Telecommunications operators in the new digital era

Contents

Introduction

"There has never been a time of greater promise, or greater peril"

Professor Klaus Schwab
Founder and Executive Chairman of the Word Economic Forum
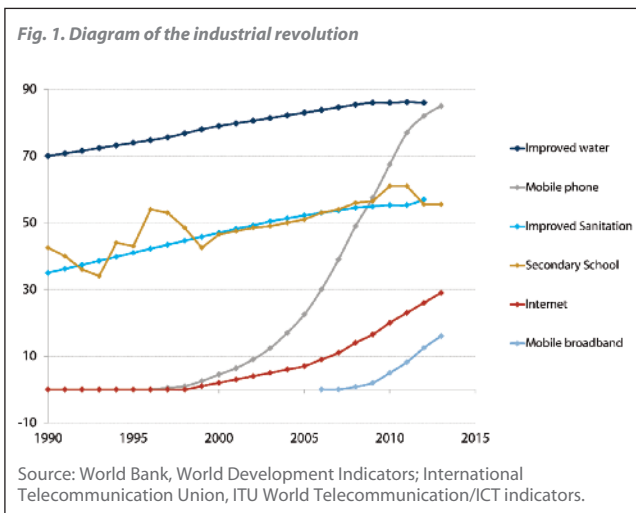
The theme of this year's World Economic Forum (WEF) in Davos[1] was "Mastering the Fourth Industrial Revolution" and the main topic was the challenges of the digital transformation for global society as a whole.

Over three days, heads of state, business people, leaders of regional and global organizations and civil society discussed solutions to the challenges posed by new technologies. One of the main conclusions was clear: the world has initiated a technological revolution (digital revolution) that will radically transform how we live, work and interrelate.

This revolution is different to anything humans have previously experienced in scale, scope and complexity. Three things confirm that we are bearing witness to profound structural change:

▶ The speed of current advances has no historical precedent. Compared with the linear development of previous industrial revolutions (Fig. 1), this one is evolving at an exponential rate.

▶ Its scope is affecting practically all industries in every country (Fig. 2).

▶ The breadth and depth of these changes is leading to the transformation of entire systems of production, management and government of all players (businesses, institutions, etc.) that comprise this world economic system

The possibilities of billions of people connected by mobile devices, with an unprecedented facility of access to information and with enormous storage capacities and drastically reduced processing costs, (Fig. 3) are almost limitless. Today these possibilities, driven by the exponential increase in computing power, are beginning to reflect on our daily lives: from cars and planes crewed by virtual assistants to software that translates and algorithms that deduce our tastes and cultural interests.

[1]World Economic Forum Annual Meeting. 20-23 January 2016 Davos-Klosters, Switzerland

Fig. 1. Diagram of the industrial revolution

Source: World Bank, World Development Indicators; International Telecommunication Union, ITU World Telecommunication/ICT indicators.

Fig. 2. Disruption by industry

Source: The Global Center for Digital Business Transformation, 2015.
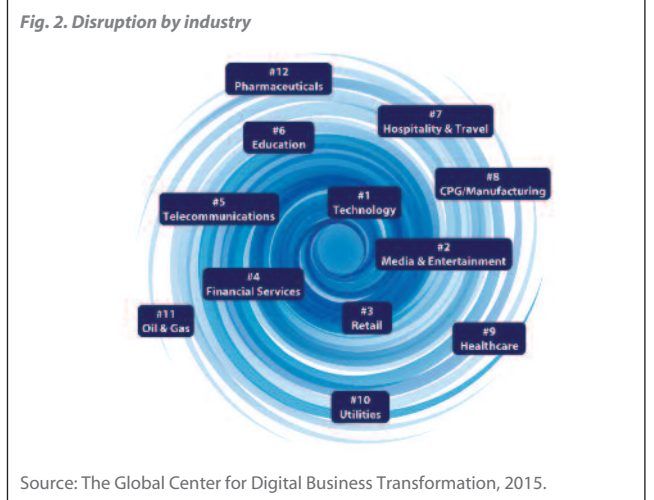
In the center of this revolution are the telecommunications operators. At present these are the agents tasked with facilitating the connectivity of the entire ecosystem (people, companies, machines, etc.) at an adequate speed and with the necessary quality.

Despite playing this central role in the digital transformation of society, telecommunications operators are not significantly capturing the increased value generation from the digitization of economic activity and the new business models growing up around it (Fig. 4).

At the same time, several "new players", called over the top service providers (OTTs[2]), have been the first to identify and understand the new consumer demands and transform them into successful business models (Fig. 4).

These new entrants are having a significant impact on the operators' business models:

▸ On the one hand, they have eroded the sector's main source of income[3]: voice and data transmission. New players such as Skype, WhatsApp and Facebook have redefined the communication standards among people through their free applications, drastically affecting the sector's income (e. g. long distance calls and SMS).

▸ On the other hand, they are generating exponential demand for broadband[4]. Players such as YouTube, Netflix and Spotify have digitized the consumption of audio and video by consumers. At a business level, providers such as Amazon, Microsoft, IBM and Google have made the use of cloud infrastructure globally widespread. This new reality is demanding heavy investment from telecommunications operators to accommodate the extraordinary increase in data traffic required by the new digital ecosystem.

▸ Last, these new players are completely transforming the structure of market prices by commoditizing the value of connectivity, in favor of monetizing knowledge of customer or user needs through advanced data processing.

This study aims to describe the main opportunities for telecommunications operators in this new digital era. To this end, the document is divided into two sections, with two objectives:

▸ To describe current industry trends.

▸ To analyze the main challenges to operators in the current market context.

[2]Over-the-top (OTT) services are provided over the internet, but do not require infrastructure or spectrum, nor are they subject to the regulatory framework of telecommunications operators.
[3]For instance, it is estimated that between 2008 and 2012, European operators lost up to 12 billion euros and EBITDA margins dropped by three percentage points per year. In addition, new players such as Google and Microsoft took 35% of the business from telecommunications operators.
Source: http://www.europapress.es/portaltic/sector/noticia-telco-seran-mas-competitivas-digitalizacion-punto-venta-modelos-multicanal-20140206123936.html
[4]Real-time Entertainment through video and audio streaming represents more than 70% of download traffic in North America at peak afternoon hours in fixed access networks. Five years ago it was less than 35% (source: https://www.sandvine.com/trends/global-internet-phenomena/).

