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BEST PRACTICES TO MEASURE THE IMPACT OF OPEN DATA IN EUROPE

GOBIERNO DE ESPAÑA
VICEPRESIDENCIA PRIMERA DEL GOBIERNO
MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL
SECRETARÍA DE ESTADO DE DIGITALIZACIÓN E INTELIGENCIA ARTIFICIAL
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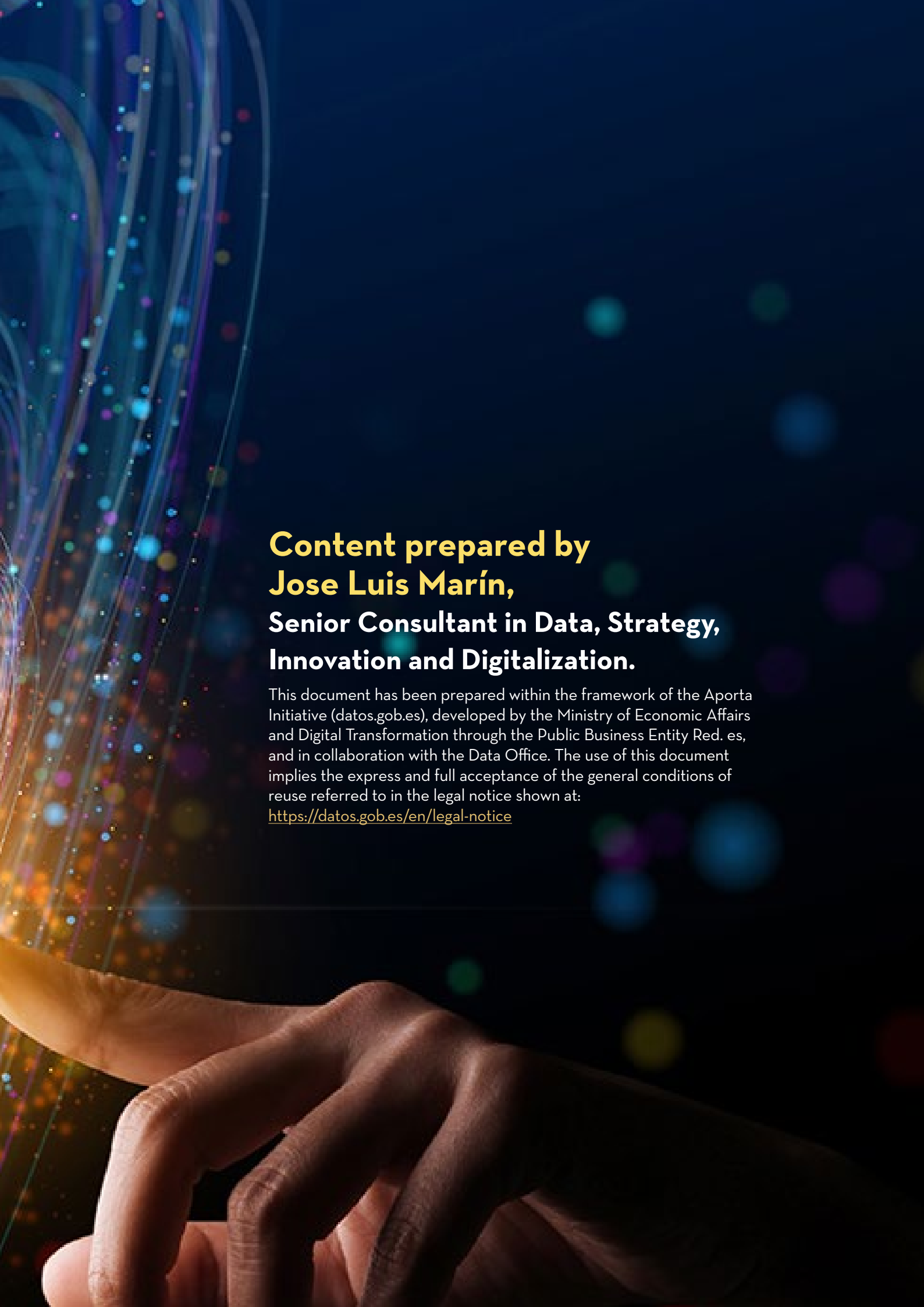
Contenido



Content prepared by Jose Luis Marín,

Senior Consultant in Data, Strategy, Innovation and Digitalization.

INTRODUCTION

The Open Data Maturity Report 2022 provides an insight into the **level of development of policies promoting open data in European countries**, as well as an assessment of their expected impact. The report is based on a self-assessment survey completed by 35 European countries (EU, EFTA, candidate countries and Bosnia-Herzegovina). This annual report, produced by data.europa.eu (a result of the consolidation of the European Data Portal and the EU Open Data Portal), and available with annual updates since 2015, helps countries understand **their level of open data maturity**, measure the progress made, find areas for improvement and compare their maturity with that of other countries.

The report **assesses the progress** made by countries in publishing and reusing open data in **four dimensions**:

1. **Policy**: this dimension focuses on the open data policies and strategies in European countries.
2. **Impact**: this dimension analyzes the willingness, readiness and capacity of European countries to measure both reuse and impact created by open data.
3. **Portal**: this dimension focuses on the characteristics, use and sustainability of countries' national open data portals.
4. **Quality**: this dimension assesses the quality of open data (and metadata) published by countries.

In the 2022 edition, a review of the report methodology was carried out, resulting in a refinement of the four dimensions and a complete restructuring of the indicators in the impact section. The main objective of the review was to better measure the level of preparation of countries for the new regulation of the European Commission on high value data sets and for the Open Data Directive in general.

The **average open data maturity score** for EU27 countries in 2022 was 79%, which represents a **decrease of 2 percentage points** compared to the 2021 result. The report identifies four groups of countries based on your score: beginners, followers, high potential (fast-trackers) and trend leaders (trend-setters). The leading trend countries, with scores between 91% and 97%, are France, Ukraine, Poland, Ireland, Cyprus, Estonia, Spain and Italy, closely followed by high potential countries with scores between 87% and 90%: Denmark, Norway, the Czech Republic, Slovenia and Lithuania.

Among the findings that this report allowed us to identify, we can highlight three main trends:

- There is a good level of readiness of the EU Member States to meet the obligations related to high-value data sets.
- **Measuring the impact of open data is a priority, but also a great challenge throughout Europe.**
- New difficulties have appeared, joining those that already existed and which have not disappeared after the pandemic.

In order to **better understand how to progress in the challenge of measuring the impact of open data**, in this report we will analyze the **best practices that exist in Europe on this matter**.

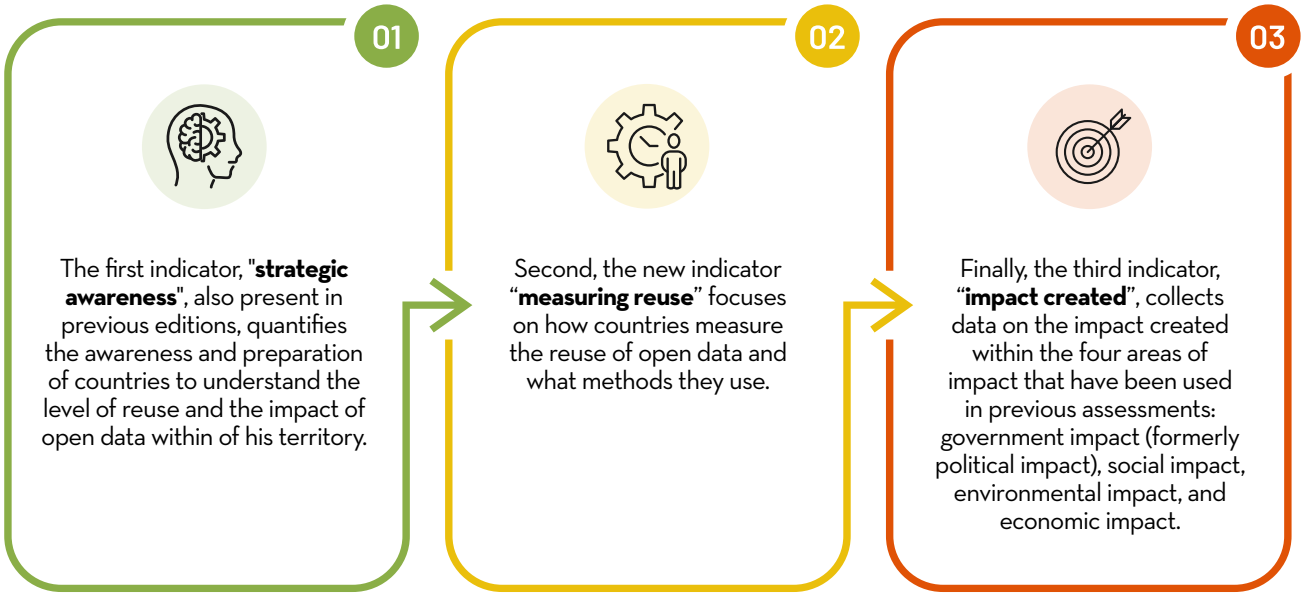
To achieve this objective, we will work with the data provided by the countries in the responses to the study questionnaire and, in particular, with those of the 11 countries that have scored more than 500 points in the Impact dimension, regardless of their score. overall and its position in the ranking.

Based on the comparative analysis of these countries, we will extract a series of recommendations and good practices with the aim of **providing ideas on how to improve the impact of open data, which the report measures through the indicators of the impact dimension**.

1. 1. THE "IMPACT OF OPEN DATA" DIMENSION IN 2022

Before analyzing the specific examples and countries, it is important to have a good understanding of the structure and objectives of the impact dimension, its importance and how it is measured within the framework of the Open Data Maturity Report, whose section 2.4 includes the evaluation of the general performance based on the indicators of the impact dimension.

