European Commission

European

DATA Market Study 2021–2023

CNECT/LUX/2020/OP/0027–VIGIE 2020-0655, contract number: LC-01568518

D2.4 SECOND REPORT ON FACTS AND FIGURES

February, 2023

IDC theLisboncouncil Lisbon Council Research

Author(s)	IDC: Mike Glennon, Marianne Kolding, Martin Sundbland, Carla La Croce; Giorgio Micheletti; Nevena Raczko; Leonardo Freitas. Lisbon Council: Cristina Moise; David Osimo.
Deliverable	**D2.4 First Report on Facts and Figures**
Date of delivery	16 December 2022
Version	0.3
Addressee officer	Katalin IMREI Policy Officer European Commission, DG CONNECT Unit G1 — Data Policy and Innovation EUFO 1/265, L–2557 Luxembourg/Gasperich katalin.imrei@ec.europa.eu
Contract ref.	LC-01568518

Contents

Table of Tables

Table of Figures

ESSENTIAL GLOSSARY – THE KEY INDICATORS

Data professionals[1] are workers who collect, store, manage, and/or analyse, interpret, and visualise data as their primary activity or as a relevant part of their activity. Data professionals must be proficient with the use of structured and unstructured data, should be able to work with a huge amount of data, and should be familiar with emerging database technologies. For 2021–2023, the definition of data professionals was refined to differentiate the roles played by different data users: These are Data Technical Professionals, Data Business Professionals, and Data Consumers.

Data technical professionals are specialists in the collection, storage, management, modelling, and quality assurance of data, as well as the integration of various data sources, to ensure consistency, accuracy, and quality of data. A data technical professional can, given the question that needs to be answered, ensure that the data supply chain is provided and that it is accurate.

Data business professionals have as a primary or significant focus the task of performing predictive analysis, qualitative analysis, data modelling, data extraction, and data summaries with the purpose of creating new insights and knowledge from available data. They have thorough industry and/or process understanding and can put data analysis into context and relate to existing trends within the industry or line of business they are in. They typically leave collection, management, and quality of data to the data technical professional but, using analysis tools such as Excel, Tableau, and Power BI, are able to summarise large amounts of data and to visualise and present trends and insights to a wider audience of key stakeholders in the business in order to drive the strategic decision-making process in the organisation. Data scientists predominantly reside within the data business professional group.

Data consumers are product, process, human-resource, asset, or department employees and managers responsible for driving change or maintaining a position whereby decision making is heavily reliant on the supply of data and insights based on large amounts of data. They work directly with data only part of the time. They are decision makers or stakeholders in a decision process whereby the data and insights provided determine the quality of the decisions made. A data consumer guides the business based on the data and insights provided through the data supply chain.

Data companies are organisations that are directly involved in the production, delivery, and/or usage of data in the form of digital products, services, and technologies. They can be both data suppliers' and data users' organisations:

- **Data suppliers** have as their main activity the production and delivery of digital data-related products, services, and technologies. They represent the supply side of the data market.

[1] The European Data Market Study (SMART 2013/0063) included an indicator measuring "Data Workers", which was based on a similar, but slightly more restrictive, definition. In the subsequent European Data Market Study Update (SMART2016/0063) we measured "Data Professionals" – that is, workers with a wider range of data-related roles. In this context, data professionals are not only data technicians, but also users who, based on sophisticated tools, take decisions about their business or activities after having analysed and interpreted the available data.

- **Data users** are organisations that generate, exploit, collect, and analyse digital data intensively and use what they learn to improve the business. They represent the demand side of the data market.

Data companies' revenues correspond to the aggregated value of all the data-related products and services generated by Europe-based data suppliers, including exports outside the EU. This indicator measures the revenues of the data suppliers identified and classified by Indicator 2 (see the products and services specified in our definition of the data market). Data companies' revenues do not include data monetisation as part of the data market.

The **data market** is the marketplace where digital data is exchanged as "products" or "services" as a result of the elaboration of raw data. The data market captures the aggregate value of the demand of digital data without measuring the direct, indirect, or induced impacts of data in the economy as a whole. The value of the data market is not exactly equal to the aggregated revenues of European data companies because it includes imports (data products and services bought on the global digital market from suppliers not based in Europe) and excludes the exports of the European data companies. In this report, we add to the data market an estimate for the value of data monetisation.

The **data economy** measures the overall impacts of the data market on the economy as a whole. It involves the generation, collection, storage, processing, distribution, analysis elaboration, delivery, and exploitation of data enabled by digital technologies. The data economy captures a wider concept than the data market only, as it considers the value and wealth generated in the economy as a whole (not just across businesses) by the exploitation of data.

EXECUTIVE SUMMARY

Following the First Report on Facts & Figures (D2.1) released in February 2022, this Second Report on Facts & Figures (Deliverable D2.4 of the European Data Market Study, SMART VIGIE 2020-0655) presents the results obtained through the second round of measurements of the European Data Market Monitoring Tool. The tool was designed and developed under the previous European Data Market Study (SMART 2013/0063) and subsequently revised and extended in the Update of the European Data Market Study (SMART 2016/0063). This report cover the years 2020-2022 with a Baseline for 2025 and 2030 under three alternative scenarios.

In line with the First Report on Facts & Figures, this document focuses on the following set of indicators:

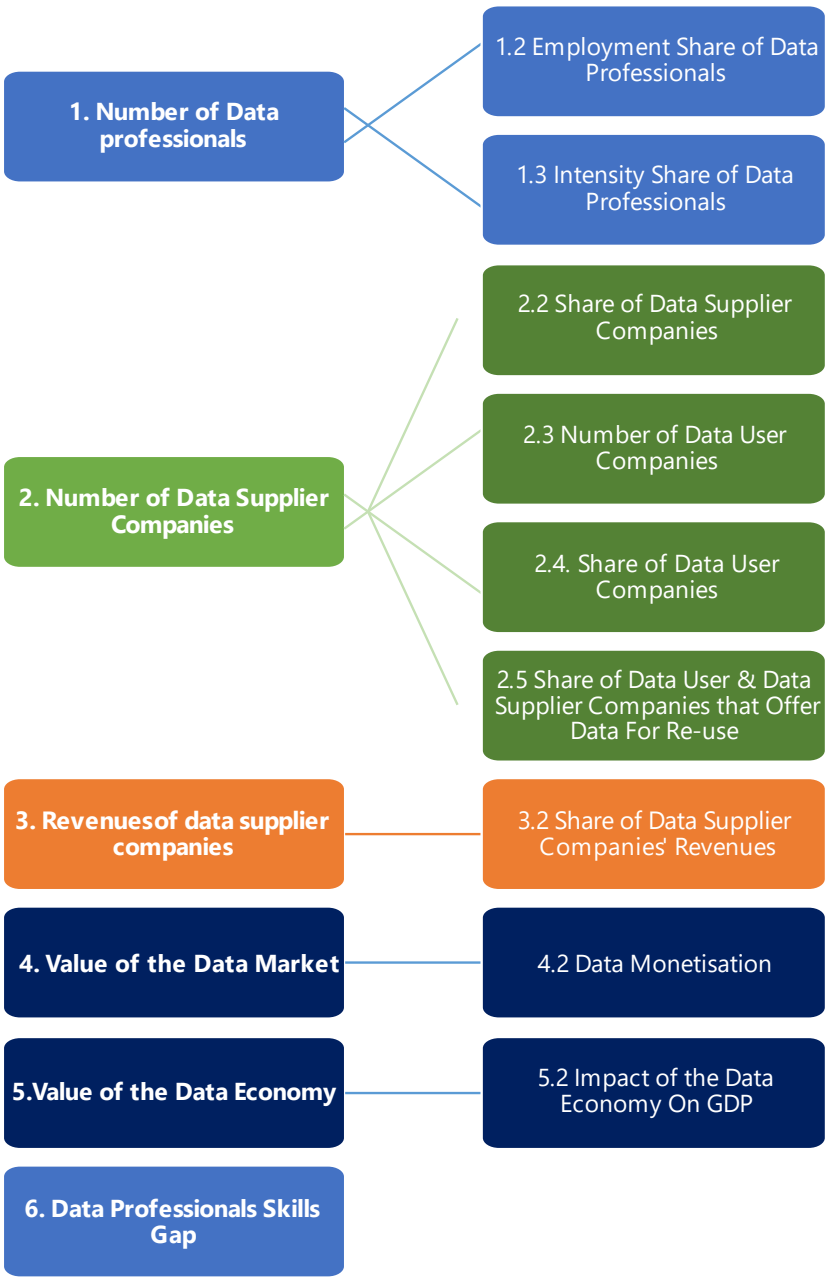


Figure 1 EDM Indicators overview

In this Second Report on Facts & Figures (D2.4), the indicators are presented for the year of 2022, as well as for year of 2025 under the Baseline scenario and for the year 2030 according to three alternative scenarios. In line with the previous round of measurements, each indicator is measured at the level of the total EU and for each individual Member State, when available and applicable. When possible, industry-specific and company-size views are also offered with indicators provided by industry sector and company size bands.
The UK and Switzerland were measured separately, as was the EEA (Norway, Iceland, and Lichtenstein) in an aggregated way.

This report embraces the Data Economy beyond the European Union and includes a specific section on four non-European countries, namely the United States, the People's Republic of China, Brazil and Japan. For each of these countries, this report presents the following selected indicators:

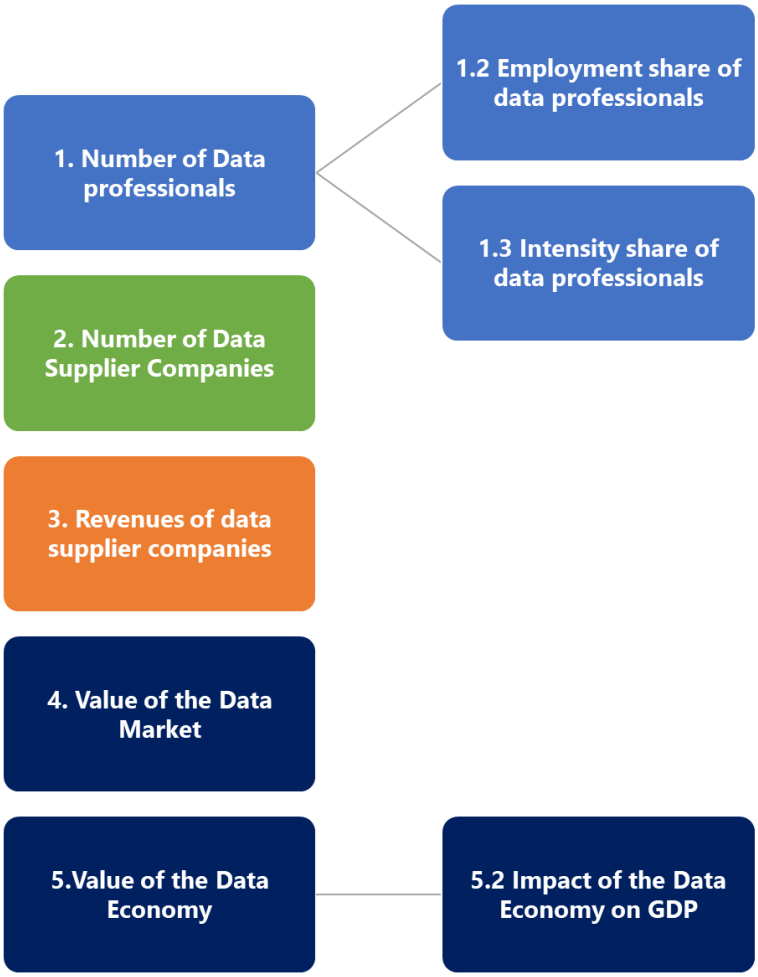


Figure 2 EDM International Indicators Overview

Methodological Note

Methodological Note: The European Data Market study requires a complex mix of qualitative and quantitative methodologies to allow it to reach its objectives. While quantitative methodologies represent the most relevant part of the study, qualitative methodologies are indispensable to balance the statistical approach and provide the market and social intelligence needed to lead to policy insights and the development of sound scenarios.

Updating the European Data Market Monitoring Tool

In order to ensure the study's continuity, the methodological approach builds upon the previous EDM Monitoring Tool releases, including necessary improvements.

The definition of the main indicators is revised and updated according to the evolution of the market and data economy. It is important to emphasise that the EDM Monitoring Tool's modular structure will not change in its core substance, as it has already proven to be sufficiently adaptable to the evolution of the data market and data economy in recent years.

The main methodological changes concern four of the main indicators:

1. measuring the value of data;
2. measuring data supplier and data user companies;
3. measuring of business impacts;
4. measuring data professionals.

Forecast Scenarios Methodology

In line with the previous edition of the European Data Market studies (SMART 2013/0063, SMART 2016/0063), and with the First Report on Facts and Figures (D2.1) of the subsequent study update, this document presents the main findings of the European Data Market Monitoring Tool at the year 2030 according to three potential scenarios based on alternative development paths and driven by different macroeconomic and framework conditions.

As in the first round of measurement, the overall methodological framework remained unchanged. As presented in the First Facts and Figures, the updated scenario methodology, builds on the successful approach applied in the study in the past two editions, with some improvements concerning the development of assumptions and their validation through brainstorming workshops with external and internal experts.

The three scenarios provide the storylines, the contextual framework, and the main assumptions used to model and forecast the EDM Monitoring Tool indicators, with a specific focus on the role of policies. Therefore, the scenarios and the forecast models will be developed in parallel, testing their relative coherence and fine-tuning their results. The time horizon to 2030 is likely to require a wider potential variation of social and business dynamics.

The Data Economy and the current economic and geo-political situation: from temporary instability to Storms of Disruptions

The year of 2022 was characterised by a weak global economic growth with many macroeconomic uncertainties, such as the Russia-Ukraine War, the energy crisis, rising inflation rates and many others. However, 2022 proved to be a more resilient and, to some extent, stable year for the European data economy when compared to the previous year. In May 2022, we produced an update on the main indicators published in October 2021 showing a slight contraction in the growth rate of the Data Market and the Data Economy indicators in the EU27 in 2025 and 2030 when compared to our previous estimates.

Notwithstanding an overall worsening of growth projections, both measures appeared to suffer a mild decline in growth terms and only with respect to the Baseline and High-Growth scenarios, meaning that our Challenge scenario had already discounted some potential and unexpected economic and political turmoil during the previous round of measurement.

The latest round of measurements from October 2022 of the European Data Market Monitoring Tool, which is presented in this report, portrays a similar but more positive picture where both measures regain sustained growth in the period 2025-2030 under the Baseline and High-Growth scenarios. The Challenge scenarios, on the other hand, seems to crystalise the difficulties for the European data economy which lie ahead and displays a further reduced growth with respect to our estimates in May 2022.

Table 1 Updated CAGR Estimates for Data Marker and Data Economy –November 2022 Estimates

	CAGR 2025/2030 Challenge	CAGR 2025/2030 Baseline	CAGR 2025/2030 High Growth	CAGR 2020-2025
November 2022				
EU 27 Data Economy	2.5%	5.5%	10.0%	10.2%
EU27 Data Market	0.5%	3.4%	6.9%	8.7%

Nonetheless, the future of Europe's digital economy after 2023 remains uncertain. After the hit received in 2021 following the pandemic, the inflationary pressures and the Russia-Ukraine war in 2022, the European economy is facing a set of alarming challenges– from supply chain constraints to IT skills shortages, from populists' threats to severe energy shortages. This "new normal" characterised by waves of crisis in tight sequence is likely to stay over the next few years and has been taken into consideration in this second round of measurement of the European Data Market Monitoring Tool.

Measuring Data Professionals

Data professionals[2] *are workers who collect, store, manage, and/or analyse, interpret, and visualise data as their primary activity or as a relevant part of their activity. Data professionals must be proficient with the use of structured and unstructured data, should be able to work with a huge amount of data, and should be familiar with emerging database technologies. For 2021–2023, the definition of data professionals was refined to differentiate the roles played by different data users: These are Data Technical Professionals, Data Business Professionals, and Data Consumers. The measure of data professionals includes data technical professionals and data business professionals only.*

Data Professionals Forecasts: 2025 and Three 2030 Scenarios

We continue to anticipate strong growth in the number of data professionals over the period of the forecast, from 2020 to 2030. The three scenarios for 2030 accommodate potential upsides and downsides affecting the social, economic, technological and political factors underpinning the data market and the data economy over the coming eight years (2022-2030). According to our estimates, the demand for data professionals remains high, and the supply is not yet meeting this demand. The forecast shows a demand that is rapidly being fulfilled. Long term growth to 2030 (Baseline) is slightly higher for the EU27 Member States than for the other geographies under consideration as we are slightly more optimistic about the EU longer-term outcomes with the acceleration of artificial intelligence technology uptake, which will stimulate demand for data professionals. The table summarises the outlook to 2025 and the three scenarios to 2030.

Table 2 Data Professionals Forecast: 2025; 2030 Challenge, Baseline, and High Growth Scenarios (000's); and CAGRs (%)

	2025	2030, Challenge	2030, Baseline	2030, High Growth	CAGR: 2020–2025	CAGR 2020-2030, Challenge	CAGR 2020-2030, Baseline	CAGR 2020-2030, High Growth
EU27	8,301	9,268	9,865	11,615	3.6%	2.2%	3.5%	6.9%
EEA (NO, LI, IS) + CH	186	190	205	270	N/A	0.5%	2.0%	7.7%
Total, all countries	10,955	12,334	12,989	15,125	3.6%	2.4%	3.5%	6.7%

Measuring Data Companies

Data companies *are organisations that are directly involved in the production, delivery, and/or usage of data in the form of digital products, services, and technologies. They can be both data supplier and data user organisations:*

- ***Data suppliers*** *have as their main activity the production and delivery of digital data-related products, services, and technologies. They represent the supply side of the data market.*

[2] The previous European Data Market Study (SMART 2013/0063) included an indicator measuring "data workers", which was based on a similar, but slightly more restrictive, definition. In line with the First Report on Facts & Figures (D2.1), in this document, we measure "data professionals" – that is, workers with a wider range of data-related roles. Indeed, data professionals are not only data technicians, but also users who, based on sophisticated tools, take decisions about their business or activities after having analysed and interpreted the available data.

- ***Data users*** *are organisations that generate, exploit collect, and analyse digital data intensively and use what they learn to improve their business. They represent the demand side of the data market.*

Forecasting Data Supplier Companies: 2025 and Three 2030 Scenarios

The table below presents the summary forecast for data supplier companies in the Member States and greater European continent for 2025 and three scenarios for 2030. We anticipate the number of data supplier companies in the 27 Member States will grow at a compound rate of 8.4% between 2020 and 2025 and grow at a slightly slower rate of 3.5% between 2025 and the 2030 Baseline forecast. Compared to previous forecasts, the growth is less pronounced up to 2025, and slightly higher between 2025 and 2030 than previously forecast, primarily due to changes in economies resulting from events in Ukraine and the consequential fallout on economies and specifically energy costs.. While the war in Ukraine has weakened the forecast, the primary factors dictating higher or lower growth remain the ability of new companies to form and exploit the monetisation of data markets. In addition, the emergence of new ways of using data – particularly in artificial intelligence applications will also impact the growth in the number of data supplier companies

Table 3 Data Supplier Companies Forecasts: 2025, Three 2030 Scenarios, and Growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020–2025	CAGR '25–30, Challenge	CAGR '25–30, Baseline	CAGR '25–30, High Growth
EU27	263,187	298,241	312,961	330,968	8.4%	2.5%	3.5%	4.7%
EEA (NO, LI, IS) +CH	7,683	8,712	9,344	10,246	8.7%	2.5%	4.0%	5.9%
Total, all countries	518,786	588,841	611,087	642,448	8.4%	2.6%	3.3%	4.4%

Forecasting Data User Companies: 2025 and Three 2030 Scenarios

The increased use of data ensures a considerable growth in the number of data use companies across the Member States out to 2030. The table below summarises the growth in data user companies out to 2025 and the three scenarios for 2030.

This growth is moderate due, primarily to the economic conditions resulting from the war in Ukraine and the subsequent impact on energy costs. However, we interpret this as a local and temporary condition so the forecast out to 2025 is more positive in this forecast than in the previous one, as the growth in data technologies, particularly the rising use of artificial intelligence, overcomes the downturn resulting from the conditions in Ukraine and their consequences on global supply-chains and on the energy sector. From 2025 onwards, we expect more modest growth in the overall EU data market and data economy. For this reason, our 2030 Baseline forecast is increased by less than 1% with respect to the previous forecast in 2021.

Table 4 Data User Companies Forecasts: 2025, Three 2030 Scenarios, and Growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR: 2020–2025	CAGR 2020-2030, Challenge	CAGR 2020-2030, Baseline	CAGR 2020-2030, High Growth
EU27	648,354	761,094	905,716	1,094,049	3.6%	3.3%	6.9%	11.0%
EEA (NO, LI, IS) +CH	8,304	9,969	12,093	14,842	3.2%	3.7%	7.8%	12.3%
Total, all countries	876,408	1,025,183	1,216,783	1,466,935	3.6%	3.2%	6.8%	10.9%

Measuring Data Companies' Revenues

Data companies' revenues *correspond to the aggregated value of all the data-related products and services generated by Europe-based data suppliers, including exports outside the EU. This indicator measures the revenues of the data suppliers identified and classified by Indicator 2 (see the products and services specified in our definition of the data market). Data companies' revenues do not include data monetisation as part of the data market.*

Forecasting Data Companies' Revenues

Data companies' revenues will continue to grow as the market evolves, as detailed in the table below. Overall growth among the Member States will be 3.4% out to 2030 (Baseline), although, from 2020 to 2025, growth will be higher, at a compound rate of 7.9%. The data market is healthy and robust but will slow a little as organisations consolidate their spending following early years' expense. The key industries that benefit from spending in the data market are – as always – information and communication, and professional services.

Table 5 Data Companies Revenues Forecasts: 2025 (€M), Three 2030 Scenarios (€M), and Compound Growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020–2025	CAGR 2025–2030, Challenge	CAGR 2025–2030, Baseline	CAGR 2025–2030, High Growth
EU27	113,389	119,624	137,149	168,386	8.5%	1.1%	3.9%	8.2%
EEA (NO, LI, IS) + CH	3,658	3,900	5,329	6,876	5.6%	1.3%	7.8%	13.5%
Total, all countries	153,294	169,957	196,650	238,040	8.0%	2.1%	5.1%	9.2%

Measuring the Data Market

*The **data market** is the marketplace where digital data is exchanged as "products" or "services" as a result of the elaboration of raw data.*

The data market remained hesitant in 2021 due to the remnants of the Covid influence, but this is offset by a more optimistic market and outlook due to greater adoption of data technologies such as artificial intelligence, which is rapidly becoming endemic in a wide range of data software, client interaction tools and business management tools. The war in Ukraine also impacted the growth in the market, but this was hidden by the greater growth experienced in the take up of data software and tools.

Table 6 Value and Growth (%) of the Data Market (€M), 2020-2022

N.	Market	Name	Description	2020	2021	2022	Growth 2021-2022
4.1	EU27	Value of the Data Market	Estimate of the overall value of the Data Market	60,635	64,820	72,963	12.6%

Data Monetisation

The definition of data supplier companies has been extended to accommodate the inclusion of the sale and purchase of data, **data monetisation**: Data monetisation is the revenue that data suppliers get from selling data. In the data economy, we consider data monetisation as an additional direct impact, generated at the level of supplier companies

Forecasting the Data Market

The forecast for the data market to 2025 and the three scenarios for 2030 are summarised in the table below. The data market in the EU27 will grow to €116 Billion in 2030 (Baseline), representing compound growth rate of 3.4% over the period 2025 to 2030. The EEA countries (Norway, Liechtenstein and Iceland) will be characterised by higher growth (5.4% compound growth rate over the same period) but their market will remain a fraction if compared to the size of the EU27.

Table 7 Data Market Forecast: 2025 (€ '000s), Three 2030 Scenarios (€ '000s), and Compound Growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR: 2020–2025	CAGR: 2025–2030, Challenge	CAGR: 2025–2030, Baseline	CAGR: 2025–2030, High Growth
EU27	98,484	101,564	116,462	137,591	8.7%	0.6%	3.4%	6.9%
EEA (NO, LI, IS) + CH	3,675	3,771	4,784	6,261	7.7%	0.5%	5.4%	11.2%
Total, All Countries	131,601	135,980	153,557	180,306	8.7%	0.7%	3.1%	6.5%

Measuring the Data Economy

The **data economy** measures the overall impacts of the data market on the economy as a whole. It involves the generation, collection, storage, processing, distribution, analysis elaboration, delivery, and exploitation of data enabled by digital technologies.

The data economy captures a wider concept than the data market only, as it considers the value and wealth generated in the economy as a whole (not just across businesses) by the exploitation of data.

The Data Economy, 2020–2022

The value of the data economy for the EU27 has been estimated to reach more than €450 billion in 2021, a small adjustment with respect to the previous deliverable in May 2022 (around 3% for EU27) to take into account the new data published by IDC. In 2022, the data economy will reach the threshold of €500 billion, with an annual growth of 8.7% on 2021. Indeed, despite the economic turmoil, the market for intelligent analytics and data technologies has been one of the vibrant. Enterprises are increasingly recognizing that business transformation and business benefit is dependent on improved use of data – digital transformation is nothing without data transformation and modernization. Recent economic and political market shocks have not caused long-lasting reduction in data analytics market growth.

The estimated share of both direct and indirect impacts on GDP in the EU27 ranges from 3.7% in 2021 to 3.9% in 2022.
EEA countries (NO, IS, LI) excluding Switzerland, reach a value of the data economy of around €20 billion in 2021 and €21.5 billion in 2022, with an annual growth of 7.8% and a share on the regional GDP in 2021 and 2022 above 5%.

Table 8 Data Economy, 2020–2022: Value (€M), Growth (%), and Impact on GDP (%)

	Name	Description	2020	2021	2022	Growth Rate 2021–2022	Impact on GDP, 2020	Impact on GDP, 2021	Impact on GDP, 2022
EU27	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	434,318	455,479	495,198	8.7%	3.7%	3.7%	3.9%
EU27+ UK	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	569,797	594,659	647,343	8.9%	4.1%	4.1%	4.3%
Total, all countries	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	620,212	646,991	703,913	8.8%	4.2%	4.2%	4.4%

Forecasting the Data Economy, 2030

In 2030, the data economy for the EU27 is expected to remain slightly below the €1 trillion threshold, with a 5.5% 2025–2030 CAGR. When we consider the UK, the data economy in 2030 is expected to reach the €1.1 trillion value and also adding Switzerland and EEA (NO, LI, IS) countries, the value will reach €1.2 trillion, with a 2025–2030 CAGR of 5.7%.

- One of the main results is that, despite the slower growth, the share of the data economy as a part of GDP in the EU27 will increase from 4.8% in 2025 to 5.7% in 2030.
- Another important result is the increase in induced impacts, from almost 33% in 2025 to nearly 36% in 2030. Both direct and indirect impacts will decrease in size while remaining widespread in the economy. People and companies benefitting from the value of data shared across companies from a ripple effect, despite the importance of direct and indirect impacts continuing to be very high (the buying and selling of data products and services and the benefits in the B2B space in particular).

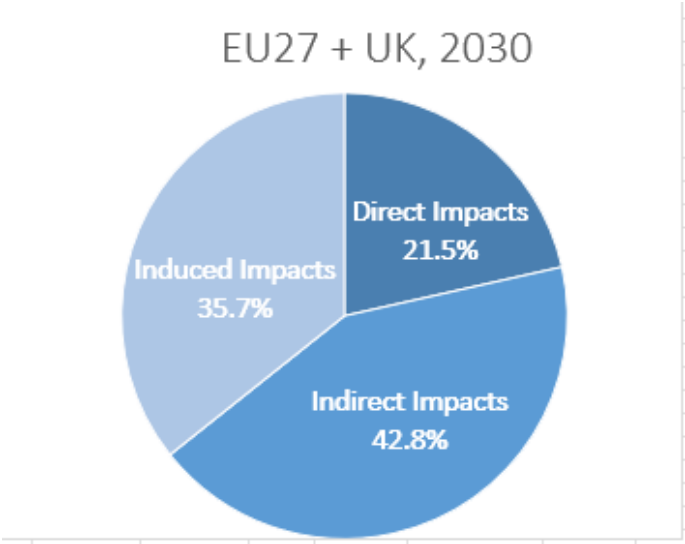


Figure 3 Data Economy by Impact Type, EU27+UK, 2030 (%)

Source: European Data Market Monitoring Tool, IDC 2022

The two alternative scenarios will consider a slower growth of the impacts in the overall economy in 2030 for a Challenge scenario, affected by a slower growth of GDP as well, and a faster growth for data economy and GDP for a High Growth scenario. The pace of growth, measured as the compound annual growth rate (CAGR) in 2030–2025 for the EU27 in a Challenge scenario will be less than a half the growth expected in a Baseline scenario (2.5% compared to 5.5%), and nearly double in a High Growth scenario (10.0%).

Table 9 Data Economy Value (€M); 2030 Challenge, Baseline, and High Growth Scenarios (€M); and Impact on GDP (%)

Source: European Data Market Monitoring Tool, IDC 2021

Market	Name	Description	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	25-30 CAGR			Impacts on GDP		
						2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario
EU27	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	722,210	837,110	1,027,232	2.5%	5.5%	10.0%	5.3%	5.7%	6.6%
EU27+UK	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	948,425	1,087,051	1,323,710	2.8%	5.7%	9.9%	6.0%	6.4%	7.3%
Total, all countries	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	1,025,136	1,182,345	1,437,163	2.7%	5.7%	9.9%	6.0%	6.5%	7.4%

Measuring the Data Professionals Skills Gap

The **Data Professionals Skills Gap** indicator captures the potential gap between the demand and supply of data professionals in Europe.

The measurement of this indicator is based on a model combining the separate estimates and forecasts for the demand for data technical and business professionals and the supply of corresponding data skills by the inflow from the education system and the upskilling and reskilling of the existing workforce. This includes balancing the main sources of data skills (from the education system and retraining to provision from other careers) with the estimated demand for data skills (by all data companies).

To reach the final estimates on the potential skills gap by country and region, indicators on the supply side such as (but not limited to) immigration inflows/outflows, level of upskilling by industry, retirement of senior workers and level of proficiency of different courses to prepare professionals for data technical roles are all factored in.

The multi-variable approach enables the model to reach a more accurate mapping of worker flows, which is then compared against the calculated demand for this workforce across key industry sectors in the EU region. Calculations on the demand of data workers are based different indicators, such as (but not limited to) current number of data professionals in activity, level of technology adoption, size of industry by member state and the data sector growth potential in each of these sectors.

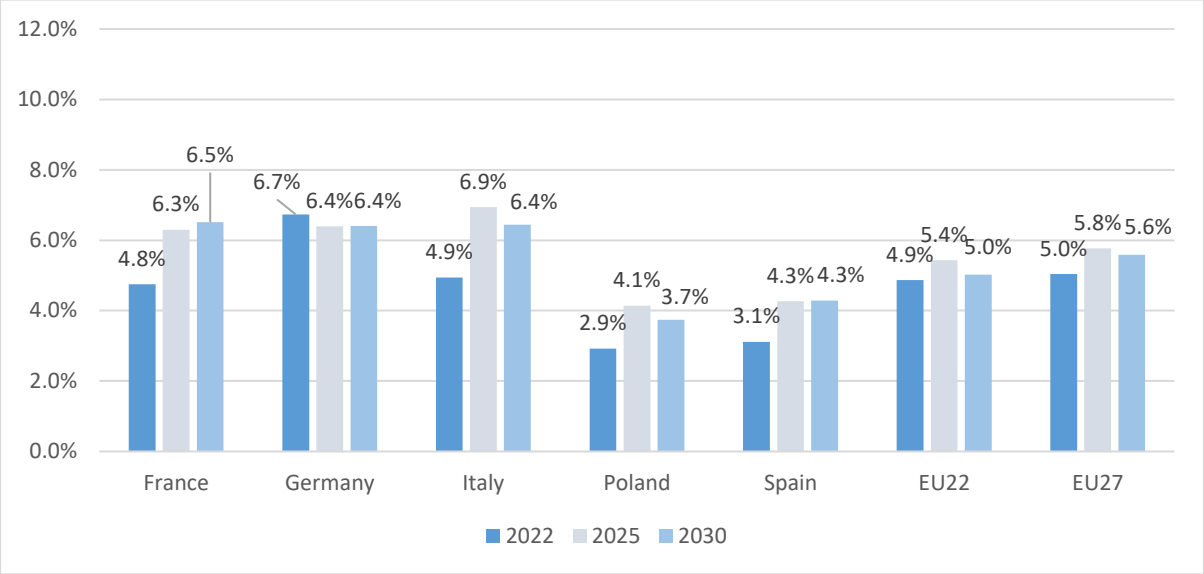
The skills gap between the demand and supply of data professionals measured as a percentage of the demand for data professionals is growing rapidly, and it will increasesignificantly in the 2021–2025 period. Demand has already outgrown supply, and it is only beyond 2025 that the gap starts to decrease in any of the scenarios and countries modelled.

The skills gap for data professionals is growing rapidly, and it will expand most significantly in the 2022–2025 period. Demand has already outgrown supply, with significant increases expected between 2022-2030 in any of the scenarios and countries modelled. The following sections provide more details for the European Union and the rest of the European countries.

The table below shows the skills gap for the EU27 in 2022 as a base year and in 2030 for the three scenarios. It is clear that in all scenarios, there is expected to be a skills gap:

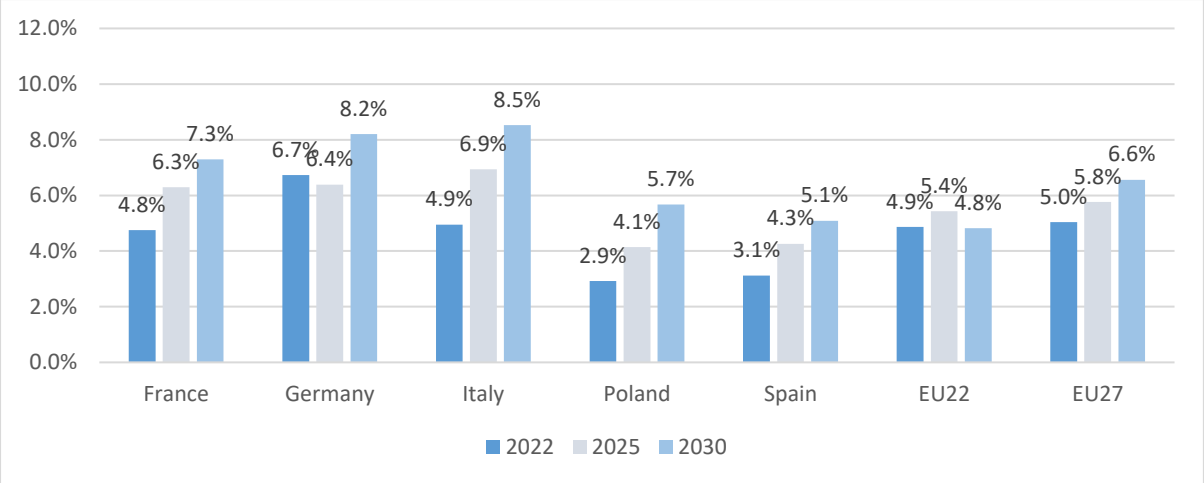
- In 2022, the data professionals' skills gap is estimated at 368,000 across the EU27, growing to 552,000 by 2030 in the Baseline scenario. This means that the gap will grow from 5% in 2021 to 6% in 2030.
- For the Challenge scenario, the gap will reach 608,000 in 2030, or 6.8%, as graduates look for alternative careers and there is a lower number of entrants from other careers.
- In the High Growth scenario, the gap will reach 981,000 in 2030 as the education system, reskilling, and upskilling programs will be unable to keep up with accelerating demand.
- Figure 54, figure 55 and figure 56 provide graphic representations of the data professionals skills gap for the three scenarios by Member State.

Figure 4 The Data Professionals Skills Gap for the EU27: 2020 and the Baseline 2030 Scenarios ('000s)



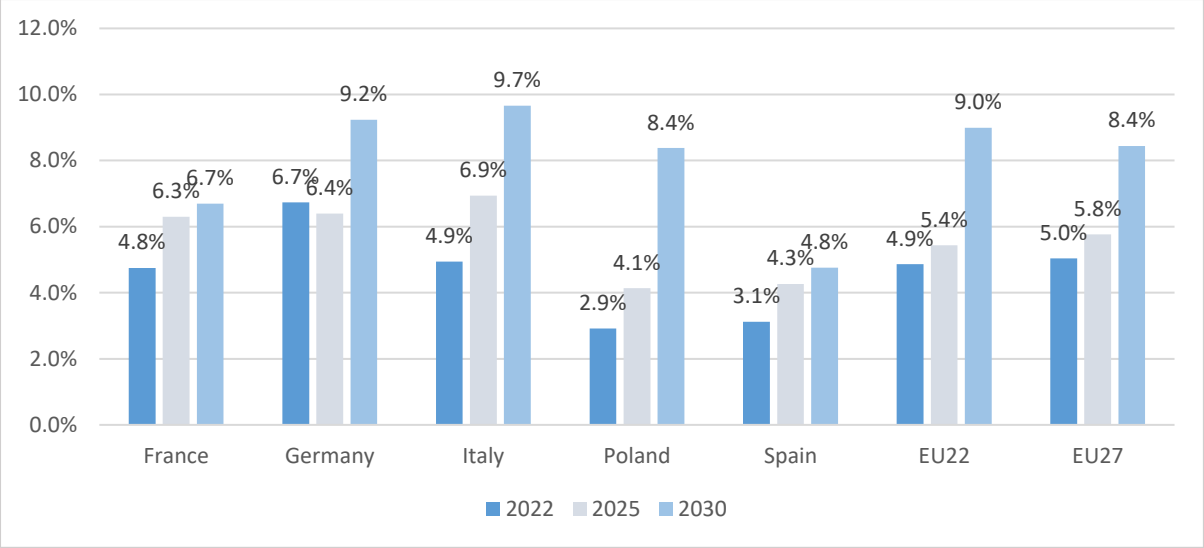
Source: European Data Market Monitoring Tool, IDC 2022

Figure 5 The Data Professionals Skills Gap for the EU27: 2020 and the Challenge 2030 Scenarios ('000s)



Source: European Data Market Monitoring Tool, IDC 2022

Figure 6 The Data Professionals Skills Gap for the EU27: 2020 and the High Growth 2030 Scenarios ('000s)



Source: European Data Market Monitoring Tool, IDC 2022

Table 10 The Data Professionals Skills Demand and Gap for the EU by Member State: 2020–2022, 2025, and Three 2030 Scenarios (Thousands)

Member State		2020	2021	2022	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
France	Numbers	33	35	52	77	105	95	114	6.4%	4.3%	8.1%
	% Gap	3.4%	3.3%	4.8%	6.3%	7.3%	6.5%	6.7%			
Germany	Numbers	69	84	123	137	208	165	285	8.7%	3.8%	15.8%
	% Gap	4.3%	4.9%	6.7%	6.4%	8.2%	6.4%	9.2%			
Italy	Numbers	22	24	35	55	75	60	101	6.3%	1.6%	12.7%
	% Gap	3.3%	3.5%	4.9%	6.9%	8.5%	6.4%	9.7%			
Poland	Numbers	18	20	18	27	37	28	74	6.7%	0.5%	22.2%
	% Gap	3.2%	3.5%	2.9%	4.1%	5.7%	3.7%	8.4%			
Spain	Numbers	16	13	17	25	31	30	38	4.3%	3.2%	8.2%
	% Gap	3.4%	2.6%	3.1%	4.3%	5.1%	4.3%	4.8%			
EU22	Numbers	48	93	123	157	151	174	369	-0.8%	2.1%	18.7%
	% Gap	2.2%	3.9%	4.9%	5.4%	4.8%	5.0%	9.0%			
EU27	**Numbers**	206	270	368	479	608	552	981	4.9%	2.9%	15.4%
	% Gap	3.2%	3.9%	5.0%	5.8%	6.6%	5.6%	8.4%			

The Data Economy Beyond the EU – the US, Brazil, Japan, and China

This report extends the Data Economy beyond the European Union and includes a specific section on four additional non-European countries – the US, Brazil, Japan and China. The indicators for the four selected EU international partners are based on IDC databases available at worldwide level. Data such as ICT spending is available for most countries worldwide and is gathered with the same approach across the board: These data series are perfectly comparable at an international level.

The US

The US remains the strongest of the internationals' data economies in 2021 and out to 2022. The country's strength lies especially in tools and software although hardware is also strong, even if much of this is manufactured outside the country. As the world's leading economy, the US has the resources and capabilities to continue to dominate the development of data and the data market.

Many data suppliers are US-based and the country is considered at the forefront of artificial intelligence (AI). AI is driving a lot of the growth in the data market as its technologies are embedded into all areas of work. The US has a strong base in cloud technology – again one of the foundational technologies for dealing with and using data and leading cloud-based organisations such as Amazon

Web Services (AWS), Microsoft, and Google are US based. These organisations lead the development of data and its associated technologies, which is why the US is the leading country in data and data technology.

The strength of the US data market and data economy is implied in the profits and market values of some of the most significant Big Techs hosted in the country. In 2020, two of the largest global data firms – Alphabet Inc. (Google) and Meta Platforms Inc. (Facebook) – had a combined net income before tax of $81.3 billion (approximately €74.6 billion), which amounted to 3.7%of the whole of U.S. corporate profits before tax. In November 2021, the combined market capitalization of the two firms was $2.9 trillion (€2.7 trillion), which amounted to 7.5%of the market capitalization of all S&P 500 firms, just as an example[3].

Table 11 US Indicators – 2020–2022 Overview

Name	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	15,275	16,492	16,567	0.5%
Data professionals' employment share	% of Data professionals on total employment	5.2%	5.4%	5.4%	0.6%
Number of Data Suppliers	Total number of data supplier companies (000s)	315,857	324,300	330,357	1.9%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	213,463	242,358	289,483	19.4%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	213,463	242,358	289,483	19.4%
Value of the Data Economy (Backward Impacts)	Backward Impacts (Million €)	163,296	232,101	276,269	19.0%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	1.3%	1.3%	1.4%	3.5%

China

The People's Republic of China is emerging as a significant contributor to the data market thanks to its development of advanced technologies and specifically artificial intelligence and has the capability to be the more dominant supplier of data tools and data *tout court* to the worldwide data market. China has growing capabilities in AI, 5G telecommunications, and high-performance computing and this could easily present China as a significant competitor to the US within the data field. Table 68 and Figure 52 present the key statistics for the US.

Under the presidency of Xi-Jinping, the country has multiplied its efforts towards a solid digital economy notwithstanding the difficulties in coming to terms with the Covid-19 emergency. After years of unabated growth, China's Gross domestic product (GDP) grew just 2.8% in 2022 as lockdowns weighed on activity and confidence, according to the median forecasts of 49 economists polled by

[3] Valuing the U.S. Data Economy Using Machine Learning and Online Job Postings, José Bayoán Santiago Calderón and Dylan G. Rassier, U.S. Bureau of Economic Analysis, BEA Working Paper Series, WP2022-13, October 2022 https://www.bea.gov/system/files/papers/BEA-WP2022-13.pdf

Reuters[4], slower than a 3.2% rise seen in October's forecast and braking sharply from 8.4% growth in 2021. On top of these macro-economic issues, the country continues to suffer from a relatively smaller share of qualified labour force in services industries (43%) if compared with the EU EU (73%), thus making it relatively more difficult to generate, share and use data on a very large scale. However, the sheer size of China's economy and population ensures that the number of data professionals amounts to more than 10 million units in 2022, second only to the US.

Table 12 China Indicators – 2020–2021 Overview

Name	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	9,184	10,065	10,105	0.4%
Data professionals' employment share	% of Data professionals on total employment	1.2%	1.3%	1.3%	0.5%
Number of Data Suppliers	Total number of data supplier companies (000s)	858,509	887,152	888,658	0.2%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	27,470	31,968	39,664	24.1%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	27,470	31,968	39,664	24.1%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	31,062	42,144	47,966	13.8%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.8%	0.9%	0.9%	3.5%

Brazil

With one of the highest number of lives lost in the world, Brazil is still coping with the damages inflicted by the Covid pandemic. The economy recovered in 2021 following a recession in 2020, with the recovery mainly in the services sector – one of the key drivers of the data market. However, 2022 showed a lower growth – below 1% in GDP – given the political uncertainty that dominated the country throughout the year in view of the presidential elections that were held in October 2022. The uncertainty is likely to affect the country in 2023 as well because of the narrow margin of victory of President Lula and, more importantly, because of the riots that shook the capital in the aftermath of Lula's inauguration on 1st January of this year.

The country would benefit from the development of the data market, using artificial intelligence to boost efficiencies on organisations as productivity is low in the country when compared to e.g., China or the US. However, a brake on development of the data economy could be the relatively weak student performance in the country, which is among the lowest of the OECD members.

[4] https://www.reuters.com/markets/asia/china-growth-seen-rebounding-49-2023-more-stimulus-cards-2023-01-12/#:~:text=9%20days%20ago-,POLL%20China%20growth%20seen%20rebounding%20to%204.9%25%20in%202023,more%20stimulus%20on%20the%20cards&text=BEIJING%2C%20Jan%2012%20(Reuters),for%20the%20COVID%2Dravaged%20economy .

We forecast growth for the Brazilian data economy as the country employs or develops more data professionals.

Table 13 Brazil Indicators – 2020–2022 Overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	1,244	1,272	1,409	10.8%
Data professionals' employment share	% of Data professionals on total employment	1.0%	1.0%	1.1%	9.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	39,606	41,261	41,947	1.7%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	8,374	8,865	9,252	4.4%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	8,374	8,865	9,252	4.4%
Value of the Data Economy (Backward Impacts)	Backward Impacts (Million €)	7,812	10,841	11,018	1.6%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.2%	0.2%	0.2%	0.3%

Japan

Japan's economy is regaining momentum with recent efforts that are shifting from emergency support measures to targeted policies and reforms to boost labour force participation and productivity. Improving public spending efficiency, including through digitalising more government services, and gradually raising the consumption tax, which is low by OECD standards, are slowly but steadily reducing the public debt-to-GDP ratio, thus helping a relaunch of the economy as well as increased investments in digital infrastructure and business digitalisation. However, Japan's dependence on fossil fuels poses a geo-political problem. As energy prices rises European economies will switch to more sustainable renewable fuel sources to mitigate the increased cost, while Japan still consumes considerable fossil fuels, which put the country at an economic disadvantage in the longer term. Despite these difficulties, our estimates for the year 2022 show a reasonable growth for Japan's data economy and data market overall, with the latter marking a year-on-year growth of 16.3% in 2022.

Table 14 Japan Indicators – 2020–2022 Overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	4,398	4,536	4,801	5.8%
Data professionals' employment share	% of Data professionals on total employment	3.3%	3.4%	3.4%	2.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	106,214	106,994	107,720	0.7%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	36,649	39,570	46,011	16.3%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	36,649	39,570	46,011	16.3%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	30,960	40,145	45,197	12.6%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	1.2%	1.3%	1.4%	2.9%

Comparing the Internationals to the EU27

The EU27 appears to confirm its second position in terms of size and strength of the data market and data economy if compared against the present international background. European firms lag the US in the adoption of digital technologies, and this is reflected in the size of the data market as measured by our indicators – in 2022 the data market in the EU27 is still approximately one fourth of the one measured in the US.

Slow recovery from Covid-19 in 2022 is possibly one explanation but other reasons such as the small size of companies in Europe vis-à-vis other regions of the world and, in particular, the US should be included. Structural barriers to investment in digitalisation, policy fragmentation, lack of awareness of the potential digital upsides and an insufficient number of digitally skilled workforce are other very well-known reasons that may account for the EU's current gap vis-à-vis the US.

The following table presents the overall picture of the EU27 with respect to the indicators that we have measured for this international comparison.

Table 15 EU27 indicators 2020-2022 Overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	6,502	6,957	7,307	5.0%
Data professionals' employment share	% of Data professionals on total employment	3.6%	4.0%	4.1%	1.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	175,605	190,796	216,209	13.3%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	60,635	64,820	72,963	12.6%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	71,050	75,287	83,992	11.6%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	108,546	115,738	126,727	9.5%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.6%	0.6%	0.6%	5.9%

Introduction

This report presents the **second round** of measurements in 2022, European Data Market Monitoring Tool following up on the **First Report on Facts and Figures (D2.1)** [5] published in February 2022 within the framework of the third edition of the **European Data Market Study** (VIGIE 2020-0655) entrusted by the European Commission to IDC and the Lisbon Council.

In continuation, the **Second Report on Facts and Figures (D2.4)** focuses on the following six indicators: 1) the number of data professionals (including the number of data scientists); 2) the number of data companies and data user companies (including the number of start-ups and SMEs); 3) the revenue generated by data companies (including start-ups and SMEs); 4) the size of the data market; 5) the value of the data economy; and 6) the data skills gap (including the data scientists' skills gap).

The results presented in this report leverage the work conducted by the original European Data Market Study (SMART 2013/0063) and the Update of the European Data Market Study (SMART 2016/0063). As in in the previous rounds of measurement of the indicators included in the First Report of Facts & Figures (D2.1), the indicators are presented along three potential scenarios of evolution based on alternative development paths that were modelled on possible different evolutions of a set of key underpinning factors (such as the macroeconomic factors, policy and regulatory conditions, supply-demand dynamics of the market of data and global megatrends). Thus, the Monitoring Tool also provides a forecast of the main indicators to the year 2030 according to three distinct and alternative development paths: Baseline, Challenge and High Growth.

In the first round of measurements the indicators that were produced in October-November 2021 did not consider the effects of the Russian-Ukrainian War. An initial evaluation of this event on the European data market and data economy was offered in First Report on Policy Conclusions (D2.2). This report (D2.4) include a brand-new round of measurements and analysis with the impacts of these recent events.

1.1 Objectives

The main goal of this study is to update and develop the EDM Monitoring Tool, continuing to provide the market intelligence, factual evidence, and insights on the future developments needed to support European policies in this field in the next three years. A balance between continuity (to build on the value of the data and understanding accumulated in the past seven years) and innovation (to monitor and measure new developments and emerging trends as the Data

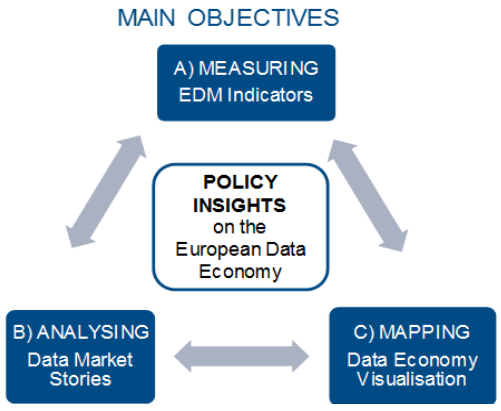


Figure 7 EDM Main Objectives

[5] D2.1 First Report on Facts and Figures https://ec.europa.eu/newsroom/dae/redirection/document/82977

Economy matures) is a key objective of the methodology presented in this report.

As for the previous editions, the study will be conducted through three correlated streams of work aimed at collecting and delivering factual evidence, data, and qualitative insights, which together will feed into the overarching goal to provide insights on progress towards policy targets.

1. Updating and implementing the EDM Monitoring Tool indicators, revising the taxonomy and methodology approach developed in the last years to adapt to the market evolution, measuring annually the main EDM indicators, providing facts and figures on all the key features of the European data market and economy, with a strong focus on the measurement of growth and job creation.
2. Producing descriptive stories analysing the main critical issues of the development of the data economy and society, complementing the EDM statistical indicators with qualitative and quantitative evidence based on case studies and expert analysis. The stories have proven a flexible and valuable tool to investigate issues and questions arising from evolving data policy priorities during the life of the project.
3. Further developing the data stakeholders' landscape and community built in the past years, improving the mapping and visualisation activities published online. In this edition of the EDM study, the EU data landscape will be considerably improved thanks to collaboration with Dealroom, a leading provider of data on tech companies and partners of the EuropeanStartups.co EU initiative. We also plan to leverage the data stakeholder's community to collect information and evidence for the ongoing measurement of EDM indicators.

1.2 Overview of Indicators

This document focuses on the following indicator sets:

- Indicator 1.1: The Number of Data Professionals
- Indicator 1.2: The Employment Share of Data Professionals
- Indicator 1.3: The Intensity Share of Data Professionals
- Indicator 2.1: The Number of Data Supplier Companies
- Indicator 2.2: The Share of Data Supplier Companies
- Indicator 2.3: The Number of Data User Companies
- Indicator 2.4: The Share of Data User Companies
- Indicator 2.5: The Share of Data User and Data Supplier Companies That Offer Data for Re-Use
- Indicator 3.1: The Total Revenues of Data Supplier Companies
- Indicator 3.2: The Share of Data Supplier Companies' Revenues
- Indicator 4.1: The Value of The Data Market
- Indicator 4.2: Data Monetisation
- Indicator 5: The Value of The Data Economy
- Indicator 5.1: The Impact of The Data Economy On GDP
- Indicator 6: The Data Professionals Skills Gaps

Each indicator is measured at the level of the total EU and for each Member States, when available and applicable; industry-specific and company-size views are also offered with indicators provided by industry sector and company size bands, when possible.