Fig. 3. Falling cost of accessing technology
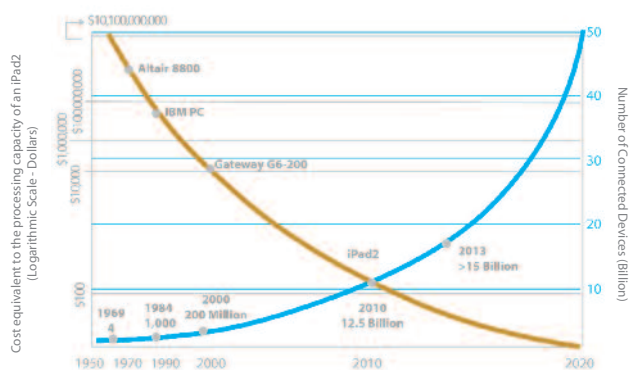
Source: Mary Meeker's Internet Trends Report 2014: http://qz.com/214307/mary-meeker-2014-internet-trends-report-all-the-slides/; The Hamilton Project, Brookings Institute, Ericsson.

Fig. 4. Key OTT data (Billling indexed to2012)

	CAGR (12-15)
Facebook	37%
Alibaba Group	23%
Amazon	15%
Google	13%
US TELCOs	5%
European TELCOs	1%
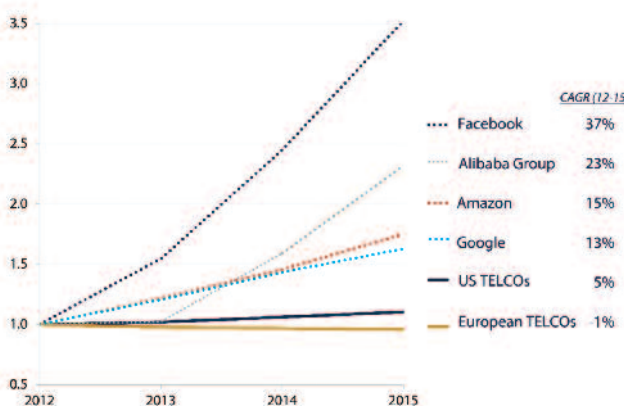
Source: S&P Capital IQ.

Executive summary

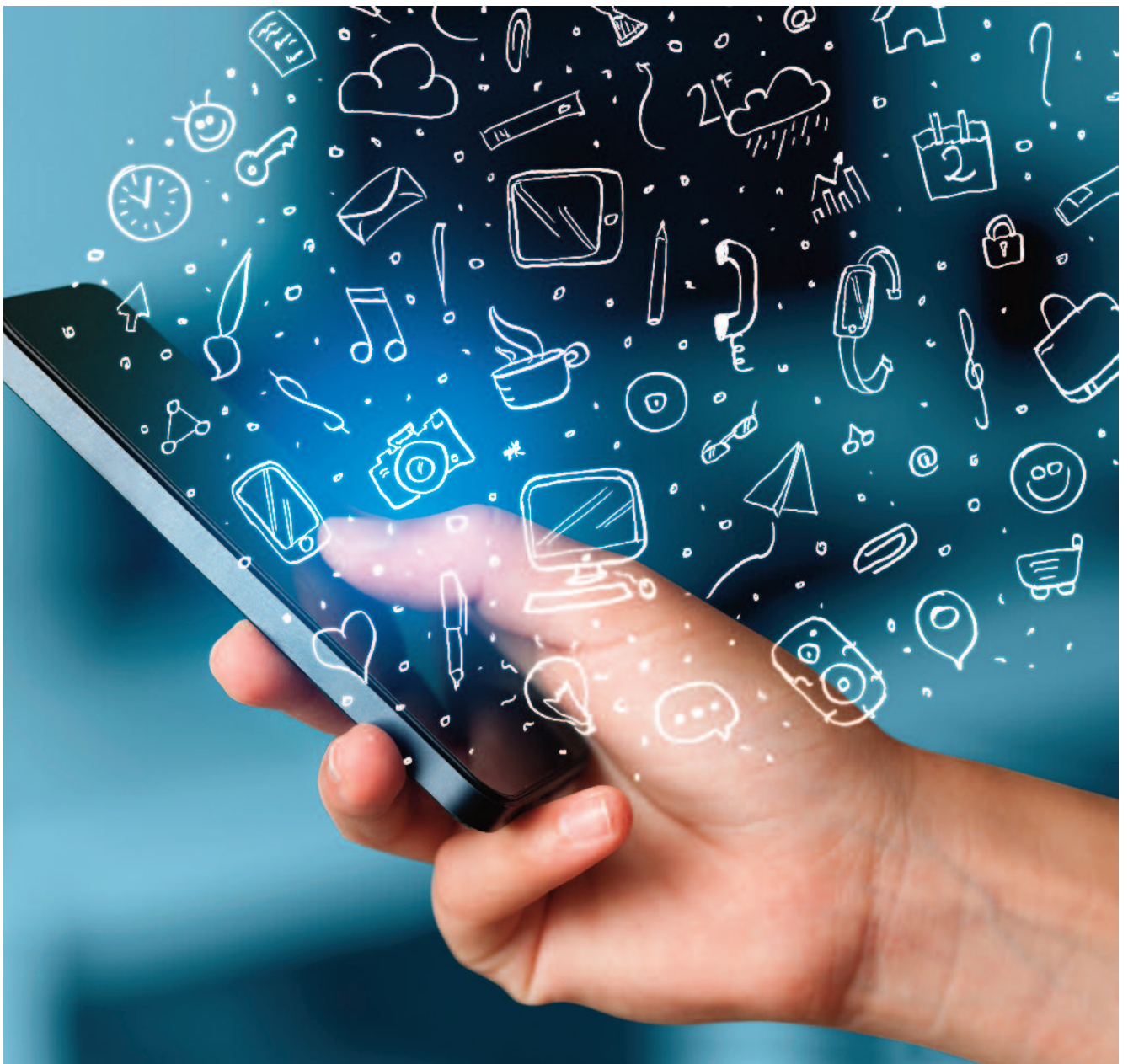*"There have been moments in history where the invention of new technology has completely rewired the way our society lives and works. The printing press, radio, television, mobile phones, and the Internet are among these".*

Mark Zuckerberg,
Co-founder of Facebook

Trends in the sector

1. The world is facing an unprecedented technological revolution. In 2015, 98% of the population had mobile cellphone coverage, 43% was connected to the internet and 1.1 billion had high speed internet[5]. The spread of broadband internet access, along with the democratization of access prices for both handsets and connectivity are digitizing the habits of people, companies and institutions, transferring a large part of their daily work to the net.

2. Telecommunications operators are at the center of this digitization, being tasked with providing connectivity to the entire system. However:

   ▸ They no longer compete only with each other. New players developing "Over the Top" services (OTTs) have fully entered the sphere of digital services.

   ▸ Customers are adopting OTT services en mass (applications and contents), gradually transferring to these new players their perception of value in the digital experience (fig. 5).

   ▸ The operators, facing difficulties differentiating their offerings, have opted to use prices as one of their central pillars of customer acquisition, leading the sector to a price war over the last decade. Additionally, the digitization of customers is causing exponential growth in traffic, obliging operators to increase their investments in networks to accommodate the growing connectivity demands.