The methodological restructuring has improved the ability to analyze the willingness and readiness of European countries **to measure both reuse and the impact created through this reuse**. For it:



The following table summarizes the key elements of the indicators described above:

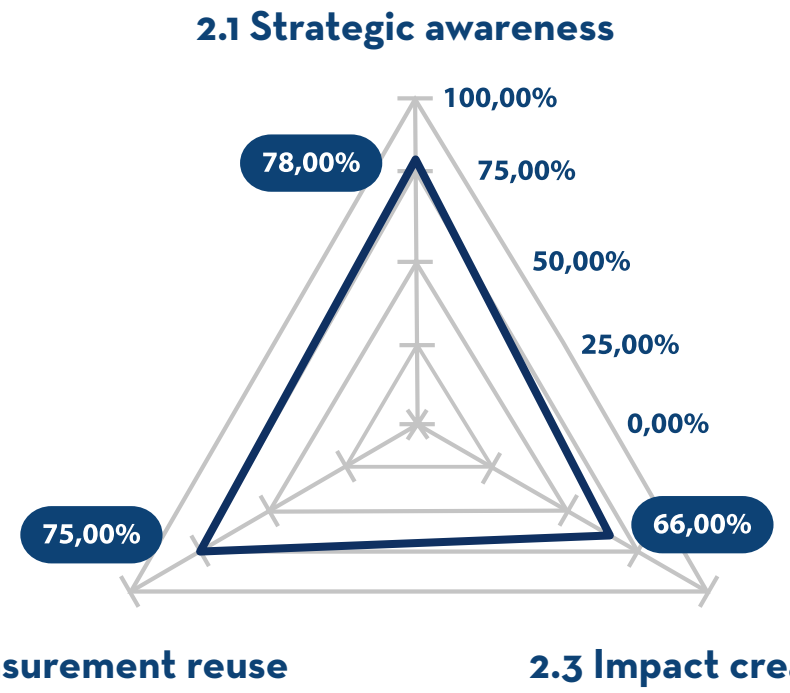
INDICATOR	DESCRIPTION
Strategic awareness	• Measures whether there are mechanisms in place at the national, regional or local level to monitor and encourage the reuse of open data, including high-value datasets. • Check if there is a methodology to measure the impact derived from the reuse of open data or if the first steps in this direction have been taken.
Measuring reuse	• Measures whether there are tools available to understand which datasets are reused and how. • Check whether activities have been implemented to better understand the needs of reusers.
Impact created (governmental, social, environmental and economic)	• Measures whether data are available on the impact created by open data on specific challenges in the various impact areas. • Check if there are several examples of reuse that show the impact of open data in each area.

RESULTS

In 2022, the average maturity level in the impact dimension for EU27 countries was 71%, while in 2021 the average among these same countries was 78%. However, due to the restructuring in the measurement of the impact dimension in the 2022 edition, **it is not possible to strictly compare the results of this year's study with those of previous years**. Even so, the impact dimension continues to be the one with the most room for improvement among the four dimensions of the report.

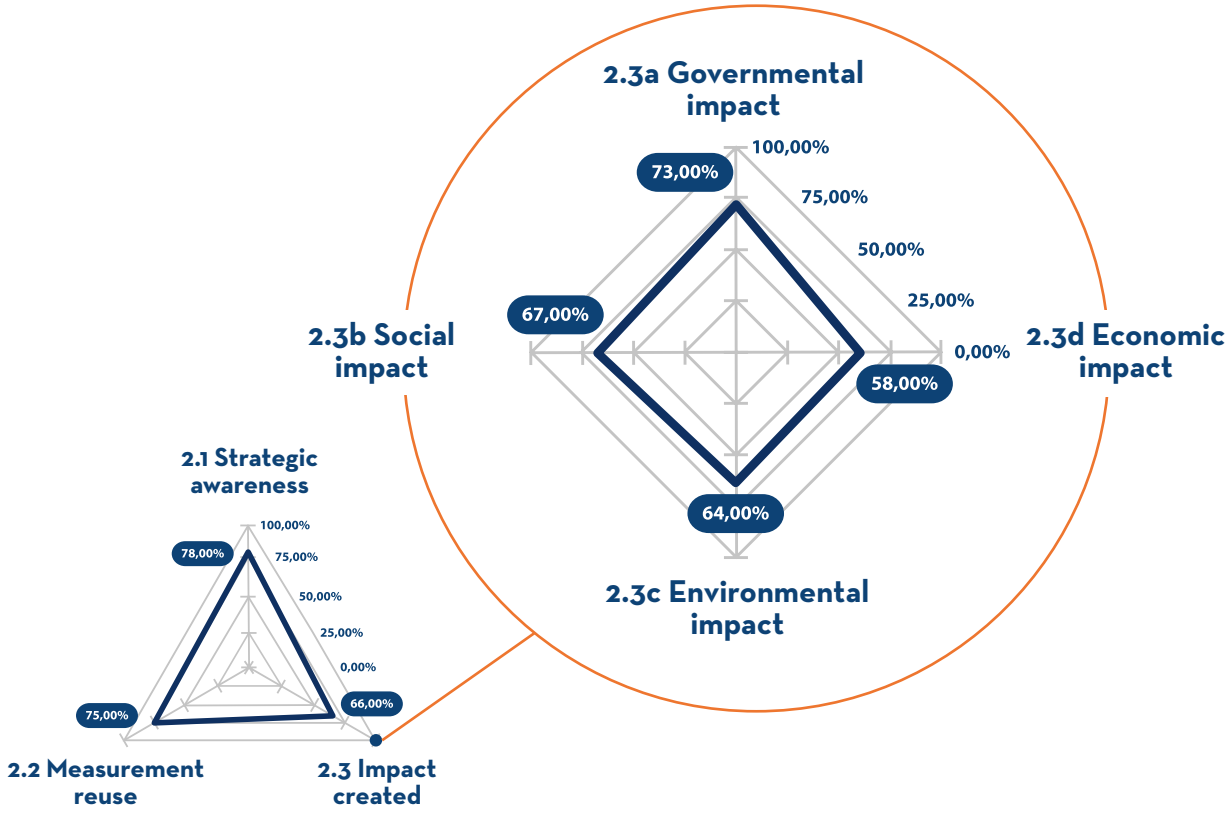
However, this decrease of 7 percentage points does not so much represent a decrease in the level of maturity, but **rather provides a more accurate picture of the difficulty in assessing the impact resulting from the reuse of open data**.

This issue is clear when disaggregating the indicator into its components as EU countries maintain high scores on the **strategic awareness** indicator (78%) and on the indicator related to **measuring reuse** (75%), which was introduced in this edition. However, the **impact created** indicator scores only 66%, which is mainly responsible for the 7-point drop in the dimension.



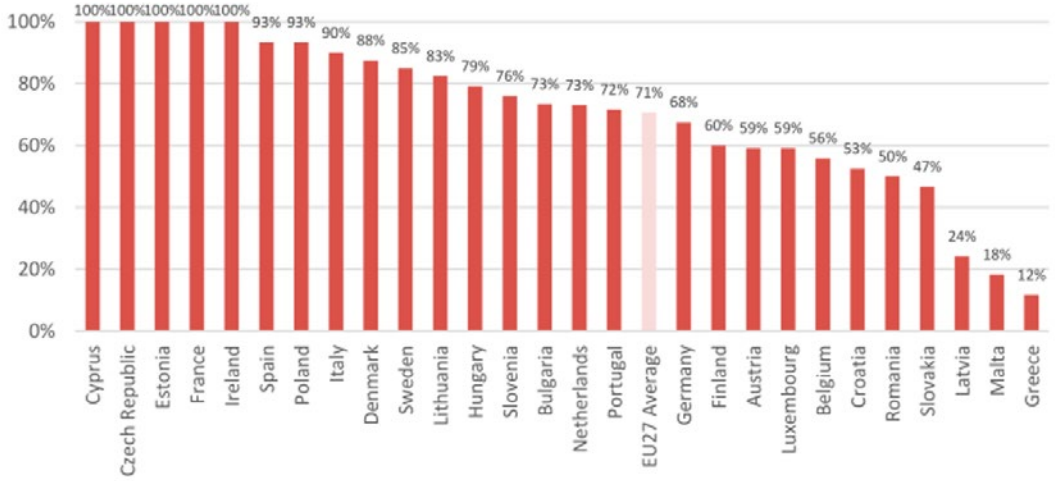
If we disaggregate the impact indicator 2.3 created to study its four components for the EU27 countries we see that **the impact created by open data is substantially lower on average in the area of economic impact** (58%). This area has ample room for improvement despite the fact that open data tends to be used regularly in areas related to innovation and where the presence of technology is high.

The impact created by open data is strongest in terms of government impact (73%) as government transparency and efficiency continue to grow. The area of social impact (67%) scores more modestly along with the area of environmental impact (64%), with room for improvement in both areas.



In this report we will analyze in detail the root causes of the results of the 10 EU27 countries **scoring above 500 points** (83.33%): France, Ireland, Cyprus, Estonia and the Czech Republic, which obtained the highest score; and Poland, Spain, Italy, Denmark and Sweden, which scored above 510 points (85%).

In this way, and through a comparative analysis between countries, we will be able to draw up a series of recommendations that will contribute to understanding which actions are the most appropriate for improving the impact created by open data.



Country ranking for the impact dimension

2. ANALYSIS OF THE COUNTRIES WITH TOP SCORERS

Each subsection will provide a country profile, its score on the impact dimension and a summary of the practices that led to its high score based on the analysis of the responses to the questionnaire.

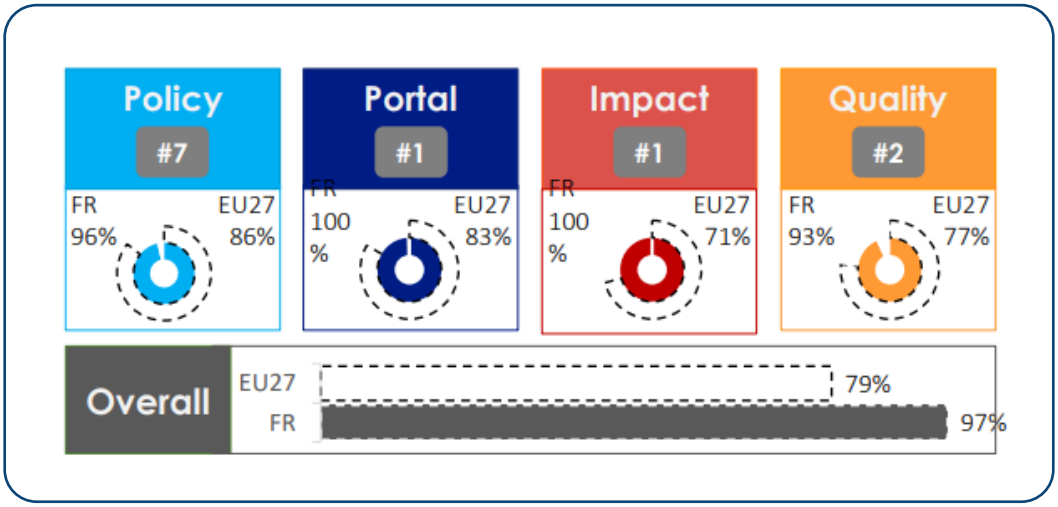
Country	Dimension Impact	Total Score	Group
France	600 (100%)	97%	Leaders (trend-setters)
Ireland	600 (100%)	95%	Leaders (trend-setters)
Cyprus	600 (100%)	94%	Leaders (trend-setters)
Estonia	600 (100%)	93%	Leaders (trend-setters)
Czech Republic	600 (100%)	88%	High potential (fast-tracker)
Poland	560 (93%)	95%	Leaders (trend-setters)
Spain	560 (93%)	92%	Leaders (trend-setters)
Italy	540 (90%)	91%	Leaders (trend-setters)
Denmark	525 (88%)	89%	High potential (fast-tracker)
Sweden	510 (85%)	78%	Follower

Table prepared by the authors based on the Open Data Maturity Report 2022.
Source: https://data.europa.eu/sites/default/files/landscaping_insight_report_n8_2022.pdf

FRANCE

Overall performance and global position

France has maintained a leading role in open data maturity in Europe. In the 2021 edition, France scored 98%, which earned it the first position in the ranking. In the 2022 report, Fran- cia maintained its leadership, in this case tied with Ukraine, with an overall score of 97%, well above the EU27 average. It is therefore in the category of trend-setters, i.e. leaders in the field of open data, leading the way for other countries. In all metrics the results have been very high, with generally very little room for improvement.