The indicators are presented for the years 2020, 2021, 2022, 2025 to a baseline and 2030 according to three alternative scenarios.

As in the First Report on Facts & Figures (D2.1), a select number of indicators has been developed and updated for four non-European countries, namely Brazil, Japan, China and the United States.

For each of these countries, this report presents the following indicators:

- Indicator 1.1: Number of data professionals;
- Indicator 1.2: Data professionals' employment share;
- Indicator 2.1: Number of data supplier companies;
- Indicator 3.1: Revenues of data companies;
- Indicator 4: Value of the Data Market;
- Indicator 5.1: Value of the Data Economy (only Direct and Backward Indirect impacts);
- Indicator 5.2: Incidence of the Data Economy on GDP (only direct and backward indirect impacts).

The table below offers an overview of the full set of indicators that have been developed in this Second Report on Facts and Figures

Table 16 D2.4: Second Report on Facts and Figures – Full Set of Indicators

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
1.1	**Number of data professionals**	2020	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
1.2	**Employment share**	2020	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 High Growth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Challenge	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
1.3	**Intensity share**	2020	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 High Growth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Challenge	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
2.1	**Number of data supplier companies**	2020	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2025	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
		Baseline						
		2030 Baseline	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
2.2	**Share of data supplier companies**	2020	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2025 Baseline	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Not Applicable	Applicable	Applicable	Applicable
2.3	**Number of data user companies**	2020	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2025 Baseline	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
2.4	**Share of data user companies**	2020	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
		2025 Baseline	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
2.5	**Share of data user and data supplier companies that offer data for re-use**	2020	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2021	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 High Growth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Challenge	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
3.1	**Total revenues of data supplier companies**	2020	Not applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2021	Not applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2022 estimated data	Not applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 High Growth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Challenge	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
3.2	**Share of data supplier**	2020	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
	companies' revenues	2022 estimated data	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Baseline	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 High Growth	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
		2030 Challenge	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
4	**Value of the data market**	2020	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Challenge	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
4.1	**Data monetisation**	2020	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
		2030 Challenge	Applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
5	**Value of the data economy**	2020	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Challenge	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
5.1	**Impact of the data economy on GDP**	2020	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2021	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2022 estimated data	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
		2030 Challenge	Not applicable	Applicable	Not applicable	Applicable	Applicable	Applicable
6	**Data professionals skills gap**	2020	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable
		2021	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable

#	Name of Indicator	Year	Industry	Member State	Company Size	EU27	UK+ Switzerland	EEA (NO, LI, IS)
		2022 estimated data	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable
		2025 Baseline	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable
		2030 Baseline	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable
		2030 High Growth	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable
		2030 Challenge	Not applicable	Applicable (only for DE, ES, FR, IT PL)	Not applicable	Applicable	Applicable	Applicable

This document is accompanied by a comprehensive dataset reporting the values for all the indicators outlined in the table above, including the values obtained through the previous rounds of measurement from the First Report on Facts & Figures (D2.1) of the European Data Market Study 2021-2023.

1.3 Structure of the Report

This Second ***Report on Facts & Figures*** focuses on the results obtained through the second round of measurements of the European Data Market Monitoring Tool for the 2020–2022 period, with forecasts for 2025 and for 2030 under three distinct scenarios.

The report is organised in the following chapters:

- **Chapters 1 and 2** include a brief introduction and a short reminder of the overall study's goals and objectives, as well as a summary of the European Data Market Monitoring Tool and its functioning. It also focuses on the forecast scenarios methodology and includes analysis on the data economy and the current economic and geopolitical situation.
- **Chapter 3** is devoted to the measurement of the data professionals, including their main values in absolute terms, their share in terms of total employment, and their forecast to 2025 and 2030 according to the three scenarios under consideration.
- **Chapters 4 and 5** provide the values for the indicators measuring the data companies (both suppliers and users of data) in terms of absolute numbers and produced revenues. They include an updated forecast of the indicators to 2025 and 2030.
- **Chapter 6** presents the indicators measuring the size of the data market in Europe based on the value generated by pure data players developing BDA technologies and the value created

by data-related research, businesses, information, and IT services and its contribution to the data market. In this chapter, as a new feature, an estimate for the value of data monetisation is added to the data market.

- **Chapter 7** focuses on the data economy and measures the overall impacts of the data market on the economy, including three sets of impacts – data companies' revenues, indirect impacts, and induced impacts.
- **Chapter 8** is devoted to the update of the data professionals skills gap indicator in the EU.
- **Chapter 9,** International Dimension of the Data Economy, presents a select number of indicators for the United States, China, Brazil, and Japan.
- **Chapter 10** provides a set of concluding remarks of the report.
- The **Methodological Annex** summarises the key methodological steps that we have undertaken to measure the indicators covered in both the previous reports and in the current report.

2. European Data Market Monitoring Tool: 2021–2023

2.1 A Novel Methodological Approach

The European Data Market (EDM) study requires a complex mix of qualitative and quantitative methodologies, allowing to reach the objectives presented in the previous chapter. While quantitative methodologies represent the most relevant part of the study, qualitative methodologies are indispensable to balance the statistical approach and provide the market and social intelligence needed to lead to policy insights and the development of sound scenarios.

In order to ensure the study's continuity, the methodological approach builds upon previous EDM Monitoring Tool releases, including necessary improvements. The definition of the main indicators is revised and updated according to the maturing of the market and data economy. It is important to emphasise that the EDM Monitoring Tool's modular structure does not change in its core substance, as it has already proven to be sufficiently adaptable to the evolution of the data market and data economy in past years.

The complexity of the methodologies used for providing the facts and figures on the European data market and European data economy is presented on the figure below, with the main methodological steps being as follows:

- The revision and update of the conceptual framework and taxonomy consist of the following elements: a) an update of definitions of data professionals, data user companies, and data market, including data monetisation value; b) the definition and management of data sharing and data interoperability issues, including the role of common European data spaces and the concept of data sovereignty; c) the assessment of the social and environmental impacts of data-driven innovation.
- The validation of the revision/update through expert interviews.
- The organisation and implementation of data collection (including desk research and field research), which will be repeated annually to feed into the measurement of indicators.
- In parallel, activities in case studies and stories and the polling of the stakeholder community will provide complementary data and analytical insights, particularly concerning socioeconomic and environmental impacts.
- The outputs of data collection and qualitative analysis will feed into the seven interlocked quantitative models used to measure the main indicators (the data companies indicator has two models, one for user companies and one for supplier companies).
- In parallel with the calculation of indicators, the scenario forecasting methodology will be implemented, developing the main assumptions driving the three alternative scenarios to 2030 and the forecasting of all indicators.
- The quantitative models and the scenarios methodology interact closely and provide reciprocal feedback.
- Quality control will accompany each step of the process, with a focus on data quality control in the data collection phase and on model quality control in the phase of the measurement of indicators and the development of scenarios.

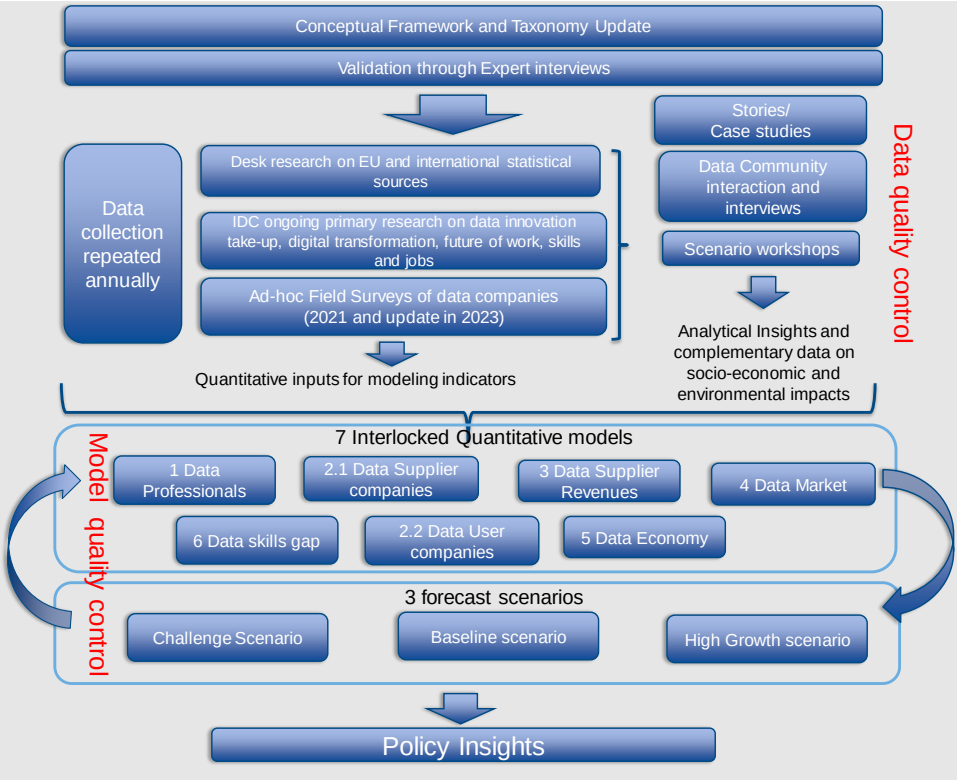


Figure 8 A Complex Methodology

The main methodological changes introduced by this third edition of the European Data Market Monitoring Tool revolve primarily around four indicators.

1. **Measuring the Value of Data**

Measuring the value of data, and/or measuring the value of the data sharing market, is becoming increasingly relevant to assess its contribution to economic growth and assess the benefits and returns on investments in the data economy. However, measuring the value of data is also a relevant challenge because of the nature of data and the complexity of its role in the economic system.
To measure the value of data, we have improved the methodology by:

- Adding a sub-indicator on data monetisation to the data market value indicator, which can be measured by industry/country and company size, as with all of the other indicators
- Deepening the analysis and estimates of the indirect benefits of data sharing and data reuse within the data economy indicator
- Investigating other aspects of the value of data through stories and interaction with the data community

2. **Measuring Data Supplier and Data User Companies**

The approach to measuring data supplier and data user companies has been improved based on market developments. The definition of data companies (which is divided into data suppliers and data users) will remain unchanged.

Data-supplier companies: Data innovation has been rapidly spreading from technology-driven sectors to a larger part of the economy and is now diffused in many industries. As a result, we believe that a congruous number of specialised data companies have emerged in other sectors (such as finance and retail), and these companies can now be measured. In order to gauge this evolution of the data industry, in the quantitative survey, we have investigated both data suppliers and data users in all sectors of the economy and identified them based on questions about their activities in the data market. Desk research and IDC data have complemented the survey results.

Data-user companies: In the past editions of the study, we identified data users based on of their use of big data technologies for decision-making. We are able now to use a more sophisticated method by investigating in the survey the main business goals and the range of ways in which companies use data based on data-driven use cases. Use cases are specific instances of the implementation of technologies to achieve business goals, and IDC has accumulated a rich library of use cases for all the main technologies and specifically for digital transformation. In this report, we identify data users based on their level of adoption of use cases and their main business goals.

2.2 Forecast Scenarios Methodology

In line with the previous edition of the European Data Market studies (SMART 2013/0063, SMART 2016/0063), and with the First Report on Facts and Figures (D2.1) of the subsequent study update this document presents the main findings of the European Data Market Monitoring Tool at the year 2030 according to three potential scenarios based on alternative development paths and driven by different macroeconomic and framework conditions.

As in the first round of measurement the overall methodological framework remained unchanged. As presented in the Report on the First Facts and Figures, the updated scenario methodology, builds on the successful approach applied in the study in the past two editions, with some improvements concerning the development of assumptions and their validation through brainstorming workshops with external and internal experts.

The three scenarios provide the storylines, the contextual framework, and the main assumptions used to model and forecast the EDM Monitoring Tool indicators, with a specific focus on the role of policies. Therefore, the scenarios and the forecast models will be developed in parallel, testing their relative coherence and fine-tuning their results. The time horizon to 2030 is likely to require a wider potential variation of social and business dynamics.

Important to highlight that the scenarios are not predictions but potential development paths. Their value-added lies especially in thinking through the potential consequences of different market trajectories and therefore providing a guide to action, particularly for policy makers.

The ultimate objective of the scenarios is to analyse which combination of framework conditions and policy actions may maximise the growth potential of the European data market and economy and, by feeding into the quantitative models, estimate the actual size and depth of their potential benefits. In this way, the scenarios provide a realistic approach to the forecast estimates – since we project a range of values (not a single estimate, which may be widely off the mark) – and provide guidance on the potential consequences of different external events or alternative policy choices.

The year of 2022 is characterised by a weak global economic growth with many macroeconomic uncertainties, such as the Russian-Ukraine War, the energy crisis, rising inflation rates and many others.

In this edition, we present the outcomes of a brainstorming workshop which was organised to discuss the key drivers on the European data market and data economy.

The general methodology approach is organised with the following main steps:

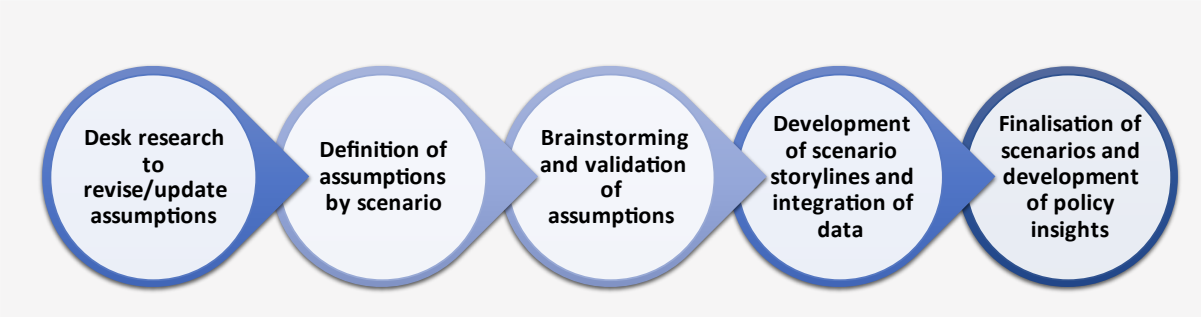


Figure 9 Scenarios Methodology Approach

The scenario model used in this study is based on the definition of alternative assumptions about four main groups of key factors. This model was developed and further implemented in various projects and studies published by IDC.

The four main groups of factors are:

1. Macroeconomic factors
2. Policy/regulatory conditions
3. Data market dynamics factors
4. Global megatrends affecting all technology markets

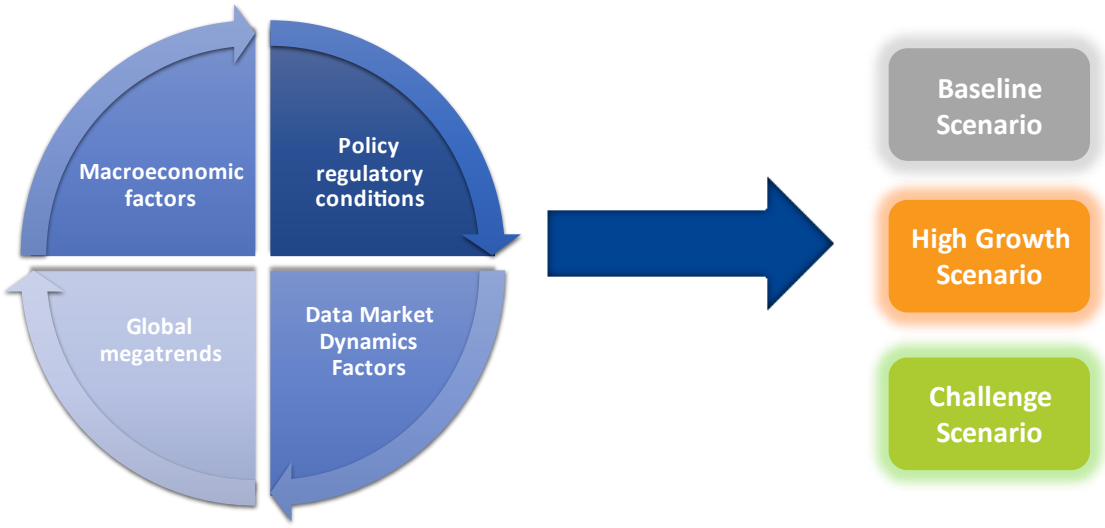


Figure 10 Scenarios Group of Factors

2.2.1 Macroeconomic Factors

The macroeconomic environment, along with the availability of risk capital, the volume of investments, and consumer willingness to spend money on new goods and services, will continue to have a significant impact on the development of the data market in the future.

Thus, GDP growth and ICT spending development will directly shape our scenarios. Innovative data technology adoption is strongly correlated with overall ICT investments, which are ultimately dependent on GDP growth and market confidence.

We have developed a baseline scenario to 2025 and alternative scenarios from 2025 to 2030. As inputs to the scenarios, we have estimated the value of ICT spending, as well as of GDP for:

1. The European Union countries (EU 27)
2. The UK
3. Switzerland
4. The rest of the European Economic Area (NO, LI, IS)

Table 17 Macroeconomic Data Forecast for Scenarios

	2019	2020	2021	2022	2025 Baseline	2030 Challenge	2030 Baseline	2030 High Growth
ICT Spending								
EU27	528,969	531,181	558,396	608,933	693,461	726,331	836,892	941,900
UK	141,148	144,237	150,063	165,431	191,351	202,724	234,487	261,986
Switzerland	30,311	30,223	31,167	32,950	37,846	39,414	44,550	49,613
EEA (NO, LI, IS)	13,347	13,593	14,146	16,038	18,627	20,507	22,965	25,356
GDP								
EU27	12,515,078	11,748,729	12,381,815	12,723,499	13,332,038	13,517,083	14,619,945	15,487,923
UK	2,198,318	1,981,850	2,128,506	2,198,747	2,265,229	2,290,208	2,413,142	2,616,234
Switzerland	653,733	637,350	660,932	675,473	709,800	714,448	787,706	827,042
EEA (NO, LI, IS)	384,443	378,280	393,054	406,332	432,901	435,728	475,189	497,830

Table 18 Macroeconomic Variables

	Growth Rate 2022/2021	CAGR 2030/2025 Challenge	CAGR 2030/2025 Baseline	CAGR 2030/2025 High Growth
ICT Spending				
EU27	5.8%	0.9%	3.8%	6.3%
UK	5.5%	1.2%	4.1%	6.5%
Switzerland	6.5%	0.8%	3.3%	5.6%
EEA (NO, LI, IS)	5.5%	1.9%	4.3%	6.4%
GDP				
EU27	2.76%	0.28%	1.86%	3.04%
UK	3.30%	0.22%	1.27%	2.92%
Switzerland	2.20%	0.13%	2.10%	3.10%
EEA (NO, LI, IS)	3.38%	0.13%	1.88%	2.83%

2.2.2 Policy and regulatory conditions in 2022

In 2022, the EU continued to pursue its goals and objectives presented back in 2020, in the five-year strategy for shaping the EU's digital future[6] and the Data Strategy[7] to build a strong legal framework and become a role model for society empowered by data to make better decisions.

This year in the EU digital policy front was all about negotiations and the adoption of the key legislative files such as the *Digital Markets Act, the Data Services Act and the Data Governance Act*. Of course, new important legislative files have been presented on *semiconductors*, the Commission presented the *Data Act* and recently new *EU cybersecurity* rules were proposed to ensure more secure hardware and software products.

Platform regulations

In December 2020, the Commission adopted a proposal for a **Digital Markets Act** ("Regulation of the European Parliament and the Council on contestable and fair markets in the digital sector") seeking to address the negative consequences arising from platforms acting as digital "gatekeepers". The legislations entered into force on 1 November 2022 and will start applying on 2 May 2023. Once in effect, the DMA will put an end to unfair practices by the gatekeepers and will give the Commission stronger power to launch investigation and ensure that the rules are enforced.

The **Digital Services Act** (DSA) was presented as a draft proposal by the Commission in December 2020. The DSA is about online content moderation, clarifying responsibilities and obligations of online intermediary services, hosting services and (very large) online platforms such as (META or Twitter). Earlier this year a political agreement was reach between the European Parliament and EU27. This legislation entered into force in November 2022. This legislation introduces new responsibilities to limit the spread of illegal content and illegal products online, increase the protection of minors, give users more choice and better information.

Data Governance and Sectoral Data Spaces

The first outcome of the data strategy was the Commission's proposal for a Data Governance Act[8] (DGA) The goal of the legislation adopted in June 2020 is to strengthen mechanisms that increase data availability, thus enabling companies and start-ups to develop new products and services. It also aims to allow the safe reuse of specific categories of public-sector data that are subject to the rights of others. It contains the first steps toward the limitation of the transfer of non-personal data. It supports the development of common European data spaces in strategic sectors such as health environment, energy, mobility and finance.

[6] communication-shaping-europes-digital-future-feb2020_en_4.pdf (europa.eu)
[7] EUR-Lex - 52020DC0066 - EN - EUR-Lex (europa.eu)
[8] https://eur-lex.europa.eu/eli/reg/2022/868

Semiconductors

The Covid 19 crisis has revealed Europe's structural vulnerabilities and highlighted its interdependence on the rest of the world. The lessons learned led to a shift in emphasis toward reducing economic reliance on foreign supply chains and strengthening Europe's strategic autonomy and industrial competitiveness also in the area of processors and the semiconductor technologies.

In February 2022, the EU unveiled a comprehensive set of measures to strengthen the EU's semiconductor ecosystem with the European Chips Act package. The package includes a Communication on a Chips Acts for Europe[9] which spells out the European Chips Strategy. Two proposals for a Regulation: a proposal for a Council Regulation establishing the Joint Undertakings under Horizon Europe[10]; and a proposal for a Regulation establishing a framework of measures for strengthening Europe's semiconductor ecosystem (the Chips Act)[11] and a Recommendation addressing the Member States on a common Union toolbox to address semiconductor shortages and an EU mechanism for monitoring the semiconductor ecosystem[12].

Cybersecurity

In September 2022, the Cyber Resilience Act was presented. It introduces mandatory cybersecurity requirements for products with digital elements, throughout their whole lifecycle. It will guarantee that digital products are more secure for consumers throughout the EU: in addition to increasing manufacturers' accountability by requiring them to provide security support and software updates to address identified vulnerabilities.

Table 19 EU Data Regulation Overview

		Regulation	Goal	Data covered	Scope /Target group
Shaping Europe's digital future	EU Data Strategy	**Data Governance Act**	***Foster data availability for use by increasing trust in data intermediaries and*** strengthening data-sharing mechanisms across the EU.	Personal Non-Personal data	Horizontal Public sector bodies
		Data Act	***Maximise the value of data*** in the economy by ensuring stakeholders gain control over their data	Private-sector data Personal data Non-Personal data	Horizontal Private companies, Public sector Cloud and data processing service providers

[9] EUR-Lex - 52022DC0045 - EN - EUR-Lex (europa.eu)
[10] EUR-Lex - 52022PC0047 - EN - EUR-Lex (europa.eu)
[11] Proposal for a Regulation establishing a framework of measures for strengthening Europe's semiconductor ecosystem (Chips Act) EUR-Lex - 52022PC0046 - EN - EUR-Lex (europa.eu)
[12] EUR-Lex - 32022H0210 - EN - EUR-Lex (europa.eu)

		Open Data Directive (Revised PSI Directive)	***Overcome the barriers** that still **prevent the full re-use of public sector information***	Public sector data	Public sector bodies
	The Digital Services Act package	**Digital Services Act**	Legislate against the spread of ***illegal content*** and ***ensure the protection of the fundamental rights*** of the EU citizens.	-	Intermediary services, hosting services, online platforms
		Digital Markets Acts	Ensure fair competition in the EU digital market by limiting the ***market power*** of big online platforms, the so-called "gatekeepers."	Personal data Private-sector data	Cloud and data processing service providers, digital platforms

2.2.3 Data Market Dynamics Factors

The data market dynamics factors correlate with the main drivers of and barriers to data market growth and the interaction between supply and demand stakeholders.

The analysis of the current Data Market in Europe, presented in this report, shows a dynamic supply-side (an emerging data industry) and a not-yet fully developed demand-side, where actual users are still a minority of potential users. Technology-push is still the dominant model of supply-demand interaction.

2.2.4 Global Mega trends

As presented in the First Report on Policy Conclusions (D2.2) the key factor driving the global trends remained unchanged. The year of 2022 continued to be dominated by the ongoing Russian-Ukraine war, the weak economic growth and the rising inflation rates all over the globe.

Table 20 Key risks influencing the three scenarios

Key risks influencing the Baseline, Challenge and High Growth Scenarios by 2030	
1.	The Russia-Ukraine War and its long-term consequences on the international front.
2.	The possibility of global recession in 2022/2023 with a stagflation scenario.
3.	The slowdown of quitting from the use of fossil fuels, pushed for the return of coal and gas. New generation nuclear solutions would emerge (like for instance in France)
4.	Fundamental change on the climate targets and the climate agenda.
5.	International supply chain disruptions.

2.2.5 Workshop

The European Government Consulting Unit of IDC organised a small workshop on 4th November 2022 with IDC analysts and BDVA members to discuss the main assumption that will be shaping the future scenarios of the European data market and data economy. The format of the workshop was a 1-hour discussion among experts with some questions to elicit a few discussion points and reach consensus on three possible scenarios are featured in the study: Challenge Scenario (pessimistic), Baseline Scenario, High-Growth Scenario (optimistic).

The workshop started with an introduction of the European Data Market Study background, goals and its evolution over the past years and with the presentation of the complex conceptual framework, and key indicators the EDM Monitoring Tool is measuring.

After the introduction, the definition of the data market and the data economy was presented. This was followed by a more detailed description of the EDM scenarios methodologies. The workshop focused on analysing the policy regulatory conditions and the data market dynamic factors. In each session the latest update on the assumptions was presented and accompanied with a number of guiding questions to elicit a discussion among the experts.

I. Policy Assumptions:

Table 21 Policy Regulatory Assumptions

POLICY-REGULATORY ASSUMPTIONS	Baseline Scenario	High Growth Scenario	Challenge Scenario
Digital Strategy Achieving European technological sovereignty	Europe makes progress in the development of data infrastructures and digital resources, plays a strong role in shaping global digital governance rules building on GDPR but does not quite dominate AI-led developments	Strong investments and MS cooperation help Europe to develop fully independent data infrastructures and digital resources, shape global digital governance rules with EU values, becoming a leader in the Big Data-AI space	With the uneven development of European data infrastructures and digital resources, continuing dependency on global platforms fail to take the lead in global digital governance, Europe struggles to keep up with the competition, particularly for AI
Data Strategy make Europe, a global leader in the data-agile economy	The EU gradually builds a single market for data and attracts a growing share of the global data economy	The EU's share of the global data economy is well on the way to becoming equal to its economic weight by 2030, thanks to a	The EU market for data remains fragmented with uneven data sharing, and the EU's share of the global data economy does not grow on a par with its economy

		genuine single market for data	
Data Strategy Development of an effective data governance framework	Progress in the development of the new regulatory framework enhances data access and sharing in time, but the main effects deployed at the end of the forecast period, the single market for data gradually emerges	Fast progress with the new Data Act, Digital Services and Competition framework enhances data access, sharing and re-use, achieve a fair playing field and contribute to the effective single market for data	EU efforts to renew the digital services and data governance regulation fail or achieve only minimal changes, barriers and stakeholder's reluctance to data sharing remain high, only high performing enterprises and regions make progress
2030 Digital Compass	Europe gets closer to reaching the digital targets and the objectives set up by the Digital Compass.	Europe reaches its targets of the Digital Decades and gets closer to binging in the backlog with other international players.	Due to the lack of MS engagement and disparity across the block. The targets of the Digital compass are only partially fulfilled.

Guiding questions:

- **Policy and Regulation**: *Which upcoming regulatory or policy initiative do you believe will have an impact on the EU data market? (describe level of impact (low, moderate, high) and the level of uncertainty?*
- **Funding***: The Digital Europe Programme (DIGITAL) is a new EU funding programme focused on bringing digital technology to businesses, citizens and public administrations will they have a meaningful contribution to the data economy?*
- **Other:** *National Recovery and Resilience Plan (NRRP) and the next Generation Europe*

Discussion:

- **EU Funding programmes**: Some programmes such as the Digital Europe Programme requires co-funding from the EU27. Giving a certain level of analysis on how Member States manage these programmes and what are the key technology areas that are prioritised would give a broad picture on the state of the data economy and the data market in the EU.

  Impact of the research and innovation programs, very difficult to measure as normally the impact of the research and innovation can be seen in the market only until many years after at least a few years after.

- **Private investments:** Data is the propensity for the countries to invest in adopting digital technology based on the background industries that already have. The larger countries having an inherent strong investment already done by individual companies at the country level.

- **Big momentum for the deployment:** In the high growth scenario there is a big momentum, a big opportunity for the data and the deployment. On the other hand, the challenge scenario is characterised with a whole aspect of resilience. Companies and business are trying to adapt and transform their activities by deploying new technologies. The challenge that remains in these two opposite scenarios is on how to ensure adoption while at the same build data infrastructure.

II. Data Market Assumption:

Table 22 Data Market Assumption

Assumptions	Baseline Scenario	High Growth Scenario	Challenge Scenario
Development of the data ecosystem in Europe	Emergence of multiple vertical/ horizontal industrial and personal data platforms providing secure data sharing and trading environments for data industry and data owners	The industrial and personal data platforms converge in interoperable EU infrastructures with clear governance models, fostering participation of SMEs	Insufficient development of the data ecosystem, limited diffusion of data sharing platforms
Rate of diffusion of digital transformation and data-driven business models	Fast adoption by large companies and innovative SMEs; public sector gradually catches up during the period; slower adoption by traditional SMEs	Widespread diffusion of digital transformation, EU SMEs learn to adopt data monetization solutions; successful impact of DEP and other policies supporting fast digital transformation	Slower adoption of digital transformation and data-driven business models hindered by lower private investments, lower expectation of take-up of innovative services, lack of trust and confidence in data sharing
Managing data ethics and AI business risks	Guidelines and data ethics principles multiply even though there is a trend towards consolidation – enterprises need time to find a balance between business interests and ethics but eventually succeed – in some areas European enterprises able to use their ethics as a competitive advantage	Europe develops a coherent system of data ethics guidelines balancing EU values and business interests which becomes a global reference point and a competitive advantage for EU businesses	Guidelines and data ethics principles multiply – European enterprises struggle to develop skills and capability to manage risks – many enterprises refrain from data-driven innovation for fear of business risks

Deployment and adoption of 5G infrastructures	5G connections in Europe will grow more than 8x from 2021 to 2025, reaching 600 million; 5G will remove the limitations and bottlenecks of existing networks, delivering data to new/future applications running in the cloud and boosting interconnect-based ecosystems. (IDC)	High availability and adoption of 5G enables the delivery of innovative real-time, data-intensive use cases for hyper-connected ecosystems. According to the GSMA economic model in optimal conditions 5G could contribute 0.38% additional growth to European GDP in 2030. Services, including healthcare and education, and manufacturing are expected to yield the highest portion of the economic benefit, with the manufacturing sector accounting for almost 40% of the growth.	Insufficient public-private collaboration constraints the availability of spectrum particularly for mid-band 5G, resulting in increased network congestion and deployment costs, lower work quality and speed, limiting 5G adoption and its economic impact (GSMA report).

Guiding questions:

- ***Data Ecosystem****: Digital platforms development: will digital platform/industrial digital platform evolve towards a truly data space model where data is shared securely, through open and accepted standards and with recognized and working data governing principles?*
- ***AI developments in Europe:*** *Will the EU succeed in developing data ethics guidelines for AI that will be in force and accepted by the whole of the block? How do you see this happening?*
- ***5G:*** *Will public-private collaboration in deploying 5G network continue in Europe with more available spectrum? What other assumptions can we make when it comes to the market of data-based products and services? Is for example data monetization going to progress? Are companies really trying and will they be in a position to make money out of their data?*

Discussion:

- **Data ecosystem**: Big companies have their own data ecosystems while smaller players are trying to build something available for the rest. The small use case for a big company and the big use case for the small company. There are mismatched incentives for small and big companies.
- **AI:** The AI investments is built on the safe data. However once businesses start getting involved with customer relationship management and there's a lot of concern about where the sensitive data flows through an AI model.
- **5G:**It is a natural extension of technology and people are now looking around to see what it is that they can do with 5G. For example, mobile applications such as vehicle autonomy requires the use of the 5G technology. This will develop and the infrastructure is currently under development.

2.3 Overview of the scenarios for 2030

The 2030 scenarios outline different pathways of the evolution of the European Data Market (EDM) and Data Economy in the next years, exploring the different mix of factors and policy choices which may lead to achieving the EU's ambitious objectives or, on the contrary lead to a setback.

The scenarios are structured as follows:

- **Baseline scenario**, with the main assumptions based on the continuation of current growth trends and the evolution of current framework conditions
- **High Growth scenario**, whereby the data market enters a faster growth trajectory, thanks to more favourable framework conditions
- **Challenge scenario**, whereby the data market grows more slowly than in the Baseline scenario because of less favourable framework conditions and a less positive macroeconomic context

In the First Report on Policy Conclusions (D2.2) a revised structure for the three scenarios was presented for the year of 2022 in the following section the description of the scenarios was updated according to the latest round of measurements of the EDM Monitoring Tool.

2.3.1 Baseline

The baseline scenario predicates a slower growth trend to 2030 with a cumulative GDP average growth rate of 1.86% over the period 2025-2030, versus a 0.28% average growth rate in the Challenge scenario and a 3% in the High Growth scenario. The disruptive events of last year starting with the outbreak of the Russia-Ukraine war, COVID 19 resurgence in China, macroeconomic risks of stagflation the current growth trends and framework conditions are substantially worsened and their extrapolation leads to a stagnation in 2025 and a lower potential growth in 2030. Therefore, this scenario is characterised by a slower than previously foreseen growth of data innovation to 2025 followed by acceleration after 2025, a modest concentration of power in the hands of dominant data owners, a data governance mechanism that protects individual data rights, and unequal but relatively broad distribution of data innovation benefits across society.

2.3.2 High Growth

In the High Growth scenario, Europe's economy will continue to grow moderately over the coming years, with a stronger emphasis on digital innovation and higher overall ICT investments as a percentage of GDP. Faster than expected resolution of international conflicts leads to improved economic conditions already by 2024-25 with faster growth than the baseline from 2025 onwards. This scenario remains characterised by advanced data innovation and digital transformation across Europe and a globally recognised data framework. This is also characterised by global supply chains more integrated than previously between Europe, the US, South Korea and Japan and a reduced dependency from China manufacturing by 2030. In this scenario, a positive spill over effect is foreseen as the outcome of bigger investment that targeted to rebuild Europe strengths in the areas of the Important Projects of Common European Interest (IPCEI) such as semiconductors, hydrogen and the batteries.

2.3.3 Challenge

The Challenge scenario will still be characterized in 2025 by a stagnating macroeconomic environment, unfavourable framework circumstances, and a slower dissemination of digital innovation. This scenario predicts that the Data Market would see low growth, significant fragmentation, and only a partial realisation of the Digital Compass targets. This scenario is characterised by continuing geopolitical crisis (long Ukraine war followed by weak cease-fires rather than a sound peace) hard economic conditions (stagflation) up to 2025, with uncertain economic growth perspectives to 2030. This context results in strong disparities between countries with rich economies (US, leading EU countries such as Germany and France) continuing to invest in digital technologies with a moderate innovation level and development of the data market-data economy, and a growing gap with weaker economies and countries. This scenario is also characterised by fragmented data flows and low level of digital innovation by SMEs.

2.4 The Data Economy and the current economic and geo-political situation: from temporary instability to Storms of Disruptions

2022 is proving to be a more resilient and, to some extent, stable year for the European data economy when compared to the previous year. In May 2022, we produced an update on the main indicators published in October 2021 showing a slight contraction in the growth rate of the Data Market and the Data Economy indicators in the EU27 in 2025 and 2030 when compared to our previous estimates. Notwithstanding an overall worsening of growth projections, both measures appeared to suffer a mild decline in growth terms and only with respect to the Baseline and High-Growth scenarios, meaning that our Challenge scenario had already discounted some potential and unexpected economic and political turmoil during the previous round of measurement. The table below summarises our revised estimates in May 2022 for the Data Market and the Data Economy in the EU27 in terms of Compound Annual Growth Rate (CAGR) and compares them with the values produced in October 2021.

Table 23 Updated CAGR Estimates for Data Marker and Data Economy – October 2021 vs. May 2022 Estimates

	CAGR 2025/2030 Challenge	CAGR 2025/2030 Baseline	CAGR 2025/2030 High Growth	CAGR 2020-2025
May 2022 Update				
EU 27 Data Economy	2.6%	5.2%	9.5%	7.2%
EU27 Data Market	0.9%	2.9%	6.5%	8.2%
October 2021				
EU 27 Data Economy	2.6%	5.4%	9.6%	7.4%

EU27 Data Market	0.9%	3.2%	6.8%	8.4%

The latest round of measurements of the European Data Market Monitoring Tool, which is presented in this report, portrays a similar but more positive picture where both measures regain sustained growth in the period 2025-2030 under the Baseline and High-Growth scenarios. The Challenge scenarios, on the other hand, seems to crystalise the difficulties for the European data economy which lie ahead and displays a further reduced growth with respect to our estimates in May 2022.

Table 24 Updated CAGR Estimates for Data Marker and Data Economy –November 2022 Estimates

	CAGR 2025/2030 Challenge	CAGR 2025/2030 Baseline	CAGR 2025/2030 High Growth	CAGR 2020-2025
November 2022				
EU 27 Data Economy	2.5%	5.5%	10.0%	10.2%
EU27 Data Market	0.5%	3.4%	6.9%	8.7%

It is true, however, that the shocks unleashed by the war are hitting the EU economy both directly and indirectly, setting it on a path of lower growth and higher inflation. The rapid increase in energy and food commodity prices is feeding global inflationary pressures, eroding the purchasing power of households and triggering a faster monetary policy response than previously assumed. Furthermore, the deceleration of growth in the US is adding to the negative economic impact of China's strict zero-COVID policy. In its summer 2022 economic forecasts, the European Commission has confirmed real GDP to grow to grow by 2.7% in 2022 and only by 1.5% in 2023 in the EU. In the euro area, 2.6% growth is expected in 2022 against a meagre 1.4% in 2023. On the other hand, inflation in the EU is forecast to increase to 8.3% in 2022 (7.6% in the euro area); and to 4.6% in 2023 (4.3% in the euro area) hence showing no real sign of significant slow-down.

While the prospects for the EU economy as a whole remain grim, it is fair to observe that that the economic activities triggered by, or directly related to the use and exchange of data (the data economy as whole), appear to embody a more resilient attitude towards the current adverse circumstances. Indeed, when looking at two of the most significant threats to the EU economy today – high inflationary pressures and the geo-political instability caused by the Russia-Ukraine war – it seems that that none of these challenges has managed to inflict a severe blow to the digital economy, at least until now. Indeed, the digital economy during the pandemic has been able to support the daily life of citizens and businesses and has proved to be essential for work, school and social contacts in the midst of difficult circumstances. Even more importantly, the digital economy has proved to be by and large a low-inflation economy. While the price of old economy products like cars, clothing, and gasoline has been soaring, the inflation rate of digital goods and services has remained low.

According to the U.S Bureau of Labor Statistics (BLS)[13], for example, the digital consumer inflation rate was only 1.6% in the year ending December 2021 in the U.S, barely above the 1.4% rate in the year ending December 2019, before the pandemic started (see Figure below).

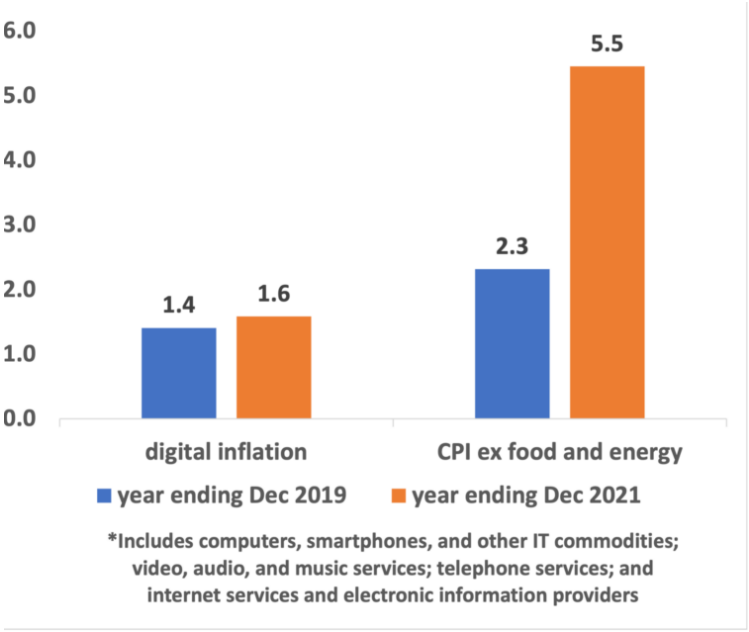


Figure 11 Consumer Price Index (CPI) vs. Digital Inflation in the U.S. – December 2019 vs. December 2021

In Europe, high levels of inflation and energy prices, as well as the increasing cost of living, will result in reduced demand for PC and tablets among consumers while the war in Ukraine will continue causing product shortages, especially in the digital device segment. All in all, however, IDC predicts[14] that the digital markets will remain relatively stable during the next couple of years. In fact, demand will increase for AI platforms and applications in Europe, as a part of digital transformation initiatives. Also, the importance of security solutions to counter cyber-threats related to hostile Russian activities will continue to grow, along with robotic process automation, event process management, and supply chain management – all linked to increasing digitisation of products and services.

When it comes to the damages perpetrated by the Russian war in Ukraine, the impact for Ukraine's digital economy (and digital infrastructure as a whole) has been severe but the overall technology sector and digital economy in Europe and elsewhere have demonstrated high levels of resiliency. Russia's large-scale aggression against Ukraine has caused severe disruptions to internet connectivity, a pre-condition for the resilience and further development of the digital economy, while digital technologies have played a crucial role in continuing to provide citizens with access to digital services, including when they are displaced. Furthermore, access to the Internet and quality of data transmission has decreased since the start of the war, due to both cyber and physical attacks on the digital infrastructure of the country[15]. However, digital technologies have continued to play an

[13] https://www.bls.gov/cpi/factsheets/personal-computers.htm
[14] https://www.idc.com/getdoc.jsp?containerId=prEUR249241022
https://www.idc.com/getdoc.jsp?containerId=EUR148981522
[15] OECD, Digitalisation for recovery in Ukraine 1 July 2022 https://www.oecd.org/ukraine-hub/policy-responses/digitalisation-for-recovery-in-ukraine-c5477864/

important, if not decisive, role in the conflict proving to be an essential defense to escalating cyberattacks, for instance, or have proved to be a determining factor in ensuring the continuation of service delivery[16]. In this context, the technology sector on both sides of the Atlantic has reacted quickly to support Ukraine's digital economy thus confirming its capacity to react incisively in times of crisis. Just as during the Covid-19 emergency, many US and European companies in Ukraine activated their business continuity plans, allowing people to relocate from the eastern part of the country to safer locations with minimal disruptions. The digital industry's resilience and reactiveness has ensured – if not business as usual – at least a semblance of normality under dramatic circumstances.

While not by all means in a comparable situation, Europe's digital industry shows signs of resistance and vivacity. In spite of a severe worsening economic output, the overall spending for Information Technologies (including digital technologies) will continue to display a 5.3% growth in 2023 if compared to 2022, thus setting the scene for a positive development of the European Data Market and Data Economy in the near future.

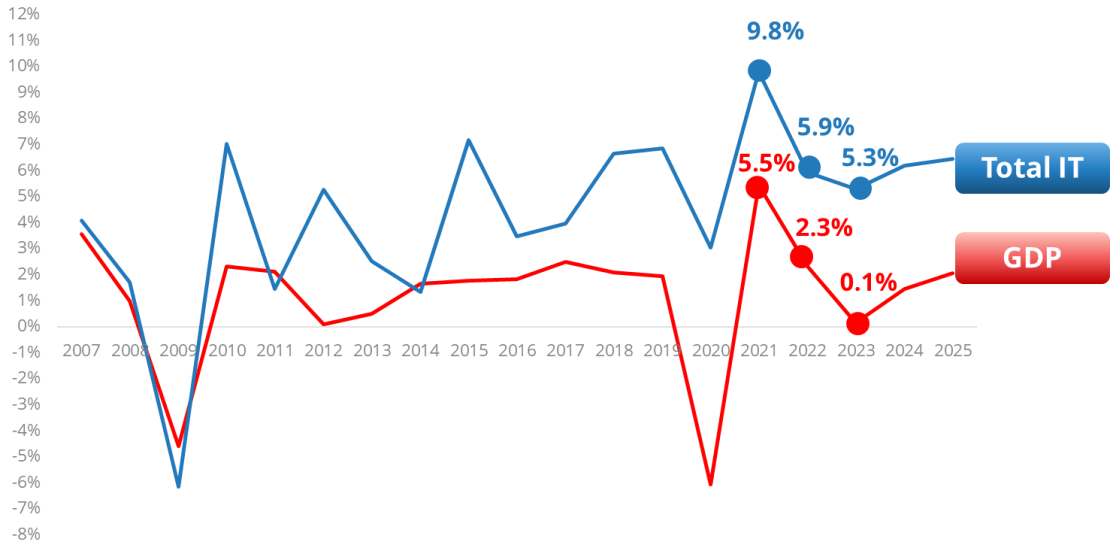


Figure 12 EU27 GDP Growth vs. Total IT Spend Growth: 2007-2025 (IDC Worldwide Black Book, November 2022; European spending growth in constant currency ($))

Nonetheless, the future of Europe's digital economy after 2023 remains uncertain. After the hit received in 2021 following the pandemic, the inflationary pressures and the Russia-Ukraine war in 2022, the European economy is facing a set of alarming challenges– from supply chain constraints to IT skills shortages, from populists' threats to severe energy shortages. This "new normal" characterised by waves of crisis in tight sequence is likely to stay over the next few years and has been taken into consideration in this second round of measurement of the European Data Market Monitoring Tool.

[16] https://dig.watch/trends/ukraine-conflict-digital-and-cyber-aspects

3. Data Professionals

3.1 Definition

Data professionals[17] *are workers who collect, store, manage, and/or analyse, interpret, and visualise data as their primary activity or as a relevant part of their activity. Data professionals must be proficient with the use of structured and unstructured data, should be able to work with a huge amount of data, and should be familiar with emerging database technologies. For 2021–2023, the definition of data professionals was refined to differentiate the roles played by different data users: These are data technical professionals, data business professionals, and data consumers – defined below. The measure of data professionals includes data technical professionals and data business professionals only.*

Data technical professionals are specialists in the collection, storage, management, modelling, and quality assurance of data, as well as the integration of various data sources to ensure consistency, accuracy, and quality of data. A data technical professional can, given the question that needs to be answered, ensure that the data supply chain is provided and that it is accurate.

Data business professionals have as a primary or significant focus the task of performing predictive analysis, qualitative analysis, data modelling, data extraction, and data summaries with the purpose of creating new insights and knowledge from available data. They have thorough industry and/or process understanding and can put data analysis into context and relate to existing trends within the industry or line of business they are in. They typically leave collection, management, and quality of data to the data technical professional but, using analysis tools such as Excel, Tableau, and Power BI, are able to summarise large amounts of data and visualise and present trends and insights to a wider audience of key stakeholders in the business in order to drive the strategic decision-making process in the organisation. Data scientists predominantly reside within the data business professional group.

Data consumers are product, process, human-resource, asset, or department employees and managers responsible for driving change or maintaining a position whereby decision-making is heavily reliant on the supply of data and insights based on large amounts of data. They work directly with data only part of the time. They are decision makers or stakeholders in a decision process whereby the data and insights provided determine the quality of the decisions made. A data consumer guides the business based on the data and insights provided through the data supply chain.

3.2 Measuring Data Professionals

As with the previous report, data professionals are defined as above and are measured using the EU Labour Force survey, with the data built from the International Labour Organisations ILOSTAT database and Eurostat's Structural Business Statistics and Business Demography. This data allows the

[17] The previous European Data Market Study (SMART 2013/0063) included an indicator measuring "data workers", which was based on a similar, but slightly more restrictive, definition. In line with the First Report on Facts & Figures (D2.1), in this document, we measure "data professionals" – that is, workers with a wider range of data-related roles. Indeed, data professionals are not only data technicians, but also users who, based on sophisticated tools, take decisions about their business or activities after having analysed and interpreted the available data.

modelling of data professionals by Member State, NACE II industry, and company size band. The data sources used are as follows:

Data Professionals by Country

Table 25 Data Professionals data sources

Data Source	Updated
Eurostat Business Demographic Statistics	Sep 2022
Eurostat Annual Structural Business Statistics	Sep 2022
IDC Worldwide Black Book (standard edition)	Sep 2022
ILOSTAT statistics and databases	Oct 2022

Data for 2020 is adjusted to reflect the refined definitions, and the previous 2021 data was delivered as a forecast, which is superseded by measured data. Publication data delivered before 2020 segmented by size band and Member State included the UK as a member of the EU28. Since January 2020, the UK is no longer a member of the European Union, so EU27 totals exclude the United Kingdom. However, the UK is still a dynamic user and supplier of data alongside the EU: Together with Switzerland, the EEA countries of Iceland, Liechtenstein, and Norway are included in the statistics.

An overview of Data Professionals is included below.

Table 26. Data Professionals – Summary Statistics, 2019–2021

N.	Region	Name	Description	2020	2021	2022	Growth Rate 2020–2021
1.1	EU27	Number of data professionals	Total number of data professionals in EU (000s)	6,502	6,957	7,307	5.0%
1.2	EU27	Data professionals share of total employment	Share of data professionals on total employment in EU (%)	3.6%	4.0%	4.2%	4.4%
1.3	EU27	Intensity share of data professionals	Average number of data professionals per user company (units)	11.9	12.4	12.6	1.6%

There is a small increase in the number of data professionals available as a consequence of the war in Ukraine, as a number of refugees with data skills leave Ukraine and enter the European Union. However, this increase is not noticeable in the number of data professionals across the European Union. The number of data professionals is marginally greater (2%) than in the previous publication and reflects the growth in data use – particularly in the areas of artificial intelligence. Changes in economic growth as a consequence of degrading economies and the war in Ukraine had little impact in the number of data professionals across the Member States.

Table 27 shows the size and growth of the number of data professionals by Member State for 2020 and 2021 and the forecast for 2022. Growth overall remains high but falls a little in 2022 when compared to the prior growth forecast for 2021. The limitations in the supply of data professionals constrains growth and the influx of Ukrainian professionals does little to expand the overall supply of data professionals.

Figure 13 shows the number of data professionals by Member State for 2022. The largest Member States have the biggest demand. EEA (NO, LI, IS) again show high growth in 2022, but as before, this

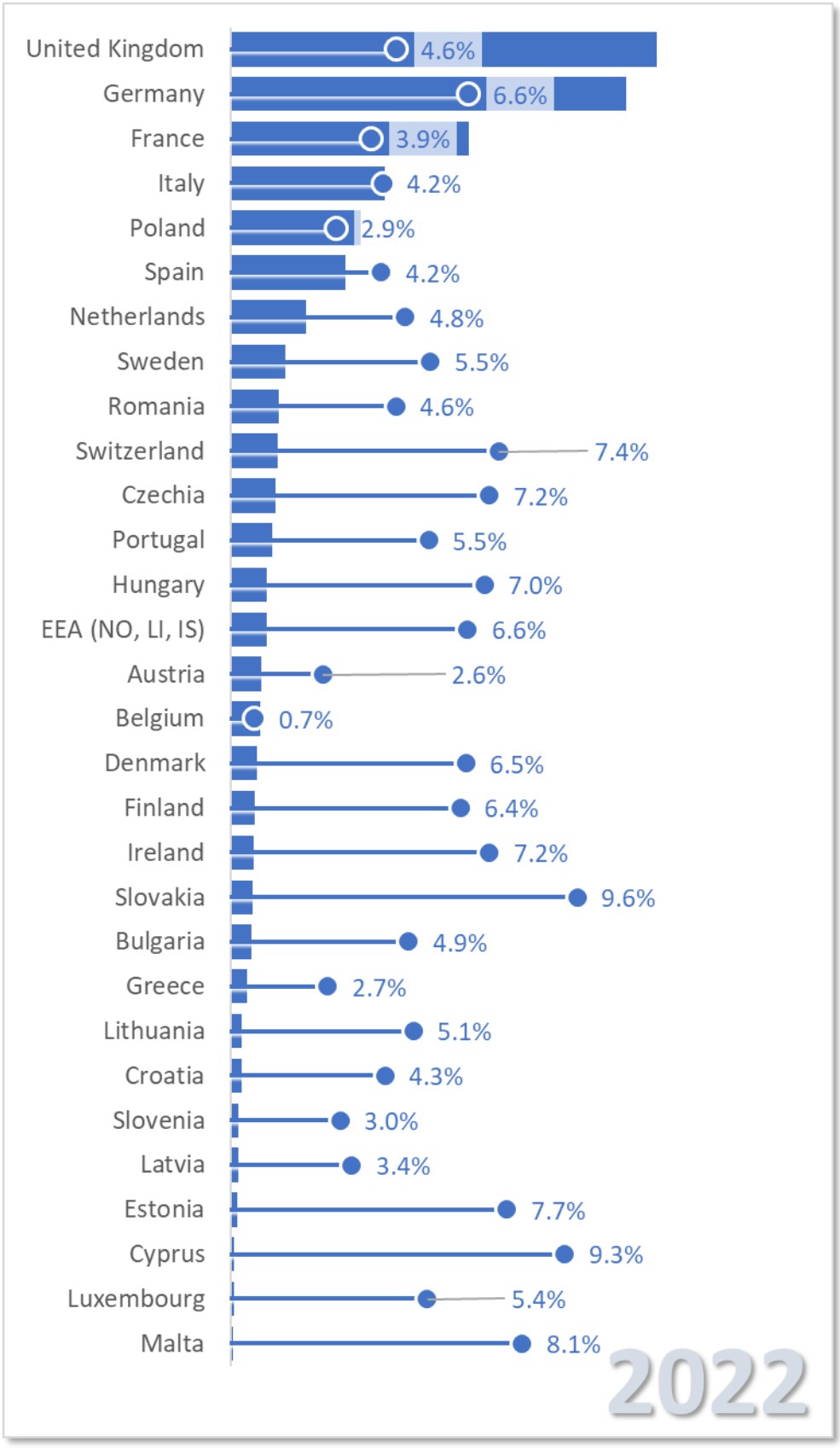
is from a lower base than for other countries and is more an artefact of the differing stages of the economy than any fundamental benefits these states see in 2022.

