

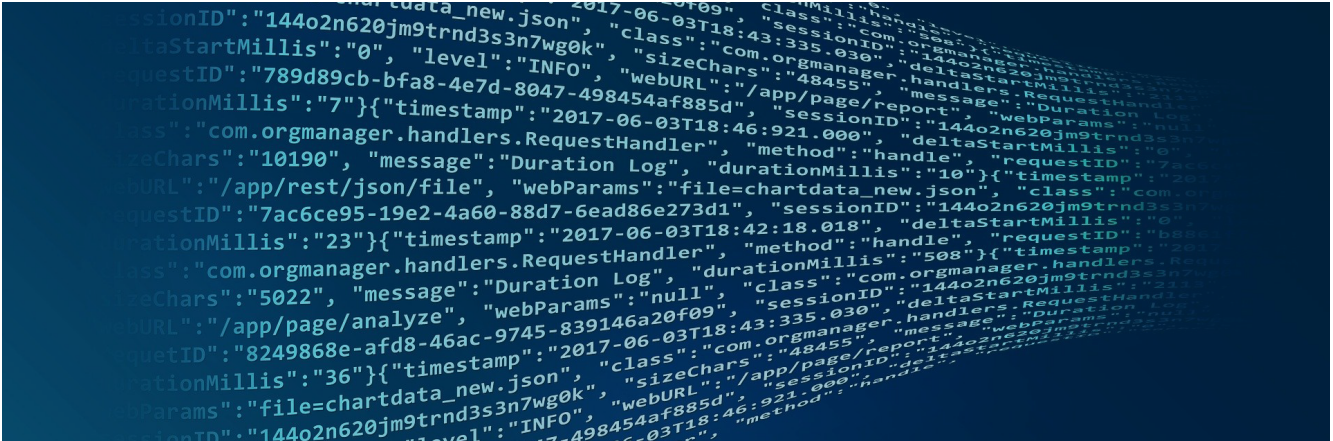


Big Data

2022



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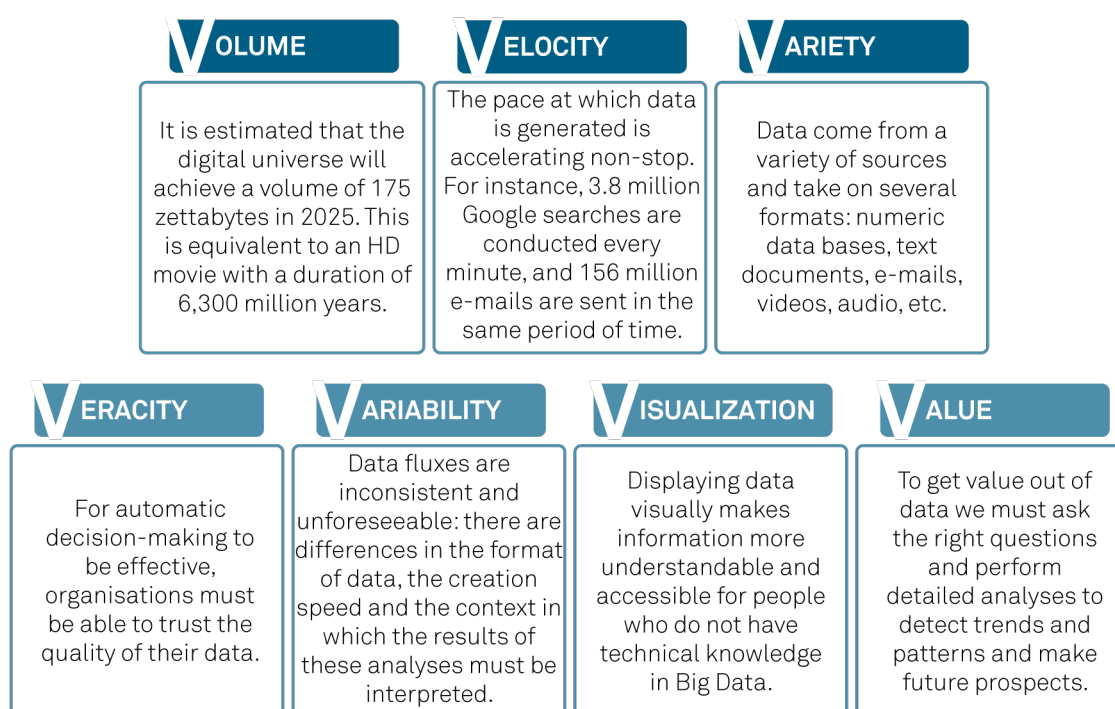


