in terms of applications that enable a better access to a country's cultural life, enhance visitors' experience in museums, galleries, cities, historic locations or tourist attractions. Cyprus provides a few examples in this sense. The 'Choose Your Cyprus' application is an interactive website and mobile application/guide to the main cultural and leisure points of interest of the island. It provides location data, information on how to access museums and points of interest, their opening hours and entry fees. The application is used by both tourists and locals. It represents a good example of combining data from numerous publishers and adding value, that is offered for free[80]. Another example is the application 'CY Consumer', is a mobile application that aims to provide constant information and training on issues related to consumer rights to protect their health, safety and economic interests. The application provides comparisons and rankings of major retailers of certain categories of goods based on prices. The data utilised in the application is collected by the CY Consumer Protection Service Observatories and includes supermarkets, fuel stations, etc.

With regards to the extent to which the civil society projects are supported on the social dimension, only 14 Member States (54%) are supporting such initiatives in 2018 (Austria, Cyprus, France, Germany, Belgium, Ireland, Italy, Netherlands, Poland, Romania, Spain, Slovenia, Slovakia and the UK).

Environmental impact

in terms of activities conducted to monitor the benefits of Open Data-based application on the environment, 11 of EU28 stated that they conduct such activities in 2018.

In Italy, the Ministry of the Environment, Land and Sea has launched its own portal in 2018[81] providing information on environmental assessments and authorisations given to companies. In addition, a Memorandum of Understanding was signed towards the creation of the "Development and environmental sustainability" ecosystem between the Agency for Digital Italy and the Ministry of the Environment and Protection of Land and Sea[82].

Moreover, several forums and events were organised at municipal levels to sustain the use of Open Data in the environmental field[83].

In Ireland, the Irish Environmental Protection Agency (EPA) managed to attract funding from the EU Innovation Networks Executive Agency (INEA) to launch the "Corona" project. One of its objectives is to ensure the availability of reliable, harmonised air quality data on the European Data Portal. To this end, the project will provide a methodology to publish air quality data in an interoperable and standardised manner.

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79. https://www.gov.uk/government/publications/race-disparity-audit
80. https://www.chooseyourcyprus.com/
81. http://www.va.minambiente.it/it-IT
82. https://trasparenza.agid.gov.it/moduli/downloadFile.php?file=oggetto_allegati/17355959350OO359+-+DT+DG+n.+359+-+07+dic+2017+-++Protocollo+Intesa+Ministero+Ambiente.pdf
83. Forum PA Challenge 22-24 May 2018 - "Premio PA sostenibile. 100 progetti per raggiungere gli obiettivi dell'Agenda 2030": "La Rete delle Scuole Eco-Schools di Latina" - Municipality of Latina: 4.Forum PA Challenge 22-24 May 2018 - "Premio PA sostenibile. 100 progetti per raggiungere gli obiettivi dell'Agenda 2030": "Progetto SASS - Sistemi Agricoli e Sviluppo Sostenibile" – University of Milan Bicocca http://www.forumpachallenge.it/soluzioni/progetto-sass-sistemi-agricoli-e-sviluppo-sostenibile

Corona EU also aims to create an EU-wide assessment model to analyse the impact to users of publishing air quality Open Data. Towards this end, a survey was conducted and reported on last year to look at the current user perspective on air quality Open Data and the barriers to accessing data in general. The project is run by a consortium whose members are the Irish EPA, the Flanders EPA (VMM), Information Flanders (CORVE) and the Norwegian Air Institute (NILU).

When asked to evaluate the impact that Open Data has on the environmental dimension in their countries, 11 Member States (Cyprus, France, Greece, Ireland, Italy, Latvia, Luxembourg, Slovakia, Slovenia, Spain and UK) assessed impact as high. 8 countries (Austria, Belgium, Bulgaria, Croatia, Estonia, Germany, Poland and Romania) described it as medium. 6 further countries (Denmark, Finland, Malta, Netherlands, Portugal and Sweden) did not have enough evidence to assess the environmental impact derived from using Open Data.

Figure 34: Open Data impact on the environment – EU28, 2018
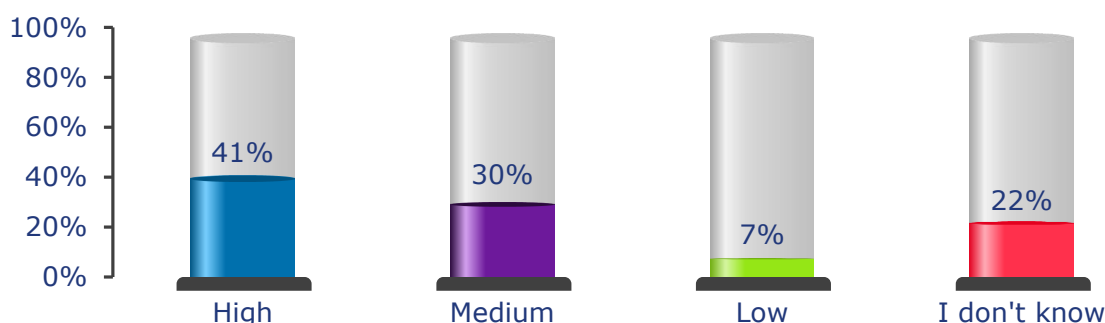
Various great examples of using Open Data for environmental management were provided in 2018 by the EU Member States. In Belgium, a biodiversity informatics platform[84] was launched funded by the Federal Belgian Science Policy Office, providing tools and organising events to support publication and reuse of biodiversity data[85]. For house owners, the Open Solar Map application[86] was developed to help check if their roof is suited for installing solar panels. It maps roofs' exposition to sunlight to facilitate the deployment of the most suitable and sustainable energy solutions. Another example is the InfluencAir" project[87], led by Open Knowledge Foundation Belgium, that aims at gathering open air quality data from DIY "open hardware" devices. In the Netherlands, several applications were developed to monitor air quality, meteorological factors and mobility in cooperation with the city of Eindhoven, to provide information on high temperature stress in cities or emissions stemming from the shipping sector.

In Luxembourg, information on the charging stations for electric vehicles is published as Open Data, which contributes to the efforts to promote sustainable mobility in the country[88]. In France, a map of every recharging station for electric cars was developed.

84. https://www.biodiversity.be/1767/
85. http://natureforall.global/success-stories/2018/4/13/belgian-biodiversity-platform-for-science-policy-and-practice?platform=hootsuite)
86. https://www.energiesparen.be/zonnekaart
87. https://influencair.be/
88. https://data.public.lu/fr/datasets/bornes-de-chargement-publiques-pour-voitures-electriques/

In Latvia, a waste sorting point map[89] was created to helps citizens locate their closest sorting site. In Croatia, various applications were developed specifically to support tourism (e.g. describing the quality of water for bathing) and environmental sustainability (e.g. air pollution)[90]. These applications increased the awareness on environmental sustainability. Also at local levels, this trend can be noticed in Croatia, with local portals publishing lists of recycling areas and waste management (e.g. the City of Rijeka's Portal[91]). Similarly, the Ministry of Construction and Planning publishes 20 key datasets, some of them in an open format, such as the list of registered energy performance certificate providers[92]. Users can then easily identify the certificate provider and request an assessment of their building.

In Poland, opening the data on air pollution has raised awareness of the issue and influenced large-scale activities by NGOs and citizens. It was one of the key factors influencing the state policy. A plenipotentiary officer for clean air reporting directly to the Prime Minister was appointed and a "Clean air strategy" is being developed. "Air Quality in Poland"[93] is the official application developed by the Chief Inspectorate for Environmental Protection. It is based on automatic measurements carried out as part of the State Environmental Monitoring performed by regional inspectorates for environmental protection. Another example is the "Health Index of Air Quality"[94] project which allow insights into the concentrations of dust, lead, carbon monoxide and other constituents in the air in various cities. The index also illustrates the increase in mortality risk due to air pollution. Another very good example is the "Kanarek – Ostrzeżenia o Smogu" (Canary – smog alert)[95] website that allows to easily check the air pollution in an area and receive alerts if quality falls under a set level.

In Cyprus, a fertiliser calculator was developed by using Open Data sourced from research by the Agricultural Research Institute. The tool can be used by farmers and other stakeholders to calculate the ideal dose of fertilisers such as nitrogen, phosphorus and potassium that need to be diluted in irrigation water according to the cultivation and the makers' specifications. The tool is aimed at both controlling the use of fertilisers and avoid overdosage[96].

12 of EU28 since 2017 stated that they supported civil society initiatives that aimed to identify policy solutions to environmental challenges faced by the country. In Luxembourg a Call for Proposals was initiated to support civil society projects ideas in the environmental field. One of the initiatives was to create an application that uses Open Data collected since 1992 on pollen concentration in Luxembourg. This project is conducted together with the Centre Hospitalier du Luxembourg (CHL) and aims to ensure that the CHL data is made available on the national Open Data portal. The data is used to create daily predictions using machine learning[97]. The Belgium Flanders Region supported the "Curieuzeneuzen" citizen-science project[98]. The project aims to acquire a detailed map of air quality in Flanders, in cities as well as the countryside. The data collected should improve the predictive capabilities of a current computer model that estimates the population exposure to nitrogen dioxide. This, in turn, should allow to provide better information and recommendations to policy makers.

89. https://data.gov.lv/dati/lv/dataset/skiroviegli
90. http://baltazar.izor.hr/plazepub/kakvoca; http://iszz.azo.hr/iskzl/index.html
91. http://data.rijeka.hr/dataset?groups=envi
92. http://www.mgipu.hr/default.aspx?id=14550
93. http://powietrze.gios.gov.pl/pjp/content/mobile_app
94. https://mojepanstwo.pl/srodowisko#param=index
95. https://play.google.com/store/apps/details?id=pl.tajchert.canary&hl=pl
96. http://news.ari.gov.cy/fertigation_v1.html
97. https://data.public.lu/en/datasets/pollen/
98. https://curieuzeneuzen.be

Economic impact

Showcasing the economic impact of Open Data is a key element to rallying support for Open Data and to trigger publication and reuse in a country. Several studies have been conducted that assess the market value of Open Data, with the most prominent European Union studies being the European Data Market Value Monitoring Tool[99] and reports[100], as well as the European Data Portal's study on "Creating Value through Open Data"[101]. The latter estimates a direct market size for Open Data in 2018 of 64.6 billion for the EU 28+. By 2020, the market size for Open Data is estimated to increase by 36.9%, to a value of 75,7 billion EUR. From 2018 to 2020, the EU28+ Open Data overall market size is expected to grow annually by more than 8% on average. This growth is also expected to trigger a higher demand for skilled Open Data workers. The same study conducted by the European Data portal estimates that the number of jobs created though Open Data will reach 100,000 by 2020. Around 20% of them will be direct Open Data jobs. When looking at the impact of Open Data for specific sectors, the public sector is expected to have the highest share in the direct market size, with a value of 22,111 million EUR.

Against this backdrop, the 2018 landscaping explores the efforts that countries made to assess the economic impact of Open Data at national level. In 2018, progress in this regard can be observed, compared to previous years. Whereas in 2015, only 5 countries had conducted studies to assess the Open Data market value, by 2017 this number has increased to 9. In 2018, 13 countries (48%) conducted or commissioned studies to capture the market value of Open Data -- Austria, Belgium, Denmark, Germany, Greece, France, Ireland, Latvia, Luxembourg, Poland, Slovakia, Spain, and the UK. Such studies are either conducted or commissioned by the government or by civil society and/or private organisations.

With regards to studies commissioned to measure impact at micro-economic levels, 10 Member States (37%) conducted such studies in the past year – Austria, Belgium, Germany, Greece, Ireland, Luxembourg, Netherlands, Spain, Sweden and the UK.

In Greece, an economic impact measurement was conducted by the Ministry of Administrative Reconstruction with support from Expertise France. In Spain, the Sixth Edition of the ASEDIE Infomediary Sector Report[102] was published in 2018. Moreover, the COTEC Foundation[103] in Spain also conducted a study published this year that focuses on the reuse of Open Data: "Open Data reuse: an opportunity for Spain"[104]. The study focused on i) research of over 100 operational portals in Spain and of their maturity according to a simplified version of the model established by the European Data Portal, ii) research of the published datasets, and iii) research on the reuse of the published data through a survey carried out with the portal managers responsible for the local and regional Open Data portals. The report concludes with a series of reflections on the PSI ecosystem in Spain and the main barriers that the country is still facing in terms of publication and reuse.

99. http://datalandscape.eu/european-data-market-monitoring-tool-2018
100. http://datalandscape.eu/study-reports
101. https://www.europeandataportal.eu/sites/default/files/edp_creating_value_through_open_data_0.pdf
102. http://www.asedie.es/assets/asedie-sector-infomediary-report-2018.pdf
103. http://cotec.es/
104. http://datos.gob.es/en/noticia/open-data-reuse-opportunity-spain-cotec-report

Capturing the economic impact of Open Data – examples from Italy and Spain

In Italy, the Open Data 500 Italia Study was launched and is a follow up of the Open Data 200 initiative. The study represents the first systematic study on Italian companies that use Open Data to create products and services and generate social and economic value. The project is developed by GovLab - New York University in collaboration with Fondazione Bruno Kessler, an Italian research institute based in Trento. The Open Data 500 Italia website[105] presents the results of the analysis and detailed information on the companies involved. The results of Open Data 500 Italy contribute to improving the match between the supply and demand of Open Data in Italy, and helps towards the formulation and improvement of national policies in the Open Data field. In addition to this, a new initiative was launched in March this year to better understand the data domains that companies are interested in. The results are expected for autumn 2018.

In Spain, the National Observatory of Telecommunications and the Information Sector published its Sixth Edition of the Study on the Infomediary Sector, conducted in collaboration with Red.es – the public body that is responsible for the implementation of the Digital Agenda in Spain. The Sixth Edition included 662 Spanish companies that have a data-based business model and conduct activities in fields such as culture, economy and finance, tourism etc. The report aims to show the current state of the infomediary sector that reuses public sector information in Spain and to capture its evolution from the previous year. Additionally, the report gathered insights on new data domains of interest for companies, the services and products developed based on data stemming from these domains, as well as the developments in terms of market demand for applications, products and services based on Open Data. During the second half of 2018, a new edition of the Study of the Infomediary Sector in Spain is scheduled for publication, which focuses on the activities and the impact of Open Data reuse in the social and economic sectors.

In the Netherlands, a systematic review of cost-benefit analyses of open government data was conducted, which took into account the micro-economic impact aspect[106]. The researchers carried out an international comparative literature study to investigate the costs and societal benefits of opening governmental data and carried out a cost-benefit analysis of five governmental datasets. The results showed that in general, the societal benefits of opening government data are higher than the societal costs. However, sometimes edits that prevent personal data from becoming publicly available can be quite expensive.

In Austria, a report on the economic and social impact of open government data[107] was published in 2017. The report examines ways in which Open Data publication can be fostered in the country in order to derive higher value for economy and society. It analyses the value of Open Data in the dimensions social and political and economic impact, from both an academic and practice perspective.

105. http://italy.opendata500.com/
106. https://pure.tudelft.nl/portal/en/publications/maatschappelijke-kostenbatenanalyse-open-data(b34165f8-7a62-431f-8b20-6120cafc6ae8).html
107. https://www.data.gv.at/2017/11/10/volkswirtschaftliche-und-gesamtgesellschaftliche-potentiale-von-open-data-studie-veroeffentlicht/

The study provides an overview on the current state-of-the-art on the impact of Open Data research and practice and offers recommendations on how to maximise the benefits of Open Government Data implementation.

In France and the UK, a collaboration was set up to focus on data-driven growth[108]. In Denmark, a study was commissioned to asses national and international market trends in terms of the use of public sector data by companies. The study examined demand and use of data, the most popular data domains in which reuse took place and the type of company in terms of size and sector that used Open Data[109].

In addition to these studies, countries also conducted research on the sectoral impact of Open Data. Ten Member States (37%) (Austria, Belgium, Germany, Greece, Ireland, Luxembourg, the Netherlands, Slovenia, Spain and the UK) have done sectoral analyses assessing the economic impact derived through Open Data in the past year.

In Spain, a study on the Open Data impact in the water sector was published by the Botín Foundation Water Observatory[110]. The report offers an overview of the progress and challenges in opening up data in the water sector. It observes that the initial transparency of information collected in this field has been progressively improved compared to previous years, but that overall little progress has been made in opening up data. While there is a large amount and diversity of both data and bodies who collect such data, much of that information either remains within the bodies collecting it or is transmitted through opaque channels without there being a strategy of coordination, systematization and openness. This acts as a main hurdle to derive economic benefits from the reuse of Open Data in this field by private actors such as data companies and start-ups. Other studies were conducted in Spain, such as the Study assessing the Value of Open Data in the Health Sector, which also explored the relationship between the open principles and the privacy of the patient[111].