3. This scenario of revenue pressure and higher investment requirements is creating a proliferation of concentration processes intended to generate sufficient economies of scale to achieve profitability over the costs of rolling out new networks and strategies to broaden the value offering, such as the incorporation of television deals with differentiated content into connectivity products.

4. While sectoral concentration is a global tendency, there are different speeds in different large geographic areas. The US, China and Japan, with sizes similar to or higher than Europe, have 3 or 4 dominant operators. However, the European market has a high degree of fragmentation (more than 150 operators). For this reason, the region is living multiple concentration movements, both locally and cross-border.

5. At the same time, there has been a breakthrough of OTT service providers accompanied by a cannibalizing effect on the operators' main source of income: calls and text messages. These ground-breaking OTT services have been able to develop new business models (NBMs) with much higher revenues than the operators.

6. In response to the emergence of these new players, operators have been devising different strategies, ranging from partial blocks on using these services and joint partnerships with preinstallation of the OTT service in handsets, to development of substitute products.

7. To date, operator profits remain largely based on connectivity (voice, text messages, data), the gradual reduction of which over the last decade seems to have reached bottom thanks to the monetization of the increased consumption of data and bundling[6] of services.

8. In addition, the types of offers have changed with the incorporation of audiovisual contents (proprietary or third party) into connectivity products as added value for the customer. To this end, IPTV services are included in convergent offers and freemium[7] rates are applied to the basic bundling price.

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[5]Source: World Bank (2015).
[6]A combination of products and services combined in a single deal.
[7]Business model that works by offering basic free services, while other more advanced or special ones are charged (e.g. free apps, with the possibility of in-app purchases; free TV with the option to buy or rent films/series, etc.).

Fig. 5. The digital purchase process

Source: a16z and analysis by Management Solutions.
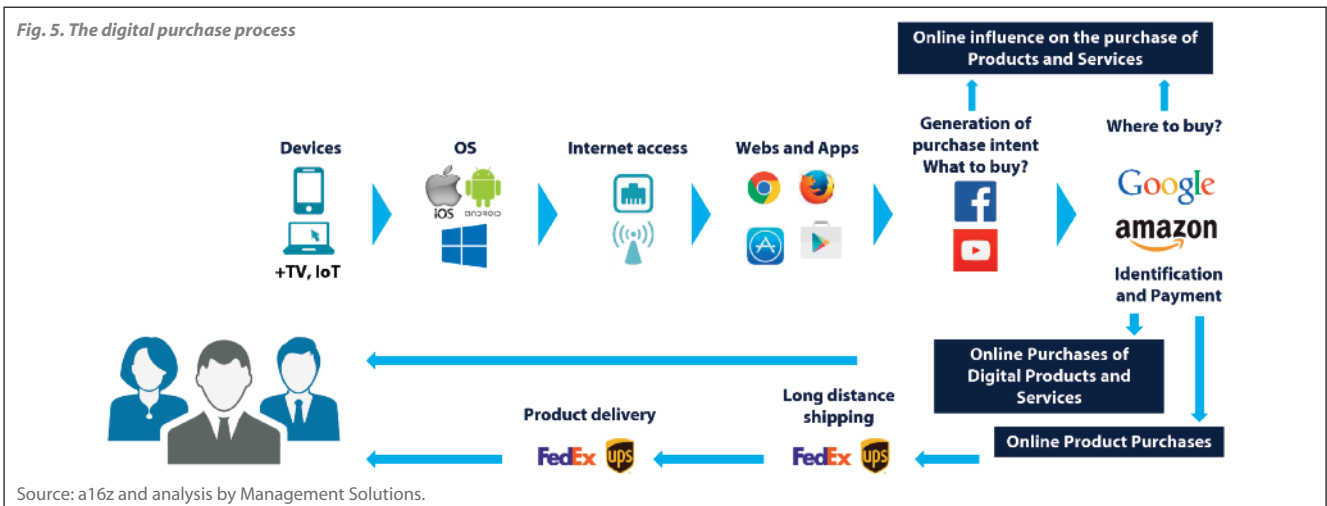
9. Last, operators are also developing OTT services to enhance their offers and compete with the new business models (NBMs) emerging from the digital economy. These services revolve around the coming wave of income growth that appears to be based around the Internet of things (IoT), Big Data/Data Science and the Cloud.

10. Strategies to monetize these new revenue sources focus on two fronts:

   ▸ **Internal monetization:** using advanced modeling to improve internal activities, especially in commercial, network and IT areas. While it is still quite new, the path has now begun.

   ▸ **External monetization:** more incipient, NBMs are being developed based on monetizing the data circulating through their networks. These NBMs range from improving advertising revenue (e. g. RTB[8]), to developing vertical solutions for specific sectors and/or needs (some of which are starting to become a reality, such as eHealth, safety, SmartCities, energy, transport and logistics).

   To address these strategies, operators are employing collaboration models that are more open to third parties[9], aware of the need for external capabilities to develop them.

11. With the decline in revenue and the progressive drop in ARPUs[10], operators have focused on optimizing their financial structures to sustain the investment required in their growth areas. This optimization addresses several fronts:

   ▸ Geographic focus, redefining the geographic parameters of action of the operators in terms of their size and the competitive advantages of each market.

   ▸ Generation of value from assets, currently highlighting sales of non-strategic infrastructure.

   ▸ Optimization of Capex and Opex through various efficiency programs, from outsourcing non-core operations to strategic procurement agreements between operators or the deployment of shared networks in some markets.

12. The development of all these strategies is dependent on the regulatory framework. The higher degree of complexity of the businesses described means that the range of regulators involved in their supervision extends beyond that of traditional NRAs[11] (National Regulatory Authorities), and increases the matters subject to regulation. Currently, the most important regulatory items for the industry

involve the need to release spectrum to support the growing demand for it; the regulation of data protection and privacy; regulation of the Internet of Things (IoT) both at the NRA level and according to industry standards; standardizing regulation with the OTTs; network neutrality (especially with regard to the OTTs whose services involve use of large amounts of data); and adaptation to accounting regulations (mainly IFRS15; NIIF9; NIIF16).

Main challenges

13. Irrespective of whether they resolve certain questions connected to the regulatory framework, operators are facing a series of challenges the resolution of which depends entirely on themselves:

   ▸ Reinventing the customer service model: customer empowerment means that the operators – the same as other industries – are aiming to focus on the customer, for which they face certain still-unanswered questions:

     • Building a solid definition of "customer", addressing the migration of management models based on access to customer-based models.

     • Aligning the product catalogue with the new market demands, simplifying the product catalog and changing rates to enable personalized offers in real time, allowing for the entrance of dynamic service combinations and flexibly supporting third party products with flexible models of income sharing.