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Why Big Data?

The concept of **Big Data** refers to data that, because of their size, speed or velocity, **are difficult or impossible to process** using traditional methods and software. The origin of big data bases goes back to the 1960s and 70s, but the term “Big Data” was not used until the 2000s. It was then when phenomena such as Facebook and YouTube made it obvious that users generate massive amounts of data through online services, and companies became aware of the wide range of uses and business opportunities that arise from using this information. Around the same time that this term became popular, in 2001 analyst Doug Laney articulated the first definition of Big Data through what we call the **three Vs** (Volume, Velocity and Variety), to which four more were added later (Veracity, Variability, Visualisation and Value).

Figure 1. The 7 dimensions of Big Data



Source: Prepared by the authors, based on *Big Data: What it is and why it matters*, by SAS and others

Due to the renovation of the interest in data that spread at the beginning of the 2000s, there was a technology boom that through the last 20 years has created more information than what many companies and organisations were prepared to handle. As a consequence, there has been a **rise in the demand for professionals who are able to analyse large volumes of data and make data-based decisions** (data analysts, data architects and data sciences, for instance), who contribute to business development. Some of the specific causes of this growth are the following:

- **Increase of connected devices:** from computers and smartphones to electronic appliances, in 2025 it is expected that there will be around 31 billion devices connected to the Internet worldwide (according to the specialised website www.statista.com). As the number of devices connected to the Internet increases, the resulting volume of data increases as well.
- **Data democratisation:** Frequently, information about a company is available to professionals who are not qualified in data analysis, such as managers and board members. So organisations need people who refine the information and make it more accessible and understandable for these non-specialised profiles.
- **Consumer needs and marketing:** Marketing is an area in which methodologies and processes have rapidly adapted to the wide data availability. The features of potential customers are analysed in order to detect their needs and offer them personalised advertisement campaigns.
- **Data-based decision making:** There has been a rise in this decision-making style based on numbers, trials and learning through objective data, which does not rely so much on simply observing the environment and following your intuition.

Several recent studies confirm the positive future work prospects for people specialised in Big Data. For example, according to the World Economic Forum, Big data is the second technology —only after mobile Internet or Cloud— with the **largest impact on the skills that are demanded in the labour market**. Therefore, it will be an important area for employment creation globally.

As per Spain, the 2020 EPyCE report concludes that professional profiles that are related with Data Science and Big Data are **amongst the five most in-demand profiles**. At the same time, these vacancies are the **most difficult ones to cover**, according to the representatives of the more than 200 companies interviewed.

Figure 1. The 5 most in-demand and difficult to cover jobs in Spain

	MOST IN-DEMAND JOBS	HARDEST JOBS TO COVER
#1	Qualified technician	Data Scientist
#2	Data Scientist	Big Data Expert
#3	Computer engineer	Computer engineer
#4	Big Data Expert	Qualified technician
#5	Computer programmer	Doctor

Source: Prepared by the authors, based on data from the report *EPyCE 2020 Posiciones y competencias más demandadas*.

Applications and benefits for companies

Although it is a fairly new concept, Big Data has positioned itself as one of the main business focus in all sectors worldwide. The reason for this general impact is that one of the areas in which data analysis has a major impact is **decision making**, an essential process in all kinds of organisations. Thanks to the analysis of large data volumes, one can detect patterns, unknown relations, market trends and changes in the preferences of the consumer public, which contributes to making more informed decisions and to defining better business strategies.