In the UK, a report was commissioned on the Value of Open Data for the transport sector[112]. According to the report, the release of Open Data by Transport for London generates an annual value of £130 million for travellers, London and Transport for London itself. Moreover, their Open Data can help promote walking and cycling and thus promote a healthier lifestyle, encourage innovation and contribute to a healthy environment by reducing emissions. In Denmark, the Agency for Data Supply and Efficiency published a study on the value of geospatial data. The study estimates the yearly value of open geodata to approximately 470 million euros[113].

Moreover, a stronger focus was set in 2018 on research that tackles the role of Open Data in enabling smart cities. In Ireland, the National University of Maynooth has set up a Programmable City project[114]. The project is investigating the relationship between networked digital technologies, infrastructures, urban management, governance and city life. The project addresses the issue of how cities are increasingly being translated into code and data, and how code and data are being used to transduce how we understand, manage, work, and live in the city and to enable the development of smart cities.

108. http://www.modernisation.gouv.fr/en/about-the-sgmap/data-economy-a-franco-british-task-force-delivers-its-report
109. https://data.virk.dk/sites/default/files/analyse_af_efterspoergsel_og_markedstendenser_inden_for_offentlige_data.pdf
110. https://www.fundacionbotin.org/noticia/datos-abiertos-en-el-sector-del-agua-en-espana.html
111. http://ojs.imodev.org/index.php/RIGO/article/view/200/330
112. http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf
113. http://sdfe.dk/media/2917052/20170317-the-impact-of-the-open-geographical-data-management-summary-version-13-pwc-qrvkvdr.pdf
114. http://progcity.maynoothuniversity.ie/resources/publications/

In Belgium, the Industry Federation Agoria published a White Paper on Open Data for Smart(er) Cities[115]. The White Paper describes how data-driven, smart solutions can increase the comfort and safety of citizens and improve and help organise the city's administration efficiently. Moreover, data can help make better-informed decisions. The White Paper also addresses the challenges that come with the use of data, such as cybersecurity and data protection issues.

In the same smart city context, in Ireland several challenges are run at municipal level to promote and monitor the economic impact of Open Data. this is the case in Dublin, where Smart Dublin and Enterprise Ireland are running several Small Business Innovation Research challenges[116]. An example thereof is the Bathing Water Quality challenge[117], which aims to support the use of Open Data by companies to address real problems faced by Local Authorities.

In terms of studies assessing the economic benefits for public administrations, 12 EU countries (44%) published such research in the past year. In Germany, the IAW Tübingen is conducting a study focusing on the benefit for public sector institutions[118], with results expected early 2019. In Spain, the Study "The Value of Open Data for the Government"[119] was published in August 2018 with focus on the economic benefits for public administrations. In Latvia, a similar study was published, entitled "Open Data, their utility and benefits"[120].

In Denmark, the Danish Business Authority is currently running a Call for Papers for a study to assess the market value of the Central Business Register (CVR) and annual reports from companies, released for free use in January 2013 and 2015 respectively. The aim of the study is both to calculate the market value of these datasets and identify the type of value and specific business models that are realised due to the release of this specific data.

Aside from the studies that focus on the micro and macro-economic benefits of Open Data, countries listed impressive examples of additional research conducted on Open Data. Whereas in 2017, 14 of EU28 were able to showcase such examples, in 2018 only 8 countries were able to do so, with another 7 not aware of any further research conducted. Amongst the countries that conducted further studies are Belgium, Croatia, Cyprus, France, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Romania, Slovenia, Spain, and the UK.

Studies range from dissertations about using linked data for multimodal Transports[121] and ongoing study on Open Data governance mechanisms[122] (Belgium), to annual reports to the Ministry of Administrative Reconstruction on Open Data to the President of the Parliament[123] (Greece), to studies on the Open Data and its transformative power[124] (Spain), or studies of companies that are using Open Data for various purposes[125] (Italy, Spain), studies from specialised institutes in the country (UK).

115. *(Industry federation) on (open/big/other) data for smart(er) cities* https://www.agoria.be/en/Smart-Cities-white-paper-Data-the-cornerstone-for-cities-and-municipalities-of-tomorrow
116. https://smartdublin.ie/challenges/
117. https://smartdublin.ie/smartchallenges/bathingwaterquality/.
118. http://www.iaw.edu/index.php/projekte-detail/open-data-oeffnung-der-verwaltung-erschliessung-von-gestaltungsoptionen-fuer-gemeinwohl-und-mitbestimmung *(forthcoming, 2019)*
119. http://datos.gob.es/es/documentacion/informe-el-valor-de-los-datos-abiertos-para-la-administracion
120. http://www.eindekss.lv/lv/111-vai-visiem-ir-kads-labums-no-atvertajiem-datiem
121. https://phd.pietercolpaert.be/
122. *Business models in Open Government Data* (2016) Austria
123. http://www.data.gov.gr/dataset/bc93b200-1f29-4316-9f72-f85b15a33d57/resource/b727e665-8f6e-4222-817c-16cc26c603d9/download/2016.pdf
124. http://datos.gob.es/en/noticia/open-data-transformative-element
125. http://italy.opendata500.com/

Overall performance –Impact dimension

Looking at the EU28 averaged results for each of the five impact indicators: metrics, political, social, environmental and economic, the following averages were registered in 2018.

Figure 35: Impact – scores break-down per indicator – EU28, 2018
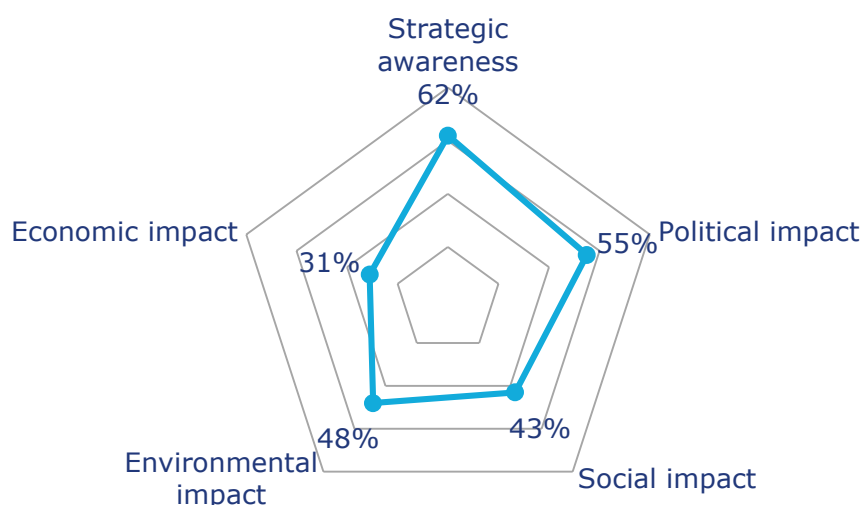
The EU28 scores highest with an average of 62% on the indicator 'strategic awareness of impact', that explored the general framework to foster reuse and generate impact through Open Data. However, when zooming into the impact dimensions (political, social, environmental and economic), the results are more modest. The political dimension scores best (55%) followed by the environmental dimension (48%). The social impact indicator follows with an 43% average across the EU28. The economic impact indicator is lagging, with an average of 31% in the EU28. When assessing the responses, the EU Member States had overall fewer difficulties to showcase examples of reuse of Open Data on the political and environmental impact dimensions, compared to the social or economic dimensions.

When looking at the country scores per indicator, the following results were registered in 2018.

Figure 36: Indicator Strategic awareness – EU28 ranking, 2018
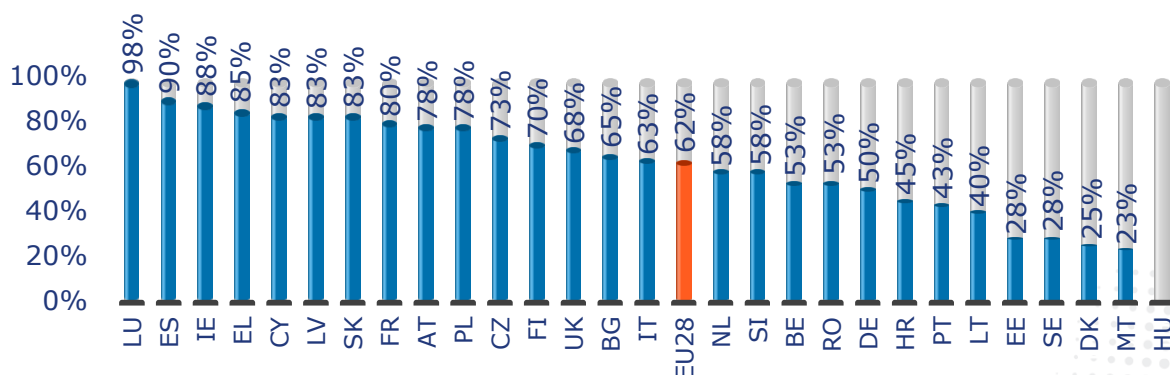
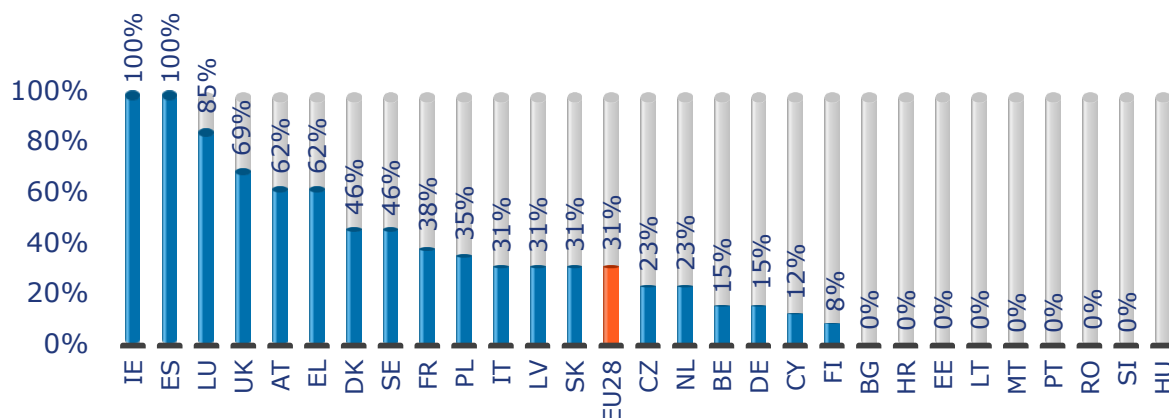**Figure 37: Indicator Political impact – EU28 ranking, 2018**
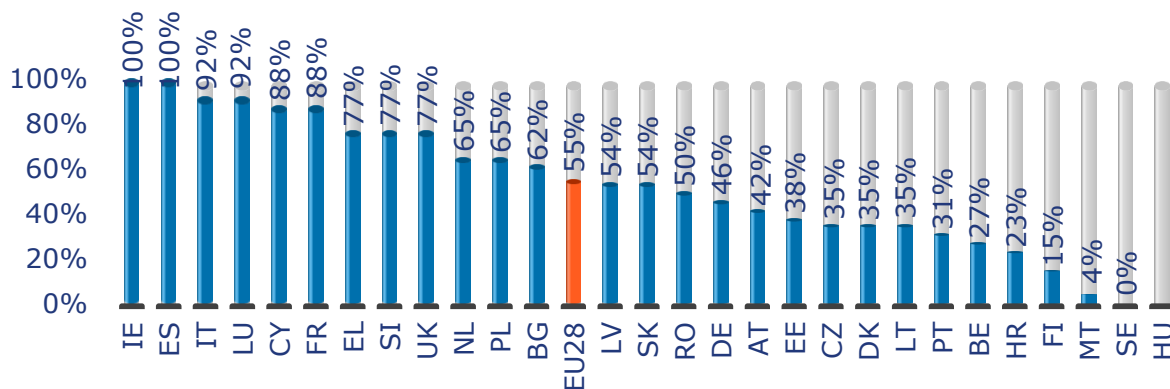
Figure 38: Indicator Social impact – EU28 ranking, 2018
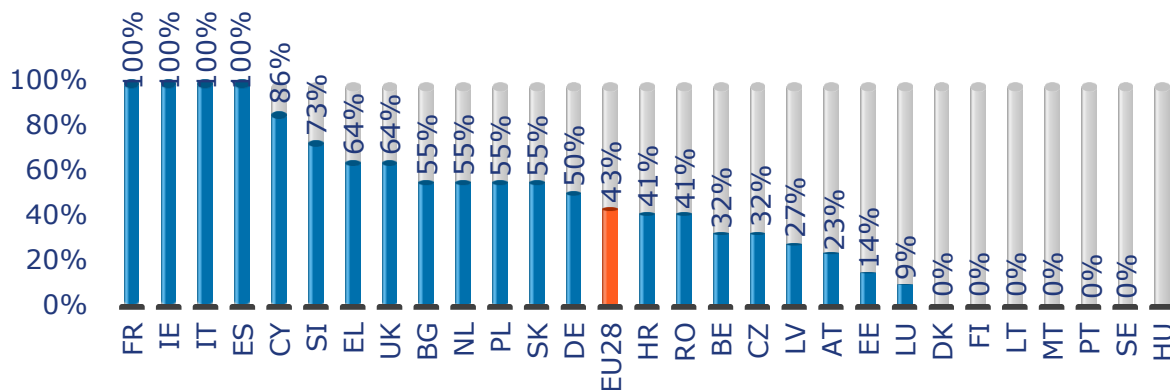
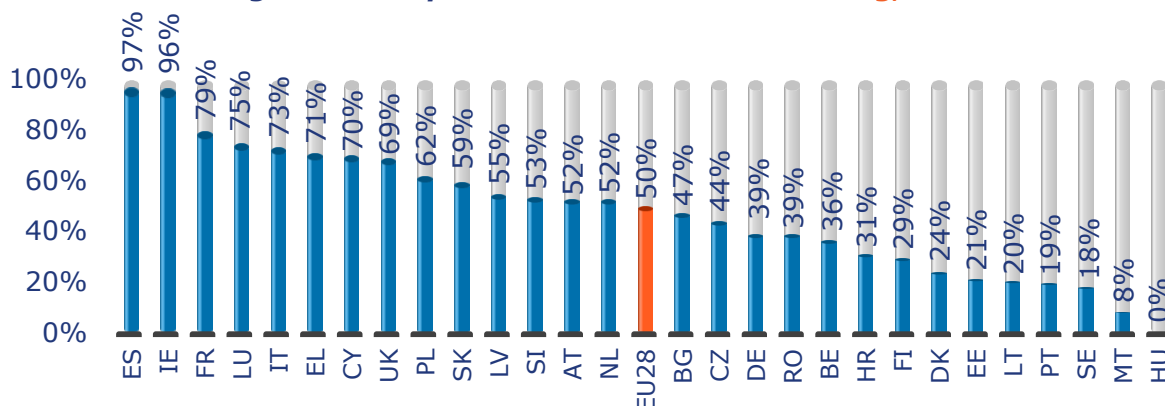**Figure 39: Indicator Environmental impact – EU28 ranking, 2018**
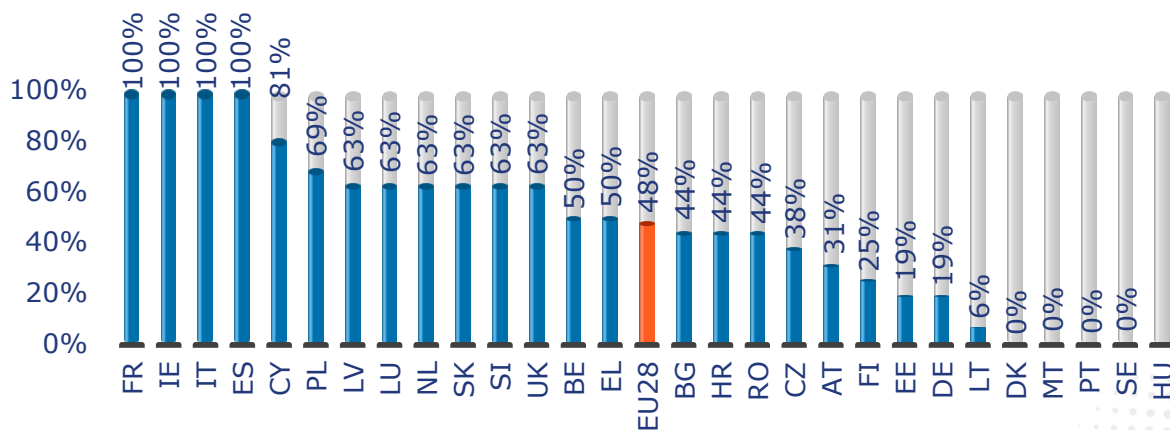
Figure 40: Indicator Economic impact – EU28 ranking, 2018

When looking at the overall impact scores by country, following results can be seen.

