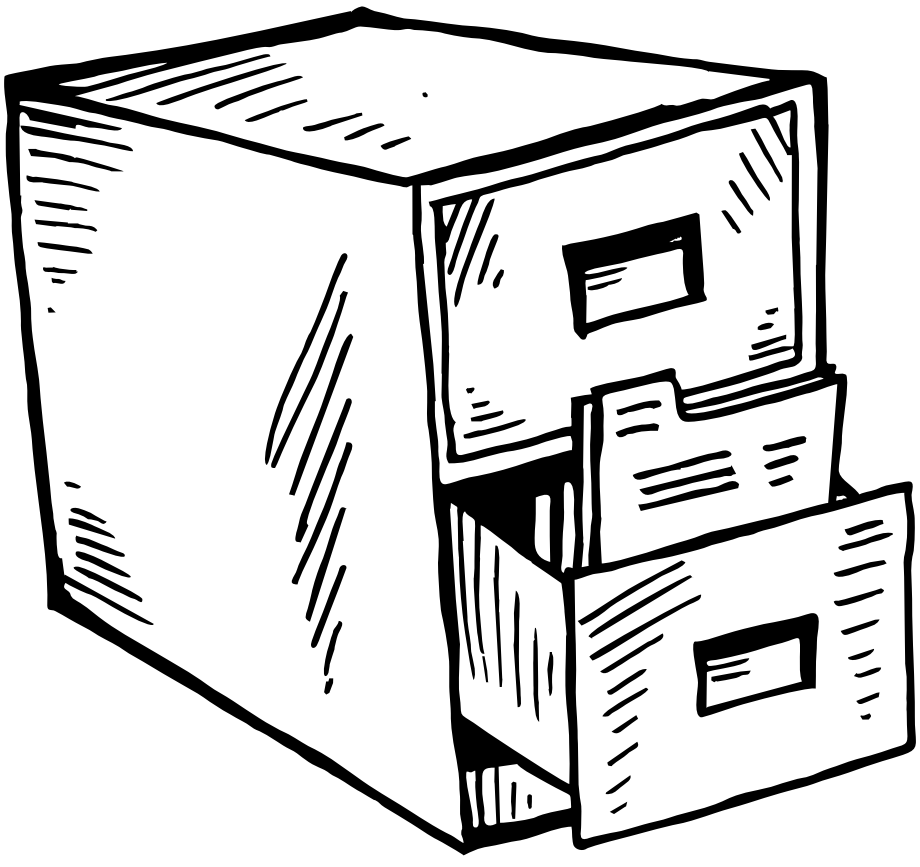
OPEN DATA REUSE IN SPAIN

UPDATE 2024

COTEC DesideDatum



OPEN DATA REUSE IN SPAIN

UPDATE 2024

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COTEC DesideDatum

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EXECUTIVE SUMMARY

The reuse of open data helps to generate social and economic value. In addition, it allows for the creation of new companies that, with limited resources of their own, carry out business models based on the development of products and services enriched with value-added information.*

*Abella, Ortiz-de-Urbina-Criado and De-Pablos-Heredero (2014)

This report is the fourth study on the reuse of open data, carried out with the aim of presenting the current status of research in 2023 and the progress made since the first report in 2017. All of this allows for the development of recommendations and future lines of work that help to generate businesses and services for society. To this end, the open data portals in Spain in 2023 have been identified, and a sample of the datasets they have available as well as the services based on them have been analysed. In addition, a questionnaire was sent to those responsible for the portals in order to analyse some of the characteristics of the open data and its potential for reuse. Specifically, a diagnosis has been made based on the knowledge they have regarding the reuse of their data, the type of innovation that can be promoted with it, the activities to promote its use, the services generated and the creation of value based on the reuse of data. The latest version of the MELODA 5 metric has also been applied to analyse the degree of reusability of open data published in Spanish open data portals. All these diagnoses have enabled an analysis of the opportunities and threats as well as of the strengths and weaknesses, from which certain reflections have been included that can help to build future public data management policies.

The study carried out allows us to reveal the following reflections on the data reuse ecosystem in Spain:

- **Statistical broadening.** Statistical data sources have increased their percentage (19.78 %) with respect to 2021 (14.58 %) and are mainly responsible for the increase in data produced in recent years.
- **Domestic consumption.** As in previous reports, the biggest consumers of published data are the public administrations themselves (51.70 % in 2023, compared with 64 % who reused it frequently or habitually in 2021).
- **Lack of standardisation and models for published data.** In 2023, 69.90 % of the data published—as opposed to 80 % in 2021—does not include information on its structure or use standardised data models.
- **Infrequent updating of data.** It is worth noting that in 2023 this aspect, despite certain improvements, still presents a challenge. 78.30 % of the open data published in 2023—compared to 92 % in 2021—has an update period longer than one month; while the percentage of data published in real time is around 0 %.
- **Non-geolocated data.** This aspect worsened in 2023: in 2021, 50 % of the data published contained no geographical information at all, and in 2023 the figure was 63.60 %.
- **Lack of maintenance of open data services.** 35 % of the open data-based services listed in the portals are inactive or no longer exist.
- ***Reputation ranking of open data publishers.*** As in the 2021 report, a portal reputation ranking has been carried out, although work is underway to develop more appropriate methodologies for measuring reputation (Ortiz-de-Urbina-Criado, Abella and De-Pablos-Heredero, 2023).

PRESENTATION

1. https://desidedatum.com
2. https://www.tylertech.com/products/data-insights
3. https://www.opendatasoft.com
4. https://ckan.org

The report on the reuse of open data emerged as a one-off project in Cotec's first PIA call, the mechanism through which the foundation selects alliances for the development of knowledge in the field of innovation. Back then, in 2017, we already sensed that a proper data culture in public administrations was essential to advance digital rights and, at the same time, to develop a knowledge economy that can compete on an international level without forgetting our principles and values.

Now, following four editions of this report, fully consolidated among the periodically published products that make up the Cotec Report Observatory, we must congratulate ourselves for having chosen this project from among more than a thousand candidates. But, above all, we must congratulate the authors and collaborating entities for their ability to show, edition after edition, the increasing value of open and shared data. This report shows us the long road ahead, while recording and analysing the timid but hopeful steps we have been taking..

DesideDatum Data Company SL —better known by its brand name DesideDatum—is the most widely recognised Spanish company in the field of open data. In fact, it is the only company in the world that is able to offer services in the three main global technologies for open data: Tyler-Socrata, OpenDataSoft and CKAN.

In addition, DesideDatum is specialised in carrying out consulting and implementation projects in the main data-related fields:

- Open Data.
- Data governance and management.
- Data analytic
- Data visualisation
- Transparency and accountability based on data

Currently—September 2023—it has more than 50 ongoing projects in many Spanish public administrations and companies, where innovation and the search for the value of data are always the main objectives.

Additionally, DesideDatum has always championed initiatives related to the opening up of public data. That is why, once again, we fully support this study.

For DesideDatum, opening up public data is synonymous with sharing and multiplying the value and quality of public data for all members of society. It is about empowering society, reviving the economy and even improving highly data-driven services (such as artificial intelligence)..

INTRODUCTION

01.

1.1 THE IMPORTANCE OF OPEN DATA

Open data is data that can be freely used, reused and redistributed by anyone, and that is subject, at most, to the attribution requirements and to being shared in the same way in which it appears (Open Data Handbook, 2023).

The value of open data is in its reuse. For open data to be reused, it is important that it meet certain quality requirements (Hrustek, Furjan and Pihir, 2021). Zuiderwij, Pirannejad and Susha (2021) highlight, among other aspects, the importance of data quality for it to be reused. In this sense, Abella, Ortiz-de-Urbina-Criado and De-Pablos-Heredero (2022) define the concept of pretender open data portals (PODP) as portals that publish data, but do not allow professional reuse of the data they store. For a data portal to be considered suitable for the reuse of its data, it must meet the following requirements:

1. Have an update mechanism that allows the delivery of real-time information on data updates.

2. Have a data management system (DMS) to provide automated access to data capture and publication.

3. Have an API for publishing data with a mechanism that allows it to be reused professionally.

Concern surrounding the creation of these types of portals, together with the scarcity of open data in key sectors such as health care, has led these same authors to recently generate a reputation index for open portals (Ortiz-de-Urbina-Criado, Abella and De-Pablos-Heredero, 2023) based on three dimensions: if the portal is known, if it is known for something specific, and how it is valued by its users.

1.2 OPEN DATA IN EUROPE

There is growing concern in Europe surrounding the quality of open data (Gao, Janssen and Zhang, 2023). The European Data Portal (*https://data.europa.eu/*) offers access to open data from any European country and promotes data publication practices at national, regional and international levels. Since 2015, comparative data on the evolution and use of open data in European countries has been presented annually. The results of these comparisons are shown in the open data dashboard, which is a very practical tool for comparing the levels of maturity of open data in the Member States of the European Union. Carsaniga, Lincklaen Arriëns, Dogger, Van Assen and Cecconi (2022) compare best open data management practices in Europe and highlight the cases of France, Ukraine, Poland, Ireland, Cyprus, Estonia, Spain and Italy as references that set good practice trends. Recently, in August 2023, in the European report on value creation in the public sector through the use of open data (Osimo and Pizzamiglio, 2023), good practices in the reuse of data in the public sector are highlighted in the cases of France, Estonia and Flanders (Belgium). The methodology, initially developed by Cecconi and Radu (2018), has been improved over time and currently analyses the level of maturity of open data in different countries by taking the following dimensions into consideration:

1. Open data policy

This dimension focuses on the existing open data policies and strategies in participating European countries. The national governance models and the measures, also at the regional and local level, applied to undertake these policies and strategies are analysed. To achieve this, the dimension is based on the same three indicators from previous years: the policy framework, open data governance and open data implementation. On 21 December 2022, Commission Implementing Regulation (EU) 2023/138 was published. This regulation defines six categories of high-value datasets: geospatial, Earth observation and environment, meteorological, statistics, companies and company ownership, and mobility. The regulation establishes that public sector bodies in Member States must make data available for reuse, free of charge.

2. Impact of open data

The second dimension analyses the willingness, readiness and capability of European countries to measure both the reuse and impact of open data. Firstly, the dimension investigates how countries are prepared to measure the level of reuse and impact of open data within their territory. This reflects the first indicator, strategic awareness, which was also used in previous editions of the study. Secondly, the emphasis is on whether countries measure open data reuse, with what methods and in what way. Lastly, the dimension focuses on collecting data on the impact created within the four impact areas that have been considered in previous open data maturity assessments, namely government (formerly political), society, the environment and the economy.

3. Open data portal

This dimension focuses on the analysis of the national open data portal. It carries out an in-depth analysis of advanced features and functions, providing a successful user experience. Additionally, the dimension assesses the extent to which portal administrators use web analytics tools to better understand the needs and behaviour of their users and update a portal's features in line with the information obtained from these analyses. This dimension examines the coverage of open data in different domains, as well as the approach and measures established to ensure the portal's sustainability.

4. Open data quality

This dimension focuses on the measures taken by the portal managers to ensure the systematic collection of metadata from sources throughout the country, as well as the updating of available metadata and, whenever possible, actual data. Compliance with the DCAT-AP metadata standard, currently published in version 2.1.1, is monitored, as well as the quality of the implementation of the published data. Quality assessment elements are provided for portal managers and policy makers, such as the use of open data in formats and licences, whether the data is machine-readable and of high quality, and is suitable for a linked data approach.

Next, Table 1 shows the measurements used for each of the dimensions:

TABLE 1. Maturity dimensions of data portals in Europe

DIMENSION	MEASURE
Open data policy	Regulatory framework
	Open data governance
	Open data implementation
Impact of open data	Strategic awareness
	Measuring reuse
	Impact created
Open data portal	Portal features
	Data provisioning
	Portal sustainability
Quality of the open data portal	Update
	Control measures
	DCAT-AP compliance
	Implementation quality and linked data

Source: Own authorship

According to the latest open data maturity report (Carsaniga et al., 2022), it can be stated that (Figure 1):

- EU Member States are preparing for the regulation of the implementation of high-value datasets. Although the regulation has not yet been adopted, this year's assessment provides an overview of the level of readiness of EU Member States to meet the requirements in the four dimensions of open data maturity. 96 % of EU Member States are working on identifying data in high-value data domains that should be prioritised for publication, especially the statistics, geospatial, Earth observation and environment, and meteorological categories. 85 % of the 27 EU Member States are already preparing to monitor and measure the level of reuse of high-value datasets, and all of them intend to promote or are already promoting high-value datasets on their portals. Finally, 63 % of EU countries are preparing to ensure interoperability of high-value datasets with available datasets from other countries.

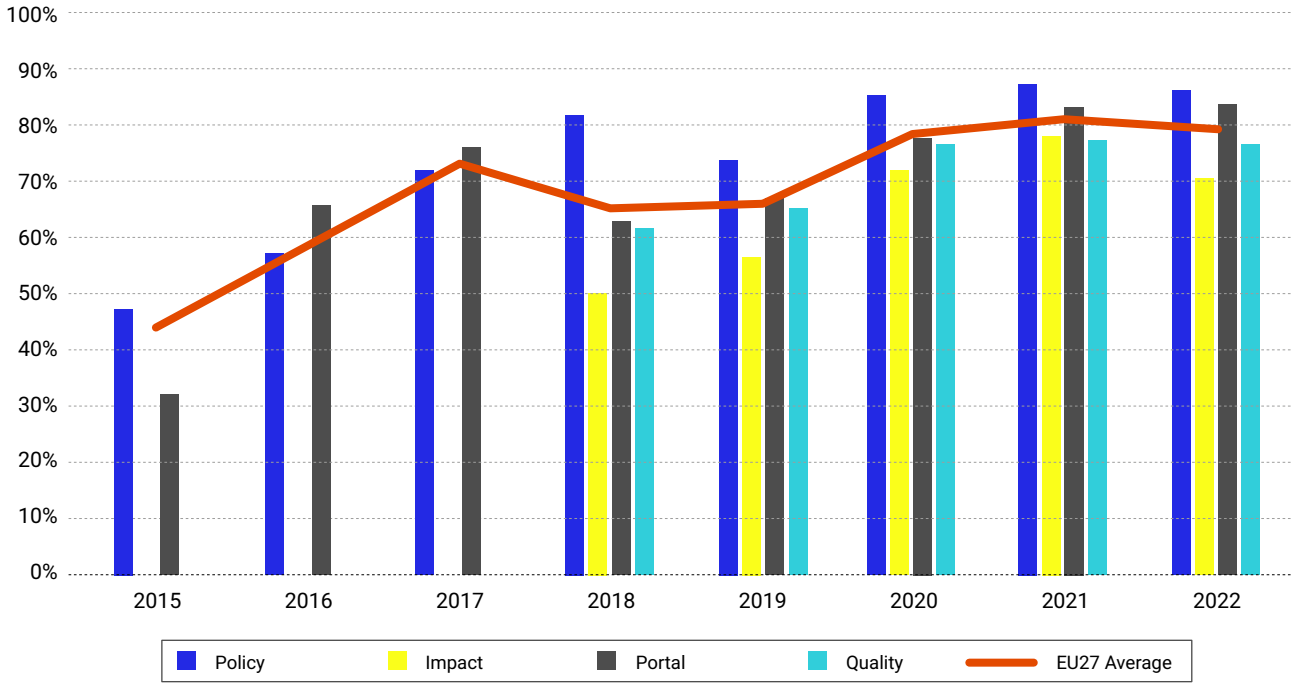
- Measuring the impact of open data is a priority for EU Member States, but also a major challenge. In 2022, the impact dimension experienced the largest decrease compared to the other

dimensions, decreasing from 78 % in 2021 to 71 % in 2022. This drop of seven percentage points is in line with the methodological restructuring of the dimension, which also makes it difficult to perfectly compare the 2022 indicators with those of previous years. Furthermore, this result should not be considered so much as a decrease in the level of maturity of the countries in the EU. The fact that these countries continue to score highly on the strategic awareness indicator—which was also used in the 2021 assessment—demonstrates that the EU-27 remains very interested in understanding open data reuse and value creation, as noted in the trends in last year's assessment. In contrast, the decrease in the impact dimension provides a more accurate picture of the difficulty EU countries have in distinguishing and evaluating open data reuse and the resulting impact. While they remain quite advanced in tracking and measuring reuse (the EU average is 75 %, the same as last year), collecting data on the impact created, especially from an economic perspective, seems to be more difficult for said countries.

- In a post-pandemic world, European countries face both new and old common challenges. From year to year, EU Member States have been recovering from the pandemic, for example, by leveraging open data for the development of statistics, dashboards and alert applications. In 2022, the Russian attack against Ukraine and the consequences of this conflict for the European economy and the energy market laid the foundations for new socioeconomic challenges across Europe. Ukraine has reported that the war has had a significant impact on its work on open data, especially as Ukraine's internet resources (in particular those that are state-owned) have been temporarily unavailable. The vast majority (18) of the EU-27 Member States are above the EU-27 average. The level of open data maturity has been improving. The potential of open data was also used by other countries in Europe to respond to the consequences of the war in Ukraine. For example, some countries have reported using open data to monitor the level of energy use or to facilitate the integration of Ukrainian refugees into their labour markets.

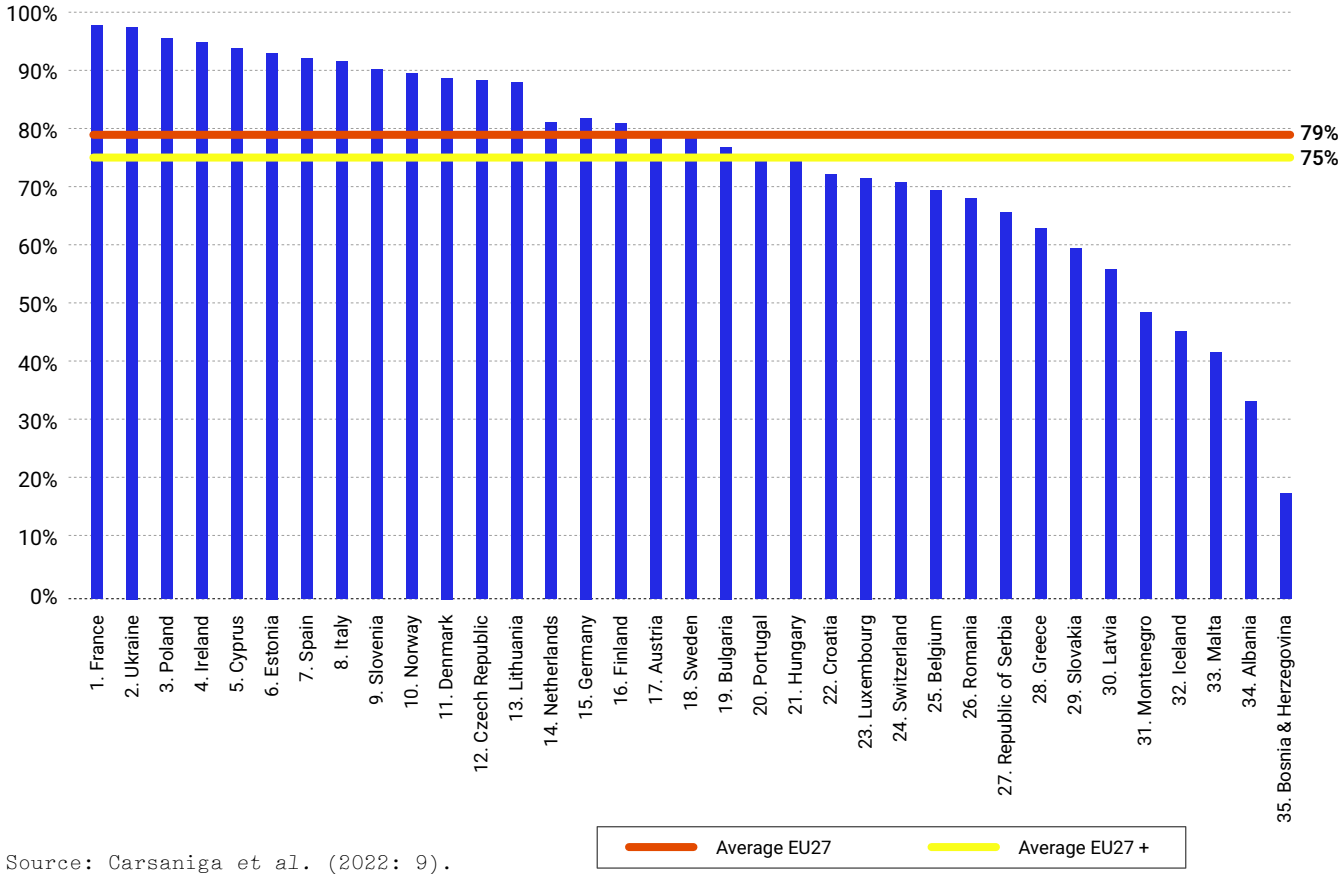
Figure 2 presents the overall open data maturity scores for each of the 35 countries participating in the 2022 assessment, according to the Open Data Maturity Report.

FIGURE 1. The development of open data maturity dimensions in Europe



Source: Carsaniga et al. (2022: 7).

FIGURE 2. Overall open data maturity scores from the 2022 assessment



Source: Carsaniga et al. (2022: 9).