Besides, the benefits of Big Data go beyond strategic planning. Many technology companies — such as Google, Facebook or LinkedIn— have developed **products that incorporate functions based on personal and user experience data analysis**. Usually, these algorithms are updated in real time through new inputs to offer a personalised user experience. This is the case, for instance, of Google ads that are adapted to recent searches of each user, or friend suggestions and job offers displayed by Facebook and LinkedIn, respectively.

Another advantage of using Big Data solutions is **saving time**. This new technology, combined with the increase of computer power, makes it possible to analyse data bases and create models or forecasts up to 10,000 times faster than with traditional methods. Thanks to these improvements in operational efficiency and the price decrease in cloud information storage, developing a good Big Data strategy often entails remarkable **cost savings** for businesses.

Below you will find a summary of **three examples of Big Data applied** to different industries:



The American chain store Macy's uses Big Data to speed up its price optimisation process, based on analysis of factors such as: the selling price of competition, the company's cost structure or general market trends, an algorithm fixes the price that allows to minimise surplus stock and maximise profit margin. Thus, the introduction of technology has reduced the time needed to adapt the price of more than 73 million articles from 27 hours to just over 60 minutes.



ORION is an initiative of the American messaging company UPS. It is a research project that collects data on the route, speed and performance of UPS vehicles to design more optimal delivery routes. In just two years, the company saved over 31 million litres of fuel.



The streaming platform Netflix was one of the first companies to use services based on user data analysis. Between 2006 and 2009, Netflix held a contest that awarded 1 million dollars to the company that managed to improve their content recommendation algorithm by more than 10%. This algorithm records public interactions with the platform, such as the contents being displayed, which days of the week and for how many hours the application is used, from which device, etc. Thus, it "learns" the behavioural habits of each profile and makes recommendations based on similar profile data.

The impact of Big Data on professional profiles

As we already learnt in the first section, the expansion of **Big Data** technologies, combined with the widespread availability of data and the cost reduction of cloud storage, has increased the demand for specialists in this area. So much so that these jobs have become some of the most demanding in the job market.

Of the most common professional profiles associated with **Big Data**, we can distinguish between those who have the most route in the sector and those who have become popular in recent years. As **consolidated profiles**, we emphasise:



Big Data Experts: They are professionals who transform large volumes of data into useful knowledge to improve the planning and decision-making of organisations. Unlike data analysts, they are also in charge of obtaining data from different sources, interpreting and analysing them from a business perspective. Besides, they may participate in maintaining the architecture of equipment, software and systems linked to data processing.



Database administrators: They are responsible for monitoring and optimising the functioning of databases, with the aim of preventing and remedying the failures and errors caused by volumes of high visits. They also work in coordination with cybersecurity professionals to ensure the confidentiality of data.



Other jobs that have gained importance as a result of the increase in the volume of data generated and the acceleration of technology are as follows:



Data architects: People who design, create and maintain the structure that holds the whole **Big Data** process, from data collection to presentation. They must be well aware of the sector and the business for which they work, as data structure is based on the company's business processes and operations.



Data scientists: These professionals design and build new processes of modelling, mining and data production. They conduct studies and experiments and intervene in the development of prototypes, algorithms and predictive models.