Figure 41: Impact dimension – EU28 ranking, 2018

Spain and Ireland scored highest in 2018 with result of 97%, respectively 96%. The activities that the two countries undertook to boost reuse, and monitor impact seemed to have paid off. Third in ranking is France, with a score of 79%. France has set a good foundation to foster impact through Open Data by focusing on the development of 'verticalities'. These are organically developed ecosystems around domains of interest such as transport, enterprise, geospatial and energy. By doing so, the country has managed to support strong communities of practice that foster reuse and boost impact within their field. Luxembourg follows closely with a score of 75%, mainly due to the central government's efforts to capture the economic impact of Open Data. Italy, Greece and Cyprus follow closely, and managed in 2018 to reach scores of 70% and above.

Chapter 4
Open Data Quality

The dimension **Open Data Quality** explores the extent to which national portals have a systematic and automated approach to harvesting, the accuracy and reliability of available data, and the compliance level in terms of the metadata standard DCAT-AP.

The following aspects were explored as part of the Quality dimension:

Indicator	Key elements
Automation	▪ Systematic approach to harvesting and updating of (meta)data is in place on the portal.
Data and metadata currency	▪ The available data and metadata are updated according to their type and on regular intervals. Data linked to the portal provides a good coverage of both historical and current data.
DCAT-AP compliance	▪ Materials are available on the portal to assist data publishers with filling out the metadata fields. ▪ Metadata compliance with the DCAT-AP standard is monitored and statistics on metadata quality are available. Main violations are known and steps are taken to eliminate them. ▪ Activities are conducted with data publishers to increase the quality of their metadata.

Automation

The automation indicator looks at the availability and effectiveness of the approach used by countries to ensure that the metadata describing the available datasets is updated regularly. For those national portals that also host and publish the data, the indicator applies to the updates of the actual data as well. The frequency of updates depends on the dataset. Some datasets do not require frequent updates, as they do not change frequently. Others do require being updated accordingly. In the case of the national Open Data portals, the highest recorded frequencies were weekly or daily.

In 2018, 77% of national portals (20 of 26 portal owners) state that a predefined approach is in place to ensure the currency of metadata and data. Exceptions in 2018 were Austria, Czech Republic, Denmark, Estonia, Portugal and Sweden which do not yet have such approach in place. Whereas in 2017 the UK did not have an established process in this regard either, in 2018 such process was set. In France, a large number of datasets linked on the national portal data.gouv.fr are directly uploaded by data holders. Some data however, is produced at a precise frequency and harvested automatically. 34 such automatic harvesters are connected to data.gouv.fr and ensure that the uploading of metadata occurs automatically (approx. 75% of the datasets available on data.gouv.fr).

In Bulgaria this frequency of updating is stipulated in the "Ordinance on the Reuse of Public Sector Information". In line with the ordinance, the data holder needs to indicate the date on which the information provided shall be considered up to date. Instructions have also been given to public sector organisations to include in the name of the dataset the date on which it is updated. In Romania, public organisations need

To specify an update interval per dataset, with checks being done automatically to verify compliance. Most central level institutions have committed to a two-year publishing plan as part of the National Open Government Partnership Action Plan, approved by a Government memorandum. The list, including the target frequency of update to the datasets, is publicly available. Regular monitoring is in place to ensure these updates are carried out. The institutions revise the list every two years. In Cyprus, the public sector bodies are obliged by law to indicate the frequency of updates in the respective metadata field. In the UK, a similar process was established at the end of 2017 by a Prime Minister's Letter[126] to Cabinet that lays down timing and publication requirements for central government department publication of transparency data. In Finland, there is no legal mechanism in place to ensure that data and metadata are regularly update. This appears to come naturally in Finland, given the fact that, as the national representatives stated, "public administrations are proud of their data and they set their own high requirements to keeping data up to date". In order to ensure the regularity of this updating, the portal managers have built additional functions on the national portal. For example, a validity period is created for the data model and email reminders are sent to the data publisher if the data was not updated within the set interval.

In 2018, only Italy and Belgium stated that all metadata is uploaded in an automated way to the national portal. In another 5 countries (the Czech Republic, Germany, the Netherlands, Spain and Sweden) over 90% of metadata upload takes place automatically, whereas in Ireland, Slovenia, France, Finland, Slovenia around 70 to 79% of the metadata is uploaded automatically to the national portals. At the other end of the spectrum, 10 portal owners (Austria, Cyprus, Denmark, Estonia, Greece, Latvia, Lithuania, Poland, Romania and Slovakia) state that less than 30% of the metadata upload occurs automatically.

In Romania a process was established with several institutions that hold high-value, structured data to enable the switch to automatic upload to the national Open Data portal. Bulgaria's experience shows the importance of integrating the introduction of tools with suitable training. The automated upload of metadata occurred for only 30 to 49% of the over 8,000 available datasets. To increase efficiency, a dedicated tool was developed to support the automatic upload from local servers to the national portal. Despite this, many civil servants had problems installing and using the tool, until a dedicated training programme was deployed.

In terms of machine re-usability of datasets, 17 of 26 portal owners (65%) stated in 2018 that over 90% of the data discoverable on their national portals is available in a machine-readable format[127]. Another 8 national portals state that between 71 and 90% of the available datasets are published in such formats. The only country in which this percentage is slightly lower is Lithuania, with a percentage between 51 and 70% of machine-readable datasets. This is expected to change, as Lithuania is currently in the process of developing a new national Open Data portal, to be launched by 2020.

Looking back at the statistics from previous measurements, this year's results are encouraging. While in 2015 only 21 EU Member States were able to provide information on the percentage of machine-readable datasets on the national portal, from 2016 onwards all portal owners were able to respond to this question.

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126. https://www.gov.uk/government/publications/letter-from-the-prime-minister-on-government-transparency-and-open-data
127. In line with the definition provided in the revised PSI Directive (Directive 2013/37/EU), 'machine-readable format' refers to a file format structured so that software applications can easily identify, recognise and extract specific data, including individual statements of fact, and their internal structure. Such file formats include RDF, XML, JSON.

The number of national portals that provide over 90% of their data in machine-readable formats is nonetheless stagnating at 17. This list comprises: Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, France, Finland, Germany, Latvia, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Romania, Slovakia and Sweden. The leap made by Sweden is particularly worth highlighting. The country jumped from a volume of 24% machine-readable datasets to 90% in 2017 – a level that was maintained throughout 2018 as well. This can be attributed to the political commitment and strong leadership to support the promotion of Open Data as well as the concerted efforts undertaken by both Government and the National Archives – the body that was until recently in charge with the coordination of the Open Data activities[128].

In 2018, the number of countries that have provided 70% or less of their data in machine-readable formats dropped. Whereas in 2017, 5 national portals still offered less than 50% of their data in a machine-readable format, in 2018 all EU28 – apart from Lithuania – recorded a percentage of machine-readable data of 70% or higher in 2018. It is worth mentioning however that Lithuania has made a significant progress compared to 2017, when the percentage of machine-readable datasets ranged somewhere between 25% and 39%. Slovenia has also improved compared to 2017, with an increase from a share ranging between 25% and 39% in 2017, to a range between 71% and 90% in 2018. The same applied for Bulgaria, where an increase to a percentage of 71% to 90% was registered in 2018, compared to approx. 40% in 2017. In Cyprus the percentage increased from around 50% in 2017, to over 90% in 2018. The improvements can be attributed to the training activities that were organised at national level to help data publishers improve their data publication process as well as the bilateral support that many countries are offering to national public administrations to publish higher-quality data.

Metadata Quality Assurance (MQA)

The European Data Portal has intensified its efforts to support the national Open Data teams, and in particular portal owners, in their data quality assurance and in sustaining further improvement of metadata quality across Europe. With its Metadata Quality Assurance (MQA) Dashboard[129], the EDP provides portal owners and visitors alike with an overview of the metadata quality in Europe. The MQA assesses metadata quality based on three criteria: i) accessibility of distributions, ii) machine readability, and iii) compliance to the DCAT-AP[130] specifications. The MQA Dashboard allows further insights into aspects such as distributions (e.g. share of machine-readable formats, most used dataset formats), data compliance (e.g. top 20 DCAT-AP compliant datasets), licencing (e.g. most used licences) and a narrowing down of the results per data catalogue.

In terms of machine-readability, the situation at European level seems to have changed significantly compared to 2017. While in the same period in 2017, the EDP MQA registered a 66%-level of machine-readability of the metadata harvested from all national portals in Europe, this number has dropped 28 percentage points in 2018, to only 38% (see Figure XX). However, it is worth underlining that the volume of metadata harvested by the EDP has increased from October 2017 to October 2018 by over 15%, to now beyond 850.000 datasets. The increase in quantity did not – as the numbers show – imply an increase of quality. With only 38% of datasets published in machine readable formats, Europe appears to still have a long way to go.

128. News item published by the European Data Portal in March 2017 as well as information available on the official website of the Swedish Government
129. The Meta-Data Quality Dashboard, European Data Portal
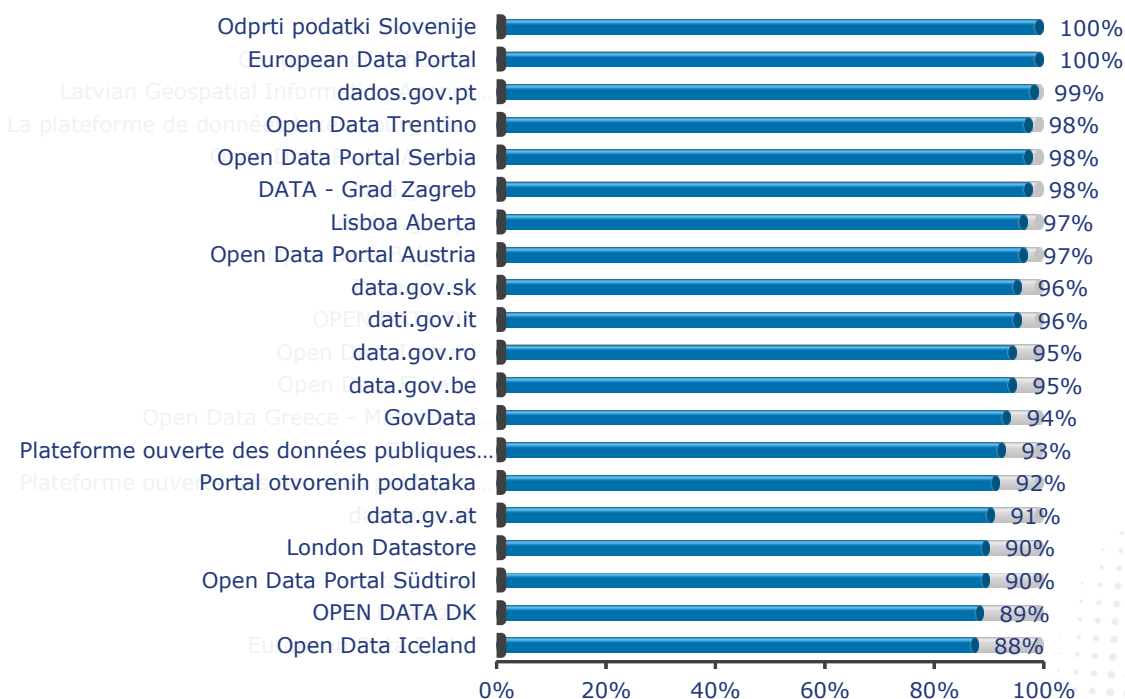130. More information on DCAT-AP on the EC JoinUp Platform

As Figure 42 below shows, there is still a fair amount of data that is published in proprietary formats (e.g. .doc, .pdf, .xls) or as .zip archives.

Ratio machine-readable datasets

Most used distributions formats
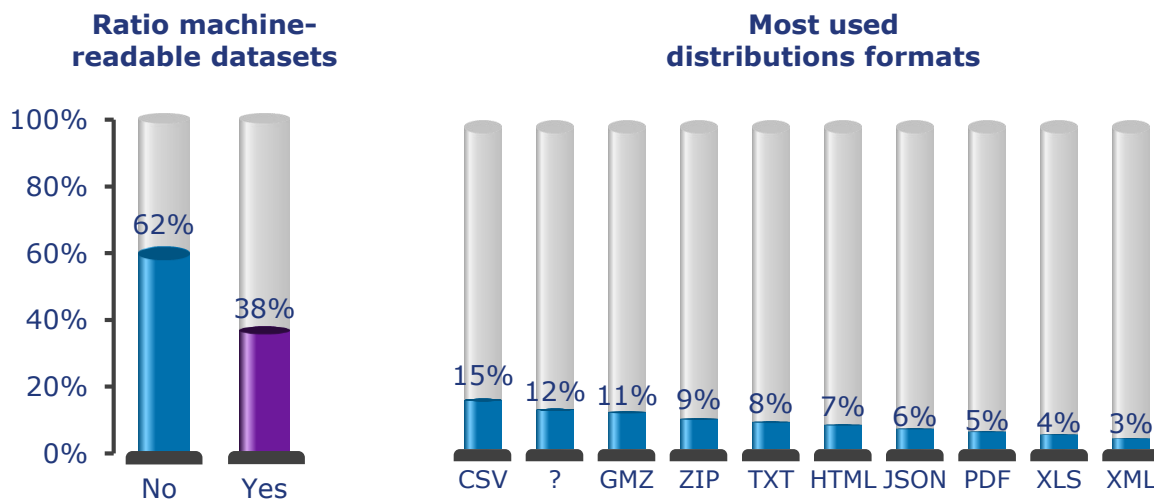
Figure 42: Machine-readability of available data across Europe – MQA data, 2018

Looking at the latest numbers provided by the EDP MQA on the top performing catalogues in terms of degree of machine-readable datasets, the following ranking can be seen in Europe (see Figure 43 below). The national portals from Slovenia, Portugal, Austria, Slovakia, Italy, Germany, Romania, Belgium, Croatia and France show high degrees of machine readability (>90%). In the top 10, several local/regional portals can be seen (city of Zagreb and Lisbon, province of Trentino and South Tyrol).

Figure 43: Top 20 catalogues with machine-readable data – MQA data, 2018

Catalogue	Percentage
Odprti podatki Slovenije	100%
European Data Portal	100%
dados.gov.pt	99%
Open Data Trentino	98%
Open Data Portal Serbia	98%
DATA - Grad Zagreb	98%
Lisboa Aberta	97%
Open Data Portal Austria	97%
data.gov.sk	96%
dati.gov.it	96%
data.gov.ro	95%
data.gov.be	95%
GovData	94%
Plateforme ouverte des données publiques…	93%
Portal otvorenih podataka	92%
data.gv.at	91%
London Datastore	90%
Open Data Portal Südtirol	90%
OPEN DATA DK	89%
Open Data Iceland	88%

Data and metadata currency

The currency of *data* is often critical to application. Analysis and insight are often not relevant when performed on outdated data used to describe a phenomenon that requires tackling today. The frequency of updates depends mainly on the type of data being published. Whereas census data, for example, needs to be updated only on the occurrence of new iterations of the census itself, other types of data need much more frequent updating. Applications such as intelligent journey planners, for example, simply cannot be built without up to date, if not real-time data.

Metadata currency instead is critical to reuse and interoperability. A dataset that is described by outdated metadata – that, for example, specifies incorrect names or wrong types for a table's fields – will most likely break any sort of automation that is built to use that data, and hinder both the dataset and the catalogue's discoverability.

In this indicator we also consider the availability of historical versions of datasets, that is often instrumental to analysis, e.g. in longitudinal studies to describe the evolution of a phenomenon over time.

Metadata currency

For this assessment, portal owners were asked to indicate the update frequency of the metadata describing the datasets offered through the national portals. The questions follow the DCAT-AP guidelines with regards to the field "update frequency" and categorise currency against the following options: less frequently than monthly, monthly, weekly and daily. The Czech Republic, Germany and Sweden stated that almost all metadata (>90%) is updated daily. In Ireland between 71 and 90% of the metadata is updated on a daily basis. At the other side of the spectrum, 14 of 26 portal owners stated that less than 10% of datasets' metadata undergo a daily update. In only three countries: Italy (>70% of data), the Netherlands and Spain (51-70%) the largest bulk of datasets' metadata is updated on a weekly basis. In Austria, Estonia and Finland over 90% of the metadata is updated less frequently than monthly, whereas in Croatia, Luxembourg, Poland, and Slovenia over 70% of metadata is updated less frequently.

Data currency and historical availability

In terms of currency of the data and the availability of historical versions, there appears to be a healthy balance of both offerings, as the chart below shows.

