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ANALYSIS OF THE DATA MARKET: 2017-2018, 2025 FOR SWITZERLAND AND OTHER EU28 MEMBER STATES

Milan (IT), 27th March 2020

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INTRODUCTION

The Swiss Federal Institute of Intellectual Property (IPI) is the federal government's central point of contact for all questions concerning industrial property rights, geographical designations of origin and copyright. It is further responsible for drafting legislation and advising the Federal Council and other federal authorities on matters concerning intellectual property.

In lines with this mandate, the Institute has been commissioned to investigate the role of data, especially non-personal data, and data access for the Swiss economy against the backdrop of intellectual property rights and antitrust law. In its preliminary research, the Institute has been able to gather a great deal of useful information regarding the economic approach to the pertinent issues like market failure, need for regulation, compulsory licensing etc. In this respect, the study prepared for the European Commission by IDC on the European data market (SMART 2013/0063), and its subsequent renewal (SMART 2016/0063), have been identified as a potential source of relevant market figures.

In order to obtain a similar level of detail and market analysis for the Swiss market, the Swiss Federal Institute of Intellectual Property (IPI) has approached IDC to extend the work conducted by IDC under the European Data Market study (SMART 2013/0063 and SMART 2016/0063) to Switzerland. Following this request, this report pursues the objective of providing facts and figures on the key features of the European Data Market with a specific focus on the Swiss data ecosystem.

This report presents the results obtained through the measurements of the European Data Market Monitoring Tool, designed and developed under the European Data Market Study, and covering the years 2017-2018 with forecasts at 2025 under three alternative scenarios. It focuses on the following set of indicators:

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- Indicator 1.1 - Number of Data Professionals: 2017, 2018, 2025 - 3 Scenarios (Baseline; High-Growth; Challenge)
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Each indicator is measured at the level of the total EU and for each individual Member State plus Switzerland.

The report also presents three potential future scenarios of evolution of the European Data Market and Economy, providing some interesting insights for the Swiss data market. The quantitative scenarios were developed as follows:

- A Baseline scenario, with the main assumptions based on the continuation of current growth trends and evolution of current framework conditions;
- A High Growth scenario, where the Data Market enters a faster growth trajectory, thanks to more favourable framework conditions;
- A Challenge Scenario, where the Data Market grows more slowly than in the Baseline scenario, because of less favourable framework conditions and a less positive macroeconomic context.

The report is organized along the following chapters:
- Chapter 1 includes a brief introduction on the Swiss economy, its positioning at a European and global level, and its most developed industries.
- Chapters 2, 3, 4, 5 and 6 present the indicators measuring respectively data professionals, data companies, data market and revenues of data companies.
- Chapter 7 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 the report.

This document is accompanied by a comprehensive dataset reporting the values for all the indicators.

1. SWITZERLAND AND THE DATA MARKET

Switzerland is one of the most successful economies in the world when considering nominal GDP per capita – only Luxembourg had a higher GDP per capita in 2019[1]. The country is the ninth largest among other European countries in terms of Nominal GDP and is growing faster than Turkey (in 8'th position) so could move up a position before 2025. Switzerland has few natural resources such as coal or oil and its success is built on a strong export driven economy with a focus on high quality manufacturing and services. Unemployment remains low and is falling from around 3% in the period 2010 to 2019, down to 2.5% currently. In a report in 2013[2], Deloitte considered the manufacturing industry to be the economic engine of Switzerland and industry accounts for around 40 percent of the employed population. However, Services has a little over 50 percent of the employed population in areas such as banking and financial services[3].

Switzerland trades mostly with the EU[4], with 78 percent of imports from the EU, and 43 percent of exports going to the EU. Within the 28 member states, Germany sees the highest share of exports at close to 17 percent of total exports[5].

The country's industry focus is primarily on manufacturing, which impacts the adoption and use of digital technology. Although Manufacturing growth is strong is it not the highest adopter of digital technologies. Across Europe manufacturing has some engagement with digital technology but tends to use it to reduce costs or improve efficiency. Industries such as Services or Retail and Wholesale are more inclined to use digital technologies to transform their business, or to change the way business is conducted[6].

The following sections identify Switzerland's position among the EU member states in terms of employment of data professionals, the development of data suppliers and data users, the size of the data market, the revenues of data companies and the size of the data economy.

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[1] IMF, *World Economic Outlook,* October 2019, available at
https://www.imf.org/en/Publications/WEO/Issues/2019/10/01/world-economic-outlook-october-2019
[2] Deloitte, *Swiss manufacturing Industry. Strengths, challenges and options for action*, 2013, available at
https://www2.deloitte.com/content/dam/Deloitte/ch/Documents/manufacturing/ch-en-manufacturing-white-paper-switzerland-summary-05052014.pdf
[3] Davis Plüss Jessica, *Switzerland's love affair with multinationals*, August 2018, available at
https://www.swissinfo.ch/eng/big-business_switzerland-s-love-affair-with-multinationals/44342642
[4] The Swiss Confederation website, Swiss Economy – Facts and Figures, January 2020, available at
https://www.eda.admin.ch/aboutswitzerland/en/home/wirtschaft/uebersicht/wirtschaft---fakten-und-zahlen.html
[5] The Swiss Federation website, Data on National Economy, available at
https://www.bfs.admin.ch/bfs/en/home/statistics/national-economy.html
[6] PWC, *The Future of Manufacturing – Switzerland*, 2018, available at https://www.gmisummit.com/wp-content/uploads/2018/09/GMIS-and-PwC-Report-on-Switzerland.pdf

2. DATA PROFESSIONALS

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. They elaborate and visualise structured and unstructured data to support analysis and decision-making processes.*
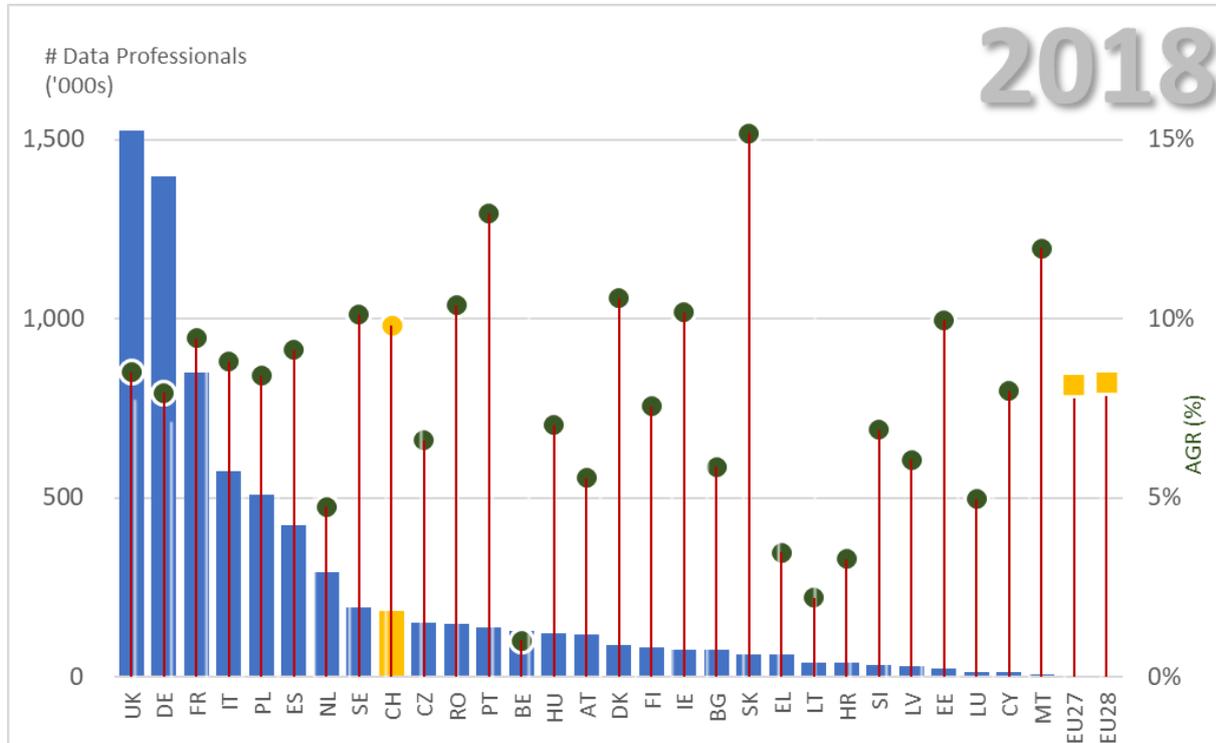
FIGURE 1 - DATA PROFESSIONALS BY MEMBER STATE, 2018 (UNITS, '000, 2017-2018 GROWTH RATES %)

Switzerland shows a growth in the number of data professionals in the country which is above the average across the EU member states – suggesting good support for the data use and the data market in the country. Figure 1 shows the number of data professionals for 2018 and the growth seen in 2018. The country ranks as the ninth largest among the member states in 2018 with 182,000 data professionals. This compares with 1,526,000 for the leading member state – the United Kingdom. However, growth in the United Kingdom is lower than that for Switzerland at 8.5 percent, compared with 9.8 percent for Switzerland. The lower growth in the United Kingdom relates partially to its already high base as the lead member state among the EU28 in 2018.

The data professionals share of total employment (Figure 2) for Switzerland is among the highest of the EU member states, which is a reflection of the industry mix in the country. Switzerland has a higher concentration of data professionals in professional services, healthcare, and wholesale and retail when compared to the EU28 average. In fact, the top three industries for data professionals account for close to 50 percent of all industries in Switzerland while for the EU28 this is less than 45 percent. It follows from this that the country is better prepared to exploit the growing data market than the average member state. Figure 2 shows Switzerland is in the top three in terms of data professionals share of total employment.