Table 27 - Data Professionals by Country 2020-2022, Growth, 2021 to 2022

	2020	2021	2022	Growth 2022/2021
Malta	8	10	11	8.1%
Luxembourg	14	15	16	5.4%
Cyprus	14	16	17	9.3%
Estonia	28	30	33	7.7%
Latvia	31	33	34	3.4%
Slovenia	35	37	38	3.0%
Croatia	45	49	51	4.3%
Lithuania	47	50	53	5.1%
Greece	69	72	74	2.7%
Bulgaria	86	91	95	4.9%
Slovakia	82	94	103	9.6%
Ireland	90	100	108	7.2%
Finland	93	104	110	6.4%
Denmark	105	113	120	6.5%
Belgium	135	138	138	0.7%
Austria	134	138	141	2.6%
EEA (NO, LI, IS)	141	155	165	6.6%
Hungary	136	156	167	7.0%
Portugal	165	182	192	5.5%
Czechia	177	194	208	7.2%
Switzerland	184	202	217	7.4%
Romania	197	211	221	4.6%
Sweden	220	240	253	5.5%
Netherlands	309	331	347	4.8%
Spain	487	510	531	4.2%
Poland	564	583	601	2.9%
Italy	653	684	713	4.2%
France	986	1,060	1,101	3.9%
Germany	1,589	1,717	1,830	6.6%
United Kingdom	1,795	1,886	1,973	4.6%

EU27	6,502	6,957	7,307	5.0%
EEA (NO, LI, IS)	141	155	165	6.6%
Total All Countries	8,622	9,201	9,662	5.0%

Figure 13 - Data Professionals by country 2022 and 2021-2022 growth



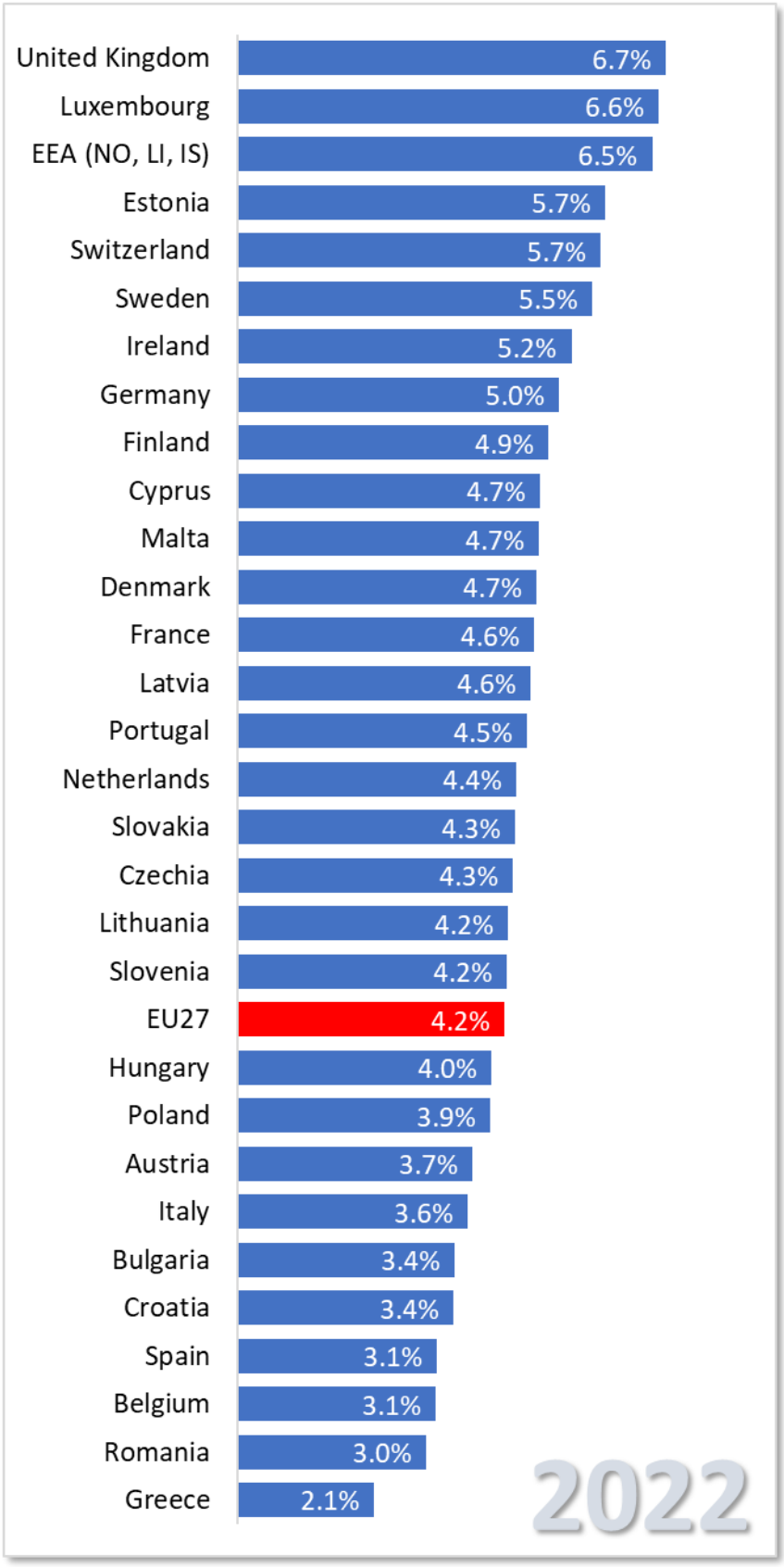
As in the previous report, it is no surprise that the larger Member States still dominate the number of data professionals and the view of the share of total employment taken by each Member State in

Figure 14 shows which Member States invested in industry and education to support the anticipated growth in the need for data experts of differing capabilities – *data business professionals, data technical professionals, and data consumers.*

These shares remain consistent with previous publications, reflecting the slow process of growing the number of professionals. Data skills need a comprehensive set of capabilities: a combination of programming, logic, and statistics, which is difficult to find although educational establishments focus more on these topics now. However, in business there are additional skills needed which only come with experience, so the development of skilled data professionals is a slow process.

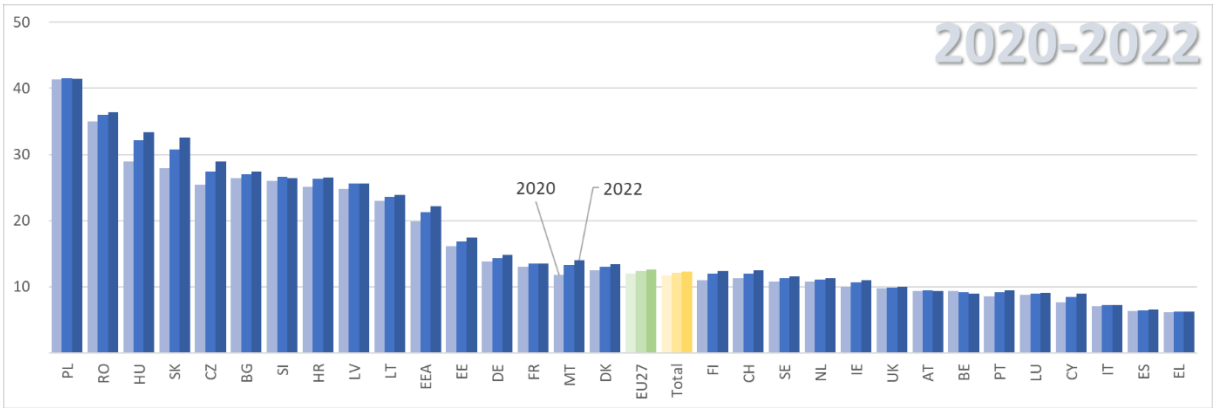
Among the EU27 Member States, Luxembourg leads in terms of data professionals' share of total employment in 2022, aided to a certain extent by the strength of data-oriented industries (e.g., information & communications and professional services) in the country and by the relatively small size of its working population. The share of total employment also reflects to a certain extent the types of economies pursued by the individual Member States, with the more agricultural economies clearly showing a lower share of data professionals than those which are more industrial or service oriented.

Figure 14 - Data Professionals - share of employment by country 2022



The differences in economic base for each Member State shows more in the differences between the Member States in the average number of data professionals per data user company, as seen in Figure 15. Service, IT, or manufacturing oriented economies have a greater number of data professionals per data user company when compared to those more focused on e.g., resource industries or agriculture. Even so, some of the strong data-oriented countries have a lower average number of data professionals per data company, which reflects the higher volume of user companies in the country rather than a lower number of data professionals.

Figure 15 - Average number of data professionals per user company by country 2020-2022



Data Professionals by Industry

Figure 16 - Data Professionals by Industry 2022 and 2021-2022 growth

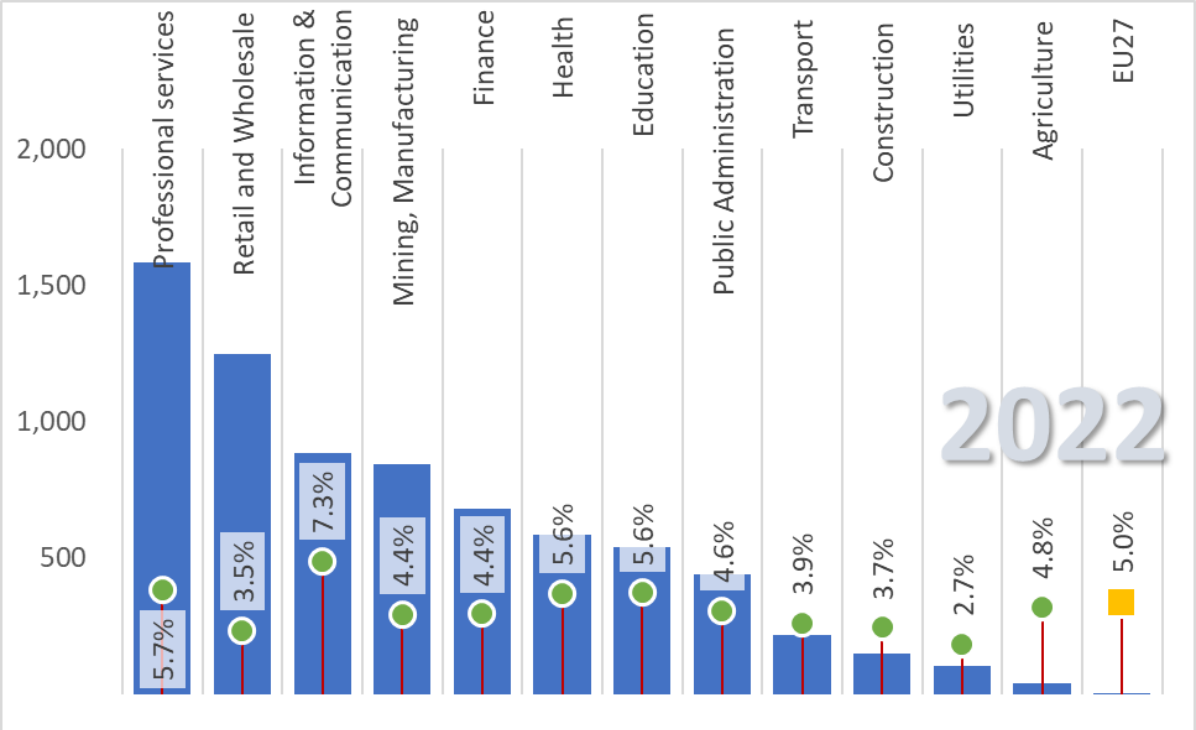


Figure 16 and Table 28 show the greater propensity for highly data intensive industries to have a larger number of data professionals and supports the Member States with more data-oriented industries – such as professional services, retail and wholesale – have a larger share of data professionals. The

relative size of industries such as manufacturing allow it to surpass finance in the number of data professionals in that industry, although manufacturing can be a highly data intensive industry itself.

Table 28 - Data Professionals by industry 2020-2022, growth 2021-2022

	2020	2021	2022	Growth 2022/2021
Agriculture	35	37	39	4.8%
Construction	131	142	148	3.7%
Education	480	509	538	5.6%
Finance	609	652	680	4.4%
Health	518	555	586	5.6%
Information & Communication	753	824	884	7.3%
Mining, Manufacturing	745	808	844	4.4%
Professional services	1,385	1,497	1,583	5.7%
Public Administration	395	419	438	4.6%
Retail and Wholesale	1,131	1,203	1,246	3.5%
Transport	197	211	219	3.9%
Utilities	92	99	102	2.7%
EU27	6,471	6,957	7,307	5.0%

3.3 Data Professionals Forecasts 2025 and 2030

We continue to anticipate strong growth in the number of data professionals over the period of the forecast, from 2020 to 2030. The three scenarios for 2030 accommodate potential upsides and downsides affecting the social, economic, technological and political factors underpinning the data market and the data economy over the coming eight years (2022-2030). According to our estimates, the demand for data professionals remains high, and the supply is not yet meeting this demand. The forecast shows a demand that is rapidly being fulfilled. Long term growth to 2030 (Baseline) is slightly higher for the EU27 Member States than for the other geographies under consideration as we are slightly more optimistic about the EU longer-term outcomes with the acceleration of artificial intelligence technology uptake, which will stimulate demand for data professionals. Table 29 summarises the outlook to 2025 and the three scenarios to 2030.

Table 29 - Data Professionals summary forecast, 2025, 2030 three scenarios (000's) and CAGR's (%)

	2025	2030, Challenge	2030, Baseline	2030, High Growth	CAGR: 2020–2025	CAGR 2020-2030, Challenge	CAGR 2020-2030, Baseline	CAGR 2020-2030, High Growth
EU27	8,301	9,268	9,865	11,615	3.6%	2.2%	3.5%	6.9%
EEA (NO, LI, IS) + CH	186	190	205	270	N/A	0.5%	2.0%	7.7%
Total, all countries	10,955	12,334	12,989	15,125	3.6%	2.4%	3.5%	6.7%

The outlook for the Member States is unchanged since the previous publication, with Germany still displaying the largest number of data professionals in 2030 among the EU27. The country is forecast to grow above average to 2030 – and in this forecast it is joined by France to become the only two Member States among the top five economies to grow at a higher-than-average rate to 2030 (Baseline). Figure 17 and Table 30 show the market for data professionals by country, sorted by size in the figure.

Figure 17 Data Professionals by country 2020, 2030 three scenarios (000's)

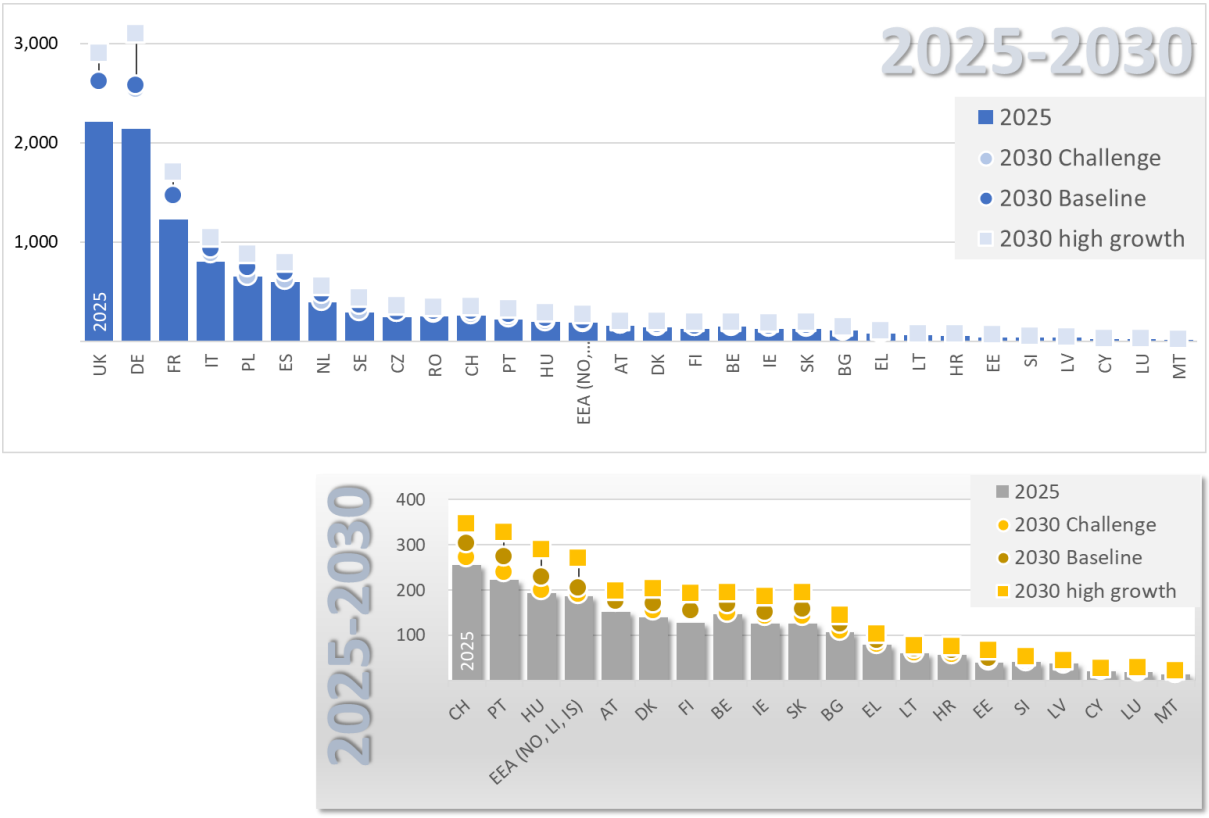


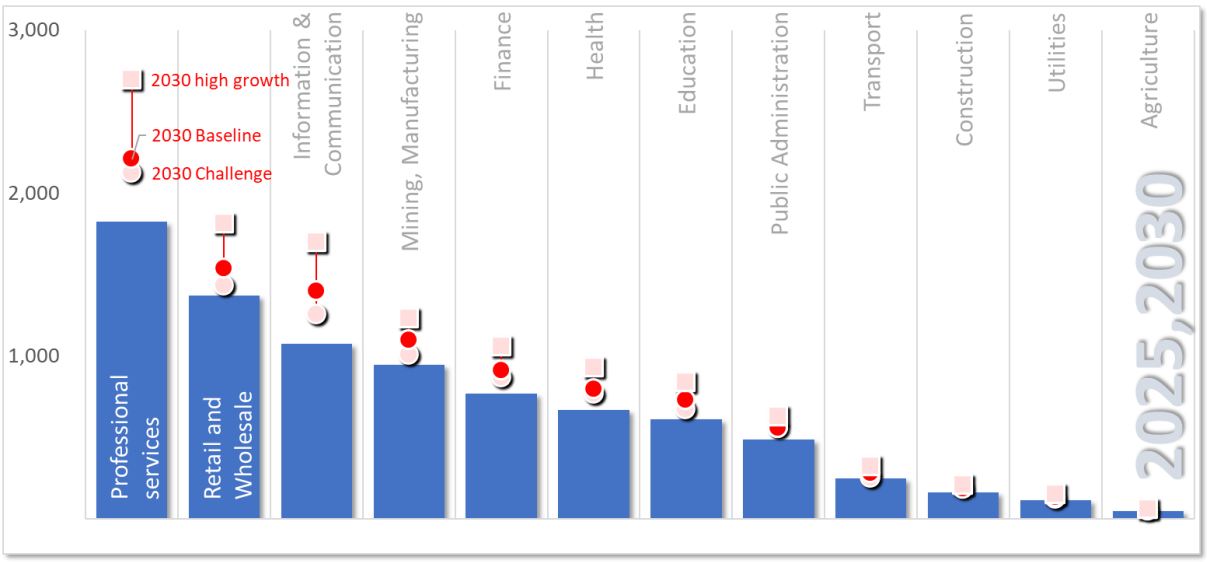
Table 30 - Data Professionals Forecast by country, 2025 and 2030 three scenarios (000's) and CAGR's (%)

	2025	2030 Challenge	2030 Baseline	2030 high growth	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
Austria	152	174	176	198	2.0%	2.6%	2.9%	5.4%
Belgium	148	150	168	195	1.4%	0.3%	2.7%	5.7%
Bulgaria	107	109	125	144	3.4%	0.3%	3.0%	6.1%
Croatia	57	57	66	75	3.0%	0.0%	2.9%	5.7%
Cyprus	21	23	25	26	5.6%	2.4%	3.9%	4.8%
Czechia	242	295	296	357	4.5%	4.0%	4.1%	8.1%
Denmark	141	155	170	202	4.5%	2.0%	3.9%	7.5%
Estonia	39	44	48	66	5.2%	2.1%	4.3%	10.8%
Finland	127	154	154	193	4.2%	3.8%	3.9%	8.7%
France	1,226	1,444	1,465	1,702	3.0%	3.3%	3.6%	6.8%
Germany	2,141	2,536	2,573	3,091	4.5%	3.4%	3.7%	7.6%
Greece	80	81	89	103	2.0%	0.2%	2.1%	5.1%
Hungary	194	199	229	290	4.4%	0.5%	3.4%	8.4%
Ireland	126	143	150	185	4.6%	2.5%	3.6%	8.0%
Italy	798	884	934	1,045	3.1%	2.1%	3.2%	5.5%
Latvia	37	37	42	44	2.4%	0.1%	2.2%	3.4%
Lithuania	60	60	70	77	3.5%	0.2%	3.1%	5.2%
Luxembourg	18	20	23	28	4.0%	2.0%	4.2%	8.6%
Malta	13	16	17	22	5.8%	3.8%	5.6%	11.0%
Netherlands	395	408	472	553	3.6%	0.6%	3.6%	7.0%
Poland	652	657	740	879	2.3%	0.1%	2.5%	6.1%
Portugal	222	239	274	327	4.1%	1.5%	4.3%	8.0%
Romania	250	287	300	342	3.4%	2.8%	3.7%	6.4%
Slovakia	126	142	157	194	6.0%	2.4%	4.6%	9.1%
Slovenia	42	43	47	52	2.3%	0.7%	2.6%	4.7%
Spain	594	614	693	791	3.1%	0.7%	3.1%	5.9%
Sweden	293	299	363	435	4.1%	0.4%	4.3%	8.2%
Switzerland	255	272	302	346	4.7%	1.3%	3.5%	6.3%
United Kingdom	2,213	2,604	2,617	2,895	3.3%	3.3%	3.4%	5.5%
EEA (NO, LI, IS)	186	190	205	270	3.7%	0.5%	2.0%	7.7%
EU27	8,301	9,268	9,865	11,615	3.6%	2.2%	3.5%	6.9%
EEA	186	190	205	270	N/A	0.5%	2.0%	7.7%
Total All Countries	10,955	12,334	12,989	15,125	3.6%	2.4%	3.5%	6.7%

Looking ahead by industry (Figure 18 shows the main drivers of the consumption of data professionals to 2025 and 2030 remains the professional services and retail & wholesale industries. The top three

industries account for more than half (52%) of data professionals by 2030 (Baseline forecast), and the top four industries account for nearly two-thirds (63%) of data professionals by this time, leaving the eight industries to compete for the remaining 37%. Demand is increasing slightly as our forecast for 2030 (Baseline) is up on our previous forecast (by 1%).

Figure 18 - Data Professionals forecast by Industry 2025, 2030 three scenarios (000's)



Data Professionals by Industry: Forecasts 2025, 2030

3.4 Key Findings

KEY HIGHLIGHT FOR THE EU27
The outlook for the number of data professionals will depend on the ability to train and educate people to work with data across a wide range of company types and sizes. The expansion of the definition of data supplier companies to include significantly more industries places a burden on universities and companies to deliver the required number of professionals cognizant with dealing with data. Without this stream of professionals there will be a brake on the growth of the data market.
There will be more than 9.3 million data professionals in the EU27 by 2030 (Baseline forecast), a growth of 3.5% per year between 2025 and 2030.
Data professionals share of total employment rises again, to 4.2%, up from 4.0% seen in 2021, confirming the growth of the data economy and the supporting workforce needed.
The average number of data professionals in 2022 is estimated at 12.6 per thousand data user companies, up again from 12.4 seen in 2021.
In the shorter term, there were 7.3 million data professionals in the EU27 in 2022, rising to 8.3 million in 2025. A growth of 3.6% per year between 2020 and 2025.
Across the industries, Professional Services adds the most in terms of number of data professionals between 2025 and 2030, accounting for nearly 25% of the data professionals added during this period, while information and communication showed the third highest

annual growth out to 2030, it added the second most to the number of data professionals due to its size.

4. Data Companies

4.1 Definition

Data companies *are organisations that are directly involved in the production, delivery, and/or usage of data in the form of digital products, services, and technologies. They can be both data supplier and data user organisations:*

- ***Data suppliers*** *have as their main activity the production and delivery of digital data-related products, services, and technologies. They represent the supply side of the data market.*
- ***Data users*** *are organisations that generate, exploit, collect, and analyse digital data intensively and use what they learn to improve their business. They represent the demand side of the data market.*

The Final Report on Facts and Figures (D2.7) of the SMART 2016/0063 European data market study applied the same definition of data supplier and data user companies as the one used in the original European Data Market study (SMART 2013/0063), as well as the First Report on Facts and Figures (D2.1) in February 2018. However, the definition of data suppliers is extended in this report to include a wider range of industries. As a result, indicator 2 measures:

- European data suppliers, counted as legal entities based in one EU Member State, as a share of the total number of enterprises included in the industry classifications of A, C, E, G, H, J, K, M, P, and Q from NACE rev2. This extends the previous definition of data supplier companies to accommodate the inclusion of the sale and purchase of data (data monetisation), as well as data software tools, hardware, and data services.
- European data users, counted as legal entities based in one EU Member State, as a share of the total number of private enterprises in the EU. This definition is unchanged from the prior definition.

4.2 Measuring Data Companies

The expansion of the number of data suppliers - in accordance with the definition above – means the share of data suppliers in this pool drops significantly when compared to the previous phase as the additional industry segments have very few data supplies included. The expansion of the industries included in data suppliers reflects the inclusion of those industries that offer data in data marketplaces and an extension of the data skills across these industries. The primary source for these is the survey of data users and data suppliers, which gives guidance on the number of companies that offer data services.

Table 31 gives an overview of the number of data supplier and data user companies across the Member States. It shows the number of data supplier companies in 2021 was 190,796, an increase of 26% from 2020. The number is forecast to rise by 13.3% in 2022 to 216,209. Data Suppliers grew to 560,596 in 2021 and is forecast to grow to 579,252 in 2022.

Table 31 - Indicator 2: Data Companies 2020-2022 and 2020-2021 growth

N.	Name	Description	Market	2020	2021	2022	Growth 2022/2021
2.1	Number of data suppliers	Total number of data suppliers measured as legal entities based in the EU ('000s)	EU27	175,605	190,796	216,209	13.3%
2.2	Share of data suppliers	Percentage share of data companies of total companies in the NACE II industries of A, C, E, G, H, J, K, M, P, and Q	EU27	1.7%	1.8%	2.0%	2.3%
2.3	Number of data users	Total number of data users in the EU, measured as legal entities based in one EU country	EU27	542,510	560,596	579,252	3.3%
2.4	Share of data users	Percentage share of data users of total companies in the EU industry	EU27	2.11%	2.17%	2.20%	1.27%

4.3 Measuring Data Supplier Companies

Data Suppliers by Country

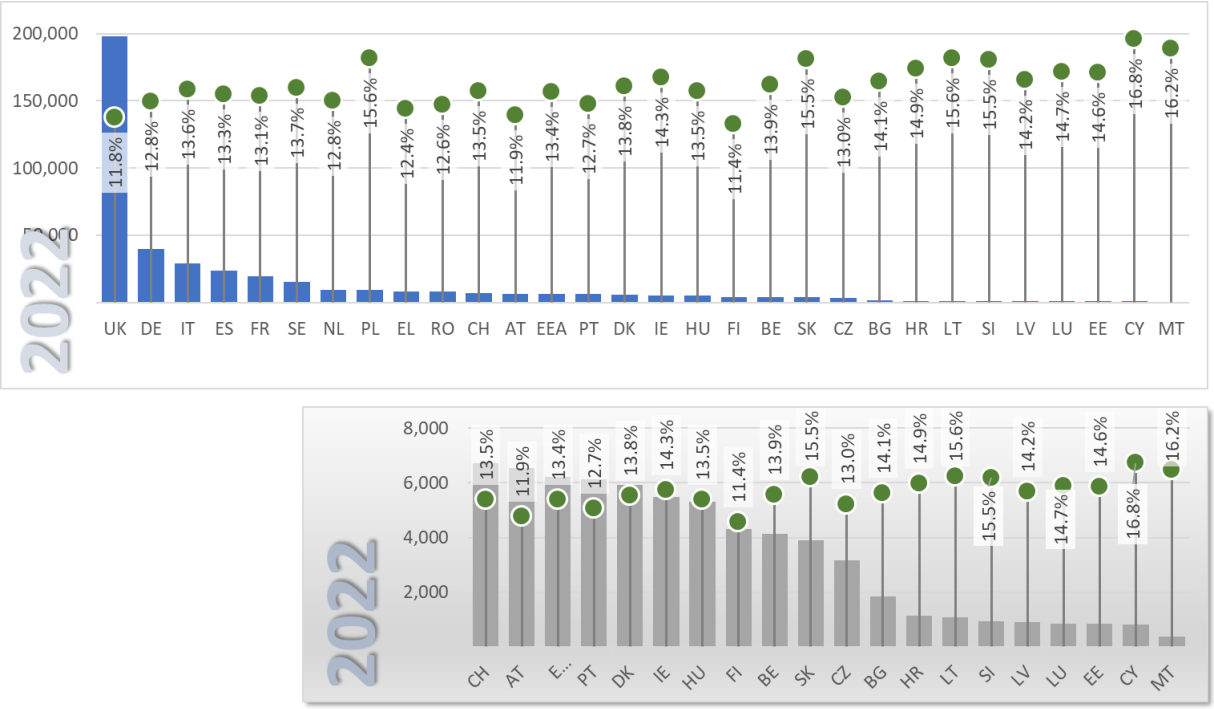
With an overall share of 18.4%, Germany remains the largest data supplier among the EU27 in 2022 followed by Italy (13.5%) and Spain (10.9%) which exhibit a percentage share similar to the previous publication for 2021. Germany is forecast to show below average growth when compared to the total for all Member States, but only by a percentage point. As Europe's largest data supplier with a substantial share of EU27 data companies, it is difficult for Germany to show growth significantly different from the EU27 average because its size tends to dictate the average growth. Germany's share of the EU27 drops gently from 2020 to 2022, primarily as the country was an earlier adopter of data technology, attributable to its focus on data intensive industries such as manufacturing. While Germany's growth is consolidating, later adopters of digital technology, such as Poland, show higher growth as they catch up with digital investments. Of the top 10 Member States, only Poland, Sweden, and Italy show growth above the average for the member states, with each of the three gaining share each year from 2020 to 2022. Italy in particular has a focus on manufacturing and retail, both early adopters of digital technologies.

Outside the EU, the United Kingdom remains prominent in terms of data supplier companies. Nonetheless, with Brexit, foreign investments into the European data economy are likely to shift to other Member States as the attraction of the United Kingdom is expected to fade. The opportunity presented by the rapid increase in the use of Artificial Intelligence across many areas of software, manufacturing and retail suggest Member States such as Germany and Italy can benefit from increased digitalisation of these areas of the economy and attract or grow data supplier companies to support the industries.

Table 32 – Data Supplier Companies by country 2020-2022 and 2021-2022 growth

	2020	2021	2022	Growth 2022/2021
Austria	5,448	5,845	6,542	11.9%
Belgium	3,326	3,630	4,134	13.9%
Bulgaria	1,491	1,630	1,859	14.1%
Croatia	906	999	1,148	14.9%
Cyprus	631	710	829	16.8%
Czechia	2,581	2,805	3,171	13.0%
Denmark	4,760	5,195	5,912	13.8%
Estonia	665	735	843	14.6%
Finland	3,613	3,865	4,305	11.4%
France	15,829	17,161	19,416	13.1%
Germany	32,632	35,304	39,819	12.8%
Greece	6,939	7,457	8,378	12.4%
Hungary	4,301	4,681	5,311	13.5%
Ireland	4,359	4,797	5,485	14.3%
Italy	23,685	25,775	29,272	13.6%
Latvia	711	780	891	14.2%
Lithuania	837	930	1,075	15.6%
Luxembourg	677	744	853	14.7%
Malta	298	334	388	16.2%
Netherlands	7,570	8,189	9,240	12.8%
Poland	7,226	8,017	9,267	15.6%
Portugal	5,047	5,448	6,138	12.7%
Romania	6,653	7,218	8,128	12.6%
Slovakia	3,040	3,368	3,890	15.5%
Slovenia	723	801	925	15.5%
Spain	19,212	20,825	23,587	13.3%
Sweden	12,445	13,555	15,405	13.7%
Switzerland	5,448	5,923	6,721	13.5%
United Kingdom	165,454	177,031	197,876	11.8%
EEA (NO, LI, IS)	5,058	5,492	6,230	13.4%
EU27	175,605	190,796	216,209	13.3%
EEA	5,058	5,492	6,230	13.4%
Total All Countries	346,117	373,320	420,316	12.6%

Figure 19 – Data Supplier Companies by Country 2022, 2021-2022 growth



Data Supplier Companies by Industry.

Since its inception in 2013, the European Data Market study (SMART 2013/0063; and its update SMART 2016/0063), has been providing a sectoral segmentation of its major indicators by different industry. In this third edition of the study (The European Data Market 2021-2023 VIGIE 2020-0655), Agriculture was added to the sector list making the number of industries list up to 12.

In the previous report (D2.2 First Report on Facts and Figures), the definition of data suppliers was extended to include a wider range of industries as the restriction of Data Suppliers to NACE sectors J and M (as used in the data market publications from 2014 to 2020). That definition was too narrow now that the data market is becoming more established. Agriculture was also excluded in the earlier definition of the market, but the data opportunities in Agriculture are notable when compared with the publications from 2014 to 2020. However, while Agriculture does present notably more data adoption opportunities in 2021 and out to 2030, the inclusion of the industry in 2021 added little to the total number of data suppliers across the Member States, accounting for just 0.03% of the data supplier companies among the EU27. Information and Communication, together with Professional Services are the major market sectors – these are the industries used exclusively in the previous definition and continue to represent the majority (88%) of data suppliers. The high growth shown by industries other than Information and Communication and Professional Services are a reflection of their small size and that they are industries with an emerging data supplier base as new companies find their place in this developing market.

Table 33 and Figure 20 and Figure 21 shows the relative size and growth of each industry for 2020-2022.

Table 33 - Data Supplier Companies by industry 2020-2022 and 2021-2022 growth

	2020	2021	2022	Growth 2022/2021
Agriculture	27	42	58	36.4%
Construction	53	86	122	42.1%
Education	147	205	287	40.1%
Finance	4,621	6,135	8,123	32.4%
Health	3,101	4,148	5,593	34.8%
Information & Communication	93,244	97,595	106,626	9.3%
Mining, Manufacturing	21	36	65	80.3%
Professional services	67,958	74,479	84,874	14.0%
Public Administration				
Retail and Wholesale	6,055	7,553	9,744	29.0%
Transport	117	157	218	38.3%
Utilities	261	359	500	39.3%

Figure 20 - Data Supplier companies by Industry 2022 and 2021-2022 growth

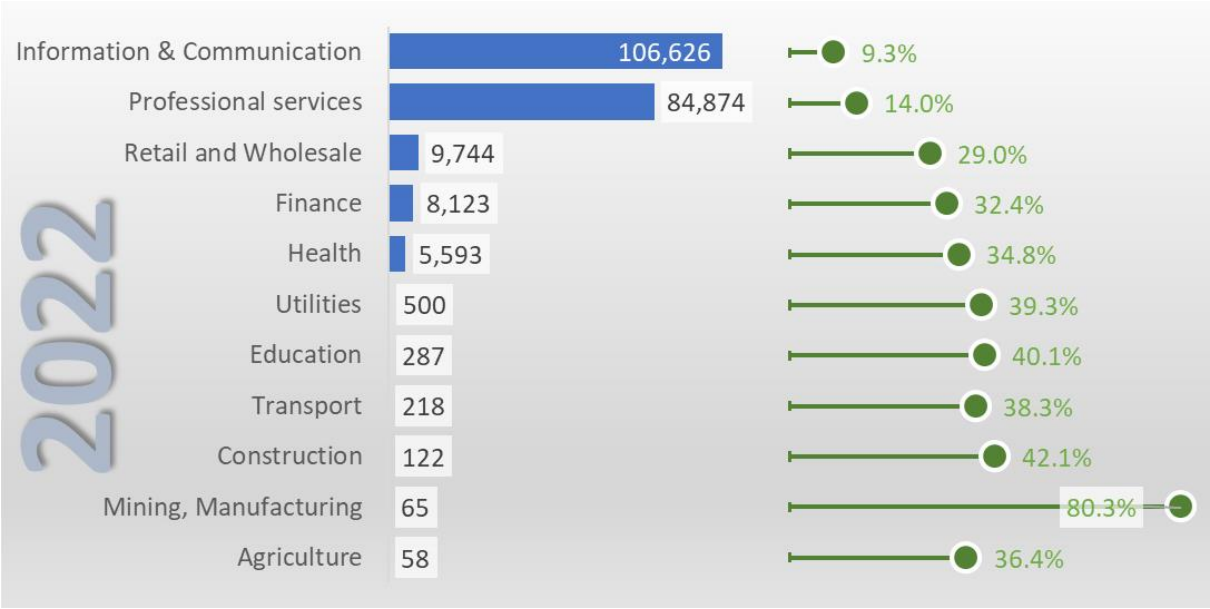
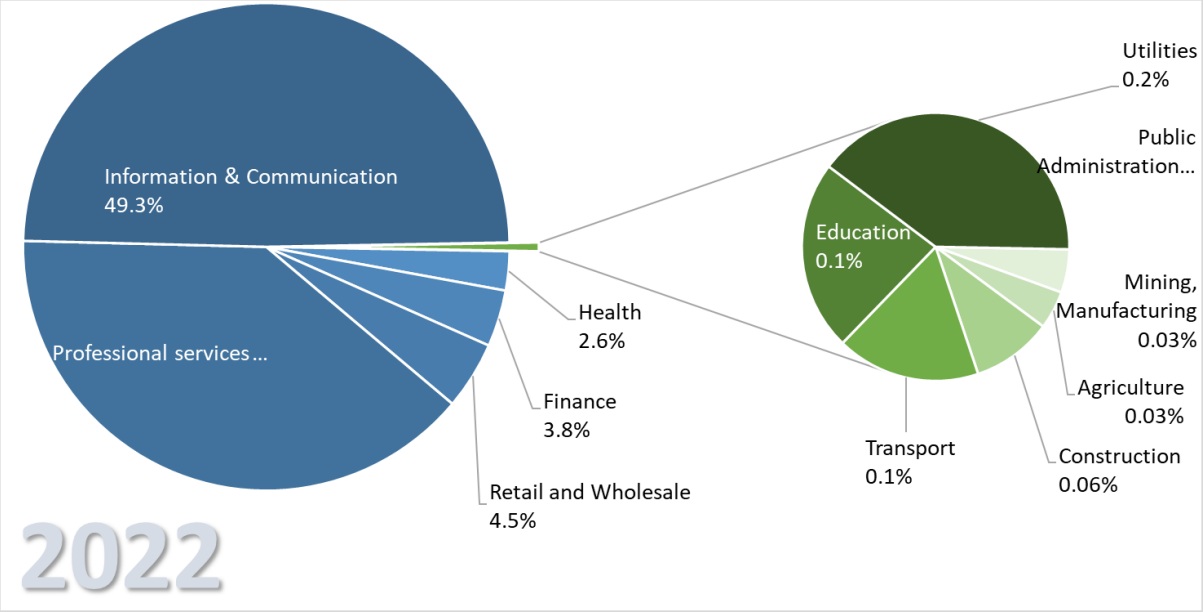


Figure 21 - Data Supplier companies share by industry 2022



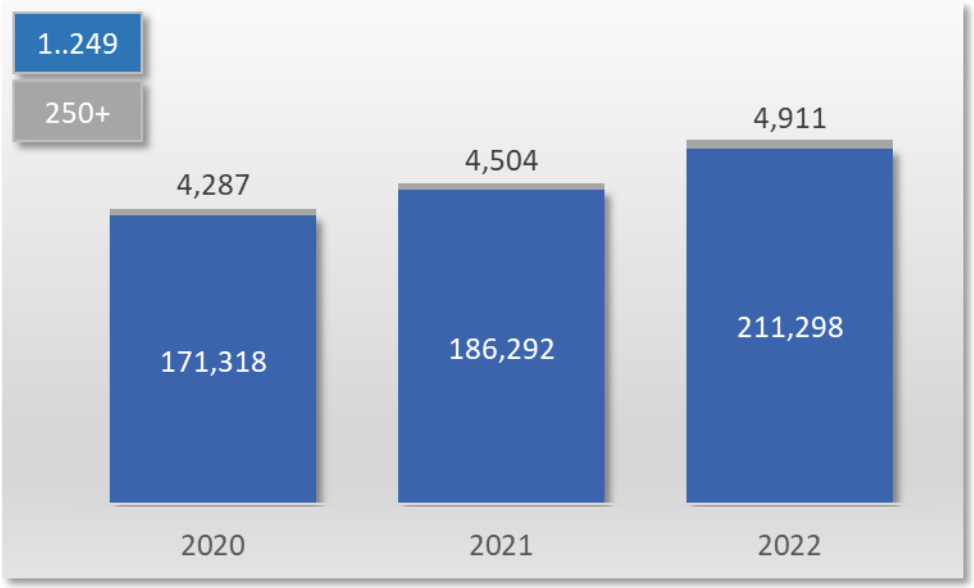
Data Supplier Companies by Company Size Band

Nearly 98% of data supplier companies among the Member States are sized 1-249 employees – which reflects the general configuration of companies by size among the countries. More than 95% of all businesses in Europe are sized below 10 employees so the small share seen by larger companies (more than 250 employees) is no surprise. However, these bigger companies account for a much larger share of total revenue. Table 34 shows the number of data supplier companies by size band, and the relative sizes are shown in Figure 22.

Table 34 - Data Supplier Companies 2020-2022 and 2021-2022 growth

	2020	2021	2022	Growth 2022/2021
250+ employees	4,287	4,504	4,911	9.0%
1-249 employees	171,318	186,292	211,298	13.4%

Figure 22 - Data Supplier Companies by company size band 2022-2022



4.4 Measuring Data User Companies

There are significantly more data user companies than data supplier companies – unsurprising considering that data supplier companies are most likely data user companies too. There are close to 2.7 data user companies for every data supplier company. This is a notable increase in data supplier companies when compared with the previous restricted definition of a data supplier company (where there were around 3.5 data user companies for each data supplier company) but still presents a notable number of data user companies. By 2022, there will be more than 579,000 data user companies among the Member States. This is a growth of 3.3% when compared to 2021, when there were 560,600 data user companies.

Growth of data user companies among the EU27 is 3.3% in 2022, which, while low when compared to growth in the data market, is still five times that of the growth among all companies in the Member States (0.66% in 2022).

Data Users by Country

Table 35 - Data User Companies 2020-2022 and 2021-2022 growth

	2020	2021	2022	Growth 2022/2021
Austria	14,250	14,581	15,041	3.2%
Belgium	14,450	14,895	15,399	3.4%
Bulgaria	3,250	3,363	3,479	3.5%
Croatia	1,800	1,862	1,930	3.6%
Cyprus	1,800	1,869	1,937	3.6%
Czechia	6,950	7,096	7,208	1.6%
Denmark	8,400	8,659	8,950	3.4%
Estonia	1,750	1,810	1,874	3.6%
Finland	8,400	8,591	8,887	3.4%
France	75,800	78,631	81,524	3.7%
Germany	115,000	119,785	123,766	3.3%
Greece	11,250	11,507	11,849	3.0%
Hungary	4,700	4,849	5,004	3.2%
Ireland	9,050	9,363	9,741	4.0%
Italy	92,050	94,495	97,617	3.3%
Latvia	1,250	1,289	1,336	3.6%
Lithuania	2,050	2,131	2,209	3.6%
Luxembourg	1,650	1,697	1,759	3.6%
Malta	710	735	758	3.2%
Netherlands	28,700	29,741	30,828	3.7%
Poland	13,650	14,055	14,499	3.2%
Portugal	19,150	19,772	20,272	2.5%
Romania	5,650	5,870	6,074	3.5%
Slovakia	2,950	3,046	3,156	3.6%
Slovenia	1,350	1,390	1,441	3.6%
Spain	76,050	78,376	80,928	3.3%
Sweden	20,450	21,137	21,784	3.1%
Switzerland	16,306	16,801	17,363	3.3%
United Kingdom	183,600	190,510	196,639	3.2%
EEA (NO, LI, IS)	7,089	7,275	7,432	2.2%
EU27	542,510	560,596	579,252	3.3%
EEA	7,089	7,275	7,432	2.2%
Total All Countries	733,199	758,381	783,322	3.3%

The EU27 accounts for 72%of data user companies among all the countries listed in Table 35 in 2022, with Germany as the largest Member State in terms of the number of data user companies. Growth Member States by country for 2022 is reasonable constant as the expansion in number of companies tends to align with both GDP growth and the Data Market growth in the Member State. The top five Member States grow close to or above the average for all countries. Germany, Italy, Spain, and France still account for two thirds of the number of data companies among the Member States in 2022, although the United Kingdom remains the largest country overall, in terms of the number of data user companies, with the number of companies in the country equivalent to a third of those in all EU27 Member States (this is in addition to the EU27 data user companies). Table 35 shows the number of data user companies by country and Figure 23 shows these graphically with the smaller countries inset to show their relative size. Fore reference, Figure 24 shows each country's data user companies' share of all companies for 2022, which gives a view of the data orientation of each country.

Figure 23 - Data User Companies by Country 2022 and growth 2021-2022

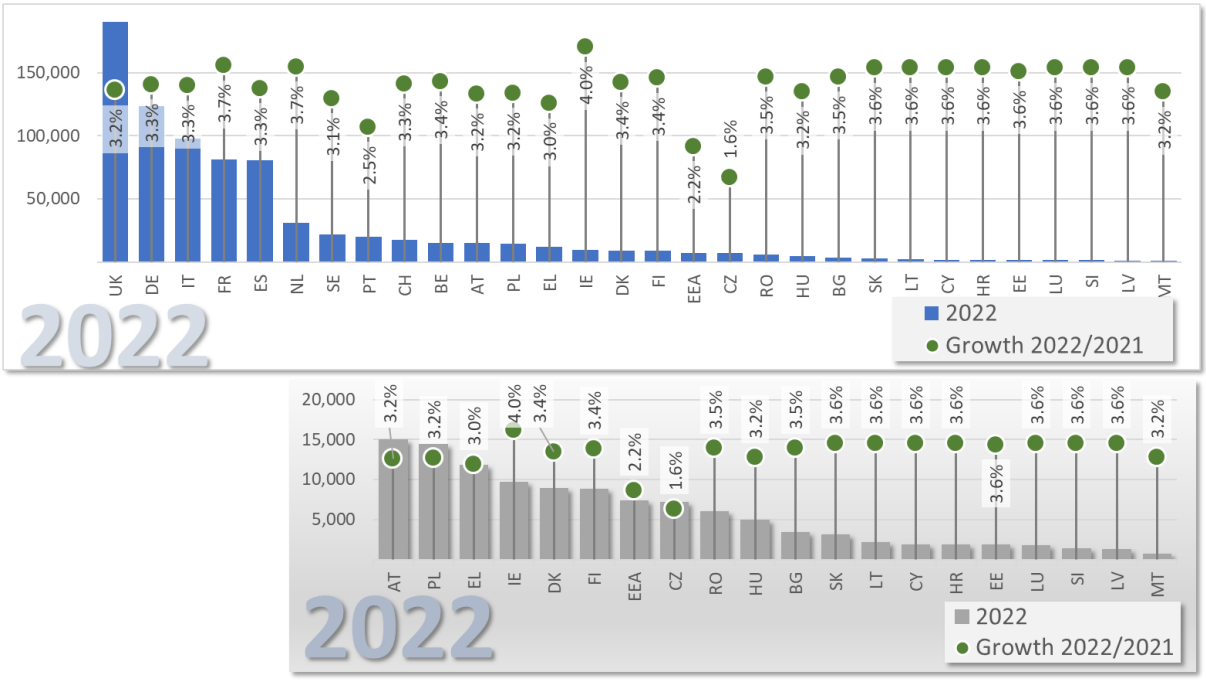
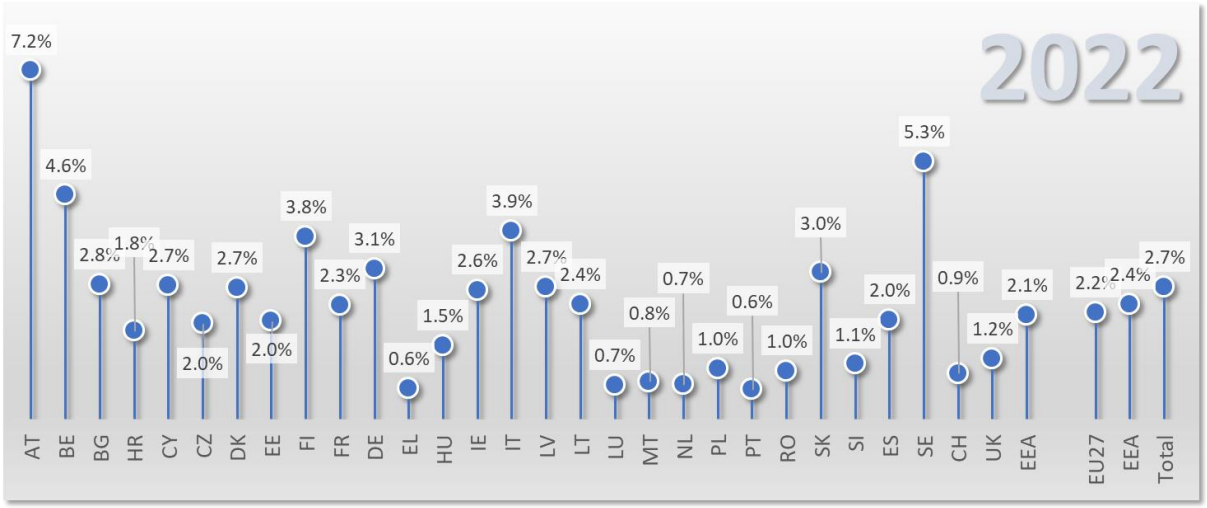


Figure 24 - Data User Companies' share of all companies by country 2022



Data User Companies by Industry

The top four industries among the Member States account for more than two thirds (60%) of data user companies in 2022. These are Retail and Wholesale, Mining and manufacturing, Information and Communication, and transport. There is a notable drop in the number of companies after these four. These service-oriented industries have more relevant data sources to use and are more inclined to understand the value of data as part of their business, hence their greater share of the number of data users among the Member States. Table 36 and Figure 25 show the size and growth for each of the industries for the Member States for 2020-2022, with Figure 26 showing the share of the total number of companies by industry to show the data focus for each of the industries among the Member States. Professional services dominate this with nearly twice the share of its nearest competitor. This chart reinforces the data focus for each for the industries as seen in Figure 25.