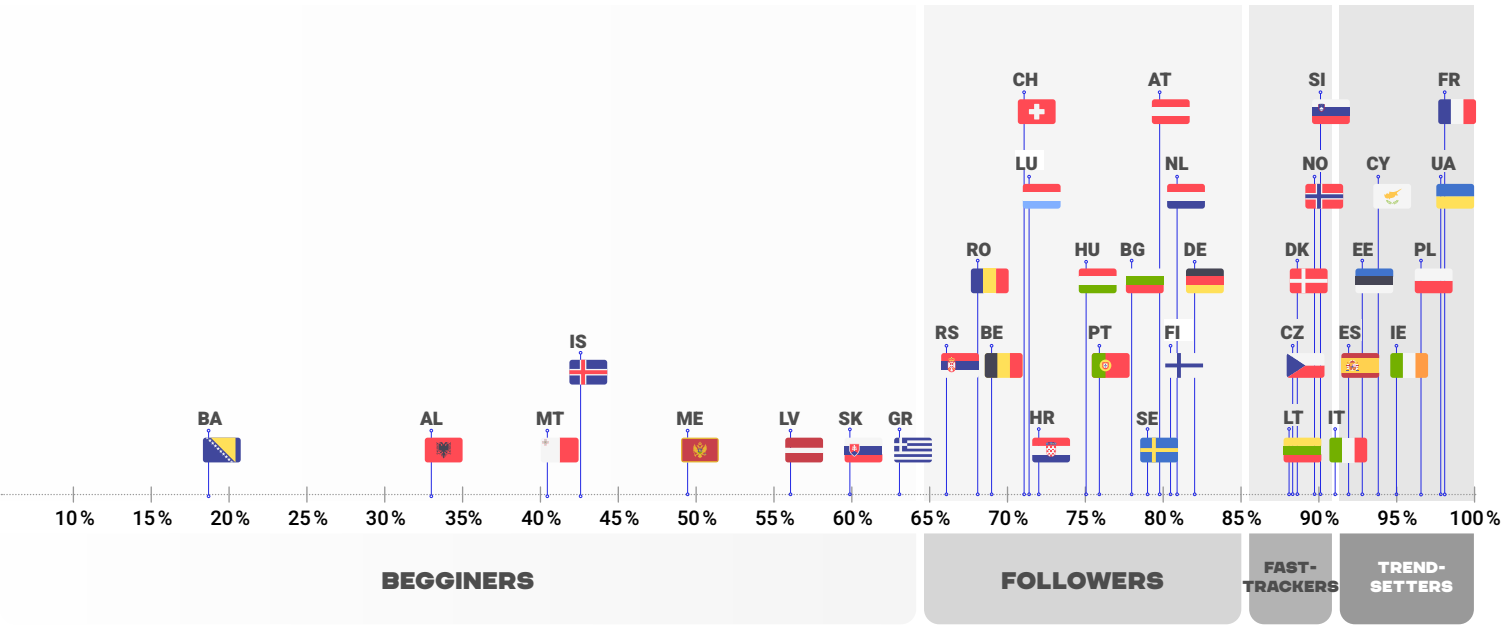
Figure 3 shows the groupings obtained according to this maturity index. Countries are grouped from lowest to highest in the index into four categories: beginners, followers, fast-trackers and trendsetters. The chart shows that:

- The maturity of European countries is concentrated at the upper end of the spectrum (above 65 %).
- The trendsetters grouping is made up of the eight top performing countries: France, Ukraine, Poland, Ireland, Cyprus, Estonia, Spain and Italy.
- The five countries included in the fast-trackers group show very similar scores, as the group is concentrated in a 3 % range (88 to 91 percentage points).

Figure 4 presents the average level of maturity of the EU-27 in each of the four dimensions and is compared with the figures from the previous year, leading to the following conclusions:

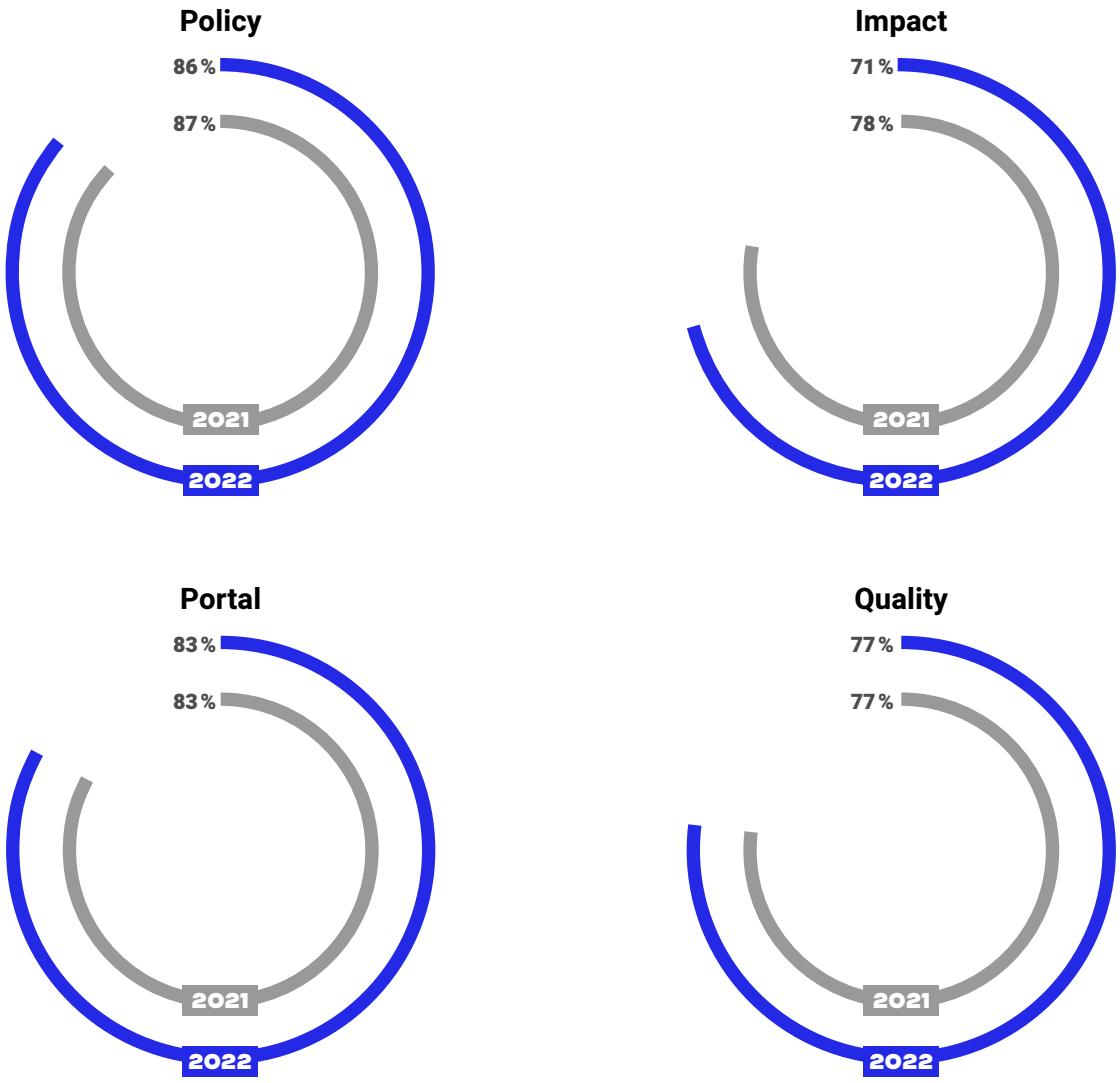
- All figures show a slight decrease or the same score as last year. The dimensions with the lowest scores are policy and impact, which went through several changes in methodology in 2021.
- As in 2021 and 2020, policy is the most mature dimension, with a score of 86 %.
- The impact dimension shows a decrease of seven percentage points, which reflects the updated methodology and questions aimed at more accurately measuring the progress of the different countries.

FIGURE 3. Groups of countries in terms of the open data maturity index (2022)



Source: Carsaniga et al. (2022: 9).

FIGURE 4. Average maturity level of the EU-27 in each of the four dimensions



Source: Carsaniga et al. (2022: 10).

- The portal dimension has remained stable since last year and is the second most mature.
- The quality dimension shows limited improvement and is the third most mature.

Additionally, European reports (Carsaniga et al., 2020; Osimo and Pizzamiglio, 2023) highlight other trends that represent good opportunities for the development and improvement of open data management in the European context:

- Human resources and skills. Several countries highlight the lack of human resources allocated to open data and the absence of adequate data and literacy skills among public officials (Carsaniga et al., 2020).
- Availability of financial resources. This challenge refers, for example, to securing a recurring budget for specific datasets (high-value datasets), as well as not having a planned budget (Carsaniga et al., 2020).

- Coordination issues. The EU-27 often reports difficulties in enabling smooth governance of data management at all levels of government (Carsaniga et al., 2020).

- Commitment to the subject of open data. Encouraging different actors to provide and use open data is a widely spread challenge throughout the EU (Carsaniga et al., 2020).

- An additional aspect of open data publishing is the need for more support, in legal, technical and financial terms, when it comes to publishing high-quality open data (Carsaniga et al., 2020).

- Regarding awareness and communication, any action must also include examples of data reuse by the public sector. The collection and communication of these examples and usage cases greatly helps to understand the importance of the public sector's role as a data reuser (Osimo and Pizzamiglio, 2023).

- Regarding policy and regulation, it would be beneficial to align the European Commission's regulation improvement activities and work plans with open data publishing activities, in order to better explore internal data needs. Furthermore, it would be useful to facilitate a similar alignment and analysis of data needs for all European public administrations. For example, this could be done by providing examples, best practices and methodologies on how to determine data needs for policy and regulatory purposes (Osimo and Pizzamiglio, 2023).

- Existing monitoring activities, such as surveys, should be reviewed to ensure that the public sector includes the reuse of data. It would be useful to create a user group, based on the existing broad community, that could be used to conduct new surveys (Osimo and Pizzamiglio, 2023).

- The role of data administrators remains fundamental in promoting reuse. Therefore, examples, best practices and methodologies on the role of data administrators should be included in supporting activities, not specifically for public sector reusers, but in general (Osimo and Pizzamiglio, 2023).

The characteristics of Spanish open data portals go beyond simply allowing users to find available datasets. There is a common focus on interaction between data publishers and reusers through discussion forums, data-specific feedback systems and rating systems. By using examples, portals expose valuable cases of open data reuse (Carsaniga et al., 2020).

The best practices related to each of the open data maturity dimensions explored in this report can be highly beneficial for all countries in Europe and beyond to get inspired, learn and work towards improving their own practices. Spain is one of the countries that sets the trend in terms of open data management (Carsaniga et al., 2020).

1.3 OPEN DATA IN SPAIN

The latest edition of the Data Economy Report in the infomediary sector, carried out by ASEDIE, includes results from an analysis of 542 companies that have business models based on data, and shows that the basis of decision-making depends more than ever on information and data and that, sometimes, we are not even aware of this act of digitalisation (ASEDIE, 2023). Advances in artificial intelligence, as well as the Internet of Things, are realities that are evolving at an ever-increasing rate and are causing a transformation in the economic system. Data, its management and its analysis have become the necessary element for business progress, which makes the infomediary sector one of the most influential in our economy (ASEDIE, 2023).

This same report highlights that there has been an increase of 12.1 % in the infomediary sector, compared to a national GDP growth of 7.6 % (ASEDIE, 2023).

The increase in both the digitalisation of processes and the attention companies give to data quality are recognised as factors that improve expectations for data reuse. So-called "data culture" is progressively growing in Spain, which on the other hand sets a trend in open data management in the EU (ASEDIE, 2023), as described in the previous summary.

In Spain, infomediary companies are more active in some regions than others. The sector is represented in all the autonomous communities of the Spanish territory and in the autonomous city of Melilla. The Community of Madrid, with 39 %, is the autonomous community with the most infomediary companies, followed by Catalonia, Andalusia and the Valencian Community, with weights of 13, 11 and 9 % respectively. The rest of the autonomous communities make up the remaining 28 % of infomediary companies (ASEDIE, 2023).

The four sub-sectors with the most impact represent 75 % of the total employees in the sector, and Geographical Information stands out with 30 % of the total. Behind it are, with a similar percentage, Financial, Technical Consulting and Market Research. The rest represent 25 % of the market, all below 10 % (ASEDIE, 2023).

Of the total infomediary companies, 68 % have existed for less than 20 years: 32 % for between 11 and 20 years, and 36 % for less than 10. 64 % of them were created more than 10 years ago. The average age of companies is 16 years. In the last year, 40 companies have been created. Publishers is the only subsector where the majority of companies have been active for more than 20 years. At the other extreme are Tourism and Meteorological, of which 100 and 85 % of companies, respectively, are less than 20 years old. The rest of the sub-sectors have between 60 and 80 % of companies that are less than 20 (ASEDIE, 2023).

The number of companies detected within the infomediary sector has grown almost 60 % since the beginning of this report in 2013. As of December 2021, the number of infomediary companies identified in Spain is 710. The number of employees of the 542 companies in those for which employee data is available amounts to 22,663, and the net profit of the 506 companies for which results data is available amounts to 181,707,060 euros (ASEDIE, 2023).

The autonomous communities that have grown the most since then (proportionally) are Cantabria (400 %), Murcia (300 %) and Extremadura (300 %); and in number, Madrid (83), Andalusia (54) and the Valencian Community (45). The only autonomous community that has decreased is Catalonia, and the only one in which no company has been detected is the autonomous city of Ceuta (ASEDIE, 2023).

74 % of respondents from the academic sector, 71 % from the private sector and 73 % from the public sector indicated that they are aware of European regulations on the six categories of high-value public datasets. Respondents from the public sector, who are both providers and reusers of public information, highlight that the most significant obstacles they encounter when reusing information are (ASEDIE, 2023):

- The information provided in the data is not homogeneous (41.9 %).
- dDatasets are not available in all autonomous communities or in all city councils (41 %).
- Lack of data updates (38.1 %).

Regarding obstacles when reusing data, both the academic and private sectors agree that the main obstacles are (ASEDIE, 2023):

- Lack of data updates.
- Lack of availability.
- Difficulty in accessing it.

Data federation allows you to redistribute an open dataset from its original domain or another domain in whole or in part. It is a way to collect external sources of data in domains that are usually most actively visited. In this sense, the 2021 report detected a significant increase in federated data as a way to avoid these obstacles (Abella, Ortiz de Urbina Criado, De Pablos Heredero and García Luna, 2021) that has continued to this day.

Regarding the impact of the usefulness of open data, 88 % of academic respondents who have knowledge of high-value sets believe that they are useful for their institution. 96 % of companies surveyed who have knowledge of high-value datasets believe they are truly useful for their business. 77 % of public sector respondents who have knowledge of high-value datasets have indicated that their agency is responsible for at least one of them. 72 % of public sector respondents who have indicated that their agency is responsible for one of the high-value datasets have indicated that they will publish the data within the established time frame—16 months— (ASEDIE, 2023).

In terms of academic and business impact, 54 % of private sector respondents who have knowledge of the six categories of high-value data have indicated that up to this point they have paid for some of the data collected in these categories, while 93 % of them have stated that free access to data will have a positive impact on their budget. Regarding the academic sector, only 13 % of respondents who have knowledge of high-value data usually pay for its use. However, all respondents affirm that free access to data will make it easier to carry out research projects (ASEDIE, 2023).

95 % of respondents state that it would be beneficial to have a list or compendium of existing regulations that directly affect the access to, publication and reuse of public sector data. 65 % of those surveyed who request a list or compendium of regulations state that it would help to advance the training and informing of those involved in the data ecosystem, and 59 % mention that it would help to make the implementation of the different regulations clearer and easier (ASEDIE, 2023).

63 % of respondents affirm that they use data daily or at least once a week. The most in-demand data is statistical, information on the public sector and geospatial. 61 % of respondents affirm that they use the data published on the data.gob.es portal. 66 % of respondents say they use data published on other Spanish portals. 77 % of respondents

who use these portals have indicated that they access the portal of the National Institute of Statistics, and 52 % access the portal of the National Centre for Geographical Information. 67 % of respondents indicate that they use data published at a regional level. Although the use is similar in all autonomous communities, it is worth highlighting the use of the portals of the Community of Madrid, the Junta de Andalucía and the Generalitat de Catalunya (ASEDIE, 2023).

The creation of open data portals does not imply that the data they publish is ready for professional reuse. Organisations that offer open data portals must consider that one of the values that data provides lies in its capacity for reuse, so they must try to define and create open portals whose characteristics allow the adequate reuse of data (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2022).

The political interest in implementing open government projects has produced some confusion and ambiguity (Gil-García, Gasco-Hernández and Parto, 2020). Specifically in the case of Spain, we have identified a high number of what we call pretender open data portals (PODP) (Abella et al., 2022), given that these are open data portals that contain data, but which is not suitable for reuse. Cetina (2021) refers to the need to work on "purposeful data" in order to make it useful.

Ortiz-de-Urbina-Criado, Abella and De-Pablos-Heredero (2023) analyse the reputation of open data portals considering it the collective recognition of the capacity demonstrated by the portal to systematically offer reusable open data and allow the creation of value based on it. The authors base their analysis on the three dimensions proposed by Lange, Lee and Dai (2011) to measure reputation:

- The degree to which "it is known" (dissemination and knowledge of the data portal).
- The degree to which it is "known for something" (for example, for its level of maturity, its datasets, the services developed by its data or by its innovation).
- Its *generalised favorability* (the opinion of the reusing agents in the data ecosystem).

Having reliable metrics that allow measuring the quality of the data hosted by open data portals, with regard to its reuse, is of great importance. The reputation of portals can boost their continuous improvement. In this report, an evaluation of open data portals in Spain is carried out, applying the latest version of the MELODA metric (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2019).

1.4 AN OUTSTANDING AUTONOMOUS APPROACH: OPEN ADMINISTRATION OF CATALONIA

The Open Administration of Catalonia Consortium (AOC) seeks to guarantee that all citizens of Catalonia enjoy quality digital public services, regardless of their municipality of residence and the capabilities and resources of the public bodies they engage with.

The great challenge we have is that more than 90 % of public entities are of a reduced or very reduced size and do not have the resources to comply with very demanding standards, which are the same for a large administration or a small-town council.

Regarding the practice of open government and good governance, the AOC offers local administrations the following common services:

- Transparency portal
- Open data platform
- Whistleblower channel
- Citizen participation platform
- Institutional integrity self-assessment guide

The results of the Catalonia model of open government are the following:

- Approximately 1,230 local entities use AOC services.
- 85 % of citizens say they are satisfied or very satisfied.
- The degree of compliance with the transparency law in Catalonia is 50 % higher than in the rest of Spain, according to data from Infoparticipa (Universitat Autònoma de Barcelona).
- Savings of 5 million euros per year are generated in administrative transparency tasks.

1.5 THE DATA REUSE MODEL

MELODA is a metric for assessing the quality of open data that enables users to qualify information and evaluate its degree of reuse (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2014). MELODA 4 was the version used in the 2017 (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2017) and 2019 (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena, 2019) reports. In its current version, MELODA 5 evaluates two additional dimensions and features a modification to the levels and calculations (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2019), as can be seen in Table 2.

TABLE 2. Dimensions and levels of MELODA 5

Dimensions (max. 61 points)	Levels
Licence (max. 6 points)	1: private use
	2: non-commercial reuse
	3: commercial or unrestricted reuse
Access to information (max. 6 points)	1: access to dataset via website or URL single parameters
	2: single access to the website with parameters referring to individual data
	3: API or query language
Technical standard (max. 6 points)	1: closed reusable standard or open non-reusable standard
	2: open reusable standard
	3: open standard, with individual metadata
Standardisation level (max. 10 points)	1: own standardisation model
	2: own standardisation model or published ad hoc (coordination)
	3: local standardisation
	4: global standardisation
Geolocated content (max. 6 points)	1: without geographical information
	2: simple or complex text field
	3: with coordinates or complete geographical information
Data update rate (max. 15 points)	1: above one month
	2: monthly: with update periods between 1 month and 1 day
	3: daily: with update periods between 1 day and 1 hour
	4: every hour: with update periods from 1 hour to 1 minute
	5: in seconds: update period less than 1 minute
Dissemination (max. 6 points)	1: non-systematic communication/dissemination
	2: available resources on updates (e.g. social media feeds)
	3: proactive dissemination / push dissemination (automated information at certain times)
Reputation (max. 6 points)	1: no information about the reputation of the data source
	2: statistics or reports are published based on the opinions of users
	3: rankings or indicators based on the reputation of the data source

Source: Abella, Ortiz de Urbina Criado & De Pablos Heredero (2019: 6).

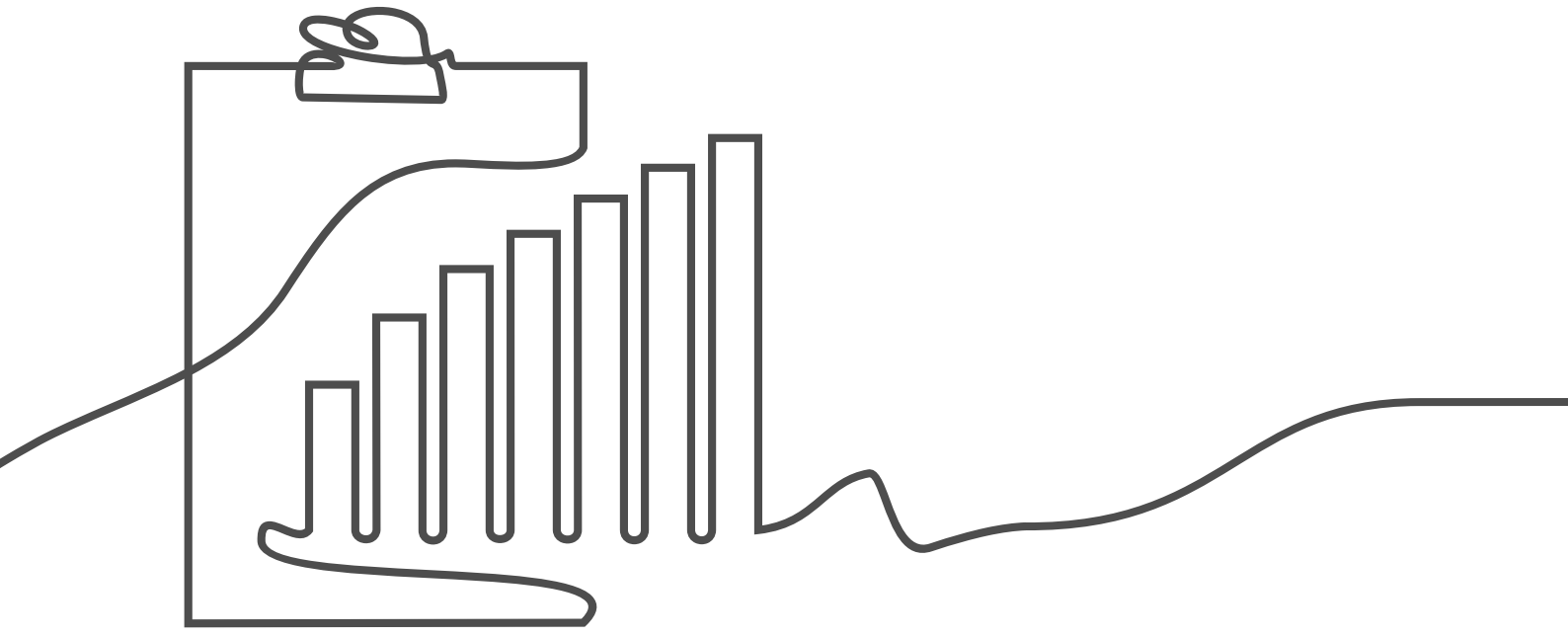
In version 5 of MELODA, some of the ideas proposed by experts have been examined and the assessment of each level has been revised. In this version, each level is assigned the value it has (1, 2, 3, 4 and 5). To evaluate the degree of reuse of each dataset, two measurements are used: 1) the sum of the scores obtained in each dimension, and 2) for each dimension a descriptive analysis of the frequency of each level is carried out. The first measurement will provide a ranking of datasets according to their degree of reusability; while the second allows us to have a more detailed image for each dataset and identify which dimensions need to be improved (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2019: 6).