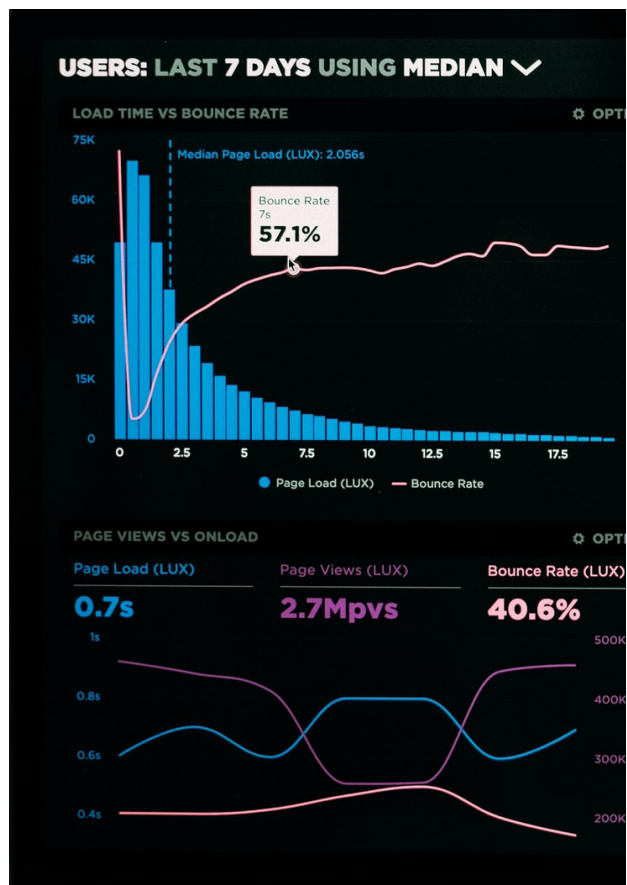


Data analysts: Data analysts work in a variety of sectors (such as trade, finance, and health sciences), developing methods for analysing large databases that are easily reproducible and scalable.

However, apart from the profiles outlined above, the trend for companies is to increasingly incorporate **hybrid profiles**. In this context, the concept of hybridity refers to profiles with **specific training in other fields** (such as finance, marketing and corporate talent) but they have also developed **transverse digital skills and techniques**.

The digitisation of economy has not only driven the creation and popularisation of new job positions, but has also transformed the kind of skills that are required in many jobs, including those that do not have a technological basis.

Three of these **digital skills** linked to Big Data are **analytic capability, data visualisation, and knowledge of data analysis tools and software**. Hybrid profiles do not require technical knowledge in Big Data or in programming. Instead, they are expected to be professionals with a good **overview of the sector** in which they work, who are familiar with the type of data that is analysed in their speciality, and able to **understand and interpret relationships between different variables, tables and graphs**. As far as software is concerned, it is positively valued that they have knowledge of some **business intelligence and data visualisation tools** such as: Power BI, Pentaho, Qlik Sense, Tableau, Toucan Toco and Jaspersoft.



Many —if not all— professional profiles can benefit from acquiring knowledge of new technologies and of data analysis in particular. However, there are areas where **Big Data** is already having a **significant impact**. Two examples are described below:



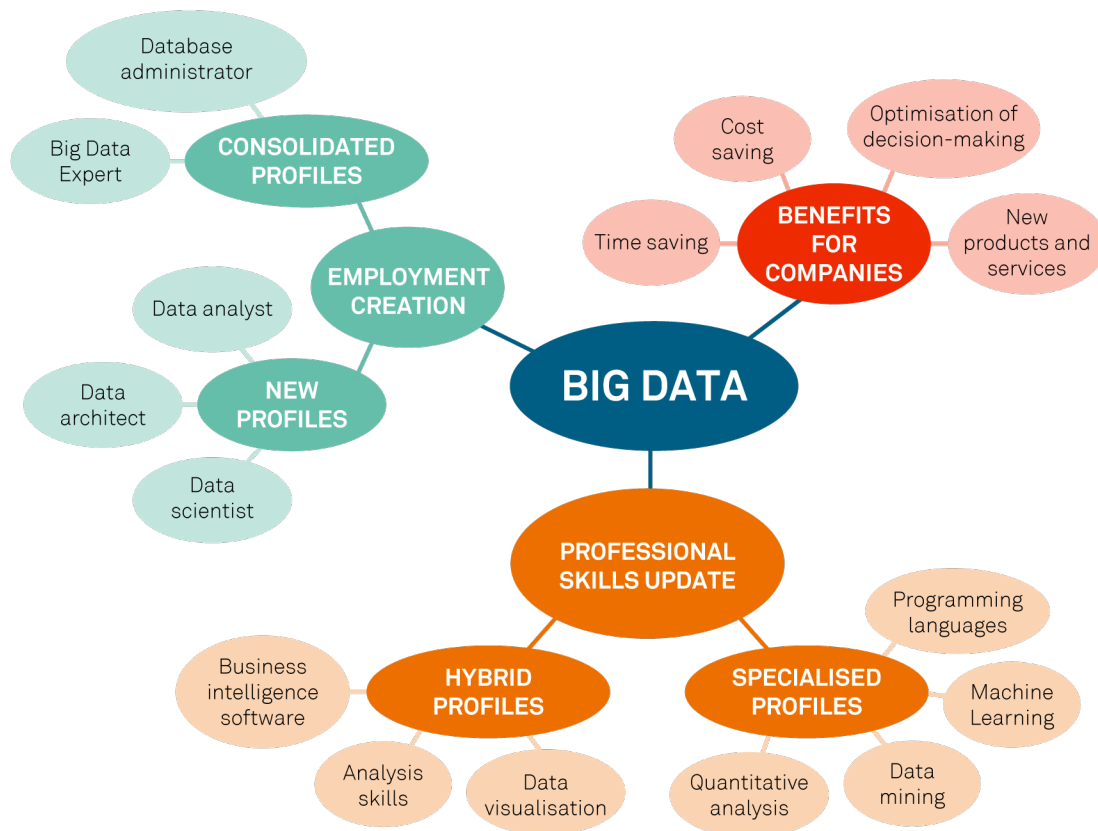
Customer Relationship Management (CRM): This software manages the relationship with consumers and works mostly with structured data, such as demographic variables (name, age, shopping history, address, phone, etc.). Thanks to Big Data technologies, however, it is now easier to incorporate **unstructured data** —more diverse and apparently random— into these analyses with the aim of better segmenting the clientele and customising user experience.



Recruitment: in the future, candidate CVs who apply for a vacancy will not be reviewed one by one, but will be automated instead. By applying Big Data, Artificial Intelligence and Machine Learning, large volumes of varied data about candidates can be analysed. As a consequence, the workload at HR departments is reduced, and the percentage of successful recruitments increases.

Graphically, the **overall impact of Big Data** could be summarised as follows:

Figure 3. Impact of Big Data in occupation

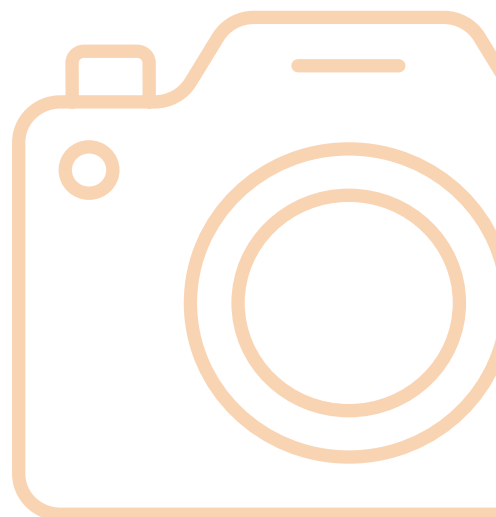


Source: Prepared by the authors.

Big Data, focused

The volume of data generated has rocketed over recent years as a result of the democratisation of Internet access and the increase in the number of connected devices. This has contributed to the rapid consolidation of Big Data as one of the essential technologies of digital transition. In fact, the pace of implementation of Big Data by companies has been so fast that **many are finding it difficult to cover their available vacancies.**

All forecasts suggest that this trend will continue to increase, both in terms of data generation and in the demand for professionals. Big Data not only encourages the recruitment of expert data analysts, but also **promotes employment in complementary specialities** such as cybersecurity, cloud computing, artificial intelligence, and machine learning. Furthermore, these professions transcend the barriers of the technological industry and integrate into very diverse sectors and areas of activity, which promotes the creation of hybrid profiles. Companies need people with deep knowledge of the sector who also have digital, numerical and analytic skills.



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