Table 36 - Data User Companies by industry 2020-2022 and 2021-2022 growth

	2020	2021	2022	Growth 2022/2021
Agriculture	3,758	4,414	5,587	26.6%
Construction	34,235	35,208	36,230	2.9%
Education	12,154	13,209	14,038	6.3%
Finance	29,960	30,192	30,625	1.4%
Health	25,955	27,999	29,646	5.9%
Information & Communication	58,507	59,165	60,165	1.7%
Mining, Manufacturing	83,428	81,445	80,868	-0.7%
Professional services	146,795	155,231	162,658	4.8%
Public Administration				
Retail and Wholesale	77,638	85,553	91,855	7.4%
Transport	60,077	58,363	57,791	-1.0%
Utilities	10,004	9,818	9,788	-0.3%

Figure 25 - Data User Companies by Industry 2022, and growth 2021-2022

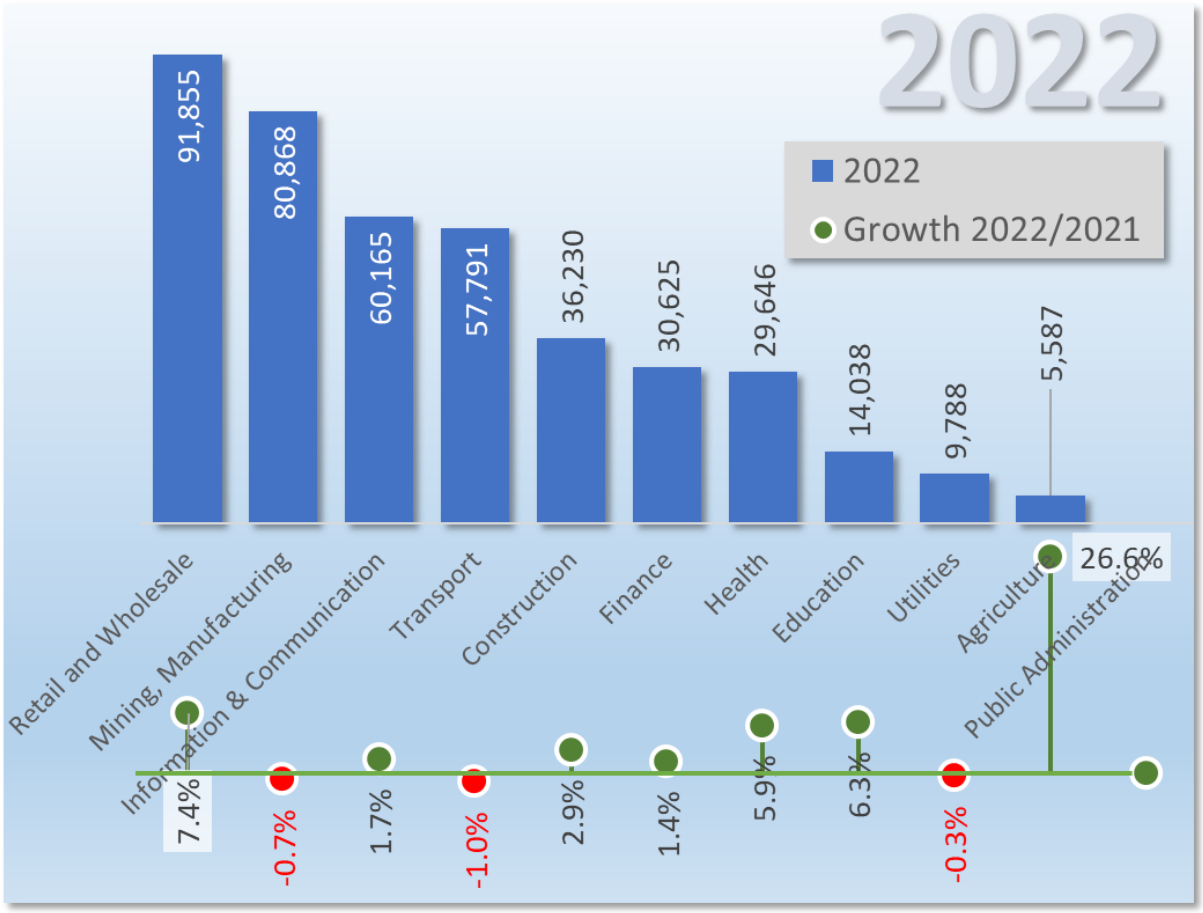
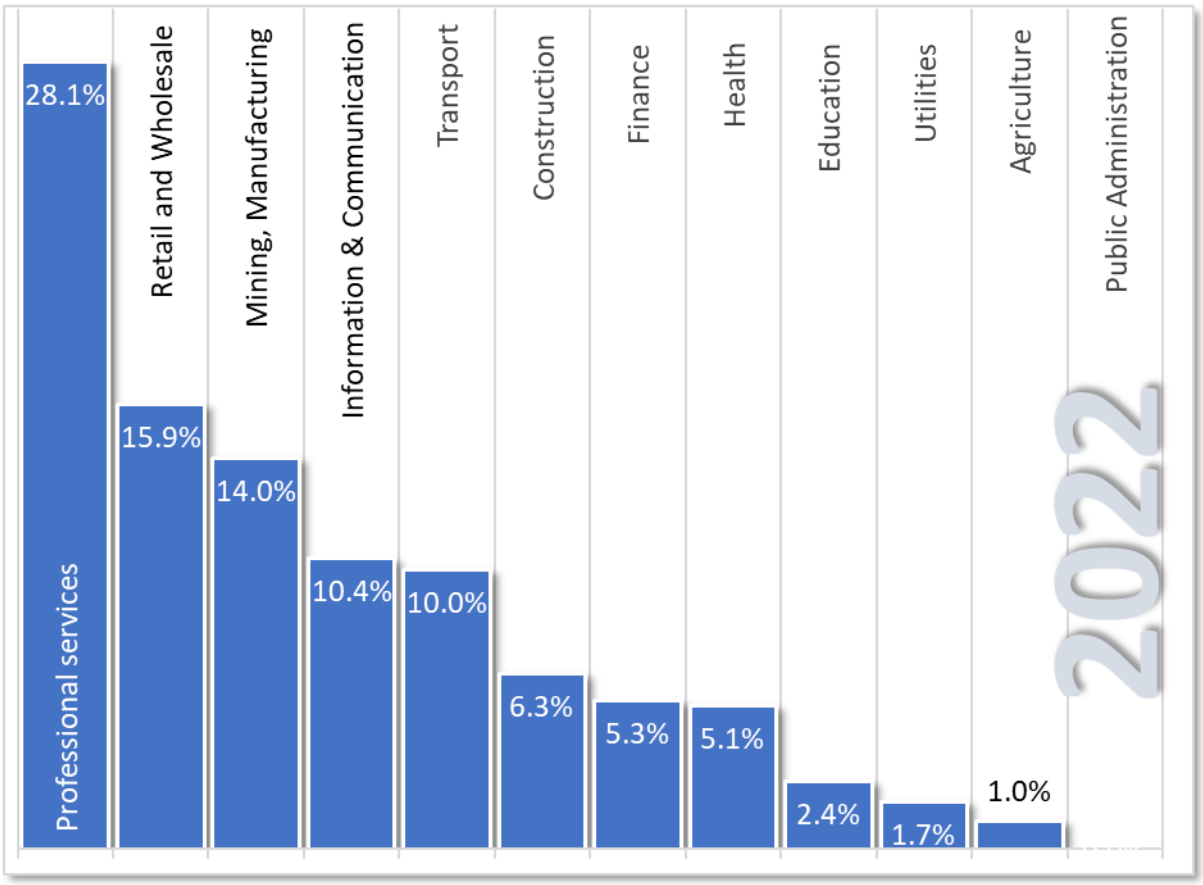


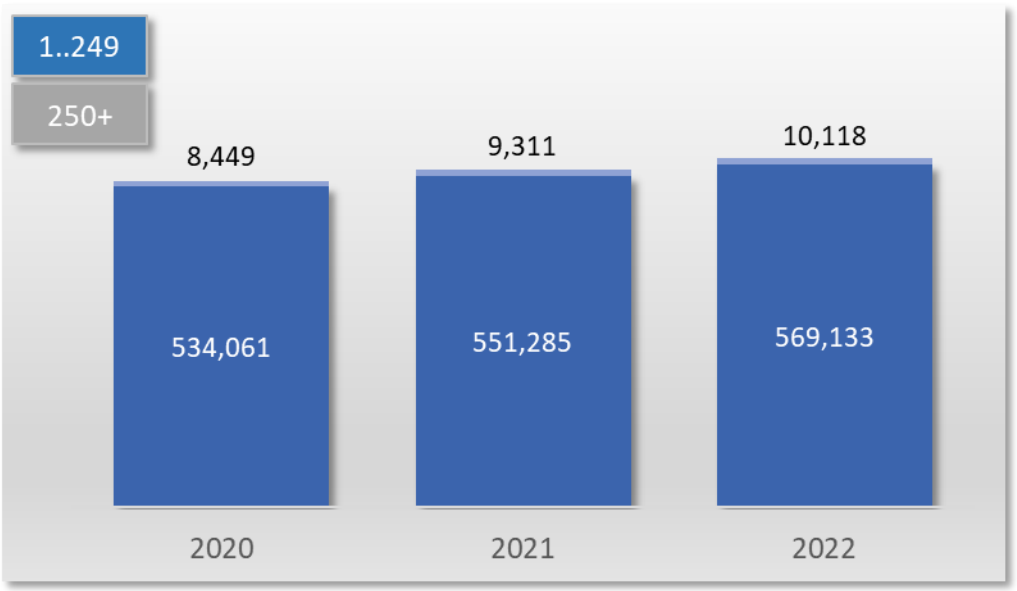
Figure 26 - Data user Companies share of total by Industry 2022



Data User Companies by Size Band

Data User companies are even more likely to be smaller companies than data supplier companies, with organisations of less than 250 employees accounting for more than 98% of companies in 2022, as seen in Figure 27. As with data supplier companies, it is the relative number of companies overall that is reflected in this mix.

Figure 27 - Data User Companies by size band 2020-2022



4.5 Forecasting Data Companies

Forecasting Data Supplier Companies, 2025 and 2030 Scenarios

Table 37 presents the summary forecast for data supplier companies in the Member States and greater European continent for 2025 and three scenarios for 2030. We anticipate the number of data supplier companies in the 27 Member States will grow at a compound rate of 8.4% between 2020 and 2025 and grow at a slightly slower rate of 3.5% between 2025 and the 2030 Baseline forecast.

Compared to previous forecasts, the growth is less pronounced up to 2025, and slightly higher between 2025 and 2030than previously forecast, primarily due to changes in the economy resulting from the events in Ukraine and their consequences on energy costs and the overall macroeconomic picture. While the issues in Ukraine have moderated the forecast the primary factors dictating higher or lower growth remain the ability of new companies to exploit the monetisation of data markets. In addition, the emergence of new ways of using data – particularly in artificial intelligence applications will also impact the growth in the number of data supplier companies.

Table 37 - Data Supplier companies forecast 2025 and three scenarios 2030

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020–2025	CAGR '25–30, Challenge	CAGR '25–30, Baseline	CAGR '25–30, High Growth
EU27	263,187	298,241	312,961	330,968	8.4%	2.5%	3.5%	4.7%
EEA (NO, LI, IS) +CH	7,683	8,712	9,344	10,246	8.7%	2.5%	4.0%	5.9%
Total, all countries	518,786	588,841	611,087	642,448	8.4%	2.6%	3.3%	4.4%

Forecasting Data Supplier Companies by Country

Among the five largest Member States (Germany, Italy, Spain, France, Sweden), only Spain and Sweden grow above the average for the EU27 to 2030 (Baseline).These five member states account for nearly 60%of the EU27 data suppliers in 2022 Most of the largest Member States in terms of absolute GDP size and population (Germany, Italy, Spain, France, Poland) have already established a data supply market and will not grow as much as smaller countries, which can catch up in a market in which they lag slightly – hence, the higher growth for the smaller countries. The longer-term growth of Member States is also related to the relative strength of data-intensive industries in the country. Those countries which have well established data-intensive industries such as finance, professional services, and retail are more prone to have local data supplier companies. Table 38 shows the outlook for all countries out to 2025 and the three scenarios for 2030.

Table 38 - Data Supplier Companies forecast by country and three scenarios 2030

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
Austria	8,207	9,307	9,552	10,013	8.5%	2.5%	3.1%	4.1%
Belgium	4,902	5,644	6,045	6,385	8.1%	2.9%	4.3%	5.4%
Bulgaria	2,267	2,604	2,773	2,930	8.7%	2.8%	4.1%	5.3%
Croatia	1,370	1,552	1,653	1,736	8.6%	2.5%	3.8%	4.8%
Cyprus	1,063	1,083	1,137	1,165	11.0%	0.4%	1.4%	1.9%
Czechia	3,900	4,415	4,503	4,824	8.6%	2.5%	2.9%	4.3%
Denmark	7,145	8,021	8,416	8,918	8.5%	2.3%	3.3%	4.5%
EEA (NO, LI, IS)	7,683	8,712	9,344	10,246	8.7%	2.5%	4.0%	5.9%
Estonia	1,023	1,164	1,227	1,357	9.0%	2.6%	3.7%	5.8%
Finland	5,486	6,157	6,299	6,777	8.7%	2.3%	2.8%	4.3%
France	23,522	26,657	27,365	28,908	8.2%	2.5%	3.1%	4.2%
Germany	48,103	54,061	55,729	59,050	8.1%	2.4%	3.0%	4.2%
Greece	10,488	11,739	12,466	13,114	8.6%	2.3%	3.5%	4.6%
Hungary	6,761	7,736	8,245	8,948	9.5%	2.7%	4.0%	5.8%
Ireland	7,702	8,994	9,391	10,104	12.1%	3.1%	4.0%	5.6%
Italy	34,173	38,624	40,212	41,895	7.6%	2.5%	3.3%	4.2%
Latvia	1,062	1,203	1,286	1,323	8.3%	2.5%	3.9%	4.5%
Lithuania	1,273	1,436	1,544	1,607	8.7%	2.4%	3.9%	4.8%
Luxembourg	1,024	1,180	1,246	1,341	8.6%	2.9%	4.0%	5.6%
Malta	457	538	566	620	8.9%	3.3%	4.4%	6.3%
Netherlands	11,473	12,967	13,817	14,616	8.7%	2.5%	3.8%	5.0%
Poland	11,116	12,709	14,006	14,961	9.0%	2.7%	4.7%	6.1%
Portugal	7,554	8,475	8,992	9,548	8.4%	2.3%	3.5%	4.8%
Romania	10,472	11,943	12,413	13,010	9.5%	2.7%	3.5%	4.4%
Slovakia	4,453	5,217	5,524	5,963	7.9%	3.2%	4.4%	6.0%
Slovenia	1,101	1,244	1,364	1,423	8.8%	2.5%	4.4%	5.3%
Spain	28,322	32,394	34,354	36,082	8.1%	2.7%	3.9%	5.0%
Sweden	18,768	21,173	22,834	24,352	8.6%	2.4%	4.0%	5.3%
Switzerland	8,118	9,151	9,640	10,111	8.3%	2.4%	3.5%	4.5%
United Kingdom	247,917	281,888	288,782	301,234	8.4%	2.6%	3.1%	4.0%
EU27	263,187	298,241	312,961	330,968	8.4%	2.5%	3.5%	4.7%
EEA	7,683	8,712	9,344	10,246	8.7%	2.5%	4.0%	5.9%
Total All Countries	518,786	588,841	611,087	642,448	8.4%	2.6%	3.3%	4.4%

Forecasting Data Supplier Companies by Industry

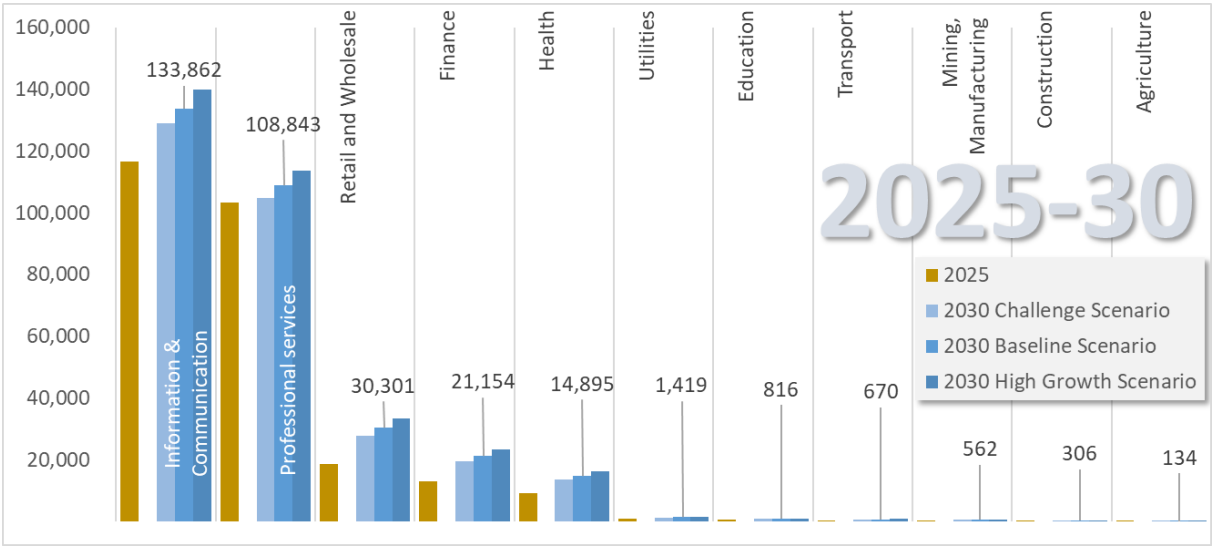
Across the data supplier industries, the key industries of Information & Communications and Professional Services – the J and M industries selected in previous reports – continue to dominate, although their growth will be below the average across all industries. The forecast for these two sectors is more optimistic than in the previous publication because of an improved expectation in the growth of the use of data (and hence in those organisations that trade in data), and a higher forecast for artificial intelligence applications, also driving greater demand for data. As a result, more organisations are inclined to address these markets.
Most of the other industries show notably higher growth of 10% or more to 2030 (Baseline), as can be seen in Table 39 and Figure 28, although growing from a small base.

Data intensive industries such as Retail and Finance organisations can add to the number of data suppliers, because these industries embraced the data industry early and have data sets that are more amenable for sale across markets.

Table 39 - Data Supplier Companies forecast by Industry 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
Agriculture	83	123	134	148	25.4%	8.3%	10.1%	12.3%
Construction	188	280	306	336	28.9%	8.2%	10.1%	12.3%
Education	502	746	816	899	27.9%	8.2%	10.2%	12.4%
Finance	13,022	19,349	21,154	23,250	23.0%	8.2%	10.2%	12.3%
Health	9,207	13,654	14,895	16,378	24.3%	8.2%	10.1%	12.2%
Information & Communication	116,645	129,114	133,862	139,985	4.6%	2.1%	2.8%	3.7%
Mining, Manufacturing	347	515	562	618	74.9%	8.2%	10.1%	12.2%
Professional services	103,218	104,799	108,843	113,774	8.7%	0.3%	1.1%	2.0%
Public Administration								
Retail and Wholesale	18,679	27,740	30,301	33,280	25.3%	8.2%	10.2%	12.2%
Transport	412	613	670	736	28.6%	8.3%	10.2%	12.3%
Utilities	883	1,307	1,419	1,562	27.5%	8.2%	10.0%	12.1%

Figure 28 - Data Supplier Companies Forecast 2025, and 2030, three scenarios



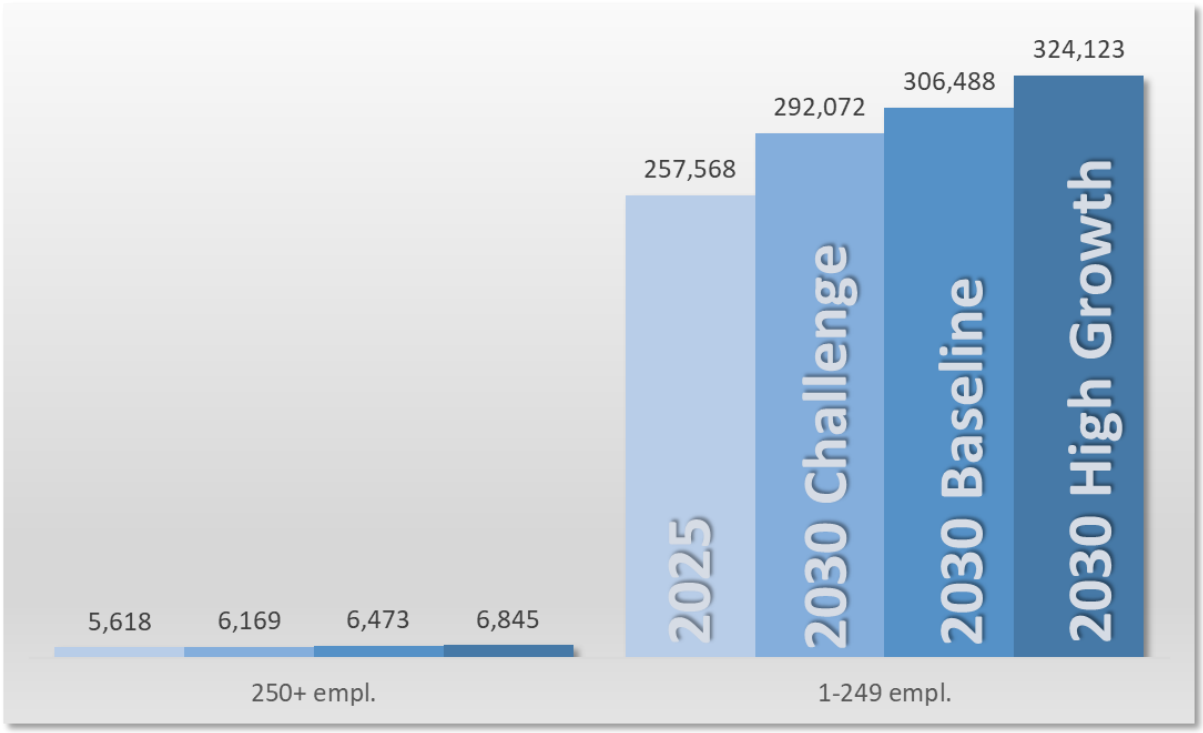
Forecasting Data Supplier Companies by Company Size

Figure 29 and Table 40 summarise the difference in the size of the number of data supplier companies by company size band, with small and medium companies dominating the number of suppliers. As mentioned before, this is a structural issue with more than 95% of companies among the Member States falling into the 0-9 employees size class. The relative sizes are unlikely to change notably because of the magnitude of the size difference in the number of companies, but larger companies are more likely to take advantage of data monetisation as these organisations should have a greater volume of data to exploit on the data market. Smaller companies will be less able to reap the rewards of higher volumes of data.

Table 40 - Data Supplier Companies forecast by company size band 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
250+ employees	5,618	6,169	6,473	6,845	5.6%	1.9%	2.9%	4.0%
1-249 employees	257,568	292,072	306,488	324,123	8.5%	2.5%	3.5%	4.7%

Figure 29 - Data Supplier Companies Forecast by company size band 2025 and 2030 three scenarios



Forecasting Data User Companies: 2025 and 2030 Scenarios

The increased use of data ensures a considerable growth in the number of data use companies across the Member States out to 2030. Table 41 summarises the growth in data user companies out to 2025 and the three scenarios for 2030.

This growth is moderate due, partly, to the economic conditions resulting from the war in Ukraine and the subsequent impact on energy costs. However, we interpret this as a local and temporary condition so the forecast out to 2025 is more positive in this forecast than in the previous one, as the growth in data technologies, particularly the rising use of artificial intelligence, overcomes the downturn resulting from the conditions in Ukraine. The outlook is slightly more moderated out to 2030 (Baseline) though as growth is pulled forward into 2025. However, while the longer-term growth is slightly lower, this reflects the better 2025, as the 2030 Baseline is increased by just under 1% when compared to the previous forecast in 2021.

Data is still used primarily to reduce cost and increase efficiency – this is unchanged from the previous forecast, but there are still emerging companies that see the opportunity data technology offers to enhance existing products and develop new ones and change the way business is conducted. Current examples of new ways of conducting business include the transition from purchasing software to paying a per-user or per-period fee, and new methods for conducting business will emerge in the period out to 2030. Potential examples could include the change from selling data to selling the analysis of the data and what the data indicates – this gives significantly higher value to data monetisation.

Table 41 - Data User Companies Forecast 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR: 2020–2025	CAGR 2020-2030, Challenge	CAGR 2020-2030, Baseline	CAGR 2020-2030, High Growth
EU27	648,354	761,094	905,716	1,094,049	3.6%	3.3%	6.9%	11.0%
EEA (NO, LI, IS) +CH	8,304	9,969	12,093	14,842	3.2%	3.7%	7.8%	12.3%
Total, all countries	876,408	1,025,183	1,216,783	1,466,935	3.6%	3.2%	6.8%	10.9%

Forecasting Data User Companies by Country

Table 42 shows the forecast for the number of data user companies to 2025 and the three scenarios for 2030. Growth to the 2030 (Baseline) scenario is reasonably even across the Member States with the usual Member States of Germany, Italy, Spain, and France accounting for the bulk of the data user companies (66% of the EU27 total) – as reflects their economies.

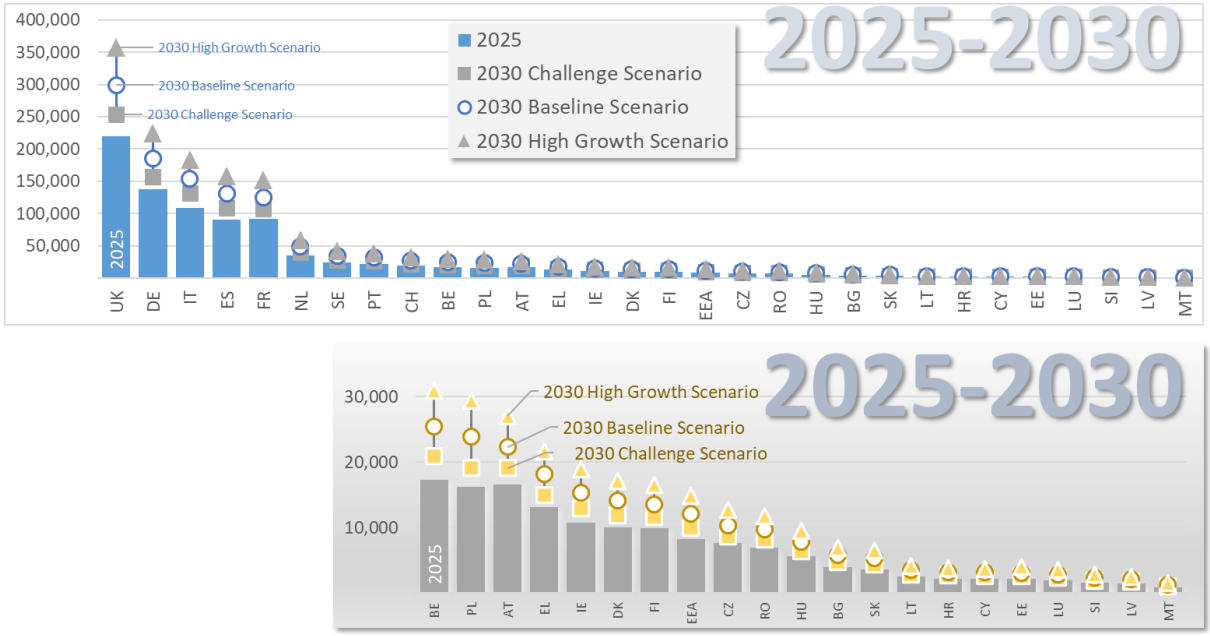
The overall growth in the number of data user companies relates to the industry mix for each Member State. Member States which are early adopters of data technologies will have a larger number of data user companies but will show slightly lower growth as a significant part of the early growth is already embedded into the number of data companies.

We expect the number of data user companies in the Member States to grow by 3.3% to 2025, and by 6.9% by the 2030 Baseline.

Table 42 - Data User Companies by country 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
Austria	16,642	19,138	22,336	27,032	3.2%	2.8%	6.1%	10.2%
Belgium	17,337	21,000	25,445	30,909	3.7%	3.9%	8.0%	12.3%
Bulgaria	3,998	4,805	5,788	6,895	4.2%	3.7%	7.7%	11.5%
Croatia	2,180	2,678	3,211	3,775	3.9%	4.2%	8.0%	11.6%
Cyprus	2,188	2,663	3,166	3,694	4.0%	4.0%	7.7%	11.0%
Czechia	7,662	8,714	10,335	12,740	2.0%	2.6%	6.2%	10.7%
Denmark	10,034	11,855	14,140	17,139	3.6%	3.4%	7.1%	11.3%
Estonia	2,165	2,564	3,138	4,010	4.3%	3.4%	7.7%	13.1%
Finland	9,973	11,705	13,617	16,533	3.5%	3.3%	6.4%	10.6%
France	92,351	107,081	125,166	152,054	4.0%	3.0%	6.3%	10.5%
Germany	137,522	157,132	185,166	224,788	3.6%	2.7%	6.1%	10.3%
Greece	13,106	15,035	18,249	21,621	3.1%	2.8%	6.8%	10.5%
Hungary	5,595	6,469	7,823	9,541	3.5%	2.9%	6.9%	11.3%
Ireland	10,783	12,938	15,405	18,892	3.6%	3.7%	7.4%	11.9%
Italy	109,250	131,349	154,248	183,976	3.5%	3.8%	7.1%	11.0%
Latvia	1,509	1,741	2,121	2,495	3.8%	2.9%	7.0%	10.6%
Lithuania	2,495	2,877	3,503	4,106	4.0%	2.9%	7.0%	10.5%
Luxembourg	1,987	2,398	2,873	3,531	3.8%	3.8%	7.7%	12.2%
Malta	848	1,040	1,240	1,510	3.6%	4.2%	7.9%	12.2%
Netherlands	34,642	40,473	49,145	59,463	3.8%	3.2%	7.2%	11.4%
Poland	16,239	19,206	23,903	29,383	3.5%	3.4%	8.0%	12.6%
Portugal	22,403	26,680	32,089	38,590	3.2%	3.6%	7.5%	11.5%
Romania	6,980	8,191	9,740	11,818	4.3%	3.3%	6.9%	11.1%
Slovakia	3,565	4,419	5,304	6,541	3.9%	4.4%	8.3%	12.9%
Slovenia	1,627	1,926	2,380	2,786	3.8%	3.4%	7.9%	11.4%
Spain	90,847	108,525	131,137	158,191	3.6%	3.6%	7.6%	11.7%
Sweden	24,426	28,491	35,049	42,038	3.6%	3.1%	7.5%	11.5%
Switzerland	19,426	22,417	26,796	32,424	3.6%	2.9%	6.6%	10.8%
United Kingdom	219,750	254,119	298,974	358,045	3.7%	2.9%	6.4%	10.3%
EEA (NO, LI, IS)	8,304	9,969	12,093	14,842	3.2%	3.7%	7.8%	12.3%
EU27	648,354	761,094	905,716	1,094,049	3.6%	3.3%	6.9%	11.0%
EEA	8,304	9,969	12,093	14,842	3.2%	3.7%	7.8%	12.3%
Total All Countries	876,408	1,025,183	1,216,783	1,466,935	3.6%	3.2%	6.8%	10.9%

Figure 30 - Data User Companies forecast by country, 2025, and 2030 three scenarios



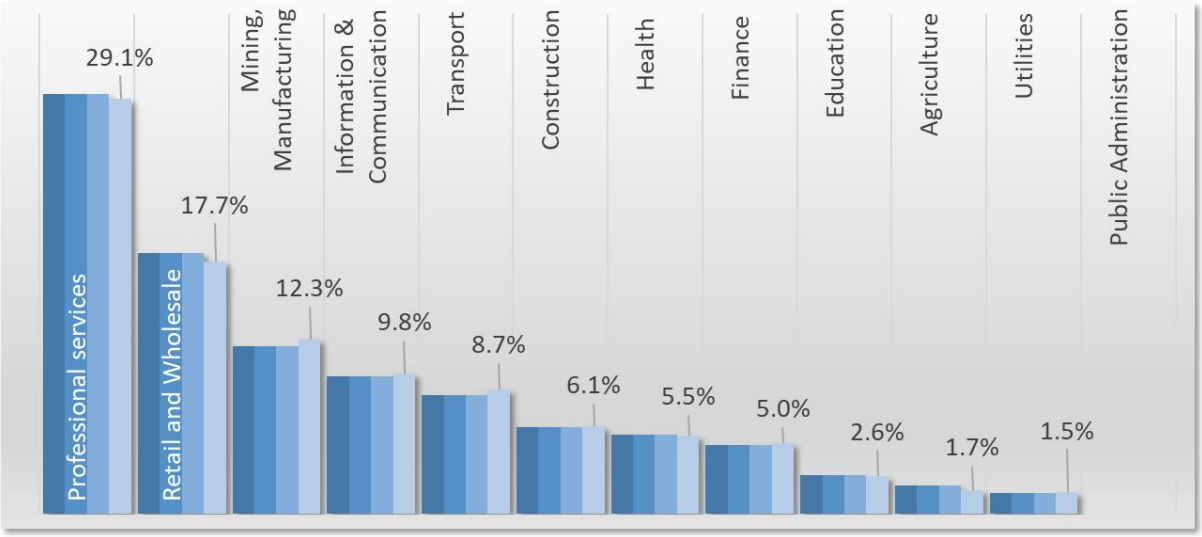
Forecasting Data User Companies by Industry

As with data supplier companies, the number of data user companies is higher in those industries that deal with large volumes of data, or a high number of customers or supporting companies for their industries. These include professional services companies, retail companies, manufacturers and information and communication companies, as shown by the top four by number of data user companies in Table 43 and Figure 31. In line with most of the data produced by this second round of measurements, by 2030 (Baseline scenario) the top four industries represent more than two-thirds (69%) of all data companies, with the remaining eight industries sharing the rest (31%). professional services, and retail and wholesale alone account for nearly half of data user companies (48%) in the EU27 by 2030. Table 43 and Figure 31 show the forecast for the number of data user companies by industry for the Member States.

Table 43 - Data User Companies by industry 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
Agriculture	10,872	15,144	18,023	21,763	23.7 %	6.9%	10.6%	14.9%
Construction	39,711	46,163	54,912	66,303	3.0%	3.1%	6.7%	10.8%
Education	16,993	20,431	24,319	29,367	6.9%	3.8%	7.4%	11.6%
Finance	32,199	36,925	43,939	53,069	1.5%	2.8%	6.4%	10.5%
Health	35,457	42,456	50,515	61,010	6.4%	3.7%	7.3%	11.5%
Information & Communication	63,735	73,259	87,195	105,345	1.7%	2.8%	6.5%	10.6%
Mining, Manufacturing	79,752	89,516	106,534	128,658	-0.9%	2.3%	6.0%	10.0%
Professional services	188,667	223,637	266,097	321,522	5.1%	3.5%	7.1%	11.3%
Public Administration								
Retail and Wholesale	114,665	139,269	165,756	200,212	8.1%	4.0%	7.6%	11.8%
Transport	56,531	63,280	75,317	90,969	-1.2%	2.3%	5.9%	10.0%
Utilities	9,772	11,014	13,108	15,831	-0.5%	2.4%	6.0%	10.1%

Figure 31 - Data User Companies by Industry share of total: 2025, 2030 three scenarios

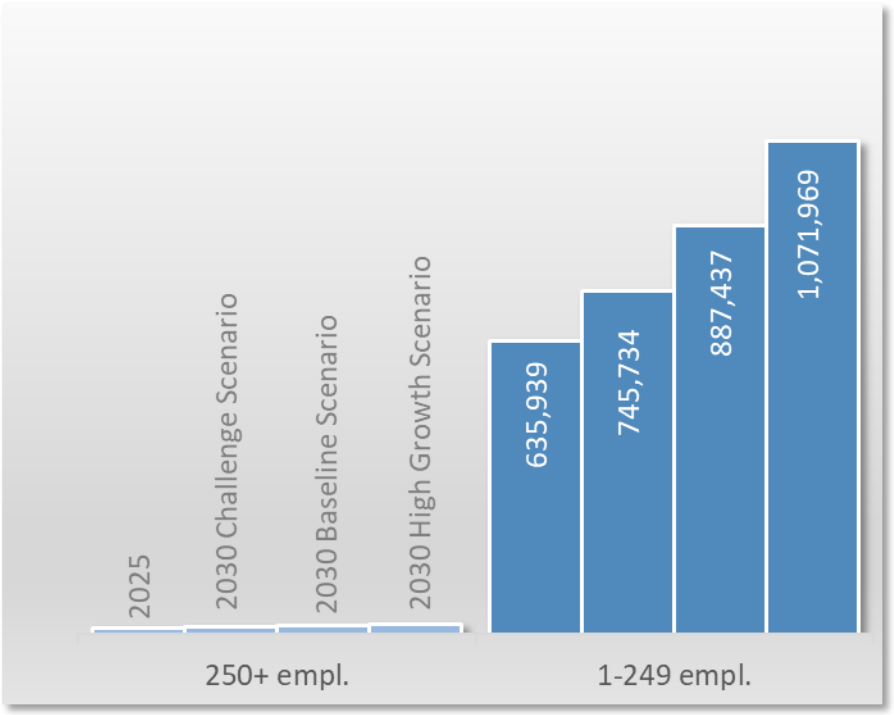


Finally, Table 44 and Figure 32 show the forecast for the number of data user companies in the EU27 by company size band to 2025 and the three scenarios for 2030. In particular, Figure 32 demonstrates the dominance of smaller companies. As with data supplier companies, we expect the number of data user companies to grow more in the larger size band because of the emerging market for data monetisation, and larger organisations have a greater ability to monetise their data simply because of the volume of it.

Table 44 - Data User Companies by Company Size Band 2025 and 2030 three scenarios

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR '25-30 Challenge	CAGR '25-30 Baseline	CAGR '25-30 High Growth
250+ employees	12,415	15,361	18,279	22,080	8.0%	4.3%	8.0%	12.2%
1-249 employees.	635,939	745,734	887,437	1,071,969	3.6%	3.2%	6.9%	11.0%

Figure 32 - Data User Companies forecast by Company Size Band 2025, and 2030 three scenarios



4.6 Key Findings

KEY HIGHLIGHT FOR THE EU27
The number of data user companies in the EU27 arrived to more than 579,000 companies by 2022, a growth over 2021 of 3.3%, continuing the growth trend seen in 2021, which also grew by 3.3%
By 2030 (Baseline scenario forecast) data user companies will account for more than 905,000 companies, growing at an annual rate of 6.9% between 2025 and 2030 Baseline. This builds on the growth seen for data user companies between 2020 and 2025 of 3.6% - an acceleration in growth out to 2030.
Data User penetration rates – i.e., the number of data user companies as a share of total companies, is stable, but varied across Member States, with an average penetration rate of 2.2% for the EU27 Member States. Penetration rates are as low as 0.6% for data user companies in Greece, and as high as 7.2% for Austria. Data User Adoption rates reflect the focus each Member State has on data intensive industries, and hence the industry profile for each Member State is an indication of which Member States are likely to have higher rates.
The services industries are those which are more likely to be data intensive, and hence have a higher number of data user companies. These service industries are Professional Services, Retail and Wholesale, and Information and Communication, but Manufacturing also has a high intensity of data use. However, Growth out to 2030 (Baseline) is evenly balanced across the industries, so the dominance seen by the services industries in terms of data user companies is unlikely to change over the period of this forecast. **The top four industries account for nearly 70% of the growth between 2025 and 2030 (Baseline)**
Small and mid-sized companies account for 98% of all data user companies in the European Union. Larger companies show slightly higher growth between 2025 and 2030 (Baseline scenario) but 98% of the growth in the number of data user companies comes from the small and mid-sized sector: companies with fewer than 250 employees account for 98%of the total number of data user companies added between 2025 and 2030. However, larger companies will invest more in digital technology. The expertise and levels of investment to be successful are high, and those companies with fewer than 10 employees cannot afford the level of expertise needed to exploit data markets and their own data resources at the same level as smaller companies. **Large companies spend up to 120 times those of small and mid-sized companies in 2022** among the EU27 Member States

5. Data Companies' Revenues

5.1 Definition

Data companies' revenues *correspond to the aggregated value of all the data-related products and services generated by Europe-based data suppliers, including exports outside of the EU. This indicator measures the revenues of the data suppliers identified and classified by Indicator 2 (see the products and services specified in our definition of the data market). Data companies' revenues do not include data monetisation as part of the data market.*

The overall value of data revenues is very close, but not identical, to the overall value of the data market for the following reasons:

- The value of the data market corresponds to the aggregated value of all the data-related products and services bought by European users (demand), including imports from foreign suppliers.
- The value of revenues corresponds to the aggregated value of all the revenues generated by Europe-based enterprises (supply) through the production, distribution, and sale of data-related products and services, including exports outside of the EU.

Table 45. Main Data Sources for Data Companies' Revenues

Data Source	Updated
Eurostat chain-linked volumes (GDP)	Apr 2022
IDC Core IT Spending Guide 2H2022	Sep 2022
IDC Big Data Spending Guide 2H2022	Aug 2022
IDC Worldwide Black Book (standard edition)	Sep 2022
IMF World Economic Outlook	Apr 2022

5.2 Measuring Data Companies' Revenues

Data companies' revenues for all companies grew by 11.1% in 2022, adding €11.6 million. As in the previous forecast, in 2022, data companies' revenues grew faster than all company revenues, as this remains an emerging market and mitigating factors such as the war in Ukraine and its impact on European economies had little impact on data revenues growth.

Table 46 - Data Companies' Revenues (€M) and share (%) 2020-2022

N.	Region	Name	Description	2020	2021	2022	Growth 2021–2022
3.1	EU27	Total revenues of data companies in the EU	Total revenues of the data suppliers calculated by Indicator 2	71,050	75,287	83,992	11.6%
3.2	EU27	Share of data companies' revenues	Ratio of data suppliers' revenues to total companies' revenues – NACE II industries A, C, E, G, H, J, K, M, P, and Q	0.3%	0.4		

5.3 Data Companies' Revenues by Country

The data market represents the most significant component of data companies' revenues. In this edition of the European Data Market study 2021-2023, we estimate data monetisation as well as a direct source of data revenues. However, to ensure consistency with prior reports, we do not account include data monetisation as estimated in section 6.6 in the data companies' revenues numbers presented in this chapter. .

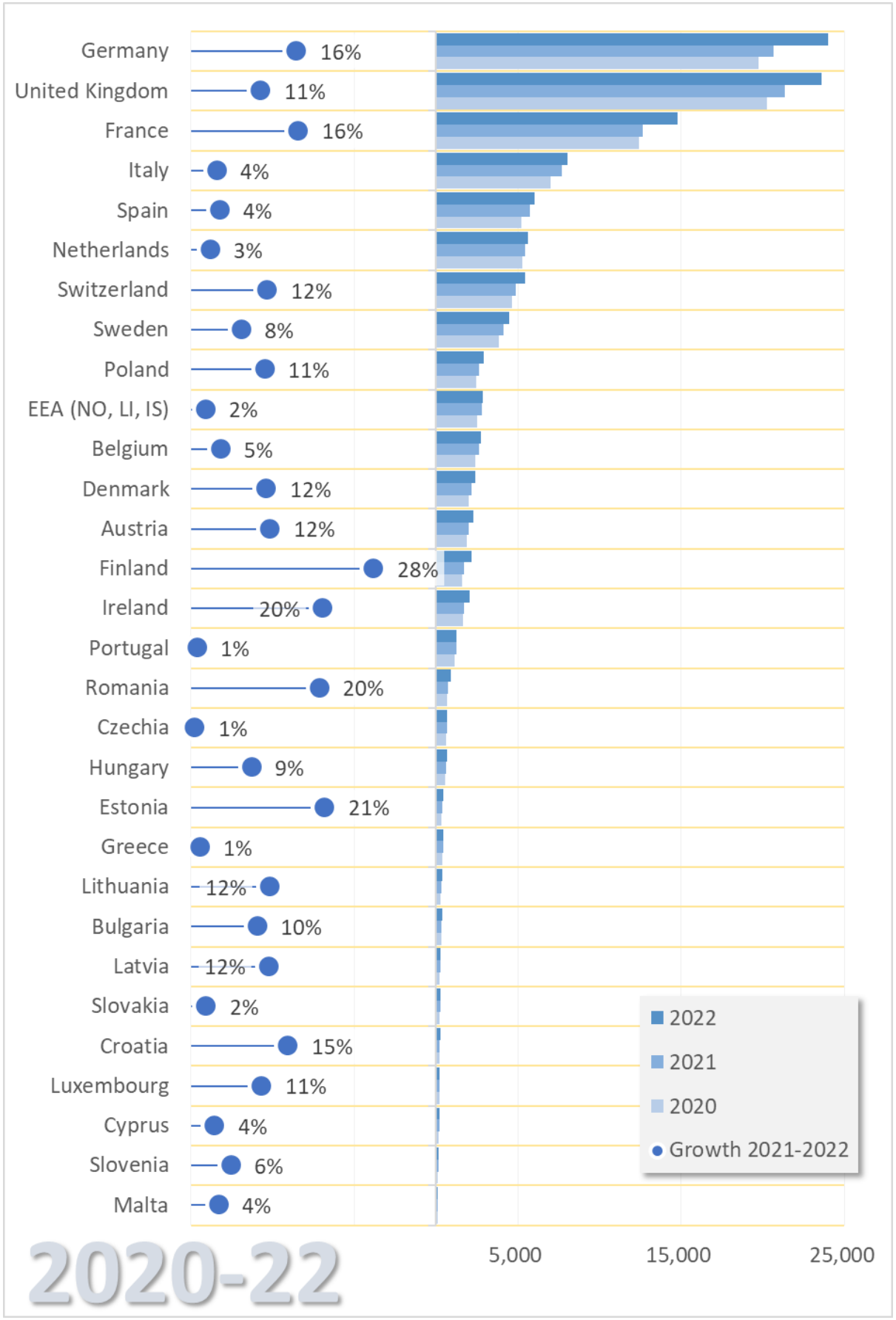
Table 47 shows the data companies' revenues for the countries in Europe, including those for the EU27 Member States. Figure 33 shows the data sorted by 2022 revenue in descending order, and Germany has overtaken the United Kingdom as the country with the largest revenues. Germany's share grows to 28.6% of EU27 total revenues in 2022, with an above average growth of 16.2% over 2021. Germany has the second largest number of data supplier companies and the largest among the EU27, with high value products such as software, and trades internationally in the data market.

As with data companies – users or suppliers – it is the industry focus that relates most to the value of data revenues, with high data-intensive industries accounting for the greater revenues among the data suppliers.

Table 47 - Data Companies' Revenues (€M) by Country 2020-2022 and 2021-2022 growth (%)

	2020	2021	2022	Growth 2021-2022
Austria	1,898	2,022	2,268	12.1%
Belgium	2,381	2,603	2,722	4.6%
Bulgaria	320	343	378	10.2%
Croatia	188	215	246	14.9%
Cyprus	178	192	199	3.7%
Czechia	641	671	676	0.6%
Denmark	1,992	2,146	2,394	11.6%
EEA (NO, LI, IS)	2,499	2,785	2,849	2.3%
Estonia	351	372	449	20.5%
Finland	1,599	1,685	2,157	28.0%
France	12,398	12,679	14,765	16.5%
Germany	19,748	20,632	23,978	16.2%
Greece	400	439	445	1.5%
Hungary	543	611	669	9.4%
Ireland	1,636	1,720	2,069	20.2%
Italy	6,999	7,715	8,025	4.0%
Latvia	213	248	278	12.0%
Lithuania	290	338	379	12.1%
Luxembourg	185	196	217	10.8%
Malta	70	73	76	4.3%
Netherlands	5,266	5,475	5,639	3.0%
Poland	2,463	2,622	2,919	11.4%
Portugal	1,155	1,244	1,256	1.0%
Romania	698	756	905	19.7%
Slovakia	231	250	256	2.4%
Slovenia	121	149	158	6.2%
Spain	5,233	5,764	6,022	4.5%
Sweden	3,851	4,127	4,446	7.7%
Switzerland	4,624	4,859	5,429	11.7%
United Kingdom	20,268	21,327	23,608	10.7%
EU27	71,050	75,287	83,992	11.6%
EEA	2,499	2,785	2,849	2.3%
Total All Countries	98,441	104,258	115,878	11.1%

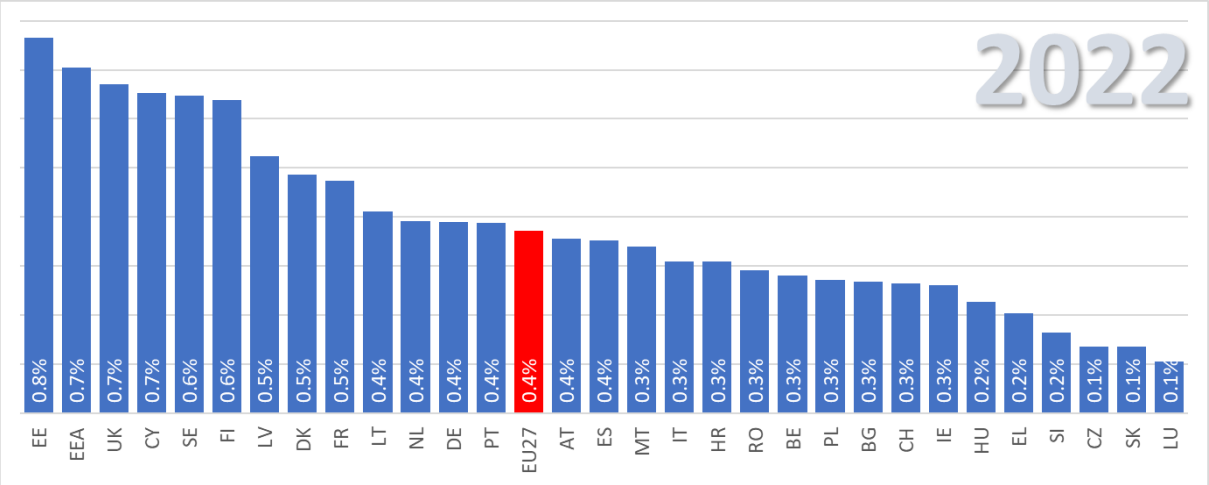
Figure 33 - Data revenues by Country 2020-2022, growth 2021-2022



5.4 Shares of All Companies' Revenues by Country

The **expansion of industries** included in company revenues means that the share of all companies' revenues is significantly lower than in the previous cycle of this study. The shares across the Member States are wide-ranging, as usual reflecting the core industries within each country. Those countries with a greater emphasis in their industries for data-intensive operations will have a stronger base of data supplier companies to support locally, and the larger countries are more likely to have an exporting culture outside the EU27 – so again will contribute to a larger share of all companies' revenues share. Figure 34 shows data companies' revenues as a share of all companies' revenues, sorted by size for 2022.

Figure 34 - Data Companies' Revenue Share 2022 - All Companies A, C, E, G, H, J, K, M, N, P, Q



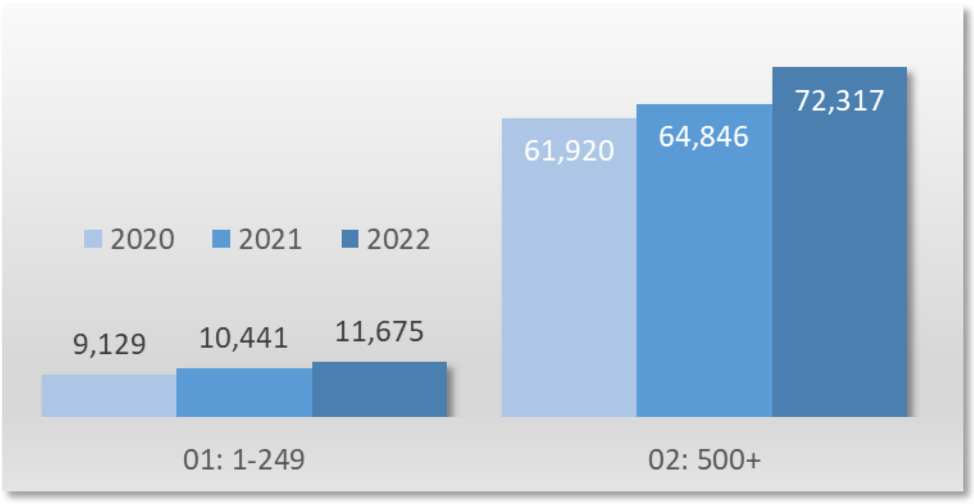
5.5 Data Companies' Revenues by Company Size

Countries' data revenues are associated with larger companies because these companies have a greater focus on using and monetizing their data and have a wider range of data to offer on the data market. Smaller organisations will not have the same range of data to offer and might not get the same value associated with data either because of their limited financial resources and organisational size: they have fewer clients, fewer products, and tend to have less data and data tools overall to monetise. . Table 48 and Figure 35 show data revenues by company size band and the significantly greater revenues associated with larger companies is clear – the opposite of the number of data supplier companies, which are almost exclusively smaller companies.

Table 48 - Data Companies' Revenues (€M) by Company Size Band 2020-2022 and growth 2021-2022

	2020	2021	2022	Growth 2021-2022
01: 1-249	9,129	10,441	11,675	11.8%
02: 500+	61,920	64,846	72,317	11.5%

Figure 35 - Data Companies' Revenues by Company Size Band 2020-2022



5.6 Data Companies Revenue Forecast

Data companies' revenues will continue to grow at a healthy rate as the market for data expands. This is still and emerging technology and will transform all businesses, but it will take time for the technology to filter down to the later adopters of using data to run and manage their companies. Table 49 shows data companies' revenues will reach €113Billion in 2025 for EU27 Member States, rising to €137Billion by 2030 (Baseline scenario). This is a compound growth of 3.9% over the 2025-2030 period, and accounts for the negative impact of the war in Ukraine but also a more optimistic forecast for the data market and hence data revenues due to the growing influence of artificial intelligence in all business processes.