Additionally, to classify the datasets based on MELODA 5, three categories of degree of reuse have been created (Table 3): from 8 to 23 points (the lower end is the sum of category 1 of the 8 dimensions) is inappropriate; from 24 to 47 points (the lower end is the sum of category 2 of the 8 dimensions) is basic; and from 48 to 61 points (the lower end is the sum of category 3 of the 8 dimensions) is advanced.

TABLE 3. Ease of reusability rating ranges in MELODA 5

MELODA 5 ranges	8-23	24-47	48-61
MELODE 5 category	Inadequate	Basic	Advanced

Source: Own authorship.



1.6 OBJECTIVE OF THE REPORT

This report conducts a study on data reuse in Spain with the aim of presenting the current status of research and identifying guidelines and recommendations that help promote the use of data and generate business. It follows on from three previous reports carried out in 2017 (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2017), 2019 (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena, 2019) and 2021 (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna, 2021 in Spanish; 2022 in English) and analyses the changes that have occurred in recent years. To this end, open data portals in Spain have been identified in order to analyse a sample of the datasets they publish and some of the services generated. In addition, a survey was conducted with those responsible for the portals in order to analyse some of the characteristics and activities in relation to their open data. Specifically, a diagnosis was made of the portals' knowledge of data reusers, the type of innovation that can be made with the published data, the activities to promote the use of data, the services generated, the creation of value from the reuse of data and the reputation of the portals. The latest version of the MELODA 5 metric has also been applied to analyse the degree of reuse of open data published on Spanish open data portals. All these analyses have allowed, by means of a SWOT matrix, a diagnosis of the opportunities and threats and of the strengths and weaknesses, from which a series of reflections have been included that can help to build future data management policies for the encouragement of business creation.

METHODOLOGY

02.

2.1 METHODOLOGY FOR STUDYING PORTALS THAT PUBLISH DATA

345 data portals have been identified from the following sources:

- Previous 2021 report on the state of open data in Spain (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna, 2021; 2022)
- Data from data.gob via its list of initiatives[5].
- Open Administration of Catalonia Consortium
- Complementary research by the team conducting the report

Through the consolidation of these sources, the availability of each of them was validated one by one. In 33 cases it was detected that the portal was either unavailable (e.g. error 404) or did not publish data.

In line with Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017), the following values were identified for each portal:

- Availability of mechanisms for publishing data updates.
- Availability of a catalogue of resources, number of available datasets and whether the catalogue is downloadable.
- Existence of direct data connection mechanisms (API) or query language (e.g. SPARQL).
- Availability of a portal where services or applications are identified based on the portal data and number of identified services.
- Use of a specific data publication and reuse tool: DMS[6].
- Number of published datasets.
- Which of the published datasets are original to the portal and which are federated from other portals.
- Identification of the autonomous community of the entity that publishes the portal or if it is part of a nationwide entity.
- The mechanisms for contacting the portal manager (e.g. e-mail or web form).

2.1.1 Simplified maturity model for portals that publish data

Following the same methodology as Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017), a simplified maturity model has been defined based on the model in the pan-European data portal initiative by Carrara, Nieuwenhuis and Vollers (2016), introducing the following elements for consideration:

- The population of datasets exceeds 30 items.
- The availability of a feed (RSS or equivalent) with data updates.
- The availability of an application programming interface (API) to allow automated access to data by external users.
- The use of a data management system (DMS). For the purpose of this task, the following tools have been considered: CKAN, Socrata, DKAN, OpenDataSoft, ESRI Open Data and AOC.

5. https://datos.gob.es/es/iniciativas.
6. Data Management System.

- The availability of an application portal with the services developed based on the published data.

With the information obtained, an analysis of the maturity of the data on the portals was carried out. For this task, the metric developed by Abella, Ortiz de Urbina Criado and De Pablos Heredero (2017) was used. The analysed aspects and their importance are presented in Table 4.

Portals with a maturity value of less than 25 are considered inadequate; from 25 to 50 are considered basic; 50 to 75 are considered adequate, and above 75 are considered optimal.

TABLE 4. Metrics for analysing the maturity degree of data portals

Concept	European report concept	Weight (%)
Having more than 30 datasets	*Spread of data*	20
Having a source with catalogue updates	*Usability of the portal*	10
Using a data management system (DMS)	*Usability of the portal*	15
Availability of an application programming interface (API) for automated interaction with the datasets	*Re-usability of data*	25
Portal of applications/services based on open data	*Re-usability of data*	30

Source: Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017), based on Carrara, Nieuwenhuis and Vollers (2016)

2.2 METHODOLOGY FOR STUDYING PUBLISHED DATASETS

From the 163 valid portals selected, a sample of datasets statistically representative of the population with a 10-point interval has been chosen with 95 % confidence using the Surveysoftware tool (*http://www.surveysoftware.net/sscalce.htm*). This has resulted in a sample number of 300.

In the previous section, all the datasets that were specific to each portal were identified, which allowed a list to be made of the 71,849 datasets collected, establishing the numbering intervals that corresponded to each portal. Following this step, 300 different numbers were randomly generated by means of a random number generator, so that each number could be assigned to a portal according to the previous ranges.

A total of 71,849 datasets were identified in the 163 selected portals. Considering the size of the study population, 300 datasets were sampled. In line with Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017), each of the data reusability dimensions described in the MELODA metric (Abella, Ortiz-de-Urbina-Criado and De-Pablos-Heredero, 2014) and updated to the latest version of MELODA 5 (Abella, Ortiz-de-Urbina-Criado and De-Pablos-Heredero, 2019) were considered for each dataset:

- Legal reuse licence
- Technical standard in which the information is presented
- Information access mechanisms
- Data model used
- Geographical content of the information
- Update frequency
- Dissemination.
- Reputation.

2.3 METHODOLOGY FOR STUDYING THE REUSE OF PUBLISHED DATA

A survey of open data portals was conducted during the months of October to December 2022 and January to March 2023. The survey was sent to 113 portals whose manager or contact form had been requested and a contact mechanism was found.

There were 31 complete responses to the questionnaire, a response rate of 27.43 %. Each of them had to answer a questionnaire on the reuse of data on their data portal, their knowledge of reusers and their policies to promote reuse (Annex 1). The new version of the MELODA metric assesses the reputation of the data on these portals, but as there are no rankings on this aspect, to implement this dimension in a robust way, questions on the reputation of the published data were included in this survey directed at the managers of open data portals.

For reputation, the survey included the assessment of the 163 open data portals, including a specific question for them to assess the level of knowledge and reputation of a random sample of between 10 and 11 portals, always excluding their own portal. In this way, 16 groups were created for each portal manager to vote for other portals. Once the first responses had been received, it was observed that there were some portals that were not rated (69 of the total), so a second round of surveys was carried out and, finally, a last round for the remaining portals, sending a new questionnaire

randomly to six of the portal managers so that they could rate the portals taking into account that they had not been included in their previous questionnaire. This survey asked about their knowledge of other open data portals and their perceived prestige. Both were classified into three categories. The final reputation was obtained by the voters' most frequent rating of the reputation of other open data portals, based on the respondent's own apparent knowledge of the voted portal.

A manual analysis of 330 open data portals was also carried out to identify their characteristics and degree of maturity. It was found that 148 were PODP, 33 were non-operational and 163 were valid.

To analyse the degree of reuse of open data, the datasets published on the open data portals were reviewed. Specifically, 300 datasets were sampled, of which 272 (90.67 %) were valid and the rest were found to have no content (28). The MELODA 5 metric was applied to analyse the degree of reuse of open data (datasets) published in the sampled portals.

Of the portals analysed, 38 of them have a section for data-driven applications and services. As for the developed services, they were detected in the sample of 1083 applications/ services listed in the application sections of the portals. 21 of them were not operational, which represents a percentage of 34.90 %.

To complete the information, a direct analysis of the applications and services that the data portals themselves provide as accredited reusers of data was also carried out, identifying the authors and extracting data from the corporate portals of each one of them. We sampled 63 applications and services from the portals that had inventoried services based on open data, chosen at random. This is a statistically significant sample for a 12-point interval with a confidence level of 95 %, following the same approach and tool as above.

In line with Abella, Ortiz-de-Urbina-Criado and De-Pablos-Heredero (2017), the data extracted for each of these services is:

- The themes of the service according to the NTI-RISP classification, from which its equivalent can be converted into DCAT-AP (European Union, 2017).
- Geolocation characteristics.
- The real-time characteristic of the service.
- The type of author of the application.
- The sustainability mechanism if there is one. Sustainability describes the economic viability of the service in the medium term, either because there is an entity that supports the costs, or because the service has its own revenue generation mechanisms. For example, in the case of a corporate service, the entity that publishes the service supports its costs even though it has no directly related revenues. Whether it has any business model that includes a source of revenue other than that of the entity publishing the data and, if so, what type. The categories used are:
  - Ads (ads would support the cost of the application/service).
  - Institutional support (for example, the support of a public entity).
  - Freemium (part of the service is free and another part is paid).
  - Entity promotion (SME marketing; used to advertise the author).

- Pay-per-use (the application is fee-based).
- Non-profit (the entity does not want to obtain profits, for example, third sector).
- No business model.

2.3.1 Data federation

Dataset federation, i.e. the republishing of datasets that belong to other portals, is a phenomenon that continues to appear. In the current report, it can be seen to have grown compared to what was obtained in the 2021 report.

This phenomenon, which in previous editions was only significant for the national portal datos.gob.es and for Open Data Euskadi, now occurs in six of the 163 valid portals. Moreover, the identification of this federation is not standardised, which means that a manual scan must be carried out to determine one or the other.

2.3.2 Consolidation of the General State Administration portals

In previous reports (2017 and 2019) it was normal for each public entity of the General State Administration to have its open data portal. In 2021 it is observed that most of them have delegated this function to datos.gob.es. For this reason, the portals have been reviewed to identify the datasets that are federated and to establish a criterion for sampling them. Specifically, only those federated in datos.gob.es have been taken as the number, since the classification of these portals is not similar. For example, this criterion has been applied for the National Centre for Geographical Information (CNIG) and based on our analysis, they have 94 datasets. For the National Employment Institute (INE) datasets, this institution defines statistical operations, each of which can generate a varied number of datasets, but it is not possible with the means at our disposal to know how many these would be. 14,255 datasets that are federated in datos.gob.es and authored by INE have been analysed. For the Cadastre, it can be seen that many sources are not open data (they require identification to access), but those that are, are often structured by years and provinces. In this case, it has been counted as only one regardless of the years or provinces, and we observe that it is not federated with datos.gob.es..

DIAGNOSIS

03.

3.1 DIAGNOSIS OF THE PORTALS THAT PUBLISH DATA

A total of 163 active portals have been sampled. If we analyse the autonomous communities with which these portals are associated (Table 5), we observe that 38.70 % are in Catalonia, 14.70 % in Andalusia and 8.60 % in the Canary Islands. Of these, 7.40 % are considered to be national in scope.

In the 2021 report, Extremadura was the region with more than 100 portals. In the 2023 report, the so-called "pretender data portals" have not been considered in the sample (Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, 2022). Therefore, in 2023, Extremadura has a lower representation of portals (3.10 %).

3.1.1 Updating of data and availability of APIs

In 2023, 29.40 % of portals have a channel to know when a dataset has been updated. This is higher than the figure obtained in previous reports. In 2021 it was 17.30 %, in 2019 it was 17.2 % and in 2017 it was 28 %.

In 2023, 84.70 % have an automated data access mechanism (API or semantic interrogation point). In this respect, the figures are much higher than in previous reports. In 2021 it was 37.7 %, while in 2019 it was 33.3 % and in 2017 it was 46 %. These results, as well as those in the following sections, show important changes due to the elimination of the detailed analysis of PODP portals, of which there are 148.

TABLE 5. Open data portals by autonomous community 2023

AUTONOMOUS COMMUNITY	FREQUENCY	PERCENTAGE
Andalusia	24	14,70
Aragon	5	3,10
Balearic Islands	1	0,60
Canary Islands	14	8,60
Cantabria	3	1,80
Castile and León	2	1,20
Castile-La Mancha	1	0,60
Catalonia	63	38,70
Community of Madrid	10	6,10
Chartered Community of Navarra	2	1,20
Valencian Community	6	3,70
Extremadura	5	3,10
Galicia	3	1,80
Basque Country	7	4,30
Principality of Asturias	1	0,60
Region of Murcia	3	1,80
Valencia	1	0,60
National	**12**	**7,40**
TOTAL	**163**	**100**

Source: Own authorship.

Practically 30 % of open data portals have a notification mechanism for updates to their data and 85 % have automated access.

3.1.2 Data management system

In terms of the system used, 72.40 % used a data management system in 2013 (CKAN, Socrata, DKAN, ODS and Arcgis Open Data), compared with 29.07 % in 2021 and 25.2 % in 2019.

Additionally, in 2023, 27.60 % do not use a DMS, while in 2021, 55.71 % used a non-specific solution, such as certain content management systems like Joomla, WordPress or Liferay, which was a lower percentage in 2019 (49.8 %).

3.1.3 Developed services portal

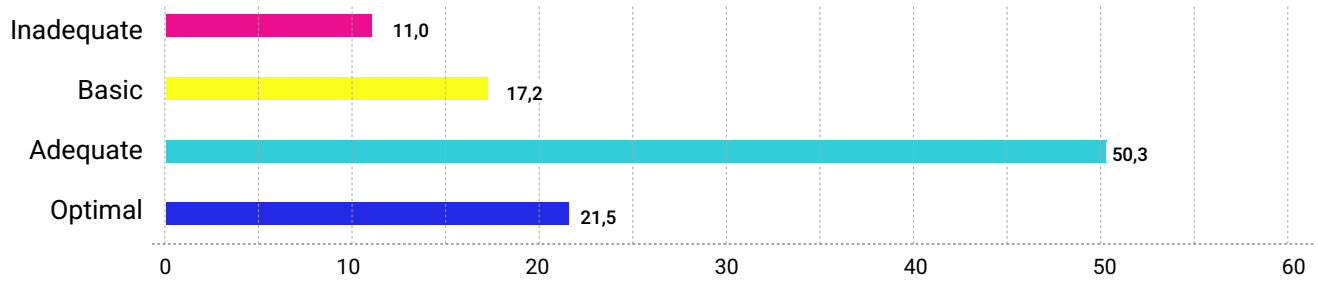
In terms of the development of services, in 2023, 34.40 % of portals have information on developed services based on their data, while in 2021 it was 15.6 %; in 2019, 19.4 %, and in 2017, 40 %. Here again, they are influenced by the removal of PODPs.

More than 70 % of data portals use a specific data publishing tool (DMS).

3.1.4 Maturity of portals according to methodology

Figure 5 shows the percentage of portals according to their maturity for data publishing based on the methodology described in section 2.1. In 2023, 21.50 % have an optimal level and 50.30 % have an adequate level. In 2019 only 13 % had an optimal level, while in 2021 this figure was similar, i.e. 12.11 %. Furthermore, in 2021, 21.80 % of portals had an adequate level of maturity similar to the 2019 figure (19 %). In 2021 the majority were inadequate (50.87 %), while in 2019, 62 % of portals were inadequate.

FIGURE 5. Distribution of data portal maturity in Spain 2023



Source: Own authorship.

3.2 DIAGNOSIS OF PUBLISHED DATASETS

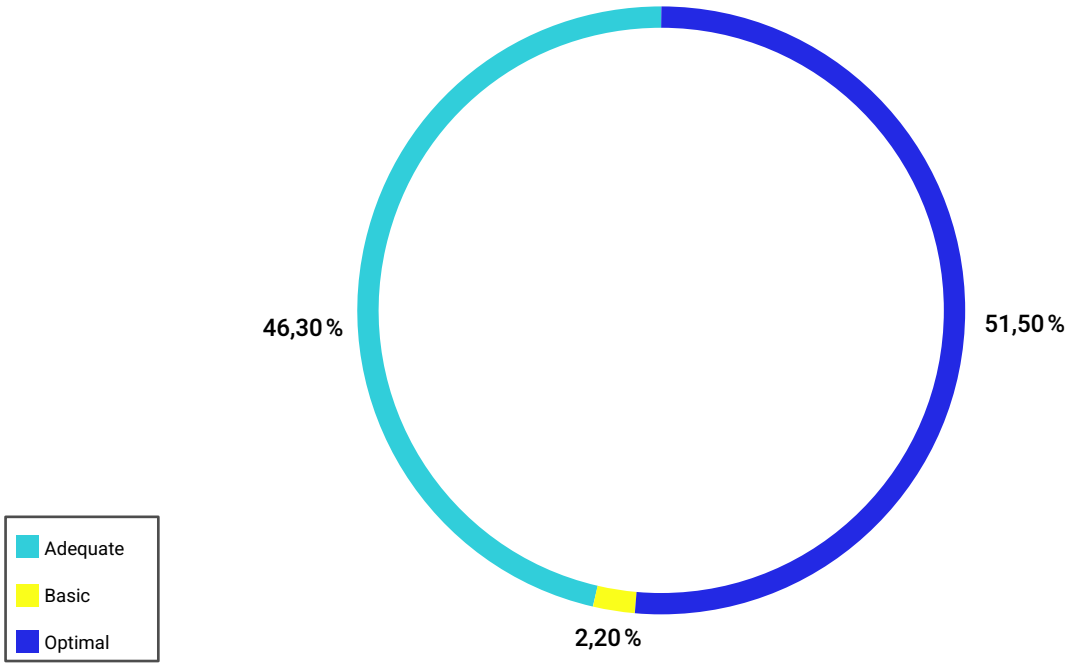
A total of 272 datasets randomly selected from those published in the sampled data portals have been analysed.

3.2.1 Distribution by degree of maturity of the portals that publish datasets

Figure 6 shows the datasets found in the portals according to their maturity in 2023. It shows that 51.50 % are on portals with optimal maturity in 2023, compared to 40 % in 2021.

More than half of the published datasets are on portals with optimal maturity.

FIGURE 6. Distribution of datasets by maturity of publishing portals 2023



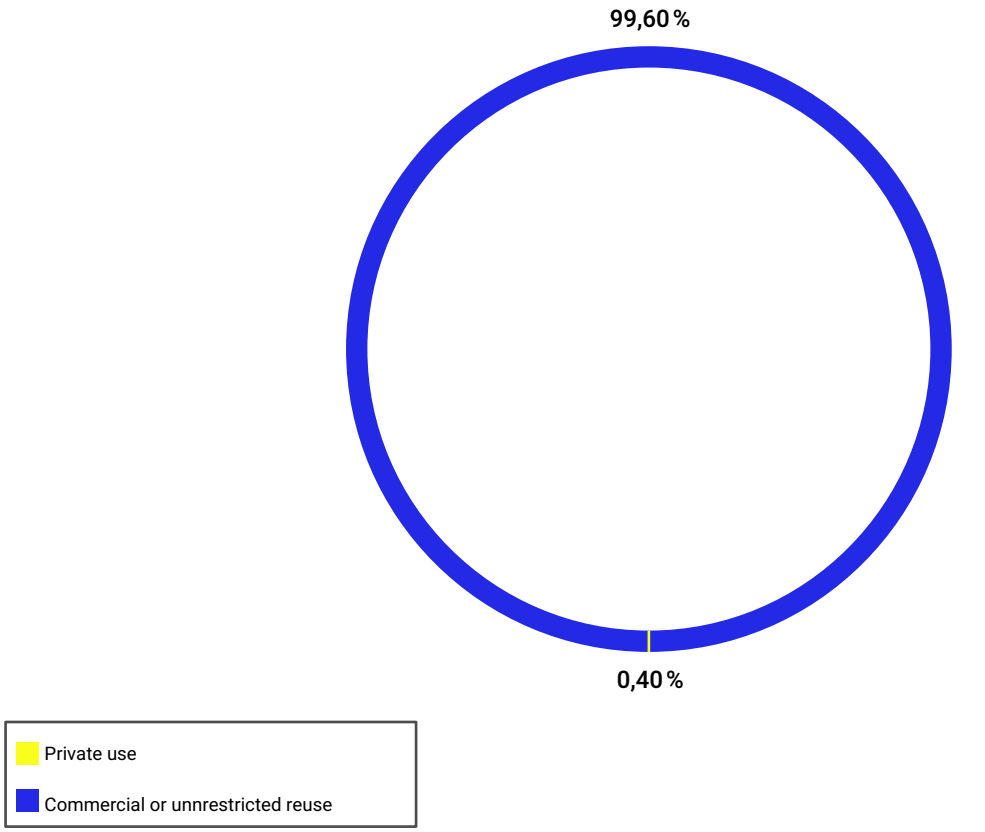
Source: Own authorship.