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[8]Online bidding system in real time for each hit on an ad in every advertising space on a webpage.
[9]The alternatives are wide-ranging: from R&D collaboration agreements to developing new networks (e.g. 5G), to distribution agreements (e. g. sales of cybersecurity solutions in conjunction with specialized companies), or providing free software to developers (e. g. to strengthen Cloud platforms)
[10]The ARPU (acronym standing for Average Revenue Per User) is the measure or average per user.
[11]e. g. regulators related with data protection or regulators that certify the suitability of devices for use in certain vertical platforms such as those in health.

▶ Strengthening the monetization of the flow of customer data, fine-tuning internal monetization, but above all rigorously addressing external monetization in order to take a leap forward and gain new revenue.

▶ Transforming the sales model by developing omnichannel programs capable of creating a consistent customer experience, rebalancing the distribution mix, the transformation of physical stores and the incorporation of quality of service as a key differentiator.

▶ Focusing the customer service model on "continuous improvement of the customer experience", completing SLAs (of theoretical quality vs. real quality) with metrics that incorporate measurement of perceived service as a key element to monitor the customer experience (CES, CA, CS, NPS; etc.)[12] and its effective incorporation into management models[13].

14. As a complement, the progressive maturity of connectivity and increased competitive pressure render simplification and efficiency key to gaining flexibility in the current market context. To this end, operators face several challenges:

▶ The digitization of processes, redesigning them through customer journey programs that incorporate customer-provider interaction favoring the development of a maximum number of touch points[14], and maximizing data collection for subsequent modeling.

▶ Rationalizing IT systems, decommissioning legacy (formats) under an orderly substitution model with flexible models of project execution to improve time to market (Lean, Agile, etc.).

▶ The transformation of the network area, moving ahead in parallel with the phase-out of obsolete networks, at the speed that Capex allows up to the limits set by universal service restrictions and increasing operating efficiency via NFV[15]/SDN[16].

▶ The simplification of organizational structures, breaking the historical "silos"[17] and gaining efficiencies derived from the process of market consolidation (recent mergers, or mergers underway). However, it is necessary to advance in parallel towards computer network-focused models, eliminating intermediary structures with higher levels of delegation and with evaluation models linked to collective performance. Ultimately, approaching OTT models with more flexible structures based on centers of excellence.

15. The challenges and opportunities mentioned above have an impact on the inherent risks to telecommunications activities. Consequently, the operators are tackling processes to strengthen their risk management and control along several lines:

▶ A maximum degree of definition and approval of a risk control and management and risk appetite[18] framework consisting of business plans that allow these to be challenged, and a set of quantitative and qualitative indicators establishing the extent of risk they are willing to take.

▶ Strengthening the organization and governance of the risk function, distributing responsibilities along three lines of defense (management, control and supervision).

▶ Advances in the identification of all risks affecting companies, from the most traditional (strategic and financial risk), to operational risks (including fraud and those related to data privacy and protection), compliance (sanctions) and model risks[19] (derived from the increasing use of decision-making models), and strengthening of analytical capabilities focusing on quantitative evaluation that enables follow-up of the evolution of the risk profile and checking against the approved risk appetite.

▶ Effective integration of risk management into business and support processes (customer acquisition and recovery, self-rating management, optimization of insurance programs, financial risk coverage policies, evaluation of investment under risk-adjusted return criteria, etc.).

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[12]*Customer Effort Score (CES); Customer Advocacy (CA); Customer Satisfaction (CS); Net Promoter Score (NPS).*
[13]*From follow-up to inclusion as a differentiating aspect for the purposes of remuneration and professional development.*
[14]A touch point can be defined as any way that a consumer can interact with a company, whether person-to-person, through a webpage, an application or any form of communication.
[15]Network Functions Virtualization (NFV): consists of "virtualizing" (applying Cloud technology) essential network components (e. g. firewalls, routers, switches, load balancers, etc.).
[16]Software Defined Networking (SDN): a set of computational network area techniques designed to facilitate the implementation of network services in a way that is deterministic, dynamic and scalable, preventing sub-optimum management of these services by the network administrator. All this is attained by decoupling the control plane (software) and the data plane (hardware).
[17]Traditionally the network area vs. the rest of the organization; completely verticalized B2B and B2C; etc.
[18]It is becoming a regulatory requirement for organizations such as the CNMV.
[19]See Management Solutions, 2014.

Trends in the sector

"We are going to hire even more specialized staff, but we should also keep learning. If we don't do it and just stick with our main business, the changes will continue without us, our knowledge will quickly fall behind and we will be in danger".

Jeff Bezos,
*Founder and CEO of Amazon.com*

The telecommunications industry is immersed in a vertiginous process of change (Fig. 6), with the convergence of a series of factors that have given rise to the present digital revolution:

▸ A critical mass of users: at the end of 2015, the world had 7.4 billion mobile subscribers (equivalent to the world population) and 3.2 billion Internet users, of which 1.1 billion connected through high speed broadband (Fig. 7).

▸ An exponential increase in connectivity capabilities: the rapid deployment of high speed connections (3G/4G for mobile connections and FTTx for fixed-line networks) is facilitating the emergence of new business models (NBMs) with new user experiences that appear to be meeting society's demands, if we look at the high penetration figures.

▸ Democratization of the price of access to the digital world: both the costs of access devices, and accessibility itself (voice and data access).

▸ Digitization of society: the combination of three factors prior to the digitization of the uses and habits of society (Fig. 8). These days communication among people largely involves data, the consumption of audiovisual content has undergone a complete transformation (a la carte, personalized, disconnected from scheduled programming, multiscreen, multidisplay, etc.), books and print press are migrating to tablets and e-books, etc.

▸ Industry disruption: in this new digital world, telecommunications service companies don't only compete with each other, but also with other players:
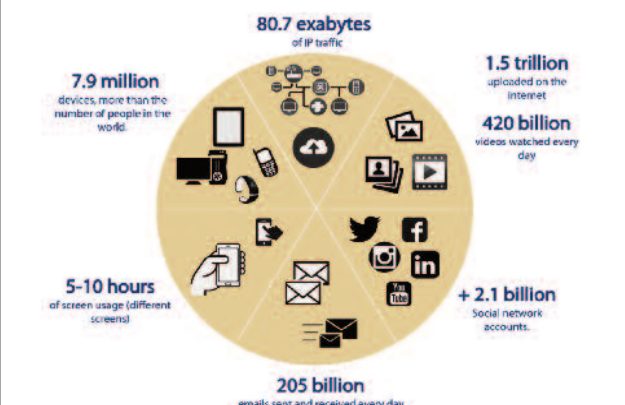