Country	Share
LU	6.1%
UK	5.1%
CH	4.4%
SE	4.1%
EE	4.0%
NL	4.0%
IE	3.8%
LV	3.7%
FI	3.7%
SI	3.6%
PL	3.6%
DE	3.6%
EU28	3.5%
FR	3.5%
DK	3.4%
LT	3.4%
MT	3.4%
CY	3.3%
PT	3.3%
EU27	3.2%
CZ	3.1%
AT	3.1%
HU	3.0%
BE	2.9%
IT	2.8%
HR	2.7%
BG	2.7%
SK	2.7%
ES	2.5%
RO	2.3%
EL	1.9%

2018
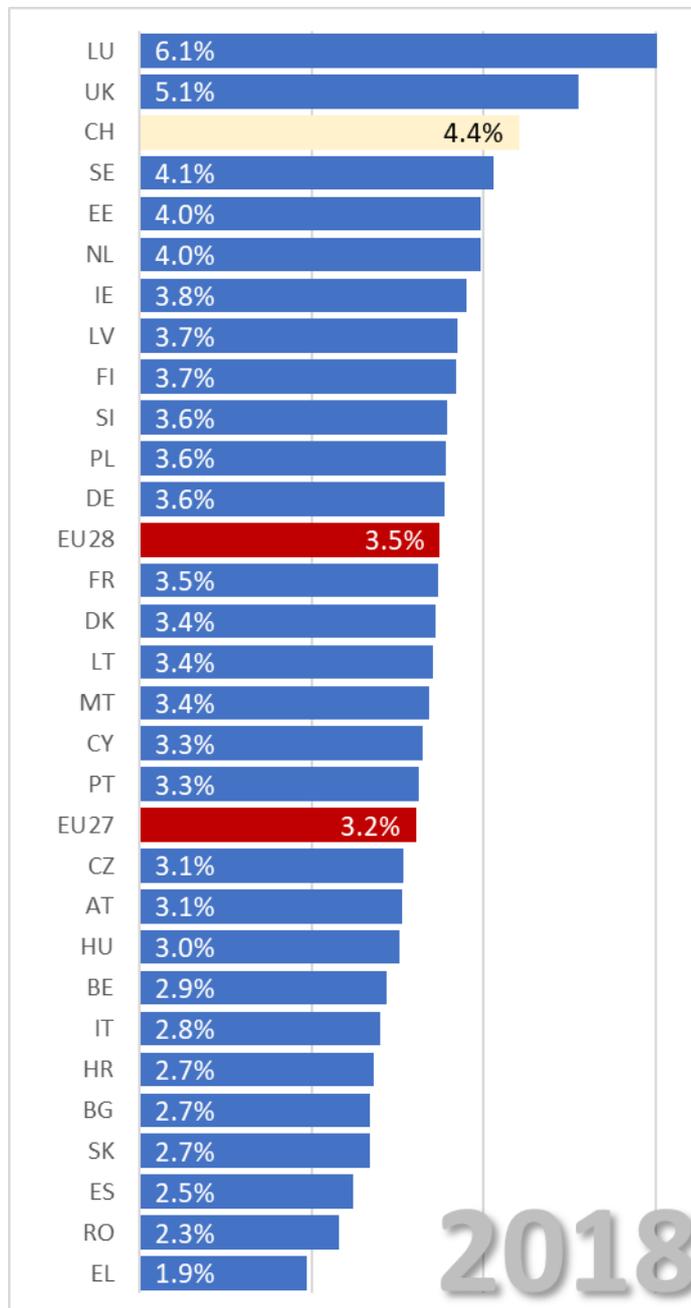
FIGURE 2 - DATA PROFESSIONALS SHARE OF TOTAL EMPLOYMENT

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3. 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 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.*

Table 1 shows the number of data suppliers and data users for each of the EU member states, together with Switzerland. Switzerland shows lower growth than the average of the EU28 member states for 2018 over 2017, growing at 2.7% for data suppliers, compared with 4.3% for the EU28 average, and at 1.3% for data users, compared with 2.9% for the EU28 average. This lower growth for data suppliers relates to the industry focus in the country.

	Data Suppliers			Data Users		
Member State	2017	2018	Growth 2017 - 2018	2017	2018	Growth 2017 - 2018
Austria	4,450	4,600	3.4%	13,750	14,150	2.9%
Belgium	2,450	2,550	4.1%	13,200	13,600	3.0%
Bulgaria	1,150	1,200	4.3%	2,900	3,050	5.2%
Croatia	700	730	4.3%	1,700	1,750	2.9%
Cyprus	500	510	2.0%	1,650	1,700	3.0%
Czech Republic	2,000	2,100	5.0%	6,650	6,800	2.3%
Denmark	3,850	4,050	5.2%	8,150	8,350	2.5%
Estonia	500	540	8.0%	1,600	1,700	6.3%
Finland	2,950	3,050	3.4%	8,150	8,300	1.8%
France	12,800	13,500	5.5%	73,050	75,150	2.9%
Germany	26,600	27,750	4.3%	111,000	114,000	2.7%
Greece	5,600	5,800	3.6%	10,850	11,100	2.3%
Hungary	3,450	3,550	2.9%	4,450	4,600	3.4%
Ireland	3,500	3,700	5.7%	8,650	9,000	4.0%
Italy	19,100	19,800	3.7%	88,250	90,400	2.4%
Latvia	550	580	5.5%	1,150	1,200	4.3%
Lithuania	650	680	4.6%	1,950	1,950	0.0%
Luxembourg	500	540	8.0%	1,550	1,650	6.5%
Malta	250	240	-4.0%	600	670	11.7%
Netherlands	5,500	5,800	5.5%	26,000	26,850	3.3%
Poland	5,800	6,050	4.3%	13,000	13,450	3.5%
Portugal	4,050	4,250	4.9%	18,400	18,850	2.4%
Romania	5,500	5,650	2.7%	5,450	5,600	2.8%
Slovakia	2,250	2,400	6.7%	2,700	2,800	3.7%
Slovenia	550	570	3.6%	1,250	1,300	4.0%
Spain	15,750	16,300	3.5%	73,300	75,300	2.7%
Sweden	8,500	8,950	5.3%	17,750	18,450	3.9%
Switzerland	16,798	17,244	2.7%	20,118	20,389	1.3%
United Kingdom	132,250	137,950	4.3%	174,400	180,150	3.3%
EU27	139,450	145,440	4.3%	517,100	531,720	2.8%
EU28	271,700	283,390	4.3%	691,500	711,870	2.9%

TABLE 1 – DATA SUPPLIERS AND DATA USERS BY MEMBER STATE 2017, 2018 (UNITS '000)

Switzerland Data Suppliers have the highest share of total suppliers in the J and M sectors (Information and Communication, professional, scientific and technical activities), comparable to Ireland and a little ahead of the United Kingdom (Figure 3). Switzerland clearly has a strong focus on the data market in terms of the companies that supply data services and software.

For Data Users Switzerland lags the EU28 member states in terms of growth, as seen in Table 1, but is closer to mainstream in terms of the share taken of total companies by data users, as seen in Figure 4. Switzerland is ahead of the average for the EU28 member states, showing a strong investment already made in education and support for Data User companies.

	Figure 3 (%)
Switzerland	23.8%
Ireland	23.8%
United Kingdom	23.2%
Netherlands	16.9%
Italy	15.9%
Austria	15.5%
Total EU28	15.2%
Greece	15.1%
Germany	15.0%
Sweden	14.9%
Cyprus	14.4%
Denmark	14.4%
Malta	14.1%
Luxembourg	14.0%
Belgium	12.1%
Finland	12.0%
Portugal	11.9%
Total EU27	11.4%
France	11.1%
Spain	10.6%
Poland	9.8%
Estonia	6.1%
Croatia	6.1%
Slovenia	6.0%
Latvia	5.9%
Bulgaria	5.8%
Hungary	5.6%
Slovakia	5.5%
Lithuania	5.4%
Romania	5.3%
Czech Republic	4.9%

2018

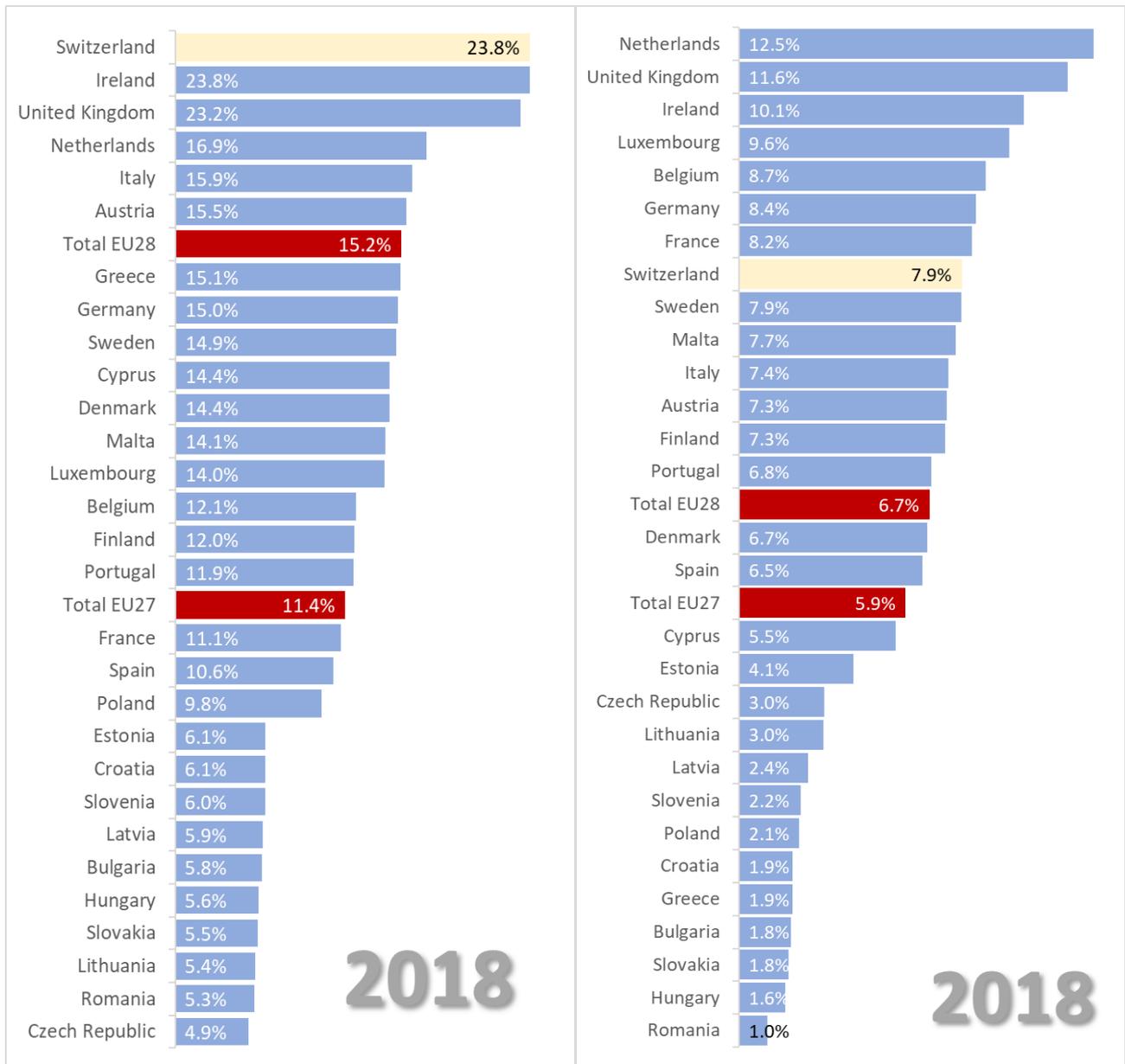|	Figure 4 (%)
Netherlands	12.5%
United Kingdom	11.6%
Ireland	10.1%
Luxembourg	9.6%
Belgium	8.7%
Germany	8.4%
France	8.2%
Switzerland	7.9%
Sweden	7.9%
Malta	7.7%
Italy	7.4%
Austria	7.3%
Finland	7.3%
Portugal	6.8%
Total EU28	6.7%
Denmark	6.7%
Spain	6.5%
Total EU27	5.9%
Cyprus	5.5%
Estonia	4.1%
Czech Republic	3.0%
Lithuania	3.0%
Latvia	2.4%
Slovenia	2.2%
Poland	2.1%
Croatia	1.9%
Greece	1.9%
Bulgaria	1.8%
Slovakia	1.8%
Hungary	1.6%
Romania	1.0%