3.2.2 Categorisation by reuse licence

Figure 7 shows the distribution of datasets according to the licence of use under which the data is published. In 2023, almost 100 % of portals publish data under licences that allow commercial or unrestricted reuse. In 2021, it was 95 %.

Nearly 100 % of published datasets are licensed for commercial or unrestricted use.

FIGURE 7. Distribution of datasets by usage licence 2023 (MELODA 5)



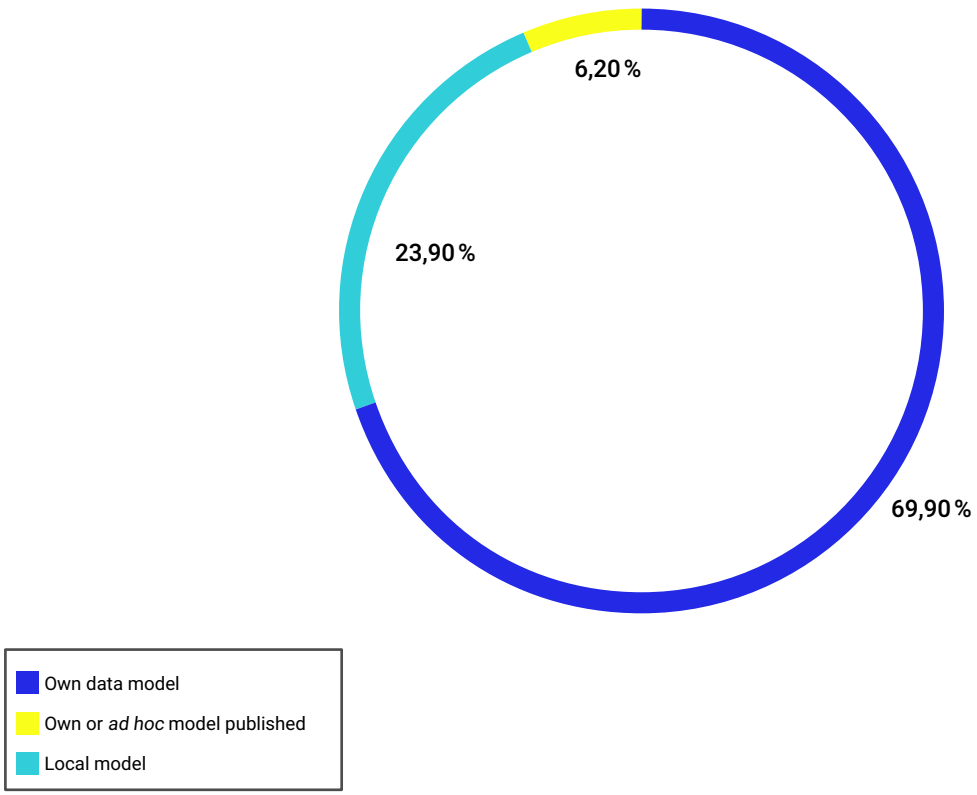
Source: Own authorship.

3.2.3 Categorisation by data model

Figure 8 shows the distribution of datasets according to data model. In 2023 no portal has a global data model, while in 2021 only 2 % had one. In 2023, 69.90 % have their own data model and 6.20 % have it published. In contrast, in 2021, overall, it was 78 %. In 2023, 23.90 % have a local model, compared to 15 % in 2021.

None of the datasets have a global data model.

FIGURE 8. Distribution of datasets by data model 2023 (MELODA 5)

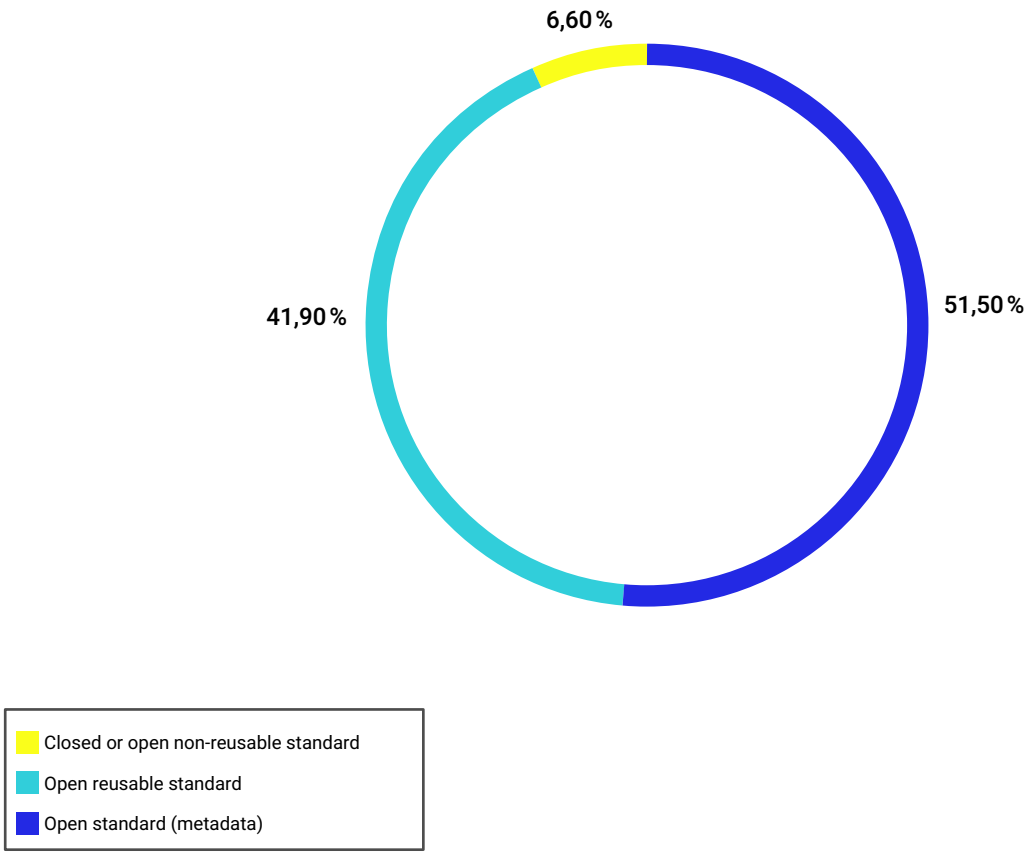


Source: Own authorship.

3.2.4 Categorisation by technical standard used

Figure 9 shows the distribution of datasets according to the technical standards in which the data are published. In 2023, 51.50 % are at the highest level of technical standard, while in 2021 it was 55 %. It is also noteworthy that only 6.60 % have a closed or open non-reusable standard, which was somewhat higher in 2021 (8 %).

FIGURE 9. Distribution of datasets by storage standard used 2023 (MELODA 5)

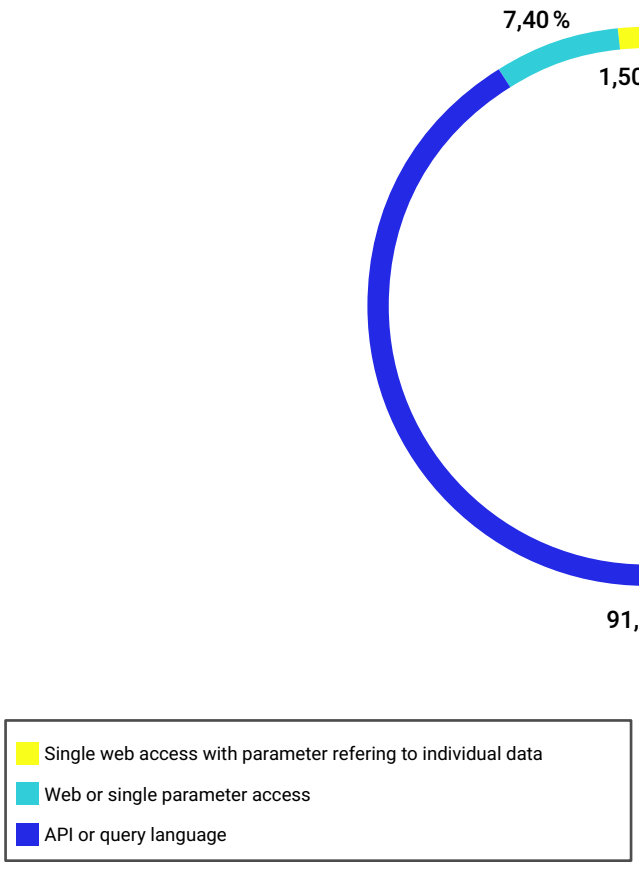


Source: Own authorship.

3.2.5 Categorisation by access mechanisms needed to access data

It is noteworthy that, in 2023, 91.20 % of datasets are at level 3 (API or query language), compared to 70 % in 2021. In contrast, only 1.40 % are at level 2, compared to 15 % in 2021. In 2023, 7.40 % have access via web or single parameter, which was higher in 2021 (15 %) (Figure 10).

FIGURE 10. Distribution of datasets by access mechanism used 2023 (MELODA 5)

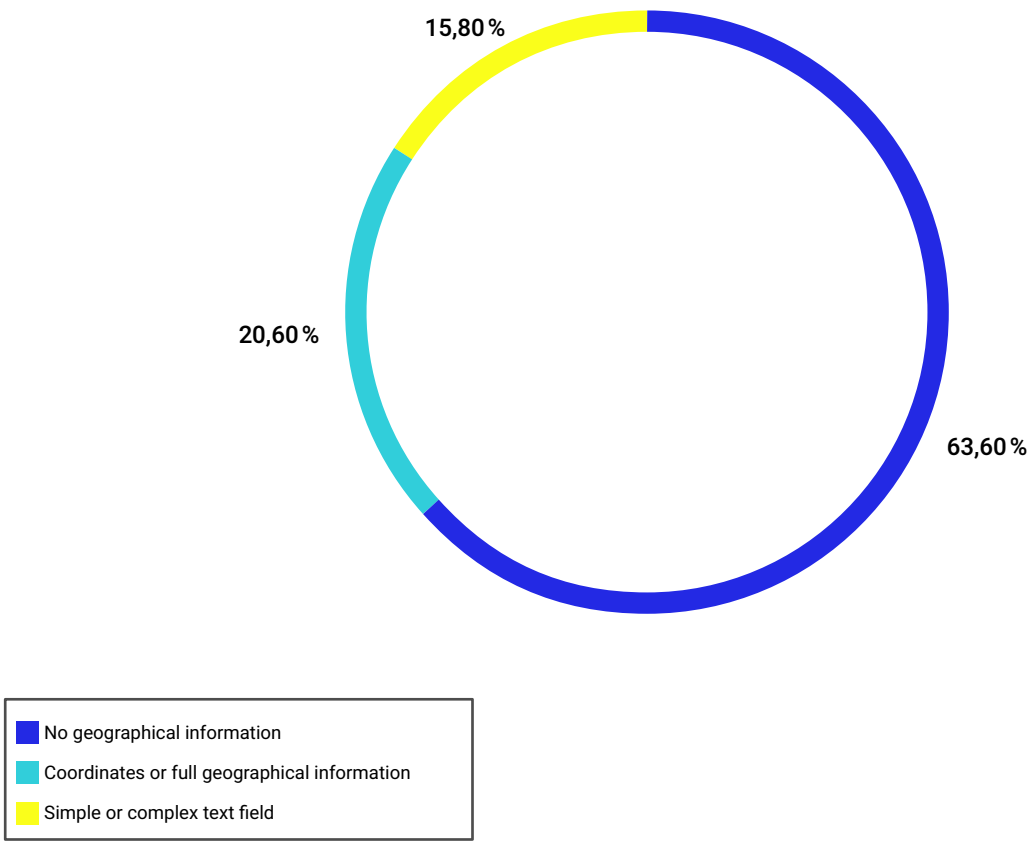


Source: Own authorship.

3.2.6 Categorisation by geographical content

In 2023, 63.60 % of datasets have no geographical information at all, this figure has increased significantly since 2021, when it was 49 %. On the other hand, in 2021, 17 % had coordinates or full information associated with the published content, and in 2023 this figure is 15.80 % (Figure 11).

FIGURE 11. Distribution of datasets by geographical content of information 2023 (MELODA 5)

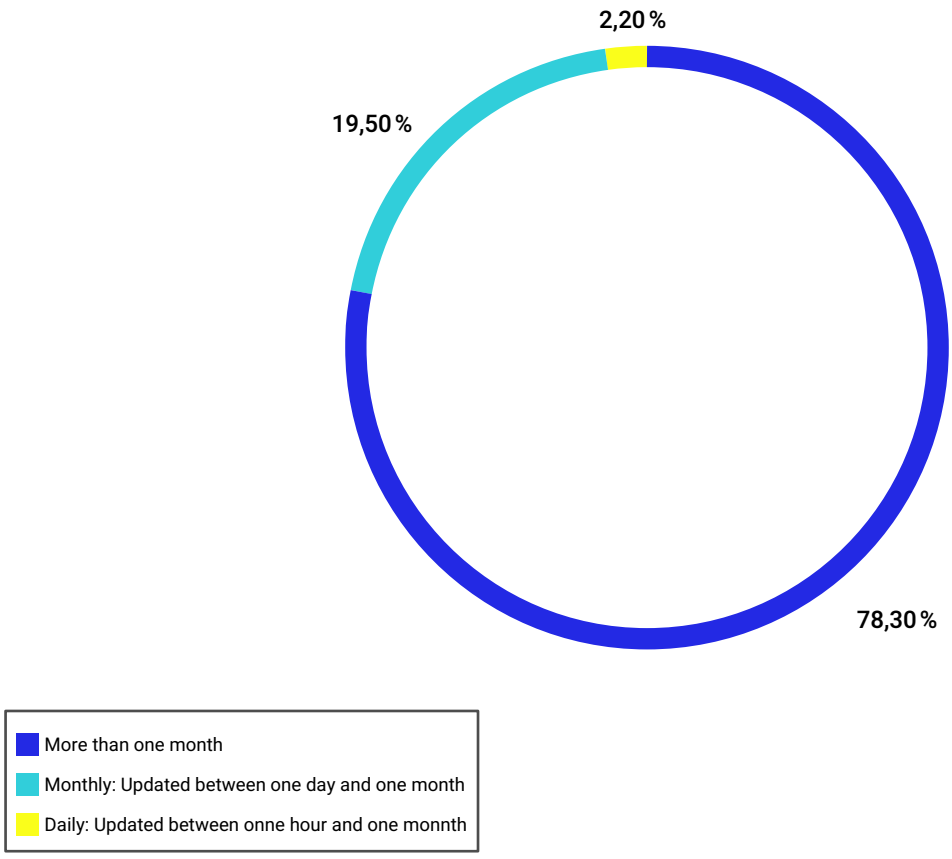


Source: Own authorship.

3.2.7 Categorisation by update frequency

Figure 12 shows the update frequency of the sampled datasets. Particularly noteworthy is the fact that 78.30 % are in the category of getting updated more than monthly, a figure that has decreased since 2021 (92 %). On the other hand, only 2.20 % in 2023 and 3 % in 2021 updated daily. In no case is the update less than one per day, so there is no data for categories 4 and 5 of the metric.

FIGURE 12. Distribution of datasets by update frequency 2023 (MELODA 5)

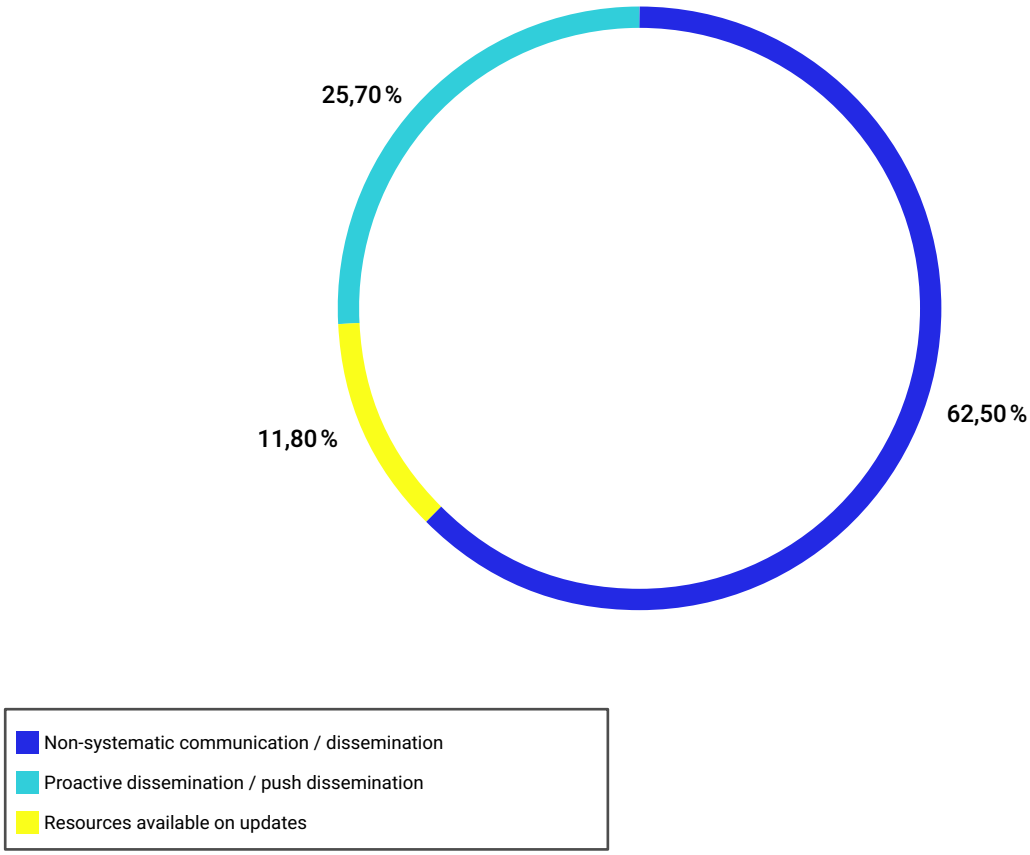


Source: Own authorship.

3.2.8 Categorisation by dissemination

Figure 13 shows the dissemination of the sampled datasets. In 2021, 42 % were in the highest category with proactive dissemination, but in 2023 this figure has dropped to 25.70 %. Furthermore, in the last year analysed, the majority (62.50 %) do not disseminate systematically, a figure that was 27 % in 2021.

FIGURE 13. Distribution of datasets by dissemination 2023 (MELODA 5)



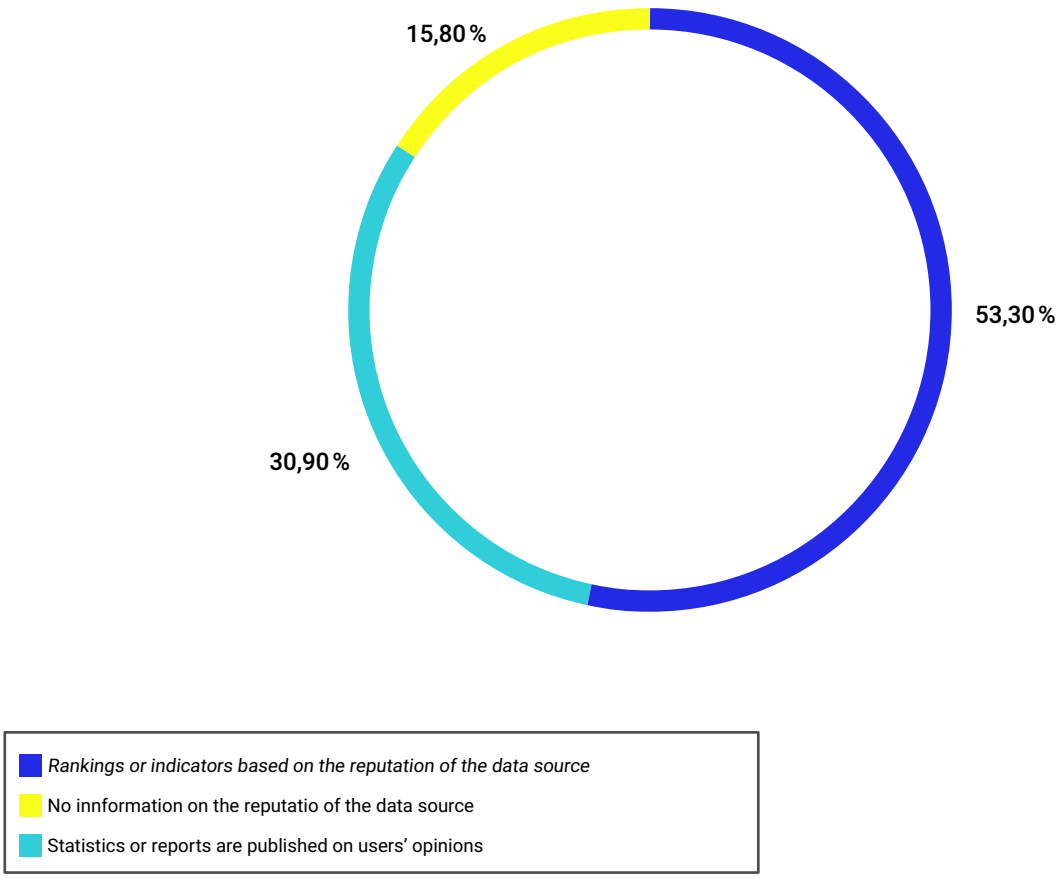
Source: Own authorship.

3.2.9 Categorisation by reputation

Figure 14 shows the reputation of the portals on which the sampled datasets are published. Particularly noteworthy is that 53.30 % of the datasets are on portals with a high reputation, a figure that has increased since 2021 (39 %), while 15.80 % have a low level (23 % in 2021).