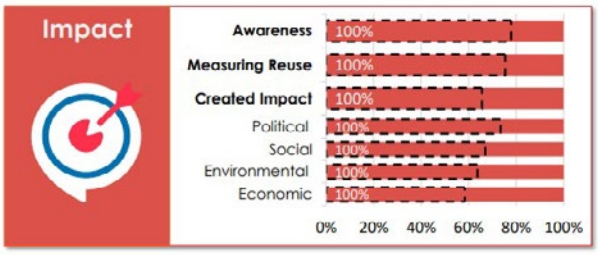
In the "**Policy**" dimension, it scored 617 points (96%), demonstrating very effective implementation of open data policies in all three metrics assessed.

In "**Portal**," it scored 647 points (100%), reflecting an effective and well-used open data portal that provides a wide range of datasets, adequate functionalities and is maintained in a sustainable manner.

In "**Impact**", where it also scored the highest score of 600 (100%), it reflects that open data in France is generating significant effects in all four areas measured.

In "**Quality**", with 605 points (93%), France provides complete, up-to-date and well-monitored open data, has effective monitoring and uses the DCAT standard for metadata. While this result indicates high quality data management, there is room for improvement in data updating and completeness, which could lead France to score even higher in future editions of the report.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

The top score on the **strategic awareness** indicator (170) is supported by issues such as France having a systematic methodology for assessing the impact of open data, which includes four levels of impact: the data itself, the direct uses of the data, the indirect uses of the data, and the externalities it generates. In addition, studies have been conducted to assess the impact of open data such as the one conducted to identify inspiring use cases and collaboration with civil society and academia to create impact with open data. France also plans **to measure the impact and reuse of high-value datasets through targeted research** in the same way as was done with other reference datasets.

In terms of **measuring reuse** (110) France has interviewed producers and reusers of reference datasets to understand how and why producers measure reuse and to estimate the impact of those datasets through concrete use cases.

To obtain the highest score in **impact created** (320) France has contributed numerous projects that use open data to address challenges in the four measured areas:

Governmental Impact (80)

Open data has had a significant impact on decision-making processes in France. The Barometer of Public Action Results, for example, provides a tool for 101 departments and 18 regions that have significantly increased the efficiency of government action at the local level.

Environmental Impact (80)

Interesting examples have also been provided in this area, such as the GeoMCE database, which helps to limit damage to biodiversity by informing project developers and engineering offices of the areas involving compensatory measures.

Social Impact (80)

Qualitative studies have shown that open data plays a key role in many projects carried out by both the public and private sectors. Examples of the impact of open data in education or public health have been provided.

Economic Impact (80)

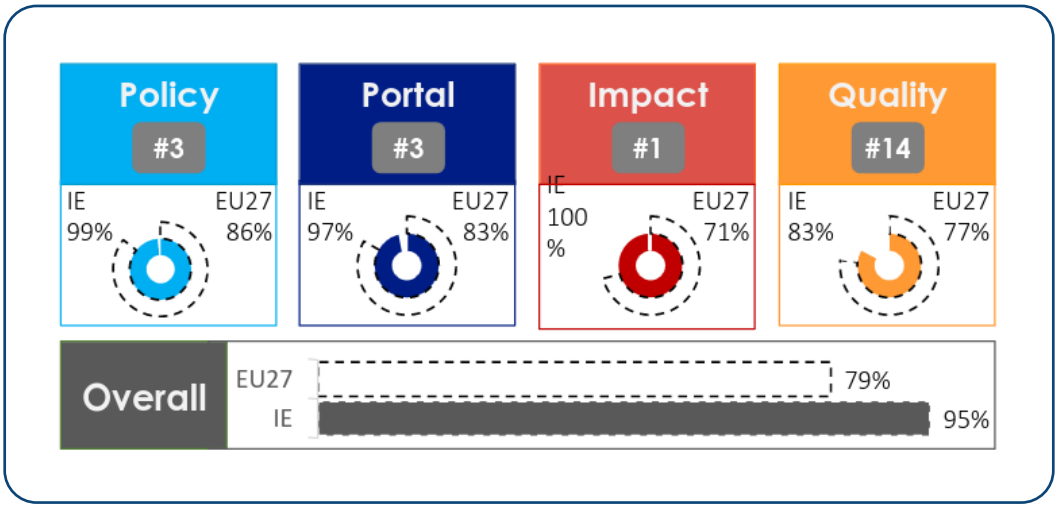
Open data has also had a significant impact on the French economy. For example, they have highlighted the public digital service "Signaux Faibles", which helps civil servants to target state support measures for companies in difficulty[1].

[1] *https://www.data.gouv.fr/fr/pages/onboarding/signaux_faibles/*

IRELAND

Overall score and global position

In the 2022 edition, Ireland has achieved an outstanding result in the Open Data Maturity Report, scoring a total of 95% in the overall score, the same as it did in the 2021 edition. This achievement places Ireland in the trend-setter category alongside the trend-setting countries in Europe.



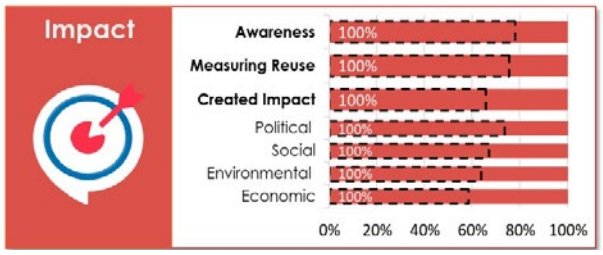
In the "**Policy**" dimension, Ireland scored 632 points, equivalent to 99% of the maximum score. This score demonstrates that Ireland has established effective policies that encourage the adoption and use of open data for all metrics assessed.

Ireland's open data "**Gateway**" achieved a very high score of 630 points, which is 97% of the maximum score. The score indicates intensive use of the portal by users and good maintenance, demonstrating Ireland's commitment to open data accessibility and availability.

In the "**Impact**" dimension, Ireland has also obtained the highest possible score with a total of 600 points (100%).

For the "**Quality**" dimension, Ireland scored the lowest of the four dimensions with a total of 539 points, equivalent to 83% of the maximum score. Although this score indicates high quality data management, it also indicates that there is room for further improvement. In particular, the lowest score in this dimension is found in the indicator measuring the updating and completeness of data on Ireland's open data portal, although all indicators in this dimension suggest some potential for improvement to reach the level of the rest of the dimensions.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Ireland has demonstrated a strong **strategic awareness** (170 points) around open data. The government has specified what it means by "open data impact" in its National Open Data Strategy 2017-2022, which recommends a macro and micro approach to assessing the impact of open data from a social, political and economic perspective. In addition, research is underway to examine the methodology for assessing the impact of open data and to analyze the current impact of open data reuse in Ireland.

Measuring the reuse (110 points) of open data in Ireland is done through a number of actions. For example, data.gov.ie uses Google Analytics to record views and downloads of datasets in its data catalog and publishes the results. In addition, efforts are being made to better understand how open data is used at events that bring together data publishers and reusers where they share their views, plans and understand each other's needs.

The **impact created** (320) by open data in Ireland is manifested in several areas:

Governmental Impact (80)

Open data has increased government efficiency, especially in the dissemination of information, reducing the time and cost of public requests for information, such as FOI (Freedom of Information), AIE (Access to Information on the Environment) and parliamentary questions.

Environmental Impact (80)

Open data is having an impact on protecting biodiversity and creating more environmentally friendly cities. For example, the Environmental Protection Agency is creating river ecology datasets that are used to monitor river habitats and detect any changes that may occur over time.

Social Impact (80)

Open data contributes significantly to improving social challenges in Ireland. Data is being collected collaboratively to properly assess the amount of unoccupied housing in Ireland as a means of addressing the housing shortage.

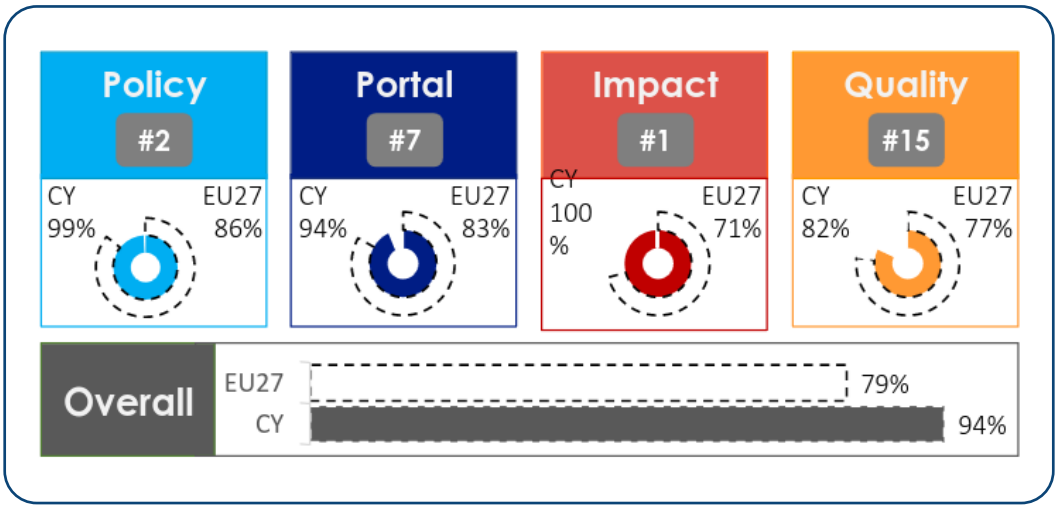
Economic Impact (80)

Open data is driving innovation and the adoption of new technologies in Ireland. An example of this is the joint initiative by the Irish High Performance Computing Center (ICHEC) and the Dublin Fire Brigade (DFB) to apply big data analytics in the context of the fire department.