Figure 44: Distribution of historical vs. current data on national portals - EU28, 2018
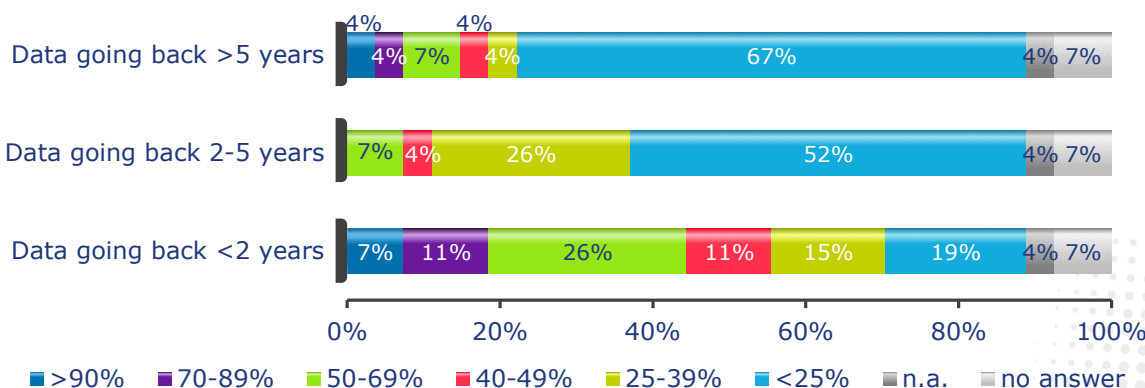
Discoverability vs publishing

Most national data portals prefer acting as discovery tools rather than as publishing platforms and leave to their primary sources (e.g. national government bodies and local administration) the responsibility of publishing. When working according to this model, the portals just harvest the metadata describing the datasets. This is the same model used by the European Data Portal.

In 2018, 18 of 26 national portal owners (69%) stated that over 90% of the linked datasets are discoverable and published by primary sources according to this model. Another 2 portal owners stated that the percentage of discoverable datasets ranged between 71 and 90%.

"Accessibility" vs direct downloads

Within the scope of this indicator, we call a dataset distribution "accessible" if its metadata includes at least reference to a human-readable webpage from the primary source where the reuser can find additional information as of how to access the data. However, DCAT-AP supports also the possibility to specify directly an URL where the data is downloadable in full and directly. This is convenient though not always feasible, as very large datasets may not be suitable for download, even on fast networks.

In 2018, 17 of 26 portal owners state that more than 90% of the harvested metadata offers download URLs. In 3 other countries, download URLs are available in 71 to 90% of cases. In most European countries, the national portals do not yet have reliable assessment mechanisms (built-in checks) that verify and report back the compliance of the harvested metadata. In some cases, these reporting mechanisms do not distinguish between access and download-URLs, hence data at this level of granularity is not available.

Looking however in bulk at the numbers that the EDP MQA recorded with regards to this aspect across all harvested portals in Europe, the MQA shows following results (see Figure 42 below). In terms of accessible distributions, the MQA numbers reflect a 68% of accessible distributions. In terms of metadata that provides a download URL, the MQA records that only 32% of available metadata includes a download-URL.
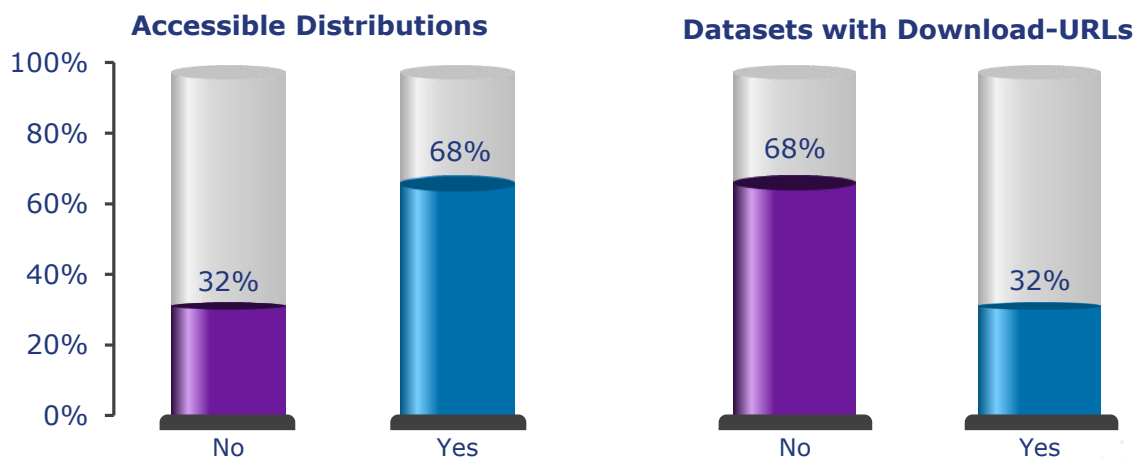
Figure 45: Accessible distributions on national portals in Europe – MQA Data, 2018

Monitoring (meta)data quality - Good practices from Ireland

In Ireland, the national portal https://data.gov.ie/ offers a portal statistics' page that provides numbers on key metrics such as compliance with the Technical Framework set for data publication, compliance with the DCAT-AP standard, insights into the number of broken links, statistics on the increase in datasets on the portal, the number of downloads, most consulted data or top keywords used for the searches on the portal.

This enables the portal owners to better understand the use of the portal as well as take targeted measures to improve the data provided on the national portal

Download: **CSV**

Monthly Reports for data.gov.ie

New Datasets

Metric	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
New Datasets	1989	568	97	14	70

Website & Usage Metrics

Metric	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
Visitors	13536	10518	10729	10416	12757
Sessions	17570	14241	13938	13126	15715
Avg. Session Duration	162 sec	172 sec	150 sec	141 sec	145 sec
Page Views Per Session	3.97	4.29	3.94	3.76	3.83
Page Views	69826	61067	54863	49316	60251
Avg. Page Load Time	3.0 sec	2.9 sec	3.2 sec	3.3 sec	3.3 sec
Exit Rate	25.09 %	23.24 %	25.35 %	26.55 %	26.02 %

Compliance with Technical Framework

Metric	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018
Datasets Under Open Licence	7920	8480	8578	8592	8660
Datasets Formats	8025 datasets scored, from which: 105 None 102 30 7785 0 3	8585 datasets scored, from which: 105 None 112 30 8335 0 3	8682 datasets scored, from which: 104 None 112 30 8433 0 3	8696 datasets scored, from which: 104 None 112 30 8447 0 3	8765 datasets scored, from which: 105 None 117 30 8510 0 3

Monitoring (meta)data quality - Good practices from Spain

In Spain, the dashboard available on the national portal http://datos.gob.es/es provides visualisations of the quality of metadata available on the portal. An interesting insight is the fact that the Spanish portal also assesses the data against the 5star scheme. At the moment, the portal team is working on integrating a tool to check whether distributions are correctly linked to the data files and to send a warning to the data owner in case of error.
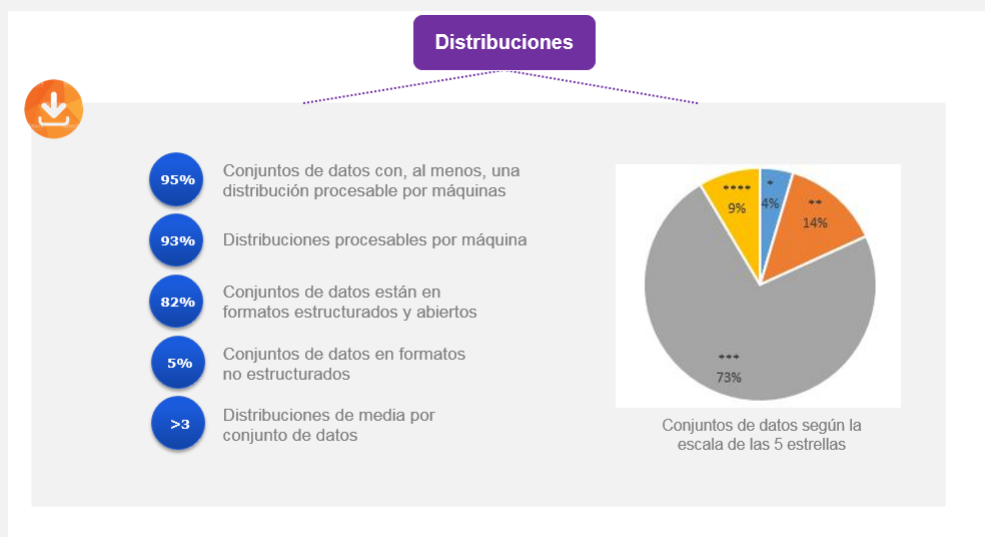
DCAT-AP Compliance

This section looks at the degree of compliance across Europe with DCAT-AP: the existing EU standard for the publication of metadata. The DCAT-AP is an example of such a standard and represents a specification for describing public sector metadata that enables a cross-data portal search for datasets. Complying with existing standards concerning the publication of metadata, such as DCAT-AP, is important as it enables access and discoverability of data and hence can help foster its reuse.

When looking at the results across Europe, 24 of EU28 national portals provide materials for data holders to start publishing data. Aside from Malta and Hungary that did not respond to these questions, only in Denmark and Portugal such materials are not yet available. These results represent a positive development compared to 2017, when only 18 of the EU28 countries (64%) had such guidelines in place.

Good practice examples here come from Slovenia, where a "Manual for Data Editors" was published back in 2016. In Austria, version 2.4 of the Guidelines for Metadata Specification was published, providing information on the core metadata and on the additional optional metadata attributes to be used when publishing Open Government Data. In Poland, the specifications for data publication were captured in a Decree passed in 2014 on Standards for Public Administration Information Systems, in which key elements such as the authority in charge of its execution, the applicable licensing schemes, publication recommendations (datasets, formats, metadata, standards, etc.) are described. This was accompanied by a "Methodological Guide" to assist data publishers even further. In Ireland a "Technical Framework for Open Data" was published by the Department of Public Expenditure and Reform back in 2015, that sets out a planned and structured approach to the publication of datasets as Open Data. The framework provides information on the Open Data licences and recommends publication formats, as well as the metadata schema and standards for Open Data publication.

In Sweden various efforts have been made by the Swedish National Archives – the national body in charge of the Open Data activities – to ensure a high level of quality in published data, with various guidelines for data publication as well as metadata specifications published on the national portal[131]. In Spain, an "Application Guide for the Technical Interoperability Standard for the Reuse of Information Resources"[132] is available. This regulation determines the minimum mandatory metadata for Open Data in Spain. In addition, an e-Learning module[133] on the Spanish extension of DCAT-AP is make available online for download.

A general guide for data publishers and holders was also published by the European Data Portal. The Open Data Goldbook[134] provides a practical guide for organisations to publish data and the how-to's for maintaining data and metadata.

Despite the various materials published at European level, only 17 of 26 national portals refer to existing materials published by the EDP[135] and on the JoinUp Platform[136]. Given the ease of sharing of such materials, these numbers could be higher. Improving this aspect could also represent a 'quick-win' for Open Data decision makers in the country that want to enhance awareness on the topic without having to

131. https://oppnadata.se/skapa-publicera-oppna-data/
132. https://datos.gob.es/es/documentacion/guia-de-aplicacion-de-la-norma-tecnica-de-interoperabilidad-de-reutilizacion-de
133. https://datos.gob.es/es/documentacion/dcat-ap-y-la-norma-tecnica-de-interoperabilidad-de-reutilizacion-de-recursos-de
134. https://www.europeandataportal.eu/sites/default/files/goldbook.pdf
135. https://www.europeandataportal.eu/en/resources/more-training-materials
136. https://joinup.ec.europa.eu

Commission or develop such materials. The JoinUp Platform of the EU provides various information on the latest releases concerning the DCAT-AP standard (currently v1.1)[137] and on any available nation-specific extensions. According to the report published on the JoinUp in this regard, 7 EU countries: Belgium, Germany, Italy, Ireland, Netherlands, Sweden and Spain, as well as 2 EFTA countries, Norway and Switzerland, have developed such extensions. National extensions help adapt the European DCAT-AP standard to a national context and its specificities in terms of legal frameworks, licencing conditions or publishers and users' needs that might not be reflected in the European specification.

Other countries such as the Czech Republic are also in the process of developing their own national extension to better align with the national legislation and the needs of publishers and reusers in the country. An analysis of Czech legal environment showed that there is a need for a more structured method to reference licences than just a link. The solution being evaluated is that four links addressing four different types of laws (regarding intellectual property) involved in the openness assessment of a dataset are needed. Furthermore, the study reckons that an additional property for attaching semantic vocabulary annotations would be beneficial, as the theme category was assessed as not fitting. An overview of the specificities of each national extension can be found in the analysis of the DCAT-AP national extensions[138] prepared for the ISA² programme.

Not only it is important having the metadata fields properly filled in, but also the extent to which this content can be naturally read by humans. 23 of 26 EU portal owners (88%) stated in 2018 that metadata on their portal is available in plain text. Exceptions here are Belgium, France and Estonia. Having plain text in the metadata represents an important element to enable human readability (vs. machine readability alone) of the published metadata.

Additionally, portal owners have also become more concerned with monitoring the increase of metadata volume on their portals. In 17 of 26 responding EU countries (65%), there is a monitoring in place for this factor. In Poland such monitoring is part of systematic reviews carried out by the portal administrator, with comments delivered to the Open Data officers on the data providers' side. In the Netherlands, a similar process is in place with both manual monitoring – called "active data management" – done by the portal team and automatically via scripting. In Slovenia and Cyprus, a stricter and more resource-intense process of ensuring (meta)data quality is in place. All datasets that are uploaded to or linked by the portal need to undergo a quality check by the editors. In Cyprus, there are 12 obligatory metadata items that need to be submitted along with the data itself. The metadata completeness and quality are manually reviewed before a dataset is published on the portal by a moderator administrator.

There is a "wizard" tool in clear plain language that guides the user through providing the necessary metadata. In this context it is worth highlighting that the size of the country permits such manual quality checking at national portal level. A similar process is in place in Belgium as well with the portal team cleaning up and mapping of metadata of the harvested portals before publication on the national portal.

Looking at the level of compliance with the DCAT-AP standard, 17 of 26 national portals achieved over 90% in terms of mandatory fields. In Greece, the results range between 10% and 30%, whereas in Estonia and Lithuania it only reaches 10%.

137. https://joinup.ec.europa.eu/release/dcat-ap-v11
138. https://joinup.ec.europa.eu/sites/default/files/document/2017-10/DCATAP%20extensions%20analysis_v1.00.pdf

It should however be noted that Estonia is focusing on achieving a high level of compliance in terms of the standards developed under the X-Road infrastructure[139]. Only 3 countries (Austria, Croatia and Poland) were not able to provide information on the level of compliance of metadata, measured against the specifications of the DCAT-AP standard.

Compliance decreases when assessing performance vs. the recommended and optional metadata fields. Whereas in terms of recommended fields, only 11 of 26 portals (42%) indicate a level of compliance of 90% or higher, only 9 of 26 portals (35%) indicate a compliance of 90% or higher in terms of optional fields. Moreover, only 7 countries were able to provide information on the main compliance violations. The most frequent violations refer to: missing contact information for data owners (Ireland, Romania), missing licensing (Belgium, Czech Republic, Germany, Greece and Portugal), missing distribution or incorrect use of RDF literal instead of URI (Belgium and Germany), missing data theme category (Czech Republic, Greece and Lithuania), missing updating frequency (Czech Republic), wrong statement in "dct:language" (Germany), wrong political Geocoding Level URI (Germany). 11 other countries were not able to provide any information.

Figure 46 depicts the distributions across the EU28 regarding the DCAT-AP compliance with the mandatory, recommended and optional metadata fields.

Figure 46: Compliance with the DCAT-AP standard - EU28, 2018
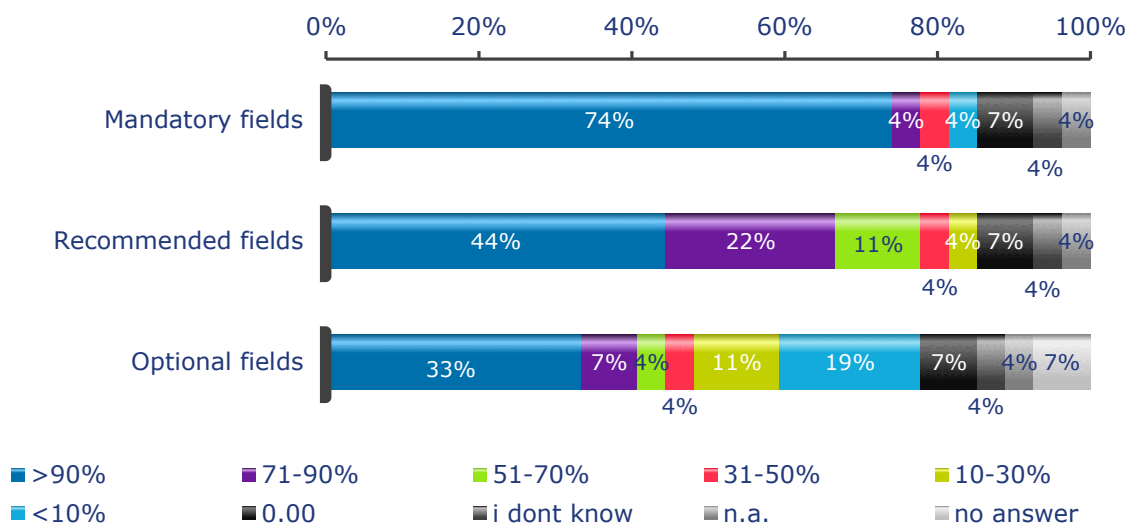
As shown above, 74% of EU28 portals record a level of compliance in terms of mandatory fields of over 90%. In terms of recommended fields, only 44% of EU28 portals record a compliance of 90% or higher. In terms of optional fields, this percentage is even lower and only reaches 33% in 2018.