Table 49 - Data Companies' Revenue Forecast 2025 and 2030 three scenarios (€M) and CAGR (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020–2025	CAGR 2025–2030, Challenge	CAGR 2025–2030, Baseline	CAGR 2025–2030, High Growth
EU27	113,389	119,624	137,149	168,386	8.5%	1.1%	3.9%	8.2%
EEA (NO, LI, IS) + CH	3,658	3,900	5,329	6,876	5.6%	1.3%	7.8%	13.5%
Total, all countries	153,294	169,957	196,650	238,040	8.0%	2.1%	5.1%	9.2%

Data Companies' Revenues by Country

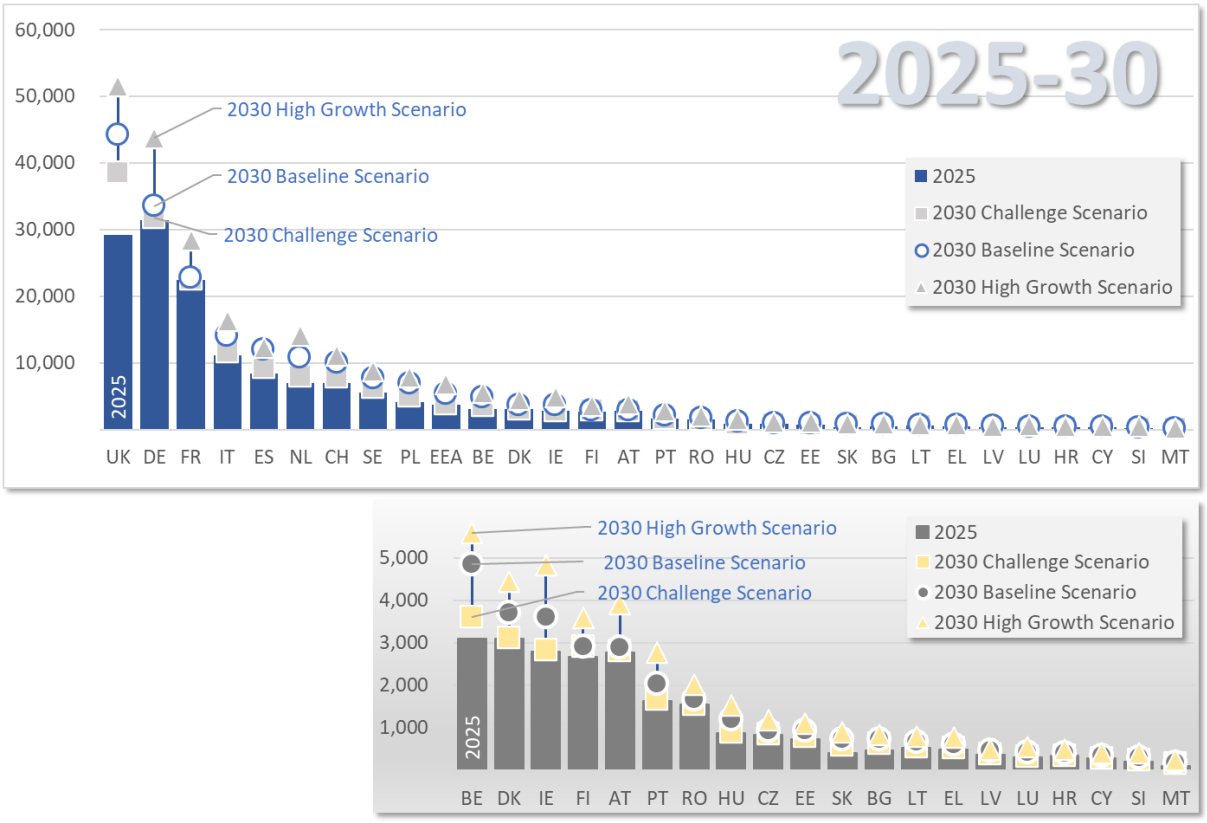
The table below presents our estimates of the data companies revenues forecast in 2025 and 2030 according to the three different scenarios under consideration. The revenues associated to data companies is clearly directly linked to the size of the number of data companies and the size of the data companies by country in a given period. To a lesser extent, the number of data professionals employed in data companies is also affecting the trend of data companies' revenues. As a result, Germany remains the country with the largest data revenues in 2025. Germany already has a strong data market with international vendors, so much of the market size has already been "discounted"

and the country will not get the same early growth as countries that are later adopters of data technologies. Based on the same premises, data companies' revenues are also particularly high in France, Italy, Spain, Sweden and Poland. Table 50 and Figure 36 present the data for all countries in this study

Table 50 - Data Companies Revenues forecast 2025 and 2030 three scenarios (€M) and CAGR (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
Austria	2,760	2,812	2,898	3,900	6.4%	0.4%	1.0%	7.2%
Belgium	3,092	3,612	4,850	5,577	3.5%	3.2%	9.4%	12.5%
Bulgaria	471	633	724	839	6.5%	6.1%	9.0%	12.2%
Croatia	344	348	391	475	9.9%	0.2%	2.6%	6.6%
Cyprus	275	278	344	402	7.5%	0.2%	4.6%	7.8%
Czechia	836	859	929	1,168	4.5%	0.5%	2.1%	6.9%
Denmark	3,089	3,107	3,705	4,437	7.6%	0.1%	3.7%	7.5%
EEA (NO, LI, IS)	3,658	3,900	5,329	6,876	5.6%	1.3%	7.8%	13.5%
Estonia	720	779	923	1,096	14.1%	1.6%	5.1%	8.8%
Finland	2,657	2,912	2,913	3,579	9.5%	1.8%	1.9%	6.1%
France	22,397	22,606	22,831	28,455	12.1%	0.2%	0.4%	4.9%
Germany	31,400	31,774	33,497	43,813	8.8%	0.2%	1.3%	6.9%
Greece	488	514	610	769	2.2%	1.0%	4.5%	9.5%
Hungary	874	882	1,194	1,513	7.4%	0.2%	6.4%	11.6%
Ireland	2,791	2,826	3,612	4,823	10.2%	0.2%	5.3%	11.6%
Italy	11,162	11,602	14,037	16,298	7.7%	0.8%	4.7%	7.9%
Latvia	364	371	464	490	8.0%	0.4%	5.0%	6.2%
Lithuania	528	542	662	780	9.4%	0.5%	4.6%	8.1%
Luxembourg	294	319	418	554	8.4%	1.7%	7.3%	13.6%
Malta	91	159	185	237	4.4%	11.8%	15.3%	21.2%
Netherlands	6,947	7,991	10,778	14,141	4.9%	2.8%	9.2%	15.3%
Poland	4,095	4,955	6,894	7,893	9.3%	3.9%	11.0%	14.0%
Portugal	1,633	1,664	2,027	2,763	5.6%	0.4%	4.4%	11.1%
Romania	1,546	1,553	1,671	2,008	15.4%	0.1%	1.6%	5.4%
Slovakia	394	590	727	886	9.5%	8.4%	13.0%	17.6%
Slovenia	190	233	302	408	5.0%	4.2%	9.8%	16.6%
Spain	8,368	9,354	11,939	12,251	7.7%	2.3%	7.4%	7.9%
Sweden	5,580	6,350	7,623	8,832	6.2%	2.6%	6.4%	9.6%
Switzerland	7,028	7,901	9,997	11,178	7.7%	2.4%	7.3%	9.7%
United Kingdom	29,220	38,532	44,175	51,601	6.5%	5.7%	8.6%	12.0%
EU27	113,389	119,624	137,149	168,386	8.5%	1.1%	3.9%	8.2%
EEA	3,658	3,900	5,329	6,876	5.6%	1.3%	7.8%	13.5%
Total All Countries	153,294	169,957	196,650	238,040	8.0%	2.1%	5.1%	9.2%

Figure 36 - Data Companies Revenue Forecast by Country 2025, 2030 three scenarios



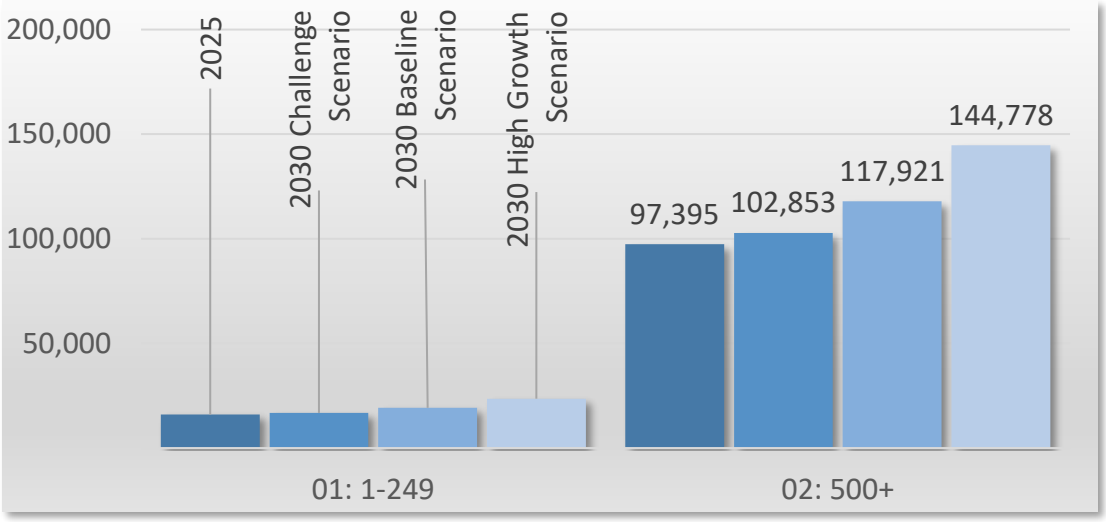
Data Companies' Revenues by Company Size

Data companies' revenues will remain higher for larger companies, with companies with 250 or more employees accounting for 86% of revenues in 2030 (Baseline). The table below shows the relative size of revenues by company size band for the three scenarios for 2030. The compound growth for both small and larger companies' revenues is similar over the forecast period.

Table 51 - Data Companies' Revenues, forecast by company size 2025 and 2030 three scenarios (000's) and CAGR (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
01: 1-249	15,993	16,771	19,228	23,608	8.9%	1.0%	3.8%	8.1%
02: 500+	97,395	102,853	117,921	144,778	8.5%	1.1%	3.9%	8.3%

Figure 37 - Data Companies Revenue Forecast by Size Band 2025 and 2030 - three scenarios



5.6 Key Findings

KEY HIGHLIGHT FOR THE EU27 Data Companies' revenues have reached nearly €84 Billion among Member States by 2022, nearly €116 Billion across the whole of Europe.
Data Companies' revenue increased in this forecast, and **by 2030 (Baseline scenario) data companies' revenues will be 11% higher than previously forecast**. This is mostly due to the increased revenue associated with artificial intelligence systems, which is growing faster than expected in the prior forecast. The mix of AI revenues changed, with more focus on machine learning and the tools associated with AI machine learning.
Data Companies' revenues account for 0.4% of all EU27 companies' revenues in 2021, up from 0.3% in 2020 – demonstrating the growing importance of the data economy in the overall EU economy.
Larger companies show a larger share of total revenues, accounting for 86% of all companies' revenues in 2022. This share remains constant out to 2030 (Baseline). While large companies (with greater than 250 employees) account for only 2% of all companies in the EU, their revenues are significantly higher than small and medium companies as they are more able to invest in the tools, technologies, and people needed to grow data market revenues.
Data Revenues differ from the data market – as data revenues reflect the global income for data companies based in the European Union, whereas the data market includes data revenues taken in Europe by all companies, irrespective of whether they are headquartered in the European Union or not. These two track each other as the data market is a global market, and the imports and exports of data tools, hardware, and services, and data are expected to track each other over the duration of this forecast.

6. The Data Market

6.1 Definition

*The **data market** is the marketplace where digital data is exchanged as "products" and "services" because of the elaboration of raw data.*

The data market captures the aggregate value of the demand of digital data without measuring the direct, indirect, and induced impacts of data in the economy. Further, the data market represents a wider concept than the market of big data & analytics (BDA), as it includes not only the value generated by pure data players developing BDA technologies, but also the value created by data-related research, businesses, information, and IT services. The digital data exchanged as "products" and "services" in the data market refers exclusively to data that is collected, processed, stored, and transmitted over digital information infrastructures and/or elaborated with digital technologies. This definition includes multimedia objects that are collected, stored, processed, elaborated, and delivered for exploitation through digital technologies (for example, image databases). The value of the Data market is not exactly equal to the aggregated revenues of the European data companies because it includes imports (data products and services bought on the global digital market from suppliers not based in Europe) and excludes the exports of the European data companies.

In this report, we added to the data market an estimate for the value of data monetisation. In previous cycles, we were not able to estimate this market because the data to enable us to complete this estimate was sparse and unreliable. In our latest survey, we asked the respondents about data monetisation, as well as conducting informal research among data companies, resulting in an initial estimate for the size of data monetisation, which is reported here for the first time.

6.2 Measuring the Data Market

Table 52 - The Data Market - Main data sources

Data Source	Updated
Eurostat chain linked Volumes (GDP)	Apr 2022
IDC Core IT Spending guide 2H2022	Sep 2022
IDC Worldwide Black Book (standard edition)	Sep 2022
IMF World Economic Outlook (Apr 2022)	Apr 2022
IT Big Data and Analytics spending Guide 2H2022	Aug 2022

Table 53 gives an overview of the latest estimates for the value and growth of the data market. The EU27 market is expected to grow by 4.9% in 2022 to a value of €72,963 million, up from €64,820 in 2021.

The market is moderated a little in 2021 due to the remnants of the Covid influence, but this is offset by a more optimistic market and outlook due to greater adoption of data technologies such as artificial intelligence, which is rapidly becoming endemic in a wide range of data software, client interaction tools and business management tools. The war in Ukraine also impacted the growth in the market but this was hidden by the greater growth experienced in the take up of data software and tools.

Table 53 - Value and Growth of the Data Market: 2020-2022 Revenue (€ M) and 2021-2022 growth (%)

N.	Market	Name	Description	2020	2021	2022	Growth 2021-2022
4.1	EU27	Value of the Data Market	Estimate of the overall value of the Data Market	60,635	64,820	72,963	12.6%

6.3 Measuring the Value of Data

This report builds on the First Report on Facts and Figures (D2.1) produced 12 months ago and again includes the value of data monetisation in the European data market. This is the value assigned to the sale and purchase of data within the Member States. Measurement of the size of data monetisation is preliminary because of poor understanding of what constitutes data monetisation, a degree of secrecy regarding which data is bought and sold, and what constitutes revenue associated with the sale of data.

We estimate the value of data monetisation at €14.8 billion in 2021, rising to €18.9 billion in 2022 across the Member States. Table 54 summarises the value of data monetisation among the Member States from 2020-2022.

Channels for data monetisation are limited because of the proprietary nature of the data. Companies are unlikely to sell internal data about the running of their company and this is also unlikely to be of interest to other vendors. Data available on open markets tends to be mobility and location data, or activity data from individuals. Data vendors showed some success in the past in selling retail data (64% of respondents to the survey associated with this report reported this), customer activity data (51% of respondents), and personal data that was anonymised and aggregated (25% of respondents).

Table 54 - Data Market Monetization for the Member States 2020-2022 (€ M) and 2021-2022 growth (%)

N.	Market	Name	Description	2020	2021	2022	Growth 2021-2022
4.1	EU27	Data Monetisation value	Estimate of the overall value of Data Monetisation	11,611	14,759	18,940	28.3%

6.4 Data Market by Country

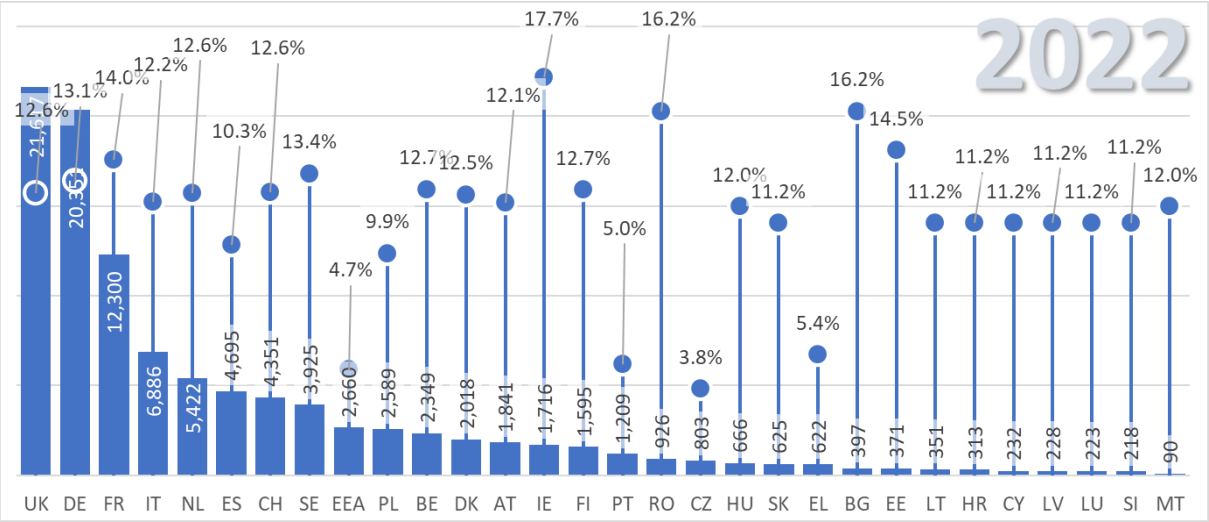
Those countries with a strong presence of industries tied to services are the ones which are more likely to benefit from a growing data market. These key industries are banking and finance, retail, manufacturing, and professional services, which have a large data component to their efficient running and implementation.

Among Member States (as shown in Table 55 and Figure 38), Germany displays the largest share of the Data Market in 2022 at more than 50% bigger than the next largest Member State – France. Growth 2021 to 2022 in the top five Member States – Germany, France, Italy, Netherlands, Spain – is above average with the exception of Italy and Spain, and the top five Member States account for more than 68% of the data market among the EU27. The relative sizes of the economies of the top five contribute notably to the size of their data markets, but in addition these economies have a background in the key data industries – enabling above average growth in their data markets.
Most other countries will exhibit significant growth in 2022 as the region recovers from the economic impacts of Covid, albeit moderated by the negative effects of the war in Ukraine.

Table 55 - European Data Market by Country 2020-2022 Revenue (€ M) and 2021-2022 growth (%)

Member State	2020	2021	2022	Growth 2021-2022
Austria	1,547	1,641	1,841	12.1%
Belgium	1,984	2,083	2,349	12.7%
Bulgaria	312	342	397	16.2%
Croatia	254	281	313	11.2%
Cyprus	189	209	232	11.2%
Czechia	739	773	803	3.8%
Denmark	1,666	1,793	2,018	12.5%
Estonia	291	324	371	14.5%
Finland	1,311	1,415	1,595	12.7%
France	9,986	10,785	12,300	14.0%
Germany	16,966	17,993	20,351	13.1%
Greece	535	591	622	5.4%
Hungary	549	595	666	12.0%
Ireland	1,397	1,458	1,716	17.7%
Italy	5,764	6,139	6,886	12.2%
Latvia	185	205	228	11.2%
Lithuania	286	316	351	11.2%
Luxembourg	181	200	223	11.2%
Malta	74	81	90	12.0%
Netherlands	4,514	4,815	5,422	12.6%
Poland	2,179	2,356	2,589	9.9%
Portugal	1,069	1,152	1,209	5.0%
Romania	719	797	926	16.2%
Slovakia	508	562	625	11.2%
Slovenia	178	196	218	11.2%
Spain	4,053	4,257	4,695	10.3%
Sweden	3,199	3,460	3,925	13.4%
Switzerland	3,648	3,864	4,351	12.6%
United Kingdom	17,845	19,204	21,617	12.6%
EEA (NO, LI, IS)	2,249	2,541	2,660	4.7%
EU27	60,635	64,820	72,963	12.6%
EEA	2,249	2,541	2,660	4.7%
Total All Countries	80,728	86,564	97,240	12.3%

Figure 38 - European Data Market 2020 Revenue (€M) and 2021-2022 growth (%)



6.5 Data Market by Industry

Growth is evenly balanced across the industries except for Public Administration and Construction. Public Administration shows higher growth due to government investments in data solutions for improved efficiencies, while the high growth in construction is more an artifact of the relatively small size of the industry. Table 56 and Figure 39 show the size and growth of the industries for the EU27 Member States.

While Finance is the largest industry for data, it does not make the largest contribution to overall growth. That honour goes to Public Administration, which, due to a combination of size and growth, adds more to the market than finance and manufacturing. Figure 40 shows the contribution to short term growth made by each of the industries. Although Finance and Manufacturing stand out as having a larger share of the data market, the remaining industries are more evenly balanced in their contribution to the data market among the Member States.

Table 56 - Data Market by Industry 2020-2022 and 2021-2022 growth (%)

	2020	2021	2022	Growth 2021-2022
Agriculture	242	248	253	2.4%
Construction	256	285	384	34.9%
Education	1,614	1,640	1,708	4.2%
Finance	12,782	13,705	15,476	12.9%
Health	1,943	2,108	2,357	11.8%
Information & Communication	6,446	6,826	7,654	12.1%
Mining, Manufacturing	12,240	13,218	15,088	14.1%
Professional services	7,326	7,542	7,970	5.7%
Public Administration	4,307	5,244	7,441	41.9%
Retail and Wholesale	6,507	6,858	7,388	7.7%
Transport	2,632	2,706	2,881	6.4%
Utilities	2,610	2,763	3,103	12.3%
Home	1,730	1,675	1,259	-24.8%
EU27	60,635	64,820	72,963	12.6%

Figure 39 - Data Market by Industry 2020-2022 and 2021-2022 Growth (%)

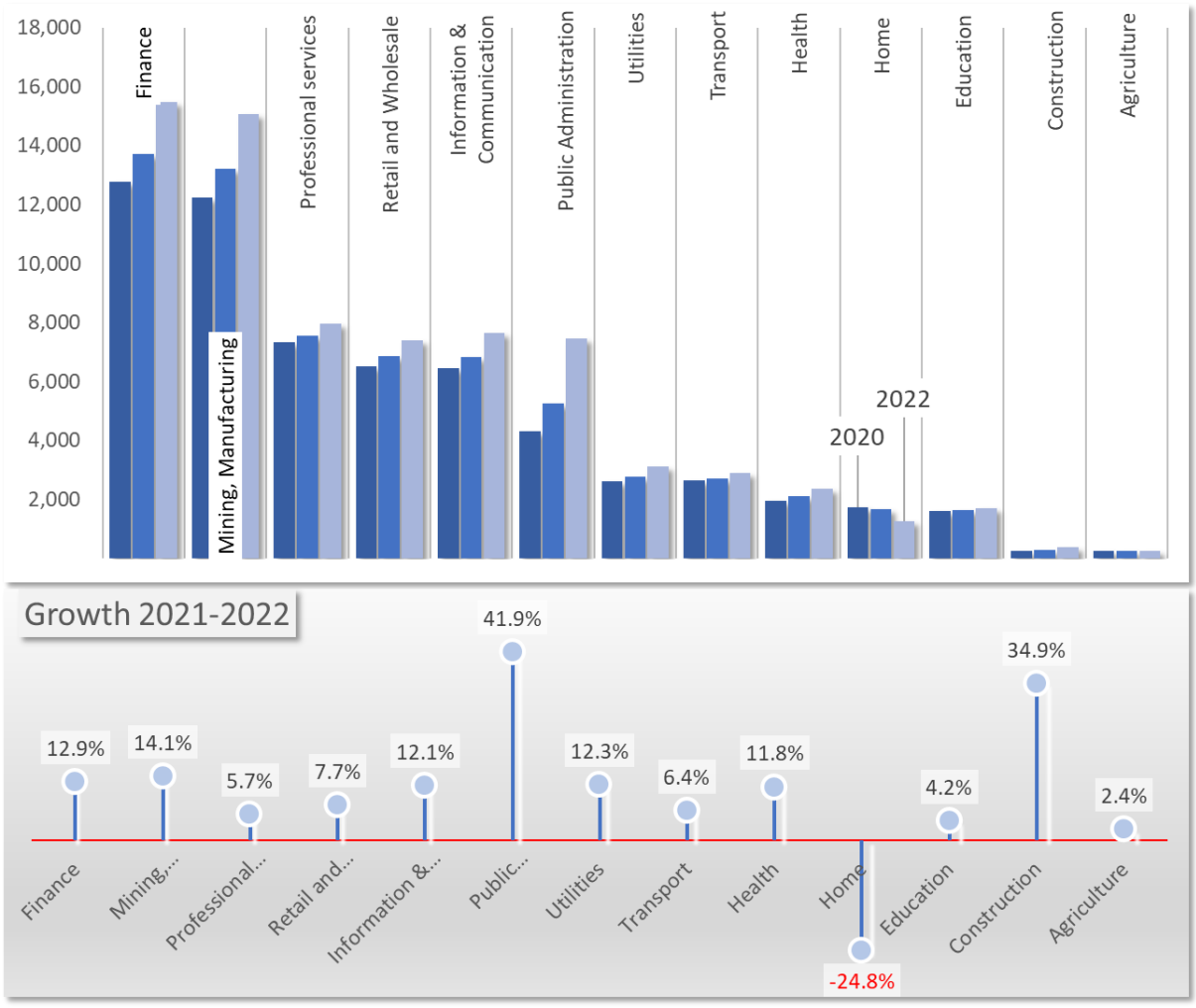
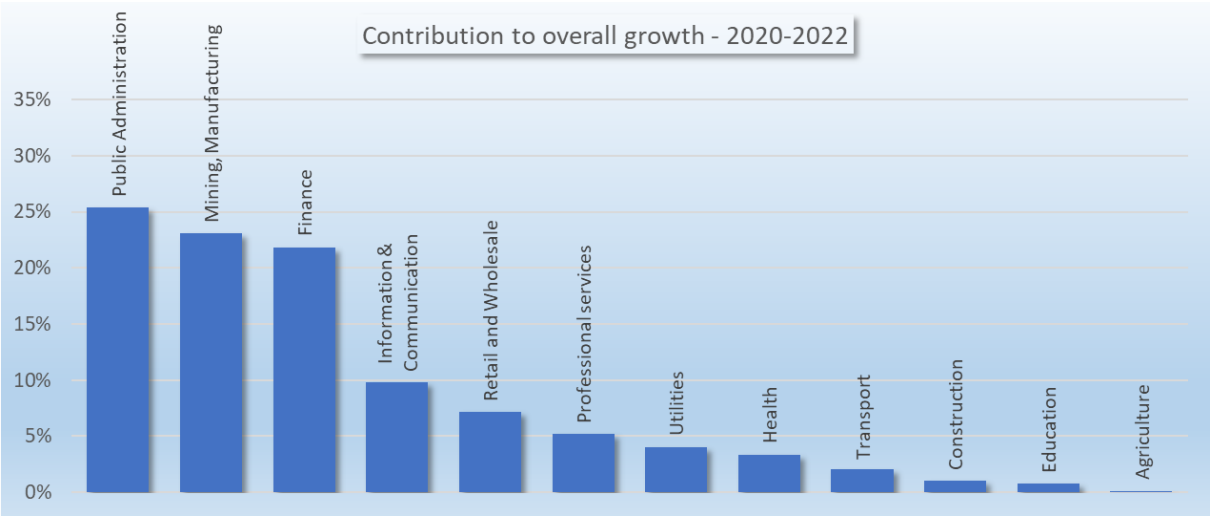


Figure 40 - Industry contribution to overall growth 2020-2022 (%)



6.6 Data Monetisation

Data monetisation is an emerging and somewhat hidden part of the data market, which involves the sale of data between organisations rather than the sale of data software, hardware, or services. Many organisations have a wealth of data and have recently discovered there is a market for this. Typically, this includes location data – giving information about where goods or people are located in space and time, purchase data – what people buy, equipment performance data – information about the how equipment is performing and indication of when equipment is operating out of tolerance. Other data types include customer activity data and personal data, but the need to comply with GDPR in the EU means much of this data needs to be processed to be further aggregated and or anonymised. ì

Information about the size of the market for data monetization is limited and of poor quality so until now estimating the size and potential for this market has been difficult, with widely varying estimates of the market size. This study uses survey responses to estimate the provisional size of data monetization, asking respondents about their use of data markets to buy and sell data, and the type of data sold. While this data is relatively weak (due to the newness of the market and the lack of clarity among respondents of what constitutes data sale and purchase) this is used to guide a simple penetration model, through a share of the total data market to estimate data monetization. As more reliable data becomes available this model will be refined to reflect better the supply and demand for data among the different countries and industries.

We estimate data monetization will account for up to 35% of additional spending by 2030 – approximately €39 Billion. Data monetization is developing slowly as organizations learn what they have and the value of it, together with how to monetize this data. Figure 41 shows the expected contribution that monetization will make to the data market out to 2030, including the three scenarios for 2030. Table 57 and Figure 42 show the estimated revenues associated with data monetization for 2020-2022, and the size monetization by country matches closely that of the size of the data market. Unsurprising as organisations need a data market to source data to monetise. Data monetization shows strong growth among the Member States with 2022 expected to grow by close to 30% over 2021.

Key areas where companies spend on data sale and purchase are retail data, customer activity data, and personal data., which – in this case – need to be carefully aggregated and anonymised in compliance with the GDPR. Location data accounts for only 11% of total data monetisation, and streaming data for even less, at 3.6%. Mobility and location data was significant in the past, but the easy availability of this undervalues the data significantly.

Table 57 – Data Monetization by country 2020-2022 and 2021-2022 growth (%)

	2020	2021	2022	Growth 2021-2022
Austria	333	383	468	22.3%
Belgium	218	275	401	45.8%
Bulgaria	29	38	55	46.7%
Croatia	34	41	55	34.0%
Cyprus	12	15	19	26.5%
Czechia	80	107	128	19.9%
Denmark	349	444	563	27.0%
Estonia	67	88	110	24.9%
Finland	162	221	258	16.7%
France	2,104	2,748	3,401	23.7%
Germany	3,857	4,814	6,327	31.4%
Greece	47	62	66	8.0%
Hungary	50	61	75	22.3%
Ireland	252	311	409	31.2%
Italy	1,295	1,638	2,188	33.5%
Latvia	18	24	34	46.2%
Lithuania	29	37	58	56.5%
Luxembourg	19	26	40	53.0%
Malta	6	7	7	7.1%
Netherlands	902	1,156	1,421	22.9%
Poland	223	300	419	39.8%
Portugal	165	194	251	29.6%
Romania	70	93	130	39.4%
Slovakia	44	56	91	61.7%
Slovenia	18	22	26	18.1%
Spain	740	918	993	8.1%
Sweden	491	678	944	39.2%
Switzerland	551	643	900	40.1%
United Kingdom	4,228	5,169	6,598	27.6%
EEA (NO, LI, IS)	223	334	376	12.7%
EU27	11,611	14,759	18,940	28.3%
EEA	223	334	376	12.7%
Total All Countries	16,061	20,261	25,914	27.9%

Figure 41 – Data Monetisation share of the European Data Market 2013-3030 (Three Scenarios) (%)

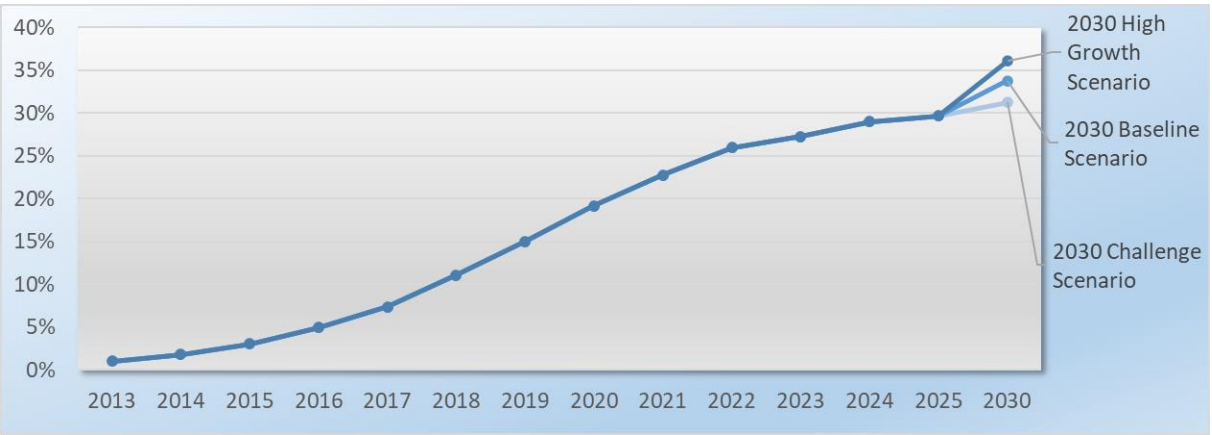
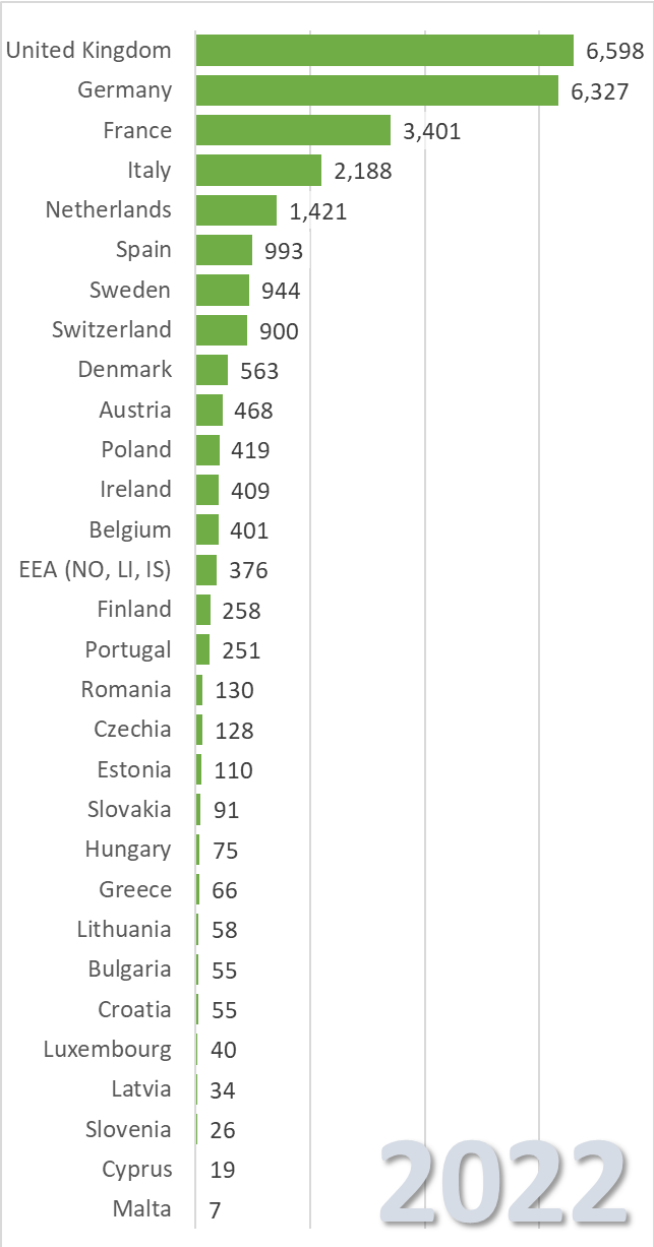
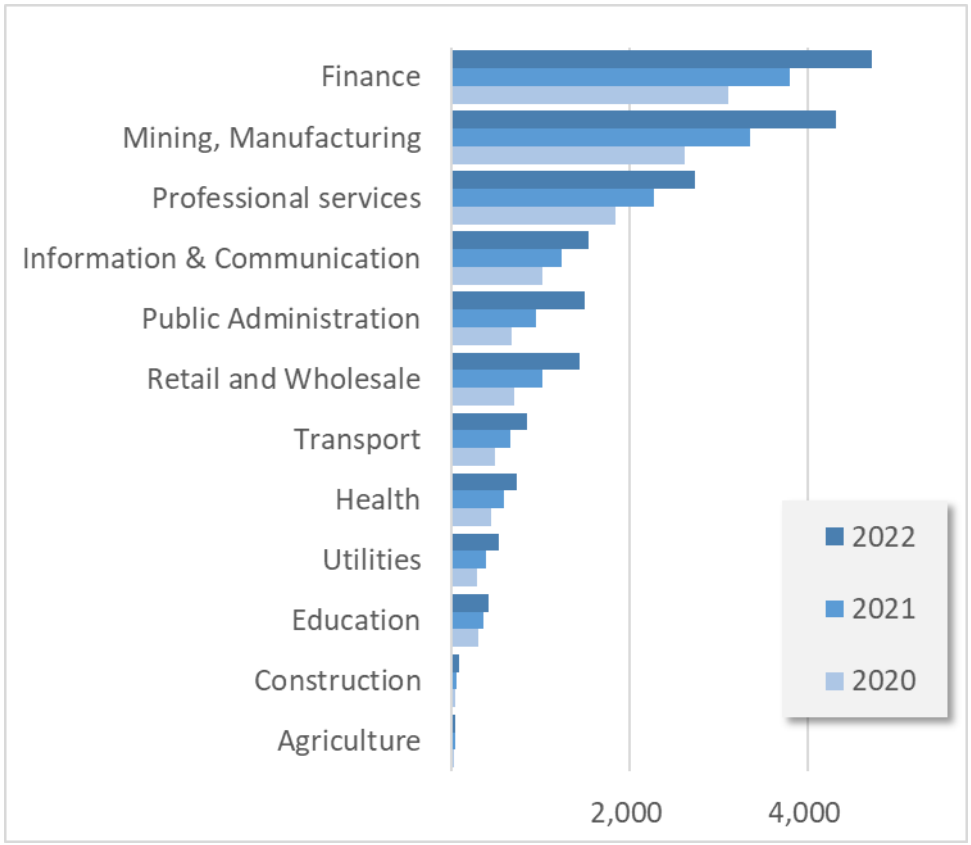


Figure 42 – Data Monetisation by Country 2022 (€M)



Industries with a strong presence in the data market are more likely to show notable data monetization revenues. These industries usually have in place the tools and processes to gather and use data, so it is a smaller step to package this data into a suitable format for sale. This market is still limited though because the channels and markets for the sale of data are still in their infancy. The industries best set to exploit data monetization are Finance, Manufacturing, and Professional Services – as seen in Figure 43.

Figure 43 – Data Monetization by Industry 2020-2022 (€ M)



6.7 Forecasting the Data Market

The forecast for the data market to 2025 and the three scenarios for 2030 is summarised in Table 58. The data market will grow to €116 Billion in 2030 (Baseline), representing a compound growth of 3.4% over the period 2025 to 2030. While the EU27 will grow by 3.4% compound, growth in the EEA (No, LI, IS) is higher at 5.4%.

Table 58 – Data Market Forecast 2025, 2030 three scenarios (€M) and compound growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR: 2020–2025	CAGR: 2025–2030, Challenge	CAGR: 2025–2030, Baseline	CAGR: 2025–2030, High Growth
EU27	98,484	101,564	116,462	137,591	8.7%	0.6%	3.4%	6.9%
EEA (NO, LI, IS) + CH	3,675	3,771	4,784	6,261	7.7%	0.5%	5.4%	11.2%
Total, All Countries	131,601	135,980	153,557	180,306	8.7%	0.7%	3.1%	6.5%

The Data Market Forecast by Country

The Data Market of EU27 will reach €116 Billion by 2030 according to the latest forecast of the Baseline scenario. Germany is the largest data market among the Member States and by 2030 it will represent 25% of the EU27 data market. Germany's industries are data oriented (manufacturing, finance, Information and communication) so present strong demand for data, data tools and data technology. However, Germany will grow below the average for EU27 Member States but will still represent a quarter of the EU27 data market. The country's earlier adoption of data technologies – because of its data-oriented industries – give less scope for growth as much of the high growth has already taken place in the country. Table 59 shows Germany and all the other European countries' outlook for 2025 and 2030 three scenarios.

Of the Member States, the top five (Germany, France, Italy, The Netherlands, Spain) represent nearly two-thirds of the data market for the EU27, but of these only the Netherlands and Spain grow above average. Figure 44 shows the relative size of all the countries and their rank.

The European data market will grow by €21.9Billion between 2025 and 2030 (Baseline), and Figure 45 shows how the top 10 countries that contribute to this growth. In general, the largest countries make the biggest contribution to growth, but while France is the third large in terms of data market size, it is a low-growth country thus contributing less to the overall growth of the market and falls to seventh among the contributors to growth.

Table 59 – European Data Market forecast by country 2025, 2030 three scenarios and compoiund growth (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
Austria	2,395	2,503	2,661	3,061	7.9%	0.9%	2.1%	5.0%
Belgium	3,358	3,623	4,522	5,223	10.0%	1.5%	6.1%	9.2%
Bulgaria	627	659	807	935	12.9%	1.0%	5.2%	8.3%
Croatia	427	435	538	614	8.7%	0.4%	4.7%	7.5%
Cyprus	317	362	416	435	8.7%	2.7%	5.6%	6.6%
Czechia	914	1,005	1,041	1,305	3.4%	1.9%	2.6%	7.4%
Denmark	2,671	2,678	3,134	3,732	8.3%	0.1%	3.3%	6.9%
Estonia	599	606	719	975	13.1%	0.2%	3.7%	10.2%
Finland	2,126	2,133	2,241	2,865	8.5%	0.1%	1.1%	6.2%
France	17,570	17,800	18,945	22,447	10.3%	0.3%	1.5%	5.0%
Germany	26,202	26,701	28,993	34,822	7.8%	0.4%	2.0%	5.9%
Greece	782	789	971	1,122	5.8%	0.2%	4.4%	7.5%
Hungary	872	955	1,175	1,488	7.9%	1.8%	6.1%	11.3%
Ireland	2,307	2,759	3,113	3,837	9.6%	3.6%	6.2%	10.7%
Italy	9,356	9,487	10,721	11,996	8.8%	0.3%	2.8%	5.1%
Latvia	311	318	398	421	8.7%	0.4%	5.1%	6.3%
Lithuania	479	480	617	681	8.7%	0.0%	5.2%	7.3%
Luxembourg	304	334	396	489	8.7%	1.9%	5.5%	10.0%
Malta	118	145	169	218	7.9%	4.3%	7.4%	13.0%
Netherlands	7,332	7,495	9,291	10,884	8.8%	0.4%	4.8%	8.2%
Poland	3,494	3,725	5,166	6,136	8.2%	1.3%	8.1%	11.9%
Portugal	1,500	1,518	1,859	2,219	5.4%	0.2%	4.4%	8.2%
Romania	1,453	1,488	1,664	1,899	12.8%	0.5%	2.8%	5.5%
Slovakia	852	1,003	1,191	1,469	8.7%	3.3%	6.9%	11.5%
Slovenia	298	301	414	459	8.7%	0.2%	6.8%	9.0%
Spain	6,482	6,880	8,312	9,478	8.8%	1.2%	5.1%	7.9%
Sweden	5,338	5,379	6,989	8,378	9.1%	0.2%	5.5%	9.4%
Switzerland	5,885	5,902	7,006	8,011	8.8%	0.1%	3.5%	6.4%
United Kingdom	29,442	30,645	32,312	36,455	8.9%	0.8%	1.9%	4.4%
EEA (NO, LI, IS)	3,675	3,771	4,784	6,261	7.7%	0.5%	5.4%	11.2%
EU27	98,484	101,564	116,462	137,591	8.7%	0.6%	3.4%	6.9%
EEA	3,675	3,771	4,784	6,261	7.7%	0.5%	5.4%	11.2%
Total All Countries	131,601	135,980	153,557	180,306	8.7%	0.7%	3.1%	6.5%

Figure 44 – European Data Market Forecast by Country 2025, 2030 three scenarios (€M)

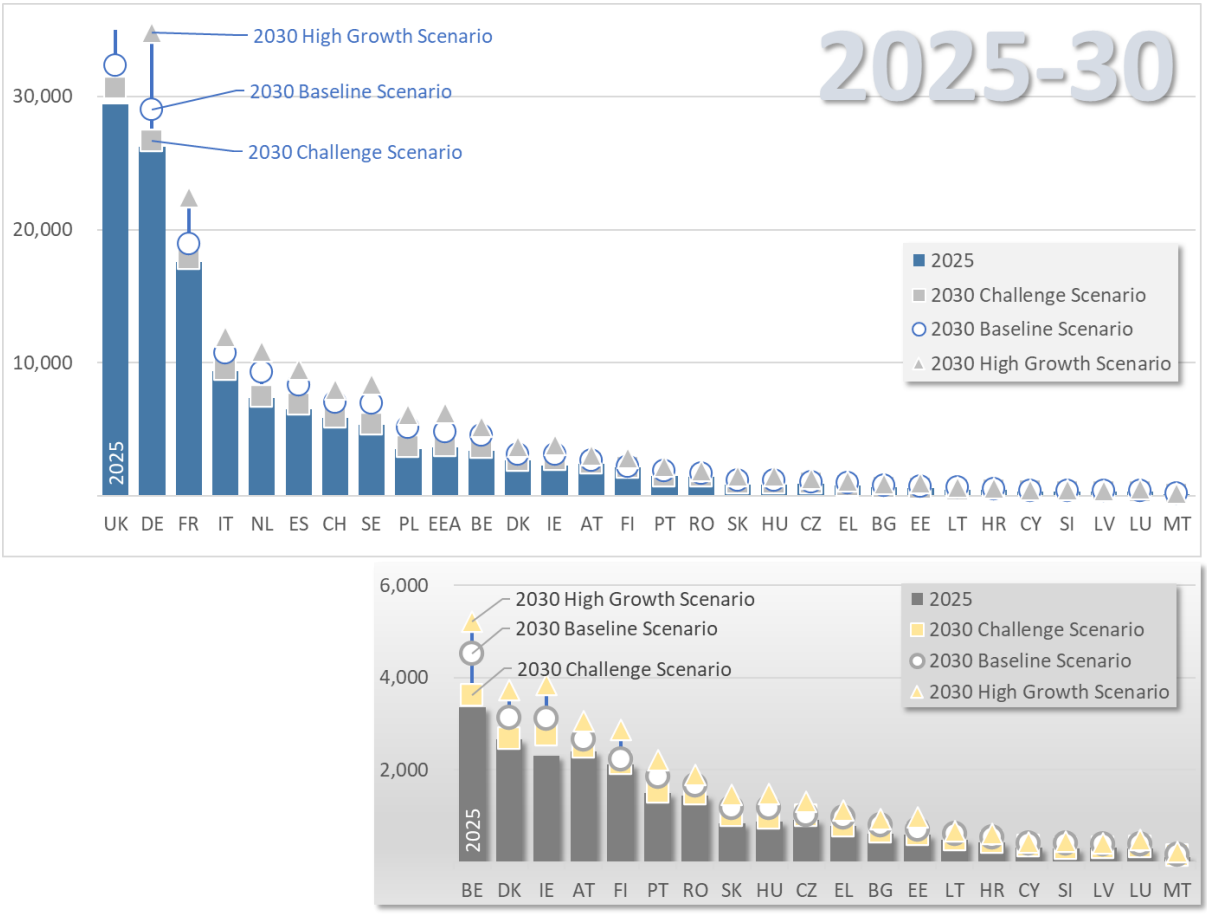
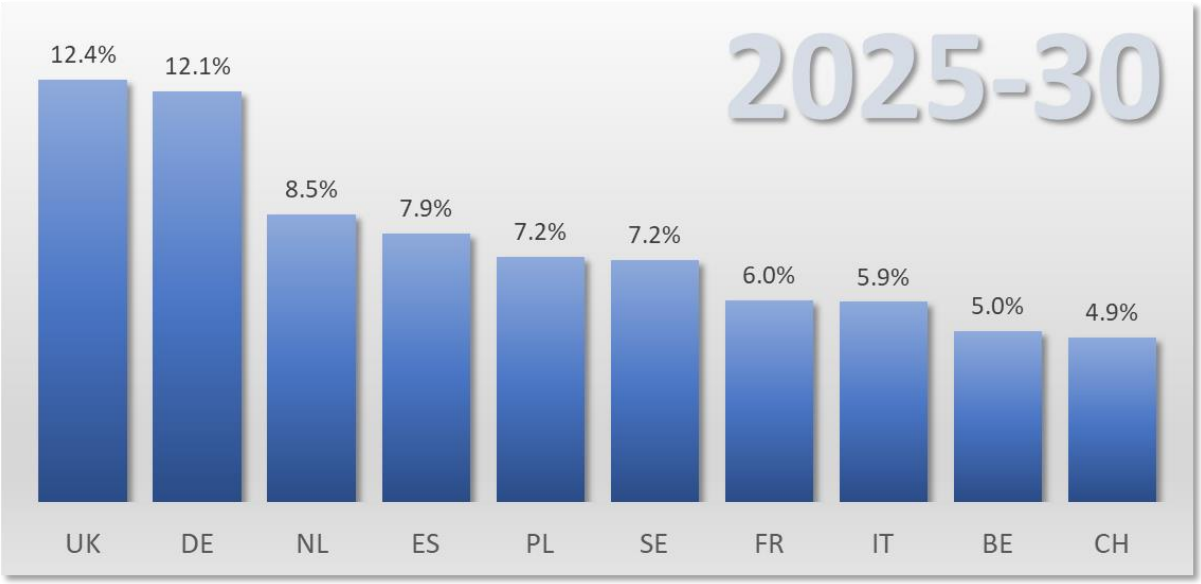


Figure 45 – Contribution to overall growth by Country 2025-2030 – top 10 contributors



The Data Market by Industry

The top four industries account for two-thirds of the data market by 2030 (Baseline) – which is down by about a percentage point in 2025. The leading industries are the usual suspects: Finance,

Manufacturing, Information and Communication, and Professional Services, with retail taking fifth place. As is true in all other measures, these industries have a high propensity to supply and use data as a functional part of their business, so have a higher demand for data tools and data. Table 60 and Figure 46 show the details for the data market by industry for 2025 and the three scenarios for 2030. The data market accounts for 12% of ICT spending across the Member States, with some variation by Member State, as shown in Figure 47. One notable exception is Estonia, in which the data market accounts for nearly 40% of its IT spending. Estonia is a very data literate country and embraced the digital lifestyle and economy earlier than other Member States, and has hence a more advanced digital economy.

Combining share and growth to measure each industry's long term contribution to growth from 2020 to 2030 (Baseline) (in Figure 48) shows that while Finance might be the largest industry by 2030, it is manufacturing that adds the most to the market growth of €55.8 Billion during this period, followed by Public Administration, and Finance is only third in terms of long term contribution to growth in the market. The top four industries account for nearly three-quarters of the growth seen in the data market between 2020 and 2030.