CYPRUS

Total score and overall position

In the 2022 edition, Cyprus has achieved an excellent third place in the Open Data Maturity Report, obtaining a total of 94% in the overall score, 3 percentage points higher than the 91% it obtained in the 2021 edition. This achievement places Cyprus in the trend-setter category behind only France, Poland and Ireland among the EU27 countries.



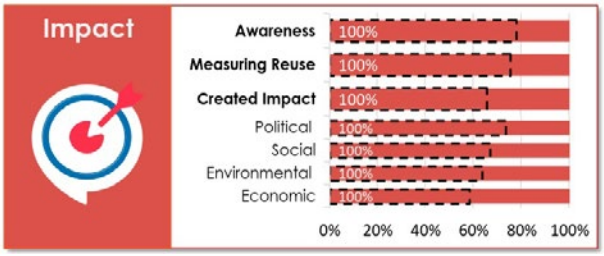
In "**Policy**", Cyprus achieved a total score of 635 (99%), very close to the maximum possible. This high performance on policy suggests that Cyprus has a well-defined and effective structure for open data management at the national level.

As for the "**Portal**", Cyprus has also obtained a very good total score of 610, 94% of the total. This result indicates that the open data portal in Cyprus is effective and well maintained, with data provision being the weakest point of those assessed. is effective and well maintained, with data provision being the weakest point of those assessed.

The "**Impact**" of open data in Cyprus is very high, with a total score of 600 (100%), the maximum possible. This score demonstrates how open data is having an impact on multiple aspects of Cypriot society.

In terms of "**Quality**" of data, Cyprus has a total score of 533 (82%), being the worst evaluated dimension of the four. As in other cases, the weakest point has been the updating and completeness of the data as DCAT-AP compliance or monitoring have obtained scores more in line with the indicators of the other dimensions.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Cyprus' **strategic awareness** of the use of open data is high (170) and is manifested in facts such as a clear definition of open data impact or a fruitful collaboration between government and academia to create value in projects such as GNOSIS. This integrated Geographic Information System collects, stores, analyzes and presents all data related to the Cyprus road network.

The **measurement of reuse** gets the highest score (110) and is supported by the interest in observing the level of reuse of open data in the country. This is evidenced by a number of activities, such as the National Open Data Impact Survey, the monitoring of key performance indicators, such as traffic on data.gov.cy, and the organization of events showcasing cases of reuse of their data.

The **impact created** by open data in Cyprus achieved the highest score (320):

Governmental Impact (80)

According to the Cyprus Open Data Impact Survey 2021, 89% of the organizations and companies surveyed stated that open data has had a very positive or positive impact on public sector transparency. A good example is the Politica.io platform that uses open data in a political analysis tool.

Environmental Impact (80)

82% of the organizations and companies surveyed stated that open data has had a positive impact on citizens' awareness of air and water quality. One example provided is the Live and Historic Air Quality Cyprus App, which provides real-time and historical information on air quality in Cyprus.

Social Impact (80)

58% of the organizations and companies surveyed in the same study stated that open data has had a positive impact on the level of awareness of the housing market. For example, the KPMG report on the housing market uses open data from the cadastre.

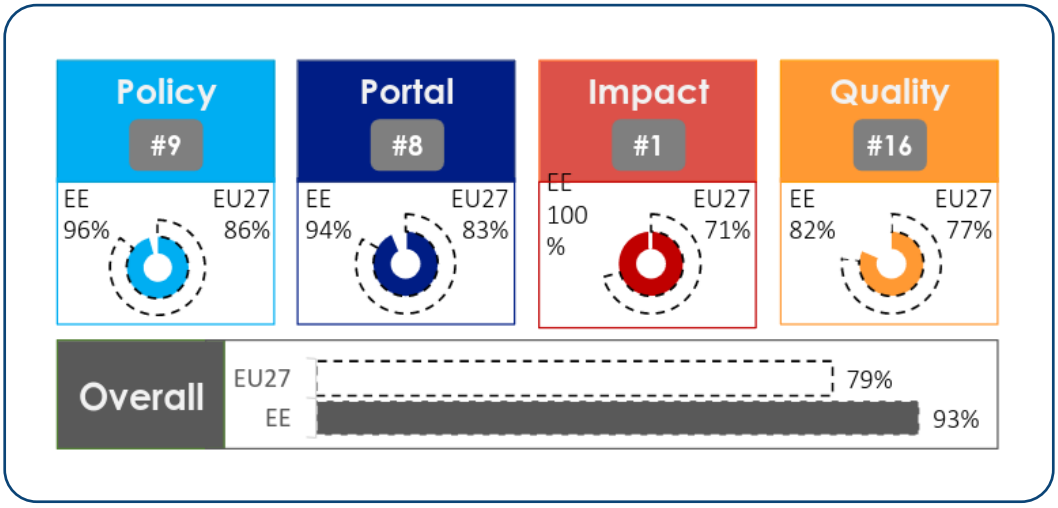
Economic Impact (80)

The 2021 Open Data Impact Survey provides various data in this regard. For example, that the total size of the open data market in Cyprus is estimated at 1.19% of GDP or that 45% of the organizations and companies surveyed stated that the availability of open data affects their turnover. A clear example would be the company "Foody", a startup that specializes in food delivery and whose business model is based on a platform that uses open data from the cadastre and postal services.

ESTONIA

Overall score and global position

In the 2022 Open Data Maturity Report, Estonia achieved an overall score of 93%, very similar to the 94% in the 2021 edition. This score keeps Estonia in the trend-setter category along with the most advanced EU27 countries.



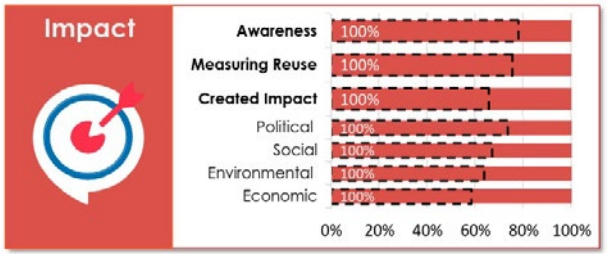
In the "**Policy**" dimension, Estonia accumulated 612 points (96%), very close to the maximum possible and already with very little room for improvement, according to current indicators.

Estonia's open data "**Portal**" scored a high 609 points (94%). This result evinces intensive use by users and strong sustainability, despite a slightly lower score on the data provision metric.

The "**Impact**" dimension shows a strong performance with a total of 600 points (100%), the maximum possible. This indicates Estonia's ability to generate awareness, promote data reuse and produce significant impact in all four domains: political, social, environmental and economic.

In the "**Quality**" dimension, Estonia achieved the lowest score of the four dimensions with a total of 530 points (82%). While this result indicates high quality data management, there is room for further improvement, particularly in terms of data timeliness and completeness, as well as implementation and deployment metrics.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Estonia has achieved the highest score in the **strategic awareness** indicator (170) in the use of open data. It highlights how public bodies are encouraged to reuse open data with actions such as an annual competition. We also find examples such as public authorities promoting their open data sets and reuse cases at events such as those of the public sector working group on AI use cases.

Regarding the **measurement of reuse**, Estonia has also achieved the highest score 110 as, among other actions, annual surveys are conducted, stakeholder events are organized to discuss relevant topics and get feedback, and dataset downloads are tracked to observe how data is used in new applications or projects.

The **impact created** (320) by the use of open data in Estonia has achieved the highest score for examples such as the following:

Governmental Impact (80)

The SATIKAS project is an information system that detects changes in farmland using satellite data. This project has had a significant impact on the efficiency of the administration by automating, to a large extent, the controls of EU agricultural subsidies, reducing face-to-face visits by inspectors.

Environmental Impact (80)

The Estonian Environmental Agency and KEMIT have developed a remote sensing information system for forests that allows for keeping records of forest resources in a geo-referenced manner and collecting and sharing information about forests to help manage them more efficiently.

Social Impact (80)

One example is the Haridussilm portal, which hosts data on different levels of education in Estonia and reflects indicators related to successful participation in learning and entry into the labor market, helping to identify problems in the education system.

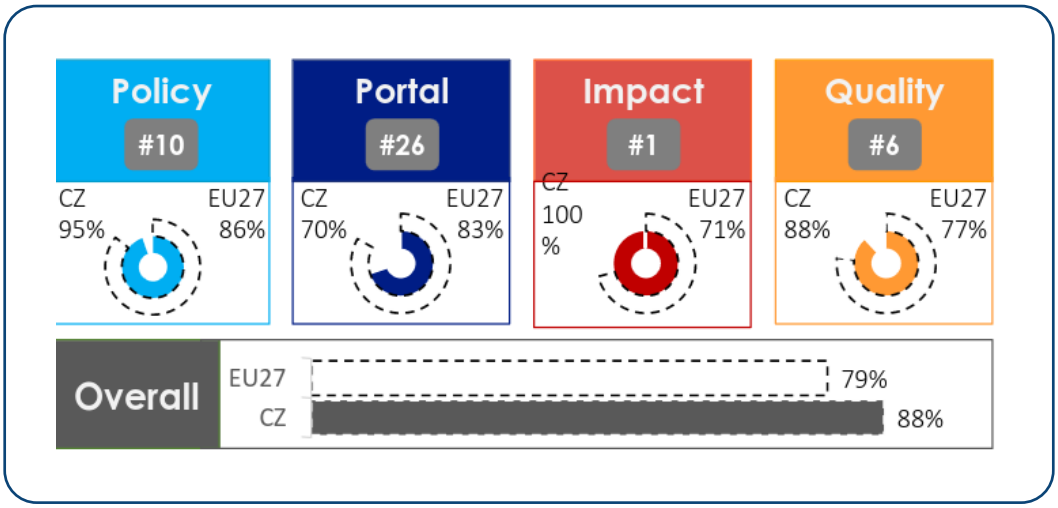
Economic Impact (80)

A case in point is Sunly, a company that uses open data to drive renewable energy production. Sunly analyzes wind resources, the amount of open space, the availability of transmission lines, and the absence of various constraints by modeling data in real time. Once it has verified that the land parcel is attractive for renewable energy production, Sunly offers landowners competitive leases appropriate to the estimated production.

CZECH REPUBLIC

Overall score and global position

In the 2022 edition of the Open Data Maturity Report, Czech Republic scored 88%, experiencing a significant rise from 74% obtained in the 2021 edition. This score places it in the fast-trackers category but with some dimensions assessed among the best in the EU27.