Looking at the level of compliance with the DCAT-AP standard at catalogue level, the MQA of the European Data Portal provides additional insights into the top performing catalogues (see Figure 47). The national catalogues from Poland and Croatia are the best performers (both the Open Data catalogues and the geoportal catalogues). Featured in the top 20 are also the geoportals of France, Lithuania, Luxembourg and Sweden, as well as the national Open Data catalogues of Denmark, Portugal and several regional catalogues from Spain.

139. https://e-estonia.com/solutions/interoperability-services/x-road/

Figure 47: Top 20 catalogues with most DCAT-AP compliant datasets - *EU28, 2018*

Catalogue	Value
Geoportal of Lithuania	100%
Geoportal Dane Publiczne	100%
Latvian Geospatial Information Data Directory…	100%
La plateforme de données Geoportal Poland	100%
Geo-System metadata catalogue	100%
OPEN DATA DK	100%
Czech National Open Data Portal	100%
Open dados.gov.pt	100%
Geodata Portal Sweden	100%
Infrastructura de Datos Espaciales de…	100%
Geoportal of the Grand-Duchy of…	100%
Open IDEAndalucia	100%
Open Portal otvorenih podataka…	100%
Dataportaal van de Nederlandse overheid	100%
Plateforme ouv Metadata Catalogue Poland…	100%
NIPP Geoportal Croatia	100%
London data.gov.be	100%
Geocatalogue France	100%
CEDAI Catalog Service for Provision of…	100%
E Avaandmete portaal	100%

Ensuring high quality of published Open Data – Good practices from the Netherlands and Germany

In **the Netherlands**, a national extension was developed as a sub-model of the DCAT-AP. In addition to this, a DCAT-NL-DONL was also created to be more restrictive than DCAT-NL and ensure strictest consistency to their desired specifications. For example, only values from pre-published value lists are allowed. This year, the new version DCAT 1.1 will be introduced on the portal. This will be very helpful for the portal to monitor the quality of (meta) data. The Netherlands focuses on the quality of data, in particular the quality of reference data and high value datasets. To ensure a high level of acceptance of the DCAT-AP.NL extension, the portal team conducted several working sessions with government organisations to allow them to contribute to the development of the national variation. Once adopted, a series of workshops and trainings were organised with major data providers about how one implements the DCAT 1.1 version and how datasets can be harvested by or to the portal.

In **Germany**, the DCAT-AP.DE national extension was introduced in 2017, and will become mandatory from 2019 onwards. The creation of a uniform metadata structure for open government data in Germany has already been underway for some time. The project has been since 2013 on the agenda of the Working Group on Standardisation within the national IT-Planning Council. The DCAT-AP.DE extension was recognised as a standard as of June 2018.

It focuses on licencing, copyright, and law restrictions in Germany, and defines additional value lists and URIs that better account for the specificities existing in the country. Currently GovData is working on implementing subsequent versions of DCAT-AP.DE, with version 1.1. planned for autumn 2018 and version 1.2 planned for 2019. In order to ensure a high level of understanding and compliance with the DE-standard, the GovData team has carried out a series of workshops and bilateral sessions with the main data publishers and contributors to the national portal. Furthermore, the national portal also has a link checker in place to help data publishers with the correct filling of the metadata fields. The portal also provides a separate log-in area for data publishers, to enable further exchange on DCAT-AP.DE compliance issues and more. Early 2019 GovData is planning on implementing a metadata validator on the portal, to further enable data providers to deliver high-quality metadata. Towards this end, a project has set up that aims to develop a standard for provision of high-quality data and metadata[140], with first results to be expected in spring 2019. Along these efforts, a high level of interest from behalf of data providers towards providing high-quality metadata to the national portal was observed. This appears to have been the successful mix in Germany, and enabled the country to achieve rank 1 on the quality dimension in 2018.

Overall performance – Quality dimension

In terms of EU28 average scores per indicator, the following results were recorded on the dimension Quality in 2018.

Figure 48: Quality – scores break-down per indicator – EU28, 2018
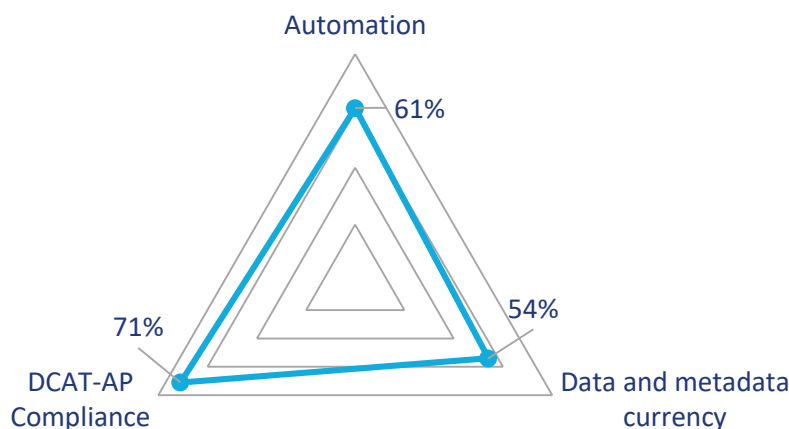
The scores on this dimension are overall modest, ranging from a moderate 71% EU28 maturity in terms of DCAT-AP compliance, to a more modest results of 61% in terms of automation and 54% in terms of data and metadata currency.

140. https://www.nqdm-projekt.de/

When looking at the country scores per indicator, following ranking can be seen in 2018.

Figure 49: Indicator Automation – EU28 ranking, 2018
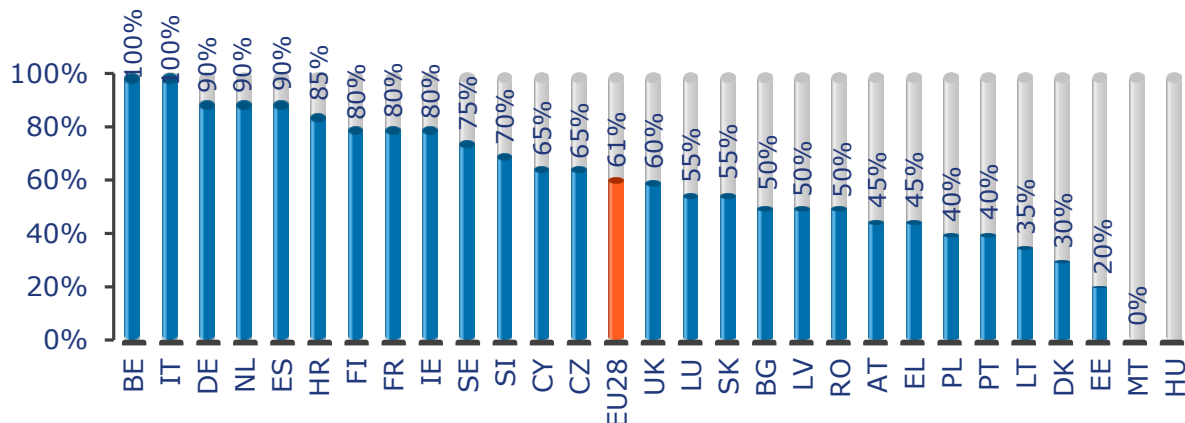
Figure 50: Indicator Data and metadata currency – EU28 ranking, 2018
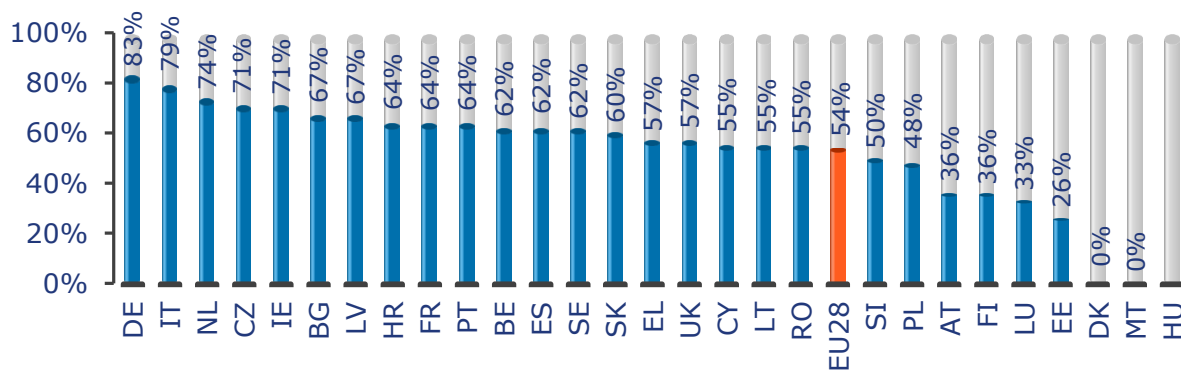
Figure 51: Indicator DCAT-AP compliance – EU28 ranking, 2018
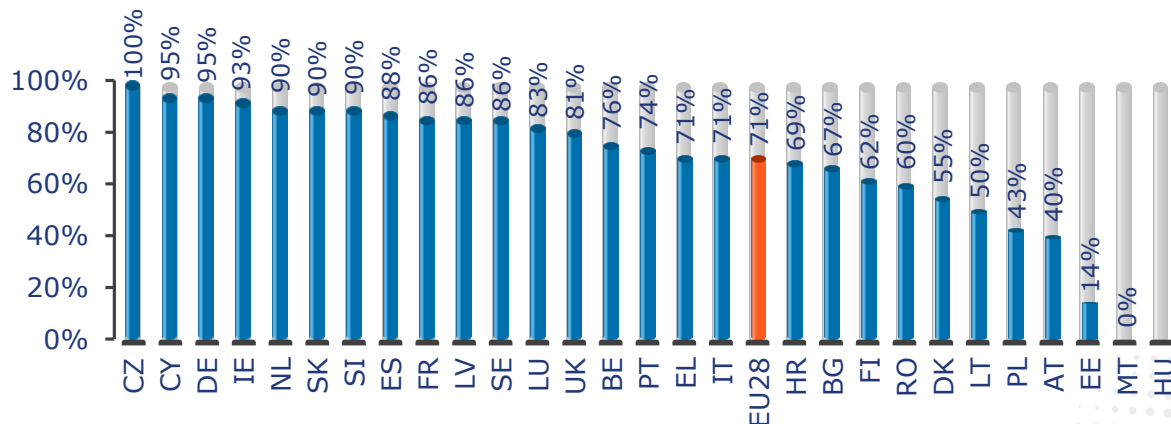
In terms of the best performing countries, Germany stands out with very good results on this dimension. The country shows a consistent ranking amongst the top 3 performers on each of the three indicators.

When examining the overall EU28 results on this dimension, the following EU28 ranking can be observed:

Figure 52: Quality dimension – EU28 ranking, 2018
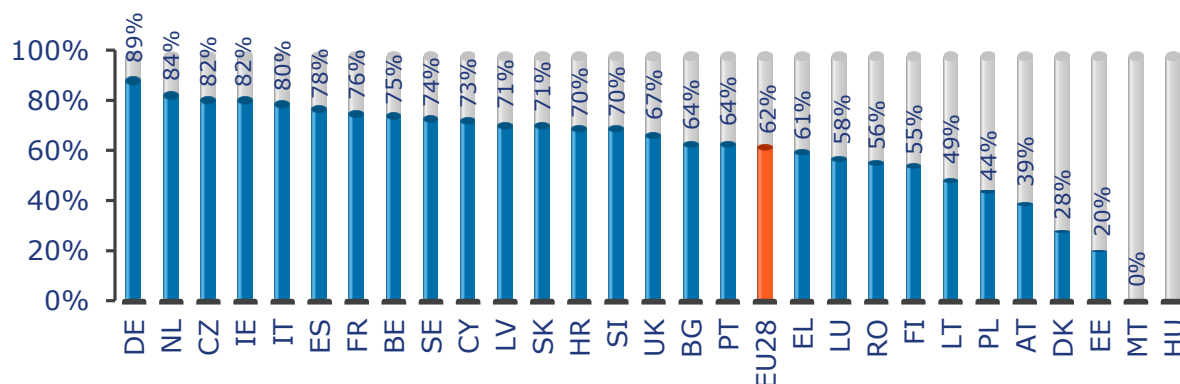
Best in class in 2018 is Germany with an overall score on 89%, followed by the Netherlands (84%), the Czech Republic and Ireland (both with 82%) and Italy with a very good score of 80%. Next in ranking are Spain (78%), France (76%), Belgium (75%), Sweden (74%), Cyprus (73%), Latvia and Slovakia (71%). Croatia and Slovenia rank next with results of 70% each in 2018.

Despite the overall moderate scores on this dimension, and the EU28 average of only 62%, Member States seem to have understood the importance of enhancing the publication of higher quality data. It will be interesting to observe to what extent these scores will significantly improve in the 2019 assessment.

Chapter 5
The EFTA countries

Similar to previous years, the Open Data landscaping exercise also assesses the Open Data maturity in the four European Free Trade Association (EFTA) countries – Iceland, Liechtenstein, Norway and Switzerland. The maturity assessment follows the four dimensions: policy, portal, quality and impact.

Open Data Policy

Policy framework

With regards to the presence of Open Data policies, only Norway and Switzerland have dedicated Open Data policies in place. In Norway, an updated Digital Agenda for Norway[141] was published in 2016, which focuses strongly on data sharing features. The importance of data sharing was identified as cornerstone towards ensuring a more efficient and effective Government. Data sharing and data analysis are deemed necessary for seamless and integrated services, for improved policy-making and allows for impact of services to be evaluated and calibrated accordingly. As part of the strategy, the Norwegian Government plans to establish a common framework for Information Management and a data catalogue to access the data. It is estimated in a Study undertaken by Det Norske Veritas[142] that this will lead to savings of 30bn. NOK over a 15-year period. Coupled with this, the Government has prioritised five sectors for Open Data: Government spending, geodata, transport, research and culture. Open Data strategies have been developed for all these sectors. In 2017, Norway also updated it Guidelines for Open Data[143].

In Switzerland, an Open Government Strategy 2014-2018[144] was approved by the Federal Council in April 2014. It was developed under the auspices of the Federal IT Steering Unit and it defines the scope and actions in the field of Open Government Data until the end of 2018. The strategy focuses on three main pillars: i) the release of official data, ii) the coordinated publication and provision of official data, with the help of a central infrastructure (the national Open Government Data Portal) and iii) the establishment of an Open Data culture, by fostering the use of data through free, uniform and understandable Terms of Use and through a dialogue and collaboration with the public.

In Iceland, a policy on Open Data is currently being developed and it is expected to be published in 2019. In Liechtenstein, the PSI Directive is currently being implemented. The Directive is not yet part of the European Economic Area (EEA) Acquis.

When asked to assess whether the national Open Data policy is more ambitious than the PSI policy, Norway and Switzerland stated that the national policies follow the same lines of the PSI Directive.

Regardless of whether a dedicated Open Data Strategy is in place in the country, all four EFTA countries provide lists of the available Open Government Data to the broader public. In Liechtenstein, these lists are available on the websites of the country's main data providers, the General Administration of Liechtenstein[145], the

141. https://www.regjeringen.no/no/dokumenter/meld.-st.-27-20152016/id2483795/
142. http://www.menon.no/wp-content/uploads/24rapport_informasjonsforvaltning.pdf
143. https://www.regjeringen.no/no/dokumenter/retningslinjer-ved-tilgjengeliggjoring-av-offentlige-data/id2536870/
144. https://www.egovernment.ch/en/umsetzung/e-government-schweiz-2008-2015/open-government-data-schweiz/
145. https://www.llv.li/

Office of Statistics[146], the Geoportal of Liechtenstein[147] as well as other sources such as the online register that enable free access to the country's legislative texts[148].

Only in Norway there is a legal obligation to provide justifications for not publishing Open Data. Aside from the justifications for not publishing data when this implies releasing private or sensitive data, or confidential information that deal with the national security, in Norway it appears that public administrations also have the right to refuse to publish data if this publication is too time consuming. It is not clear however to what extent citizens can challenge a public body's decision not to release data on the grounds of the effort and time that such publication would imply.

As stated above, Norway is also the only EFTA country that has developed a set of priority domains for data publication. The prioritised domains are Government spending, Geodata, transport, culture and research sectors. The developments in terms of data publication in each of the priority domains are published at regular intervals in the form of reports[149]. In Switzerland – although such priority domains were not official - the national Government has prioritised data publication around topics of interest. The Swiss Open Data team has engaged with data publishers and reusers via round-tables around specific topics like food, smart cities, and transport.

