THE DIGITAL REVOLUTION AND THE TRANSFORMATION OF BUSINESS MODELS

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Technology doesn't provide value to a business. Instead, technology's value comes from doing business differently because technology makes it possible

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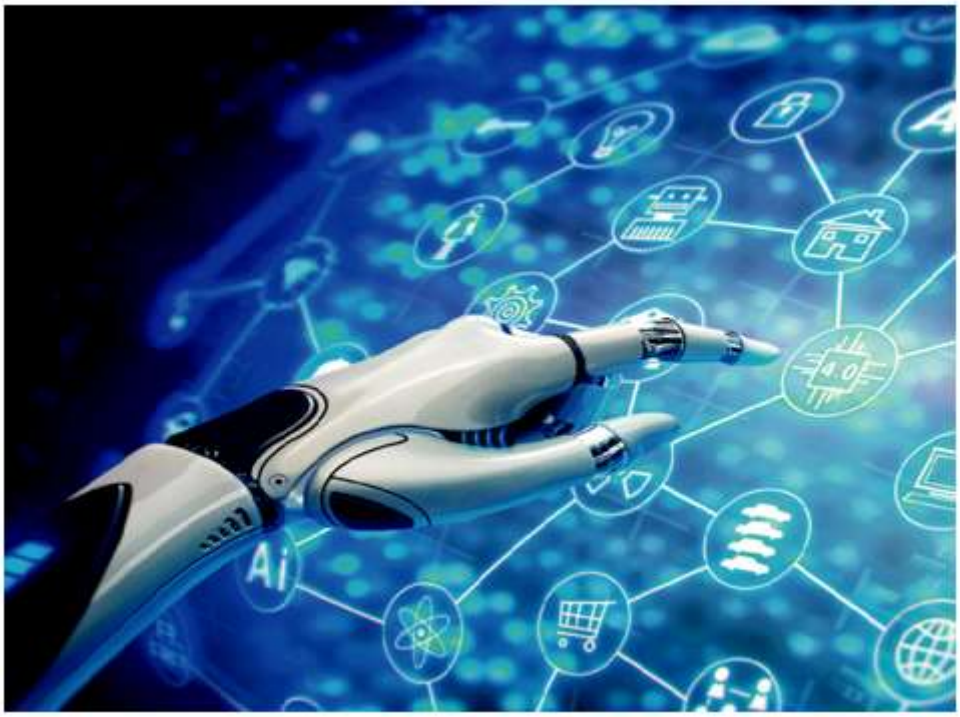


Abstraction: *For some years now, there have been many initiatives to transform the processes and systems used by companies, which ultimately impacts the way work is done. These initiatives have taken place in both the private and public sectors, and are based on a combination of physical infrastructures and novel elements from digital technology and biotechnology developments.*

These changes are a more sophisticated continuation of the current production systems and represent a new paradigm, the so-called fourth industrial revolution. This paradigm is based on radical changes in production linked to the speed of implementation, which has no historical precedent, and on the scope of the transformation, which affects a large number of elements in the value chain.

Keywords: *Digital transformation technologies, artificial intelligence, Big Data, digital transformation environment, strategy and mobilization, commercial processes, data Protection, cybersecurity*

Within this industrial revolution, the concept of digital transformation brings together those initiatives directly related to digital technologies. According to some authors, digital transformation can be defined as:

"The use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements (such as enhancing customer experience, streamlining operations or creating new business models)"

These digital technologies have a direct impact on processes in terms of speed, security, and transparency, which allows the development of new services that did not exist before due to a lack of markets or profitability, since digital technologies usually have few barriers to entry, and their marginal costs tend to zero.

They also affect service intermediaries by correcting, at least partially, some market imperfections such as asymmetric information, transaction costs, or asymmetries in the matching of supply and demand, through the use of B2B or P2P platforms with minimum involvement of third parties.

However, data management has become a fundamental asset for companies, and it is a raw material and a business generator at the same time. The digitalization of processes and the interaction with customers, employees, and suppliers through digital channels, provides a huge amount of information that can be used for new opportunities. By way of illustration, according to the European Commission, the value of the data economy in the European Union could reach 4% of GDP in 2020 (more than double concerning the current situation).

It also involves a paradigm shift in the labor market, since it requires more qualified tasks, which implies the need to make a greater investment both in the educational system and in the ongoing training plans of companies.