2018

FIGURE 3 - SHARE OF DATA SUPPLIERS ON TOTAL J AND M SECTORS, 2018 (%)

FIGURE 4 - DATA USER COMPANIES SHARE OF TOTAL COMPANIES, 2018 (%)

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4. 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. We define its value as the aggregate value of the demand of digital data without measuring the direct, indirect and induced impacts of data in the economy as a whole. The value of the Data Market 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.*
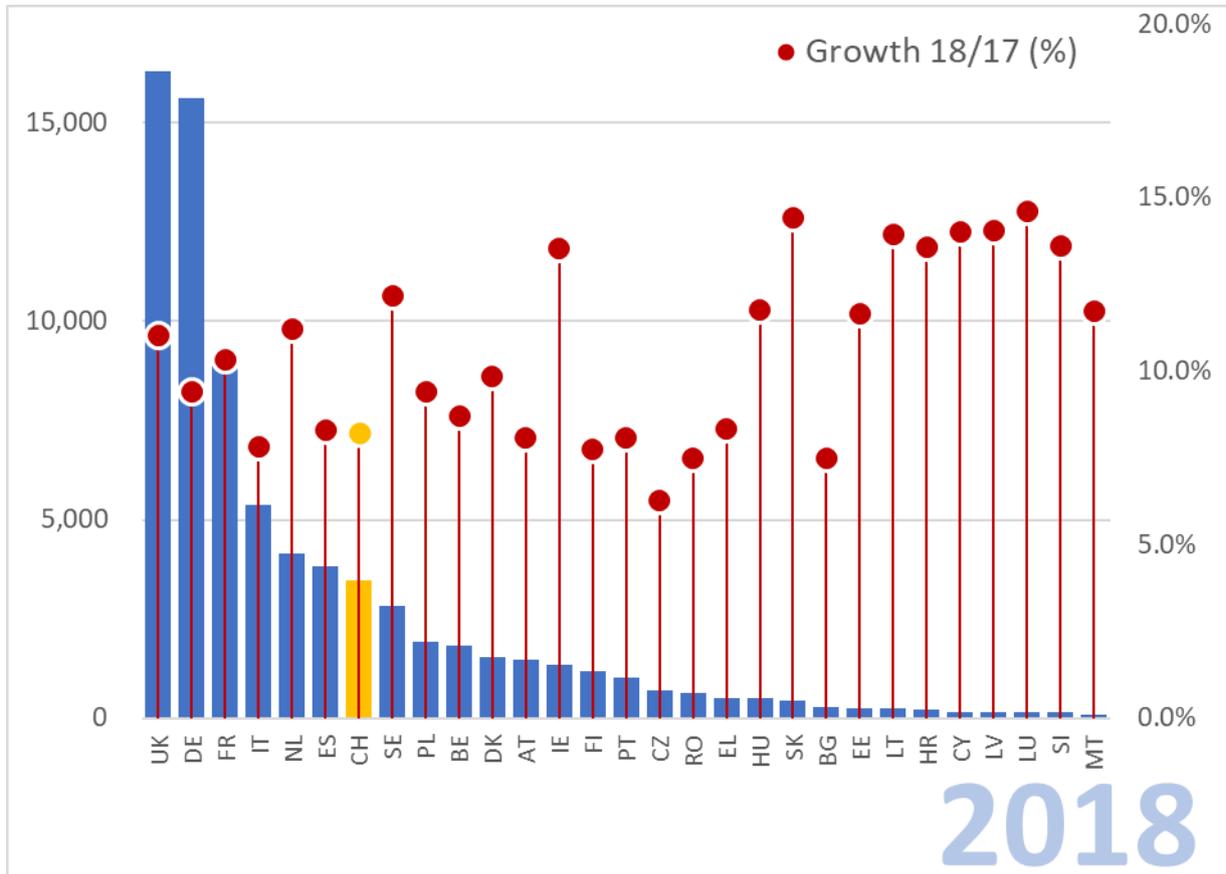

FIGURE 5. DATA MARKET SIZE, GROWTH BY MEMBER STATE, 2018 (€, MILLION; %)

In the EU28 data market Switzerland ranks higher than in data professionals – positioned seventh (compared to ninth with the Data Professionals) – as seen in Figure 5. As with Data Professionals, the higher ranking in the data market reflects the industry mix in the country when compared to that for the EU28 overall. Figure 6 compares the top industries in the Switzerland market with those of the average for the EU28 and this shows the greater strength of the market in finance and manufacturing – while other high-data-use markets such as retail and professional services fall behind those for the EU28. It is this focus on

FIGURE 6 - TOP FIVE INDUSTRY SEGMENTS, SWITZERLAND DATA MARKET 2018 (%)

finance and manufacturing which drive the position of the country among the EU28 member states – with

some focus on data markets but not on the strong data user industries such as retail and professional services.

The share that the data market takes of total ICT shows the relative focus of the member states and Switzerland towards the data market. Switzerland has a strong orientation towards the data market with 13 percent of total ICT being focused on the data market. This is well above the average for the 28 member states and reflects some of the data orientation for industries in the country. Figure 7 shows the position of Switzerland and the other member states, and the average for the EU28.
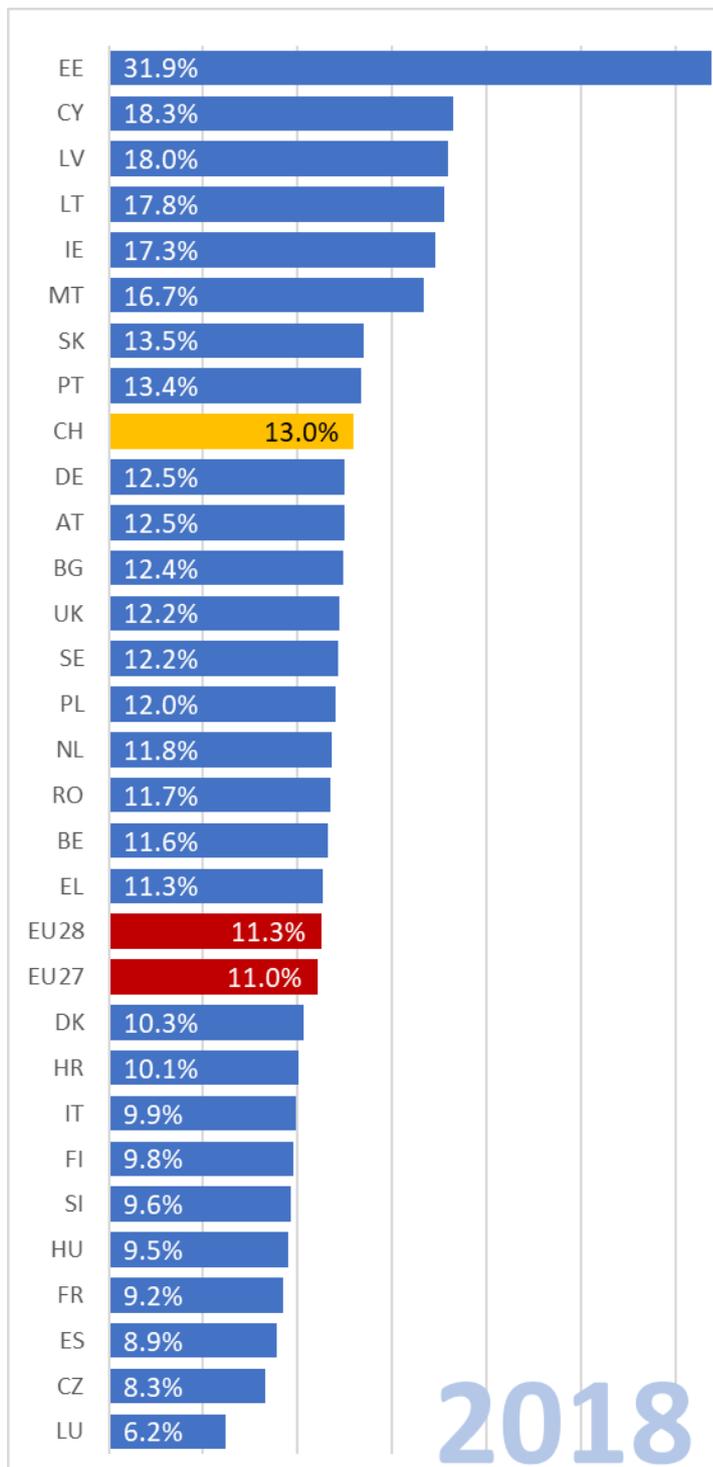
The data market's share of Total ICT has been strong for some time in Switzerland and remains ahead of the average for the member states out to 2025 – under all three scenarios. As with all other factors, it is the industry mix that drives the strength of the data market growth in Switzerland.