Table 60 – European Data Market by Industry 2025, 2030 three scenarios (€M) and CAGR (%)

	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2020-2025	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
Agriculture	274	309	346	403	2.1%	2.4%	4.7%	8.0%
Construction	707	713	774	890	19.9%	0.2%	1.8%	4.7%
Education	1,914	2,033	2,393	2,803	3.1%	1.2%	4.6%	7.9%
Finance	20,606	21,439	24,405	28,882	8.5%	0.8%	3.4%	7.0%
Health	3,046	3,236	3,641	4,327	7.6%	1.2%	3.6%	7.3%
Information & Communication	9,977	10,043	11,894	14,685	7.9%	0.1%	3.6%	8.0%
Mining, Manufacturing	20,550	20,590	24,140	27,563	9.2%	0.0%	3.3%	6.0%
Professional services	9,495	10,214	11,504	14,299	4.7%	1.5%	3.9%	8.5%
Public Administration	14,442	15,017	16,153	18,597	22.5%	0.8%	2.3%	5.2%
Retail and Wholesale	9,068	9,456	11,020	13,212	5.7%	0.8%	4.0%	7.8%
Transport	3,310	3,358	4,110	4,801	4.1%	0.3%	4.4%	7.7%
Utilities	4,064	4,098	4,838	5,651	8.0%	0.2%	3.5%	6.8%
Home	1,030	1,059	1,243	1,478	-9.3%	0.6%	3.8%	7.5%

Figure 46 – European Data Market Forecast by Industry 2025, 2030 three scenarios (€M)

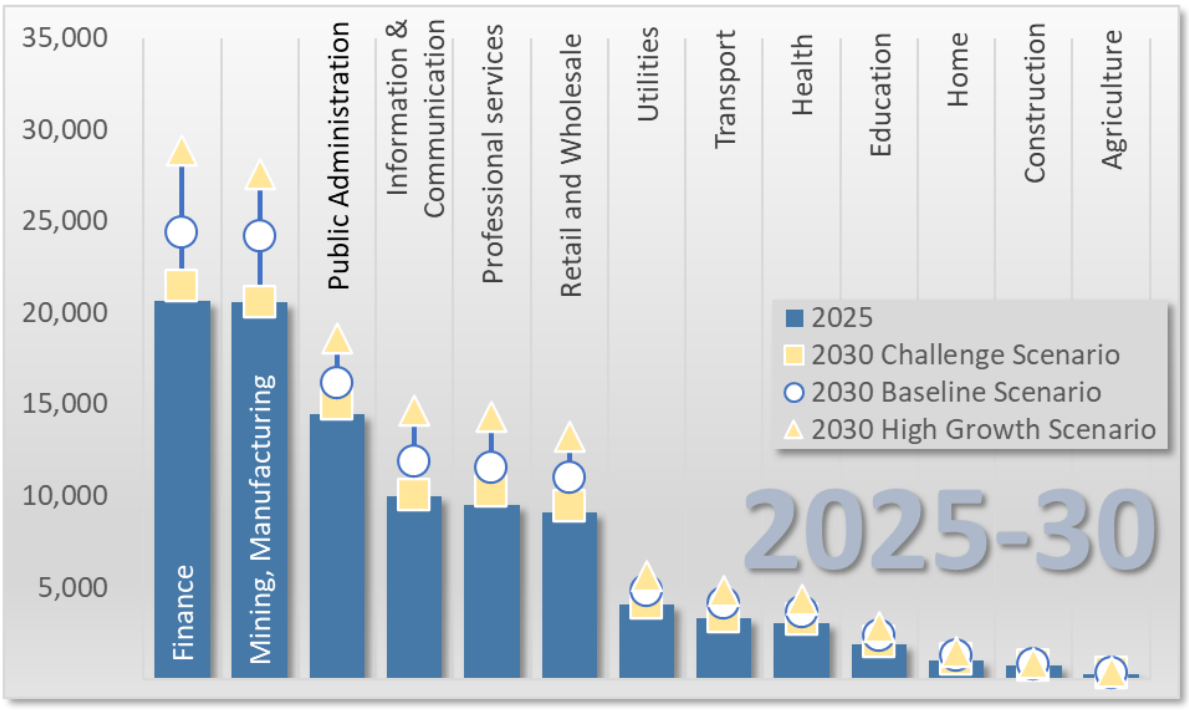


Figure 47 – Data Market Share of Total ICT Spending by Country 2020-2022 (%)

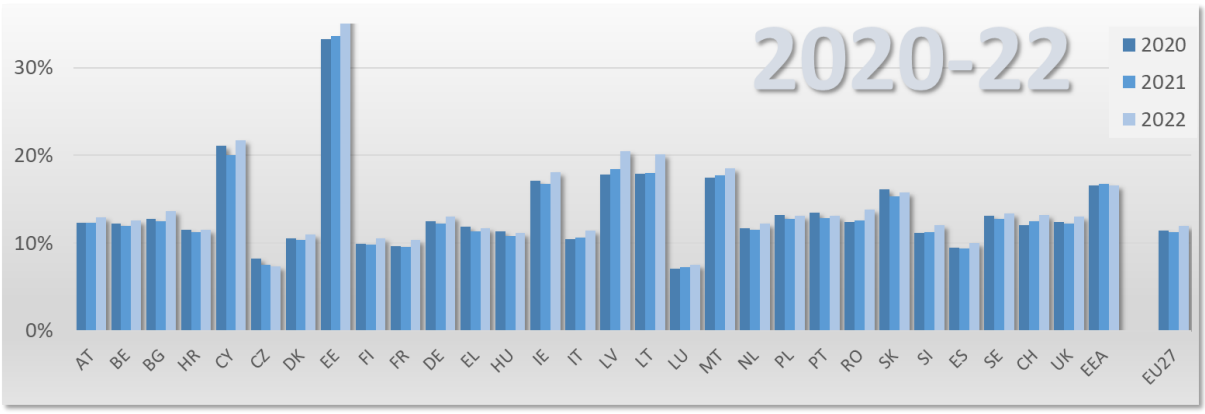
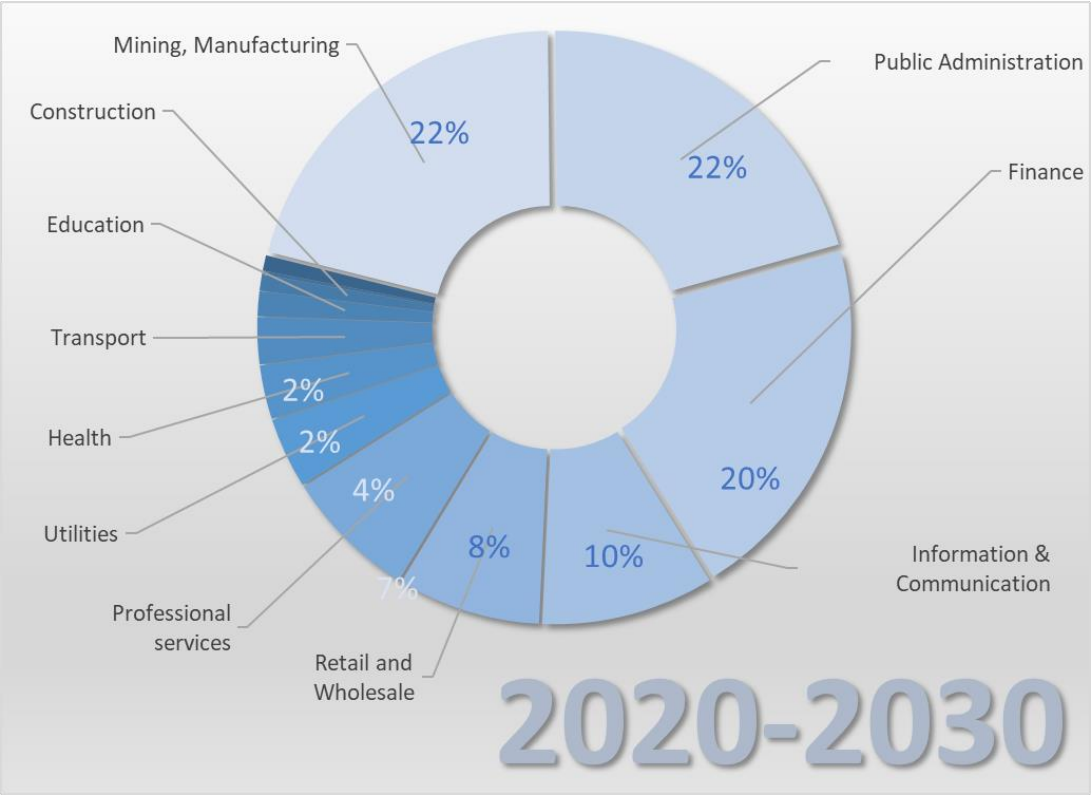


Figure 48 – Industry Contribution to overall growth 2020-2030 (%)



6.8 Key Findings

KEY HIGHLIGHT FOR THE EU27
The value of the data market in the EU27 reached €73Billion by 2022, a growth of 12.6% over 2021. The data market is growing strongly, ahead of ICT spending, which grew by 5.8% over the same period. By 2022 spending in the Data Market among the EU27 Member States accounted for 12.0% of ICT spending., rising from 11.3% in 2021.
The growth of the data market is driven by demand in the services industries: primarily from Finance, Manufacturing, Public Administration, Information and communications, professional services, and retail and wholesale. **The top four of these account for 80% of the growth seen in the data market between 2020 and 2022**, and the top 5 account for 81% of the growth between 2020 and 2030 (Baseline)
The size of the data market by Member State correlated well with the economic strength of each Member State, with the larger shares going to Germany, France, Italy, the Netherlands, and Spain. These five account for nearly two-thirds of the data market in 2030 (Baseline)
In terms of total Data Market spending added between 2025 and 2030 (Baseline), **Germany adds the most out of the Member States at 12.1%**, followed by the Netherlands and Spain. France – the second largest Member State – is only fourth in terms of the spending it adds to the data market over this period. Although one of the largest, growth in France is lower than the EU27 average, reflecting the less intense focus of the country on service industries – the biggest users of data.
Data Monetisation adds to data market spending, although it is included separately in this report. **Monetisation grew by 28.3% in 2022 over 2021**, significantly faster than the data market itself, to €189Billion. **This is expected to reach 39.3Billion by 2030 (Baseline)** at a compound rate of 6.1% per year from 2025.

7. The Data Economy

7.1 Measuring the Data Economy: Definitions

The **data economy** measures the overall impact of the data market on the economy as a whole. It involves the generation, collection, storage, processing, distribution, analysis, elaboration, delivery, and exploitation of data enabled by digital technologies.

The data economy captures a wider concept than the data market only, as it considers the value and wealth generated in the economy as a whole (not just across businesses) by the exploitation of data. The data market captures the value of the market in which data-driven products and services (apps, IoT-based products, and all sorts of services relying on heavy use of data) are exchanged. It captures the aggregate value of the demand of digital data. It includes not only the value generated by pure data players developing BDA technologies, but also the value created by data-related research, businesses, information, and IT services. The digital data exchanged as "products" and "services" in the data market refers exclusively to data that is collected, processed, stored, and transmitted over digital information infrastructures and/or elaborated with digital technologies.
The data economy includes three sets of impacts on the economy: data companies' revenues in the form of direct impacts on the economy, indirect impacts (backward and forward) on the economy, and the induced impacts of the data market on the economy.

1. The **direct impacts** are the initial and immediate effects generated by the data supplier companies. The quantitative direct impacts will then be measured as the revenues from data products and services sold, i.e. the value of the data companies' revenues.
2. The **indirect impacts** are the economic activities generated along a company's supply chain by data supplier companies, considering input providers as well as customers of data supplier companies. And, for this reason, there are two different types of indirect impact: backward indirect impacts and forward indirect impacts.
    - **Backward indirect impacts** represent the revenues resulting from changes in sales from input providers to the data suppliers. In order to produce and deliver data products and services, data suppliers need inputs from other stakeholders.
    - The **forward indirect impacts** include the economic growth generated through the use of data products and services by the downstream industries, i.e. the data users.
3. **Induced impacts** include the economic activity generated in the whole economy as a secondary effect. Induced additional spending is generated by both new workers, who receive a new wage, and the increased wages of existing jobs. This spending induces new revenue creation in nearly all sectors of the economy. The additional consumption will support economic activity in various industries, such as retail, consumer goods, banks, and entertainment.

The difference between the data market (the exchange of data) and the broader Data Economy is represented in Figure 4937 below. A concrete example is the following: a company either headquartered in EU or outside the EU, provides an IoT solution for shipping data at worldwide level. Another company (in EU or outside) using the solution provides location information (data provider)

of its ships at sea, so that ports (data users) can schedule the arrivals. This exchange of data generates two streams of revenues:

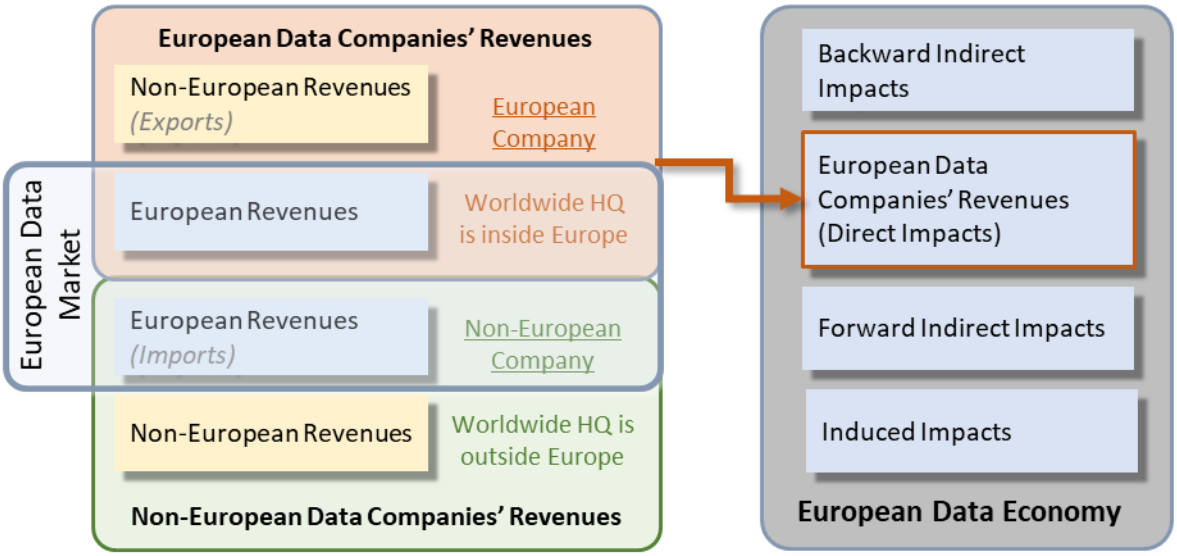
- The revenues generated at the European level (also through data imports) by this exchange of data represent the Data Market.
- The revenues generated by European companies (also through data exports) represent the European Data Companies' Revenues, which in turn represent the Direct Impacts of the broader Data Economy.

The Data Economy measures:

- the revenues generated by European data companies that sell and produce data products and services (measured by data companies' revenues), but it includes also
- the value/revenues generated in their supply chain by data companies' clients who will increase their revenues and employees thanks to the benefits deriving from the use of a specific solution
- the value/revenues generated by data companies' providers who provide all the components such as hardware, software, services, but also all procurement that enable the company to run and to build a specific solution.
- and finally, as a secondary effect, the value/revenues generated in the whole economy as new jobs will be created thanks to the benefits deriving from the use of this data products and services, but not directly generated by the data exchange market

Figure 49 shows the relationship between the Data Suppliers Companies' Revenues, the European Data Market, and the European Data Economy.

Figure 49. Relationship of Data Market, Data Revenues, Data Economy



7.3 Measuring the Data Economy

The Data Economy: 2020–2022

Since the beginning of 2021, the global economy faced different events, from new COVID-19 variants, to related lockdowns and closures, up to the diffusion of vaccines and the release of the Next Generation EU (NGEU) funds from the European Union, but especially the Russia-Ukraine war started in February 2022. IDC provided initial evaluation of this event on the European data market and data economy in June 2022 in the First report on policy conclusions D2.2.

As highlighted at that time, the war instead has taken a hit on the global ICT market and on the overall economy, and its effects will linger for years to come. The economic outlook deteriorated fast, changing again the economic picture as well as slowing down a recovery at its very initial phase. Indeed, the escalation of the crisis into a war completely reshaped the horizon and expectations for future economic activities and inflation. In the summer 2022 the inflation pressure in Europe recorded peaks never reached in the last decades.

It is now clear that high inflation has proven to be more persistent and central banks and governments started to increase interest rates, with the risk of an economic recession in some countries.

We took into consideration all these trends, as well as the impacts the inflation especially has on the ICT market. The value of the data economy for the EU27 has been estimated to reach more than €450 billion in 2021, a small adjustment with respect to the previous deliverable in May 2022 (around 3% for EU27) to take into account the new data published by IDC. In 2022 the data economy will reach the threshold of €500 billion, with an annual growth of 8.7% on 2021. Indeed, despite the economic turmoil, the market for intelligent analytics and data technologies has been one of the vibrant. Enterprises are increasingly recognizing that business transformation and business benefit is dependent on improved use of data – digital transformation is nothing without data transformation and modernization. Recent economic and political market shocks have not caused long-lasting reduction in data analytics market growth.

The estimated share of overall impacts on GDP in the EU27 ranges from 3.7% in 2021 to 3.9% in 2022. EEA countries (NO, IS, LI) excluding Switzerland, reach a value of the data economy of around €20 billion in 2021 and €21.5 billion in 2022, with an annual growth of 7.8% and a share on the regional GDP in 2021 and 2022 above 5%.

The UK share of the data economy as a part of GDP remains significant, bringing the value of the data economy in the EU27 plus the UK as a share of GDP in 2022 to 4.3%.. Indeed, with its large service sector, the UK has the largest internet economy as a proportion of GDP within the G20, reflecting the centrality of data to most goods and services trade. An interruption in data flows between the EU and the UK would therefore be costly. We already mentioned that the European Commission has recently adopted two adequacy decisions that allow for the free flow of personal data from the European

Union to the United Kingdom in the case that the exchanged data is granted an essentially equivalent level of protection to the one guaranteed under EU law. This is reflected in the data economy value for the UK, and despite economic uncertainties, the UK investments in the data market and then the economic impact throughout the economy will remain strong throughout the period.

Table 61. Data Economy Value and Growth, 2019-2020-2021 and Impacts on GDP 2019-2020-2021 (€, Million; %)

Source: European Data Market Monitoring Tool, IDC 2022

N.		Name	Description	2020	2021	2022	Growth Rate 2021–2022	Impact on GDP, 2020	Impact on GDP, 2021	Impact on GDP, 2022
5.1 5.2	EU27	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	434,318	455,479	495,198	8.7%	3.7%	3.7%	3.9%
5.1 5.2	EU27+ UK	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	569,797	594,659	647,343	8.9%	4.1%	4.1%	4.3%
5.1 5.2	Total, all countries	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	620,212	646,991	703,913	8.8%	4.2%	4.2%	4.4%

The Data Economy in 2025

As recent events showed, data and analytics-based strategies are key factors for a resilient, agile, and sustainable business. For example, the data and analytics market fits into the accelerated drive to digitalization that Covid sparked. Covid showed us that uncertain and challenging times provide a boost to digitisation initiatives and push technology spending, especially of the software market. Also, market vibrancy is set to continue for the foreseeable future.

Multiple trends have been highlighted to be drivers or support of further investment in data and analytics technologies (some of them have been already highlighted in the previous publication) thus driving and sustaining the growth of the Data Economy impacts along the period up to 2025 and beyond:

- The European strategy for data aims to create a single market for data that will ensure Europe's global competitiveness and data sovereignty. The EU is now pursuing the creation of a European data infrastructure – as well as other initiatives, such as enhancing data security – to ensure the EU's leadership in the global data economy (Proposal for a Regulation on

European data governance [*EU Data Governance Act*]) and support the growth of the European data economy in the future.

- Another important contribution to this growth of the data economy is the investment measures imbedded in the Next Generation EU (NGEU) fund and national Recovery and Resilience reforms. Indeed, the NGEU and national funds will play a crucial role in the next three to five years, by enabling countries to put in place a series on investments around key technologies, from cloud to 5G, IoT and smart devices, edge, artificial intelligence, and digital infrastructure, among others. Behind the increasing adoption of innovative technologies, the value of data is the common denominator. Sustainability is also emerging prominently among the Data Economy-related: data is becoming increasingly essential in tracking different kind of information in relation with the European Green Deal, for example, such as the level of greenhouse gas emissions, the environmental impact of renovated, energy-efficient buildings or the life-expectancy of longer lasting products that can be repaired, recycled and re-used.
- Cloud computing is the overarching trend affecting all different aspects of the Data Economy The vast majority of new investments in the data and analytics markets are cloud-related: storage, retrieval, transformation, and analysis of cloud-based data with analytics software as well as data delivered as a service. Furthermore, the Cloud computing is continuing to witness unabated growth in Europe and elsewhere.
- Artificial intelligence. The rising interest in and use of AI is driving a continually growing need for data on which to base AI and machine learning algorithms. In general, data being generated by businesses continues to grow. IDC estimates that in 2022, European enterprises generated 1,481 exabytes (EB) of data, which will more than double by 2026 to 3,016EB. The need for sophisticated tools to analyse this much business data — and gain better value from it — is contributing to the further consolidation of the Data Economy.

IDC expects that the data economy for the EU27 in 2025 will reach €640 billion, with a share on GDP of 4.8%. The results for the EU27 + UK show the value of data economy well above €800 billion and a share on GDP of 5.3% and the UK as the second largest country in terms of data economy impacts. Results are slightly above the estimations in May 2022 and are driven by the increase in the Data Companies Revenues (the direct impacts without the data monetisation). We do not anticipate the same increase across the different type of impacts as we consider the benefits already having their impact in the overall economy is a healthy way. So, if we look at the indirect and induced impacts, there's no significant change in what was predicted in the previous updates, were we increase the data suppliers' perimeter, which already increased the economic impact generated at an indirect and induced level.

Table 62. Data Economy Value (€M), Growth (%), and Impact on GDP (%), 2025

N.	Market	Name	Description	Data economy in 2021	Impacts on GDP in 2021	Data economy in 2025	Impacts on GDP in 2025	CAGR 2025/2021
5.1 5.2	EU27	Value of the Data Economy and Impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	455,479	3.7%	639,112	4.8%	8.8%
5.1 5.2	EU27+UK	Value of the Data Economy and Impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	594,659	4.1%	825,103	5.3%	8.5%
5.1 5.2	Total, all countries	Value of the Data Economy and Impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	646,991	4.2%	895,512	5.3%	8.5%

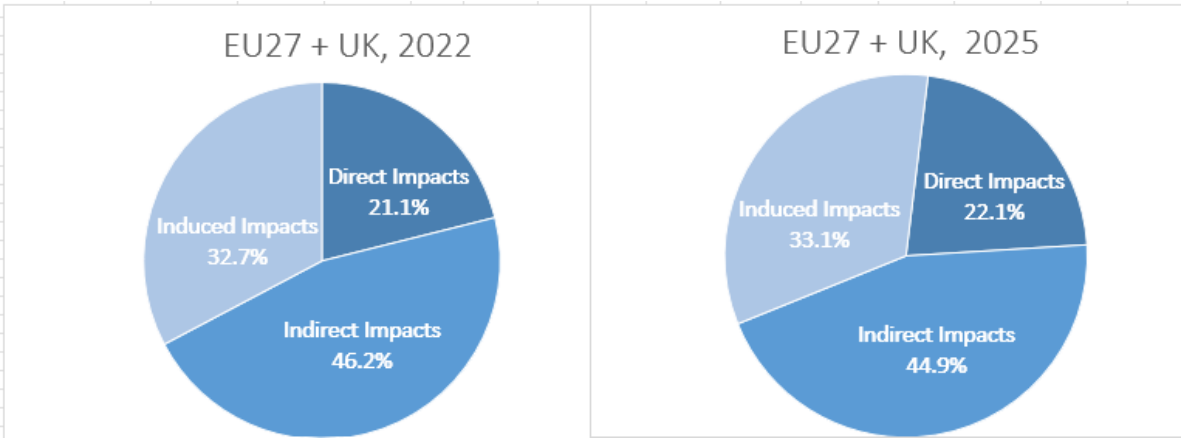
Source: European Data Market Monitoring Tool, IDC 2022

The Data Economy by Impact Type: 2022 and 2025

Analysis of the data economy also provides an overview of the total effects by type of impact (direct, indirect, and induced). It is worth mentioning how the composition of impacts changes over time, from 2022 to 2030 (see next paragraph), in favour of induced impacts, despite slowly, but thus revealing the effects of data access, data products and services exchange, and data value distribution in the economy.

The shift toward induced impacts is slightly offset by the change in data supplier companies, which have increased the revenues generated at the input provider level, the backward impacts. These revenues have increased significantly since the previous deliverable. Indeed, as the number of data suppliers increases, requests for inputs in the supply chain also increase, thus helping the input provider companies to further improve their revenues.

Figure 50. Data Economy by Impact Type: EU27 + the UK, 2022 and 2025 (%)



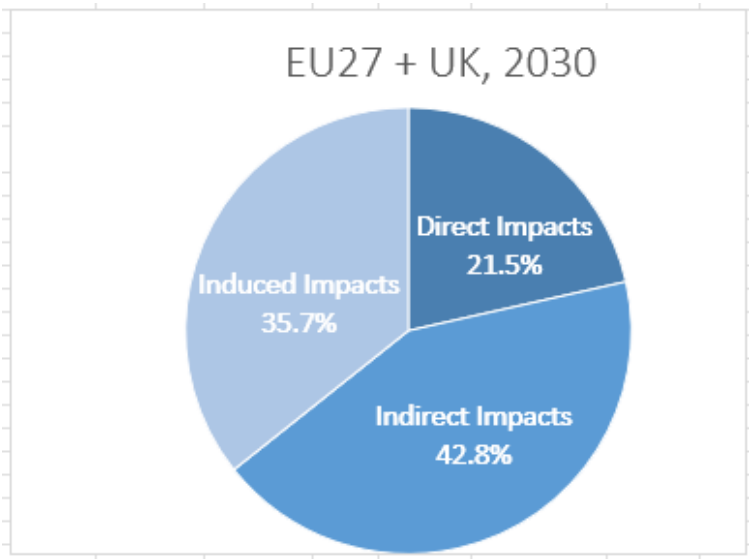
Source: European Data Market Monitoring Tool, IDC 2022

7.4 Forecasting the Data Economy in 2030

In 2030, the data economy for the EU27 is expected to remain slightly below the €1 trillion threshold, with a 5.5% 2025–2030 CAGR. When we consider the UK, the data economy in 2030 is expected to reach the €1.1 trillion value and also adding Switzerland and EEA (NO, LI, IS) countries, the value will reach €1.2 trillion, with a 2025–2030 CAGR of 5.7%.

- One of the main results is that, despite the slower growth, the share of the data economy as a part of GDP in the EU27 will increase from 4.8% in 2025 to 5.7% in 2030.
- Another important result is the increase in induced impacts, from almost 33% in 2025 to nearly 36% in 2030. Both direct and indirect impacts will decrease in the medium term to become then more widespread in the overall economy. People and companies benefitting from the value of data shared across companies from a ripple effect, despite the importance of direct and indirect impacts remaining very high (the buying and selling of data products and services and the benefits in the B2B space in particular).

Figure 51 Data Economy by Impact Type: EU27 + the UK, 2030 (%)



Source: European Data Market Monitoring Tool, IDC 2022

The two alternative scenarios will consider a slower growth of the impacts in the overall economy in 2030 for a Challenge scenario, affected by a slower growth of GDP as well, and a faster growth for data economy and GDP for a High Growth scenario. The pace of growth, measured as the compound annual growth rate (CAGR) in the period 2030–2025 for the EU27 in a Challenge scenario will be less than a half the growth expected in a Baseline scenario (2.5% compared to 5.5%), and nearly double in a High Growth scenario (10.0%). A similar picture is expected when considering the EU27 plus the UK.

Table 63. Data Economy Value (€M); 2030 Challenge, Baseline, and High Growth Scenarios (€M); and Impact on GDP (%)

							25-30 CAGR			Impacts on GDP		
N.	Market	Name	Description	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario
5.1 5.2	EU27	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	722,210	837,110	1,027,232	2.5%	5.5%	10.0%	5.3%	5.7%	6.6%
5.1 5.2	EU27+UK	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy and % of EU GDP	948,425	1,087,051	1,323,710	2.8%	5.7%	9.9%	6.0%	6.4%	7.3%
5.1 5.2	Total, all countries	Value of the data economy and impacts on EU GDP	Value of total impacts on the EU economy	1,025,136	1,182,345	1,437,163	2.7%	5.7%	9.9%	6.0%	6.5%	7.4%

			and % of EU GDP									

Source: European Data Market Monitoring Tool, IDC 2021

7.5 Data Economy by Industry

The industry split of the data economy over the 2021–2025 period follows that of the data revenues generated from the supply side and the adoption of technologies such as big data analytics, artificial intelligence, IoT, cloud, with revenues potentially being generated through data products and services at the different impact layers.

Table 64 Data Economy Value by Industry, 2019–2021, 2025 (€M)

	2021	2022	2025	2021 Industry Distribution	2022 Industry Distribution	2025 Industry Distribution
Industry	€ (M)	€ (M)	€ (M)	%	%	%
Agriculture	2,517	2,608	3,093	0.6%	0.6%	0.5%
Construction	3,225	3,485	4,076	0.7%	0.7%	0.7%
Education	9,914	10,470	12,457	2.2%	2.2%	2.1%
Finance	103,451	111,117	142,710	23.1%	22.7%	22.4%
Health	17,580	18,919	25,385	4.0%	3.9%	3.8%
Information & communications	44,013	47,118	59,305	10.1%	9.7%	9.5%
Mining & manufacturing	94,977	100,498	126,157	20.7%	20.9%	20.3%
Professional services	40,827	44,979	60,063	9.0%	9.0%	9.1%
Public administration	56,095	65,647	88,623	11.7%	12.3%	13.3%
Retail & wholesale	45,935	48,401	60,239	10.2%	10.1%	9.8%
Transport	17,534	18,787	24,780	3.9%	3.8%	3.8%
Utilities	19,410	23,169	32,224	3.9%	4.3%	4.7%
Total EU27	**455,479**	**495,198**	**639,112**	**100%**	**100%**	**100%**

Source: European Data Market Monitoring Tool, IDC 2022

The highest share of the data economy's value is generated in the Finance sector (23% in 2022), where great focus is placed on open banking, security solutions, digital payments, and biometrics. The second largest share is represented by the manufacturing and mining industry (around 21% in 2022): here, the data economy value is driven by a focus on automation, remote collaboration, and agility needs. Public Administration is the third largest industry (12% in 2022) as well as the second fastest in terms of impacts. Indeed, thanks to NGEU's strong focus on the modernisation of public administrations, public administrations will invest in modernising digital services, digital connectivity, cybersecurity, and digital identity. This will increase the opportunity to generate value through the efficient use of data to deliver public services. Among the public sector industries, Health will face the fastest growing impacts (up to 2025), also thanks to the specific policies to improve the digitalization of the healthcare sector (especially driven by the necessities and shortcomings that Covid-19 highlighted).

Finally, the retail & wholesale industry accounts for 10% in 2022: retailers focused on hyperconnected and omnichannel customer experiences, breaking data silos, and integrating offline and online customer data to maintain healthy revenue streams and ensure customer loyalty.
The top three fastest growing markets in terms of impacts are Utilities (which will benefit for example from investing in maintenance and prevention, this creating externalities for the other sectors), Public Administration (already mentioned above) and Professional Services (which will be driven by the need of IT optimization), followed by Health and Transport.

7.6 Data Economy by Country

In terms of countries' contributions to the data economy, France, Germany, Italy, followed by Spain, and the Netherlands will contribute the most from 2022 to 2025. We already highlighted the crucial role played by the NGEU, with around 50% of total resources distributed across the four biggest countries in the EU27, thus making a significant difference in the next three years. France and Germany are also among the fastest growing data economies, together with Sweden, Ireland, the Netherlands, Denmark and Finland, as well as Lithuania and Latvia, among others.

All sectors are affected in the context of the currently ongoing digital transformation of the economy and society under the influence of innovative technologies and the global megatrends of the digital era. From smart transportation initiatives to the modernisation of the public sector, companies will be asked to fulfil the need for digital skills and digital workplaces in a more digitalised world. In order to understand the progress in digitalization, IDC also looked at the Digital Economy and Society Index (DESI) 2022, which captures the progress in key digital policy areas. What the Commission highlighted is that "*To date, digitalisation in the EU is uneven, although there are signs of convergence. While the frontrunners have remained unchanged, there is a substantial group of Member States that cluster around the EU average. Importantly, the majority of Member States that had a lower level of digitalisation 5 years ago, are progressing at a faster pace than the rest, indicating an overall convergence in digital in the EU.*"

Among the most significant national initiatives directly affecting the evolution of the Data Economy at Member State level, it is worth mentioning the following:

- Germany progressed relatively well in the last five years (2017-2022), nevertheless the country has to improve on some indicators, such as the provision of key public services for European citizens and businesses. As the EU's largest economy, Germany's progress with digital transformation in the coming years will be crucial, to enable the EU as a whole to reach its 2030 Digital Decade targets. Digitalisation is a key priority for the new government, building on the digital dimension of the Recovery and Resilience Plan.
- France has over-performed in the past years, progressing more than expected, thanks to a sustained effort in support of digitalisation. Nevertheless, the country is not yet among the digital frontrunners. The digital transformation of the French economy and society is being supported by the Plan de Relance (Recovery plan, aimed at strengthening technological sovereignty, ensure the greening of the economy and boosting innovation.
- Ireland's average yearly relative growth of its DESI score has been one of the highest in the EU in the last 5 years. Ireland performs well regarding the human capital dimension, and it is a

top performer for mobile broadband take-up (which will have positive impact in the economy). Moreover, the public services provided to businesses and citizens in Ireland are highly digitalised and a large proportion of internet users engage actively with e-government services. Nevertheless, while enterprises in Ireland take advantage of some digital technologies (such as social media, big data and cloud), other technologies such as artificial intelligence or electronic information sharing are not so widespread.

- The Netherlands ranks third out of 27 EU Member States in the 2022 edition of the Digital Economy and Society Index. The Dutch digital strategy (DDS) for the digital transformation of the economy and society stresses the importance of an inclusive digital transition and it singles out the Netherlands' position as a digital frontrunner in Europe and the world. Despite the country has not adopted the Dutch Recovery and Resilience Plan (RRP) yet, the country has been a consistent top performer in the EU and is still able to make progress in key areas.
- Finland ranks 1st of 27 EU Member States in the 2022 edition of the Digital Economy and Society Index: the country continues to lead the EU countries on the indicators tracking human capital, it is a leader in 5G commercial services provision, and moreover it is well positioned to bring 100% of key public services online and reach the Digital Decade target for 2030 ahead of schedule.

There are other countries that lag behind in terms of digitalisation, and then in the benefits that the overall economy can have, such as Bulgaria, Greece, Hungary, Poland, Romania, among others.

7.7 Key Findings

KEY HIGHLIGHT FOR THE EU27

Despite the economic turmoil, the market for intelligent analytics and data technologies has been one of the vibrant. Enterprises are increasingly recognizing that business transformation and business benefit is dependent on improved use of data. Recent economic and political market shocks have not caused long-lasting reduction in data analytics market growth.

In 2022, the data economy has reached the threshold of €500 billion, with an annual growth of 8.7% on 2021. IDC expects that in 2025 the data economy for the EU27 will reach €640 billion, with a share on GDP of 4.8%. Finally, in 2030, the data economy for the EU27 is expected to remain slightly below the €1 trillion threshold, with a 5.5% 2025–2030 CAGR and a share on GDP of 5.7%.

KEY HIGHLIGHT FOR THE EU27 According to the scenarios

The two alternative scenarios will consider a slower growth of the impacts in the overall economy in 2030 for a Challenge scenario, affected by a slower growth of GDP as well, and a faster growth for data economy and GDP for a High Growth scenario. The pace of growth, measured as the compound annual growth rate (CAGR) in 2030–2025 for the EU27 in a Challenge scenario will be less than a half the growth expected in a Baseline scenario (2.5% compared to 5.5%), and nearly double in a High Growth scenario (10.0%).

Multiple trends have been highlighted to be drivers or support of further investment in data and analytics technologies: the European strategy for data, the investments in cloud and artificial intelligence, the Next Generation EU funds and the sustainability goal, among other trends.
The composition of impacts changes over time, from 2022 to 2030, in favour of induced impacts, despite slowly, but thus revealing the effects of data access, data products and services exchange, and data value distribution in the economy.
The highest share of the data economy's value is generated in the finance sector, where great focus is placed on open banking, security solutions, digital payments, and biometrics. The second largest share is represented by the manufacturing and mining industry, with a focus on automation, remote collaboration, and agility needs. Public administration is the third largest industry, investing in modernisation of digital services, digital connectivity, cybersecurity, and digital identity. The top three fastest growing markets in terms of impacts are utilities, public administration and professional services, followed by health and transport.
France, Germany, Italy, followed by Spain, and the Netherlands will contribute the most from 2022 to 2025. NGEU will play a key role, with around 50% of total resources distributed across the four biggest countries in the EU27, thus making a significant difference in the next three years. France and Germany are also among the fastest growing data economies, together with Sweden, Ireland, the Netherlands, Denmark and Finland, as well as Lithuania and Latvia, among others.

8. Data Professionals Skills Gap

8.1 Definitions

The **data professionals skills gap** indicator captures the potential gap between the demand and supply of data professionals in Europe.

Monitoring the skills gap is critical, since lack of skills is a potential barrier to the development of the data industry, the adoption of data-driven innovation and the transformation of businesses and organizations. Monitoring of the data skills gap is based on a model that balances the main sources of data skills (the education system, retraining, and other contributors) with the estimated demand (from all data companies).

The data skills gap is provided for the five largest EU countries and the rest of EU 27 aggregated, mainly because of the difficulty in measuring job vacancies for data professionals for each individual Member State.

Table 46 Indicator 6 – Data Skills Gap

Indicator 6 – Description				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
6	Data Professionals Skills Gap	Gap between demand for and supply of data technical and data business professionals (not segmented)	Absolute number and % of total demand, 2020–2022. Forecast to 2025 (Baseline scenario). Forecast to 2030, 3 scenarios.	By Geography: 5 EU MS: DE, ES, FR, IT, PL Rest of EU27 Total EU 27 UK Switzerland EEA (NO, LI, IS)

8.2 Measuring the Data Professionals Skills Gap

The measurement of this indicator is based on a model that combines the separate estimates and forecasts of the demand for data technical and business professionals and the supply of corresponding data skills by the inflow from the education system and the upskilling and reskilling of the existing workforce. This includes balancing the main sources of data skills (from the education system and retraining to the profession from other careers) with the estimated demand for data skills (from all data companies).

More specifically, we use the following definitions:

- **The supply of data professionals** is equal to the data skills supply stock (the sum of employed data professionals and unemployed data professionals).
- **The demand for data professionals** is the sum of existing and open positions for data technical professionals and data business professionals – that is, the number of currently employed data professionals (indicator 1 in this study) plus the unfilled vacancies.
- **The indicator measures the difference between total demand and supply**; if demand is higher than supply, there is a data skills gap (excess demand). If supply is higher than demand, there is over supply and potentially unemployment.

To reach the final estimates on the potential skills gap by country and region, indicators on the supply side such as (but not limited to) immigration inflows/outflows, level of upskilling by industry, retirement of senior workers and level of proficiency of different courses to prepare professionals for data technical roles are all factored in.

The multi-variable approach enables the model to reach a more accurate mapping of worker flows, which is then compared against the calculated demand for this workforce across key industry sectors in the EU region. Calculations on the demand of data workers are based different indicators, such as (but not limited to) current number of data professionals in activity, level of technology adoption, size of industry by member state and the data sector growth potential in each of these sectors.

Data Sources

As is the case for the other indicators, the study team annually carries out ad-hoc desk research on data skills supply and demand dynamics. The main sources considered are (but not limited to):

- ILOSTAT (International Labour Organization) Statistics and Databases (2021)
- EUROSTAT Educational enrolment statistics (last update: 2022)
- IDC's Technology Employment Impact Guide – updated on an annual basis with forecasts of employment across 40 technology job roles, including seven data management and analytics roles (last update: December 2021)
- Cedefop – Skills-OVATE data for vacancy estimations (most recent data collected Q3 2021 and Q2 2022)
- Cedefop – Skills Index and Skills forecast (last update: 2022)

Measurement of Demand

The total demand for data technical and business professionals is calculated for the years 2020, 2021, and 2022 and will move forward one year for each measurement cycle. For the current year of the indicator (2022), to the number of data professionals sourced from Indicator 1 we have added an estimate of existing unfilled positions (vacancies).

To estimate the current vacancies, we have carried out additional data collection on job search portals such as LinkedIn to calculate the level of demand for data skills jobs, defined on the basis of the desks research and analysis calculated for Indicator 1 on data professionals. IDC's ongoing research on the demand for advanced ICT and data skills has been leveraged to support the forecasts. In the past 12-18 months there has been a clear increase in companies' difficulty in filling many job roles including those of data professionals. The phenomenon often referred to as “the great resignation” or the “the great reshuffle” has affected many organisations’ ability to retain staff. While does not directly affect the overall demand, it does mean that there is much more movement in the job market and the number of vacancies is higher.

The forecast demand for data professionals to 2025 (Baseline scenario) and 2030 under the three scenarios calculated by Indicator 1 is considered the total potential demand (as it incorporates future potential vacancies).

Measurement of Supply

The estimation of supply of data professionals in the baseline year (2021) is calculated from the number of data professionals employed plus the number of unemployed data professionals (due to transitions between jobs and natural unemployment). To arrive at the forecast of supply of data professionals, the model takes into account inflows, such as entry of graduates in the relevant disciplines corresponding to the data skills identified in Indicator 1 and the level of inflows from other careers and upskilling. The model also considers outflows from the data skills market, such as retirements and career changes away from the data profession.

The relationship between skills demand and supply and the resulting skills gap or over-supply is illustrated in figure 53.

Figure 53. The Data Skills Demand-Supply Balance Model

Source: European Data Market Monitoring Tool, IDC 2022

With the proliferation of data as the basis for product and service development, customer support and in decision making processes, the view of what constitutes a data professional is broadening significantly from the traditional technology-related roles. Increasingly, the roles of business analyst, data scientist and even data analyst have become more related to business than to technology. Business professionals tend to develop skills in data science to manage emerging business models and products. Consequently, the recruitment of data professionals from universities are therefore from broader fields of study than the traditional STEM programs, and organisations recruit data professionals into a wider range of roles – and from a wider scope of backgrounds with additional up- or reskilling efforts.

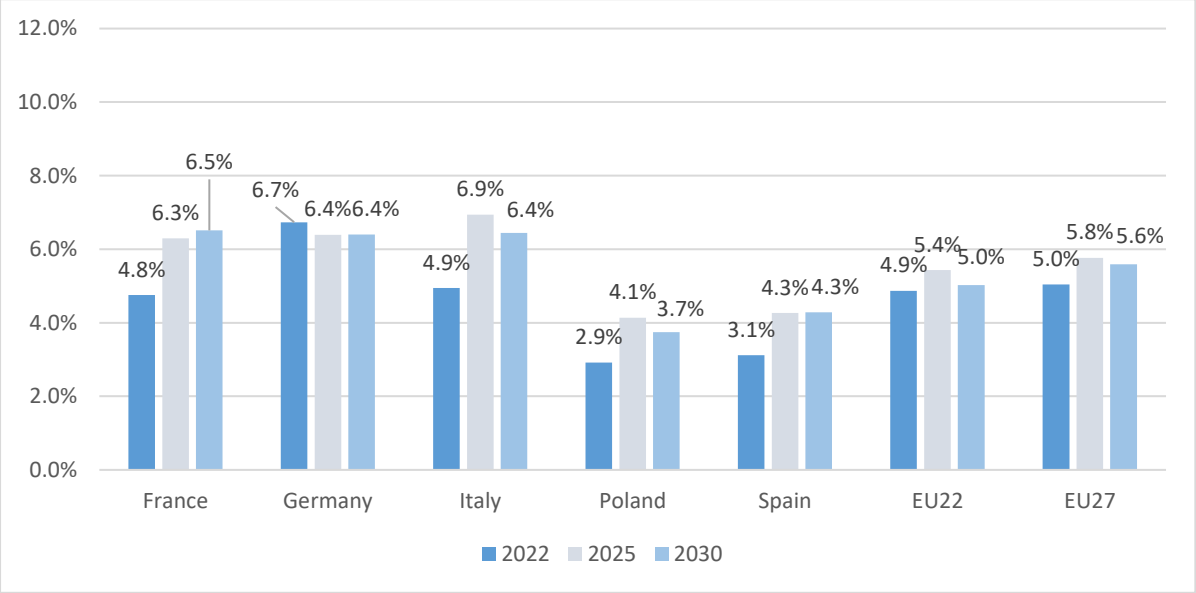
8.3 Data Professionals Skills Gap

The skills gap for data professionals is growing rapidly, and it will expand most significantly in the 2022–2025 period (see Figure 8.2). Demand has already outgrown supply, with significant increases expected between 2022-2030 in any of the scenarios and countries modelled. The following sections provide more details for the European Union and the rest of the European countries.

Table 47 shows the skills gap for the EU27 in 2022 as a base year and in 2030 for the three scenarios. It is clear that in all scenarios, there is expected to be a skills gap:

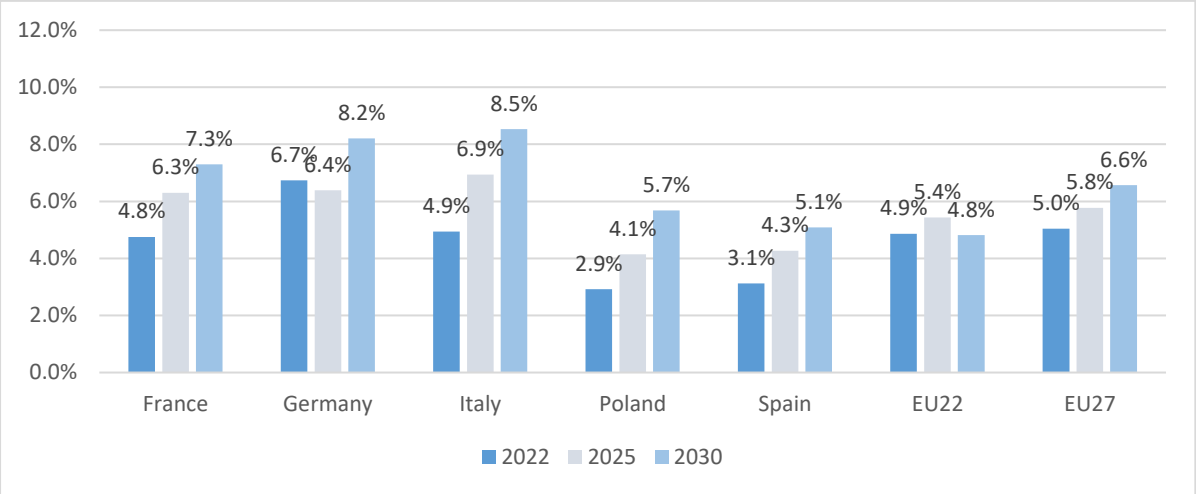
- In 2022, the data professionals' skills gap is estimated at 368,000 across the EU27, growing to 552,000 by 2030 in the Baseline scenario. This means that the gap will grow from 5% in 2021 to 6% in 2030.
- For the Challenge scenario, the gap will reach 608,000 in 2030, or 6.8%, as graduates look for alternative careers and there is a lower number of entrants from other careers.
- In the High Growth scenario, the gap will reach 981,000 in 2030 as the education system, reskilling, and upskilling programs will be unable to keep up with accelerating demand.
- Figure 54, figure 55 and figure 56 provide graphic representations of the data professionals skills gap for the three scenarios by Member State.

Figure 54. Data Professionals Skills Gap for the EU by Member State: 2022, 2025, and 2030 Baseline Scenario



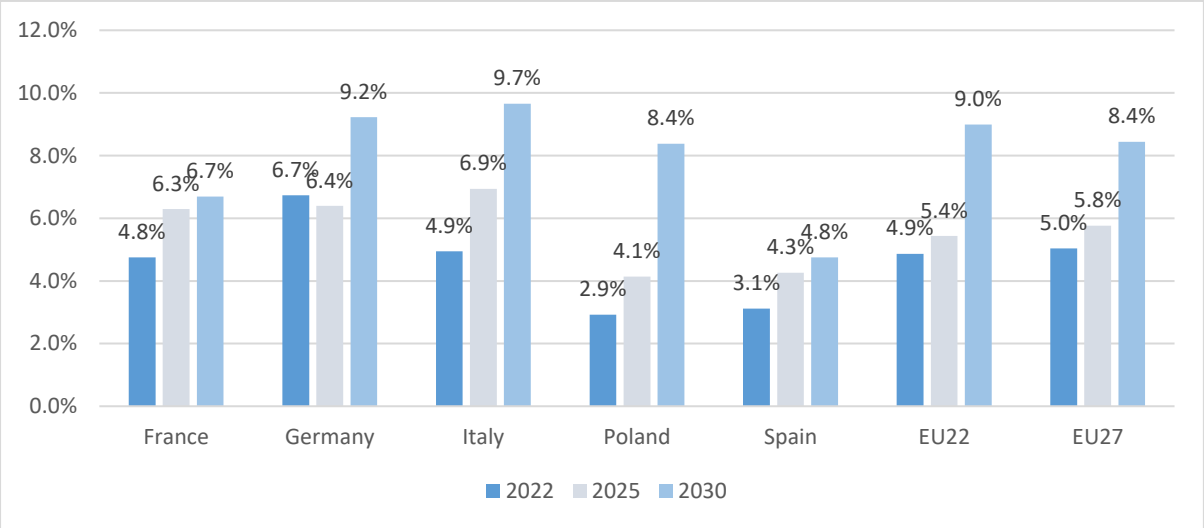
Source: European Data Market Monitoring Tool, IDC 2022

Figure 55. Data Professionals Skills Gap for the EU by Member State: 2022, 2025, and 2030 Challenge Scenario



Source: European Data Market Monitoring Tool, IDC 2022

Figure 56. Data Professionals Skills Gap for the EU by Member State: 2022, 2025, and 2030 High Growth Scenario (%)



Source: European Data Market Monitoring Tool, IDC 2022

Table 65 The Data Professionals Skills Demand and Gap for the EU by Member State: 2020–2022, 2025, and Three 2030 Scenarios (Thousands)

Member State		2020	2021	2022	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
France	Numbers	33	35	52	77	105	95	114	6.4%	4.3%	8.1%
	% Gap	3.4%	3.3%	4.8%	6.3%	7.3%	6.5%	6.7%			
Germany	Numbers	69	84	123	137	208	165	285	8.7%	3.8%	15.8%
	% Gap	4.3%	4.9%	6.7%	6.4%	8.2%	6.4%	9.2%			

Italy	Numbers	22	24	35	55	75	60	101	6.3%	1.6%	12.7%
	% Gap	3.3%	3.5%	4.9%	6.9%	8.5%	6.4%	9.7%			
Poland	Numbers	18	20	18	27	37	28	74	6.7%	0.5%	22.2%
	% Gap	3.2%	3.5%	2.9%	4.1%	5.7%	3.7%	8.4%			
Spain	Numbers	16	13	17	25	31	30	38	4.3%	3.2%	8.2%
	% Gap	3.4%	2.6%	3.1%	4.3%	5.1%	4.3%	4.8%			
EU22	Numbers	48	93	123	157	151	174	369	-0.8%	2.1%	18.7%
	% Gap	2.2%	3.9%	4.9%	5.4%	4.8%	5.0%	9.0%			
EU27	**Numbers**	206	270	368	479	608	552	981	4.9%	2.9%	15.4%
	% Gap	3.2%	3.9%	5.0%	5.8%	6.6%	5.6%	8.4%			

8.3.1 Data Professionals Skills Gap – the Rest of Europe

Similar to the observations for the EU27, the other European countries (the UK, Switzerland, and the rest of the EEA) are also experiencing a skills gap amongst data professionals and will continue to do so in all scenarios (as shown in Table 47) – specifically:

- In 2022, the data professionals' skills gap is estimated at 113,000 across the rest of Europe (outside the EU), growing to 225,000 in 2030 in the Baseline scenario. This means that the gap will grow from 4.8% in 2022 to 7.2% in 2030.
- For the Challenge scenario, the gap will reach 284,000 in 2030 or a gap of 10%. The UK represents the largest share of this country group, with a gap of 257,000 data professionals in 2030 (a gap of 9.8%). The UK estimates were reviewed to reflect the country's current economic situation, workforce attraction capacity and technology investments.
- In the High Growth scenario, the gap will reach 195,000 in 2030, representing a gap of 7.8%. Again, this is highly influenced by the gap in the UK, which will amount to 167,000 data professionals.

Table 66 The Data Professionals Skills Demand and Gap for the non-Member States (UK, Switzerland and EEA): 2020–2022, 2025, and Three 2030 Scenarios (Thousands)

Countries outside of the EU		2020	2021	2022	2025	2030 Challenge Scenario	2030 Baseline Scenario	2030 High Growth Scenario	CAGR 2025-2030 Challenge	CAGR 2025-2030 Baseline	CAGR 2025-2030 High Growth
UK	Numbers	48	55	90	156	257	194	167	10.5 %	4.5%	1.4%
	% Gap	2.7%	2.9%	4.6%	7.0%	9.9%	7.4%	5.8%			
Switzerland	Numbers	5	6	9	13	13	15	18	-0.2%	2.4%	7.3%
	% Gap	2.7%	2.8%	4.3%	5.1%	4.7%	4.8%	5.3%			
EEA (NO, LI, IS)	Numbers	9	9	14	15	14	16	10	-1.5%	0.7%	-8.3%
	% Gap	6.5%	5.8%	8.5%	8.3%	7.6%	7.9%	3.7%			

8.3.2 Measuring Skills Demand

In the different forecasts that are included in this study, the investments in products and technology, which feed the demand for data professionals, continue to grow with 3-8% annually in the period up

to 2025, depending on industry and technology. The 2020/2021 pandemic also showed that the underlying strength of digital transformation was such that growth continued in that period, also in terms of demand for data professionals.

Growth in demand for data professionals do not follow directly the growth in demand for data-related technology; the model for data professionals is different and factor in the maturity of the technology investments and the relation between technology investment and the human resources required to implement and operate it.

Therefore, this study shows a continued significant growth in demand for data professionals, and this growth is robust even in the challenging scenario with a weakening world economy.

8.3.3 Measuring Skills Supply

The scarcity of data professionals is a reality for most organisations throughout the EU member countries, and IDC research has clearly shown that it is already impacting the digital transformation projects across EU. IDC measured the impact of skills shortages in larger European digital transformation programs in June 2022, and among the KPIs measured was the delay due to lack of skills and experience – on average this delay was 8.1 months. According to the same survey, the perceived impact on business and customer satisfaction is significant, and this has, in turn, led to significant investments in up-skilling and re-skilling of technology and business professionals to meet the demand. In 2021, it is estimated that reskilling added around 4% to the supply of data professionals, especially in business analyst and data scientist roles, and comes from re-skilling of process-savvy business professionals. However, as organisations become more data driven, this is expected to increase. It is important to note that the level of reskilling/upskilling of employees tend to vary by each of the countries in the region, with some states such as Germany, France and the UK presenting a higher tendency for training, on average.