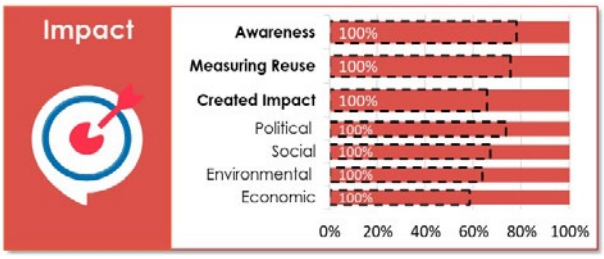
In terms of "**Policy**", the Czech Republic received a total score of 605 (95%) indicating that the country has established a solid framework for open data and has implemented policies with a good level of success.

The Czech Republic's open data "**Portal**" received a total score of 454 (70%). Although the data pro- vision and sustainability of the portal received good scores, the use and features of the portal were weaker areas and have ample room for improvement to be at the same level as the rest of the indicators.

However, for "**Impact**" of open data, the Czech Republic scored the highest score of 600 (100%) only matched by four other countries, all of which had higher overall scores.

The "**Quality**" of open data in the Czech Republic scored a total of 573 (88%). These scores indicate that the Czech Republic is at a good level in terms of applying quality standards in its adoption of open data. The indicator with the most room for improvement here is also the updating and completeness of the data published on the portal.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

The Czech Republic has demonstrated **strategic awareness** (170) in the use of open data. The Czech Republic's national open data policy is defined by the recently amended Free Access to Information Act. This law regulates that public bodies publish their data in open and machine-readable formats. In addition, the law introduces the term "open data" and underlines the role of the National Open Data Portal as its main information platform.

In terms of **measuring the reuse** (110) of open data, the Czech Republic has implemented several strategies and processes to monitor and encourage the reuse of open data. For example, some public bodies participate in or organize hackathons to support reuse and discover the use of their data.

The **impact created** (320) by the use of open data in the Czech Republic can be observed in several areas:

Governmental Impact (80)

In terms of transparency and accountability of public administration the published data are used in several applications that have had a remarkable impact. For example, "Hlídač státu" uses data from the Contract Register to draw attention to irregularities in the expenditure of public resources. Another example is the exekucí map, which focuses on the activities of the Chamber of Bailiffs and facilitates the review of decisions.

Environmental Impact (80)

Envidata is one of the largest projects that analyzes publicly available environmental data and presents it in a clear and interactive way, with the aim of helping to understand environmental changes and contribute to the solution of key problems. Another important portal is Fakta o klimatu (Climate Facts).

Social Impact (80)

It is evident in several projects that seek to improve the lives of citizens. One example is the "Mapy bez bariér" (Map without barriers) project, which publishes open data and helps people with limited mobility to plan their trips and vacations. Another example is the Autism Map project, which visualizes statistical data on the number of people with autism spectrum disorders for the purpose of care provision.

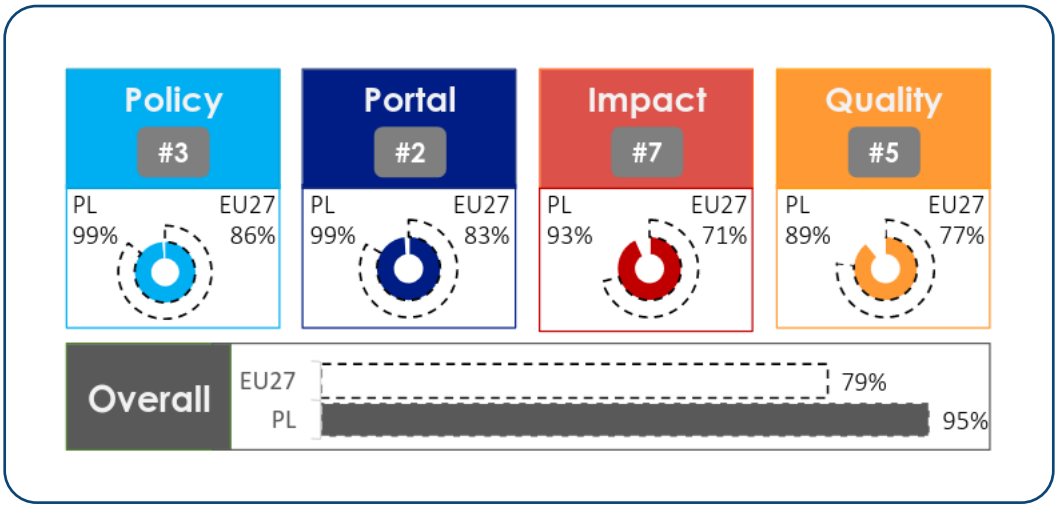
Economic Impact (80)

The Ministry of Labor and Social Affairs publishes the dataset called "Vacancies in the Czech Republic", which serves as the basis for the job search portal managed by the Labor Office. Another example with an important impact is the Unemployment Map that processes data on employment in the Czech Republic, visualizes it on a map and uses it as a basis for various analyses such as the influence of COVID19 on precarious workers, the impact of legislative changes on social benefits or how lower unemployment changes the situation of households at risk of exclusion.

POLAND

Overall result and global position

The 2022 Open Data Maturity Report places Poland high in the European open data landscape in the "trend-setters" category. The overall score of 95% in 2022 has placed it in third position, having moved up from fourth place where it was in 2021 with the same score.



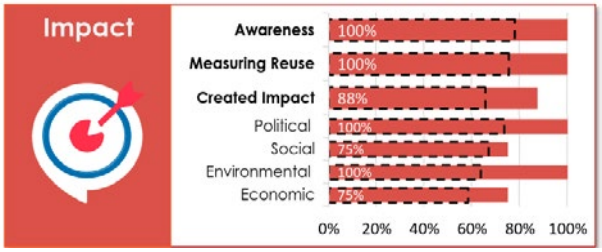
In the "**Policy**" dimension, Poland scored a total of 632 points (99%), demonstrating the strength of Poland's open data framework, effective governance and its commitment to continuous improvement.

The "**Portal**" scored a total of 644 points (99%). The high degree of functionality, intensive use and a strong sustainability strategy are the pillars behind this score, which underlines Poland's commitment to maintaining an accessible and constantly evolving open data portal.

In the "**Impact**" dimension, Poland achieved a total of 560 points (93%), demonstrating Poland's commitment to maximizing the impact of its open data in various sectors. As with other countries in the same category, these results demonstrate Poland's strong performance in strategic awareness and measurement of data reuse. However, the impact generated in the social and economic areas scored somewhat lower.

Finally, in the "**Quality**" dimension, Poland scored a total of 580 points (89%). This score highlights the priority that Poland places on the integrity and usability of its data and its dedication to maintaining high data quality standards. The metric of quality of display and linked data is the lowest scoring metric within the dimension and penalizes the overall result.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Poland has demonstrated **strategic awareness** in the use of open data by scoring 170 points on the indicator. According to the report, Poland has implemented an open data strategy that focuses on creating economic and social value through the reuse of open data. An example of this is the Open Data Program 2021-2027, which aims to create an environment where the economic and social benefits of open data are noticeable and where data is used for new services, products and business models, as well as to support strategic decision making.

Measuring the **reuse of open data** in Poland also scored the highest (110) and highlights the obligation of all ministries to monitor the data provided by their institutions and then report annually to the Prime Minister's Chancellery.

The **impact created** (280) by open data in Poland in each area has been:

Governmental Impact (80)

Poland declares the use of open data in all measured aspects. For example, in public policy development through analytical tools such as Strateg that integrate open data and are used to support data-driven decision making.

Environmental Impact (80)

This area provides examples such as helping to popularize knowledge on how to live in cities in a sustainable way or the application offered by the Institute of Meteorology and Water Management, which sends weather alerts in case of emergency.

Social Impact (60)

In Poland, open data has had an impact on society's awareness of health and wellness. and wellness. One example is the "My Health Plus" app, which is aimed at people who find it difficult to take care of their health in chronic illness. However, there seems to be no data measuring the impact created to address societal challenges.

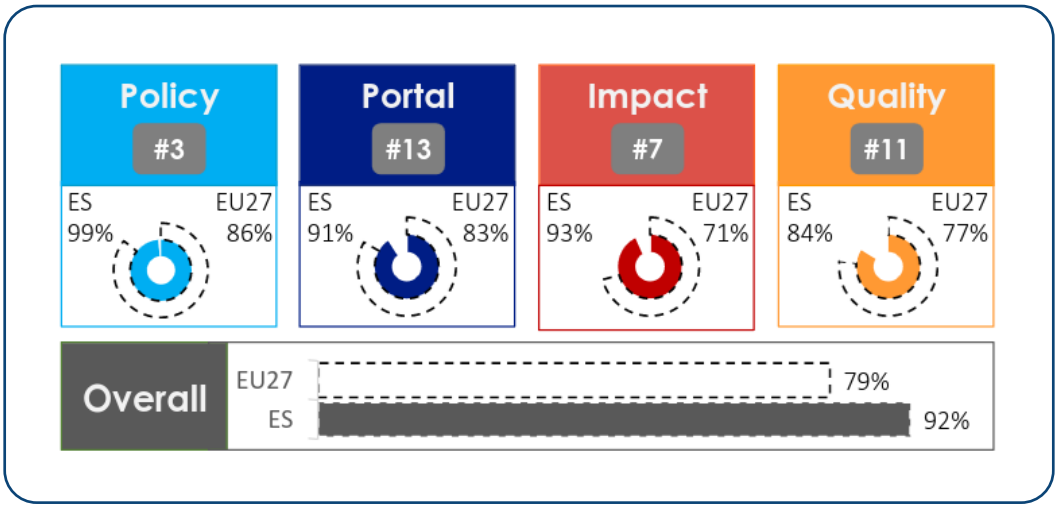
Economic Impact (60)

Poland does not have studies measuring the economic impact created by open data. However, it does provide cases such as the impact of open data on the level of investments in cities. This is Bełchatów Invest Planner, which is a tool for investors looking for a suitable location for their project.

SPAIN

Overall score and global position

The overall score for Spain was 92%, which continues to keep it in the "trend-setter" category, along with other leading countries in the open data space despite scoring 3 points below 2021. The result shows Spain's commitment for more than a decade to open data principles and its effectiveness in implementing open data policies and practices.