The outlook for the data market in Switzerland is also strong when compared to the member states, with its position unchanged as the seventh biggest data market among the EU28. Figure 9 shows the three-scenarios forecast for Switzerland and the other member states

Country	Share
EE	31.9%
CY	18.3%
LV	18.0%
LT	17.8%
IE	17.3%
MT	16.7%
SK	13.5%
PT	13.4%
CH	13.0%
DE	12.5%
AT	12.5%
BG	12.4%
UK	12.2%
SE	12.2%
PL	12.0%
NL	11.8%
RO	11.7%
BE	11.6%
EL	11.3%
EU28	11.3%
EU27	11.0%
DK	10.3%
HR	10.1%
IT	9.9%
FI	9.8%
SI	9.6%
HU	9.5%
FR	9.2%
ES	8.9%
CZ	8.3%
LU	6.2%

FIGURE 7 - DATA MARKET SHARE OF TOTAL ICT BY COUNTRY, 2018 (%)
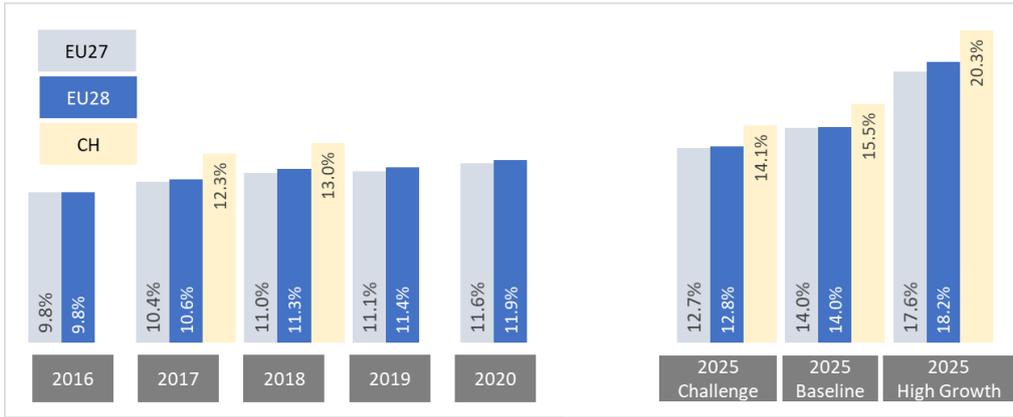
IDC | ANALYZE THE FUTURE
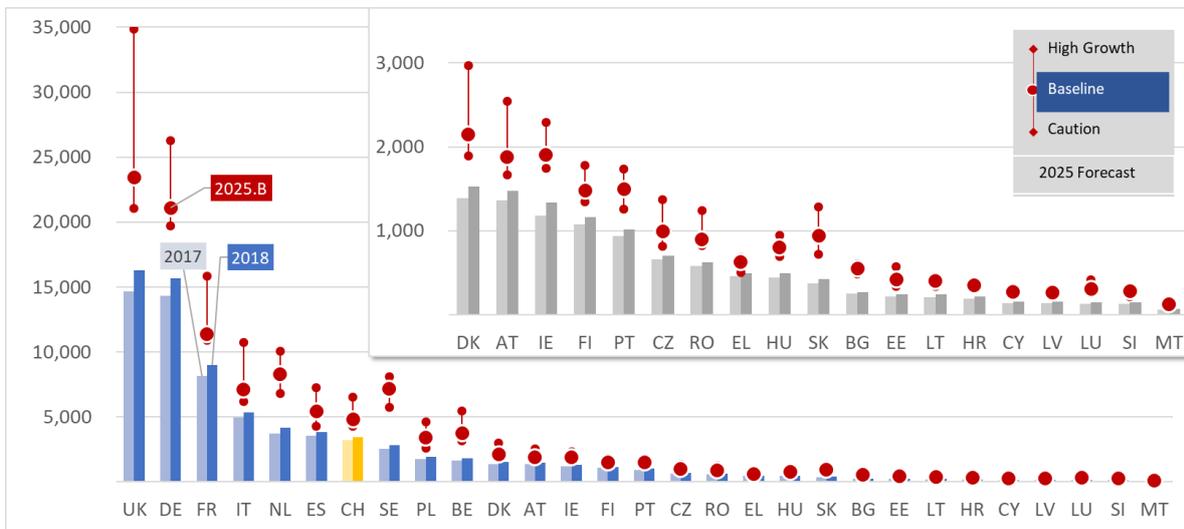
FIGURE 8 - DATA MARKET SHARE OF TOTAL ICT (%)

FIGURE 9 - EUROPEAN DATA MARKET FORECAST 2025 BY COUNTRY - THREE SCENARIOS (€, MILLION)
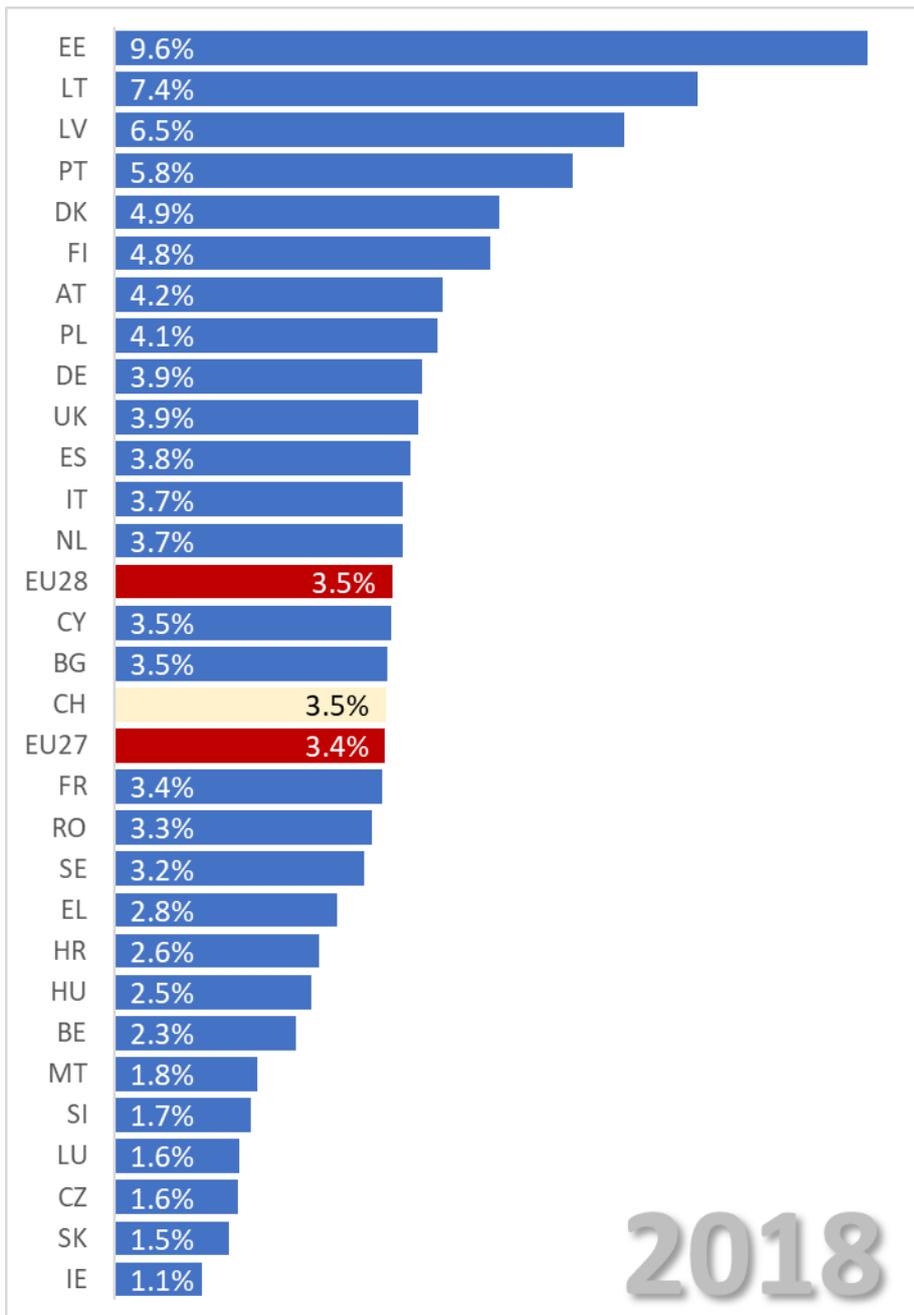
5. REVENUES OF DATA COMPANIES