However, as will be discussed later, digital transformation does not refer to the new applications and uses of new technologies, but to how these technologies change the environment in which companies operate and how they must adapt to this new environment (Figure 1), using precisely these technologies in processes and systems, but also changing their organization and strategy.

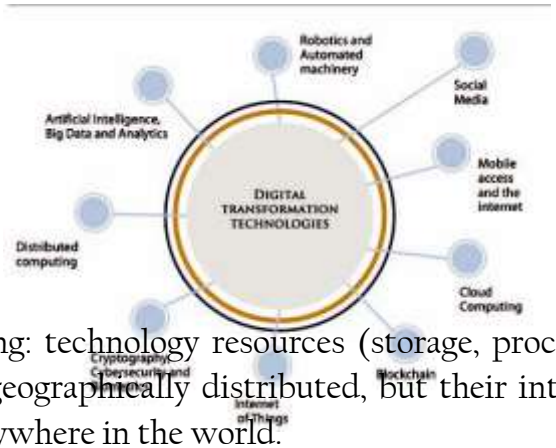
Figure 1. Digital transformation elements.

Digital transformation technologies

Business transformation, which encompasses a number of areas and proposals, is based on technology developments that, while having different origins and nature, share some common elements: their strong leverage in investment, the production and use of large data volumes, and the goal of improving the customer experience and operational efficiency. Some of the main technologies that drive transformation are the following: (Figure 2):

- Mobile and internet access: the prevalence of telecommunications and access to a wide range of online services is leading companies to develop application programming interfaces (APIs), which enables companies to have new channels of dialogue with customers as well as a broad data set. This leads to the appearance of new relevant forms of information, such as geolocation. Likewise, mobile access has allowed universal access to information and communication, regardless of physical location. As an example, mobile broadband communications have multiplied fivefold in the developed economies over the past ten years.
- Social Media: social networks are a source of data that provides a better understanding of customer behavior and greater productivity through improved internal communications. Trends for Social Media suggest a much more segmented and directed marketing as well as new forms of communication in real-time.
- Artificial intelligence, Big Data, and Analytics: pattern detection tools and behavior prediction models based on the use of huge databases (containing both structured and unstructured information - internet connection logs, messages on social networks, etc.) and on the use of advanced modeling techniques and algorithms. All this provides better customer knowledge, which in turn improves segmentation, product customization, and price, and allows more efficient marketing.

Figure 2. Digital transformation technologies.



- Distributed computing: technology resources (storage, processing, data sources, and supercomputers) can be geographically distributed, but their interconnection can be taken advantage of by users anywhere in the world.
- Cloud computing: technology resources (storage, processing, data sources, and supercomputers) can be geographically distributed, but their interconnection can be taken advantage of by users anywhere in the world. Also, the use of cloud-based applications enables access to information from anywhere, facilitates business operations, and allows for greater speed, security, and lower costs. This leads to a new business model where these resources are offered as utilities and the use of the service is billed.

- Distributed Ledger Technology (Blockchain): a data structure that implements a distributed registration system (ledger), that is, a cryptographic record of all operations performed and previously validated by a network of independent nodes through a consensus algorithm. This allows the recording of any digitizable asset, such as cryptocurrencies, financial instruments or "smart contracts" (programmable contracts that implement business rules and whose code is registered and can be executed in a distributed manner by the different nodes on the network). All this brings immediacy of operations, security and privacy through cryptographic rules that allow the unbreachable registration of operations, transparency (since all operations are stored in the register and can be audited by any network member), removal of a single point of failure, and cost reduction (intermediation to validate and register operations is eliminated).
- Cryptography, cybersecurity and biometrics: new cryptographic tools, and initiatives that seek the improvement of the information security and encryption processes, as well as the creation of more robust security systems in sensors and biometrics.
- Internet of Things: unlike traditional communication systems, the Internet of Things concept refers to an open-network interconnection of computer devices that send and receive data without human intervention, which allows direct, mass collection of data, as well as the remote, real-time operation of the Internet-connected devices. This technology improves the customer experience and at the same time allows the data to be used in some business processes, as is the case with pricing or the pursuit of efficiency.
- Robotics and automated machinery: RPA tools and virtual assistants based on the interpretation of natural language allow the automation of repetitive, reduced added-value tasks traditionally carried out manually, so that this available capacity can be focused on greater added-value tasks. End-user industries are rapidly adopting this new technology in order to improve product quality and reduce manufacturing costs.
- 3D printing: aimed at the delocalized and decentralized manufacturing of items based on the remote, digitized reception of industrial design, and is widely used in industry as well as directly by consumers (in areas such as aeronautics, automotive, electronics, medicine, etc.).