Fig. 6. Telco evolution
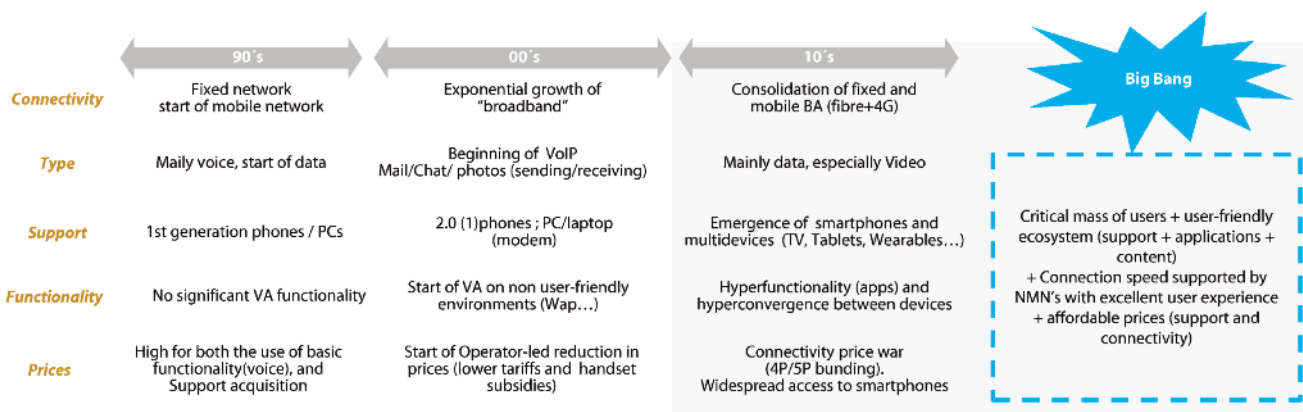
Soource: S&P Capital IQ.

Fig. 7. Digitization penetration levels
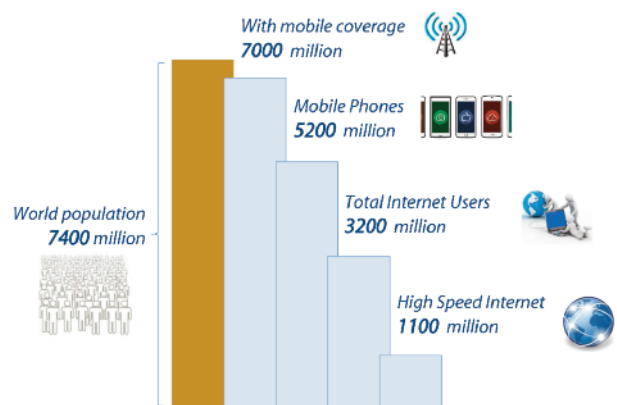
Source: World Bank, 2015; Meeker, 2015; ITU, 2015; GSM Association (GSMA).

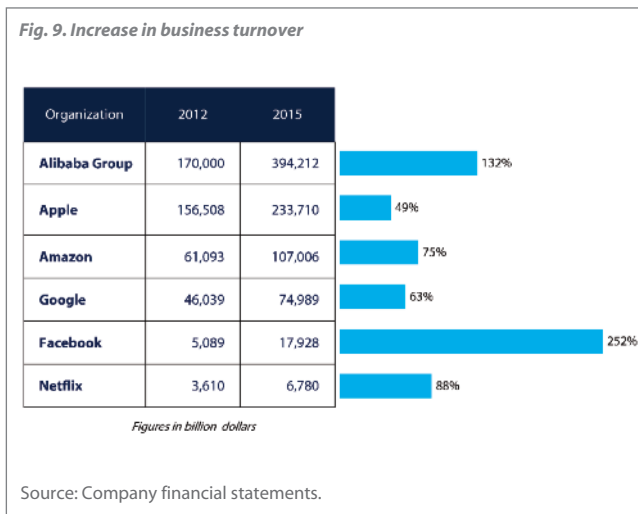Fig. 8. "A typical day in the digital world"

Source: http://pennystocks.la/internet-in-real-time/

- So-called "over the top" services have fully entered the digital services arena with very significant sales and user figures (Fig. 9).

- New companies providing connectivity (with or without their own networks), which are based on new generation operating structures, and don't have technological legacies to forfeit, have competitive advantages over traditional operators. These companies are capturing market quotas thanks to their higher degree of price competitiveness, thus stoking the price war of recent years.

For this reason operators are trying to reinvent themselves and develop new value added services to compensate for the drop in connectivity prices with greater participation in new sources of income from the digitization of society.
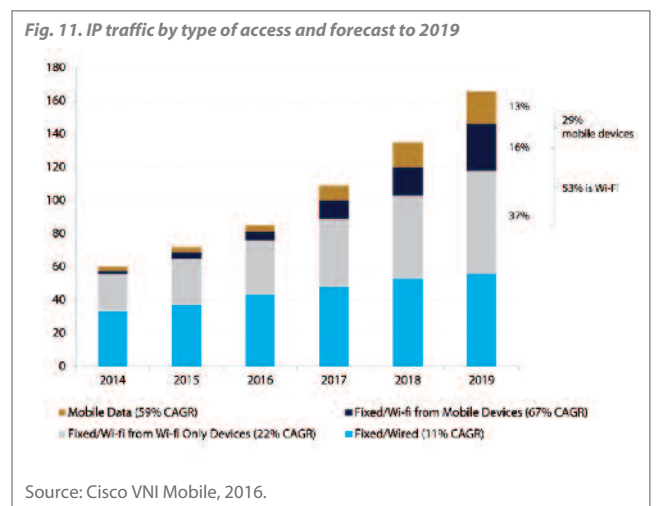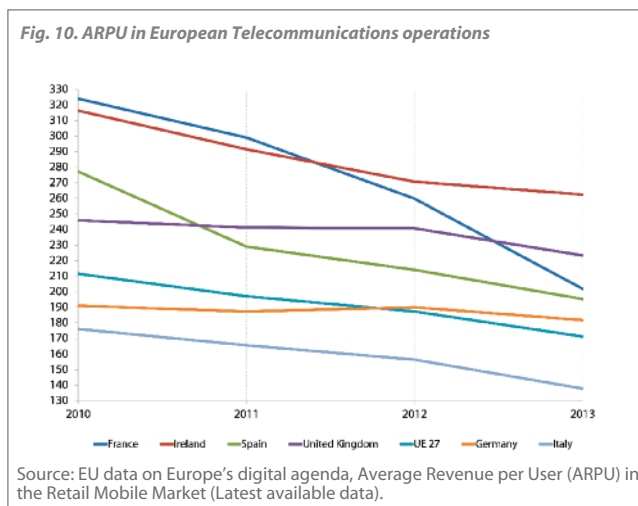
Recent context

Currently, the structure of the operators' income continues to be based on the provision of connectivity services (voice and data) to an extent exceeding 80%, and it has not yet captured a significant share of the new income from the digitization of the economy.

In addition, the current penetration of connectivity has to a large extent reached a state of maturity in the main markets. In terms of fixed-line communication, there is clear saturation of the number of subscriptions in developed countries (decreases or vegetative growth in the main markets). In terms of mobile communications, ARPUs are combining the new mix of voice and data, while displaying a general downward trend (especially in Europe, see Figure 10), affected to a great extent by the deep economic crisis current in the main developed countries of the world.