In addition to analysing the reputation dimension of MELODA 5, a ranking of portals has been carried out taking into account the three levels of the reputation dimension (Annex 2). In this report, we have chosen to use the MELODA dimension because the answers of the respondents to two aspects have been taken into account for its creation: the level of knowledge of the portal (1: low level of knowledge; 2: medium level of knowledge and 3: high level of knowledge) and type of portal (1: incipient portal, 2: mature portal and 3: model portal).

FIGURE 14. Distribution of datasets by reputation 2023 (MELODA 5)



Source: Own authorship.

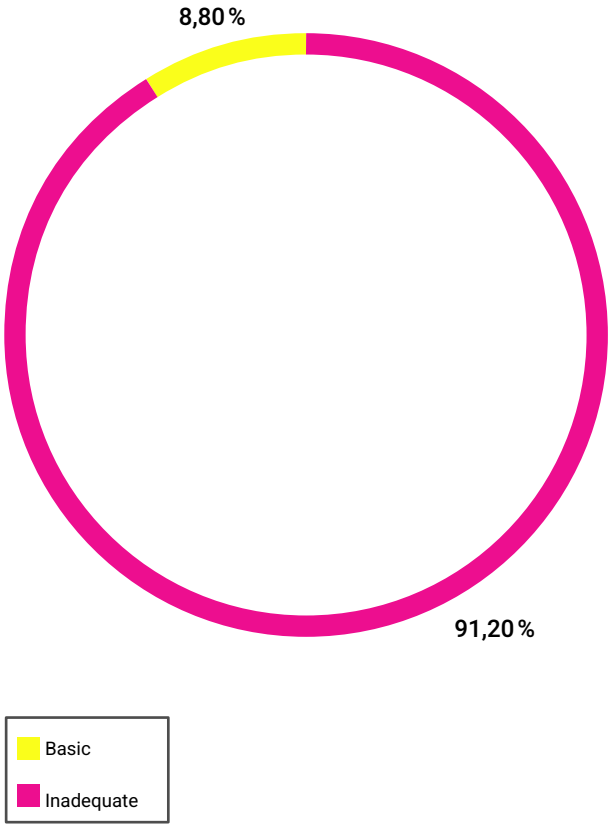
3.2.10 Categorisation by global reuse

According to the MELODA 5 metric, the sampled data has been categorised according to its eight dimensions (reuse licence, technical standard, access mechanism, data model, data geolocation, update frequency, dissemination and reputation). Figure 15 shows the results obtained.

It is noteworthy that, according to the MELODA 5 categories, in 2023 no dataset has an advanced degree of reuse, but the majority, 91.20 %, has an inadequate degree of reuse. In 2021, 83 % had a basic degree of reuse.

This result, which seems surprising, may be due to several factors. Additionally, there is a phenomenon that has been observed when obtaining the data and analysing the portals for the sample, namely that many portals do not seem to be updated. In recent years, policies for the publication and use of open data have stagnated and some interest is being maintained, but they are not being developed and enhanced.

FIGURE 15. Distribution of sampled datasets by categories 2023 (MELODA 5)



Source: Own authorship.

In 2023, almost 94 % of portal managers know the reusers of the data they publish.

3.3 DIAGNOSIS OF DATA REUSE

3.3.1 Analysis of knowledge regarding entities that reuse published data

Respondents were asked whether they knew of any public or private entity (companies, NGOs, academics, students, individual citizens) that reused the data they publish on their open data portal.

In 2023, 93.50 % of respondents said they knew some of the reusers, while this figure was 97.20 % in 2021, 75.60 % in 2019 and 77 % in 2017. This data shows that there has been some

improvement in the knowledge of data reuse in recent years.

To find out the respondents' opinion on the degree of open data reuse for each type of reuser, we asked to what extent each type of entity reused open data from its portal. Table 6 shows the results obtained.

In the opinion of the portal managers, 32.30 % of citizens in 2023 frequently or always reuse open data. This figure is lower than the one obtained in the 2021 report, 38.80 %, but higher than in the other two reports: 2019 (19.60 %) and 2017 (25.90 %).

In the case of professional for-profit reusers (infomediaries and individual for-profit developers), we can observe that in 2023, 25.80 % use them frequently or always, while in 2021 it was 33.30 %, 36.60 % in 2019 and 25.90 % in 2017. As for the use of open data by professional non-profit reusers (NGOs, foundations, individual non-profit developers and other social initiatives), in 2023, 29 % use it sometimes or hardly ever, although 58.10 % of respondents did not answer this question. In 2021, 13.90 % used them frequently or always, while in 2019 it was 31.70 %, and in 2017 it was 22.20 %.

38.70 % consider that researchers and academic staff (including students) use open data frequently or always. This figure is somewhat higher than in previous reports: 37 % in 2017, 34.20 % in 2019 and 25 % in 2021.

In terms of the organisation itself, open data is most frequently used by stakeholders. They are frequent or regular users at 51.60 % in 2023. These figures were also high in other years: 44.40 % in 2017, 56.10 % in 2019 and 63.90 % in 2021. For other public entities, 35.50 % use them frequently or always in 2023, compared to 22.20 % in 2017, 26.80 % in 2019 and 13.90 % in 2021.

The percentage of cases not answering one or more of these questions is also particularly remarkable. In 2023, the highest non-response rate is for professional non-profit re-users (58.10 %). In 2021, the same was true for non-profit professionals (41.70 %), as in 2017 (48.10 %). In 2019, the highest values are for non-profit professionals (43.90 %) and other public entities (41.50 %).

3.3.2 Analysis of data reuse by sector

When analysed by sector, in 2023 the sectors with the highest daily use over all are transport and storage (12.90 %), followed by hotels and tourism, and professional, scientific and technical activities (9.70 % in both cases). In 2021, the most frequent are information and communications (8.30 %) and other services (8.30 %) (Tables 7, 8 and 9). In 2019, the frequency of daily use in the information and communications sector was 19.50 %, 14.60 % in warehousing and transport, and 17.10 % in public administration and defence. In 2017, the transport and storage sector and the public administration and defence sector had the highest frequency of daily use (11.10 %).

TABLE 6. Knowledge of the types of data reusers

Scale		Never (%)	Hardly ever(%)	Sometimes(%)	Frequently(%)	Always(%)	NR/DK (%)	Total (%)	N.º
Citizens	**2017**	3,70	22,20	22,20	11,10	14,80	25,90	100	27
	2019	9,80	12,20	29,30	9,80	9,80	29,30	100	41
	2021	5,60	22,20	30,60	19,40	19,40	2,80	100	36
	2023	6,50	19,40	22,60	19,40	12,90	19,40	100	31
For-profit professionals	**2017**	0	18,50	18,50	18,50	7,40	37	100	27
	2019	0	12,20	17,10	24,40	12,20	34,10	100	41
	2021	2,80	11,10	41,70	19,40	13,90	11,10	100	36
	2023	9,70	12,90	22,60	12,90	12,90	29,00	100	31
Non-profit professionals	**2017**	11,10	7,40	11,10	11,10	11,10	48,10	100	27
	2019	0	12,20	12,20	19,50	12,20	43,90	100	41
	2021	6	13,90	25,00	11,10	2,80	41,70	100	36
	2023	12,90	19,40	9,70	0,00	0,00	58,10	100	31
Academics	**2017**	0	14,80	25,90	25,90	11,10	22,20	100	27
	2019	0	12,20	26,80	17,10	17,10	26,80	100	41
	2021	3	16,70	44,40	13,90	11,10	11,10	100	36
	2023	9,70	6,50	29,00	22,60	16,10	16,10	100	31
Propia organización	**2017**	7,40	3,70	22,20	22,20	22,20	22,20	100	27
	2019	0	2,40	24,40	26,80	29,30	17,10	100	41
	2021	6	8,30	16,70	22,20	41,70	5,60	100	36
	2023	6,50	9,70	19,40	19,40	32,30	12,90	100	31
Other public entities	**2017**	7,40	14,80	22,20	7,40	14,80	33,30	100	27
	2019	0	9,80	22	14,60	12,20	41,50	100	41
	2021	2,80	13,90	44,40	5,60	8,30	25,00	100	36
	2023	9,70	3,20	12,90	22,60	12,90	38,70	100	31

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

TABLE 7. Reusers by sector (I)

Reusers by sector	Sector/year	Agriculture, livestock, forestry and fishing (%)	Manufacturing (%)	Mining and quarrying (%)	Electricity, gas, steam and air conditioning supply (%)	Water supply, sewerage, waste management and remediation activities (%)	Construction (%)	Information and communication (%)
Daily	**2017**	3,70	0,00	ND	ND	ND	ND	3,70
	2019	0,00	0,00	2,40	0,00	7,30	0,00	19,50
	2021	0,00	0,00	0,00	3	0,00	0,00	8,30
	2023	3,20	0,00	0,00	0,00	0,00	3,20	6,50
Frequently	**2017**	0	0,00	ND	ND	ND	ND	11,10
	2019	9,80	0,00	0,00	4,90	4,90	0	9,80
	2021	2,80	3,00	0,00	0,00	2,80	6	2,80
	2023	3,20	0,00	0,00	3,20	3,20	3,20	6,50
Sometimes	**2017**	3,70	0,00	ND	ND	ND	ND	0
	2019	9,80	9,80	0,00	2,40	7,30	4,90	9,80
	2021	8,30	0,00	0,00	0,00	5,60	2,80	8,30
	2023	0,00	0,00	0,00	0,00	3,20	0,00	9,70
Exceptionally	**2017**	3,70	0,00	ND	ND	ND	ND	7,40
	2019	9,80	7,30	12,20	9,80	9,80	12,20	7,30
	2021	2,80	2,80	2,80	0,00	2,80	0,00	8,30
	2023	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Never	**2017**	7,40	3,70	ND	ND	ND	ND	0
	2019	2,40	2,40	4,90	4,90	4,90	9,80	2,40
	2021	5,60	0,00	0,00	2,80	2,80	5,60	16,70
	2023	0,00	0,00	0,00	0,00	0,00	0,00	6,50

Note: NA = not available

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

TABLE 8. Reusers by sector (II)

Reusers by sector	Sector/year	Wholesale and retail trade (%)	Transport and storage (%)	Hotels and tourism (%)	Financial and insurance activities (%)	Real estate activities (%)	Professional, scientific and technical activities (%)	Administrative and support service activities (%)	Public administration and defence (%)
Daily	**2017**	0,00	11,10	3,70	0,00	3,70	0,00	0,00	11,10
	2019	2,40	14,60	9,80	2,40	2,40	4,90	7,30	17,10
	2021	2,80	5,60	11,10	0,00	2,80	2,80	2,80	0,00
	2023	3,20	12,90	9,70	0,00	0,00	9,70	0,00	29,00
Frequently	**2017**	3,70	0,00	7,40	0,00	0,00	7,40	3,70	11,10
	2019	4,90	4,90	14,60	2,40	4,90	17,10	7,30	14,60
	2021	5,60	5,60	2,80	5,60	2,80	13,90	0,00	8,30
	2023	3,20	12,90	12,90	0,00	3,20	16,10	3,20	6,50
Sometimes	**2017**	0,00	0,00	11,10	3,70	7,40	7,40	0,00	11,10
	2019	7,30	4,90	12,20	4,90	14,60	17,10	7,30	17,10
	2021	2,80	8,30	8,30	0,00	0,00	5,60	5,60	19,40
	2023	3,20	0,00	6,50	0,00	0,00	3,20	3,20	6,50
Exceptionally	**2017**	0,00	0,00	3,70	0,00	0,00	7,40	0,00	7,40
	2019	9,80	9,80	4,90	7,30	0,00	4,90	4,90	2,40
	2021	0,00	2,80	5,60	0,00	6,00	11,10	5,60	5,60
	2023	0,00	3,20	9,70	0,00	3,20	3,20	0,00	3,20
Never	**2017**	0,00	0,00	3,70	0,00	0,00	0,00	0,00	0,00
	2019	2,40	2,40	2,40	2,40	2,40	4,90	4,90	2,40
	2021	2,80	11,10	8,30	2,80	5,60	11,10	5,60	19,40
	2023	0,00	3,20	0,00	3,20	0,00	3,20	0,00	3,20

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

TABLE 9. Reusers by sector (III)

Reusers by sector	Sector/year	Education (%)	Health care and social work activities (%)	Arts, entertainment and recreation activities (%)	Activities of extraterritorial organisations and bodies (%)	Activities of households as employers of domestic personnel (%)	Other services (%)
Daily	**2017**	0,00	0,00	0,00	0,00	ND	3,70
	2019	2,40	0,00	4,90	0,00	0,00	ND
	2021	2,80	0,00	2,80	6	0,00	8,3
	2023	3,20	0,00	0,00	0,00	0,00	0,00
Frequently	**2017**	3,70	0,00	0,00	0,00	ND	0,00
	2019	14,60	2,40	4,90	2,40	2,40	ND
	2021	2,80	0,00	2,80	0,00	0,00	5,6
	2023	9,70	0,00	3,20	3,20	0,00	3,20
Sometimes	**2017**	7,40	0,00	3,70	3,70	ND	3,70
	2019	7,30	9,80	7,30	12,20	0,00	ND
	2021	13,90	5,60	2,80	2,80	0,00	2,8
	2023	6,50	3,20	0,00	0,00	0,00	0,00
Exceptionally	**2017**	7,40	3,70	0,00	3,70	ND	0,00
	2019	7,30	7,30	7,30	2,40	7,30	ND
	2021	8,30	0,00	0,00	0,00	0,00	2,8
	2023	0,00	0,00	0,00	0,00	0,00	0,00
Never	**2017**	0,00	0,00	0,00	0,00	ND	0,00
	2019	2,40	2,40	4,90	4,90	4,90	ND
	2021	8,30	2,80	0,00	0,00	0,00	0,00
	2023	3,20	0,00	0,00	0,00	0,00	0,00

Note: NA = not available

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

In 2023, the sectors with the highest frequent use of all are transport and storage, and hospitality and tourism (12.90 % in both cases), followed by professional, scientific and technical activities, and education (9.70 % in both cases). In 2021, professional, scientific and technical activities (13.90 %) and public administration and defence (8.30 %) are the sectors with the highest values in the "frequently" category. In 2019, it was hospitality and tourism (14.60 %) and professional, scientific and technical activities (17.10 %), education, and public administration and defence (14.60 %). And in 2017, the information and communications and public administration and defence sectors had the highest percentage of frequent data use (11.10 % each).

3.3.3 Analysis of data reuse by territorial scope

In order to find out the areas of action, the portal managers were asked about the areas in which the reusers of their data were working (Table 10).

If we analyse, for each area, the cases in which the uses are "always" or "frequently", the local area has a percentage of 51.60 % in 2023, 47.20 % in 2021, 39.10 % in 2019 and 25.90 % in 2017. For the regional level the percentage in 2023 is 32.30 %, and the figures are similar in 2021 (33.30 %) and 2019 (31.70 %), and somewhat lower in 2017 (18.50 %). For the national level, in 2023 the percentage is 16.10 %, while the figures are 14.80 % in 2017, 29.30 % in 2019, and 16.80 % in 2021. In the European case the figures are lower: 6.50 % in 2023, 5.60 % in 2021, 12.20 % in 2019 and 7.40 % in 2017.

The result obtained for the frequency "never" is also remarkable. In most cases, except for the local case and others, the percentage in 2023 is 3.20 %. This is an improvement on previous reports. Especially for the European level, which had figures of 19.40 % in 2021, 11.10 % in 2017 and the lowest of 4.90 % in 2019. For the national case, the highest was in 2017, with 7.40 % in 2017, falling sharply in 2019 (2.40 %) and 2021 (2.80 %).

3.3.4 Analysis of the types of innovation due to the reuse of open data

Table 11 shows the types of innovation that can be achieved through the use of open data.

In 2023, 32.30 % of respondents do not know whether open data from their portal is being used for product innovation or process innovation. These figures were 27.80 % for product innovation and 22.20 % for process innovation in 2021, 51.20 % and 48.80 % in 2019 and 44.40 % in 2017. For the categories "frequently" and "always", the percentages in 2023 are 12.90 % and 16.10 %. In the other reports they were also low for product innovation (11.10 % in 2021, 17.00 % in 2019 and 14.80 % in 2017) and for process innovation (11.10 % in 2021, 14.70 % in 2019 and 14.80 % in 2017).

Data portal managers are largely unaware of the product or process innovations generated with their data.

TABLE 10. Scope of action of open data reusers

Scale	Year	Never (%)	Hardly ever (%)	Sometimes (%)	Frequently (%)	Always (%)	NR/DK (%)	Total (%)
Local	**2017**	3,70	11,10	18,50	11,10	14,80	40,70	100
	2019	2,40	7,30	14,60	9,80	29,30	36,60	100
	2021	5,60	8,30	27,80	25,00	22,20	11,10	100
	2023	0,00	3,20	12,90	38,70	12,90	32,30	100
Autonomous	**2017**	0,00	11,10	22,20	7,40	11,10	48,10	100
	2019	2,40	4,90	14,60	29,30	2,40	46,30	100
	2021	2,80	8,30	36,10	22,20	11,10	19,40	100
	2023	3,20	3,20	12,90	19,40	12,90	48,40	100
National	**2017**	7,40	4,00	14,80	14,80	0,00	55,50	100
	2019	2,40	2,40	19,50	22,00	7,30	46,30	100
	2021	2,80	25,00	33,30	14,00	2,80	22,20	100
	2023	3,20	3,20	29,00	12,90	3,20	48,40	100
European	**2017**	11,10	11,10	7,40	3,70	3,70	62,90	100
	2019	4,90	4,90	17,10	7,30	4,90	61,00	100
	2021	19,40	27,80	2,80	2,80	2,80	44,00	100
	2023	3,20	19,40	9,70	3,20	3,20	61,30	100
Others	**2017**	7,40	7,40	0,00	3,70	7,40	74,10	100
	2019	2,40	4,90	4,90	2,40	4,90	80,50	100
	2021	5,56	8,33	5,56	0,00	2,78	77,78	100
	2023	6,50	3,20	6,50	0,00	3,20	80,60	100

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

TABLE 11. Types of innovation by reuse of open data

	Product innovation				Process innovation			
Scale	2017	2019	2021	2023	2017	2019	2021	2023
Never (%)	7,40	9,80	8,30	12,90	7,40	4,90	8,30	12,90
Hardly ever (%)	25,90	9,80	27,80	16,10	22,20	14,60	30,60	22,60
Sometimes (%)	7,40	12,20	25,00	25,80	11,10	17,10	27,80	16,10
Frequently (%)	14,80	14,60	8,30	12,90	11,10	9,80	11,10	16,10
Always (%)	0,00	2,40	2,80	00,00	3,70	4,90	0,00	0,00
NR/DK (%)	44,40	51,20	27,80	32,30	44,40	48,80	22,20	32,30
Total (%)	100	100	100	100	100	100	100	100

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

3.3.5 Analysis of access registration availability

Table 12 shows the information available according to portal managers based on access logs.

In 2023, 71.00 % of the portals were aware of the access logs to their data. This is better than the figures obtained in 2021 (63.90 %), 2019 (63.40 %) and 2017 (59.30 %). This is of interest in terms of being able to manage the demand for data, which requires, among other things, information on data access..

TABLE 12. Availability of data access logs

Frequency/year	2017	2019	2021	2023
No (%)	25,90	14,60	36,10	25,80
Yes (%)	59,30	63,40	63,90	71,00
NR/DK (%)	14,8	22	0	3,20
Total (%)	**100**	**100**	**100**	**100**

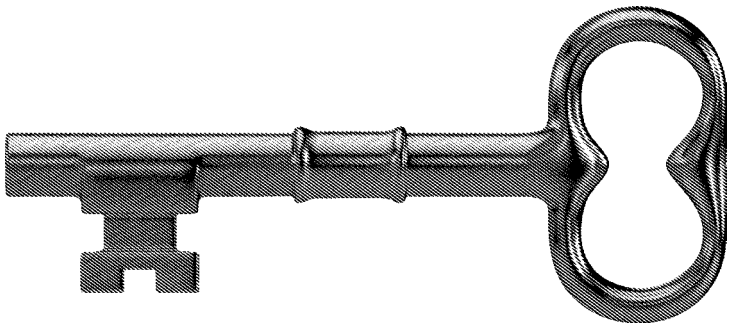
Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

3.3.6 Analysis of activities promoting the use of open data

Another aspect that the portal managers were asked about is the activities they carry out to promote the use of open data. Table 13 shows the results obtained.

Regarding the activities to promote the use of open data, for the category "always", in 2023 we only see the use of application contests (3.20 %), and in 2021, the use of internal presentation events (3.00 %). In 2023 there are activities that are frequently used as internal events (12.90 %), external presentation events (9.70 %) and meetings with reusers (6.50 %). The latter have the highest percentages in the category "frequently" in 2017 (25.90 %) and 2019 (19.50 %), and slightly less in 2021 (5.60 %).

For the "never"' category, the figures for application contests (38.70 %) and for meetings with reusers (19.40 %) stand out in 2023. This is similar to the previous reports for these two categories. For the former, the figures were: 44.40 % in 2021, 29.30 % in 2019 and 40.70 % in 2017. And for the second, 25.00 % in 2021, 29.30 % in 2019 and 25.90 % in 2017.



3.4 DIAGNOSIS OF GENERATED SERVICES

3.4.1 Analysis of service themes

In this section, an analysis is made of the services generated from the information obtained in the portals' datasets. 63 applications were sampled and 22 of them were found to be invalid (35 %). Therefore, the 41 that are active were analysed. In 2023, Table 14 and Figure 16 show the themes according to the NTI-RISP classification of the generated applications. In some cases there were several themes, which have been collected as options 2 and 3. It can be seen that the most frequent is the public sector (17.07 %), followed by rural environment and fisheries (14.63 %), transport, and environment (9.76 % in both cases). Whereas, in 2021, the most frequent was transport (20 %), followed by the public sector (15.6 %), culture and leisure (13.3 %) and environment (13.3 %). And in 2019, it was culture and leisure (14.5 %), environment (12.9 %), transport (12.9 %) and urban planning and infrastructure (9.7 %).