- Augmented reality and virtual reality: used in many areas, such as in the video games or multimedia-content industries, employee training in highly specialized industries, repairs, and maintenance support in the energy industry, support in off-the-plan property sales, property search engines, bank branches, ATMs, etc.

The new digital transformation environment

This new digital environment is significantly modifying the conditions in which markets reach equilibrium by changing both the supplying companies and the expectations and behavior of consumers, as well as the different conditions in which operations are performed (sale of products, services, etc.).

As will be discussed in this section, digital transformation is taking place in an environment where different drivers come into play. While new technological capabilities

are the root cause of this transformation, the fundamental component making it possible is the changes in customers and markets brought about by technology, which enable, encourage, and require the implementation of this technology in companies so they can adapt to this new paradigm.

These changes are magnified as a result of the disappearance of previous barriers to entry in the different industry sectors (Figure 3).

The fact is that this disruption in the supply of goods and services is motivated by various factors. A key factor is the entry of new competitors whose value proposition is fundamentally based on a technology component, which determines the business model and its related elements (high growth capacity, low costs and decreasing marginal cost, strong leverage in mobile technology, data analysis, cloud technologies, and cybersecurity).

In addition to entering the market, new competitors sometimes replace the product or service offered with a digital or hybrid service, which results in lower costs and prices and makes traditional services easily and quickly replaceable. This happens with new service models based on algorithms that interpret data from social networks and other unconventional sources to provide relevant, real-time information to their clients, thus replacing traditional information sources.

Finally, suppliers can also influence the adaptation of specific processes by generating communication platforms and digital business approaches that make it easier for their clients to migrate their product or service provisioning processes.

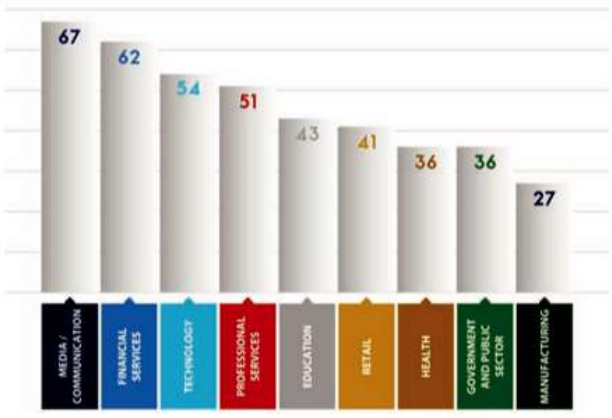
In response to all this, market incumbents are also adapting their business models despite the various inhibitors to digital transformation they have to deal with, such as resistance to change, culture, or lack of training.

Indirectly, technology also acts as a driver of change in terms of how customers understand the provision of services.

Changes in consumption patterns are synthesized by the World Economic Forum (WEF) as:

1. Greater focus on the customer experience: the purchasing experience becomes more important, to the point that people and organizations choose product and services not only based on their quality and price, but also on the related purchasing experience (e.g. delivery times or after-sales service).

Figure 3. Percentage of respondents who think it very likely that an industry would be affected by digital trends. Source: Harvard Business Review (2017)



2. Hyper-personalization of the customer offer: customers have higher expectations as to how much products and services suit their preferences and lifestyles. Digital technology allows companies to meet these expectations without dramatically increasing costs.

3. Access against ownership: the concept of access as opposed to ownership is becoming widespread. Customers prefer on-demand access, thus optimizing product consumption.

The above explains the success of initiatives such as Amazon, where the customer experience during the purchase process is enriched with a personalized selection of related products and the value proposition to the customer includes the product and some personalization in terms of delivery times and methods; or that of Netflix or Spotify platforms, where customers access content without owning it, at a lower cost.

At the same time, international regulations are adapting to the new environment, becoming more global and incisive, especially in areas relating to the protection of personal data.

Finally, the labor market itself is also being affected, with growing demand for IT and quantitative profiles, as is the Human Resources management area, with greater work flexibility and fragmentation being promoted and changes taking place in areas such as performance measurement, hiring strategies, or training needs.

Implications for organizations and areas of action

Many organizations are incorporating new technologies into their processes (with a greater or lesser degree of integration), but not always with the same goal. Some companies intend to take advantage of new technologies to be more efficient and reduce their costs, others as a way to reach new markets, but only some use them to generate new business models.