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.*

The revenues of Data Companies in the member states grew in 2018 by 12.8 percent – significantly more than total ICT sales in these member states. The data market is strong in the EU, and Switzerland is showing similar but slightly lower growth – increasing by 10.6 percent in the same period. Its lower growth is partly due to a slightly weaker ICT market – pushing down into data market sales, and its position on the peripheral of the EU. Finance and Manufacturing are the two strongest industries for vendor revenues in Switzerland, and these two accounts for just over 50 percent of total data revenues in the country. Figure 10 positions Switzerland among the EU member states – at seventh largest in 2018.
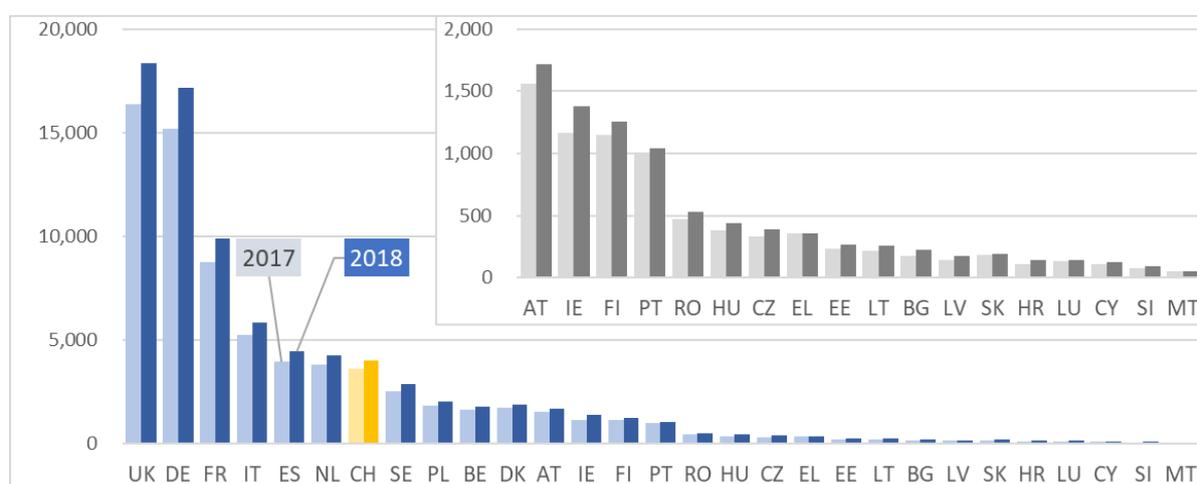
FIGURE 10 - DATA SUPPLIERS REVENUES BY COUNTRY (EUR MILLIONS)

However, while Switzerland is well positioned in terms of data companies' revenues, its share of total company revenues is lower, below the average for the EU28 member states. This identifies a lower focus on data within Switzerland and relates to the industry mix seen in the country – with a lower focus in Switzerland on high-data-usage industries such as Retail and Wholesale, and Professional Services.

FIGURE 11 - DATA COMPANIES' REVENUES SHARE OF TOTAL COMPANIES' REVENUES BY COUNTRY, 2018 (%)

This lower focus on high-data-content industries impacts the longer-term view for Switzerland– with compound growth out to 2025 at 6.9 percent. This is lower than the EU28 average, and positions Switzerland among the bottom half of the member states in terms of growth. Figure 12 shows Switzerland's position compared with the other member states in long term growth out to 2025. In spite of this lower long term growth, Data Companies revenues still rise to 6,425 million Euro under the baseline forecast (as seen in Figure 13) with a high growth forecast up to 8,531 million Euro, and the challenge forecast down to 5,240 million Euro.
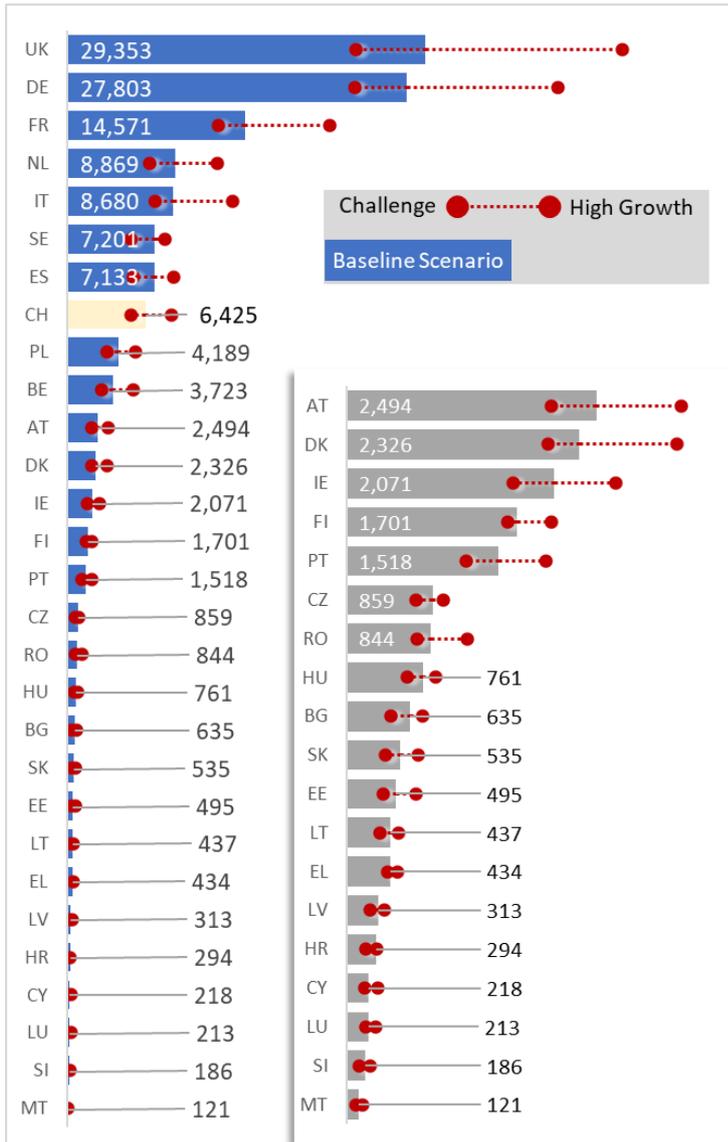
FIGURE 13 - DATA COMPANIES' REVENUES FORECAST BY MEMBER STATE 2025 - THREE SCENARIOS (€, MILLION)
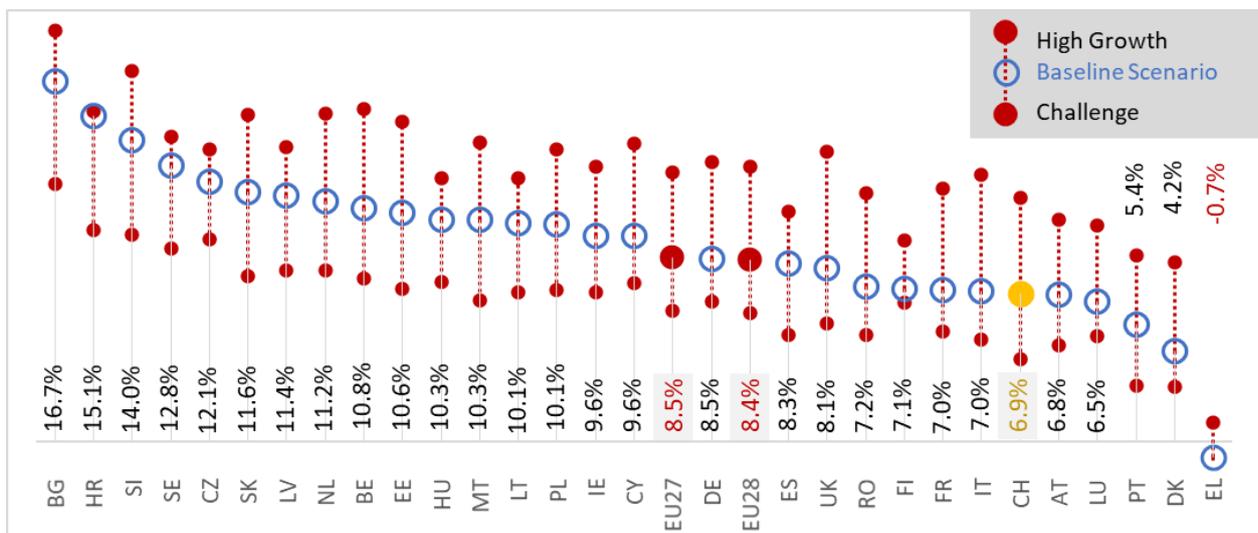

FIGURE 12 - DATA COMPANIES REVENUES' BY MEMBER STATE CAGR 2025 - THREE SCENARIOS (%)

6. SWITZERLAND AND 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* represents a wider concept than the Data Market, the latter being the market where digital products or data-enabled services are exchanged, generating innovation, improving production processes, and allowing for enhanced customer experience and understanding. The Data Market is therefore a business-oriented concept. The Data Economy instead captures a wider reality as it apprehends the value and wealth generated in the economy as a whole (not just across businesses) by the exploitation of data.

Digital Switzerland

With the Federal Council's "Digital Switzerland" strategy[7], the country wants to make the best use of the opportunities for society and the economy which arise from digital change. The main fields were the country took action for the digital strategy are for example education and research, infrastructure, security, government, and health, in particular. Switzerland provides room for the development of new business models, it has a highly diversified start-up scene which brings innovations to the market, together with an innovative global fintech sector.

Switzerland is expanding its **communications network infrastructure** in order to maintain its leading position compared to other countries. With the development of innovative solutions and standardisation, the security of communication infrastructures will also be guaranteed in the future. The energy networks as well are smart, secure and efficient, exploiting the use of digital instruments for planning and operation.

In terms of **mobility**, the country has a very efficient and intelligent transport system, sustained by the Confederation. Indeed, it promoted the deployment of the data infrastructure for multimodal mobility and is developing appropriate general conditions for digital selling.

The Confederation is increasing Switzerland's **cybersecurity**, but it is also improving digitalisation to enhance **security**. Digitalization is very important for prevention, in case of crisis situations real-time data from sensors and geo-information can contribute to a better understanding of the situation and improve the response.

Innovative and intelligent technologies expanded also in the **healthcare** system, for example in the form of telemedicine services or in the area of assistance systems and robotics. Digitalisation in the health sector pushes for having interoperable solutions that enable better networking, integration and coordination of treatment processes.

Switzerland sustains new forms of **political participation**, based on the application of new technologies, from electronic consultations and collections of signatures to project-related possibilities for involvement in decision-making. Moreover, the country enables population and businesses to communicate and handle their dealing with the authorities efficiently and digitally through the electronic service.