On the organization level, IDC's 2021 MaturityScape on IT training mapped the ability of European organizations to develop a strategic approach to Learning & Development, and results showed that only a small proportion of European companies (6.4%) have a future-oriented approach to training and can map future skills, aligning desired business outcomes with upskilling of employees. Although companies are becoming more aware of the need of having a robust skill development strategy in place, changes may take time to surge effect and keep up pace with the growth in technology adoption. As the Baseline scenarios shows, additional recruitment and re-skilling does not compensate for the growth in demand in the next four years. Organisations will therefore experience a shortage that will impact efficiency and the ability to generate value, and these organisations will instigate additional measures to overcome the shortage.

For organisations with less ability to recruit outside the traditional target groups, and with less ability to re-skill and leverage on skills outside the traditional ICT skills, this shortage will become a bottleneck in digitalisation and operational efficiency programs. As with any resource in shortage, it is anticipated that there will be investments in assessment of data proficiency skills throughout organisations, in matching supply of skills vs demand from projects and lines of business and of programs for

continuous development of data proficiency skills. In addition, as with any resource in shortage, it is anticipated that there will be an increase in re-use of skills across organisational silos, thereby increasing lateral movements across organisations and cross-fertilisations across departments.

8.4 Key Findings

KEY HIGHLIGHT FOR THE EU27 **Key Findings – Skills Gap** **The skills gap for data professionals already has a significant business impact on organisations in Europe. Business and technology are in rapid development, largely due to ongoing digital transformation of enterprise and society, but also due to a very strong pace of development in technology. A transformation of this magnitude requires large amounts of human capital and skills before the process changes stabilize and become mainstream. The reported skills gap in data professionals is therefore impacting both existing and coming transformation initiatives and becomes one of the more serious challenges facing the European industries.**
KEY HIGHLIGHT FOR THE EU27 According to the scenarios
The gap between supply and demand for data professionals continue to grow. In the Baseline scenario, the gap for EU27 is estimated at 5% of the total number of data professionals in 2022, growing to 5.8% in 2025 and decreasing to 5.6% in 2030.
The underlying driver for the shortage is the significant growth in investments in technology, in turn driven by the digital transformation. Organisations throughout Europe will attempt to remedy the situation by a combination of continuous training, re-skilling, and recruitment, but current efforts may not be enough to significantly reduce the gap by 2030. **Therefore,** other measures including re-skilling of additional business roles outside data analysis and ICT and adding data analysis skills to the curriculum of additional university programs will be suggested **to mitigate the skills gap in the region.**

9. The International Dimension of the Data Economy

9.1 Measuring the Data Economy Beyond the EU

This report covers the data economy beyond Europe; it includes a specific section on four additional non-European countries:

- **The United States**: The top trading partner of the EU27 and other European countries.
- **Brazil**: An upper-middle-income economy and a country with among the highest ICT Development Index (IDI) scores in Latin America.
- **Japan:** The largest high-income economy in the Asia/Pacific region, and the main Asia-EU trading partner after China. Japan is a mature ICT market with many similarities to the European market.
- **China:** An emerging world force in ICT, which extends to the data economy. The second largest economy in the world and the main Asia-EU trading partner. China represents a very large market opportunity in terms of data consumption, data tools, and data monetisation.

For the international dimension, we kept the international focus on a restricted set of core indicators due to the wide disparity of the available statistical sources for these EU partners.
Specifically:

- Indicator 1.1: the number of data professionals
- Indicator 1.2: the employment share of data professionals
- Indicator 2.1: the number of data companies
- Indicator 3.1: the revenues of data companies
- Indicator 4.1: the value of the data market
- Indicator 4.2: the value of the data economy
- Indicator 4.3: the impact of the data economy on GDP

Definitions

The indicators for the four selected EU international partners leverage IDC databases available at worldwide level. Data such as ICT spending is available for most countries worldwide and is gathered with the same approach across the board. These data series are perfectly comparable at international level.

The economic model used to define the direct and indirect impacts of the data market was refreshed in 2021, resulting in a significantly higher value for indirect impacts. This is partially due to the redefined model but also the extension of the perimeter for data suppliers. Increasing industry coverage from J & M segments to include A, C, E, G, H, J, K, M, and P added significantly to the number of companies included, even if the size of the data revenues was not notably increased. The indirect impacts were accelerated by the addition of these companies in the model.

IDC also used existing data and desk research to estimate the key metrics for the four countries, accepting that the categorisation of data professionals, data companies, and revenues of data companies might not be as current as for the EU27. We used IMF forecast data and available statistics to validate our estimates. This is coupled with IDC's existing data sources of IT spending in the IDC

Black Book and IDC Spending Guides, both of which include spending for the four countries beyond the EU. The table below outlines the main sources used to estimate the international indicators in this report.

Table 67. Internationals – Main Data Sources

Data Source	Updated
IDC Core IT Spending Guide 2H2022	Sep 2022
IDC Worldwide Black Book (standard edition)	Sep 2022
IMF World Economic Outlook (Apr 2022)	Apr 2022
ILOSTAT statistics and databases	Sep 2022
IT Big Data and Analytics Spending Guide 2H2022	Aug 2022
China Statistical Yearbook 2021	Oct 2022
CIA World Factbook	Ongoing

9.2 The US

The US remains the strongest of the internationals' data economies in 2021 and out to 2022. The country's strength lies especially in tools and software although hardware is also strong, but much of this is manufactured outside the country. As the world's leading economy, the US has the resources and capabilities to continue to dominate the development of data and the data market.

Many data suppliers are US-based, and the country is considered at the forefront of artificial intelligence (AI). AI is driving a lot of the growth in the data market as its technologies are embedded into all areas of work. The US has a strong base in cloud technology – again one of the foundational technologies for dealing with and using data and leading cloud-based organisations such as Amazon Web Services (AWS), Microsoft, and Google are US based. These organisations lead the development of data and its associated technologies, which is why the US is the leading country in data and data technology.

The strength of the US data market and data economy is implied in the profits and market values of some of the most significant Big Techs hosted in the country. In 2020, two of the largest global data firms – Alphabet Inc. (Google) and Meta Platforms Inc. (Facebook) – had a combined net income before tax of $81.3 billion (approximately €74.6 billion), which amounted to 3.7%of the whole of U.S. corporate profits before tax. In November 2021, the combined market capitalization of the two firms was $2.9 trillion (€2.7 trillion), which amounted to 7.5%of the market capitalization of all S&P 500 firms, just as an example[18].

The US primacy is confirmed by looking the sheer amount of data that are generated by country and that will sustain data-fuelled solutions in the next few years (AI applications in the first place). A recent study by McKinsey[19] maps the digital evolution and digital competitiveness of different countries around world along four data-related criteria: volume exchanged, usage size, accessibility (easiness to

[18] Valuing the U.S. Data Economy Using Machine Learning and Online Job Postings, José Bayoán Santiago Calderón and Dylan G. Rassier, U.S. Bureau of Economic Analysis, BEA Working Paper Series, WP2022-13, October 2022 https://www.bea.gov/system/files/papers/BEA-WP2022-13.pdf

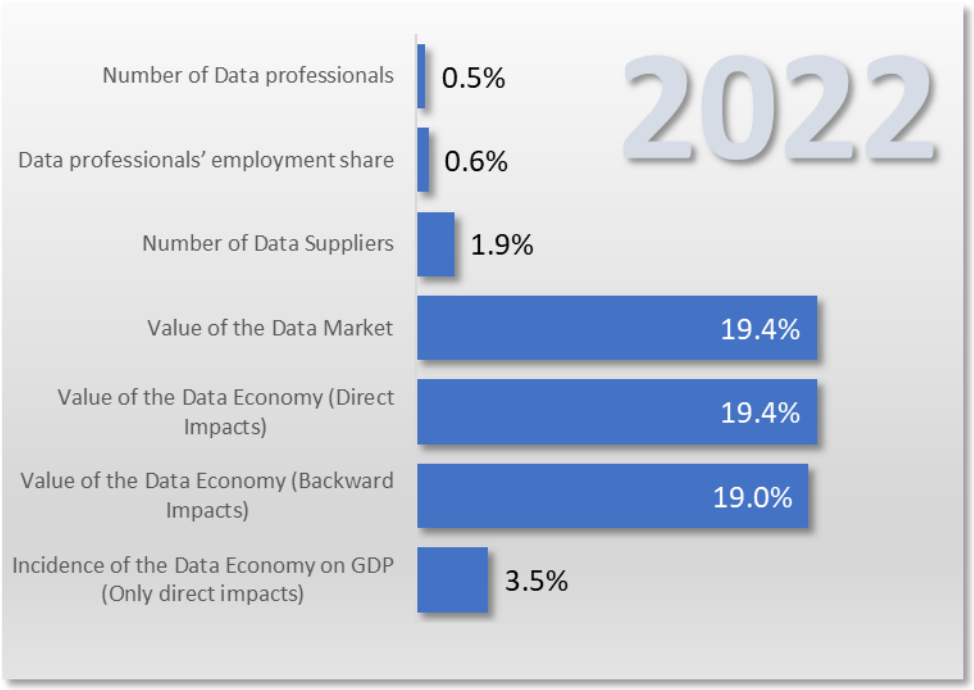
[19] Which Countries Are Leading the Data Economy? by Bhaskar Chakravorti, Ajay Bhalla, and Ravi Shankar Chaturvedi, Harvard Business Review, January 24, 2019 https://hbr.org/2019/01/which-countries-are-leading-the-data-economy

access the data) and complexity of digital activities. According to this research, the US come on top of list of 30 countries worldwide, followed by the UK and with China only in the third position.

Table 68 - US Indicators 2020-2022 Overview

Name	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	15,275	16,492	16,567	0.5%
Data professionals' employment share	% of Data professionals on total employment	5.2%	5.4%	5.4%	0.6%
Number of Data Suppliers	Total number of data supplier companies (000s)	315,857	324,300	330,357	1.9%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	213,463	242,358	289,483	19.4%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	213,463	242,358	289,483	19.4%
Value of the Data Economy (Backward Impacts)	Backward Impacts (Million €)	163,296	232,101	276,269	19.0%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	1.3%	1.3%	1.4%	3.5%

Figure 52 - US Annual Growth Rates 2022 - Key Metrics



9.3 China

The People's Republic of China is emerging as a significant contributor to the data market through its development of advanced technologies and specifically artificial intelligence and has the capability to be the more dominant supplier of data tools and data to the worldwide data market. China has growing capabilities in AI, 5G telecommunications, and high-performance computing and this could

easily present China as a significant competitor to the US within the data field. Table 68 and Figure 52 present the key statistics for the US.

Under the presidency of Xi-Jinping, the country has multiplied its efforts towards a solid digital economy notwithstanding the difficulties in coming to terms with the Covid-19 emergency. After years of unabated growth, China's Gross domestic product (GDP) grew just 2.8% in 2022 as lockdowns weighed on activity and confidence, according to the median forecasts of 49 economists polled by Reuters[20], slower than a 3.2% rise seen in October's forecast and braking sharply from 8.4% growth in 2021. On top of these macro-economic issues, the country continues to suffer from a relatively smaller share of qualified labour force in services industries (43%) if compared with the EU(73%), thus making it relatively more difficult to generate, share and use data on a very large scale. However, the sheer size of China's economy and population ensures that the number of data professionals amounts to more than 10 million units in 2022, second only to the US.

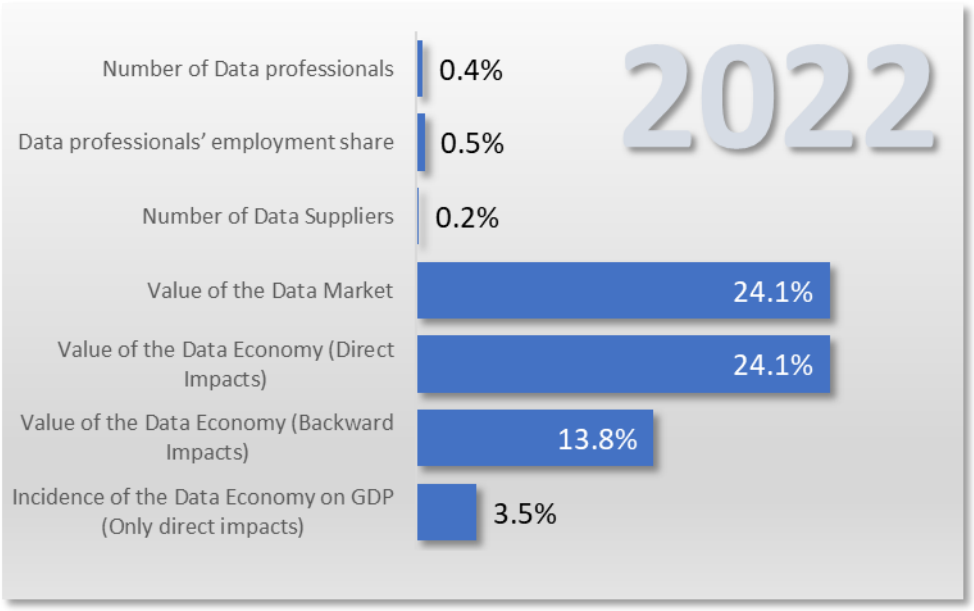
The size of companies in China tends to be smaller than in the US and, to a lesser extent, to the EU. As a result, companies using data as core of their businesses are more concentrated in high-tech and professional services sectors. At the same time, the high share of the labour force employed in agriculture (28% vs. 5% for the EU) also suggests a lower propensity to focus on data as core to their business. In spite of this, the number of data companies in China will continued to grow in 2022 as the country rapidly transitions from an agricultural economy straight to a data-driven industrial one. The country has shown its ability to transition over the recent past and will continue to develop its data economy over the period of this forecast (to 2030). Table 69 and Figure 53 summarise the key statistics for the People's Republic of China. The country has such good potential for success in the data market because of its size, the investments being made in driving sectors such as education for data professionals, and the potential for transition coming from an agricultural base.

[20] https://www.reuters.com/markets/asia/china-growth-seen-rebounding-49-2023-more-stimulus-cards-2023-01-12/#:~:text=9%20days%20ago-,POLL%20China%20growth%20seen%20rebounding%20to%204.9%25%20in%202023,more%20stimulus%20on%20the%20cards&text=BEIJING%2C%20Jan%2012%20(Reuters),for%20the%20COVID%2Dravaged%20economy.

Table 69 - China indicators 2020-2022 Overview

Name	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	9,184	10,065	10,105	0.4%
Data professionals' employment share	% of Data professionals on total employment	1.2%	1.3%	1.3%	0.5%
Number of Data Suppliers	Total number of data supplier companies (000s)	858,509	887,152	888,658	0.2%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	27,470	31,968	39,664	24.1%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	27,470	31,968	39,664	24.1%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	31,062	42,144	47,966	13.8%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.8%	0.9%	0.9%	3.5%

Figure 53- Peoples Republic of China Annual Growth Rates 2022 - Key Metrics



9.4 Brazil

With one of the highest number of lives lost in the world, Brazil is still coping with the damages inflicted by the Covid pandemic. The economy recovered in 2021 following a recession in 2020, with the recovery mainly in the services sector – one of the key drivers of the data market. However, 2022 is expected to show lower growth – below 1% in GDP – given the political uncertainty that dominated the country throughout the year in view of the presidential elections that were held in October 2022. The uncertainty is likely to affect the country in 2023 as well because of the narrow margin of victory of President Lula and, more importantly, because of the riots that shook the capital in the aftermath of Lula's inauguration on 1st January of this year.

The country would benefit from the development of the data market, using artificial intelligence to boost efficiencies on organisations as productivity is low in the country when compared to e.g., China

or the US. However, a brake on development of the data economy could be the relatively weak student performance in the country, which is among the lowest of the OECD members.

In Brazil, the transformation of business models through data-driven technologies is clearly visible in many areas. Digital start-ups are threatening to disrupt consolidated markets like transport (e.g. Loggi, 99) or banking (e.g. Nubank, Creditas). Mercado Libre, an Argentinian online marketplace with major stakes in Brazil, recently reported that its payment service Mercado Pago Point in the country by far surpassed its merchant service business in terms of volume[21]. As another example, the business-to-consumer (B2C) food delivery app iFood has recently increased the scope of products, offering food supplies and market analysis to restaurant owners (B2B). The Chinese e-commerce giant Alibaba, as Amazon's AWS, is now offering Alibaba Cloud services to business customers in Brazil (Bnamericas, 2019).

Brazil's data economy is therefore continuing on a growth path despite the country's political instability and mixed economic picture. Our estimates for the year 2022 display solid year-on-year growth in most of the indicators under consideration in our analysis. In particular, both the value of the data economy (direct impacts) and the value of the data market exhibit a 4,4% increase vis-à-vis the previous year – a value that, while lower than the one in the US or in the EU, confirms the positive trend of the Brazilian data-driven economy. The country has also visibly improved on the data professional front, with a year-on-year growth in 2022 remarkedly higher than in the EU or the US – a sign that the efforts on education and professional training that were made during the Rousseff's and Lula's administrations are starting to pay off.

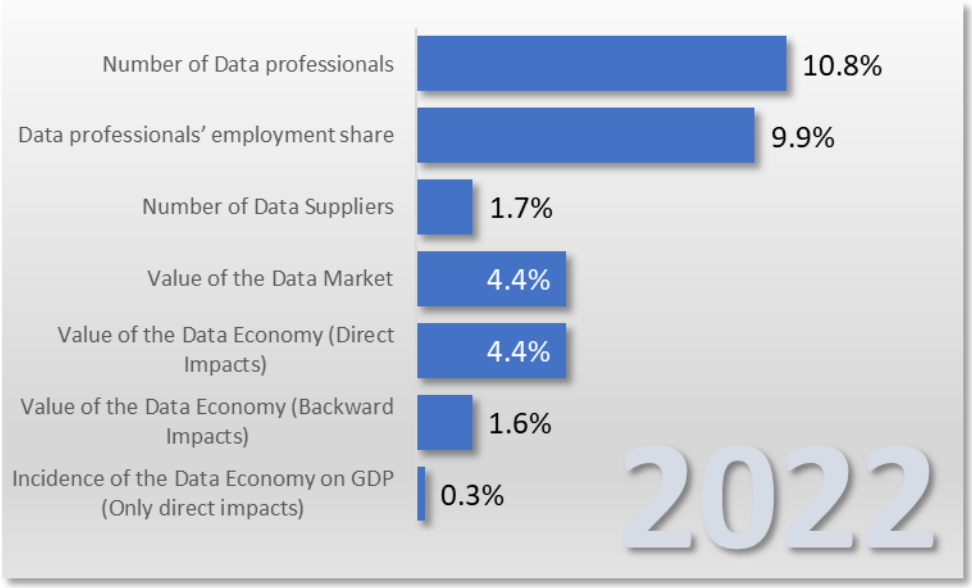
Table 70 and Figure 54 summarise a positive 2022 for the country and the expectation is for further growth.

Table 70 - Brazil Indicators 2020-2022 Overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	1,244	1,272	1,409	10.8%
Data professionals' employment share	% of Data professionals on total employment	1.0%	1.0%	1.1%	9.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	39,606	41,261	41,947	1.7%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	8,374	8,865	9,252	4.4%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	8,374	8,865	9,252	4.4%
Value of the Data Economy (Backward Impacts)	Backward Impacts (Million €)	7,812	10,841	11,018	1.6%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.2%	0.2%	0.2%	0.3%

[21] https://www.oecd-ilibrary.org/sites/e9bf7f8a-en/1/3/6/index.html?itemId=/content/publication/e9bf7f8a-en&_csp_=4d15becbcaf4101a1f8bb9316741cfec&itemIGO=oecd&itemContentType=book#chapter-3

Figure 54- Brazil Annual Growth Rates 2022 - Key Metrics



9.5 Japan

Japan's economy is regaining momentum with recent efforts that are shifting from emergency support measures to targeted policies and reforms to boost labour force participation and productivity. Improving public spending efficiency, including through digitalising more government services, and gradually raising the consumption tax, which is low by OECD standards, are slowly but steadily reducing the public debt-to-GDP ratio, thus helping a relaunch of the economy as well as increased investments in digital infrastructure and business digitalisation. However, Japan's dependence on fossil fuels poses a geo-political problem. As energy prices rises European economies will switch to more sustainable renewable fuel sources to mitigate the increased cost, while Japan still consumes considerable fossil fuels, which put the country at an economic disadvantage in the longer term.

The data economy remains robust, and its share of GDP is ahead of the EU and comparable with that of the US. However, Covid affected Japan more than several other OECD countries and the country is only now recovering economically with GDP growth expected to be over 3% (OECD forecast) in 2022. What is more, Japan has a well-developed digital infrastructure, a highly skilled workforce and is at the leading edge of technologies such as robotics, yet many small firms are lagging behind in adopting digital tools. More investments in tech sector hardware and research, greater efforts to diffuse new technologies throughout business and government, and more firm-based training in digital skills would help further develop the country's data economy and, more importantly, would tackle Japan's long-standing issue of low productivity[22].

We anticipate reasonable growth for the data market and the number of data professionals in Japan, although there is significant opportunity in the country to improve STEM education and increase the number of data professionals emerging from the market. The value of the data market and data economy in Japan is estimated to grow in 2022 at a 16,3-percentage rate – a value in line with the

[22]https://japannews.yomiuri.co.jp/business/economy/20221220-78590/#:~:text=OECD%20data%20on%20labor%20productivity,was%20first%20compiled%20in%201970.

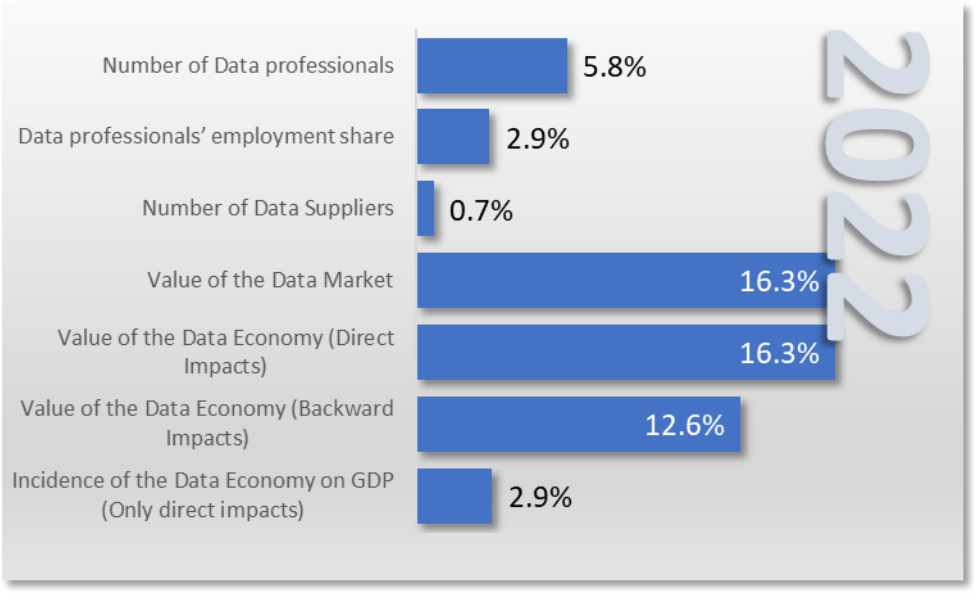
trend exhibited in the EU and slightly lower than in the US. The incidence of the data economy on GDP is equally mirroring the one in the US and therefore considerably higher than the incidence in the EU.

Table 71 and Figure 55 summarise the data economy for Japan.

Table 71 - Japan Indicators 2020-2022 overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	4,398	4,536	4,801	5.8%
Data professionals' employment share	% of Data professionals on total employment	3.3%	3.4%	3.4%	2.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	106,214	106,994	107,720	0.7%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	36,649	39,570	46,011	16.3%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	36,649	39,570	46,011	16.3%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	30,960	40,145	45,197	12.6%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	1.2%	1.3%	1.4%	2.9%

Figure 55- Japan Annual Growth Rates 2022 - Key Metrics



9.5 Comparing the Internationals to the EU27

The relevant EU27 indicators are re-posted in Table 72 and Figure 56 to give a reference for comparison with the other international countries covered in this chapter.

The EU27 continues to show good growth in 2022 as the number of supplier and user companies rises, and the number of data professionals needed to support increasing data use also rises. 2021 was a tough year for the region in macroeconomic terms. The real gross domestic product (GDP) in the EU27 showed a moderate rebound, even if economic activities were still affected by the containment measures. Nevertheless, GDP remained below the 2019 pre-COVID level, as the economic fallout due to COVID-19 resulted in a 5.9% decrease in 2020. Despite these difficulties, GDP growth in the EU27 is expected to be above 4% (OECD) for 2022. This impacted growth in 2021 but there is an expectation for recovery in 2022, with the data market among the Member States showing growth of 12.6% (as seen in Figure 56).

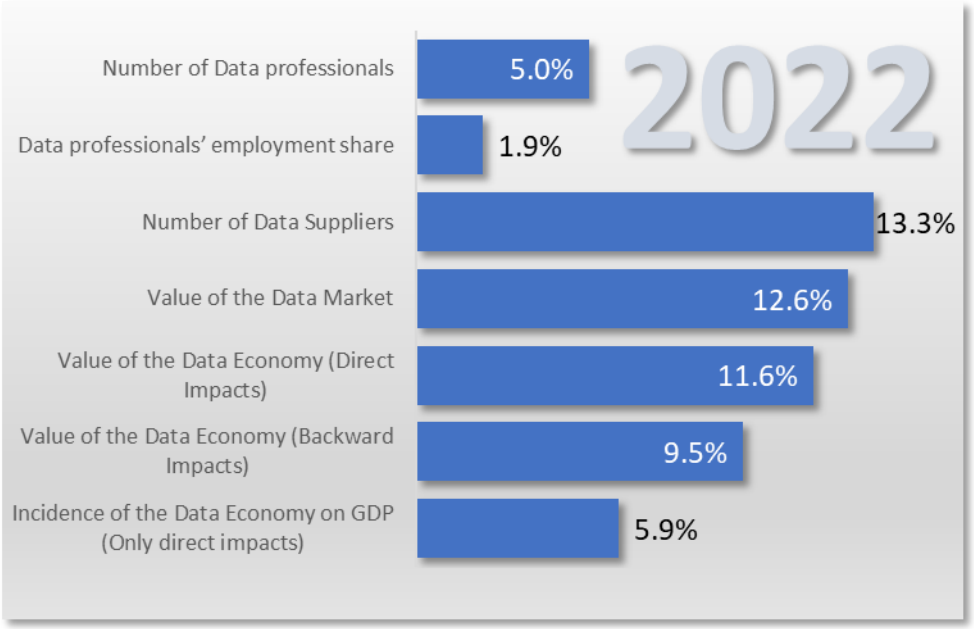
All in all, the EU27 appears to confirm its second position in terms of size and strength of the data market and data economy if compared against the present international background. European firms lag the US in the adoption of digital technologies, and this is reflected in the size of the data market as measured by our indicators – in 2022 the data market in the EU27 is still approximately one fourth of the one measured in the US. Slow recovery from Covid-19 in 2022 is possibly one explanation but other reasons such as the small size of companies in Europe vis-à-vis other regions of the world and, in particular, the US should be included. Structural barriers to investment in digitalisation, policy fragmentation, lack of awareness of the potential digital upsides and an insufficient number of digitally skilled workforce are other very well-known reasons that may account for the EU's current gap vis-à-vis the US.

The following table presents the overall picture of the EU27 with respect to the indicators that we have measured for this international comparison. More specific comments are offered in the sections below.

Table 72 - EU27 indicators 2020-2022 Overview

	Metrics	2020	2021	2022	Growth 2021-2022
Number of Data professionals	Total Number of Data professionals (Thousands)	6,502	6,957	7,307	5.0%
Data professionals' employment share	% of Data professionals on total employment	3.6%	4.0%	4.1%	1.9%
Number of Data Suppliers	Total number of data supplier companies (000s)	175,605	190,796	216,209	13.3%
Value of the Data Market	Estimate of the overall a value of the Data Market (Million €)	60,635	64,820	72,963	12.6%
Value of the Data Economy (Direct Impacts)	Direct Impacts (Million €)	71,050	75,287	83,992	11.6%
Value of the Data Economy (Backward Impacts)	Backward Indirect Impacts (Million €)	108,546	115,738	126,727	9.5%
Incidence of the Data Economy on GDP (Only direct impacts)	Ratio between value of the Data Economy and GDP (%)	0.6%	0.6%	0.6%	5.9%

Figure 56- EU27 Annual Growth Rates 2022 - Key Metrics



Data professionals

The Member States' employment share of data professionals – as a share of total employment (Table 74) – remains low but is showing improvements with a 2% growth when compared to 2021 (see Table 73 and Figure 57). It is the third largest of the four international countries presented in this section, mainly because of the drop in employment share for Brazil. China's employment share is lower than in the other internationals primarily because of the sheer size of the total employment in the country which, not surprisingly, reflects the total amount of population in China. In absolute terms, China has nearly 40% more data professionals than the EU although this is growing more slowly than the EU too. The education and training of data professionals in the European Union needs development to ensure enough data professionals to meet the growing demand from companies wishing to extend their data capabilities, in particular the on-the-job training for existing staff being re-skilled into data-oriented roles.

Table 73 - Internationals: number of Data Professionals 2020-2022

	2020	2021	2022	Growth 2022/2021
Brazil	1,244	1,272	1,409	10.8%
Japan	4,398	4,536	4,801	5.8%
United States	15,275	16,492	16,567	0.5%
China	9,184	10,065	10,105	0.4%
EU27	6,502	6,957	7,307	5.0%

Figure 57 - Internationals: Number of Data Professionals 2020-2022

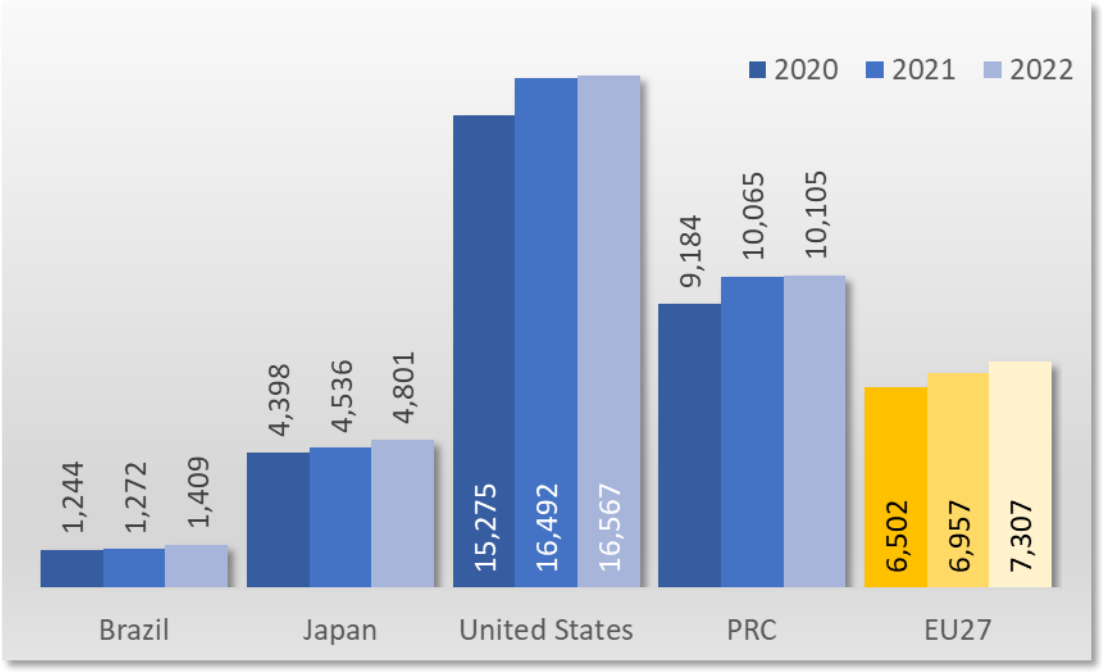


Table 74 – Internationals: Data Professionals - share of Total employment 2020-2022

	2020	2021	2022	Growth 2022/2021
Brazil	7.7%	2.4%	2.6%	9.9%
Japan	5.5%	8.2%	8.3%	1.5%
United States	6.4%	12.5%	12.5%	0.4%
PRC	1.2%	1.3%	1.3%	0.5%
EU27	3.6%	4.0%	4.1%	1.9%

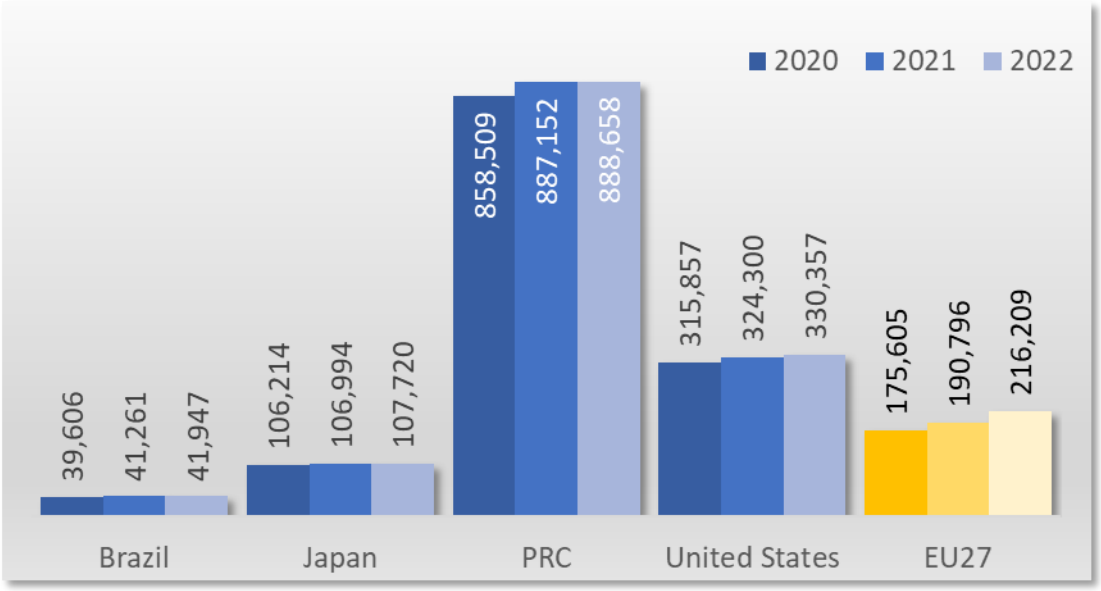
Data Supplier Companies

The People's Republic of China accounts for nearly two-thirds of the internationals' data supplier companies – as seen in Table 75 and shown graphically in Figure 58). Growth in the number of data supplier companies is low for the international countries while the EU motors ahead with a 13.3% increase forecast for 2022. The range of data capabilities possible with the data market ensures many new companies will emerge with very specific skills to provide very specific services, before being acquired by larger wide range companies and integrated into them. As an example of emerging specialisations, in retail there are companies in Europe that focus exclusively in retail demand forecasting for consumer packaged goods, allowing retailers to predict and order stock more efficiently, and also meet anticipated surges in demand as a result of e.g., hot weather, or specific holidays. These specialisations stretch across all industries and improved data reporting enable companies to form to focus on a very specific demand.

Table 75 - Internationals: Number of Data Supplier Companies 2020-2022, growth 2021-2022 (%)

	2020	2021	2022	Growth 2022/2021
Brazil	39,606	41,261	41,947	1.7%
Japan	106,214	106,994	107,720	0.7%
PRC	858,509	887,152	888,658	0.2%
United States	315,857	324,300	330,357	1.9%
EU27	175,605	190,796	216,209	13.3%

Figure 58 - Internationals: Number of Data Supplier Companies 2020-2022



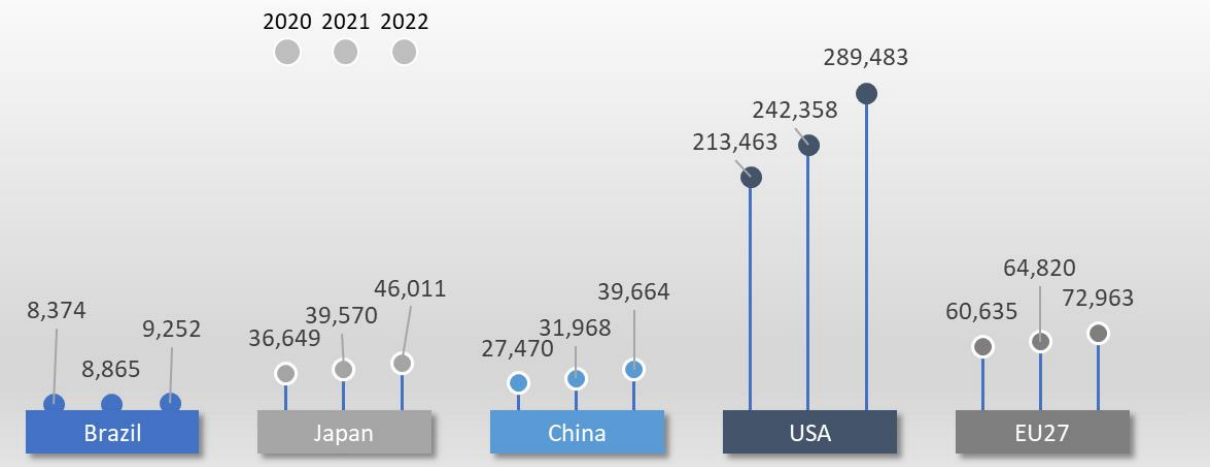
Data Market

The data market in the European Union remains strong in 2022 (Table 76, Figure 59) but most of the non-EU countries investigated in this chapter show higher growth than the EU (with the exception of Brazil). Figure 59 makes very clear the dominance of the world market shown by the US. China's data market is surprisingly small considering the size of the country's economy. The pace of its growth, however, suggests that China has the capability to dominate the global data market in years to come because of its growth dynamics and the number of data user companies that the country can support. China's investment in data skills, and the focus on artificial intelligence as a technology will ensure this market will become a major opportunity for companies that sell data tools, data, and data services. The US and Japan exhibit solid growth in the data market for the period 2021-2022 thus confirming a consolidated trend that, notwithstanding the macroeconomic difficulties of the past two years, is not expected to be reversed in the near future.

Table 76 - Internationals: value of the data market 2020-2022 and growth 2021-2022 (%)

	2020	2021	2022	Growth 2022/2021
Brazil	8,374	8,865	9,252	4.4%
Japan	36,649	39,570	46,011	16.3%
PRC	27,470	31,968	39,664	24.1%
United States	213,463	242,358	289,483	19.4%
EU27	60,635	64,820	72,963	12.6%

Figure 59 - Internationals Data Market Value 2020-2022 (€M)



The Data Economy

Table 77 and Figure 60 show the impacts on the economy of the data market across the five regions and countries under consideration. The data economy adds significantly to the overall economy and the extension of the perimeter to include a wider range of industries within the data market makes a notable contribution to the growth in indirect impacts. Clearly the size of the impacts aligns with the size of the data market for each country or region, rather than with the GDP of that country, which is why China has the second lowest impact but the second highest GDP among all the internationals. The highest growth of the data economy in the period 2021-2022 in terms of direct impacts was registered in China as clearly the country is still starting from a relatively small base of in absolute size if compared to the other countries. The US and Japan's dynamism were also confirmed in 2022 with year-on-year growth rates of 19,4% and 16.3% respectively. The EU27 scored a very promising 11.6% growth rate in the same period – a reassuring result for a mature economy boasting the second-largest data economy in size among the countries under consideration, second only to the US.

Table 77 - Internationals: economic Impact (direct and indirect) 2020-2022, growth 2021-2022 (%)

		2020	2021	2022	Growth 2022/2021
Brazil	Internationals - Direct impacts	8,374	8,865	9,252	4.4%
Brazil	Internationals - Indirect impacts	7,812	10,841	11,018	1.6%
Japan	Internationals - Direct impacts	36,649	39,570	46,011	16.3%
Japan	Internationals - Indirect impacts	30,960	40,145	45,197	12.6%
PRC	Internationals - Direct impacts	27,470	31,968	39,664	24.1%
PRC	Internationals - Indirect impacts	31,062	42,144	47,966	13.8%
United States	Internationals - Direct impacts	213,463	242,358	289,483	19.4%
United States	Internationals - Indirect impacts	163,296	232,101	276,269	19.0%
EU27	Internationals - Direct impacts	71,050	75,287	83,992	11.6%
EU27	Internationals - Indirect impacts	108,546	115,738	126,727	9.5%

Figure 60 - Internationals - Economic Impacts 2020-2022

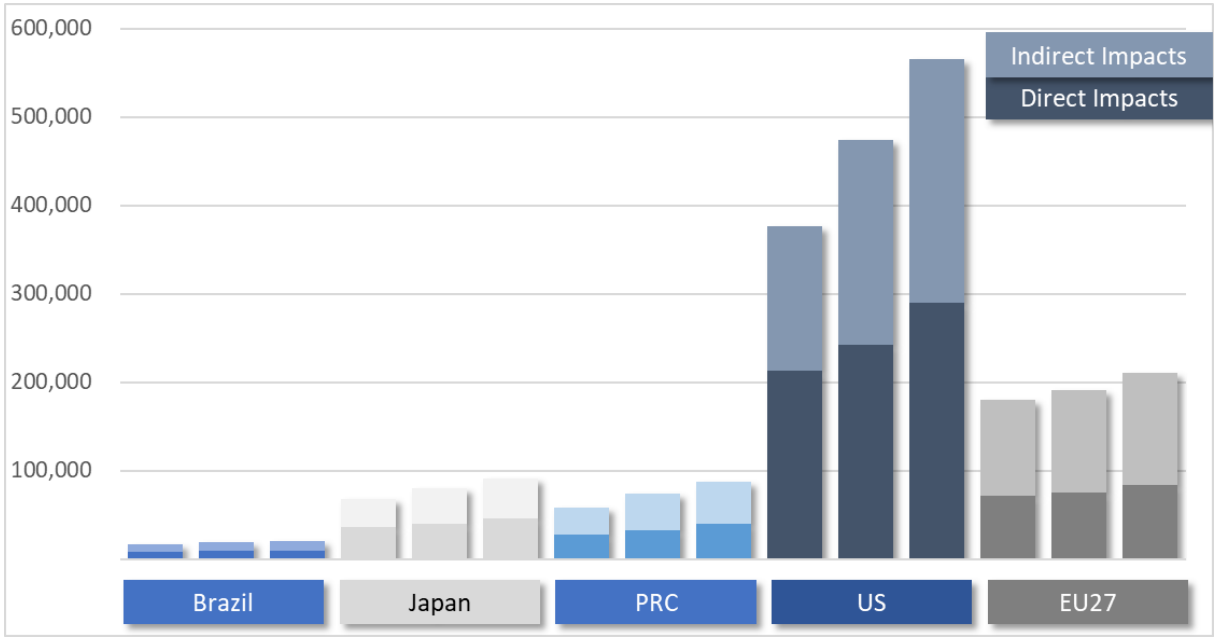
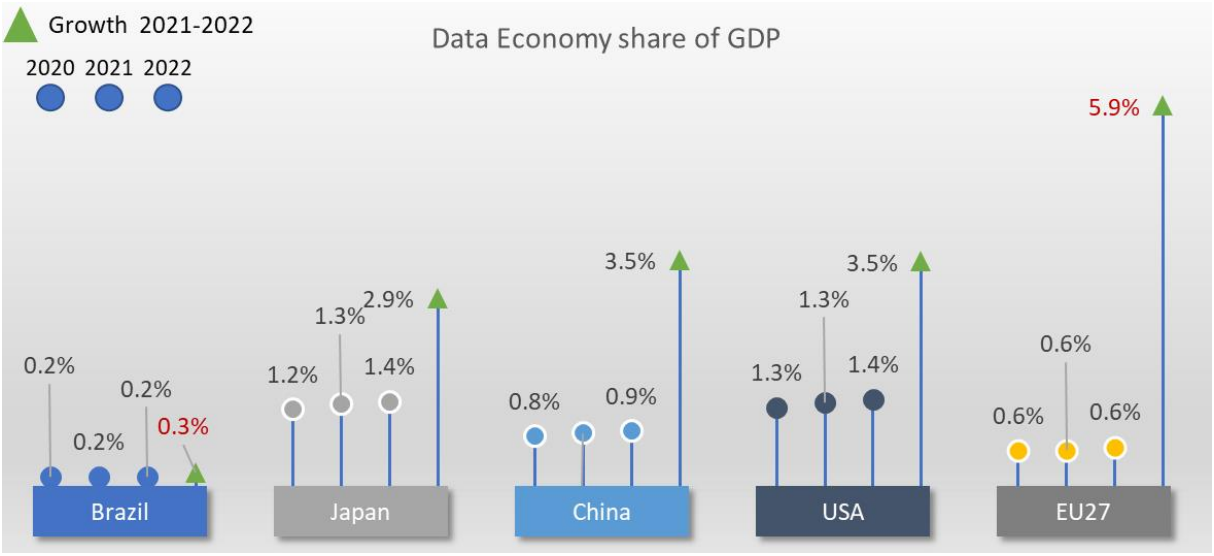


Table 78 and Figure 61 show the incidence of the data economy on the total economy, and the EU shows the highest growth for 2022, although the incidence of direct and indirect impacts is again among the lowest of the internationals.

Table 78 - Internationals: Impact of the data economy on GDP 2020-2022 (Direct and indirect impacts)

	2020	2021	2022	Growth 2022/2021
Brazil	0.20%	0.20%	0.20%	0.3%
Japan	1.23%	1.31%	1.35%	2.9%
PRC	0.82%	0.87%	0.90%	3.5%
United States	1.26%	1.34%	1.39%	3.5%
EU27	0.60%	0.61%	0.65%	5.9%

Figure 61 - Internationals - Impact of the Data Economy on GDP 2020-2022 and 2021-2022 Growth (%)



9.5 Key Findings

KEY HIGHLIGHT FOR THE EU27

The data economy in Europe shows reasonable growth confirming the EU27's second position in terms of size (after the US) but only third position (after the US and China) in terms of growth. The EU27 shows the signs of a mature, yet promising data economy.

The EU27 data economy's share of GDP is among the lowest of the Internationals. On the other hands, the size of Europe's data economy and data market in absolute terms continue to be remarkable if compared to the other countries under consideration.2022 showed good growth for the region though, with the number of data suppliers up by 13.3%, and the value of the data market up by 12.6% compared with 2021. However, many of the other countries in the internationals group showed higher growth for their domestic data markets.

China has the greatest potential simply due to its size and level of investment. It has the largest number of data companies with more than twice the number of its nearest competitor, the US , **although growth in 2022 was low at 0.2%**, while the EU27 grew the number of data companies by 13.3%. While still emerging in the data economy space, China is rapidly becoming a world protagonist in the development of advanced technologies and specifically artificial intelligence. This could potentially transform the country into a dominant supplier of data and data tools in to the worldwide data market in the near future.

The US has the largest data market value, accounting for three-quarters of the Internationals (not including the EU27) data market. It is the foundation of much of the data industry and its position is unassailable in the near-term future. China's competition, however, is becoming more and more visible. . With the largest number of data user companies China is well placed to take a larger share of the existing internationals' home data markets without giving up access to its own market. However, political activity might exclude many Chinese companies should some of the internationals (e.g., the US, Europe) refuse access to Chinese companies, as happened with 5Gtechnology in telecoms.

Japan will grow the value of its data market by 16.3% in 2022 to €46Billion, from €39.5Billion in 2021. The country will also show the second highest growth in data professionals for 2022, cementing its position in the middle ground in terms of the number of data professionals. Japan is the closest match to the European Union in terms of size and growth in the number of data professionals and the data market although its economy behaves very differently. After a difficult 2018-2020 economic performance, the recovery that began in 2021 should improve into 2022, and the country can continue its investment into the data economy to improve its productivity growth to levels seen in Europe. However, Japan suffers from a high dependence on fossil fuels. As energy prices rises European economies will switch to more sustainable renewable fuel sources to mitigate the increased cost, while Japan still consumes considerable fossil fuels, which put the country at an economic disadvantage in the longer term.

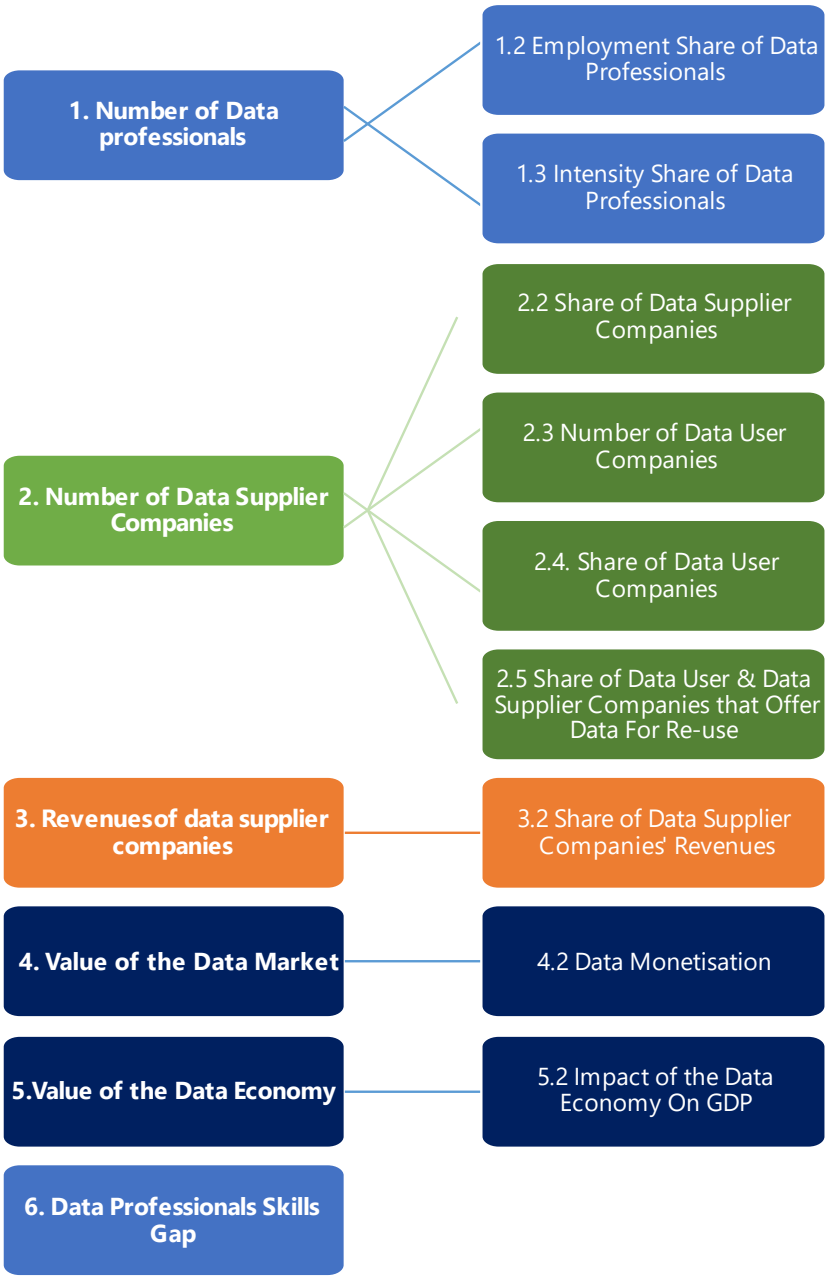
Despite its political and economic instability, Brazil is continuing on a growth when it comes to the development of its data market and data economy.

The positive outlook seen for the economy when this series of reports began has faded. However, the country will show the highest growth among the internationals for the number of data professionals in 2022, growing by 10.8%, lifting its data professionals share of total employment to 9.9% by 2022, the highest of all the international economies considered. For comparison, the EU employment share for data professionals of total employment is only 1.9% - the second highest. Brazil's data market will also grow the least in 2022, at only 2.4%. Covid plunged the economy into recession in 2020 and the country is only just starting to recover from this. Brazil's change of administration at the end of 2022 bodes well for the years to come.

10. Conclusions

This Second Report on Facts & Figures (Deliverable D2.4 of the European Data Market Study 2021-25, VIGIE 2020-0655) has presented the results obtained through the second round of measurements of the European Data Market Monitoring Tool for the period 2020-2023 with forecasts for 2025 under baseline scenario and for 2030 under three distinct scenarios.

The results pertained to the following set of indicators, as per the updated version of the European Data Market Monitoring Tool:



Each indicator has been measured for the total EU27 and for all the EU27 Member States when available and applicable; industry-specific and company-size views are also offered, with indicators provided by industry sector and company size band when possible. The UK and Switzerland were measured separately in an aggregated way, as were the countries of the EEA (Norway, Iceland, and Lichtenstein). As in the previous European Data Market Studies (SMART 2013/0063 and SMART 2016/0093), a select number of indicators has been developed and updated – this time, for four non-European countries, Brazil, Japan, the United States, and China.

10.1 Data Professionals

KEY HIGHLIGHT FOR THE EU27
The outlook for the number of data professionals will depend on the ability to train and educate people to work with data across a wide range of company types and sizes. The expansion of the definition of data supplier companies to include significantly more industries places a burden on universities and companies to deliver the required number of professionals cognizant with dealing with data. Without this stream of professionals there will be a brake on the growth of the data market.
There will be more than 9.3 million data professionals in the EU27 by 2030 (Baseline forecast), a growth of 3.5% per year between 2025 and 2030.
Data professionals share of total employment rises again, to 4.2%, up from 4.0% seen in 2021, confirming the growth of the data economy and the supporting workforce needed.
The average number of data professionals in 2022 is estimated at 12.6 per thousand data user companies, up again from 12.4 seen in 2021.
In the shorter term, there were 7.3 million data professionals in the EU27 in 2022, rising to 8.3 million in 2025. A growth of 3.6% per year between 2020 and 2025.
Across the industries, Professional Services adds the most in terms of number of data professionals between 2025 and 2030, accounting for nearly 25% of the data professionals added during this period, while information and communication showed the third highest annual growth out to 2030, it added the second most to the number of data professionals due to its size.