According to a European Commission survey, companies tend to use new technologies, such as mobile services, cloud technology, social media, etc. (Figure 4), to improve specific business functions rather than as a disruptive tool to transform business models.

Digital transformation in companies, understood as disruptive change, has implications not only in processes and systems, as they become adapted to new tools and work approaches, but also in governance, organization and the strategic definition itself.

It is therefore important for companies to take stock of their position in each of the main areas of action affected by digital transformation (Figure 5).

Strategy and mobilization. A strategic approach to the digital challenge implies questioning the current business and support models. There is no universal recipe for all companies, but digital transformation is not an option but a necessity whose timing and scope will depend on the context of each company.

Several formulas can be used to undertake this transformation, both in terms of a company's position vis-à-vis new technologies (early adopter, follower, challenger, etc.) and concerning third-party involvement (joint ventures, partnerships with start-ups,

universities, research centers, venture capital funds, or other companies, or even through platforms based on open ecosystems).

A very important first step is to properly document the starting position of each company and its industry sector, to then try and deduce the opportunities and threats that arise with digitalization.

Another fundamental issue is the leadership for transformation that needs to be adopted by the company's CEO. The impact of transformation on people and the company's work culture cannot be forgotten.

Since costs and risks are high, and implementation times uncertain, it is important to synthesize and prioritize the transformation goals, and to have specific indicators (such as the economic impact, improved customer experience or employee engagement) that help measure the company´s progress towards compliance with such goals.

Organization, culture, and governance. The way companies work and organize work is also changing. Organizational structures are becoming more horizontal, with multidisciplinary teams that are organized into projects, adopt principles, and develop agile organizations. In addition, technology is changing interaction, communication, and decision-making.

New functions are also emerging, such as those dealing with the strategic approach to technology, the governance of data and models, the protection of personal data, and computer security (cybersecurity).

Figure 4. Percentage of adoption of key technologies. Source: EC (2017).

Commercial processes. Companies are reviewing their production and distribution models, and redesigning the use of their digital and traditional channels. In this context, the mobility lever stands out, as the mobile channel has become a central element of a company's relationship with its customers.

Companies also seek to further personalize their value proposition (interpreting the information available through models), thus trying to improve the customer's experience.

Operational processes. The fundamental aim of (end-to-end) operational process transformation is to improve efficiency and customer service quality, as well as to strengthen operational control.

Many initiatives are used to achieve these goals, such as paperless back-office design, contact center digitalization, production process sensorization, processing center robotization, etc.

Data and modeling. Greater storage and data processing capacity leads to more efficient use of the information available; but there are also new challenges, such as the use of unstructured information, the management of big data, or the analysis of information in real-time.

In addition, modeling and machine learning techniques are incorporated (such as neural networks, deep networks, support vector machines, Bayesian classifiers, classification and regression trees, etc.), which contribute to improving decision-making.

Data Protection. In the current environment, data has become a strategic asset. Therefore, data confidentiality and security are now a fundamental feature for companies, especially concerning personal data.

This requires proactively managing user rights to comply with regulations and adequately use the potential of available data. As a result, consent and purpose management policies are needed, as are cross-border processing policies, identifying and maintaining personal data repositories, linking business actions to permitted uses, etc., which is an opportunity for organizations to rethink their data structure and governance.

Cybersecurity. In recent years, cyber risk has increased due to various factors, such as the existence of bigger and more complex IT ecosystems in companies, the integration of companies from different industry sectors, or the professionalization of attacks. Damages for cyber-attacks have already reached 3 trillion dollars a year, and it is estimated that by 2021 they will have reached 6 trillion per year. This is huge in the context of digital transformation, as a potential incident could impact the continuity of business operations.

Within the digitalization strategy, cybersecurity involves taking initiatives to avoid risks during and after transformation processes. Some of the main initiatives are implementing cybersecurity frameworks, reviewing the organizational structure relating to cybersecurity, identifying and reviewing critical systems and services, measuring risk, and developing an effective response to incidents.

New technologies. Investment in new technologies is a key factor in any digital transformation process. It requires having sufficient knowledge of information and communication technologies.

The fact is that the evolution of IT platforms towards cloud environments, the definition of software architectures that incorporate open solutions, and the use of disruptive technologies (big data, AI, blockchain, IoT, biometrics, robotics, etc.) have become key strategic issues for organizations.

Figure 5. Areas of action of digital transformation

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