TABLE 13. Activities promoting the use of open data

Scale	Year	Never (%)	Hardly ever (%)	Sometimes (%)	Frequently (%)	Always (%)	NR/DK (%)	Total (%)
Application contests	2017	40,70	14,80	11,10	11,10	0,00	22,20	100
	2019	29,30	22,00	12,20	4,90	0,00	31,70	100
	2021	44,40	11,00	22,20	2,80	0,00	19,40	100
	2023	38,70	12,90	25,80	0,00	3,20	19,40	100
Internal presentation events	2017	7,40	29,60	29,60	18,50	0,00	14,80	100
	2019	7,30	26,80	17,10	19,50	0,00	29,30	100
	2021	25,00	22,20	27,80	16,70	3,00	5,60	100
	2023	9,70	25,80	32,30	12,90	0,00	19,40	100
External presentation events	2017	7,40	29,60	22,20	22,20	0,00	18,50	100
	2019	14,60	24,40	22,00	17,10	0,00	22,00	100
	2021	16,70	30,60	31,00	11,10	0,00	11,10	100
	2023	9,70	32,30	19,40	9,70	0,00	29,00	100
Meetings with reusers	2017	25,90	25,90	3,70	25,90	0,00	18,50	100
	2019	29,30	22,00	9,80	19,50	0,00	19,50	100
	2021	25,00	33,00	22,20	5,60	0,00	13,90	100
	2023	19,40	22,60	29,00	6,50	0,00	22,60	100
Others	2017	18,50	0,00	3,70	7,40	0,00	70,40	100
	2019	24,40	0,00	0,00	14,60	0,00	61,00	100
	2021	19,40	2,80	2,80	5,60	0,00	69,40	100
	2023	19,40	0,00	0,00	0,00	0,00	80,60	100

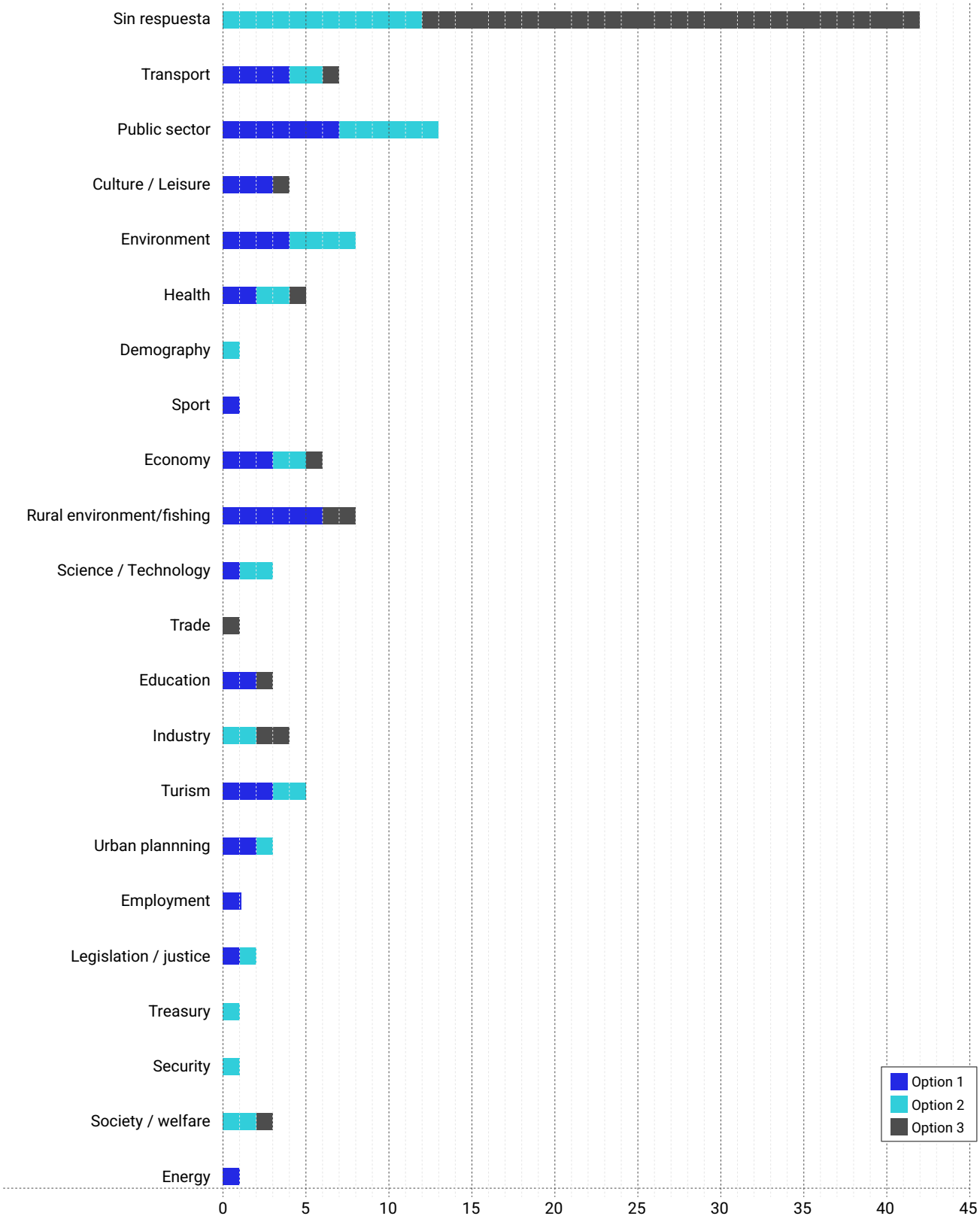
Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

TABLE 14. NTI-RISP themes of applications in 2023

NTI-RISP	Option 1	Option 1 (%)	Option 2	Option 2 (%)	Option 3	Option 3 (%)
No response	0	0	12	29,27	30	73,17
Transport	4	9,76	2	4,88	1	2,44
Public sector	7	17,07	6	14,63	0	0
Culture/Leisure	3	7,32	0	0	1	2,44
Environment	4	9,76	4	9,76	0	0
Health	2	4,88	2	4,88	1	2,44
Demography	0	0	1	2,44	0	0
Sport	1	2,44	0	0	0	0
Economy	3	7,32	2	4,88	1	2,44
Rural environment/fishing	6	14,63	0	0	2	4,88
Science/technology	1	2,44	2	4,88	0	0
Trade	0	0	0	0	1	2,44
Education	2	4,88	0	0	1	2,44
Industry	0	0	2	4,88	2	4,88
Turism	3	7,32	2	4,88	0	0
Urban planning and infrastructures	2	4,88	1	2,44	0	0
Employment	1	2,44	0	0	0	0
Legislation/justice	1	2,44	1	2,44	0	0
Treasury	0	0	1	2,44	0	0
Security	0	0	1	2,44	0	0
Society/welfare	0	0	2	4,88	1	2,44
Energy	1	2,44	0	0	0	0
Total	**41**	**100**	**41**	**100**	**41**	**100**

Source: Own authorship.

FIGURE 16. NTI-RISP application themes in 2023



Source: Own authorship.

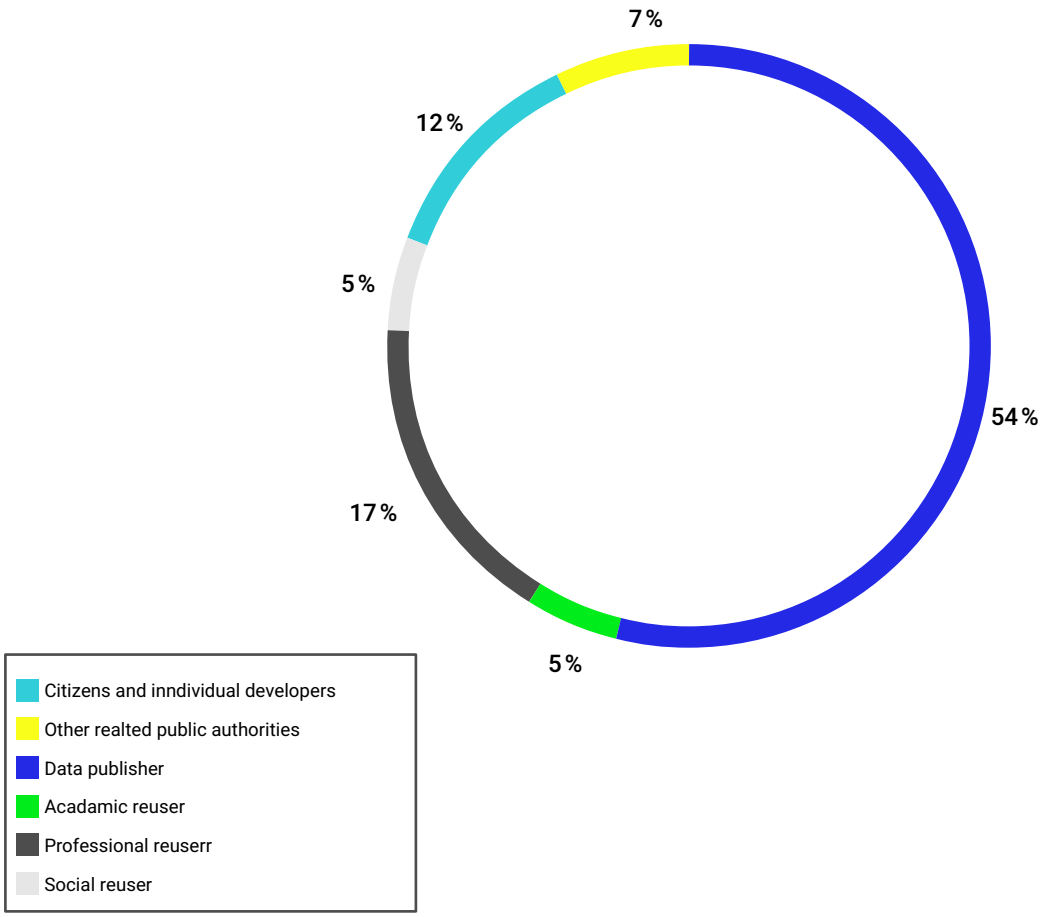
3.4.2 Analysis of sustainability and service business models

Whether the services developed had any sustainability mechanism was also analysed. In 2023, all the sampled applications have them, which improves the results compared to previous reports: in 2021, 31.1 % did not have them; in 2019, 30.6 %, and in 2017, the figure was 52 %.

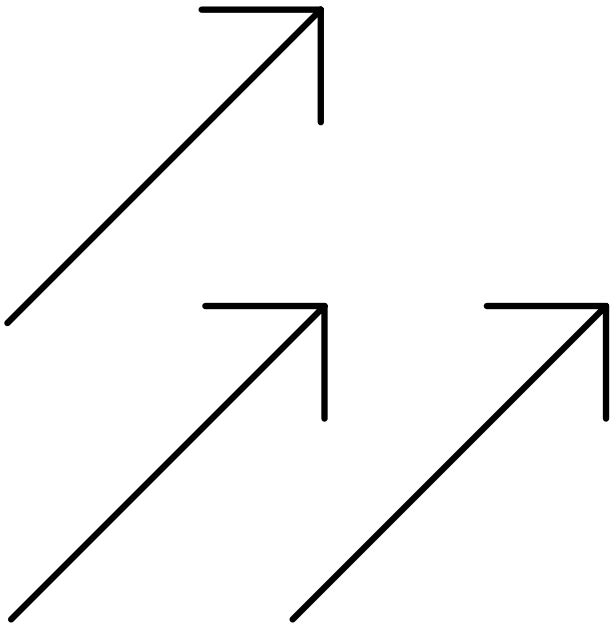
3.4.3 Analysis of service authors

It is noteworthy that it is most often the service generators who publish the data (53.70 %), followed by professional reusers (17.10 %) and individual citizens and developers (12.20 %) (Figure 17). These results are more or less in line with the trend observed in the previous reports. In the 2021 report, public organisations were the biggest users of data (40 %), and it was similar in 2019, with 61.2 %, and in 2017, with 43 %. In these reports, professional reusers—businesses—were next (35.6 % in 2021, 24.2 % in 2019 and 30 % in 2017), followed by citizens (20 % in 2021 and 9.7 % in 2019).

FIGURE 17. Distribution of service authors 2023



Source: Own authorship.



3.4.4 Analysis of other service characteristics

In 2023, 58.50 % of the applications are geolocated, which is much lower than in previous reports: 73.3 % in 2021, 74.2 % in 2019 and 72 % in 2017. Moreover, in 2023, only 17.10 % of the sampled applications have real-time information, compared to 42.2 % in 2021, 25.8 % in 2019 and 35 % in 2017.

3.4.5 Analysis of the value creation of services

In the survey conducted, the percentages obtained for the "frequently" or "always" categories stand out (Table 15). In 2023, 19.40 % considered that customers were frequently satisfied, while for citizens the figures were 16.10 % frequently and 6.50 % always.

In the improvement of public administration (PA) services, in 2023 the figure for the categories "frequently" and "always" is 38.70 %, while it was 30.50 % in 2021, 46.40 % in 2019 and 33.30 % in 2017. In the case of business creation, in 2023 only 3.20 % are in the "often" category and 16.10 % in the "sometimes" category. In 2021, the figures were not much higher either (11.10 % frequently). And for the "sometimes" category they were 13.90 % in 2021, 19.50 % in 2019 and 18.50 % in 2017.

Nearly 40 % of the portals consider that reusing data often or always leads to improvements in public administrations.

TABLE 15. Value creation through data reuse

Scale	Year	Never (%)	Hardly ever (%)	Sometimes (%)	Frequently (%)	Always (%)	NR/DK (%)	Total (%)
Satisfied customers	**2017**	11,10	3,70	3,70	18,50	11,10	51,80	100
	2019	2,40	4,90	12,20	19,50	4,90	56,10	100
	2021	8,30	13,90	19,40	25,00	2,80	30,60	100
	2023	12,90	6,50	12,90	19,40	0,00	48,40	100
Satisfied citizens	**2017**	7,40	7,40	7,40	25,90	11,10	40,70	100
	2019	2,40	7,30	19,50	29,30	9,80	31,70	100
	2021	5,60	13,90	41,70	25,00	0,00	13,90	100
	2023	6,50	9,70	29,00	16,10	6,50	32,30	100
Environmental improvement	**2017**	14,80	0,00	11,10	18,50	0,00	55,50	100
	2019	4,90	7,30	17,10	9,80	2,40	58,50	100
	2021	11,10	13,90	36,10	11,10	0,00	27,80	100
	2023	9,70	12,90	22,60	16,10	0,00	38,70	100
Infrastructure improvement	**2017**	7,40	0,00	7,40	14,80	14,80	55,50	100
	2019	7,30	9,80	7,30	22	7,30	46,30	100
	2021	16,70	13,90	27,80	14	0,00	27,80	100
	2023	16,10	9,70	16,10	16,10	0,00	41,90	100
Business creation	**2017**	14,80	0,00	18,50	0,00	0,00	66,60	100
	2019	7,30	7,30	19,50	9,80	0,00	56,10	100
	2021	16,70	16,70	13,90	11,10	0,00	41,70	100
	2023	16,10	22,60	16,10	3,20	0,00	41,90	100
Improvement of PA services	**2017**	7,40	3,70	33,30	11,10	22,20	22,20	100
	2019	2,40	4,90	19,50	24,40	22	26,80	100
	2021	8,30	11,10	38,90	22,20	8,00	11,10	100
	2023	6,50	6,50	19,40	22,60	16,10	29,00	100
Others	**2017**	11,10	0,00	3,70	0,00	0,00	85,20	100
	2019	2,40	0,00	2,40	2,40	0,00	92,70	100
	2021	8,30	0,00	8,30	0,00	0,00	83,40	100
	2023	12,90	0,00	0,00	0,00	0,00	87,10	100

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero (2017); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero, Vidal-Cabo and Ferrer-Sapena (2019); Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021), and the results of the 2023 survey

QUALITATIVE ASSESSMENT OF INNOVATION SERVICES

04.

4.1 TYPES OF BUSINESS MODELS IDENTIFIED TYPES OF BUSINESS MODELS IDENTIFIED

Five business models have been identified in the sampled services:

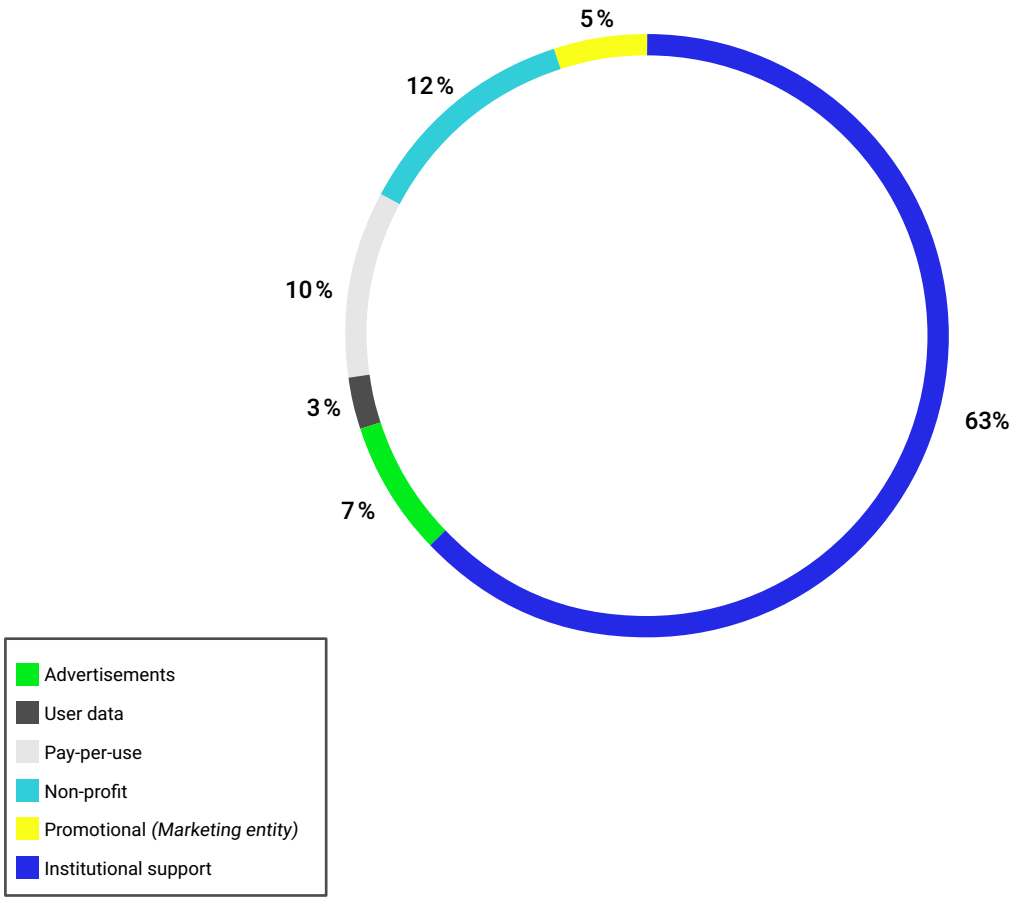
- Promotional (marketing entity)
- Institutional support
- Freemium
- Pay-per-use
- Advertisements

And additionally:

- Non-profit

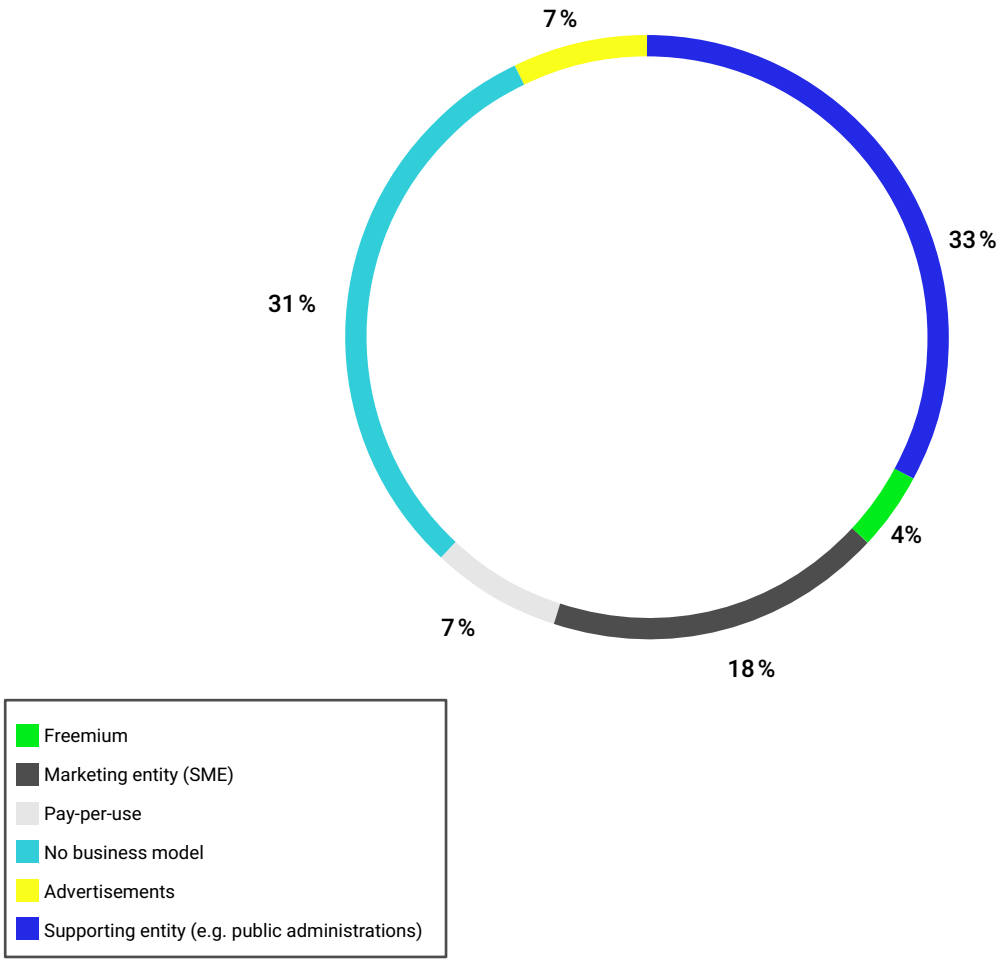
Figure 18 shows the results obtained in 2023. With respect to the 2021 report (Figure 19), it can be seen that in all cases there is a business model and that the most frequent is institutional support (63 %). In 2021, 68.90 % of cases had a business model, with the promotional/marketing entity model being the most notable (33.30 %), while in 2019, 66.7 % were promotional models.