Switzerland supports the use of new technologies to achieve the goals of the United Nations 2030 Agenda for Sustainable Development (SDGs), supports an open, constructive dialogue on the continuing development of global digital governance and also supports a secure, open and free digital space which is based on clear rules and mutual trust.

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[7] https://strategy.digitaldialog.swiss/en

The Swiss Data Economy

Given Switzerland's leading position as a location for innovation and research, the country is strengthening competencies relating to digital technologies and it is also supporting knowledge transfer in relation to the developments of "Industry 4.0". Companies need to embark on more comprehensive digital transformations, redesigning business models, customer journeys, and business processes so that they embed a "digital first" strategy[8]. Digital technologies, automation, and artificial intelligence could boost Swiss productivity, so in the light of "Industry 4.0" digital transformation and skills development are imperative, in order to remain competitive and boost growth.

Data Economy						
Member State	2017	2018	Growth 2018/2017	2018 IMPACTS on GDP	2025 Baseline Scenario	CAGR 2025/2018
Austria	8,272	9,068	9.6%	2.7%	15,304	7.8%
Belgium	8,826	10,132	14.8%	2.5%	20,682	10.7%
Bulgaria	736	916	24.4%	2.0%	2,055	12.2%
Croatia	573	698	21.9%	1.4%	1,457	11.1%
Cyprus	405	506	24.8%	2.4%	1,113	11.9%
Czech Republic	2,462	2,754	11.9%	1.5%	5,078	9.1%
Denmark	7,310	8,177	11.9%	2.9%	13,984	8.0%
Estonia	655	856	30.7%	4.3%	1,851	11.6%
Finland	5,073	5,599	10.4%	2.8%	9,665	8.1%
France	42,855	47,681	11.3%	2.2%	83,696	8.4%
Germany	84,231	93,114	10.5%	3.1%	160,684	8.1%
Greece	1,470	1,724	17.3%	0.9%	3,155	9.0%
Hungary	1,368	1,729	26.3%	1.4%	3,503	10.6%
Ireland	6,612	7,853	18.8%	2.8%	13,800	8.4%
Italy	29,783	32,346	8.6%	2.0%	54,311	7.7%
Latvia	411	511	24.2%	2.2%	1,090	11.4%
Lithuania	670	825	23.2%	2.2%	1,806	11.8%
Luxembourg	485	565	16.5%	1.1%	1,074	9.6%
Malta	240	279	16.3%	2.7%	499	8.7%
Netherlands	19,237	22,548	17.2%	3.1%	45,008	10.4%
Poland	5,354	5,710	6.6%	1.2%	9,511	7.6%
Portugal	3,267	3,736	14.4%	2.0%	7,018	9.4%
Romania	1,890	2,179	15.3%	1.3%	3,859	8.5%
Slovakia	1,135	1,401	23.5%	1.7%	3,126	12.1%
Slovenia	437	523	19.5%	1.3%	1,133	11.7%
Spain	24,152	27,470	13.7%	2.4%	54,363	10.2%
Sweden	10,077	12,738	26.4%	2.9%	30,957	13.5%
Switzerland	11,767	14,097	19.8%	2.8%	28,305	10.5%
United Kingdom	68,616	76,234	11.1%	3.5%	124,480	7.3%
EU27	267,986	301,637	12.6%	2.4%	549,783	9.0%
EU28	336,602	377,871	12.3%	2.6%	674,263	8.6%

TABLE 2 – VALUE AND GROWTH OF THE DATA ECONOMY (€ MILLION; %)

The value of the Data Economy for EU27 and EU28 has been estimated to exceed the threshold of 300 Billion Euro in 2018. The estimated share of overall impacts on GDP in EU28 is 2.6% in 2018 and is expected to grow along the period. The value of the Data Economy on GDP in Switzerland in 2018 is above the average.

Looking at the Data Economy by EU Member State, there are countries which grow at a faster pace (both in terms of 2018 growth rate and 2025/2018 CAGR): Switzerland is among the Western European fastest

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[8] https://www.mckinsey.com/featured-insights/europe/the-future-of-work-switzerlands-digital-opportunity

growing countries, while Eastern and Central European Member States (in particular Bulgaria, Croatia, Cyprus, Estonia, Hungary, Latvia, Lithuania, Slovakia) are more receptive than mature economies to the digital transformation process that helps them in filling the gap in innovation, and their growth is usually faster than the rest of countries.

Data Economy					
	2025 Scenarios			**2025 IMPACTS on GDP**		
Member State	**2025 Challenge Scenario**	**2025 Baseline Scenario**	**2025 High Growth Scenario**	**2025 Challenge Scenario**	**2025 Baseline Scenario**	**2025 High Growth Scenario**
Austria	12,764	15,304	22,120	3.6%	4.1%	5.8%
Belgium	16,375	20,682	29,886	3.8%	4.6%	6.5%
Bulgaria	1,680	2,055	3,205	3.1%	3.6%	5.5%
Croatia	1,201	1,457	2,175	2.2%	2.5%	3.7%
Cyprus	917	1,113	1,751	3.8%	4.5%	6.9%
Czech Republic	4,017	5,078	7,351	1.9%	2.3%	3.2%
Denmark	11,387	13,984	20,258	3.8%	4.5%	6.3%
Estonia	1,480	1,851	3,148	6.3%	7.6%	12.6%
Finland	7,698	9,665	14,011	3.6%	4.3%	6.1%
France	67,044	83,696	121,697	2.8%	3.5%	4.9%
Germany	127,896	160,684	232,979	4.1%	5.0%	7.0%
Greece	2,510	3,155	4,679	1.2%	1.5%	2.2%
Hungary	2,847	3,503	5,321	2.0%	2.3%	3.5%
Ireland	10,512	13,800	19,463	3.1%	4.0%	5.4%
Italy	43,565	54,311	78,878	2.6%	3.2%	4.6%
Latvia	870	1,090	1,667	3.1%	3.8%	5.6%
Lithuania	1,444	1,806	2,651	3.4%	4.1%	5.7%
Luxembourg	899	1,074	1,549	1.5%	1.8%	2.5%
Malta	415	499	730	3.1%	3.7%	5.2%
Netherlands	34,987	45,008	67,149	4.5%	5.6%	8.1%
Poland	8,149	9,511	11,401	1.4%	1.6%	1.9%
Portugal	5,548	7,018	10,268	2.8%	3.4%	4.8%
Romania	3,150	3,859	5,602	1.5%	1.8%	2.5%
Slovakia	2,476	3,126	4,757	2.5%	3.1%	4.5%
Slovenia	861	1,133	1,648	1.8%	2.3%	3.2%
Spain	39,121	54,363	81,585	3.1%	4.1%	6.0%
Sweden	22,548	30,957	46,585	4.6%	6.1%	9.0%
Switzerland	17,512	28,305	38,043	3.1%	5.0%	6.7%
United Kingdom	104,356	124,480	198,326	4.5%	5.2%	8.0%
EU27	**432,360**	**549,783**	**802,515**	**3.3%**	**4.0%**	**5.7%**
EU28	**536,715**	**674,263**	**1,000,840**	**3.4%**	**4.2%**	**6.0%**

TABLE 3

– DATA ECONOMY FORECAST AT 2025 AND IMPACTS ON GDP ACCORDING TO THE THREE SCENARIOS (€ MILLION; %)

In terms of the predicted impact of Data Economy on GDP in 2025, the picture is variegated. Estonia stands out with shares well above EU27 or EU28 average (4.0% and 4.2% respectively), followed by Sweden, the Netherlands, the U.K., Switzerland and Germany, showing a value of the Data Economy on GDP higher than 5%.

This is particularly relevant to understand how investments in digitization can boost growth in the overall economy. It not just a matter of increasing ICT spending, but to embrace a broader and more comprehensive

digital transformation process, redesigning business models, customer journeys, and business processes, and remaining in the frontline of digital competition.

7. SUMMARY

Overall Switzerland is well positioned among the member states in terms of data professionals. The workforce is already focused on high quality manufacturing and financial services, which can be data focused work. However, the growth sectors for the data market are in sectors such as Professional Services and Retail, and the country has a lower share of companies in these sectors. This shows as a weaker position when comparing the Data Market and Data Revenues to the EU28 member states. In particular, the outlook for Data Companies Revenues is below the average for the EU28 member states, as shown in Figure 11. In addition, Switzerland is in the lower half of companies when considering growth out to 2025, as shown in Figure 12.

The data market in Switzerland is currently strong, with demand for data tools and services positioning the country at seventh among the EU28 member states, but again the focus on lower growth industries means Switzerland might lose this position to Sweden by 2025.

The value of the Data Economy on GDP in Switzerland in 2018 is above the average. Looking at the Data Economy by Member State, there are countries which grow at a faster pace, appearing more receptive to the digital transformation process. When looking at the predicted impact of Data Economy on GDP in 2025, Switzerland places among those countries with the value of the Data Economy on GDP higher than 5%, thus confirming its role as one of the most dynamic digital economies in Europe.

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METHODOLOGY ANNEX

Estimation of Data Professionals, Data Companies, Data Companies revenues, and the data Market

- Switzerland - 2017, 2018,
- 2025 Baseline,
- 2025, Conservative,
- 2025 High Growth scenarios

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.*

Data professionals are included in the category of the knowledge professionals and specifically in the category of the "codified" knowledge [9]; data professionals specifically deal with data while knowledge professionals deal with information and knowledge. Data entry clerks' primary activity is related to data, so they could be considered data professionals; however, data entry is a very routine task and for the sake of this study, data entry clerks are not going to be considered as knowledge professionals. Another specific category of data professionals is data analysts, who usually extract and analyse information from one single source, such as a CRM database. They require a medium level of creative thinking and usually work on structured data.

Statistical definition of Data Professionals

To define statistically the data professionals, we adopted the International Standard Classification of Occupations (ISCO-08). In the ISCO classification, there is no data professionals category so we define in which categories of the ISCO-08, data professionals are classified. International Labour Organization's **ILOSTAT** Database, publicly available, provides for all countries in scope the total employed population by economic activity and occupation (major group). This is used as the main data source for estimating the number of data professionals. The ISCO occupation codes used to define data professionals are shown in Table 4.