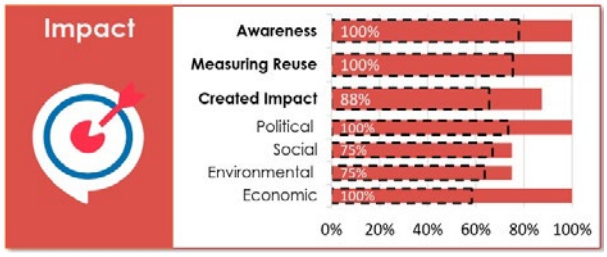
In the "**Policy**" dimension, Spain scored a total of 632 points (99%), very close to the maximum possible, demonstrating that Spain maintains a robust framework for its open data policy, with effective governance mechanisms and very solid implementation.

The score for the "**Portal**" dimension was 591 points (91%) indicating that Spain's open data portal is highly functional and widely used, and that it is being maintained and improved in a sustainable manner.

In the "**Impact**" dimension, Spain achieved a total of 560 points (93%), highlighting the indicators of strategic awareness, the measurement of data reuse and the impact generated in the governmental and economic area where the highest score was obtained.

In the "**Quality**" dimension, Spain obtained a total of 545 points (84%). These results indicate a high level of quality in the data provided and its management. However, they are not at the same level as the rest of the indicators and have more room for improvement, particularly with regard to the metrics of quality of deployment and linked data.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Spain has demonstrated a very high **strategic awareness** of open data, obtaining the highest possible score of 170 points. It is worth highlighting, for example, the definition of open data impact as "any positive effect or benefit obtained directly or indirectly for individuals, communities or society as a whole, which occurs over a certain period of time and results from the development of different activities in a given area characterized by the use of open data as a means to an end", included in the document Iniciativa Aporta. Implementation Strategy 2019-2023.

In the **Measuring Reuse** indicator (110), Spain has demonstrated a high commitment to measuring and monitoring the reuse of open data as various activities have been implemented to map which datasets are reused and to better understand the needs of reusers. The report also highlights that Spain has a methodology in place to measure the impact of open data that establishes the application of progress and impact indicators.

The **impact created** (280) by open data in Spain is manifested in:

Governmental Impact (80)

Open data has had a significant impact on challenges such as efficiency, effectiveness, transparency and decision-making capacity. An example of this is the Cordoba Provincial Council's 'Link, Cordoba Smart Municipalities' project, which seeks to intelligently manage municipal electricity supplies in 19 Cordoba municipalities.

Environmental Impact (60)

In Spain, open data also plays a relevant role in environmental monitoring and management, as well as in decision making related to sustainability and climate change mitigation. One example is the energy datahub of Castilla y León, which provides a compendium of information on energy supply in buildings and facilities in the region and helps to optimize energy contracts for the various government entities. However, the evaluation penalized the lack of global studies on the impact of open data in the environmental area.

Social Impact (60)

Despite not obtaining the highest score due to the lack of aggregate studies on the impact in this area, open data is also having an impact on social challenges in Spain. One example is the Instituto de Ingeniería del Conocimiento, which offers optimization services for telecare services in order to anticipate patients' needs and improve the quality of the service at a lower cost. To do this, they analyze data stored in very heterogeneous information systems: primary care, specialized care, pharmacy, comments collected by specialists, social variables, etc.

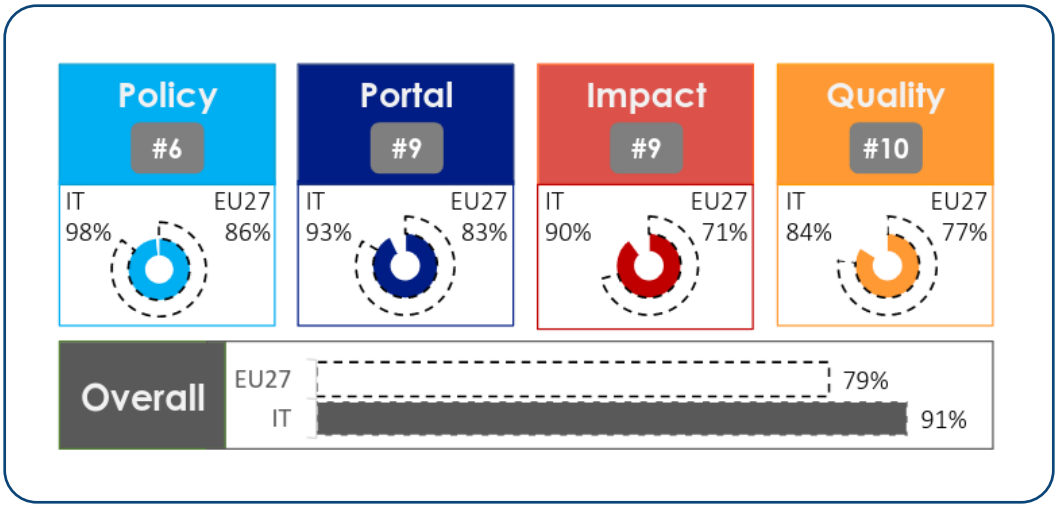
Economic Impact (80)

The economic impact of open data in Spain has been remarkable. An example is the massive Artificial Intelligence language model in Spanish, MarIA, promoted by the Secretary of State for Digitalization and Artificial Intelligence, which makes it possible to summarize existing texts and generate new ones based on instructions.

ITALY

Total score and overall position

In the 2022 edition, Italy obtained an outstanding position with a total overall score of 91%. This result places Italy in the trend-setter category, albeit with a slight decrease of 3 percentage points compared to the previous year. Despite this small decrease, the overall result manifests Italy's strong adherence to open data principles, as well as an effective capacity to carry out related policies and practices.



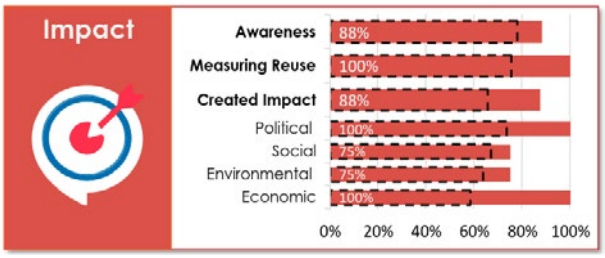
In the "**Policy**" dimension, Italy accumulated 630 points (98%), very close to the maximum possible. As with other countries in the same category, the result shows the strength of Italy's policy framework for open data, backed by efficient governance and strong implementation.

Italy's open data "**Portal**" also scores a high 604 points, equivalent to 93% of the maximum score. This result is evidence of intensive use by users and good maintenance, which compensates for the lower score obtained in the evaluation of its functionality.

The "**Impact**" dimension presents an area of improvement for Italy, with a total of 540 points, or 87% of the maximum score. Although the score highlights strategic awareness, measurement of data reuse and having produced significant economic and governmental impact, it also highlights the need for greater focus on social and environmental areas, which seem to be lagging a bit behind in comparison with the other impact areas.

For the "**Quality**" dimension, Italy achieved the lowest score of the four dimensions with a total of 546 points, or 85% of the maximum score. Although this result indicates high quality data management, there is room for further improvement, particularly with regard to data updating and completeness.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Italy's **strategic awareness** (150) in the use of open data has been assessed with 150 points. The transposition of the Open Data Directive was carried out by Legislative Decree 200/2021 and introduced guidelines to support public administrations in the process of opening data through specific requirements and recommendations. Similarly, it foresees a specific guideline to provide additional help for high value data providers. However, it seems that the Italian government does not yet have an official definition of what open data impact means.

In terms of **measuring reuse** (110) Italy scores the highest. Several cases stand out such as public authorities that collect reuse cases systematically like the Emilia Romagna or Lombardy region.

The **impact created** (280) by open data in Italy is observed in several areas:

Governmental Impact (80)

The report highlights open data projects that increase the efficiency and/or effectiveness of administrative action such as Pronto Soccorso Lazio Ospedali that allows to know how many people are waiting in the emergency room of the nearest hospital and thus identify the one with fewer patients waiting to avoid long queues.

Environmental Impact (60)

The report highlights the portal dedicated to climate data, indicators and climate maps or the Italian Ministry of Economy's project Gestore Servizi Energetici (GSE) to provide citizens with free access to data on public incentives for the transition to clean energy. However, there are also no reports on the impact of open data on environmental challenges.

Social Impact (60)

The report mentions among others the project "Valore Paese Cammini e Percorsi", which aims at the redevelopment and reuse of public buildings located along cycling and historical-religious routes. However, there seem to be no studies or reports in Italy that prove the effect of open data on our society, from a health or housing perspective, for example.

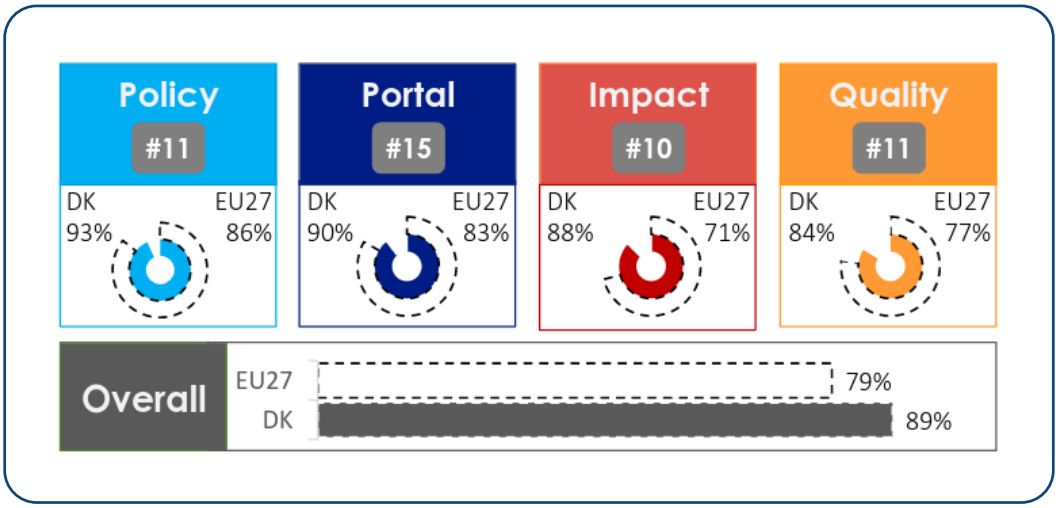
Economic Impact (80)

Italy conducted an analysis for the identification of appropriate measures to promote sustainable, inclusive and lasting economic growth with full employment and decent work for all. This analysis, conducted by the Italian National Institute of Statistics (ISTAT), was based on open data and provided valuable insight into labor market needs and trends in Italy.

DENMARK

Overall score and global position

In the 2022 edition, Denmark achieved 89% in the overall score, slightly below the 91% obtained in 2021. This result has placed Denmark in the "tast-tracker" category in this edition, albeit a very short distance from the "trend-settlers" group where it was in the previous edition.