FIGURE 18. Business models of services 2023



Source: Own authorship.

FIGURE 19. Business models of services 2021

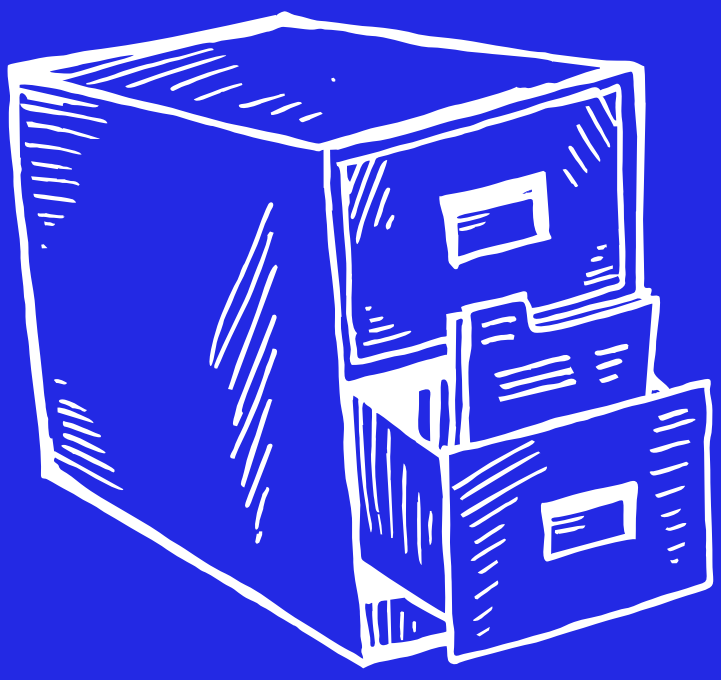


Source: Abella, Ortiz de Urbina Criado, De Pablos Heredero and García Luna (2021).

4.2 Analysis of services by business model

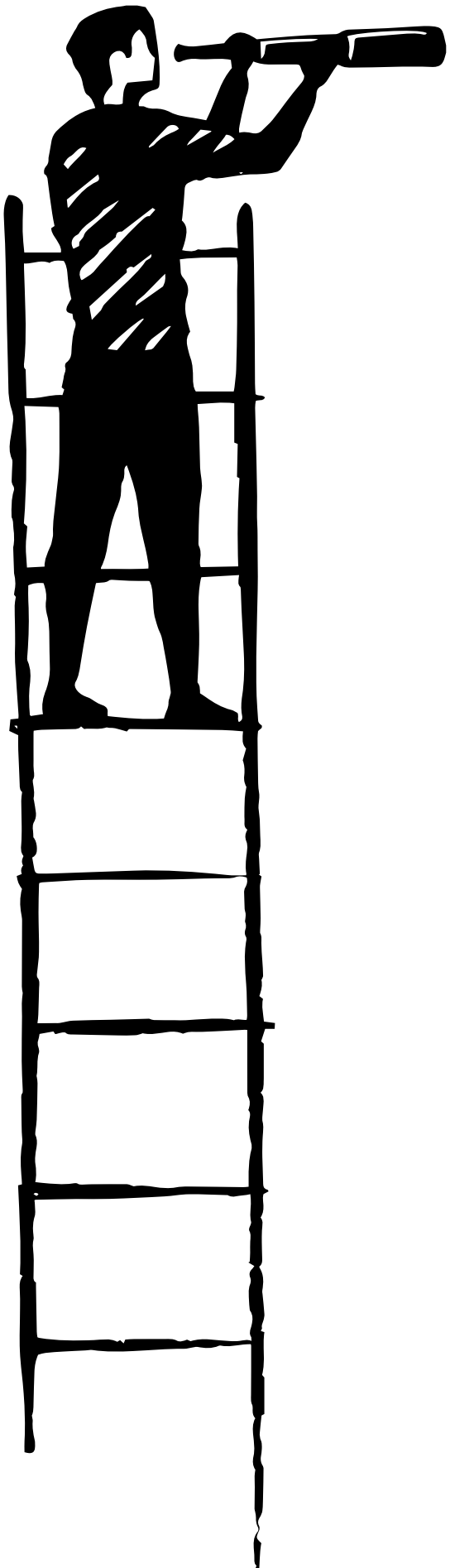
In 2023, all the sampled applications have a business model, so the number of applications with a business model and geolocated is 58.50 %, while it was 74.2 % in 2021, 83.3 % in 2019, and 87 % in 2017. Additionally, the services with a business model in 2023 is 17.10 % in real time, a figure which was higher in previous reports (41.94 % in 2021, 58.3 % in 2019 and 66 % in 2017).

Of the applications with a business model, in 2023 the most frequent are the public sector (17.07 %), rural environment/fishing (14.63 %) and transport and environment (9.76 % in both cases). While in the 2021 report it was transport (22.58 %), environment (16.13 %) and public sector (12.9 %). In 2019, it was health (25 %), economy, environment and transport (16.7 %), and in 2017, transport (47 %) and meteorology (27 %).



SWOT

05.



Tables 16 and 17 show both the threats and opportunities and the strengths and weaknesses based on the analyses carried out. For their identification, the external environment has been considered to be society as a recipient of the services along with the public managers who allocate the resources to keep the data portals running, and the internal environment as the managers of the portals along with the reusers of all types of data. In addition, each dimension is compared with the SWOT dimension of the 2021 report.

TABLE 16. SWOT analysis: weaknesses and threats

Weaknesses 2023	Weaknesses 2021	Threats 2023	Threats 2021
Lack of human resources allocated to open data. Lack of adequate data skills. Information provided in open data is not homogeneous. Unpublished local data models (70 %). Lack of data updating in a high percentage of data portals. More than 78 % of data is updated more than monthly. More than 63 % of open data is not geolocated. More than 62 % without systematic dissemination.	Lack of digitalisation of data and processes. Low capacity to reuse data. Poor updating of data. Difficulty in identifying truly federated data across domains. There is still a percentage of published datasets that are not reusable due to the technical format of publication. Almost half of the datasets have no geographical information at all. More than a quarter of the data portals have a low level of reputation. No dataset has an advanced degree of reusability. There is a percentage of open data managers who do not yet know whether or not the data in their portals is being reused. Open data portal managers are not aware of product and process innovations generated with their data. Difficult contact with portal managers. 36 % of portals do not know whether or not their data is accessed. High rate of closure of open portals. High rate of abandonment of services based on open data.	Lack of information on regulations affecting access to data, publication and reuse of open data. Lack of budgets allocated to open data. Lack of open data coordination mechanisms at a European, national and regional level. Datasets are not available in all autonomous communities. The growth of data publication exceeds the capacity to create common data models.	Failure to maintain clear and specific open data policy legislation. Current data protection regulations. Pretender portals: portals with political impetus, but without strategies or prior planning. Lack of regulation for the use of shared data models for publishing. Lack of business models for services based on open data.

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021) and the results of the 2023 report

TABLE 17. SWOT analysis: strengths and opportunities

Strengths 2023	Strengths 2021	Opportunities 2023	Opportunities 2021
Discussion forums, data-specific feedback systems and rating systems. Increased digitalisation of business processes (COVID-19 outcome). Increased interest of companies in data quality. Increased "data culture". Increased publication of open data. Increasing size of the infomediary sector. High degree of awareness of the usefulness of open data. High degree of awareness of European regulations in the six categories of high-value public datasets. High percentage of automated access to data. More than 50 % of published datasets are on optimally mature portals. Nearly 100 % of the data is licensed for commercial use. 94 % of portal managers know the reusers of the data they publish. Data portal managers are largely aware of product or process innovations that are generated with their data.	There has been a substantial improvement in the knowledge of data reusers on the part of data portal managers. Data reuse has increased at local and regional levels. Adequate metrics are in place to measure the capacity to reuse open data on portals (MELODA 5). Increased maturity level of open data portals. Almost all portals publish data under licences that allow commercial or unrestricted reuse. About 40 % of datasets are on portals with a high level of reputation. Citizens and the publisher themselves have increased the number of services developed with open data. The number of services that have an identified business model has increased. A significant percentage of portals think that reusing data leads to frequent or permanent improvements in public administrations. A high percentage of datasets are in the highest category with proactive dissemination. Existence of a reputation ranking of open data portals.	European regulation on the implementation of high-value datasets. The interest of EU countries to understand and capture open data reuse and value creation. The war in Ukraine has generated the need to generate open data in areas such as energy, food, national security, etc. The EU's priorities for 2019–2024: the European Green Pact, Europe fit for the digital age, an economy that works for people, a stronger Europe in the world, promoting the European way of life. Advances in the IoT and artificial intelligence. Spain among the trend-setting countries in open data maturity. The open data reputation ranking.	The COVID-19 pandemic has emphasised the real need for data. Increased data dissemination thanks to the trend towards federated open data. Agile standardisation allows rapid adoption of standards. Dedicated European funding for open data. Dumping of statistical data on open data portals. Increased societal demand for data (digital literacy).

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021) and the results of the 2023 report

CONCLUSIONS

06.

6.1 CONCLUSIONS REGARDING PORTALS

The analyses carried out have shown that the percentage of ineffective portals (PODP) is still close to 50 %. This is an indication of the lack of updating of open data portals in recent years. Moreover, other data supports this idea, such as the fact that, according to MELODA, the degree of reuse of their datasets is low and that few (23.31 %) have a section to show the applications or services that have been developed based on them.

We can continue to observe that the General State Administration has consolidated many portals on datos.gob.es, resulting in a large part of these deregistrations.

Only six portals have been identified that federate data between them (they replicate links to the data), which initially facilitates its dissemination.

Approximately one third of the portals analysed have a mechanism for announcing updates to their datasets. This is an increase of 70 % compared to the 2021 report. This may be due, among other reasons, to the elimination of PODPs from the analysis.

There is a very significant 84.70 % increase in the availability of an API for data access, but this increase is also explained by the elimination of PODPs, seeing as in these cases, one of the requirements they do not meet is having an API.

The use of data management software (DMS) has increased to 72.40 %, which is a slight increase (6.00 %), even taking into account the removal of PODPs.

Assessing the reputation of open data publishers was one of the recommendations made by an international group of experts for MELODA 5. This report presents a reputation ranking that takes into account the MELODA dimension that assesses it. These ranking complements those presented in the 2021 report.

6.2 CONCLUSIONS REGARDING DATA

Data federation is highly developed on just a few portals (six).

As in the 2021 report, there is still a massive amount of publication of data from statistical sources on open data portals.

Despite the maturity of the sector, there is still a high percentage of data in formats not suitable for reuse (6 % compared to 6.7 % in 2021).

In 2023, 77.10 % of the data published does not contain the description of the data model used (it does not follow a public standard), making it difficult to consolidate common data from different sources. This figure is also very similar to that of 2021, but for practical purposes represents a decrease considering that PODPs have been eliminated.

There has been a change in the issue of commercial licensing, with restrictive licences at 0.33 % in 2023, compared to 5.00 % in 2021.

The availability of geographical references within the published datasets has worsened: in 2021, 49.00 % were not geolocated, and in 2023 this figure is 63.60 %.

In terms of update frequency, there has been a small improvement, with 78.00 % being updated more than monthly in 2023, compared to 92.00 % in 2021.

Proactive dissemination of datasets has worsened in recent years. In 2023 it is 25.70 %, while in 2021 it was 42.00 %. This reflects a lower social and political concern for open data governance issues.

6.3 CONCLUSIONS REGARDING PORTAL MANAGERS

In 2023, managers still have a high level of awareness of data reusers (93.50 %, compared to 97.20 % in 2021).

In 2023, there is an improvement in the figures in terms of portal managers' access to data reuse statistics. 25.80 % of them do not have access to their data reuse statistics, compared to 36.10 % in 2021.

Presentations at internal events (47.50 % in 2023 and 44.50 % in 2021) remain the most popular mechanisms for disseminating data on open data portals. In contrast, there has been a significant drop in external events (29.10 % in 2023 and 42.10 % in 2021).

6.4 CONCLUSIONS REGARDING GENERATED SERVICES

The most frequent themes of the generated services are on the public sector (17.07 %), rural environment/fisheries (14.63 %) and transport and environment (9.76 % in both cases).

The generated services are published in real time in only 17.10 % of cases, which is a clear decrease compared to the figures obtained in the previous reports, which were 43 % in 2021 and 26 % in 2019. In the case of geolocation, there is also a decrease, with only slightly more than half of cases (58.50 %), compared to 73 % in 2021 and 74 % in 2019.

However, there has been an improvement in the case of business models. In 2023 all the applications sampled had a business model, while in 2021 there were 31 % that did not. As for the authors, the importance of publishers, professional reusers and citizens stands out, in a similar way to what was seen in previous reports.

RECOMMENDATIONS

07.

- **Clear strategies for the development of the sector in Spain.** There is still a need for a clear strategy for portals to improve their usage expectations. In this case it is advisable to use open innovation to better understand the needs of reusers so that data can be published in a way that better meets their expectations.

- **Unique identifier of datasets.** Data federation facilitates the republication of datasets across different portals. There are already initiatives to develop a unique identifier (Ortiz de Urbina Criado, Abella and García Luna, 2023) and specific mechanisms to identify federated datasets that can help to make better use of said datasets.

- **Pretender portals.** 43.02 % of open data portals still have minimal reusability features, a very low number of datasets and extreme difficulties for interacting with portal managers.

- **Data standardisation.** 69.90 % of the published data does not follow an international model, nor do they publish their own data model, and none follow an international standard.

- **Commitment to data spaces.** Open data portals have to be integrated as the primary data sources for data spaces, which are widely promoted in the European Union; but the technical tools to make this connection are not yet available.

- **Developing data governance.** This would allow for the integration of internal data sources and their systematic publication with low impact on the organisation. This could improve the use of data models, publication frequencies, data geolocation and overall data quality.

FUTURE LINES OF WORK

08.

- **Continuous collection of open data in Spain.** The reports published so far have been biennial (2017, 2019, 2021), but work is underway to develop tools that allow data collection to be carried out in a more automated way, although the main obstacle is the divergence of publication mechanisms (García Luna, 2022).

- **Applications and services that use open data.** As in previous reports, further efforts have to be made to improve the information available on the use of open data, as this will help to better analyse its impact and the value creation it can generate.

- **Data for sustainability.** The circular economy and climate change are two issues that concern society today. However, there are still no initiatives that aim to standardise and make open data available in these areas, so it remains a challenge to analyse their effects, especially in relation to the Sustainable Development Goals (SDGs). Similarly, there is no consensus on how to measure and evaluate it from the perspective of the private sector and corporate social responsibility.

- **Open data observatory.** The creation of an open data observatory can stimulate the updating of portals and help launch initiatives to make improvements to the aspects recommended in this report.

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Questionnaire addressed to data reusers

ANNEX

01.

QUESTIONNAIRE ADDRESSED TO OPEN DATA PORTAL MANAGERS

1.- Do you know of any entity that reuses the data you publish on your open data portal? Businesses, NGOs, academics, students, individual citizens.

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.a Individual citizens]

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.b Professional for-profit reusers (infomediaries and individual for-profit developers)]

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.c Non-profit professional reusers (NGOs, foundations, individual non-profit developers and other social initiatives)]

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.d Researchers and academic staff (including students)]

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.e The organisation itself that publishes the data (other areas or departments)]

2.- Indicate the extent to which each type of these entities reuse your data (scale 1–5, where 1: no data/ never and 5: all data/always). [2.f Public entities other than the one publishing the data]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [A.- Agriculture, livestock, forestry and fisheries]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [B.- Extractive industries]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [C.- Manufacturing industry]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [D.- Electricity, gas, steam and air conditioning supply]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [E.- Water supply, sanitation, waste management and decontamination]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [F.- Construction]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [G.- Wholesale and retail trade]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [H.- Transport and storage]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [I.- Hotels and tourism]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [J.- Information and communications]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [K.- Financial and insurance]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [L.- Real estate]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [M.- Professional, scientific and technical]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [N.- Administrative activities and auxiliary services]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [O.- Public administration and defence]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [P.- Education]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [Q.- Health and social services]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [R.- Arts, recreation and entertainment]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [S.- Households as employers of domestic staff]

3.- Which sector do these entities belong to? Choose the 5 that reuse data the most. [T.- Extraterritorial organisations and bodies]

4.- Indicate to what extent (scale 1–5, where 1: no data/never and 5: all data/always) reusers operate at the following levels [Local (city)]

4.- Indicate to what extent (scale 1–5, where 1: no data/never and 5: all data/always) reusers operate at the following levels. [Autonomous]

4.- Indicate to what extent (scale 1–5, where 1: no data/never and 5: all data/always) reusers operate at the following levels. [National]

4.- Indicate to what extent (scale 1–5, where 1: no data/never and 5: all data/always) reusers operate at the following levels. [European]

4.- Indicate to what extent (scale 1–5, where 1: no data/never and 5: all data/always) reusers operate at the following levels. [Other]

5.- Indicate to what extent your entity has carried out any kind of activity to promote the use of your data (scale 1–5, where 1: no data/never and 5: all data/always). [Application contests]

5.- Indicate to what extent your entity has carried out any kind of activity to promote the use of your data (scale 1–5, where 1: no data/never and 5: all data/always). [Internal events (organised by your entity) for presenting the available data]

5.- Indicate to what extent your entity has carried out any kind of activity to promote the use of your data (scale 1–5, where 1: no data/never and 5: all data/always). [External events (organised by other organisations) for presenting the available data]

5.- Indicate to what extent your entity has carried out any kind of activity to promote the use of your data (scale 1–5, where 1: no data/never and 5: all data/always). [Meetings with reusers (of any type)]

5.- Indicate to what extent your entity has carried out any kind of activity to promote the use of your data (scale 1–5, where 1: no data/never and 5: all data/always) [Other (indicate in the notes at the end of the questionnaire)]

6. Indicate to what extent these types of innovations are produced by the reuse of data (scale 1–5, where 1: no data/never and 5: all data/always) [Product innovation]

6. Indicate to what extent these types of innovations are produced by the reuse of data (scale 1–5, where 1: no data/never and 5: all data/always). [Process innovation]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users. (scale 1–5, where 1: no data/never and 5: all data/always). [More satisfied clients]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users. (scale 1–5, where 1: no data/never and 5: all data/always) [More satisfied citizens]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users (scale 1–5, where 1: no data/never and 5: all data/always). [Environmental improvement]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users (scale 1–5, where 1: no data/never and 5: all data/always). [Infrastructure improvement: security, health, transport, etc.]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users (scale 1–5, where 1: no data/never and 5: all data/always). [Business creation]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users (scale 1–5, where 1: no data/never and 5: all data/always). [Improvement in the services offered by the public administration]

7. Indicate to what extent data reuse has created value in the following areas for the entities using the data or for their clients/users. (scale 1–5, where 1: no data/never and 5: all data/always) [Other]

8.- Could you indicate the 3 most common uses of the data on your portal by reusers? [1]

8.- Could you indicate the 3 most common uses of the data on your portal by reusers? [2]

8.- Could you indicate the 3 most common uses of the data on your portal by reusers? [3]

9.- Could you indicate the 3 datasets (in order of most accessed to least accessed) that are most used on your portal? [1]

9.- Could you indicate the 3 datasets (in order of most accessed to least accessed) that are most used on your portal? [2]

9.- Could you indicate the 3 datasets (in order of most accessed to least accessed) that are most used on your portal? [3]

10.- Do you have data on the access to your data by reusers?

NOTES (any other comments you may have)

The questions below this line are aimed at increasing the scope of the study.

An association of open data repositories would be useful.

- Do you belong to an organisation similar to an association of open data repositories/publishers? Indicate which one.

- Given the list of respondents, have any other open data portals been left out that should be included? Please include a reference to them (URL, website address, entity name or contact email)..

Ranking of portals according to reputation

ANNEX

02.