Coordination at national level

In 2018, only Norway and Switzerland had guidelines for data publication developed at national level. In Switzerland the Guidelines for Opening Data[150] are available on the national portal and cover three areas: i) how to identify open government data within an organisation; ii) how to make sure the legal basis supports the publication as open government data and iii) how to publish the data in question. In Norway, the Guidelines for Data Publication cover[151] 15 areas. The guidelines provide information on how to publish data at zero charge, provide data in machine-readable formats, update the data and enable feedback channels for reusers. It also informs on the 'How to's to publishing high-quality metadata and the licensing the Open Data. In Iceland and Liechtenstein no guidelines for data publication were developed yet.

Both Norway and Switzerland state that all Open Data activities are coordinated at national level. This is due to the small country size and the relatively small Open Data community in comparison with larger countries. In Norway, the coordination activities span from organising meetings with reusers and publishers from across the country to providing advice to public administrations that want to publish their data. Centralising the coordination activities at national level also enables the national teams in both Norway and Switzerland to keep up to date with all the Open Data initiatives which are happening in the country.

In Switzerland, given the country's administrative structure, every data initiative at regional (canton) level is invited to follow the lines set up by the national strategy. Every data publisher references its datasets on the national portal (opendata.swiss). These activities are coordinated through different project groups. This kind of coordination via different working groups is reported to work very well in Switzerland.

In Iceland, agencies are autonomous in making their own decisions, with the national level only maintaining a passive coordination approach.

146. https://as.llv.li; https://etab.llv.li/pxweb
147. https://geodaten.llv.li/
148. https://www.gesetze.li
149. https://doc.difi.no/kunnskapsgrunnlag-tilgjengeliggjoring-offentlige-data/
150. https://handbook.opendata.swiss/en/pages/index
151. https://www.regjeringen.no/no/dokumenter/retningslinjer-ved-tilgjengeliggjoring-av-offentlige-data/id2536870/

In Liechtenstein such activities do not take place currently, as Open Data is not considered a main priority in the country.

In 2018, none of the EFTA countries had data publication plans in place. Moreover, none of the four EFTA countries could provide information on the extent to which data holders engage in intensive data publication. This is also due to the fact that there is monitoring in place to track progress nor is there a monitoring system that tracks the percentage of public bodies that charge above marginal cost for their data.

In Iceland, Norway and Switzerland Open Data initiatives exist also at local and regional levels. Whereas in Iceland and Norway up to 25% of cities in the country conduct their own Open Data initiatives, in Switzerland the percentage is slightly higher and ranges between 25 and 50%, with cities such as Zürich[152] or the canton of Thurgau[153] having their own Open Government Data portals. Similar applies for Norway, where municipalities such as Stavanger as well as national public bodies, such as the Norwegian Public Roads Administration[154] run their own Open Data initiatives.

In three of the EFTA countries (Iceland, Norway and Switzerland) interoperability of data is a focus for the national government, with efforts being made in terms of developing common models, specifications and definitions to enable better data exchange between public administrations.

In Switzerland, a national extension of the DCAT-AP standard was developed, along with other guidelines and initiatives, i.e. for Open Government Data formats and linked data projects.

When asked about the planned actions to increase both publication and reuse, only Switzerland stated to have such activities planned. With regards to fostering uptake of data supply, the national government plans to use the data inventory as a basis to make the data publication more systematic. It also plans to organise topic-oriented round tables where data providers and reusers can exchange on prioritisation of data publication and align the data release with users' needs.

Additionally, in both Norway and Switzerland round-tables were set up to discuss what data domains should be prioritised. The two countries are also regularly organising events around Open Data at city level, as well as workshops and meet-ups at national level[155]. In Switzerland, various activities are conducted, from formal round tables between publishers and reusers to more information meet-ups such as meet-ups called "Open Data beer" that are co-organised by civil servants. Whereas in Norway it is mainly the national level organising such activities, in Switzerland they are mainly organised by the civil society and the community of Open Data reusers. For the coming year, both Norway and Switzerland plan on continuing the series of initiated events and exchange formats. Additionally, the national teams plan on intensifying the dialogue with the Open Data community in the country.

While there are no such events currently organised in Liechtenstein, the body in charge of coordinating Open Data activities is maintaining a strong communication with the main data publishers and the community of reusers.

152. https://data.stadt-zuerich.ch/
153. https://ogd.tg.ch/
154. dataut.vegvesen.no
155. Oslo Big Data day, 13. March,; Ideathon, 16. May, Drammen; Open Data Meetup, 15. February, Bergen; Open Data Meetup, 28. February, Oslo; Hack4no; 26-27. October 2018, Hønefoss.

Licencing norms

Apart from Liechtenstein, all EFTA countries stated that all their published data is published free of charge. Additionally, in the three cases (Iceland, Norway and Switzerland), guidelines were published at national level to help public bodies correctly licence the published data. In Switzerland and Norway 100% of published datasets are licensed under an Open Licence. In Iceland this percentage ranges between 75 and 90% - a very good result as well. In terms of licences that the national Open Data portal features, Iceland, Norway and Switzerland feature between 1 and 5 licences. In Liechtenstein, this is non-applicable due to the lack of a national Open Data portal.

In terms of licences recommended at national level, Norway recommends the Creative Licensing Suite as well as the Norwegian Licence for Open Data. In Switzerland, because of the legal framework, it was decided that the correct legal instrument to use were "Terms of Use', instead of licences. Such Terms of Use follow the Open Data principles, even if they do not entirely align with the CC licences.

Overall performance – Policy dimension

When aggregating the results per indicator, the following ranking emerges among the EFTA countries (see Figure 53 below). Best in class is Norway with 70%, followed closely by Switzerland at 67%. Iceland follows at a visible distance with an overall maturity on the policy dimension of 29%. Given the development currently underway in the country, a significant progress is expected in 2019 for Iceland with regards to the policy dimension. In Liechtenstein a very modest score of 1% maturity was registered in 2018.

Figure 53: Policy dimension – EFTA ranking, 2018
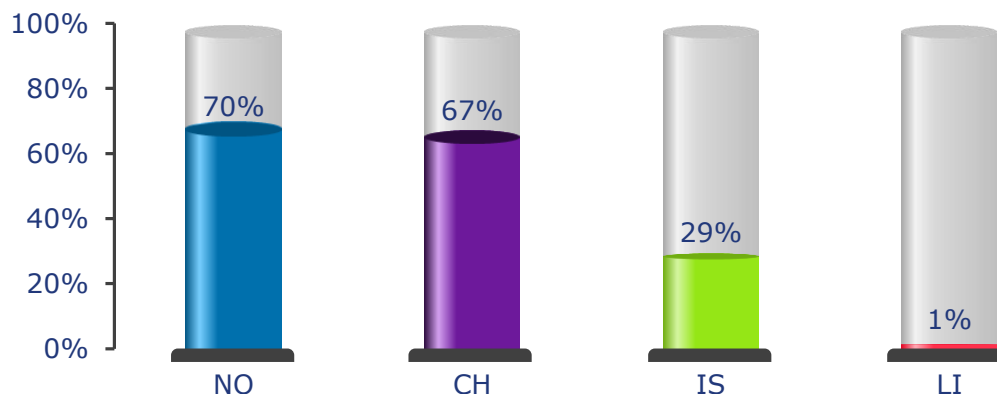
Open Data Portal

Given that Liechtenstein does not yet have an Open Data portal, the following section will only discuss the maturity of the national portals in Iceland, Norway and Switzerland.

Portal features

In terms of portal features, all three portals provide basic features for visitors to search per file or data domain format, and access and download datasets. However, only the portals of Norway and Switzerland also provide a designated area to showcase Open Data based applications. The Norwegian and Swiss portals also enable users to submit their own reuse cases. The two portals also allow for a mapping of these use cases to the Open Data that they are based on and which is available on the portal. In addition, the two portals also enable users to provide feedback to available datasets. The Swiss portal allows two ways to provide feedback, at both portal and dataset level. At the portal level, there is a generic contact form. The feedbacks are then dispatched to the data holder. At the dataset level, a point of contact is defined for each dataset. A user can send feedback, questions or requests to the data holder.

With regards to ensuring an information channel via the portal, only the Norwegian Open Data portal provides a news section. None of the three portals provide the possibility to subscribe to a newsletter. In terms of enabling previews into the data, only the Swiss Open Data portal has visualisation features for both tabular and geographical data.

None of the three portals however provide additional tools for data providers and/or reusers to start working with the data, nor do they offer a designated login area for advanced users or the possibility for advanced users to search data via a SPARQL query.

Portal usage

In terms of the portal usage, all 3 EFTA portal owners were able to provide information on the numbers of unique visitors per month (Iceland 50, Norway 7.600, Switzerland 6.200) as well as percentage of foreign visitors to the national portal (Iceland 1%, Norway 15%, Switzerland 65%). Only Norway and Switzerland had deeper insights into the type of visitors to their portal. Whereas in Norway the typical user comes from the private sector, the Swiss portal attracts a mixed audience from the public, private and civil society sectors. Furthermore, all three countries stated to use analytics tools to track the use of their portals, but only Norway derives insights from this information, that flows into further updates to the portal.

In terms of more advanced access to the portal via an API, only Norway and Switzerland have such feature in place. None of the two portal owners were able to provide information on the actual traffic to the portal via the API.

Data provision

On the indicator 'data provision' results are encouraging, with all three portal owners being able to provide information on the most popular data domains. Only Switzerland was also able to list the most consulted datasets on their portal. Also, from the three EFTA Open Data portals, the Swiss portal is the only one that provides access to gender-aggregated as well to real-time data.

The percentage of real-time data linked to the Swiss Open Data portal ranges between 1 and 5% and is similar to the percentages in Austria, Italy, the Netherlands or Spain.

With regards to having a sustainability strategy in place for the portal, the same situation as in the EU28 appears in the EFTA countries. In Iceland no such strategy was defined, given the lack of an Open Data strategy in the country. Both in Norway and Switzerland the portal derives its sustainability from the financing via the state budget and its "enshrinement" in the country's national Open Data strategy.

Overall performance – Portal dimension

Looking at the portal maturity across the four EFTA countries, the following ranking can be observed. Switzerland ranks first with an overall maturity score of 64%, followed by Norway with 55%. Both portals feature the main functionalities that national Open Data portals should provide for their visitors. Ranking third is Iceland with an overall performance of 25% in 2018. This percentage is expected to change in 2018, given the increased priority that the Open Data topic now has on the national political agenda. Liechtenstein has not yet launched an Open Data portal.

Figure 54: Portal dimension - EFTA ranking, 2018
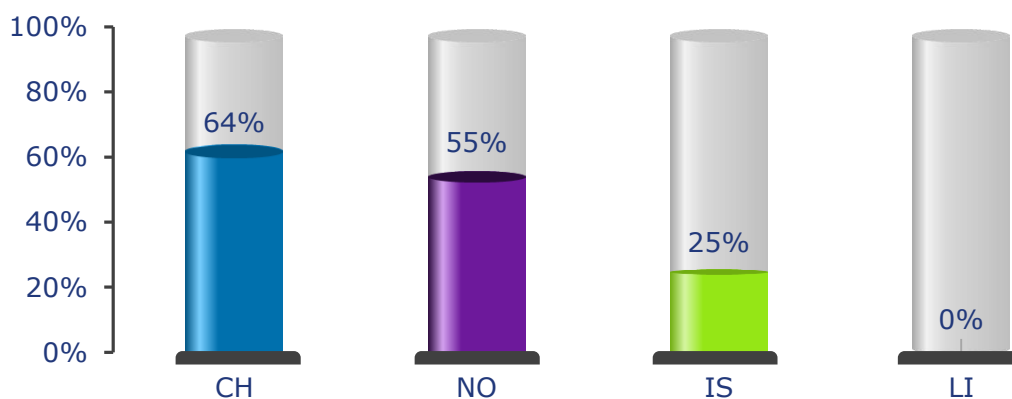
Open Data Impact

Strategic awareness

With regards to the availability of activities to monitor both the reuse and impact of Open Data, some efforts are visible in the four EFTA countries.

In 2018, Iceland, Norway and Switzerland were monitoring the increase in volume of published data, with different results. Whereas in Switzerland the increase registered was higher than 50%, in Iceland it ranged between 41 and 50%, in Norway between 21 and 30%. In Liechtenstein such monitoring is not yet in place.

In the same lines of monitoring, none of the EFTA countries track the extent to which open government data is reused by public administrations. Furthermore, while in Norway public administrations concern themselves to a high extent with understanding the reuse of the data published, in Liechtenstein and Switzerland the topic of reuse is not a current focus. In Iceland no information was available on this aspect.

Furthermore, the focus on fostering reuse also seems to be different within the EFTA country group. Whereas in Norway no specific activities to foster reuse are currently conducted, Switzerland and Liechtenstein conduct some activities. In Liechtenstein the efforts limit themselves to counselling on the potential reuse of Open Data. In Switzerland the activities are more intense and involve regular meet-ups with the reuse community. In addition, Switzerland is also considering anchoring the fostering of reuse more strongly in the new Open Data Strategy that will be adopted at the end of this year.

At the same time, Switzerland is also the only EFTA country to conduct activities to foster the impact of Open Data, by conducting a series of topic-oriented round tables, that aim to enable further reuse and capture the impact of the used Open Data. The country is also planning on investing more resources in this type of efforts.

In terms of activities to monitor and measure the impact of Open Data in the country, none of the four countries are undertaking such actions. In Switzerland some resources are allocated to defining a methodology to measure impact that is both reliable and realistically implementable. The national portal managers are monitoring portal statistics and proactively look for Open Data use cases. These are good first steps to understating and capturing reuse.

Impact on the political, social, environmental and economic dimension
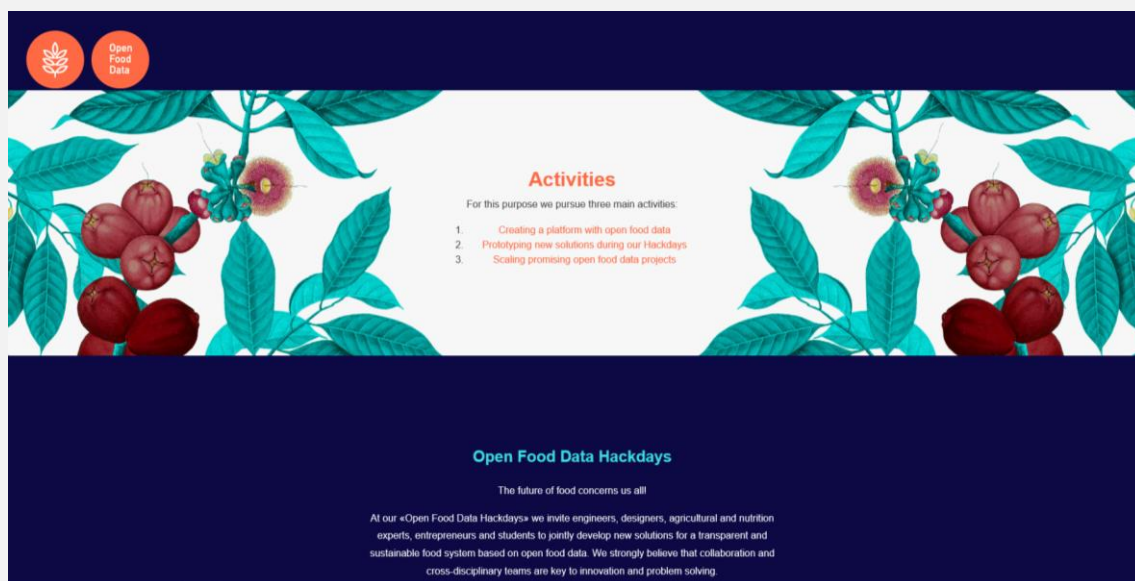
With regards to the impact section, Iceland, Liechtenstein and Norway did not provide any insights into the impact of Open Data on the political, social, environmental and economic dimension. Switzerland was the only EFTA country in which some proof of the benefits that Open Data has on these dimensions could be provided.

The Swiss national Open Data team underlined the fact that there is an awareness in the country with regards to the political impact of Open Data. This comes to light in the various discussions with the stakeholders, mentioning better data exchange between different political level and/or data domains, optimising or dropping their data selling practices.

With regards to the impact of Open Data on the environmental dimension, Switzerland could observe how the opening of data registers containing data on air quality led to journalists exposing the high level of air pollutants in different cities across Switzerland[156]. In terms of the benefits that Open Data has on the social dimension, an Open Food Data[157] initiative that aims to increase awareness around nutrition aspects within the Swiss society by using Open Data.

The Open Food Data Initiative in Switzerland

Launched by opendata.ch, the Open Food Data programme aims to make the food system more transparent and sustainable, by developing a publicly available base of nutrition data, fostering the development of value-adding solutions and strengthening the use of Open Data for entrepreneurial and societal purposes. The project platform provides an overview of datasets being worked on by the community at Datacentral[158], where they are being curated and packaged using Frictionless Data standards. The platform also gives visibility to the benefits of opening up such datasets, by promoting the projects[159] as well as the start-ups that benefit from working with food data, such as Prognolite, V-Zug or DigiMeals[160].