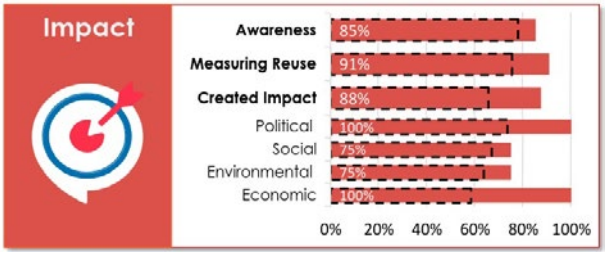
In the "**Policy**" dimension, Denmark accumulated 597 points (93%), a result that is at a slight distance from the top-scoring countries. This was due to the fact that the metric "open data governance" penalized the total score for this dimension.

Denmark's open data "**Portal**" scored 582 points (90%). This result shows that the Danish open data portal is in regular use and is being maintained in a sustainable manner, although it has room for improvement in terms of its functionalities.

The "**Impact**" dimension shows areas of improvement for Denmark, with a total of 525 points (88%). The score highlights Denmark's ability to measure the impact of reuse and create a significant impact in the governmental and economic areas but also highlights the need for greater focus on the social and environmental areas. Similarly, strategic awareness also has room for improvement.

In terms of the "**Quality**" dimension, Denmark achieved a score of 545 points (84%). Although this result indicates high quality data management, there is room for improvement in all four metrics of this dimension, and in particular with regard to data updating.

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Denmark has demonstrated significant **strategic awareness** that has been rated with a score of 145 on this indicator thanks to the existence of national policies and strategies that promote the use of open data such as the implementation of the Basic Data program, which has provided Danish society with high quality data since 2012. However, Denmark has not reported studies conducted in the last year that focus on assessing the impact of open data.

Denmark has also demonstrated a significant commitment to **measuring the reuse** of open data and scored 100 points. This is reflected in the existence of mechanisms to measure data use, to collect and classify instances of open data reuse, as well as conducting analyses to assess the impact of open data reuse.

The **impact created** (280) by open data in Denmark extends across the four key areas as follows:

Governmental Impact (80)

Denmark has used open data to improve the efficiency and effectiveness of public administration. For example, open data has enabled the city of Thisted to save hundreds of thousands of Danish kroner by offering consulting firms to comprehensively map an area before starting rewilding projects and thus facilitate the work and save costs.

Environmental Impact (60)

In Denmark, open data has had an impact on the fight against climate change and the transition to renewable energy. For example, surface erosion maps support climate change adaptation by calculating areas at risk of flooding and planning water drainage. However, as in the case of social impact, there are no studies quantifying the environmental impact of open data.

Social Impact (60)

Open data has had an impact in areas such as inclusion, healthcare and education. For example, the AssistData database provides data to public and private providers of assistive products and IT solutions to support inventory control, information retrieval and case management in the assistive technology field.

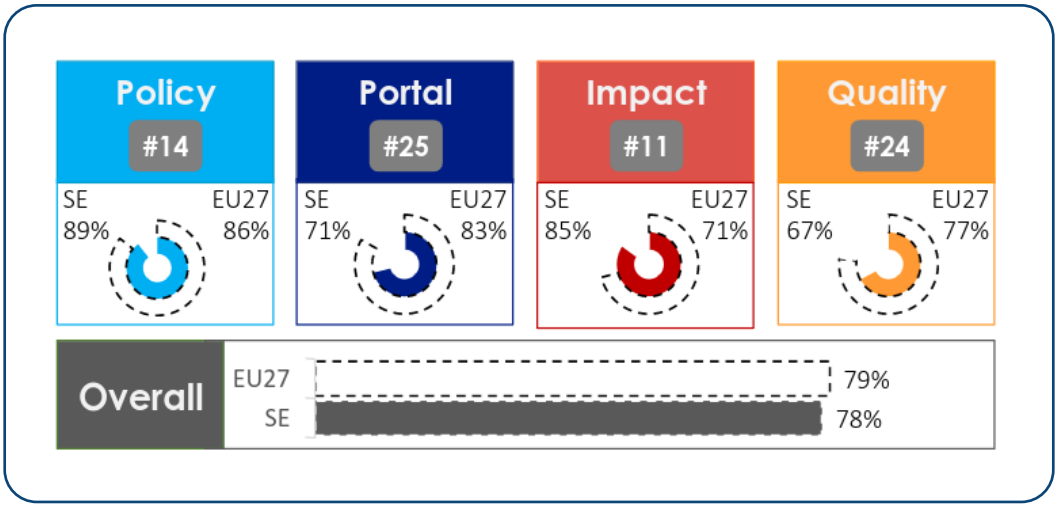
Economic Impact (80)

Open data in Denmark has also had an impact on employment, innovation and start-ups. Several reports and analyses have highlighted the value of open geodata and basic data in general by placing it in billions of Danish kroner.

SWEDEN

Overall score and global position

In the 2022 edition of the report, Sweden scored a total of 78% in the overall score, placing it in the "follower" category. It scored 6 points lower in this edition than in 2021 when it achieved 84% and thus a more prominent position in the European countries as a whole. While this position does not place Sweden at the forefront of open data, it still indicates a strong commitment and significant adherence to open data principles.



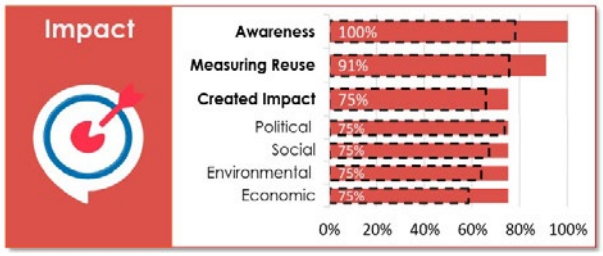
In the "**Policy**" dimension, Sweden accumulated 572 points (89%), demonstrating the strength of its policy framework in relation to open data. This score reflects a strong framework (245 points), good governance (160 points) and effective implementation (167 points), the best of the four dimensions.

Sweden's open data "**Portal**" scored a total of 463 points (71%), which, while not a leader in its category, suggests reasonable use by users (95 points) and good sustainability (110 points). However, portal functionalities and data provision can be substantially improved, scoring 180 and 78 points respectively.

The "**Impact**" of open data in Sweden was assessed with 510 points (85%). Sweden demonstrated a high degree of strategic awareness (170 points) and generated significant impacts (240 points). However, the scores on the political, social, environmental and economic metrics, all with 60 points, suggest that there is room to expand the impact of open data in these areas.

As for the "**Quality**" dimension, Sweden scored a total of 437 points (67%), much lower than in the other dimensions. In particular, the metric that penalized the result the most is the quality of the folding and availability of linked data (70 points).

Result of the impact dimension



NOTE: The black dashed lines represent the mean for each country in the study.

Sweden has demonstrated a very high **strategic awareness** (170) in the use of open data. The Agency for Digital Government (DIGG) has been working on collecting insights on the impacts of reuse through seminars, national projects to scale open and shared data, and dialogues with public organizations[2] that release open data. In addition, the government is working on a plan to manage high-value data (HVD), which includes measuring the socioeconomic value of these datasets that expands on the one conducted in 2020.

Measuring the reuse (100) of open data in Sweden is done through several processes. At the local level, public bodies establish processes to estimate the impact of reuse on their portals. Most public bodies that have an API strategy measure reuse and also use web analytics on their portals. Studies such as the one by the Swedish Government Research Institute (RISE) have also been conducted to assess the socio-economic impacts of open public procurement data.

The **impact created** (240) by open data in Sweden can be seen in several areas:

Governmental Impact (60)

Open data is estimated to have had an impact on transparency and accountability in Sweden. For example, several local administrations (Umeå, Gothenburg) have opened their billing information to increase transparency. However, the overall result has been penalized because there are no studies on the impact created by open data on government challenges.

Environmental Impact (60)

There are notable examples such as the Swedish Forestry Agency, in collaboration with the Swedish University of Agricultural Sciences, who have launched the "Skogsdatalabbet" data lab to increase access to forest and wildlife data and information. the data lab "Skogsdatalabbet" to increase access to forest and wildlife data and information. However, there does not seem to be any data on the impact created by open data in this dimension either.

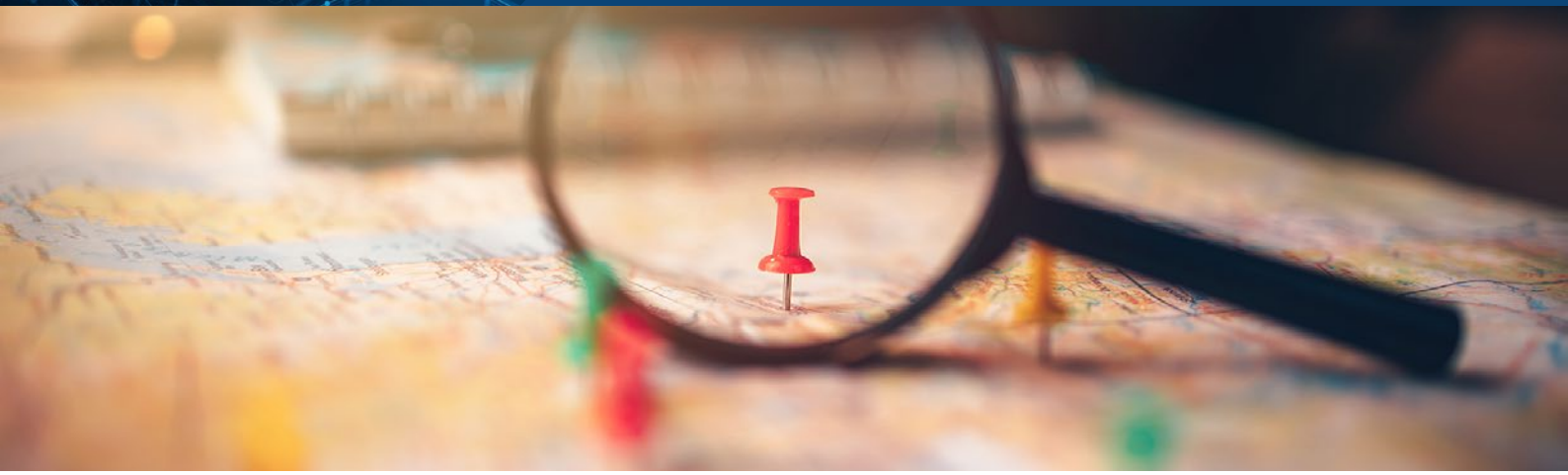
Social Impact (60)

Open data has been used for example to help dementia patients remember through the Platsminnen app. In addition, a blockchain-based solution has been developed to simplify the compensation process in case of job loss. However, there seems to be no data on the overall impact caused by open data on health or the fight against inequality.