However, consumers linked to these accesses (mainly IP traffic) continue to show high growth figures (Fig. 11) mainly driven by the increase in transmissions of images and videos.

In this context, the greatest difficulty lies with how to differentiate the connectivity offering, when the user perception of added value has been transposed to the world of the applications and services that run on it.

This section will detail the market environment, the new players emerging from the digital economy and the main regulatory conditions that impact on the telecommunications operators' process of reinvention.

Comprobar las cifras. Al pie se dice que están en billones de dólares (se entiende que son billones anglosajones), no en miles de millones.

Fig. 9. Increase in business turnover

Organization	2012	2015	
Alibaba Group	170,000	394,212	132%
Apple	156,508	233,710	49%
Amazon	61,093	107,006	75%
Google	46,039	74,989	63%
Facebook	5,089	17,928	252%
Netflix	3,610	6,780	88%

Figures in billion dollars

Source: Company financial statements.

Fig. 10. ARPU in European Telecommunications operations

Source: EU data on Europe's digital agenda, Average Revenue per User (ARPU) in the Retail Mobile Market (Latest available data).

Fig. 11. IP traffic by type of access and forecast to 2019

Source: Cisco VNI Mobile, 2016.

Market concentration

Mergers and acquisitions have been a constant in the recent history of the telecommunications sector. Their purposes have varied depending on the moment ranging from acquisitions of core carriers (telecom services, licenses), to acquisitions of or mergers with adjacent companies (infrastructure, ISPs, multimedia, etc.) and differentiating between a local market focus and a multinational focus.

In the first decade of this century the market was characterized by the proliferation of new operators, mainly without their own network infrastructure (OMVs, Fig. 12).
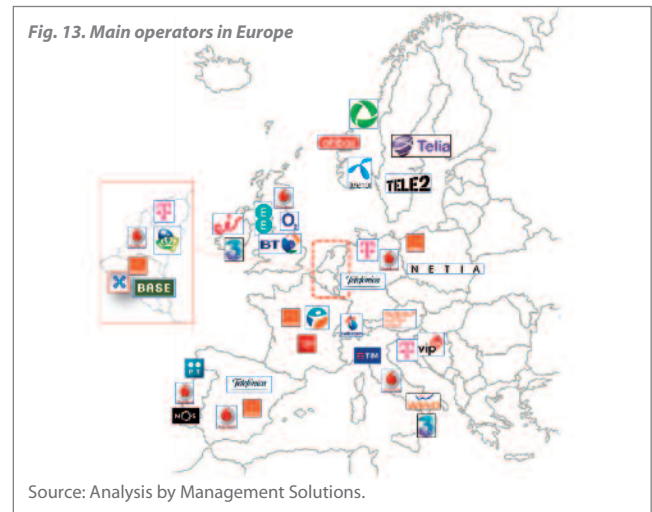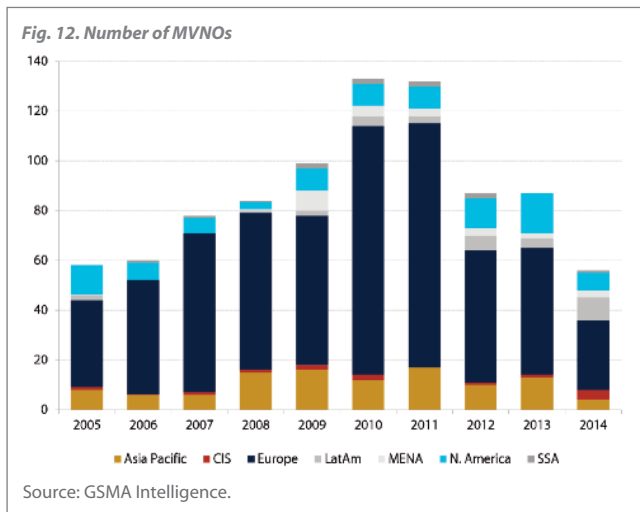
However, the collapse in consumption in the crisis years, the price wars among operators and the emergence of new entrants with substitute products led to sharply reduced income for traditional fixed-line telephone and mobile services.

In this context, operators are developing a differential offering based on ultra-fast connectivity (4G and/or fiber optic) combined with TV deals with differentiated paid content such as premium (sports events, popular television series, new release films, etc.). This business model requires high levels of investment, which means addressing concentration processes to generate sufficient economies of scale to reach profitability considering the high costs of deploying new networks and purchasing contents.

Within this global trend, there are significant differences in speeds in different large geographic areas, in part due to different regulatory perspectives. While in the US competition is limited to four large groups (with a concentration process still in progress, as demonstrated by Verizon's recent purchase of the 45% it didn't own of Verizon Wireless), the European market remains fragmented (Fig. 13), in part due to a regulatory framework highly focused on fostering competition and lowering prices, and the drawbacks to harmonization of the single market.

For this reason, the sectoral concentration trend is currently focused to a large extent in Europe. The region is living a situation in which it is carrying out local sphere transactions in parallel with concentration transactions with a multinational impact (Fig. 14).

Fig. 12. Number of MVNOs

Source: GSMA Intelligence.

Fig. 13. Main operators in Europe

Source: Analysis by Management Solutions.

Fig. 14. Mergers analyzed by the European Commission

|	Country	Case analyzed	Resolution	
	Austria	Case M.3916, T-Mobile/Tele.Ring (2006)	Approved with conditions	☑
	Greece	Case M.4036, TPG IV/APAX/Q-Telecommunications (2006)	Approved without conditions	☑
	Netherlands	Case M.4748, T-Mobile/Orange NL (2007)	Approved without conditions	☑
	UK	Case M. 5650, T.Mobile/Orange UK (2010)	Approved without conditions	☑
	Austria	Case M.6497, Hutchison 3G Austria/Orange AT (2012)	Approved with conditions	☑
	Ireland	Case M.6992, Hutchison 3G UK/Telefónica IE (2014)	Approved with conditions	☑
	Germany	Case M.7018, Telefónica Deutschland/E-PLUS (2014)	Approved with conditions	☑
	Spain	Case M.7231, Vodafone/ONO (2014)	Approved without conditions	☑
	Spain	Case M.7421, Orange/Jazztel (2015)	Approved with conditions	☑
	UK	Case M.7612, Hutchison 3G UK/Telefónica UK (2016)	Blocked	☑
	Belgium	Case M.7637, Liberty Global/Base Belgium (2016)	Approved with conditions	☑
	Italy	Case M. 7758, Hutchison 3G Italy/Wind / JV	Under analysis	

Source: European Commission, Competition.

These transactions not only focus on acquisitions, but also on alliances that allow operators to become more efficient in their use of resources. Proof of this are examples such as the alliance between France Telecom and Deutsche Telekom to create Everything Everywhere in the United Kingdom, the purchase of ePlus Alemania by Telefónica and the network sharing agreements between Telefónica and Vodafone in certain markets.