The availability of Open Data from different fields in Switzerland in has also triggered some applications such as the Open Data Showroom[161] presented in the insights box on the next page.

156. https://blog.tagesanzeiger.ch/datenblog/index.php/9333/wo-die-schweiz-am-dreckigsten-ist
157. https://food.opendata.ch/
158. https://food.schoolofdata.ch/
159. https://food.opendata.ch/#supported-projects
160. https://food.opendata.ch/share-your-data/
161. http://opendata.iwi.unibe.ch/?orderBy=-date_publish

The Open Data Showroom in Switzerland

The Open Data Show Room is a project developed by the Digital Sustainability Research Centre. The platform showcases applications for interactive data visualization. Students have developed the mostly D3.js-based web applications within the framework of the Open Data curriculum lectures. The apps deal with topics such as finance, environment, transport, education, etc. and provide an understandable and transparent access to complex data through creative ways of presentation. The applications used data published by the Swiss public administrations, and is used to create easy-to-understand visualisations on topics such as voting, traffic, or the environment.

Overall performance – Impact dimension

Considering the lack of a systematic monitoring of the impact of Open Data, Switzerland was not yet able to fully document such effects. Given however these efforts the country was able to reach a 25% level of maturity of the Open Data impact in 2018.

As the ranking in Figure 54 shows, Switzerland ranks highest, at a clear distance from the other three EFTA countries. Although below the EU28 average of 49%, Switzerland is on a good track in this regard. The country is focusing on Open Data publication and reuse in a particular domain, and it is undertaking efforts to develop an ecosystem in these focus domains (e.g. nutrition, the food Open Data programme). With this, the country will certainly make progress on the impact dimension and improve its score in the coming year.

Figure 55: Impact dimension – EFTA ranking, 2018
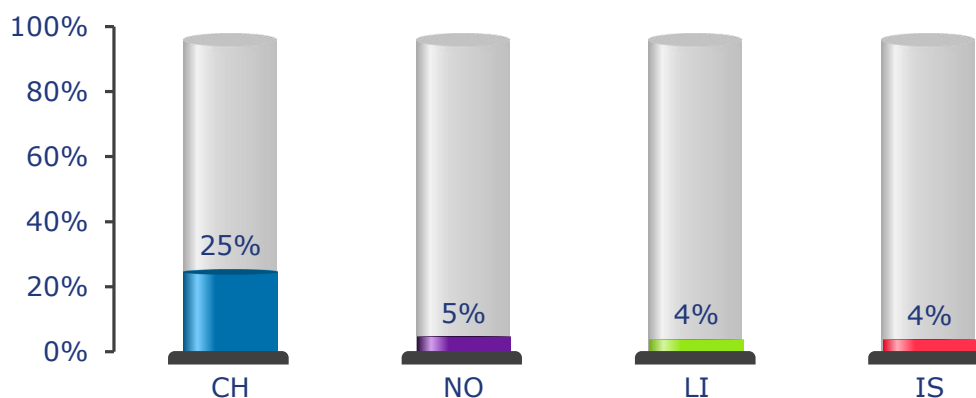
With an overall maturity of 64% the Swiss Open Data portal ranks first and exceeds the average of 64% that the EU28 reached in 2018. The Norwegian Open Data portal follows closely, with a score of 55%. Iceland could only achieve at a 25% level of portal maturity and is ranking third.

Open Data Quality

On this dimension, only the results from Iceland, Norway and Switzerland were captured. Liechtenstein could not provide information in this section, as the country does not have an Open Data portal yet.

Automation

Whereas in Iceland less than 30% of data is uploaded automatically, Switzerland has an automatic upload rate of 71 to 90%. Norway was not able to provide any information here. Moreover, only the national Swiss portal has a predefined approach to ensure data is harvested automatically. In Switzerland, the majority of metadata is harvested from catalogues where legal/organisational requirements are in place to ensure that the data and metadata are up to date. This approach is however not in place for all dataset. For this reason, the Swiss national Open Data team is currently coordinating efforts to introduce a general agreement which should introduce a formal obligation to all organisations in this regard.

In terms of the automatic updating of the (meta)data on the national portal, Iceland and Norway stated that this occurs in over 90% of cases. In Switzerland this percentage is lower and ranges between 10 and 30%.

Data and metadata currency

In 2018, only Switzerland that a predefined approach is in place to ensure the currency of metadata and data featured on the national portal. In Switzerland 71 to 90% of the metadata is updated on a weekly basis. In Norway the frequency of updates occurs less often – less than once of month.

Additionally, both the Norwegian and Swiss portals provide a good balance in terms of current and historical data and hence ensure a good variety of data available for further reuse. Iceland was not able to provide any information in this regard.

In terms of the quality of data, Norway and Switzerland recorded a machine-readability of over 90% of the featured datasets. In Iceland, the level of machine readability ranges between 71 and 90%.

DCAT-AP compliance

In terms of compliance with the DCAT-AP standard, both Norway and Switzerland showcase good levels on all three fields. In terms of mandatory classes, Norway registers over 90% compliance, whereas Switzerland a level of compliance between 51 and 70%. In terms of recommended classes, the level of compliance exceeds 90% in both cases. For the optional classes, both countries showcase modest results, with under 10% in Switzerland and between 10 and 30% compliance rate in Norway. In terms of main violations, Switzerland made note of missing description in statistical metadata. In Norway no information on the main violations was available.

The national portals of Norway and Switzerland also provide online material on how to correctly add the metadata information for data publishers. The two portals also ensure that metadata is also available in plain text, addressing the less advanced users.

Concerning the evolution of metadata on the portal, the portal owners in Switzerland and Norway have a monitoring mechanism in place. None of the portals provides visualisations for such insights on their website.

In Norway and Switzerland over 90% of datasets linked to the portal can be downloaded via the national Open Data platform.

The two countries have stated to conduct activities to boost the quality of metadata in their country. Both Switzerland and Norway developed national extensions of the DCAT-AP standard, to better fit their national context. Whereas in Switzerland this development was mainly due to legal reasons, in Norway the main reason for this to facilitate government to government sharing of data.

Overall performance – Quality dimension

When looking at the overall scores for the dimension "Data Quality", the following ranking can be observed in the EFTA countries (see Figure 56 below). Switzerland ranks first with an overall maturity of 70%, followed by Norway with 58%. Both country results are close to the EU28 average, with Switzerland exceeding and Norway slightly under the 61% average registered in 2018 in the EU Member States.

Figure 56: Quality dimension – EFTA ranking, 2018
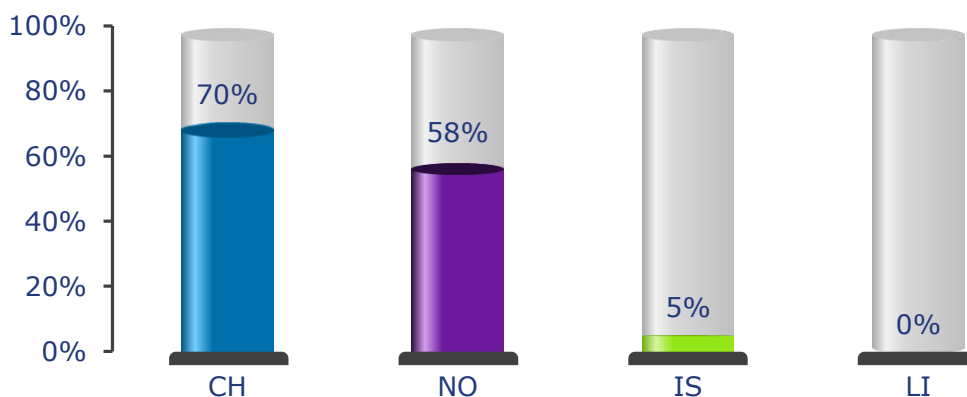
Overall performance – EFTA countries

In terms of the overall maturity level, the 2018 results show a mixed picture in the EFTA countries. Whereas Switzerland and Norway have a good level of overall Open Data maturity that reaches 56% and respectively 47%, Iceland shows more modest results of only 17%. It is however worth highlighting that Iceland is currently undertaking efforts to push for more progress on the Open Data topic. Hence an improvement in scores is expected for the year 2019.

Similar holds true in the case of Switzerland and Norway with both countries showing a strong motivation to intensify their Open Data activities. Here as well improvements in scores are expected in 2019. In Liechtenstein, given the low level of engagement on the Open Data topic, the overall maturity level could only reach 1%. It remains unclear to what extent the situation in Liechtenstein will change in 2019.

Figure 57: Open Data Maturity – EFTA ranking, 2018
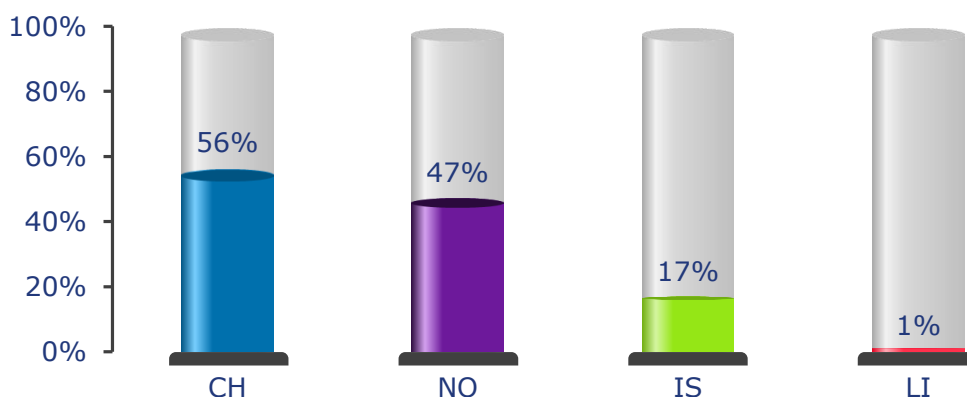
Overall the same observation as in the case of the EU28 can be made for the EFTA countries. While dimensions such as Policy and Portal show good results in 2018, the newly introduced dimensions of Quality and Impact lag behind.

In terms of the dimensions Policy and Portal, some efforts still need to be made to achieve a very good level of maturity. A solid foundation needs to be secured in terms of a policy framework that enables the development of Open Data in the coming years. At the same time, a modern national Open Data portal should be in place that caters to the needs of its users and ensures visibility and discoverability of published Open Data in the country. Ensuring this solid foundation ties into the other two other dimensions that need to developed more strongly - quality and impact. With a high-quality of data and metadata ensured, a push in the Open Data reuse in the country can be expected. The reuse of Open Data will help demonstrate the positive impact that Open Data can have on economy and society. This will trigger further publication of Open Data and will contribute to the development of a mature ecosystem in the country.

It remains to be seen in 2019 to what extent the EFTA countries set new focuses on strategic aspects such as quality and impact, while at the same time continuing to develop in terms of the policy and portal dimensions.

Chapter 6
Clustering

The 2018 clustering exercise follows the previous year's grouping of countries and distinguishes between following levels of maturity: Open Data beginners, followers, fast-trackers and trend-setters.

The cluster profiles for the 2018 study can be described as shown in the table below. The table also highlights the changes in cluster sizes between 2015 and 2018.

Cluster	Profile	2018	2017	2016	2015
Beginners	Country shows early stage of maturity on the four dimensions, with more prominent progress on the Open Data policy dimension. There is no Open Data portal or, if existent, the portal showcases very limited features and only 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 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.	3	3	3	7
Followers	Country has already 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 and also a limited number of features that cater to the needs of more advanced users. There are some activities conducted to boost the publication of high-quality data from different providers, however there is no systematic approach to ensure higher quality of publication across the board. Only very limited activities to monitor reuse and measure the impact derived via Open Data are performed. A fair number of limitations in terms of data publication and reuse still exist.	7	8	12	14

Cluster	Profile	2018	2017	2016	2015
Fast-trackers	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 existing standards is achieved. The national portal provides a good level of functionalities to cover the needs of advanced and basic users. Limited efforts are made to monitor the impact of Open Data. However a stronger focus is given to tracking and boosting reuse. Some issues can still be observed, with measures in place to tackle them.	16	8	8	./.
Trend-setters	Country has an advanced Open Data policy in place with a strong coordination of Open Data activities throughout the country. 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 are in place to ensure publication of high-quality data and the compliance with the DCAT-AP standards. There are different Open Data ecosystems developed around data domains, with a high level of interaction and reuse within these domains. Activities to measure reuse are conducted, with methodologies already in place to assess the impact in different domains. Little to no limitations to publication or reuse are observable.	5	15	8	10

In 2018, the visual analysis of the overall scores presents the following clustering of the Member States as presented in Figure 58 below. The overall scores are calculated as the weighted averages of the scores recorded for each country against the four assessment dimensions[162].

This year only 5 countries could qualify as 'trend-setters': Ireland, Spain, France, Cyprus and Italy, thanks to their high level of maturity on each of the four dimensions. Aside from the overall very high level of maturity on the policy dimension, the top 5 performers distinguished themselves in 2018 with their various projects to boost the reuse of Open Data at national level and to foster impact, and their continuous work to update the national portals, as well as improve the volume, quality and variety of data published in their country.

Figure 58: Open Data Maturity clustering – EU28+, 2018
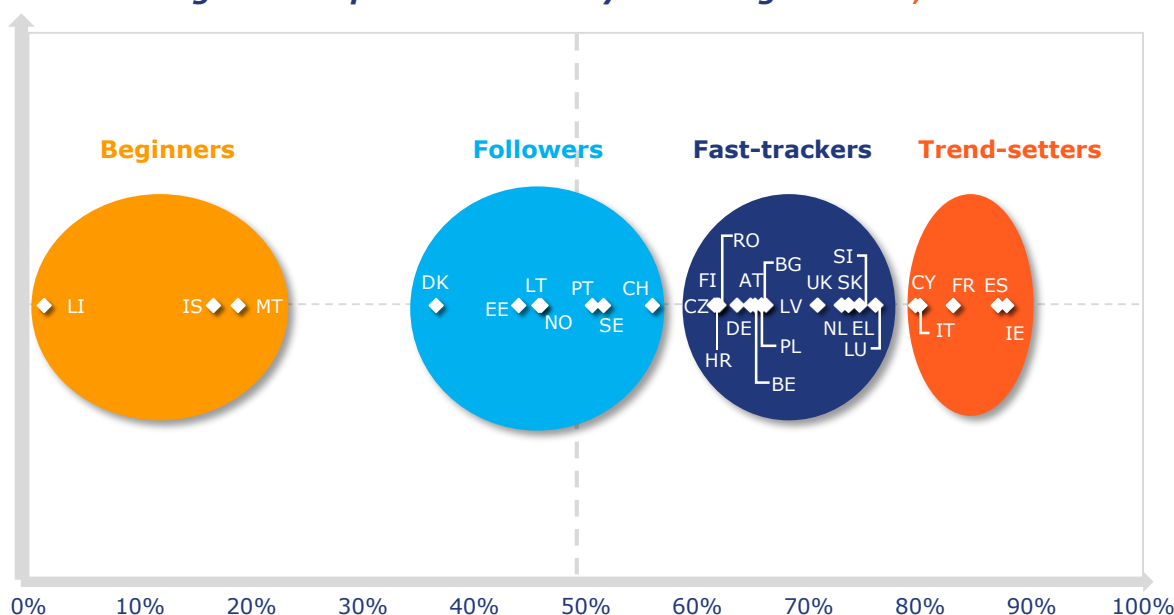
In 2018, as Figure 58 also shows, the densest cluster is the 'fast-trackers' with 16 countries that have scored around the 70%-mark. These countries are (highest to lowest score): Luxembourg, Slovenia, Greece, Slovakia, the Netherlands, the UK, Latvia, Bulgaria, Poland, Belgium, Austria, Germany, Romania, Croatia, Finland and the Czech Republic.

With scores around 50%, Switzerland, Sweden, Portugal, Norway, Lithuania, Estonia and Denmark can be described in 2018 as 'followers'. In 2018, Malta, Iceland and Liechtenstein qualify as 'beginners'. With scores under 20%, the three countries may be uncertain of their Open Data strategy and implementation, or are simply focusing on other priorities. Here, it is worth making some additional remarks. Malta has a different approach to enable digital transformation in the country, of which Open Data is a constituting element but with a lower priority in respect to public service provision and implementation of the "Once-Only" principle. Iceland is currently working on developing a national Open Data strategy to be published in 2019. This will certainly enable the country to score higher in the 2019 assessment.

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162. The weights attributed to each dimension are presented in detail in the Method Paper available on the European Data portal, in the designated section on Open Data maturity.

Liechtenstein can only be described as 'shy' in Open Data efforts, with no overall Open Data strategy in place at the moment. Hungary was invited but did not participate in this year's assessment.