10.2 Data Companies

KEY HIGHLIGHT FOR THE EU27
The number of data user companies in the EU27 will grow to more than 579,000 companies by 2022, a growth over 2021 of 3.3%, continuing the growth trend seen in 2021, which also grew by 3.3%
By 2030 (Baseline scenario forecast) data user companies will account for more than 905,000 companies, growing at an annual rate of 6.9% between 2025 and 2030 Baseline. This builds on the growth seen for data user companies between 2020 and 2025 of 3.6% - an acceleration in growth out to 2030.
Data User penetration rates – i.e., the number of data user companies as a share of total companies, is stable, but varied across Member States, with an average penetration rate of 2.2% for the EU27 Member States. Penetration rates are as low as 0.6% for data user companies in Greece, and as high as 7.2% for Austria. Data User Adoption rates reflect the focus each Member State has on data intensive industries, and hence the industry profile for each Member State is an indication of which Member States are likely to have higher rates.
The services industries are those which are more likely to be data intensive, and hence have a higher number of data user companies. These service industries are Professional Services, Retail and Wholesale, and Information and Communication, but Manufacturing also has a high intensity of data use. However, Growth out to 2030 (Baseline) is evenly balanced across the industries, so the dominance seen by the services industries in terms of data user companies is unlikely to change over the period of this forecast. **The top four industries account for nearly 70% of the growth between 2025 and 2030 (Baseline)**
Small and mid-sized companies account for 98% of all data user companies in the European Union. Larger companies show slightly higher growth between 2025 and 2030 (Baseline scenario) but 98% of the growth in the number of data user companies comes from the small and mid-sized sector: companies with fewer than 250 employees account for 98%of the total number of data user companies added between 2025 and 2030. However, larger companies will invest more in digital technology. The expertise and levels of investment to be successful are high, and those companies with fewer than 10 employees cannot afford the level of expertise needed to exploit data markets and their own data resources at the same level as smaller companies. Large companies spend up to 120 times those of small and mid-sized companies in 2022 among the EU27 Member States.

10.3 Data Supplier Companies

KEY HIGHLIGHT FOR THE EU27
Data Companies' revenues will reach nearly €84 billion among Member States by 2022, nearly €116 billion across the whole of Europe.
Data Companies' revenue increased in this forecast, and **by 2030 (Baseline scenario) data companies' revenues will be 11% higher than previously forecast**. This is mostly due to the increased revenue associated with artificial intelligence systems, which is growing faster than expected in the prior forecast. The mix of AI revenues changed, with more focus on machine learning and the tools associated with AI machine learning.
Data Companies' revenues account for 0.4% of all EU27 companies' revenues in 2021, up from 0.3% in 2020 – demonstrating the growing importance of the data economy in the overall EU economy.

Larger companies show a larger share of total revenues, accounting for 86% of all companies' revenues in 2022. This share remains constant out to 2030 (Baseline). While large companies (with greater than 250 employees) account for only 2% of all companies in the EU, their revenues are significantly higher than small and medium companies as they are more able to invest in the tools, technologies, and people needed to grow data market revenues.
Data Revenues differ from the data market – as data revenues reflect the global income for data companies based in the European Union, whereas the data market includes data revenues taken in Europe by all companies, irrespective of whether they are headquartered in the European Union or not. These two track each other as the data market is a global market, and the imports and exports of data tools, hardware, and services, and data are expected to track each other over the duration of this forecast.

10.4 Data Market Value

KEY HIGHLIGHT FOR THE EU27
The value of the data market in the EU27 reached €73Billion by 2022, a growth of 12.6% over 2021. The data market is growing strongly, ahead of ICT spending, which grew by 5.8% over the same period. By 2022 spending in the Data Market among the EU27 Member States will account for 12.0% of ICT spending., rising from 11.3% in 2021.
The growth of the data market is driven by demand in the services industries: primarily from Finance, Manufacturing, Public Administration, Information and communications, professional services, and retail and wholesale. **The top four of these account for 80% of the growth seen in the data market between 2020 and 2022**, and the top 5 account for 81% of the growth between 2020 and 2030 (Baseline)
The size of the data market by Member State correlated well with the economic strength of each Member State, with the larger shares going to Germany, France, Italy, the Netherlands, and Spain. These five account for nearly two-thirds of the data market in 2030 (Baseline)
In terms of total Data Market spending added between 2025 and 2030 (Baseline), **Germany adds the most out of the Member States at 12.1%**, followed by the Netherlands and Spain. France – the second largest Member State – is only fourth in terms of the spending it adds to the data market over this period. Although one of the largest, growth in France is lower than the EU27 average, reflecting the less intense focus of the country on service industries – the biggest users of data.
Data Monetisation adds to data market spending, although it is included separately in this report. Monetisation grew by 28.3% in 2022 over 2021, significantly faster than the data market itself, to €189Billion. This is expected to reach 39.3Billion by 2030 (Baseline) at a compound rate of 6.1% per year from 2025.

10.5 Data Economy

KEY HIGHLIGHT FOR THE EU27
Despite the economic turmoil, the market for intelligent analytics and data technologies has been one of the vibrant. Enterprises are increasingly recognizing that business transformation and

business benefit is dependent on improved use of data. Recent economic and political market shocks have not caused long-lasting reduction in data analytics market growth.

In 2022 the data economy will reach the threshold of €500 billion, with an annual growth of 8.7% on 2021. IDC expects that in 2025 the data economy for the EU27 will reach €640 billion, with a share on GDP of 4.8%. Finally, in 2030, the data economy for the EU27 is expected to remain slightly below the €1 trillion threshold, with a 5.5% 2025–2030 CAGR and a share on GDP of 5.7%.

KEY HIGHLIGHT FOR THE EU27 According to the scenarios
The two alternative scenarios will consider a slower growth of the impacts in the overall economy in 2030 for a Challenge scenario, affected by a slower growth of GDP as well, and a faster growth for data economy and GDP for a High Growth scenario. The pace of growth, measured as the compound annual growth rate (CAGR) in 2030–2025 for the EU27 in a Challenge scenario will be less than a half the growth expected in a Baseline scenario (2.5% compared to 5.5%), and nearly double in a High Growth scenario (10.0%).

Multiple trends have been highlighted to be drivers or support of further investment in data and analytics technologies: the European strategy for data, the investments in cloud and artificial intelligence, the Next Generation EU funds and the sustainability goal, among other trends.

The composition of impacts changes over time, from 2022 to 2030, in favour of induced impacts, despite slowly, but thus revealing the effects of data access, data products and services exchange, and data value distribution in the economy.

The highest share of the data economy's value is generated in the finance sector, where great focus is placed on open banking, security solutions, digital payments, and biometrics. The second largest share is represented by the manufacturing and mining industry, with a focus on automation, remote collaboration, and agility needs. Public administration is the third largest industry, investing in modernisation of digital services, digital connectivity, cybersecurity, and digital identity. The top three fastest growing markets in terms of impacts are utilities, public administration and professional services, followed by health and transport.

France, Germany, Italy, followed by Spain, and the Netherlands will contribute the most from 2022 to 2025. NGEU will play a key role, with around 50% of total resources distributed across the four biggest countries in the EU27, thus making a significant difference in the next three years. France and Germany are also among the fastest growing data economies, together with Sweden, Ireland, the Netherlands, Denmark and Finland, as well as Lithuania and Latvia, among others.

10.6 Data Skills Gap

KEY HIGHLIGHT FOR THE EU27

Key Findings – Skills Gap

The skills gap for data professionals already has a significant business impact on organisations in Europe. Business and technology are in rapid development, largely due to ongoing digital transformation of enterprise and society, but also due to a very strong pace of development in technology. A transformation of this magnitude requires large amounts of human capital and skills before the process changes stabilize and become mainstream. The reported skills gap in data

professionals is therefore impacting both existing and coming transformation initiatives and becomes one of the more serious challenges facing the European industries.

KEY HIGHLIGHT FOR THE EU27 According to the scenarios

The gap between supply and demand for data professionals continue to grow. In the Baseline scenario, the gap for EU27 is estimated at 5% of the total number of data professionals in 2022, growing to 5.8% in 2025 and decreasing to 5.6% in 2030.

The underlying driver for the shortage is the significant growth in investments in technology, in turn driven by the digital transformation. Organisations throughout Europe will attempt to remedy the situation by a combination of continuous training, re-skilling, and recruitment, but current efforts may not be enough to significantly reduce the gap by 2030. Therefore, other measures including re-skilling of additional business roles outside data analysis and ICT, and adding data analysis skills to the curriculum of additional university programs will be suggested to mitigate the skills gap in the region.

10.7 Data Economy Beyond the EU: the US, Brazil, Japan, and China

KEY HIGHLIGHT FOR THE EU27

The data economy in Europe shows reasonable growth confirming the EU27's second position in terms of size (after the US) but only third position (after the US and China) in terms of growth. The EU27 shows the signs of a mature, yet promising data economy.

The EU27 data economy's share of GDP is among the lowest of the Internationals. On the other hands, the size of Europe's data economy and data market in absolute terms continue to be remarkable if compared to the other countries under consideration. 2022 showed good growth for the region though, with the number of data suppliers up by 13.3%, and the value of the data market up by 12.6% compared with 2021. However, many of the other countries in the internationals group showed higher growth for their domestic data markets.

China has the greatest potential simply due to its size and level of investment. It has the largest number of data companies with more than twice the number of its nearest competitor, the US , **although growth in 2022 was low at 0.2%**, while the EU27 grew the number of data companies by 13.3%. While still emerging in the data economy space, China is rapidly becoming a world protagonist in the development of advanced technologies and specifically artificial intelligence. This could potentially transform the country into a dominant supplier of data and data tools in to the worldwide data market in the near future.

The US has the largest data market value, accounting for three-quarters of the Internationals (not including the EU27) data market. It is the foundation of much of the data industry and its position is unassailable in the near-term future. China's competition, however, is becoming more and more visible. . With the largest number of data user companies China is well placed to take a larger share of the existing internationals' home data markets without giving up access to its own market. However, political activity might exclude many Chinese companies should some of the

internationals (e.g., the US, Europe) refuse access to Chinese companies, as happened with 5Gtechnology in telecoms.

Japan will grow the value of its data market by 16.3% in 2022 to €46 Billion, from €39.5 Billion in 2021. The country will also show the second highest growth in data professionals for 2022, cementing its position in the middle ground in terms of the number of data professionals. Japan is the closest match to the European Union in terms of size and growth in the number of data professionals and the data market although its economy behaves very differently. After a difficult 2018-2020 economic performance, the recovery that began in 2021 should improve into 2022, and the country can continue its investment into the data economy to improve its productivity growth to levels seen in Europe. However, Japan suffers from a high dependence on fossil fuels. As energy prices rises European economies will switch to more sustainable renewable fuel sources to mitigate the increased cost, while Japan still consumes considerable fossil fuels, which put the country at an economic disadvantage in the longer term.

Despite its political and economic instability, Brazil is continuing on a growth when it comes to the development of its data market and data economy. The positive outlook seen for the economy when this series of reports began has faded. However, the country will show the highest growth among the internationals for the number of data professionals in 2022, growing by 10.8%, lifting its data professionals share of total employment to 9.9% by 2022, the highest of all the international economies considered. For comparison, the EU employment share for data professionals of total employment is only 1.9% - the second highest. Brazil's data market will also grow the least in 2022, at only 2.4%. Covid plunged the economy into recession in 2020 and the country is only just starting to recover from this. Brazil's change of administration at the end of 2022 bodes well for the years to come.

Methodological Annex

Overview

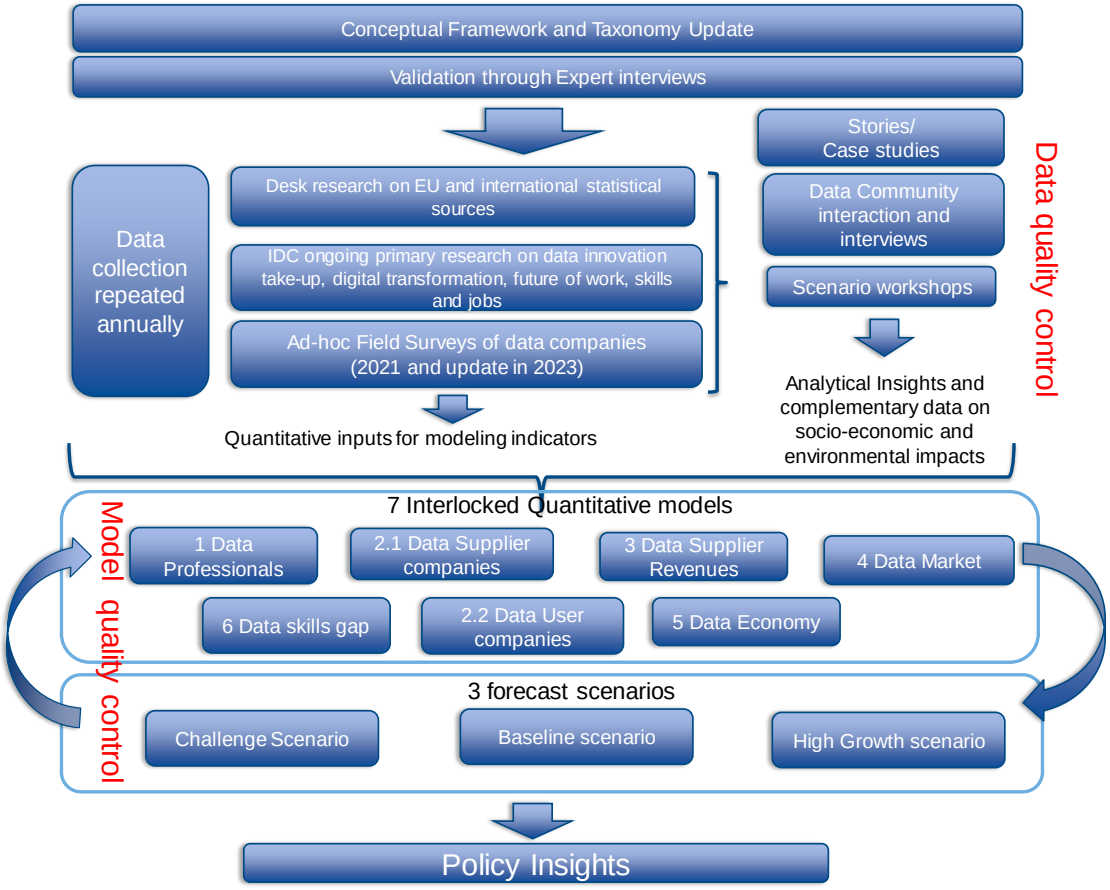
The study required a complex mix of quali-quantitative methodologies allowing to reach the interlocked objectives. While quantitative methodologies represent the most relevant part of the study, qualitative methodologies are indispensable to balance the statistical approach and provide the market and social intelligence needed to lead to policy insights and the development of sound scenarios.

In order to guarantee the continuity of the study, the methodological approach is similar to the previous releases of the EDM Monitoring Tool with the following improvements:

- Updated and revisions of the main indicators' definitions aligned with the maturing of the market and the Data Economy
- Strengthening of the quali-quantitative analysis of socio-economic and environmental impacts
- Additional data collection on data skills and jobs
- Stronger focus on start-ups, thanks to access to data from Dealroom, leading data and intelligence provider on start-ups and scaleups in Europe, and partner of EuropeanStartups.co

The main steps of the methodology did include:

- Revision and update of the Conceptual framework and taxonomy, focusing on:
    - Update of definitions of data professionals, data user companies, Data Market including data monetisation value
    - Definition and management of data sharing and data interoperability issues, including the role of Common European data spaces and the concept of data sovereignty
    - Assessment of social and environmental impacts of data-driven innovation
- Validation of the revision/update through the expert interviews.
- Organisation and implementation of data collection (including desk research and field research) which will be repeated annually to feed into the measurement of indicators.
- The outputs of data collection and qualitative analysis of the 7 interlocked quantitative models used to measure the main indicators (the data companies indicator has 2 models, one for user companies and one for supplier companies).
- In parallel with the calculation of indicators, the scenario forecasting methodology is implemented developing the main assumptions driving the 3 alternative scenarios to 2030 and the forecast of all indicators.
- The quantitative models and the scenarios methodology interact closely and provide reciprocal feedback.
- Quality control accompanied each step of the process, with a focus on data quality control in the data collection phase and on model quality control in the phase of measurement of indicators and development of scenarios. Quality control of deliverables is under project management.



Desk Research

As in the previous editions of the European Data Market study, the study team revised the list of relevant and available public sources, integrated it if necessary and collected the data that are necessary for the indicators' update.

- Concerning the indicators on data market, data companies, data companies' revenues, and the data economy the main sources are:
    - Eurostat business demography statistics in the European Union, treating aspects such as the total number of active enterprises in the business economy, their birth rates, death rates, and the survival rate (last update: March 2020)[23];
    - Eurostat annual structural business statistics with a breakdown by size-class are the main source of data for an analysis of SMEs (latest update: March 2020)[24];
    - IDC Worldwide Black Book Live Edition, monthly updates form the years 2019 through 2024[25]. The Black Book represents IDC's live analysis of the status and projected growth of the worldwide ICT industry in 89 countries.
    - IDC's spending guides[26]. Spending Guides are multi-dimensional, all-in-one data products that present technology forecast data segmented by any or all of the following views: region, country, industry, company size, line of business or use case:

[23] https://ec.europa.eu/eurostat/statistics-explained/index.php/Business_demography_statistics
[24] https://ec.europa.eu/eurostat/web/structural-business-statistics/overview
[25] https://www.idc.com/getdoc.jsp?containerId=IDC_P336
[26] As an example: Worldwide ICT Spending Guide: Industry and Company Size, IDC 2020, Worldwide ICT Spending Guide: Industry and Company Size, IDC 2020 https://www.idc.com/getdoc.jsp?containerId=IDC_P33207

        - IDC Worldwide ICT Spending Guide Industry and Company Size, semi-annual updates for IT Hardware, Software, IT, business and telecom Services from 2019 to 2024 by 20 Industries and 5 size-classes in 53 countries;
        - IDC Worldwide Big Data and Analytics Spending Guide, semi-annual updates for Big Data and Analytics spending from 2019 to 2024 by 20 Industries and 5 size-classes in 53 countries;
        - IDC Worldwide Digital Transformation Spending Guide, semi-annual updates for Digital Transformation spending from 2019 to 2024 by 20 Industries and 278 use cases in 9 regions;
        - IDC Worldwide Artificial Intelligence Spending Guide, semi-annual updates for Artificial Intelligence spending from 2019 to 2024 by 20 Industries and 194 use cases in 9 regions and 32 countries.
    - IDC European Tech and Industry Pulse Survey 2019 2020[27].
    - IDC Big Data and Analytics in the COVID-19 Era: Adoption and Spending Trends Across Vertical in Europe, Jun 2020, IDC # EUR145280920.
    - IDC FutureScape: Worldwide Data and Analytics 2021 Predictions, October 2020, IDC #US46920420
    - IMF World Economic Outlook (WEO) Database, April 2020.
    - Consensus Forecasts, Consensus Economics, monthly updates to July 2020.
    - Review of data on social networks about new and emerging companies through a thorough research of annual reports of the most relevant companies, where available.

- For the data professionals we will use in addition the following sources:
    - OECD publications about the digital economy[28]. As an example, “A roadmap toward a common framework for measuring the Digital Economy”, OECD 2020 and “Going digital: Making the transformation work for growth and well-being: Measuring the Digital Transformation. A Roadmap for the Future” OECD 2020.
    - ILOSTAT (International Labour Organization) Statistics and Databases (2020)
    - EUROSTAT Educational attainment statistics (Last update: 2019)[29].
    - European Data Science Academy (EDSA) project deliverables and publications (2018).
    - IDC's Technology Employment Impact Guide – updated on a semi-annual basis with forecast of employment across 40 technology job roles, including eight data management and analytics roles (Last update December 2020)
    - Cedefop – Skills-OVATE data for vacancy estimations (Most recent data collected between July 2018 and September 2020)
    - Cedefop – Skills Index and Skills forecast (Last update 2019)[30]

- Other sources from which relevant data for the indicators’ measurement and for the three updates of the indicators during the study duration will be:

[27] https://www.idc.com/getdoc.jsp?containerId=EUR145717319
[28] https://www.oecd.org/sti/ieconomy/
[29] https://ec.europa.eu/eurostat/statistics-explained/index.php/Educational_attainment_statistics
[30] https://ec.europa.eu/eurostat/statistics-explained/index.php/Educational_attainment_statistics

- The Digital Economy and Society Index (DESI), Human Capital Dimension, (2a Basic Skills and Usage; 2b Advanced skills and Development), last update, 2018.
- IDC Worldwide Augmented and Virtual Reality Spending Guide.
- IDC Quarterly Wearable Device Tracker.
- IDC FutureScape: Worldwide Future of Work 2021 Predictions, Oct 2020, IDC #US46248920.
- Practices to Make AR and VR a Reality for Enterprises, Jun 2020. IDC #EUR146541720.

In addition, IDC has established a LinkedIn community for European start-ups and scale-ups, which we will be able to poll for specific insights on the topics above. As of March 2021, the community counts 251 members.

Scenarios Desk Research

We used a combination of external sources and IDC sources from its ongoing research. The most relevant sources were the following:

- IDC's European IT spending forecast and key digital trends across European industries and Worldwide Economic and Industry Assumptions. The most recent versions are dated September/October 2020)[31]. These documents are updated quarterly to feed into IDC's ongoing forecasting.
- IDC's FutureScape predictions by technology and industry are delivered once a year: IDC analysts deliver 10 main predictions for the next 2 to 5 years for each vertical market (for example, government or retail) and main technology area (for example Digital transformation). The predictions are developed in a global interactive process between analysts and then are specialised by world region (of which one is Europe). These predictions have proven very useful for the development of scenarios assumptions and storylines.
- The most recent research on Big Data and Analytics, Digital Transformation and Innovation accelerators and emerging technologies.[32]
- The 2025 emerging technologies landscape developed for the ATI (Advanced Technology for Industry) study for EASME-COSME by a consortium led by IDC with Technopolis Group, IDEA, Fraunhofer, Capgemini Consulting, NESTA[33].
- The most recent public studies about digital markets and big data forecasts and trends, by well renowned international bodies and organisations such as Accenture, OECD, Mc Kinsey[34].
- Updated forecasts to 2030 of EU GDP and ICT spending, under 3 alternative scenarios, leveraging the market insights and forecasts of the Economist Intelligence Unit (EIU[35]), the International Monetary Fund, and the OECD.
- Collection and review of all useful data from IDC's extensive databases to estimate the future value of the data market, including for example size and forecast of data stored, size and

[31] As an example: European IT Spending Forecast, 2019–2023: Key Digital Trends Across European Industries, IDC, Nov. 2019, https://www.idc.com/getdoc.jsp?containerId=EUR145632419; IDC Worldwide BlackBook, 2020 https://www.idc.com/getdoc.jsp?containerId=IDC_P336

[32] IDC FutureScape: Worldwide IT Industry 2020 Predictions, IDC, Nov. 2019, https://www.idc.com/getdoc.jsp?containerId=US45599219

[33] https://ati.ec.europa.eu/

[34] A roadmap toward a common framework for measuring the Digital Economy, OECD, 2020 http://www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf

[35] https://store.eiu.com/product/market-indicators-and-forecasts

forecast of data analytics and Big data software, primary research on companies' plans of adoption for data analytics and data-driven applications and services, etc.

- Historical trends emerging from the EDM Monitoring Tool indicators in the period 2019–2025 as per the European Data Market study update (SMART 2016/0063).

Measuring Data Professionals

Definition and Scope

Data professionals *are workers who collect, store, manage, and/or analyse, interpret, and visualise data as their primary or as a relevant part of their activity. Data professionals must be proficient with the use of structured and unstructured data, should be able to work with a huge amount of data and be familiar with emerging database technologies. For 2021–2023 the definition of data professionals was refined to differentiate the roles played by different data users: these are Data Technical Professionals, Data Business Professionals, and Data Consumers. The measure of data professionals includes data technical professionals and data business professionals only.*

Indicator 1 – Data Professionals				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
1.1	Number of data professionals	Total number of data professionals in the EU	Number, 2019–20–21 Forecast 2025. Forecast 2030, 3 Scenarios	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry: 12 industry sectors NACE rev.2
				By size: not applicable
1.2	Employment share	Total number as a share of total employment in the EU	% of total employment, 2019–20–21	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry: 12 industry sectors NACE rev.2
				By Size: not applicable
1.3	Intensity share	Average number of data professionals per company (only for private sector)	Number, 2019–20–21	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry: 12 industry sectors NACE rev.2
				By Size: not applicable

Methodology Approach:

The methodology approach is based on an iterative process and on a calibration process of the final estimates.

Statistical Identification

Data professionals are not classified as such in any of the labour and occupation statistics. In order to define them statistically, we adopted the International Standard Classification of Occupations (ISCO-08), selecting categories where data professionals may be included. The criteria adopted for the selection of the ISCO-08 codes are the following:

- We have selected the occupations where data professionals can be involved either as data providers or as data users;
- We have selected the occupations from 1 to 4-digit disaggregation;
- The occupation codes selected are those where the presence of data professionals can be detected because they fit into the definitions above:
- Data Technical Professional are a smaller subset of Data Professionals as a result of their increased expertise and focus. Out of the four digit ISCO codes only 10 categories are included in the definition of Data Technical Professionals.
- Data Business Professionals are identified as one of the 40 4-digit ISCO categories based on their management responsibilities or lower technical experience or expertise.
- The selected codes relate to the roles and responsibilities highlighted for the Data Technical Professionals and the Data Business Professionals in the preceding paragraphs and are where a significant part of the workers in these categories perform specific responsibilities relating to these roles.
- We excluded all the data professionals which are not included into the knowledge economy perimeter because their occupation is a low skilled one, i.e. with high routine level (as an example, call centre workers are in theory data professionals but since their activity is a routine one and as such excluded from the knowledge economy, they are not considered data professionals).
- Table below shows the detail of the number of codes included in each of the definitions for the 1,2-,3-, and 4-digit categories.

ISCO-08 Structure and Data Professionals	ISCO-08 structured Classification			
	Major Groups (1 digit)	Subgroups (2 digits)	Minor Groups (3 digits)	Units (4 digits)
Number of codes ISCO-08 structure	10	43	131	436
Number of selected codes including data professionals	8	23	52	245
Of which data business professionals	4	7	12	41
Of which data technical professionals	2	3	4	8
Of which data consumers	8	23	51	121

ISCO-08 Structure and Data Professionals				
	ISCO-08 structured Classification			
	Major Groups (1 digit)	Subgroups (2 digits)	Minor Groups (3 digits)	Units (4 digits)
Share of data professionals' codes in the ISCO-08 structure	80%	53%	39%	28%

Calculation of the Quantitative Perimeter

The quantitative perimeter of employment where data professionals are trackable is based on the selected ISCO codes crossed with the NACE classification of economic activities, for each one of the 27 Member States, Switzerland, the EEA countries, the UK and the EU as a whole and has been updated based on the source's updates.

Estimate and Calibration of the Penetration of Data Professionals

The next step is to estimate the percentage of data professionals within the perimeter of data professional candidates. The sets of assumptions will be revised and updated for each release of the study and applied to the model to calculate the share of data professionals by Member State and by industry. The survey of data professional companies and data user companies includes a question relating to the share of workers in each of the categories, and this is one of the prime components of the share estimate.

Forecasting Data Professionals

The same model was applied to forecast data professionals to 2030, by developing specific assumptions by scenario, even though the level of uncertainty is higher, and the reliability of the forecasts is lower.

Measuring Data Companies

Definition and Scope

Data companies *are organisations that are directly involved in the production, delivery and/or usage of data in the form of digital products, services and technologies. They can be both data suppliers' and data users' organisations:*

- ***Data suppliers*** *have as their main activity the production and delivery of digital data-related products, services, and technologies. They represent the supply side of the Data Market.*
- ***Data users*** *are organisations that generate, exploit collect and analyse digital data intensively and use what they learn to improve their business. They represent the demand side of the Data Market.*

Indicator 2 – Description				
N.	Name	Description	Type and Time	Segmentation
2.1	Number of data supplier companies	Total number of data supplier companies in the EU & EEA & UK, measured as legal entities based in one country	Number, 2019–20–21 Forecast 2025. Forecast 2030 (3 Scenarios)	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry:

Indicator 2 – Description N.	Name	Description	Type and Time	Segmentation
				Sectors A, C, D, E, G, H, J, K, M, P, Q
				By company size: below 250 employees above 250 employees
2.2	Share of data supplier companies	Total data supplier companies on total companies in industry sectors A, C, D, E, G, H, J, K, M, P, Q	%, 2019–20–21 Forecast 2025, Forecast 2030 (3 Scenarios)	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry: Sectors A, C, D, E, G, H, J, K, M, P, Q
2.3	Number of data user companies	Total number of data user companies in the EU, measured as legal entities based in one country	Number, 2019–20–21 Forecast 2025, Forecast 2030 (3 Scenarios)	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By Industry: 12 industry sectors NACE rev.2
				By company size: below 250 employees above 250 employees
2.4	Share of data user companies	Total data user companies as share of total private companies	%, 2019–20–21 Forecast 2025, Forecast 2030 (3 Scenarios)	By Industry: 12 industry sectors NACE rev.2
2.5	Share of data user and data supplier companies that offer data for re-use.	Percentage of data companies that offer data reuse as a percentage of total data supplier and data user companies	2020, 2021	By industry: 12 industry sectors NACE rev. 2 By company size band: Below 250 employees Above 250 employees

Methodology Approach

The indicators on Data Supplier Companies and Data User Companies is measured by updating the same model used in the previous EDM study which leverages both IDC and public sources.

Measuring the Revenues of Data Companies

Definition and Scope

Data companies' revenues *correspond to the aggregated value of all the data-related products and services generated by Europe-based data suppliers, including exports outside the EU. This indicator measures the revenues of the data suppliers identified and classified by Indicator 2, for the products and services specified in our definition of the data market. Data companies' revenues do not include data monetisation as part of the data market.*

Indicator 3 – Description				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
3.1	Total revenues of Data Supplier Companies	Total data supplier companies' revenues	Billion €, 2019–20–21	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
				By company size: below 250 employees above 250 employees
3.2	Share of Data Supplier companies' revenues	Ratio between data supplier companies' revenues and total companies revenues in the sectors J and M	% of revenues on total, 2019–20–21	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK

Methodology Approach

The indicator is measured by applying the same model used in the previous EDM study, which calculated the revenues by feeding on:

Data Source	Used in
Data Supplier Companies (Indicator 2)	Data Company Revenues
IDC Core IT Spending guide	Data Company Revenues
IT Big Data and Analytics spending Guide	Data Company Revenues
IDC Worldwide Black Book (standard edition)	Data Company Revenues
IMF World Economic Outlook	Data Company Revenues

Measuring the Data Market

Definition and Scope

*The **Data Market** is the marketplace where digital data is exchanged as "products" or "services" as a result of the elaboration of raw data.*

Indicator 4 – Description				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
4	Value of the data market	Estimate of the overall value of the data market (including data monetisation)	Billion €, 2019–20–21 Forecast 2025 – Baseline scenario, Forecast 2030 (3 Scenarios)	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK By Industry: 12 industry sectors NACE rev.2
4.1	Data monetisation	Sub-indicator Estimate of the value of data monetisation	Billion €, 2019–20–21 Forecast 2025 – Baseline scenario, Forecast 2030 (3 Scenarios)	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK

				By Industry: 12 industry sectors NACE rev.2

Methodology Approach

The data market indicator is updated every year for the duration of the study. The model is built on data from IDC databases concerning the components of hardware, software, and services, spending which fall in the definition of the data market. The value of data monetisation is added to this and is estimated from desk research and the results of the ad-hoc data companies survey. The IDC data is already segmented by country and by industry and this is mapped to the industry segments used in this study using already established mapping tables build from detailed matches of NACE II segments. The respective shares for the software, hardware, services, and data monetisation spending are derived from IDC surveys covering Big Data, IT spending patterns and intentions in the European market, and a survey of data supplier companies and data user companies in key Member States, together with analyst expertise and alignment with IDC's European and worldwide forecasts for the business analytics and Big Data market.

This model updates the data market value shares by MS and by industry and uses the following data sources:

Data Source	Used in
New ad-hoc survey	Data Market
Data Companies' revenues (Indicator 3)	Data Market
Eurostat Business Demographic Statistics	Data Market
Eurostat annual Structural Business Statistics	Data Market
Eurostat chain linked Volumes (GDP)	Data Market
IDC Core IT Spending guide	Data Market
IT Big Data and Analytics spending Guide	Data Market
IDC Worldwide Black Book (standard edition)	Data Market
IMF World Economic Outlook	Data Market
Consensus Forecasts – Consensus economics	Data Market

Measuring the Data Economy

Definition and Scope

The **Data Economy** measures the overall impacts of the Data Market on the economy as a whole. It involves the generation, collection, storage, processing, distribution, analysis elaboration, delivery, and exploitation of data enabled by digital technologies.

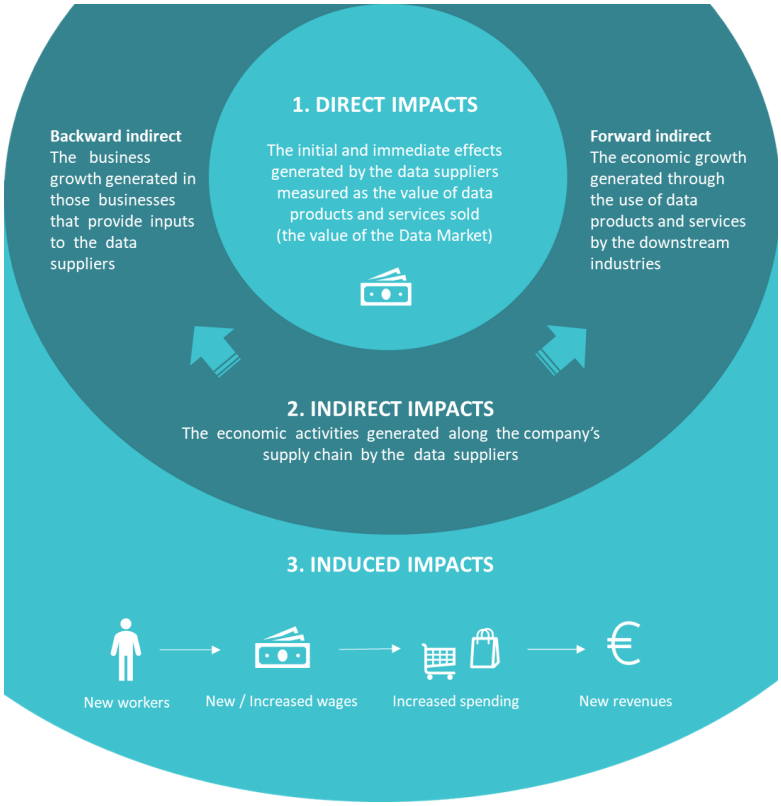
The Data Economy captures a wider concept than the Data Market only, as it considers the value and wealth generated in the economy as a whole (not just across businesses) by the exploitation of data. The Data Economy includes three sets of impacts in the economy: the Data Companies Revenues in the form of direct impacts on the economy, the indirect impacts (as backward and forward) and the induced impacts effects of the Data Market on the economy.

- The **direct impacts** are the initial and immediate effects generated by the data supplier companies; they represent the activity potentially engendered by all businesses active in the data production.

The quantitative direct impacts will then be measured as the revenues from data products and services sold, i.e. the value of the Data Market. We consider the Data Market value as a good proxy of the direct impacts. Therefore, for the sake of simplicity, direct impacts will coincide with the value of the Data Market.

- The **indirect impacts** are the economic activities generated along the company's supply chain by the data supplier companies, considering input providers and customers of data supplier companies. Indeed, there are two different types of indirect impacts, the backward indirect impacts and the forward indirect impacts (Richardson, 1985):
    - the **backward indirect impacts**: such impacts represent the business growth resulting from changes in sales from suppliers to the data industry. In order to produce and deliver data products and services, the data suppliers need inputs from other stakeholders. Revenues generated among the providers side from those sales to data suppliers companies are the backward indirect impacts.
    - the **forward indirect impacts**: such impacts include the economic growth generated through the use of data products and services by the downstream industries, i.e. the data user companies as a selected number of industries. For the user companies, data is a relevant factor of production; the adoption of data products and services by the downstream industries provides different types of competitive advantage and productivity gains to the user industries. Data users are engaged in digital transformation, able to make a strategic use of data and reap its benefits. The main benefits that the exploitation of data can provide to downstream industries are (OECD, 2013, Mc Kinsey, 2011):
        - Optimising production and delivery processes: data-driven processes (data-driven production);
        - Improving marketing by providing targeted advertisements and personalised marketing practices (data-driven marketing);
        - Improving existing organisation and management practices (data-driven organisation).
- The **induced impacts** include the economic activity generated in the whole economy as a secondary effect. Induced additional spending is generated both by new workers, who receive a new wage, and by the increased wage of existing jobs. This spending induces new revenues creation in nearly all sectors of the economy. The additional consumption will support economic activity in various industries such as retail, consumer goods, banks, entertainment, etc.

The Data Economy: Direct, Indirect, and Induced Impacts



Source: European Data Market Monitoring Tool, IDC 2021

This indicator is measured according to the scope detailed in the following table.

Indicator 5 – Value of the Data Economy				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
5	Value of the data economy	Value of the direct, indirect and induced impacts of data-driven innovation on the EU economy	Billion €, 2019, 2020, 2021 Forecast to 2025. Forecast to 2030, 3 Scenarios	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK
5.1	Impact of the data economy on GDP	Ratio between value of the data economy and EU GDP	Billion €, 2019, 2020, 2021 Forecast to 2025. Forecast to 2030, 3 Scenarios	By Geography: EU27 MS (by country and total) EEA (NO, LI, IS) Switzerland UK

Our Data Economy estimation does not include the user benefits and social impacts of data-driven innovation such as changes in quality of life (health, safety, recreation, air quality). Although these benefits may be evaluated in economic (monetary) terms, they are not economic impacts as defined above as they do not induce an increase in the business activities and a consequent growth in GDP.

The Value of Data

The value creation process based on data rests on the elaboration of information and knowledge (OECD 2016), although the boundaries between data, information, and knowledge are sometimes fuzzy. The huge volume of data is a global phenomenon which is sometimes view with suspicion by citizens, consumers and businesses because data flows are seen as an intrusion of the privacy.

Nevertheless, it is now commonly agreed that data analysis can provide benefits to both businesses and consumers. Moreover, the introduction of GDPR (General Data Protection Regulation) in May 2018 helped in managing the usage of information, giving rules to data users as well as providing control over personal data to data owners.

We should remind that the economic theory holds that information encourages competition between businesses for the benefit of consumers. Data do not provide value and benefits as such; data need to be collected, stored, aggregated, combined and analysed in order to be appropriately used for decision making processes. **To create value, data need to be processed (OECD, 2016):**

- **Extracting information from structured and unstructured data**: data analytics techniques are today able to analyse both structured and unstructured data. We should remind here that most data stored by businesses are unstructured. Technologies such as optical character recognition, natural language processing, face recognition algorithms and machine learning algorithms are empowering the use of all data.
- **Real-time monitoring and tracking**: analysis of data in real time is often mentioned as one of the most powerful factors since it supports organisations to make real-time decisions, which, in a fast changing world, is a well-known competitive advantage.

- **Inference and prediction**: until now, prediction was based exclusively on prior information and data series. Data analytics can now enable the creation of information even without prior information. Such information can be created through patterns and correlations of data. Personal information, for example, can be deduced from anonymous or non-personal data. Businesses and organisations demand real time insights rather than historical and periodical information, and for advanced specialised data analytic services. Algorithms allow machine and statistical learning based on non-specific data; businesses can learn and predict a lot about their customers even if they do not have specific data and time series about the issue they are interested in. Machine learning has, as an example, applications in health care where data collected on patients are recorded by imaging, or it supports production processes to increase the quality of production

The diffusion of technology supporting production and analysis of data induces organisations and businesses to base their decisions on data much more than they were used to do. As pointed out by OECD in its recent report, the process to take decisions is also changing. Decision makers do not necessarily need to understand the phenomenon before they act on it. A store can change the product placement based on data analysis without the need to know the reason why such a change should improve the sales. There is therefore a decision automation process: "first comes the analytical factor, then the action, and last, if at all, the understanding" (OECD, 2015).

The impacts of such a new approach to decision making and to the use of data in all the enterprises and organisations' functions are many and varied, so that we believe, such impacts will be object of studies and analysis in the upcoming years. It is, at this point, difficult to classify them and to suggest a taxonomy of such impacts.

Such impacts have been observed through some empirical studies and case analysis. The most relevant ways the benefits appear are the following:

- **Creating more information, knowledge and transparency**: technology is making data more accessible and exploitable to all kind of stakeholders, including SMEs. This increases transparency and decisions are made on a rational process.
- **Improving performance**: having access to a wide information and to a high number of data is changing the way of making decisions. An increasing number of organisations are going to become data-driven organisations, which means that they make decisions based on empirical results. As an example, retailers can adjust prices and promotions, more precisely than they were used to and in real time. This may improve competitiveness. McKinsey underlines that the health sector is achieving a lot of benefits from the new making decisions process: studies on clinical data allow to identify and understand the sources of variability in treatment, to identify the best treatment protocols and to create guidelines for the optimisation of treatment decisions. This does not only increase the effectiveness of treatments, but it also produces saves.
- **Improving customisation of actions for better decisions**: data technology is definitely improving the segmentation of customers and the analysis of their preferences in real time. This allows companies to supply products and services targeted to specific groups of individuals who have specific needs and preferences. Such a segmentation is also useful when supplying public services. Such a segmentation helps define the price precisely and offering exactly what is needed which means a better quality and also companies avoid offering products and services the consumers are not willing to pay.

- **Innovating products and services as well as business models**: the more information and understanding businesses have about their customers, the better they can serve them. It is important to say that although consumers may fear their privacy is injured, this can also provide them unexpected surplus: real time price comparison services do not only provide better transparency but also allow buying the best product at the most convenient price (for example when buying online airline tickets or when booking hotels). Companies can in fact produce and create new products and services to better satisfy their customers' needs. This is true also for the public sector and specifically for the health care system where preventing care programs can be created.
- **Ecosystem effects**: there are some areas in which there are great opportunities deriving from the use and the exchange of data, and that will be also driving examples for the near future, such as parts provenance and the origin track of food and materials in manufacturing, but also tracking the conditions at which materials and goods are shipped, know your customers and digital identity (for the financial and the public sector), tracking of medical devices and appliances as well as managing data sources of medical information in healthcare.

These effects are reflected in an increase in revenues due to higher market share from the increase in competitiveness or due to a reduction in costs. All these effects are included in the forward indirect impacts; these impacts are delivered on the user industry, and because of the above reasons, these are the impacts we consider new on the overall economic system.

Methodology Approach

Measuring the data economy, broadly speaking, depends on:

- the macroeconomic context
- the availability and diffusion of tools that help companies in their data elaboration and usage;
- the industry and country maturity;
- the integration processes the companies are implementing.

Therefore, the data economy model is based on a set of assumptions on all these factors, including choices about proxy indicators where actual data is missing.

The data economy model is a highly sophisticated model articulated by country and industry which has successfully delivered the current and forecast estimates of economic impacts for the last cycles of the EDM Monitoring Tool measurement. The model is sufficiently flexible that it was possible at the start of 2020 to run a simplified version to provide a rough post-COVID data economy estimate for 2020 and forecast to 2025 for the Baseline scenario. For the next round of the study, we will revise and update the structure and key assumptions of the model.

The main steps are similar to the other indicator models and the following:

- annual round of desk research and data collection.
- Revision and update of the assumptions driving the model and the measurement of each category of impacts.
- Measurement of each type of impacts as follows:
    - Direct impacts: they correspond to the value of the data market (indicator 4)

    - Backward indirect impacts: they correspond to the increase of revenues by data supplier companies and are based on indicator 3 – data supplier companies' revenues.
    - Forward indirect impacts: this is the most difficult type of impact since is based on the estimates of the economic benefits by industry generated by the adoption of data-driven innovation, through the calculation of multipliers.
    - Induced impacts measure the secondary effect of the other categories of impacts together on the overall economy and are calculated through the use of specific indicators and the estimate of appropriate multipliers.
- The impacts measured are then aggregated and their value and growth trend will be cross-checked again for coherence with other indicators. This is the value of the data economy and will be calculated in the first measurement for 2019, 2020 and 2021 (estimate). (for the EU27, separately and in total, EEA (NO, LI, IS), the UK and Switzerland).
- Separately, the study team will provide estimates of GDP value for each of the country covered and will calculate the impact of the aggregated data economy on GDP (for the EU27, separately and in total, EEA (NO, LI, IS), the UK and Switzerland).

The forecasting to 2030 will be carried out as follows:

For the forecasting scenarios the study team will:

- Review the qualitative assumptions developed for each scenario for the year 2025 (only Baseline) and 2030 (3 scenarios).
- For direct and backward indirect impacts, the forecast will be calculated separately by the data market model and the data supplier companies' revenues model and the results will be included in the data economy model (through a round of cross-check and validation of coherence, robustness and quality of all the results).
- For forward indirect impacts and induced impacts, we will derive assumptions in order to calculate the forecast multipliers under the 3 alternative scenarios to the year 2030.
- The value of all impacts will be aggregated calculating the value of the data economy.
- Estimates of GDP value in 2030 for the countries measured will be generated for the 3 alternative scenarios.
- Finally, we will calculate the impact of the data economy on GDP.
- The results will be again cross-checked for mistakes or lack of coherence by different members of the study team.

It should be noticed that the IDC study team includes 4 different analysts in charge of the indicators models. They are the same analysts who have developed and calculated these models in the past years. This will help the quality control since they will collaborate in the reciprocal cross-check and validation of their models.

Data sources

Each year the study team will carry out ad-hoc desk research to update the data economy model assumptions, particularly the value of multipliers, leveraging other similar studies about the economic impacts of data innovation and other emerging technologies (sources such as McKinsey, Accenture, Deloitte, Everis). The results of the data collection for this study will be used, specifically the measurement of business impacts of data innovation. IDC's annually and bi-annually updated research will be used, including (but not limited to) the following studies:

- IDC Worldwide Semiannual IT Spending Guide Industry and Company Size
- IDC Worldwide Public Cloud Services Spending Guide
- IDC Worldwide Big Data and Analytics Spending Guide
- IDC Worldwide Internet of Things Spending Guide
- IDC Worldwide Artificial Intelligence Spending Guide

IDC spending guides estimate the demand side spending in technologies by industry, country and use case for a period of 5 years (previous year, current year and 3 years forecast). The spending guides are high quality data products, cross-checked for coherence both by geography and by industry. These spending guides will feed into the estimate of the level of take-up and value of data spending by industry as well as into the historical series.

The data on business impacts sourced from the ad-hoc field survey will also be leveraged to improve the estimate of indirect impacts. In order to measure the impact of the diffusion and use of data services and products, we will estimate each component (as defined in the above paragraph) of the impacts separately.

Estimate of Forward Indirect Impacts

As highlighted by OECD, 2013, McKinsey 2011 the impacts provided by the exploitation of data over the economic system include:

- optimising production and delivery processes (data-driven processes)
- optimising marketing by providing targeted advertisement
- enhancing research and development and developing new products and services
- improved decisions making, launch of innovations, creation of new businesses,
- innovating business models
- creating transparency and diffusion of information

While impacts from the data supply-side are immediate and measurable, the impacts on the demand-side are more difficult to catch, especially in the early stage of an emerging industry.

The estimate of the value of the data economy will be based on estimates of the multipliers of the data products and services on the whole economy which depend on (but not only):

- The multiplier effect of data products and services on innovation in the whole economy;
- The multiplier effect of increased revenues by users.

IDC will cluster the industries which may be affected by a high, medium, and low multiplier effect in order to estimate the overall effect on the EU economy. Finance, retail, manufacturing, energy for example are industries where the impact of an intensive use of data is likely to be high. Direct and indirect impacts and the possible multiplier effects are not going to occur within a year, but they may require at least a couple of years.

IDC will develop a detailed model based on other models calculating the economic impacts of IT pervasive innovations. Impacts on economy will clearly depend on the diffusion rate, which in turn depends also on the general economic conditions of next years.

Measuring Data Professionals Skills Gap

Definition and Scope

The **Data Professionals Skills Gap** indicator captures the potential gap between demand and supply of data professionals in Europe.

Monitoring the skills gap is of paramount importance since the lack of skills may become a barrier to the development of the data industry and the rapid adoption of data-driven innovation. It is based on a model balancing the main sources of data skills (from the education system and re-training and other carriers) with the estimated demand (by all data companies).

For the data skills gap the data is provided as always for the 5 largest EU countries and the rest of EU 27 in an aggregated way, mainly because of the difficulty to measure data skills job vacancies for each individual Member State.

Indicator 6 – Description				
N.	**Name**	**Description**	**Type and Time**	**Segmentation**
6	Data Professionals Skills Gap	Gap between demand for and supply of data technical and data business professionals (not segmented)	Absolute number and % on total demand, 2019–20–21 Forecast to 2025 (Baseline scenario) Forecast to 2030, 3 scenarios	By Geography: 5 EU MS: DE, ES, FR, IT, PL Rest of EU27 Total EU 27 UK Switzerland EEA (NO, LI, IS)

Methodology Approach

The measurement of this indicator is based on a model combining the separate estimates and forecasts for the demand for data technical and business professionals and the supply of corresponding data skills by the inflow from the education system and upskilling and reskilling of the existing workforce (Figure 8.1). This includes balancing the main sources of data skills (from the education system and re-training to the provision from other careers) with the estimated demand for data skills (by all data companies).

More specifically, we use the following definitions:

- **The supply of data professionals** is equal to the data skills supply stock (the sum of employed data professionals and the unemployed ones).
- **The demand for data professionals** is the sum of existing and open positions for data technical professionals and data business professionals, that is the number of currently employed data professionals (indicator 1 in this study) plus the unfilled vacancies.
- **The indicator measures the difference between total demand and supply**; if demand is higher than supply there is a data skills gap (excess demand). If supply is higher than demand, there is over supply and potentially unemployment.

Data Sources

As for the other indicators, the study team will carry out annually ad-hoc desk research on data skills supply and demand dynamics. The main sources which will be considered are (but not limited to):

- ILOSTAT (International Labour Organization) Statistics and Databases (2020)
- EUROSTAT Educational enrolment statistics (Last update: 2021).

- IDC's Technology Employment Impact Guide – updated on a semi-annual basis with forecast of employment across 40 technology job roles, including seven data management and analytics roles (Last update: June 2021)
- Cedefop – Skills-OVATE data for vacancy estimations (Most recent data collected between July 2018 and September 2020)
- Cedefop – Skills Index and Skills forecast (Last update 2020)

Measuring Demand

The total demand for data technical and business professionals is calculated for the years 2019, 2020 and 2021 in the first cycle and will move forward one year for each measurement cycle. For the current year of the indicator (in the first measurement it will be 2021) we have added to the number of data professionals sourced from Indicator 1 an estimate of existing unfilled positions (vacancies). The labour market is a dynamic environment characterised by inflows and outflows of human resources, and at any given moment present there are companies looking to hire as well as unemployed looking for a job. Our model includes estimates of these inflows and outflows due to retirements, sickness, deaths, graduations, career changes between companies, industries and job roles, and people entering or exiting the market for training or education activities.

To estimate the current vacancies, we have carried out additional data collection on job search portals such as LinkedIn, Indeed and others to calculate the level of demand for data skills jobs, defined on the basis of the desks research and analysis calculated for Indicator 1 on data professionals. IDC's ongoing research on the demand for advanced ICT and data skills has been leveraged to support the forecasts. In addition, the survey has provided data about companies' difficulty in filling specific data professional positions. This has helped to model the demand forecast and to understand the level of the potential data skills gap.

The forecasted demand for data professionals to 2025 (Baseline scenario) and 2030 under the 3 scenarios calculated by Indicator 1 is considered as the total potential demand (as it incorporates future potential vacancies).

Measuring Supply

Supply has been estimated by aggregating the number of graduates in the relevant disciplines corresponding to the data skills identified in Indicator 1 and the level of inflows from other careers or upskilling. The model considers the inflows and outflows in the data skills market such as retirements, and unemployment.

Since we have changed the definition of data professionals compared to previous years, in this first phase of the study we have also updated the type of data skills to be monitored and the type of fields of study providing them. To do so we have leveraged desk research but also expert interviews.

The relationship between skills demand and supply and the resulting skills gap or over-supply is illustrated in the figure below.

The Data Skills Demand-Supply Balance Model

Source: European Data Market Monitoring Tool, IDC 2021

Angulo Bahón, C. (2022). Gaia X: federated open data in a trusted data space. In: Universitat Politècnica de Catalunya. Servei de Biblioteques, Publicacions i Arxius.