Economic Impact (60)

The Trafiklab data center is a good example of the emergence of new businesses that has evolved from the increasing availability of open data. The indicator result has been penalized because open data with an impact on improving the level of employment has not been declared.

[2] *https://data.europa.eu/sites/default/files/country-factsheet_sweden_2022.pdf*



3. CROSS-COUNTRY COMPARISON

In this section we will analyze comparatively the results of the ten EU27 countries with **the best scores in the open data impact dimension**, highlighting the key similarities and differences in the indicators, as well as the best practices identified.

Of the ten countries analyzed, seven, including France, Ireland, Cyprus, Estonia, Poland, Spain and Italy, belong to the 'trend-setters' category, indicating that these countries are leaders in the adoption and use of open data and are **setting the standard for others, also in terms of the impact created by open data**.

Denmark and the Czech Republic, on the other hand, are identified as 'fast-trackers', i.e., they are moving rapidly on their way to greater open data maturity. However, in terms of the impact created, they have **stood out above countries that have obtained a better overall score** taking into account all the dimensions.

Finally, it is striking that Sweden belongs to the 'followers' category, which suggests that it is not progressing at the same pace as the leading countries, yet in **terms of impact created it is at a very similar level**.

Given that the impact dimension is assessed across three indicators, including strategic awareness, measurement of reuse and impact created at government, social, environmental and economic levels, by breaking down and comparing these results we can gain a better view of lessons for other countries looking to improve their own open data maturity.

STRATEGIC AWARENESS

Eight of the ten analyzed scored the highest score, 170 points, on the strategic awareness indicator: France, Ireland, Cyprus, Estonia, Czech Republic, Poland, Spain and Sweden. Only Italy (150 points) and Denmark (145) lost a few points in the evaluation.

In the case of Italy, although it has demonstrated a high level of strategic awareness in general, it has **not provided a specific definition of what its government means by "open data impact"**, for example, in a strategic document as Spain has done in the 2019-2023 Implementation Strategy of the Aporta Initiative. This is the reason why Italy, by dropping 20 points here, has not achieved the maximum score in strategic awareness and where it therefore has a clear area for improvement in its strategic approach to open data.

If we look at Denmark, despite demonstrating generally good strategic awareness, it appears that **it has not conducted studies in the last year that focus on assessing the impact of open data in the country**. The lack of such studies, such as the one conducted in Spain by ASEDIE to assess the data economy in the infomediary sector, has penalized the assessment of its strategic approach to open data, losing 25 points. These regular studies on the impact of open data are very important because they make it possible to evaluate the success of open data initiatives, identify areas for improvement and adapt strategies accordingly. In fact, in the other nine countries analyzed, they have been conducted.

MEASURING REUSE

Once again, eight of the ten countries analyzed obtained the maximum score, 110 points, in the indicator: France, Ireland, Cyprus, Estonia, Czech Republic, Poland, Spain, Italy. In this case it was Denmark (100 points) and Sweden (100) that fell short, albeit by only 10 points in both cases.

In both cases, it seems that, although both Denmark and Sweden have a high degree of measurement of open data reuse, they have **not yet developed systematic ways of classifying the reuse cases collected**. This fact indicates a limitation in their ability to track and analyze data reuse, which has influenced the evaluation of their measurement of open data reuse, causing them to lose 10 points.

In the case of Denmark, it has recognized this limitation and is working on an analysis of user segmentation and use cases for the future development of its data portal, so that it can have a classification similar to that used by Spain and published in the Technical Interoperability Standard for Reuse of Information Resources.

IMPACT CREATED

In this indicator, **only five of the 10 countries analyzed obtained the maximum score in all sub-areas**: governmental impact, social impact, environmental impact and economic impact. France, Cyprus, Ireland, Estonia and the Czech Republic scored 80 points in each sub-area, giving them a total of 320 points for the indicator.

Although Poland, Spain, Italy and Denmark obtained the highest total score, 280 points out of 320, there are differences if we look at each of the four sub-areas. **Spain, Italy and Denmark scored lowest in the areas assessing social impact and environmental impact**. All three countries scored 60 points in these areas, while the governmental and economic impact areas scored 80 points.

In all three cases, according to the evaluator's comments, it appears that these countries have provided only examples of use cases for open data in the social and environmental fields. However, what the evaluation requires in this context is not simply use cases, **but concrete data or reports demonstrating the overall impact that open data has had in these fields**. This should take the form of studies showing, for example, how open data has led to measurable improvements in healthcare or climate change mitigation. It could also be the overall open data impact studies in each country that specifically consider these areas as the subject of assessment, so as to provide better evidence in future editions.

In the case of Poland, the lowest scores were obtained in the areas of social impact (60) and economic impact (60). However, the reasons are exactly the same, the lack of specific studies demonstrating impact in these areas.

Sweden is, of the ten countries, the one with the lowest score (240) on the impact indicator created. In three of the areas (governmental, social and economic) the reason for having been evaluated with 60 points is, as in the previous cases, not having been able to provide specific studies measuring the impact created by open data.

However, in the case of economic impact, the reason has been that Sweden has indicated that, to its knowledge, **the use of open data has not had a direct impact on the level of employment in the country**. This could be interpreted to mean that no increase in job creation has been seen due to open data or that no specific studies have been conducted to measure such an impact.

4. RECOMMENDATIONS FOR IMPROVING THE IMPACT OF OPEN DATA

One of the main conclusions to be drawn from the detailed analysis of the individual questionnaires is that the countries provide numerous examples of reuse but, frequently, these cases reflect more the results of reuse than the impact of reuse. This indicates that, despite the changes and improvements made in the methodology, there is still a **significant difficulty in measuring impact**, understood as the transformations in social, political and economic behaviors that originate from the reuse use cases.

We summarize below a series of good practices common among the countries that have obtained a better score in the Open Data Impact dimension of the Open Data Maturity Study 2022, organized by the indicators that comprise it:

STRATEGIC AWARENESS

Strategic awareness refers to the understanding and recognition of the value and potential impact of open data in a country. It is fundamental to developing effective open data policies and strategies.

The countries analyzed generally share the following characteristics:

- They tend to have **clear definitions of the concepts of use or impact of open data that are regulated by relevant legislation**. These definitions make it possible to align the rest of the actions that are deployed at all levels.
- Have **monitoring mechanisms in place at the national, regional or local level to monitor and encourage the reuse of open data**, including high-value datasets. These mechanisms include different monitoring, analysis and reporting systems, as well as multiple initiatives to promote the reuse of open data by companies, researchers and the general public: open data contests, hackathons, etc.
- They have **methodologies to measure the impact that can be derived from the reuse of open data**. These methodologies can include indicators and metrics that measure the governmental, economic, social and environmental impact of open data.

In particular, in terms of **measuring the use of high-value datasets**, countries should actively promote high-value datasets, but also measure their reuse. This can be done through labeling these datasets to facilitate their search or by providing content that illustrates possible use cases and their potential value. For example, Spain or France, along with other countries, foresee that **high-value datasets will have a specific category in the portal**, and that they will also be selectable through filters or highlighted searches from the general section of available datasets. France, for example, plans that the impact and reuse of high-value datasets will be measured through classical monitoring methods, but also by conducting specific research similar to what they did for certain reference datasets. Spain has also committed through the National Data Strategy that the *publication of high-value datasets will be accompanied by appropriate actions to measure their actual use and impact on society.*

MEASURING REUSE

Measuring reuse refers to a country's ability to understand which datasets are being reused and how. This is crucial for assessing the impact of open data and for informing decisions about which data to open in the future. The countries analyzed generally share the following characteristics:

- They have **analytical tools in their open data portals** to understand which data sets are being downloaded and reused. These tools provide valuable information on what types of data are of most interest to users.
- They conduct **surveys and studies to better understand how open data is being reused**, including surveys of open data portal users, meetings with reusers, as well as more detailed studies on data reuse in specific sectors.
- They develop **case studies to demonstrate how open data has been reused to create value**. These case studies can provide concrete examples of the impact of open data and are also a valuable tool to promote data reuse. In general, these cases are compiled and elaborated according to methodologies designed for this purpose.

IMPACT CREATED

The Impact Created refers to the benefits generated by available open data and its reuse in four areas: government, social, environmental and economic. For each of these impact areas, the indicator compiles existing data demonstrating the impact that open data has had in general and with concrete examples.

- **Government** impact**:** Countries report numerous examples of varying natures and backgrounds of how open data has increased government efficiency and effectiveness, improved transparency and accountability, or contributed to better decision making. For example, in Spain, the Government of Castilla y León has developed a series of scorecards with information on the healthcare structure in primary care, which make it possible to know the situation in each provincial capital and optimize resources. In Sweden, transparency and accountability have been improved through the publication by some cities of accounting information, including an electronic service to request a screenshot of the actual invoice.
- **Social** impacts: In all cases analyzed, countries have provided examples of how open data has improved health and well-being, inclusion and equity, or education. For example, in Denmark, educational statistics (Udannelsesstatistik) have included as open data the performance of students in each school compared to what might be "expected" of them given their socio-economic background, allowing for fairer comparisons between different schools and better informed choice for parents.
- **Environmental** impact: All countries with a good assessment have included examples of how open data has helped improve sustainability and resilience, and address climate and environmental challenges. For example, in Spain, the Vigo City Council has implemented a digital twin of the entire city, combining open data with geographic data to include elements such as noise, pollution or traffic maps, among others, to help manage the city more efficiently.
- **Economic** impact: Here too, all countries have provided examples of how open data has boosted employment, innovation and the adoption of new technologies, entrepreneurship and business creation. For example, in Spain, ASEDIE, a multi-sector information association, annually analyzes the economic and social value of companies that reuse public (and private) sector data to develop value-added products. In France, the opening of data from the commercial register has made it possible to develop the national business directory, to offer new services to companies and, in general, to reduce the cost of market entry for new entrepreneurs.

However, in a significant number of the countries analyzed there is a general **lack of data measuring the impact of open data in each of the areas**. Of the ten countries analyzed, in five of them there are at least two areas out of the four in which there are no studies or data measuring the impact created by open data. In all cases, interesting examples have been reported, but there is a clear area for improvement in the development of these studies to better understand the impact created by open data in the areas assessed.

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VICEPRESIDENCIA PRIMERA DEL GOBIERNO
MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL
SECRETARÍA DE ESTADO DE DIGITALIZACIÓN E INTELIGENCIA ARTIFICIAL
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