When comparing the overall clustering results to previous measurements, a decrease can be noticed in terms of the number of trend-setters, with a drop from 15 to 5 countries in 2018. Many countries that were catalogued as 'trend-setters' in last year's research – Austria, Bulgaria, Croatia, Luxembourg, the Netherlands, Romania, Slovakia, Slovenia, and the UK – could only qualify as 'fast-trackers' in 2018. This was to be expected given the update that the assessment underwent in 2018, with an overall more challenging questionnaire and new aspects that were evaluated this year. The introduction of a stand-alone dimension that tracks the extent to which a systematic approach to monitor and measure impact appears to have posed some difficulties to some two thirds of the 2017 trend-setters. At the same time, the updated methodology and the 2018 assessment strengthened the position of those countries that – despite the more challenging evaluation – were able to score very high in 2018.

Changes can also be seen within the 'fast-tracker' cluster with a doubling of the numbers compared to 2017, to now 16 countries. This can mainly be attributed to the decrease in overall scores of two thirds of the 2017 trendsetters. The number of followers remains constant at 3, with Malta, Iceland and Liechtenstein stagnating in the 'beginners' cluster.

With regards to this year's top 5 performers Open Data countries, Ireland maintains its top position in Europe, with an overall maturity of 88% (-8pp, vs 96% in 2017), followed by Spain with 87% (-7pp vs 94% in 2017), France with 83% (-8pp, vs. 91% in 2017), Italy with a maturity score of 80% (-1pp, vs 81% in 2017) and Cyprus with 80% (+7pp, 73% in 2017). The surprise comes in 2018 from the latter country. Cyprus successfully frog-leaped its transformation and managed to qualify under the top 5 best performing European countries. The major redesign and update of the national portal is one of the reasons that helped the country to significantly improve its score on the portal dimension. This was complimented by various training and support activities from behalf of the national Open Data team, to help boost data publication and increase the quality of both data and metadata.

As illustrated above, in 2018 European countries have continued their efforts to improve their policy frameworks, update their portals to better fit the needs of the users, increase activities to boost reuse and develop a strategic awareness with regards to monitoring and measuring impact. While in some countries the efforts have been more modest – given lack of resources, different priorities on the national agenda, in other European Member states the Open Data activities have been set high or remained high on the priority lists of decision makers. This prioritisation has brought visible results, as the ranking in the 2018 landscaping exercise also reflects.

Cluster *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. Present research of market value of (Open) Data for your country (e.g. European Data Market Value Monitoring) to emphasise economic benefits of opening data.

2 Develop a **national strategy for Open Data** and align it with broader strategies at national level (e.g. national digital strategy, national strategy for modernisation of public sector).

3 Set up a team at national level in charge of Open Data to **ensure coordination of activities within the country** and set up a 'road-show' to promote the team's scope and activities with the main public administrations in the country. Include both national, and -if applicable – regional and local -- administrations in this process.

4 Organise a series of Open Data events at national level and **focus on engaging both data publishers and reusers** in your country. Prioritise the promotion of data publication best practices and reuse cases during such events.

5 Set up relevant **contact persons for data publication within public administrations** (if applicable PSI liaison officers) and foster the exchange between these contact points. Maintain an active dialogue with the PSI liaison officers and enable the regular exchange of knowledge amongst them, through offline and online channels (meetings, online forums etc.)

6 Identify the main data holders in the country and **understand the main concerns and barriers to data publication.** Enable first steps to overrun these barriers and trigger publication of data.

7 Organise **workshops and awareness raising sessions** with the main data holders. Reuse materials already developed in other countries and at European level as source of inspiration to cover the basics of Open Data publication.

8 Develop **guidelines to enable publication of data, its metadata and take-up of suitable licensing conditions.** If needed, reflect on the need to develop a national licence for Open Government Data publication in your country. 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 importance of metadata and promote the DCAT-AP standard, specifications and existing guidelines developed at European level.

9 Make sure you **run a modern Open Data portal that enables publication and discoverability of Open Data.** Scout for European best practices and compare existing infrastructures to choose the most adequate one to support your portal's scope and mission. Set up a dedicated news and blog section to promote relevant developments as well as to showcase Open Data reuse examples. Ensure feedback channels are seamlessly integrated in the national portal.

10 Ensure that the national Open Data strategy guarantees scoping, management and funding of the national Open Data portal. Ensure that sufficient resources are allocated to Open Data awareness raising activities with both publishers and potential reusers.

Cluster *Followers*

Strengthen governance, boost engagement

1 **Update the national strategy for Open Data** to reflect technical and policy developments at EU level. Identify high-priority domains for data publication and prioritise publication by embedding the priority domains into the new policy text.

2 **Set up a governance structure that accounts for the characteristics of your country.** Engage potential reuse groups (e.g. data companies, research institutions, NGOs) 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 activities** (events, conferences) at national level to promote Open Data. **Focus on formats that promote publication as well as reuse by both public and private sector**. **Experiment with formats** that address both creativity (e.g. hackathons) and that enable the development of business opportunities for medium to long-term engagement (e.g. data challenges). Ensure funding and political sponsorship for winning ideas. Promote and follow up on the performance of developed products and/or services.

4 Identify **communities of reusers and conduct awareness raising activities** around Open Data within these groups (e.g. universities, data start-ups and data companies, research institutes, NGOs, journalists).

5 Encourage **the network of PSI liaison officers to set up data publication plans and monitor progress** against these plans. Enable the PSI officers to monitor charging practices within their organisation and **exchange within the network on practices to alleviate such barriers**. Deepen understanding within the network of PSI officers on the benefits of Open Data reuse by the public sector.

6 Ensure that pre-existing Open Data courses and training materials are used and cooperate with public administrations and training organisations to **develop Open Data training curricula for national, regional and local administrations.** Enable such courses to be **formally recognised as 'continuing education' and provide certification upon completion.** Ensure financial resources are allocated at all administrative levels to training activities for civil servants working with data.

7 Enable **meet-ups and engagement between reusers and publishers.** Develop a deeper understanding of Open Data demand side and work together with data publishers to prioritise data publication in line with this demand. **Focus on fostering Open Data reuse by both public and private sector** and encourage the community to send in their reuse cases. Promote these Open Data use cases more prominently on the national portal, ideally in a section on the portal's homepage.

Cluster *Followers*

Strengthen governance, boost engagement

8

Conduct **regular updates to the national 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. **Consider integrating data visualisation and analytics tools** to allow portal visitors to gain insights from data via interactive charts or 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 the variety of data.** Identifying data holders that do not publish their data or do not reach to their full potential. 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 of metadata with DCAT-AP. Create understanding around the importance of publishing data in machine readable, non-proprietary formats as well as regarding the licensing of data to foster reuse. Enhance knowledge around existing open source tools to clean up data and validators for metadata compliance.

Graduate from traction to impact

1 Assist the **development of Open Data initiatives at local and regional level** and coordinate more intensively with the local and regional Open Data teams.

2 Activate the **network of PSI officers and enable them to set up monitoring activities** within their organisation (e.g. develop plans for data publication; monitor charging practices within their organisation). **Track progress** against these plans and assist PSI officers to alleviate barriers to data publication identified in their organisation.

3 Ensure that **existing Open Data courses and training materials are promoted and extensively used.** Cooperate with training organisations to develop new course offerings tailored to the needs of your national, regional and local administrations. **Enable such courses to be formally recognised as 'continuing education' and provide certification for civil servants upon successful completion.** Ensure more financial resources are allocated at all administrative levels to enable more civil servants to benefit from such training activities.

4 Focus on organising activities that better target the delivery of sustainable solutions. **Move away from creativity-stimulating formats** (e.g. hackathons) **to formats that enable business opportunities for medium to long-term engagement** (e.g. data challenges). Ensure funding and political sponsorship (e.g. organisation as 'patron') for winning ideas. Promote and follow-up on the performance of developed products and/or services.

5 **Develop strategic awareness of reuse and impact of Open Data.** If necessary, focus your resources on a specified field or sector, to start demonstrating impact. **Start with data domains defined as high-priority around which a data ecosystem already gained momentum. Pilot thematic workshops in these areas.** Create a framework for knowledge exchange and enable the development of a community of practice between publishers and reusers. Increase your knowledge on the publication and reuse of data in that domain and start thinking of a definition of impact in that field that can be operationalised into metrics.

6 **Update the national Open Data portal** to include features that enable online interaction between data publishers and reusers. **Showcase reuse examples prominently on the national portal** and promote the datasets used to develop those use cases. If desired, do not avoid promoting 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. **Enable such insights to flow into improving the portals features,** the access to data and improve the variety of data published in your country.

Cluster *Fast-trackers*

Graduate from traction to impact

8

Identify **the main real-time data holders in your country and advertise for publication of their data.** Deepen the understanding amongst real-time data holders of the high value of their data for enabling societal development (e.g. within the broader vision of smart cities and with most of high-value sectors becoming real-time). **Understand the concerns and costs of publication and work together with publishers to enable the data publication process.** Start with a small range of datasets.

9

Think of ways to **ensure the portal's sustainability by enabling more contributions** from the Open Data community (e.g. contributions in terms of own 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 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 send out reports on published datasets to data providers.** Act on the findings of these reports and provide tailored assistance to publishers to increase the quality of their data publication, both in terms of metadata and data.

Cluster *Trend-setters*

Maintain the ecosystem, experiment and share the knowledge

1 **Enhance and consolidate the Open Data ecosystem** you developed already and create 'sectoral depth'. **Enable the development of 'thematic data ecosystems' around high-value data or high-priority domains** (e.g. transport, housing, public procurement etc). Pilot activities to develop a thematic ecosystem of publishers and reusers. Transfer the practices to help create a new ecosystem around another field of interest. Foster the creation of online exchange channels and tools to further develop knowledge, such as wikis on topics of interest for the Open Data community.

2 **Steer the network of Open Data stewards towards activities to enable data-driven policy-making** in their organisation and commission research to showcase the value of reusing Open Data by the public sector itself, e.g. in terms of efficiency gains. **Decentralise monitoring activities to the network of Open Data stewards within your country.** Monitoring should address elements that are relevant to enabling more high-quality data publication as well as to boosting reuse and impact. Such monitoring includes monitoring on charging practices for Open Data publication within the steward's organisation, degree of reuse of Open Data within the organisation, as well as monitoring of progress against the defined data publication plans. **Encourage the publication of structured data by mature, data-aware organisations.** Increase awareness around the use of URIs and RDF for metadata publication and enable data publication using URIs and RDF.

3 **Define a strategy to ensure the portal's sustainability. 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 **Engage universities and research institutions to develop country-specific metrics to measure impact.** Be aware of the characteristics of each industry and sector in your assessment. Focus on data domains in which both data publication and reuse have reached a high level of maturity. **Define and understand clearly the 'impact' to be measured** in that area. 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 to ensure a variety of insights. Improve the metrics iteratively over time. **Do not be afraid to try and fail.**

5 **Commission research to assess the economic impact of Open Data, at both micro and macro levels.** 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.

Maintain the ecosystem, experiment and share the knowledge

6

Harness the wisdom of the crowd by enabling the broader Open Data community to contribute more to the national Open Data programmes. **Enable reusers to upload their own data and showcase their ideas and creations on the national portal.** Enable users to comment on and rate datasets and embed their feedback and ratings in the search algorithms. Enable publishers to improve their data publication, based on users' feedback and ratings.

7

Continue the work on improving quality of both metadata and data by boosting the **use of tools on your portal** (e.g. setting up a validation schema for metadata). Enable **automated notifications to publishers** to help improve quality of metadata and provide tools to enable conversion into alternative formats for data publication to replace non-machine-readable, proprietary formats and foster easier reuse.

8

Link to a variety of sources of real-time data and evaluate means of incentivising custodians of real-time data to enable publishing, given the higher costs that publication of such data implies (bandwidth, processing power, etc).

9

Work with **training institutions on providing advanced Open Data courses and training and tailor training curriculum to involved more advanced elements** (e.g. Linked Data and the use of URIs and RDFs). Enable such courses to be formally recognised as 'continuing education' and provide certification to civil servants upon successful completion of these trainings.

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 elements such as open source software that your platforms share (e.g. portal extensions).

Conclusions

The 2018 Open Data maturity report presented a detailed overview of the state of play of Open Data across the EU28 and EFTA countries. It assessed the maturity at country level against four dimensions: policy, portal, impact and quality. Similar to previous years, the 2018 study clustered the countries into four groups: beginners, followers, fast-trackers and trend-setters.

With its content, the Open Data landscaping report achieved both its benchmarking and benchlearning purpose.

In terms of its *benchmarking* purpose – enabling monitoring of progress, the 2018 report sets the baseline against which progress across Europe will be measured in the years to come. This progress gains in relevance when weighed against the broader goals set by the European Commission in the data field. The report's results and the year-on-year monitoring provide an assessment tool for the European Commission on whether or not Europe is ready to enable broader visions set at EU level, such as the creation of a European data economy.

By looking at Open Data maturity from four perspectives – policy, portal, impact and quality - the 2018 report enables a more granular understanding of the actual maturity achieved by each country and gives more context to this maturity score, when weighted against the effort and performance of other Member States. The report helps highlight the strengths and narrow down the areas that countries should focus their efforts on, to achieve further progress.

In terms of the research's *benchlearning* objective – enabling learning from each other, the report provided a series of good practices sourced from the observation of the European countries' Open Data initiatives that hope to serve as inspiration for others. By showcasing such success stories, the report aims to increase the visibility and awareness of existing and proven solutions to problems that other European countries might be facing. It aims to help avoid duplication of efforts and promote countries into engaging into a more intense knowledge and best practice exchange.

The results of 2018 underline Europe's top performers in terms of their overall maturity, as well as the best performers on each of the four dimensions. It highlights not only the different speeds at which Europe moves, but also the different foci that countries have chosen to drive their Open Data transformation. This focus strongly depends on the current level of maturity of a country: while in less Open Data mature countries the focus is narrowed down to strengthening the policy framework and performing regular updates to the national portal, in the more Open Data advanced countries, this focus shifted now to areas such as delivering high-quality data and metadata and measuring Open Data impact.

While keeping the different maturity levels and country focus areas in mind, the 2018 results highlight an overall urgency to ensure publication of high-quality data to help boost reuse, as well as a compelling need to increase the strategic awareness on the impact generated by Open Data. With data quality representing a pivotal element to enable reuse and impact, more effort is needed in this regard at national level. The relatively modest scores on the impact dimension highlight the progress that still needs to be done. At the same time, the results emphasise the complexity of the goal, particularly in terms of defining the "what" and the "how" of measuring impact. This will be Europe's main challenge in the years to come.

The report underlines the necessity for a better transfer of knowledge and expertise from Europe's more advanced countries to the less Open Data-savvy ones. With the visible willingness amongst Europe's followers and beginners to speed up their Open Data transformation, it is impetuous to provide adequate frameworks for knowledge transfer and collaboration amongst European countries. At the same time, European trend-setters and the most advanced 'fast-trackers' should continue to show their willingness in sharing their expertise.

The report also presents a set of tailored recommendations, aligned with the level of maturity and characteristics of each maturity cluster. By doing so, the 2018 study provides national Open Data policy-makers and portal owners with an actionable check-list for the coming year and beyond. In moving forward, it is up to the European countries to capitalise on the 2018 insights and recommendations.

Annex I Country factsheets

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2. [Belgium](#)
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5. [Cyprus](#)
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Annex II DCAT-AP Data Categories

For the purpose if this report and in an effort to help increase the uptake of the DCAT-AP standard across Europe, the DCAT-AP data categories were used:

Data Category (alphabetical order)	Example datasets
Agriculture, fisheries, forestry, food	Farming, agricultural land means of agricultural production, agricultural activity, forestry and fisheries policy, fishing resources, fishing grounds, plant production, processed animal and agricultural produce, food technology, food products
Education, culture and sport	Educational institutions, performance of schools, digital skills, cultural institutions, sport institutions
Environment	Meteorological/weather, natural environment, deterioration of the environment, waste management, water management, pollution
Energy	Energy policy, coal and mining industry, oil industry, electric industry, energy consumption
Transport	Transport policy, organisation of transport (means, modes, destination of transport), marine and inland waterway, air and space transport, public transport timetables
Science and technology	Research and intellectual property, genome data, educational activity, experiments and research results
Economy and finance	Economic policy, economic growth, economic structures, monetary relations, financial institutions and credit, financing and investment, budget, taxation, trade and tariff policy, consumption, international trade
Population and social conditions	Demography, composition of population, census data, employment, social policy, housing, health insurance and unemployment benefits, family, social security
Government, public sector	Political structures and frameworks, electoral procedures and voting, election results, legislation and statutes, salaries (pay scales), hospitality/gifts
Health	Health care professions, illness, nutrition data, pharmaceutical data, medical science
Regions, cities	Regions and communities in Europe and the globe, economic geographies, political geographies, overseas territories
Justice, legal system, public safety	Sources and branches of law, organisation of legal systems, legal professions
International issues	International organisations, foreign policy, international agreements, conflict, peace and security, armed forces, military equipment

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