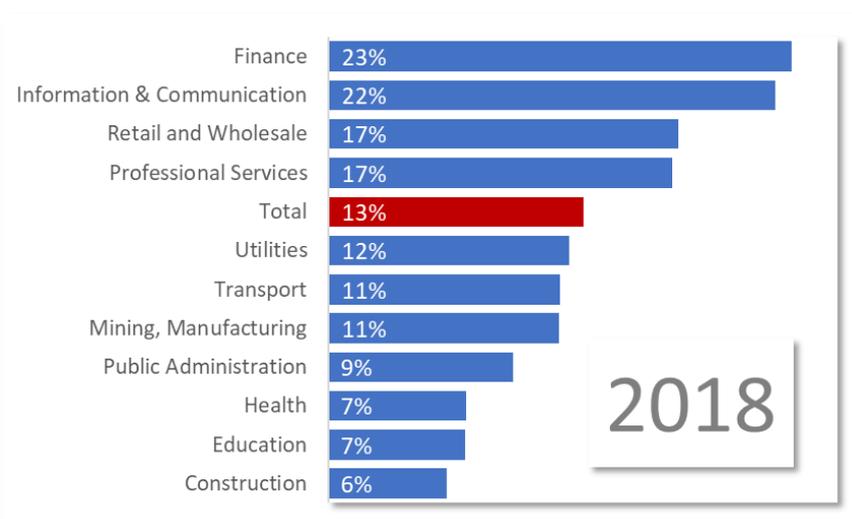| 1-Managers	2-Professionals	3-Technicians and associate professionals	4-Clerical support professionals
11. Chief executives, senior officials and legislators	21. Science and engineering professionals	33. Business and administration associate professionals	43. Numerical and material recording clerks
12. Administrative and commercial managers	24. Business and administration professionals		
13. Production and specialised services managers	25. Information and communications technology professionals		
14. Hospitality, retail and other services managers	33. Business and administration associate professionals		
	43. Numerical and material recording clerks		

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[9] Lundvall, Bengt-äke and Johnson, Björn, The learning economy, Journal of Industry Studies, Volume 1, 1994

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TABLE 4 – 1 AND 2-DIGIT OCCUPATIONS INCLUDED FOR DATA PROFESSIONALS

The criteria adopted for the selection of the ISCO-08 codes are the following:
- Occupations where data professionals can be involved either as data providers or as data users.
- Occupation codes where the presence of data professionals can be detected because:
  - they hold deep analytical skills
  - they do not need deep analytical skills but basics understanding of statistics and/or machine learning in order to conceptualize the questions that can be addressed through deep analytical skills
  - they are the ones providing enabling technology and therefore they are providers of data services
- Selected codes are those where a significant proportion of the professionals may be data professionals; occupations where data professionals are a very marginal part of all professionals are excluded; as an example, medical practitioners are excluded, although some practitioners may be data professionals because they undertake research activities. Since they are only a very marginal part of the practitioners, we excluded them from the occupations where data professionals are present
- 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 professionals 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).

This subset of the ISCO data defines professionals that are candidates for data professionals, but the actual share of data professionals is defined by industry using survey results first conducted in 2014 – which derived the share of data professionals of the total number of professionals in the categories of Professionals and Managers, across specific industries. These shares are used to estimate the number of data professionals from the specific

FIGURE 14 - DATA PROFESSIONALS SHARE OF ALL PROFESSIONALS - 2018

occupations listed in Table 4. These industry values are totaled to give the number of data professionals in each country. Figure 14 shows the shares used for 2018.

Number of 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.*

Data Suppliers

For these categories of suppliers, we include only the activities, revenues and employees related with the provision of data-based services.

- **New/ specialised intermediaries** are organizations whose core business is to develop and sell tools, products and/or services based on the re-use of data (including storage, aggregation, analysis) to other organizations. They can be cross-sector or specialised in specific vertical markets. They can be classified as follows:
    - o Providers of data marketplaces and data platforms
    - o Providers of data analytics products and services
    - o Providers of vertical solutions / mobile apps/ cloud apps / big data apps
- **ICT enablers including:**
    - o Providers of Software and Tools
    - o Providers of business & IT services
- **ICT infrastructure providers including**:
    - o Cloud Computing Providers
    - o Providers of platforms & IT Infrastructure
    - o Connectivity Infrastructure providers

IDC used NACE II classifications to identify those industries which are considered data suppliers.

- We included the NACE sections where specialised intermediaries and ICT enablers operate
- We included only those organisations where the specified industry is the main source of revenue for the organisation. Subsidiaries which might have data supplier activity, but form only a small part of the overall organisation are excluded. This is consistent with organisation categorisation by Eurostat.
- We excluded the companies collecting and implementing data products and services for their own use; we only consider as data suppliers the companies selling data products and services and therefore achieving revenues.

The sections of the NACE II in which we find data companies are:

- Section J, which is Information and communication
- Section M, Professional, Scientific and Technical Activities

The codes selected for both Section J and Section M are presented in   Table 5 and   Table 6.

Division	Group	Class	SECTION J - INFORMATION AND COMMUNICATION	
58			Publishing activities	Included
		58.12	Publishing of directories and mailing lists	Included
62			Computer programming, consultancy and related activities	Included
	62		Computer programming, consultancy and related activities	Included
		62.01	Computer programming activities	Included
		62.02	Computer consultancy activities	Included
		62.03	Computer facilities management activities	Included
		62.09	Other information technology and computer service activities	Included
63			Information service activities	Included
	63.1		Data processing, hosting and related activities; web portals	Included
		63.11	Data processing, hosting and related activities	Included
	63.9		Other information service activities	Included
		63.99	Other information service activities n.e.c.	Included

TABLE 5 - NACE II CODES – SECTION J - USED TO IDENTIFY DATA SUPPLIERS

Division	Group	Class	SECTION M — PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	
70			Activities of head offices; management consultancy activities	Included
	70.2		Management consultancy activities	Included
		70.22	Business and other management consultancy activities	Included
72			Scientific research and development	Included
	72.2		Research and experimental development on social sciences and humanities	Included
		72.2	Research and experimental development on social sciences and humanities	Included
73			Advertising and market research	Included
	73.1		Advertising	Included
	73.2		Market research and public opinion polling	Included
		73.2	Market research and public opinion polling	Included
74			Other professional, scientific and technical activities	Included
	74.9		Other professional, scientific and technical activities n.e.c.	Included
		74.9	Other professional, scientific and technical activities n.e.c.	Included

TABLE 6 - NACE II CODES - SECTION M - USED TO IDENTIFY DATA SUPPLIERS

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These companies – identified through the industries in which they are active – have only a small percentage of their activities related to data supply. To identify this share IDC conducted a survey in 2014 asking the share of data supply activity. This is supplemented annually with IDC's Vertical Markets survey across Europe. This assesses data supply and use activity as part of its remit and this data is used to update the share of companies in the J and M sectors what are active data suppliers.

Not all member states are surveyed but sufficient are surveyed that there is a proxy for un-surveyed countries among the surveyed one. The proxy is identified using the shortest orthogonal distance across the vectors that define industry share of all industries for each member state. The shortest distance might not be a sufficient match though due to outliers which can be large – so the nearest three are reviewed and the one which shows the best fit across relevant industries – J and M, but also the larger industries such as Manufacturing and Retail. This methodology is also used to identify a proxy for Data Revenues but in that case the vector space is that of IT spending, not the number of companies. Figure 15 shows the plot of orthogonal distance by industry used to identify nearest neighbour from the closest three.
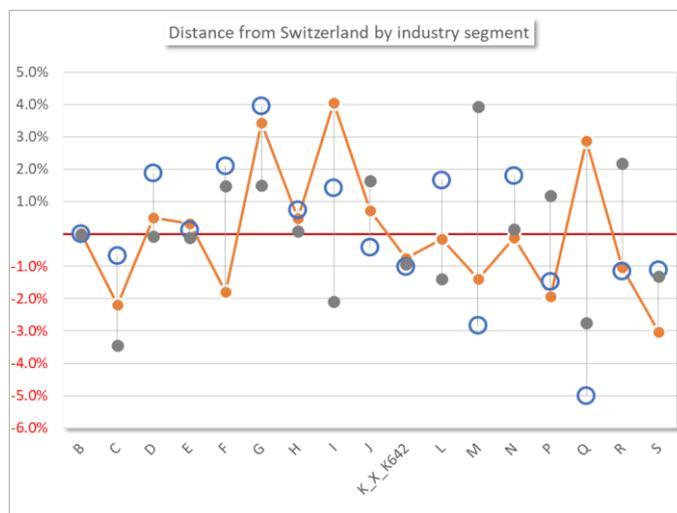

FIGURE 15 - NEAREST PROXY - ORTHOGONAL DISTANCE BY INDUSTRY

Data Users

Every company or organisation is potentially a data user, so all NACE codes should be logically included. We aggregated the main sectors to develop a realistic sample and analysis.