TABLE 18. Ranking of portals by reputation level according to MELODA 5. Levels 3 and 2

PORTALS	MELODA 5 REPUTATION LEVEL
https://www.bilbao.eus/opendata/es/inicio	3
https://www.tarragona.cat/governobert/tgn-dades/dades-obertes	3
https://www.comunidad.madrid/gobierno/datos-abiertos	3
https://datos.gob.es/es/	3
http://www.gobiernodecanarias.org/istac/datos-abiertos/	3
https://www.opendata.euskadi.eus/hasiera/	3
https://datosabiertos.jcyl.es/web/es/datos-abiertos-castilla-leon.html	3
https://www.gipuzkoairekia.eus/eu/hasiera	3
https://www.tenerifedata.com/	3
https://datosabiertos.jcyl.es/web/es/datos-abiertos-castilla-leon.html	3
https://opendata.aemet.es/centrodedescargas/inicio	3
https://datosabiertos.dipcas.es/pages/portada/	3
https://mobilitylabs.emtmadrid.es/es/portal/collections	3
https://www.universidata.es/	3
https://www.ine.es/	3
https://www.valencia.es/dadesobertes/es/data/	3
https://www.amb.cat/s/es/web/area-metropolitana/dades-obertes.html	2
https://datos.parcan.es/dataset?q=	2
https://gobiernoabierto.navarra.es/es/open-data	2
https://datosabiertos.castillalamancha.es/	2
https://dadesobertes.seu-e.cat/organization/palafrugell	2
https://opendata-ajuntament.barcelona.cat/	2
https://www.zaragoza.es/sede/portal/datos-abiertos/	2

PORTALS	MELODA 5 REPUTATION LEVEL
https://seu-e.cat/es/web/esparreguera/dades-obertes	2
https://www.girona.cat/opendata/	2
https://opendata.santfeliu.cat/ca/	2
https://datos.madrid.es/portal/site/egob	2
https://idem.madrid.org/catalogocartografia/srv/spa/catalog.search#/home	2
https://www.seu-e.cat/es/web/miravet/dades-obertes	2
https://datos.vigo.org/es/	2
https://opendata.portdebarcelona.cat/ca/dataset?q=	2
https://datosabiertossalamanca.es/	2
http://centrodedescargas.cnig.es/CentroDescargas/	2
https://www.opendatabizkaia.eus/eu/	2
https://opendata.pamplona.es/	2
https://datos.canarias.es/portal/	2
https://www.opendatalapalma.es/	2
https://catalegdades.caib.cat/	2
http://datos.santander.es/	2
https://zaguan.unizar.es/collection/opendata	2
http://sig.urbanismosevilla.org/InicioIDE.aspx	2
https://www.juntadeandalucia.es/datosabiertos/portal.html	2
https://datosabiertos.ayto-arganda.es/	2
https://opendata.sitcan.es/	2
https://analisi.transparenciacatalunya.cat/ca/browse?q=	2

Source: Own authorship.

TABLE 19. Ranking of portals by reputation level according to MELODA 5. Level 1

PORTALS	MELODA 5 REPUTATION LEVEL
https://catalogo.smartcostadelsol.es/organization/marbella	1
https://dadesobertes.seu-e.cat/organization/santvicencdelshorts	1
https://sedeelectronica.puertodelacruz.es/publico/opendata/catalogo	1
https://dadesobertes.seu-e.cat/organization/dipta	1
https://sede.tacoronte.es/transparencia/datos/catalogo	1
https://www.red.es/es	1
https://www.tmb.cat/es/sobre-tmb/herramientas-para-desarrolladores	1
https://seu-e.cat/ca/web/olot/dades-obertes	1
http://datosabiertos.torrent.es/	1
https://www.seu-e.cat/es/web/santcugatdelvalles/dades-obertes	1
https://dadesobertes.seu-e.cat/organization/palau-saverdera	1
http://opendata.ayto-caceres.es/	1
https://dadesobertes.seu-e.cat/organization/consorciaoc	1
http://opendata.villanuevadelaserena.es/	1
https://eadmin.maspalomas.com/transparencia/datos/catalogo	1
https://catalogo.smartcostadelsol.es/organization/estepona	1
https://datosabiertos.dipucadiz.es/data/	1
https://www.seu-e.cat/es/web/castellardelvalles/dades-obertes	1
https://seu-e.cat/es/web/vilafrancadelpenedes/dades-obertes	1
https://sede.mscbs.gob.es/datosabiertos/home.htm	1
https://www.seu-e.cat/ca/web/viladecans/dades-obertes	1
https://catalogo.smartcostadelsol.es/organization/alhaurindelatorre	1
https://www.chguadalquivir.es/ide	1
http://datosabiertos.sevilla.org/	1

PORTALS	MELODA 5 REPUTATION LEVEL
https://catalogo.smartcostadelsol.es/	1
https://www.fega.gob.es/es/datos-abiertos	1
https://seu-e.cat/ca/web/elpratdellobregat/dades-obertes	1
https://dadesobertes.l-h.cat/	1
https://www.seu-e.cat/es/web/elvendrell/dades-obertes	1
https://datosabiertos.regiondemurcia.es/	1
https://datosabiertos.malaga.eu/	1
https://sede.imserso.gob.es/Sede/portal/datosAbiertos.seam	1
http://datosabiertos.sevilla.org/	1
dadesobertes.valls.cat	1
https://datosabiertos.malaga.eu/	1
https://www.cartagena.es/open_data.asp	1
http://datosabiertos.sagunto.es/	1
https://dadesobertes.seu-e.cat/organization/palau-solitaiplegamans	1
https://datos.icane.es/	1
https://eadmin.aridane.org/transparencia/datos/catalogo	1
https://dadesobertes.seu-e.cat/organization/ccsegria	1
https://dadesobertes.seu-e.cat/organization/santandreudelabarca	1
https://sede.oepm.gob.es/eSede/datos/es/catalogo/datos.html	1
https://seu-e.cat/es/web/castelldefels/dades-obertes	1
https://transparencia.montoro.es/datos-abiertos/	1
https://www.gavaciutat.cat/gavaobert	1
https://catalogo.smartcostadelsol.es/organization/antequera	1
https://abertos.xunta.gal/portada	1
https://dadesobertes.seu-e.cat/organization/arenysdemunt	1

PORTALS	MELODA 5 REPUTATION LEVEL
http://datos.diputacionalicante.es/	1
https://transparencia.montilla.es/datos-abiertos/	1
https://governobert.gencat.cat/ca/dades_obertes/inici	1
https://dadesobertes.seu-e.cat/organization/arenysdemunt	1
https://opendata.alcoi.org/data/es/dataset	1
https://datosabiertos.rivasciudad.es/	1
https://www.seu-e.cat/es/web/lespreses/dades-obertes	1
https://seu-e.cat/es/web/matadepera/dades-obertes	1
https://www.donostia.eus/datosabiertos/	1
https://www.gijon.eSource: Elaboración propias/es/datos	1
https://opendata.unex.es/	1
https://catalogo.smartcostadelsol.es/organization/ronda	1
https://www.opendatabizkaia.eus/eu/	1
http://dadesobertes.cornella.cat/dataset	1
https://www.seu-e.cat/ca/web/asco/dades-obertes	1
https://seu-e.cat/es/web/santjustdesvern/dades-obertes	1
opendata.dadesobertesmanlleu.cat	1
http://opendata.manresa.cat/	1
https://catalogo.smartcostadelsol.es/organization/nerja	1
https://seu-e.cat/es/web/paretsdelvalles/dades-obertes	1
https://dadesobertes.seu-e.cat/organization/vilanovailageltru	1
http://datosabiertos.fuengirola.es/	1
https://seu-e.cat/ca/web/garcia/dades-obertes	1
https://www.seu-e.cat/es/web/sitges/dades-obertes	1
https://martos.es/index.php/nuevas-tecnologias/datos-abiertos2	1

PORTALS	MELODA 5 REPUTATION LEVEL
https://sede.teguise.es/transparencia/datos/catalogo	1
https://sede.puertos.gob.es/Paginas/CatalogoRISP.aspx	1
https://opendata.sabadell.cat/ca/inici	1
https://catalogo.smartcostadelsol.es/organization/velezmalaga	1
http://datos.almendralejo.albasmart.es/es/data/	1
https://dadesobertes.seu-e.cat/organization/ajuntament-de-santa-perpetua-de-mogoda	1
https://seu-e.cat/ca/web/santquirzedelvalles/dades-obertes	1
https://www.seu-e.cat/es/web/granollers/dades-obertes	1
https://datos.santiagodecompostela.gal/gl	1
https://dadesobertes.seu-e.cat/organization/calafell	1
https://seu-e.cat/esSource: Elaboración propia/web/amposta/dades-obertes	1
https://datos.alcobendas.org/#	1
http://datos.aytocamargo.es/	1
http://zarautz.gipuzkoairekia.eus/es/hasiera	1
https://opendata.reus.cat/	1
hhttp://eibar.gipuzkoairekia.eus/es/datu-irekien-katalogoa	1
http://transparencia.alhaurindelatorre.es/dataset	1
https://www.lasrozas.es/en/node/25	1
https://dadesobertes.seu-e.cat/organization/santacolomadegramenet	1
https://236ws.dpteruel.es/transparencia/dpteruel/	1
https://www.seu-e.cat/es/web/figueres/dades-obertes	1
https://dadesobertes.seu-e.cat/organization/olesademontserrat	1
https://data.renfe.com/	1
http://opendata.badalona.cat/od/	1

PORTALS	MELODA 5 REPUTATION LEVEL
https://seu-e.cat/es/web/santboidellucanes/dades-obertes	1
https://opendata.ugr.es/	1
https://dadesobertes.seu-e.cat/organization/lanoudegaia	1
https://catalogo.smartcostadelsol.es/organization/torremolinos	1
https://datosabiertos.dphuesca.es/	1
https://www.fecyt.es/es/info/datos-abiertos	1
https://dadesobertes.seu-e.cat/organization/montornesdelvalles	1
https://catalogo.smartcostadelsol.es/organization/benalmadena	1
https://seu-e.cat/es/web/ripoll/dades-obertes	1
https://dadesobertes.seu-e.cat/organization/ccbergueda	1
https://dadesobertes.diba.cat/	1
http://datos.arona.org/	1
https://seu-e.cat/web/EspluguesdeLlobregat/dades-obertes	1
http://opendata.aragon.es	1
https://data-crtm.opendata.arcgis.com/	1
http://datosabiertos.laspalmasgc.es/	1
http://www.santacruzdetenerife.es/opendata/	1
https://datosabiertos.dip-badajoz.es/dataset?q=	1
https://seu-e.cat/web/igualada/dades-obertes	1
http://opendata.vilanova.cat/	1
https://dadesobertes.seu-e.cat/organization/cctarragones	1
https://datos.lorca.es/catalogo/	1
https://www.seu-e.cat/es/web/rubi/dades-obertes/-/dadesobertes/showConjuntsDadesByTag?p_auth=2WARVwby	1

Source: Own authorship.

Responses to the three most common uses that reusers give their portal's data

ANNEX

03.

TABLE 20. Comparison of the three most common uses of datasets

Most common uses by reusers 2017	Most common uses by reusers 2019	Most common uses by reusers 2021	Most common uses by reusers 2023
Cultural activities	Culture	Academic, scientific or informative	Field of education
A newspaper in which to publish expenditure information	News published in the media by journalists	Database update	Analysis of real estate market trends
Car parks	Buses	Database feed	Mobility analysis and knowledge
Information search	Information search	Data analysis	Analysis and visualisation of data for statistical purposes
Mapping	Mapping	Analysis and production of own contents within our organisation	Meteorological apps in agriculture
Mapping, urban planning, geopositioning	Access to public information	Analysis and proposal for the creation of new products/services	Web applications and apps
Completion of own databases	Platform on administrative procedures	Geographical intelligence app for the city	Street maps
Citizen communication	Cross-referencing with information from other administrations	Meteorological app	Data query
Knowing the agenda of cultural and sporting activities of the city	Leisure and free time, orientation for outdoor activities	Footpath apps	Invoice query
Information queries	Information queries	Computer apps	Internal consumption and reuse in information systems and apps
Tourist data queries	For tourism-related information	Health apps (air quality)	Creation of applications
Public budget queries	Internal consumption in applications and websites of the corporation	Tourism apps	Creation of new services
Administrative structure enquiries	Information on local government	Agri-food information apps	Creation of visualisations and dashboards
Contracting technical services	Studies and reports	Press articles	Creation of applications (apps, web applications, dashboards, etc.)
Creation of maps	Tourism: festivals, fairs	Municipal management audit/control	Environmental data

Most common uses by reusers 2017	Most common uses by reusers 2019	Most common uses by reusers 2021	Most common uses by reusers 2023
Compliance with the Transparency Act	Creation/updating of directories of tourism companies in the region	Air quality	Socio-demographic data
City planning data	Population statistics	Marketing campaigns	
Transport planning data	Real-time urban transport data for apps and applications	Inter-municipal comparisons	Data enrichment
Mobile app development	App improvement	Complement to the development of solutions	Marketing studies
Statistical data	Population - statistics	Solvency check of the entity	Market research
Status of services: beaches, parks, public transport	For studies with population data	Contests, challenges	Studies, reports and research
Market research	Better knowing the market in which companies participate	Information on the state of the drought	Generating apps
Points of interest management	Citizen mailbox activity on social networks	Finding out where it is feasible to collect water	Health service information
Bus timetables	GIS analysis and generation of derived products	Better knowing the administration: transparency	Air quality information
Academic information	Studies and research	Knowledge of environmental regulations	Reports and statistics
Real-time information	Analysis of information accessed through APIs	Data consultation	Integration of general administrative data: budgets, contracts, etc. (via API or downloads)
Real-time traffic information: navigators, routes	Consultation of mobile applications	Creation of apps	Integration of footpath network data (via API or downloads)
Real-time information: public transport, public service management	Transport	Creation of websites	Integration of volcano data (via API or downloads)
Budget information	Generation of studies and dashboards	Real-time data on public transport services	Integration in transport apps
Ranking information	Internal operation statistics	University access and enrolment data for citizens in the decision-making process for career choice after the EBAUs (university entrance exams)	Integration in portals

Most common uses by reusers 2017	Most common uses by reusers 2019	Most common uses by reusers 2021	Most common uses by reusers 2023
Tourism information	Data analysis	Statistical data	Data integration and enrichment
Informing citizens	Water	Population and street statistics	Research/teaching
Data journalism tasks	Data journalism	Geographical data on accommodation during the academic year and national/international student mobility by student accommodation management companies	Healthy itineraries through the city thanks to the publication of Alcobendas' tree-lined streets
Tenders	Integration in reports and publications	Teaching	Location of electric vehicle charging points
Environmental	Environmental apps	Development of dashboards for the internal management of the city council	Improvement of public services by reusing master data (public administration): organisation chart, classification, documentary types
Mobility	Mobility	Creation of maps	Participation in tenders
Job offers	Use by micro-enterprises and SMEs	Scales	Data journalism
Offering transport information	Planning transport routes around the city based on traffic information	Research studies	Budgets
Town and country planning	Synchronisation of data related to municipal spatial planning	Statistical studies	Automated publication on municipal transparency portals
Route planner	Organisation and planning of annual calendars related to fairs and festivals in the region	Studies, analysis and geography	Publication on municipal websites
Prices of fruit and vegetable products	Exploitation	Evaluation and study	Reuse of data for statistical purposes
Budgets	Data visualisation	Informing policy action	Electronic headquarters
Development of apps	Creation of apps	Geolocation of noise	Monitoring of current issues related to transparency
Reuse of information by the organisation	Internal management within the institution	Management of services	Hydrological security
Transforming one's own organisation	The organisation itself: municipal website	Treasury	Internet connectivity situation in rural areas

Most common uses by reusers 2017	Most common uses by reusers 2019	Most common uses by reusers 2021	Most common uses by reusers 2023
Use of mapping for various purposes	Apps	General information to citizens thanks to available visualisations	Territorial
Added value for existing applications or services	New products, services and apps	Graphical information on municipal budgets	Arrival time at bus stops
	Personal projects by citizens	Information on public services	Decision-making
	Publication of third-party data	Information on municipal procedures	Transparency
	Reuse of static datasets	API integration in apps	Tourism
	Master's theses by university students	Integration of visualisations in geographical portals	
	Research and teaching. Education (university, compulsory secondary education, vocational training). Scientific	Localisation of services	
	API information consumption	Maps	
	Improvement of the product by incorporating open data information	Road improvement	
	Developments by individuals	Improved decision-making	
		Goods	
		Organisation of production	
		Student internships	
		Final degree projects	
		Publication of news in the media	
		Accountability, municipal services, transparency	
		Reuse for applications	

Most common uses by reusers 2017	Most common uses by reusers 2019	Most common uses by reusers 2021	Most common uses by reusers 2023
		Reuse for web visualisation	
		Decision-making	
		Transport	
		Tourism	
		Use of traffic data for operators like TomTom, Moovit, Here or Google Traffic	
		Use of transport data to create a virtual assistant with Alexa	
		Visualisations	

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021) and the results of the 2023 report

Responses to the three most used datasets on your portal

ANNEX

04.

TABLE 21. Comparison of the three most commonly used datasets

Datasets 2017	Datasets 2019	Datasets 2021	Datasets 2023
Cultural and leisure activities	Agenda of activities (in the city, events, etc.)	Economic activities	Economic activities
Agenda	General agenda of the Provincial Government	Actions of the municipal works brigade	Agenda of Zaragoza
Cultural agenda	Directories	Cultural agenda	Tenerife Commercial Registry. Geolocated data classified by activity
Daily agenda	BOPB (Official Gazette of the Province of Barcelona)	Agenda of the city	Neighbourhoods (containing demographic data)
Tourist agenda	Companies in the city	Bicing	Bicing
Cultural agenda information	Minor local entities	Real estate	Urban real estate
Mayors of the municipalities of the province of Alicante. 2015 legislature	General database of local entities	Official Gazette of the Business Registry (BORME)	Cartography
Buses	Buses	Air quality	Educational centres in Galicia
GTFS of bus timetables	City data, parking, cycling, etc.	Street map	Contracts published in the profile of the contracting party
La Palma Island Council bus timetable	Open data catalogue	Cartography	Calls for personnel
List of lines	Street map	Waste disposal census	Air quality data
Public transport routers (bus and taxi)	Stations	CIDO (information search engine and official newspapers)	University enrolment data
Bus arrival times	Real-time TUVISA bus information	Solvency check	University staff data
TITSA - Transport system information	Bicing stations in the city of Barcelona (mechanical and electric)	Solid waste containers	University budget data
Bicing	Bicycles	Minor contracts	Real-time traffic data

Datasets 2017	Datasets 2019	Datasets 2021	Datasets 2023
Working calendar	Number of incidents on public roads on Green Line	Real time data of the urban bus network	Demography of the inhabitants of Eibar according to their place of birth
Air quality	Air quality datasets	COVID-19 data	Shops directory of Alcobendas
Cartography	Cartography	Demographic data	Business directory of Alcobendas
Cartographic information	INAGA CAZA: GIS Cartography of Hunting Lands of Aragon (in 2018)	Statistical data	Companies in the municipality
Consultation of timetables and frequency	Timetables	Geographical data	Entities
Contracting technical services	Contracting	Real-time meteorological data	Weather stations in the Region of Murcia
Contracts awarded	Contracts under tender	General Administration Directory	Tenerife Inbound Tourism Statistics:Information on tourists staying on the island
Calls for personnel	CIDO - public service examinations	Administrative division of municipal districts	Real-time traffic status
Job offers	Job offers	Municipal companies and shops	Evolution of coronavirus disease (COVID-19)
List of jobs	List of jobs	Tourist arrivals	Pharmacies on duty
Demographics	Inhabitants of the locality	State of the drought	Petrol stations and fuel prices
Minor local entities and districts of the province of Alicante	Government of Aragon contracts (in 2018)	Evolution of coronavirus disease (COVID-19)	GDFG
State of the beaches	Leisure	Official guide to street names	Treasury: Eibar Town Council budget data
Beaches in the province of Cadiz	GTFS	Inhabitants per portal	Treasury: invoices received in Eibar Town Council
State of late payments	Economic	Incidents on public roads	Incidents on public roads
Public budget information	Economic and financial ratios	Actual bicycle information	Demographic indicators for Canary Islands sections as of 01/01/2021

Datasets 2017	Datasets 2019	Datasets 2021	Datasets 2023
Budget	Budget	Real-time information on buses	Industry, companies and activities in industrial estates
Administrative infrastructures (educational centres, agricultural offices, registry offices, etc.)	General Administration Directory	Complaints and suggestions report	Public transport information
List of associations	Associations	Inventory of senior officials of the CARM	General information on lines
Maps	National Topographic Map (scale 1:25,000)	Territorial limits	Information on the state of the municipality
Number plates	Parking spaces	List of educational centres	Intensity of bicycle measuring points
Digital elevation model	MDT5	Underground bodies of water	Canary Islands: territorial delimitations for statistical purposes
Mobility	Graphic information on cycle lanes	Number plates	ONCE kiosks
Selective collection points	Citizen requests	Picnic areas	Eurostat statistical grid adapted to the Canary Islands: 250-metre-long cells
Ranking	Electoral data of municipalities	Monuments	Portal numbers or government numbers
Educational resources	Monuments and museums	Mobility	Perimeter of the volcano
Results of trade union elections in the administration	Municipalities and regions	Municipalities in the province of Barcelona	Publications and advertisements related to COVID-19 in Aragon
Footpaths in the province of Cadiz	Lidar (altimetric information)	Museums	Points of interest and street map
Municipal services and facilities	Incidents on public roads	Public occupancy offer	Electric vehicle charging points
Traffic	Traffic datasets	Registration assistance offices	Footpath network
	Resolutions of complaints and claims	Payment to suppliers	Register of associations in the Autonomous Community of the Region of Murcia

Datasets 2017	Datasets 2019	Datasets 2021	Datasets 2023
	Mobile Numbering Consultation Service (CNMC)	Personnel - PAS	Registry of authorisations for the installation of gaming machines
	SIGPAC	Parking spaces	Register of entities
	Information systems	Budgets	Register of Cooperative Societies of the Region of Murcia
	Subsidies	Authorised water collection points	List of jobs
	Bus waiting time via API	Network of footpaths	Senior officials' salaries
	Registered unemployment by municipality	Register of associations	Remuneration of Provincial Government staff
	Meteorological	Register of cooperatives	Cartographic download service
	Most current orthoimage of the PNOA	Lists of jobs	Automatic hydrological information system
	Register of inhabitants per neighbourhood	Repairs on public roads	Location of bicycle stations
	Bus stops	Payments	Councillors' salaries
	Population of the municipality	Health	Waiting times (bus, tram)
	Payments	Venues of educational centres in the Region of Murcia	Bus arrival times
		Mobile Numbering Consultation Service (CNMC)	Toponymy
		Traffic	Traffic
		Traffic	Processing of budgets, personnel and job descriptions
		Agricultural demand units	Valenbisi availability
		Protected areas	

Source: Own authorship based on Abella, Ortiz-de-Urbina-Criado, De-Pablos-Heredero and García-Luna (2021) and the results of the 2023 report

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