New players

In parallel with the consolidation process described above, the technological advances of recent years, especially the transition to IP technology, have enabled the emergence of new services and business models that operate over the Internet. These new business models travel through the networks of telecommunications operators and are being developed by new digital players that have built successful business franchises "over the top" of the networks. These new business models based on the provision of services over the Internet are commonly known as OTTs (over-the-top) services. Some examples of OTT services are Google search tools, WhatsApp text messages, Skype voice and videoconferencing, and Netflix television series (Fig. 15).

OTT is a frequently-used term, but it is not often clearly defined. Sometimes it is used to define a group of players, other times to qualify a category of services. This report will use the definition given by the Body of European Regulators for Electronic Communication, which establishes that an OTT service is "content, a service or an application that is provided to the end user over the open Internet"[20]. According to this definition, the term OTT does not refer to a particular type of service, but to a way of presenting its supply (in this case over the Internet).
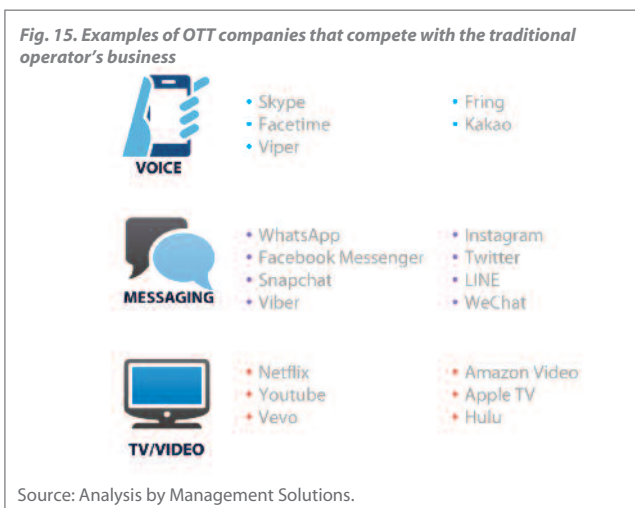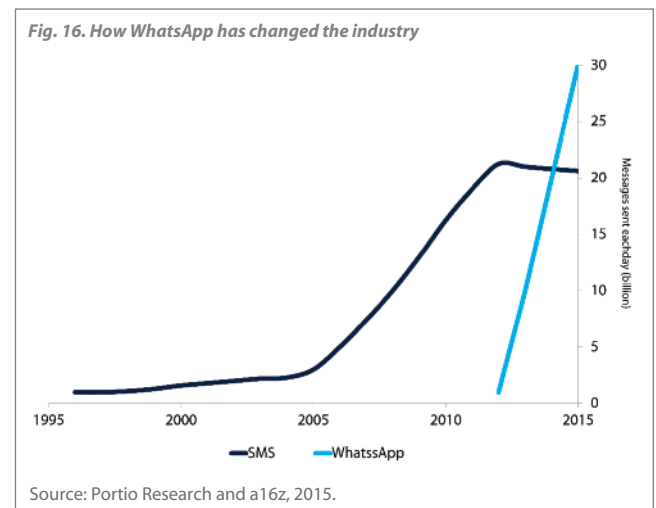
The new players that offered the first OTT services started to become worrisome to the telecommunications operators when they began to notice the impacts of the cannibalization of their services. Traditionally, (according to the existing revenue model at the end of the last decade), the main source of sales for operators was voice and texting (SMS) – data traffic came in third. At present, the impact of the growth of OTT services on reduced operator revenue for voice and text messaging is a widely accepted phenomenon[21]. There is broad consensus on their impact on the increase in mobile data traffic[22] and their incentivizing role in operators' sales of data packages.

Today OTT services far outweigh the aforementioned problem of revenue cannibalization and are fully at the center of the economic potential of the digital revolution. In effect, OTT services are transforming the uses and habits of society and generating new revenue models. The explosion of e-commerce, online advertising and digital content distribution are a few examples of this.

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[20]BoR (16) 35 BEREC Report on OTT services (February 2016).
[21]Telecom companies count $386 billion in lost revenue to Skype, WhatsApp, others. Source: Fortune, Informa's World Cellular Revenue Forecasts 2018. Consumer OTT VoIP Outlook: 2013 to 2018 [2013] by Ovum.
[22]According to the Cisco report: Internet traffic and data, 2013-2018 ", between 2013 and 2018 mobile data traffic is expected to increase at a compound annual growth rate (CAGR) of 61 percent from 2013 to 2018, from 1.5 exabytes reaching 15.9 exabytes per month by the end of 2018. Mobile video traffic will increase from 633 PB to 9103 PB per month with a compound annual rate of 70%. This exponential increase in data traffic will put stress on the operators' networks and will require telecommunications companies to make hefty investments to increase their network capacities.

Fig. 15. Examples of OTT companies that compete with the traditional operator's business

VOICE
- Skype
- Facetime
- Viper
- Fring
- Kakao

MESSAGING
- WhatsApp
- Facebook Messenger
- Snapchat
- Viber
- Instagram
- Twitter
- LINE
- WeChat

TV/VIDEO
- Netflix
- Youtube
- Vevo
- Amazon Video
- Apple TV
- Hulu

Source: Analysis by Management Solutions.

Fig. 16. How WhatsApp has changed the industry

Source: Portio Research and a16z, 2015.

Given their scope, these new players have been classified into two large groups in terms of OTT services provided:

- Those that compete for traditional communications services, from the digitization of traditional telephony (e. g. Skype vs. long-distance calls, or WhatsApp vs. SMS, Fig. 16) to the complete disruption of the mode of communication (e. g. Facebook or Instagram). This new group of competitors is having a strong impact on the telecommunications business, especially on the revenue reduction from traditional voice and SMS.

- Those that provide services through existing networks, and whose progressive widespread uptake is giving rise to new business models whose success is disintermediating numerous industries (e. g. iTunes Store, Uber, Airbnb, Netflix, etc.). This group leads the potential for revenue growth of the digital economy. However, it has a lower impact on the operators' current revenue, except for a degree of cannibalization of the pay TV business. Its greatest impact is mainly on the increased demands for investment so that networks can accommodate increased connectivity.

The first are responsible for the gradual reduction of the operators' traditional income and the second are capturing a large share of new revenue growth in the sector.

With this wave of breakthrough market competitors, operators have been developing various strategies in an attempt to capture new consumer trends and adapt to the factors that are leading to the adoption of OTT services:

Blocking the OTT service provider

Strategies to deny access[23] to certain OTT services have been observed, especially focused on stopping the substitution of SMS and VoIP calls. This kind of action needs to fall in line with network neutrality policies in the given country. An example of this type of practice are the limits on the use of Skype (only through wifi).

Packaging the service offered by the OTT provider

Many operators are turning to this strategy of packaging deals so that the lure of financial savings by including OTTs disincentivises their use. For instance, in the case of SMS services, packaging free messages into monthly rates has disincentivized the use of applications such as WhatsApp in certain markets.