Industry segmentation	NACE section(s)
Mining, Manufacturing	B - C
Electricity, gas and steam, water supply, sewerage and waste management	D - E
Construction	F
Transport and storage	H
Information and communications	J
Finance	K
Public Administration And Defence; Compulsory Social Security	O
Education	P
Human health activities	Q
Wholesale and retail trade repair of motor vehicles and motorcycles, Accommodation and food services	G - I
Professional services, administrative and support services	L-M-N

TABLE 7 - MAIN INDUSTRIES AND NACE CODES WHERE DATA USERS MAY BE CLASSIFIED
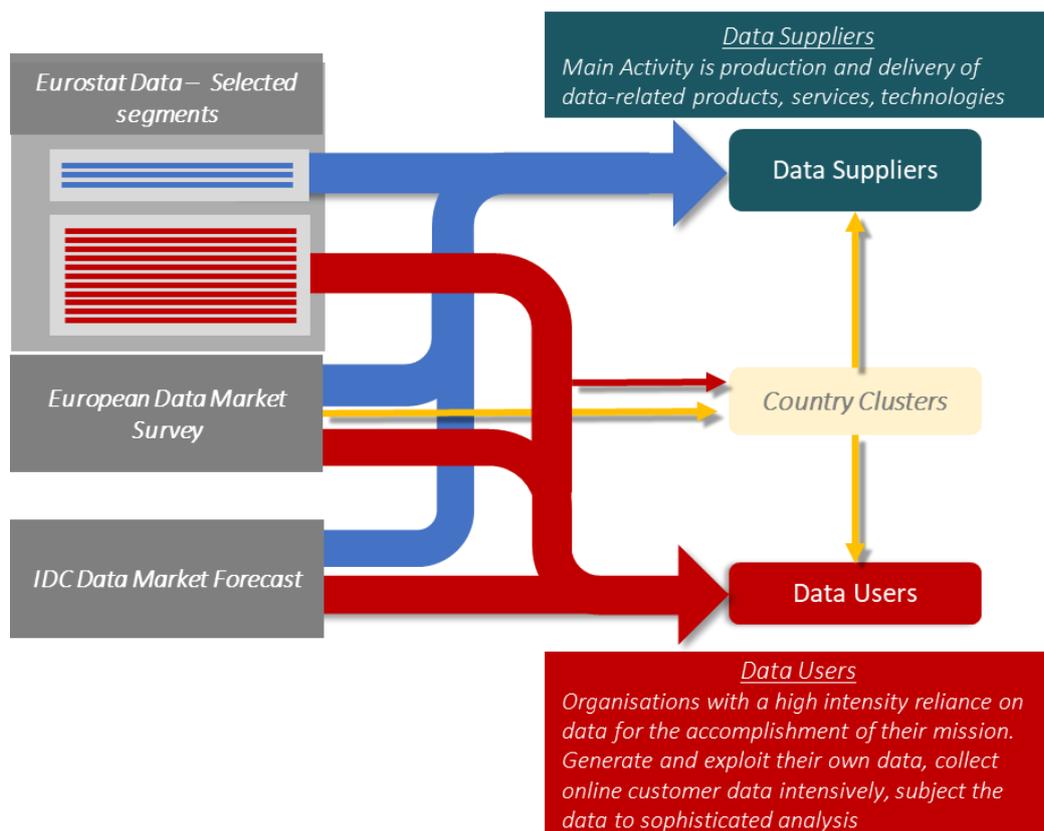
FIGURE 16 - DATA COMPANIES MODEL

Data Users also have an adoption rate applied following on from IDC's Data Market survey – which identified those organisations that use primarily data as part of their decision making. This excludes those organisations that are data averse and could not be considered data users as part of the management and organisation of their business. Figure 16 shows the data companies model.

Revenues of Data Companies

Definition and Scope

Data companies' revenues are the revenues generated by data suppliers for the products and services specified in our definition of the Data Market. The revenues correspond to the aggregated value of all the data-related products and services generated by Europe-based suppliers, including exports outside the EU.

Revenues of data companies are estimated at the member state level and by industry and company size using IDC's various market sizing databases. At the beginning of this project the data market was undefined, so the definition of the data market was built across several technology sectors. The Data Market is composed of a share of IT Hardware, IT Software, and IT Services – together with some Telecom hardware and Services. These shares formed the basis for IDC's Big Data and Analytics spending guide, although the Big Data guide focuses more on hardware and software than services.

The share of revenues is estimated across specific hardware types, which include Servers, Storage, PC and mobility hardware, and focuses on shares of specific data oriented software applications.IT Services uses a tie ratio as the relationship between IT Services and some of the specific hardware and software applications is strong and relatively invariant. Based on this the difference between IT Spending in the data market, and

IT Revenues relates mainly to import and export differences. These tend to be small – particularly in the case of software revenues. These I/O differences are estimated using import and export figures as a guide to give an estimate of Revenues of Data Companies based on the Data Market in any specific member state.

In addition, overall IT Spending growth maintains a strong relationship to GDP growth in member states, so the variations in IT Spending compared with GDP growth forecasts moderate the import and export values used to estimate Data Companies Revenues against the size of the Data Market.

The Size of the Data Market
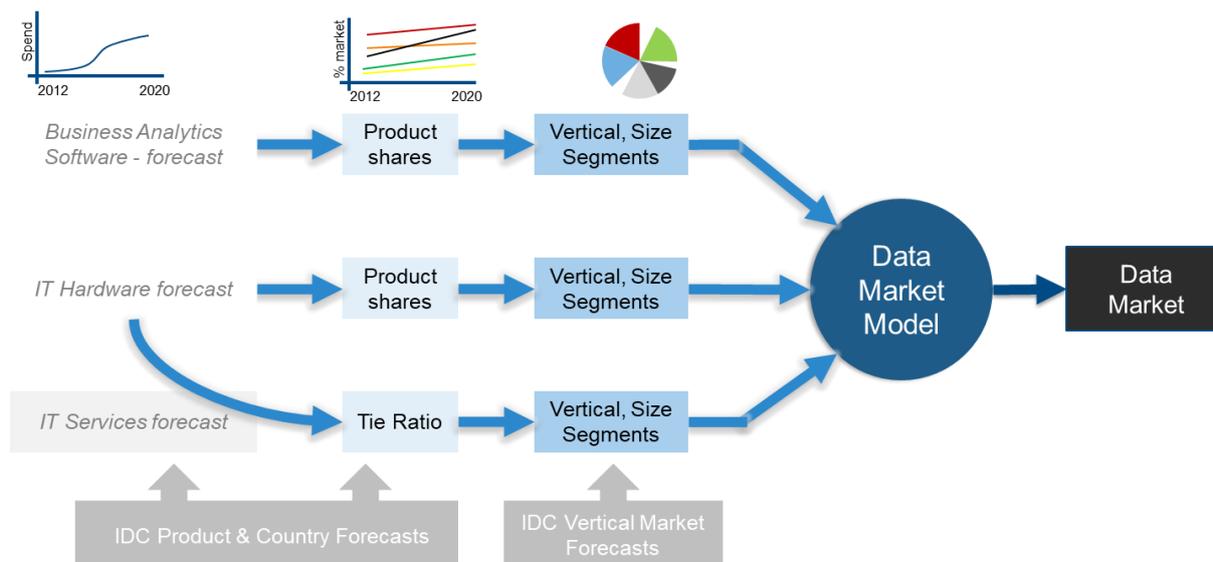
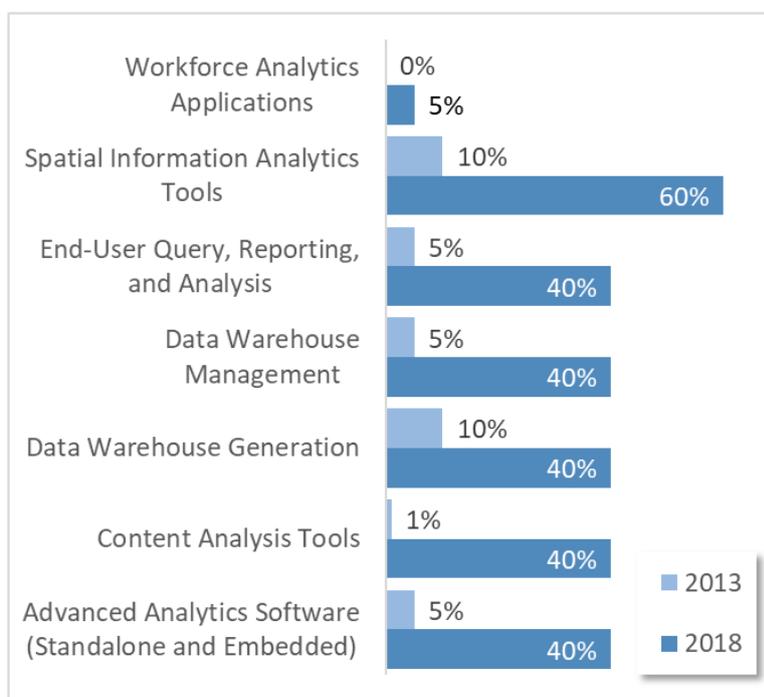**FIGURE 17 - THE DATA MARKET MODEL**

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. We define its value as the aggregate value of the demand of digital data without measuring the direct, indirect and induced impacts of data in the economy as a whole. The value of the Data Market 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.

IDC's model of the data market in Europe is composed of:

Data Market Component	Modelled as:
Data	Not included
Software	Modelled share of Business Analytics software Modelled share of System Infrastructure software – tied to Data Market Hardware
Hardware	Modelled share of Networking, Disk Systems, Servers
IT Services	IT Spend tied to Data Market Software Spend.

TABLE 8 - DATA MARKET MODEL SUMMARY

The data market is estimated as described in Revenues of Data Companies – using a model which takes defined share of IT Spending in Hardware, Software, IT Services, and Telecoms. These shares are estimated based on the results of end user surveys – specifically and most recently the IDC European Vertical Markets survey. This includes questions about adoption rates of emerging and incumbent data technologies which is used to moderate the shares of the different technologies included in IDC's Vertical Market Spending Guide, and Black Book Global IT Spending. The model is shown in Figure 17, and the weights used for the data model for specific business analytic software is shown in Figure 18.

FIGURE 18 - WEIGHTS USED FOR BUSINESS ANALYTICS SOFTWARE TO CALCULATE THE SIZE OF THE DATA MARKET

The most recently used data sources include:

Data Source	Updated
Consensus Forecasts – Consensus economics	Nov-2019
Eurostat chain linked Volumes (GDP)	Jan-2020
IDC Core IT Spending guide 2H2018	Jun-2019
IDC European Vertical Markets survey (2019)	Sep-2019
IDC Worldwide Black Book (standard edition) v3.2	Nov-2019
IMF World Economic Outlook (Oct 2019)	Jan-2020
IT Big Data and Analytics spending Guide 2H2018	Nov-2019

TABLE 9 – DATA SOURCES AND MOST RECENT UPDATES FOR THE DATA MARKET MODEL