Association with an OTT service provider

Association is also being used when an operator has difficulty overcoming a certain OTT provider in its territory. These associations enable operators to maintain traffic and take a share of revenue. An example of this are applications preinstalled into the cell phones sold by operators.

[23]AT&T: From 2007–2009, AT&T forced Apple to block Skype and other competing VOIP phone services on iPhones. The wireless provider wanted to prevent iPhone users from using any application that would allow them to make calls on "over-the-top" voice services. The Google Voice app received similar treatment from carriers like AT&T when it came on the scene in 2009.

Last, another strategy is to develop proprietary OTT services. This type of strategy can be used individually or through agreements among several operators. An example of the first case is the development of proprietary content for television products, and an example of the second are initiatives such as the creation of Joyn as a substitute product for WhatsApp.

To date, the OTT services offered by the former require the adequate connectivity ecosystem offered by the second, and the latter needs the demand for connectivity generated by the users of the former to continue to grow their sales on data packages.

Business lines

This section details trends in the telecommunications operators' main lines of business. The content, trends for the coming years and the main models of monetization are all defined for each of them.

Connectivity

Connectivity includes all aspects related to the means of supplying voice and data, through fixed or mobile access. It is the main responsibility of the operators and represents the basis on which the digital revolution is being built. At the end of 2015, 43.4% of the world population was connected to the Internet and 95% had mobile service access.

This section exclusively covers aspects of the monetization of these investments by the operators in the coming financial years . Networks in the main advanced economies are characterized by the rapid deployment of high-speed networks,

both mobile (4G) and fixed (FTTx). The business models that support the provision of this connectivity show three trends:

1. Consolidating digitization penetration of the customer base. To this end, in terms of the degree of maturity of each market, two strategies are combined:

   ▸ Upselling of the mobile customer base to high speed connectivity and post-paid subscription via sale of 3G/4G devices with data plans.

   ▸ Acceleration of the penetration of fixed broadband (FTTx) into properties and their subsequent marketing (the so-called management of "homes passed" vs. "property units passed").

2. In mature markets, the main strategy is the convergence of the offer of traditional connectivity services through packaging; that is, triple-play, or even quadruple-play[24] deals incorporating pay TV (an aspect addressed below in the section on multimedia content).

3. Development of new business models (still incipient in terms of weight relative to monetization), such as bilateral revenue models, network operations, platforms as information repositories, applications and content services, etc., all "vertical businesses" focused on specific market niches.

In sum, the capacity to offer integral fixed broadband and mobile services together with pay TV is considered the critical aspect of competition for the coming years.

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[24]Fixed voice, fixed broadband, mobile voice, mobile broadband, pay TV.

Audiovisual contents

Audiovisual contents are defined as any production containing a succession of images and/or audio able to be emitted or transmitted. It includes all film, television radio and multimedia contents and is independent of the nature of its contents and the means through which it is transmitted.

The digitization of audiovisual contents will remain the main driver of the transformation of the operators' activities, as the factors that have pushed this trend (the increased use of the Internet, more offerings and acquisitions of devices with Internet, such as smartphones, tablets, etc., and improvements in high speed networks) have been consolidating over time, accelerating the transformation of the sector toward digital.

There are four trends in the current monetization of digital content (Fig. 17):

1. The incorporation of audiovisual offers into connectivity packaging described in the prior section. This convergent offer, which includes television and differentiates it from pure connectivity, is the reason for which the prolonged drop in revenue seems to have stopped, if we observe the figures shown by the main operators in their presentations of results for 4Q15[25].

2. Creation of content distribution platforms (in some cases, operators are even addressing the creation of proprietary audiovisual contents) and fostering up-selling via subscription to, purchase or rental models of premium contents (series, new release films, sports events, etc.).

3. Development of the capacity to distribute contents to all possible devices in response to the growth trend in multi-screen or multi-device consumption of digital audiovisual contents.

4. Transformation of the advertising model (still incipient), evolving from the traditional television model based on a mixed audience panel with scheduling and programming, to a personalized model dependent on the preferences of each user and the device used.

This audiovisual content offering is taking place via alliances of different market players (cable providers, mobile cellphone operators and content providers) or end-to-end by large operators, which has led in the latter case to increased investment in media and entertainment companies to strengthen their connectivity services with value added content.
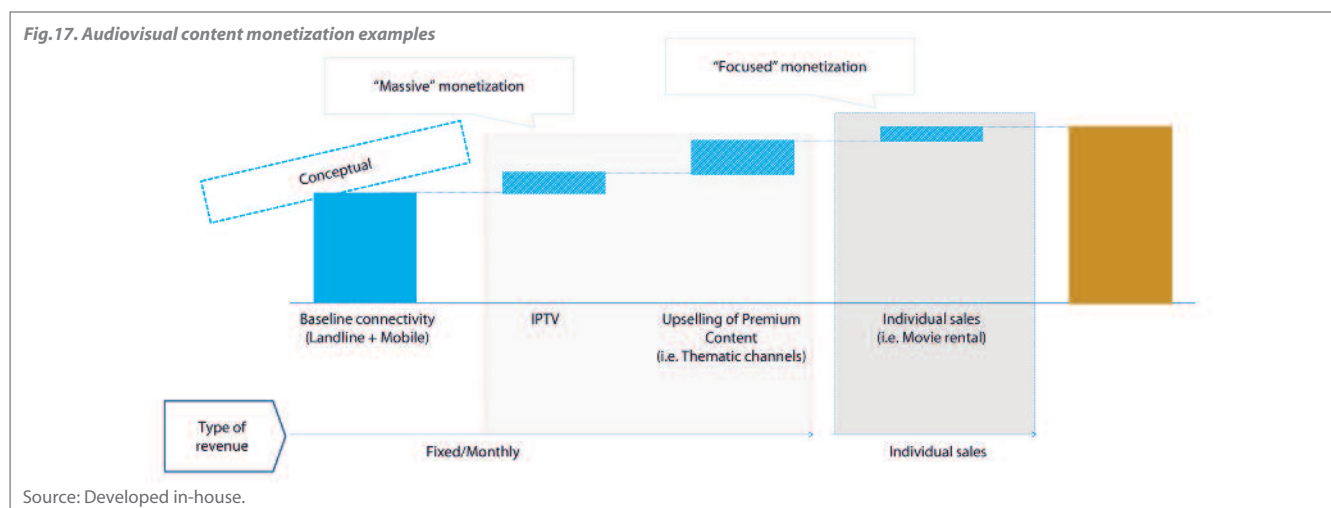
Applications

Applications are any software that helps facilitate the user's tasks, from mobile applications (known as apps) to those more focused on simplifying tasks in the business sphere, together with their corresponding platforms. The latter case also includes applications related to the financial area such as electronic commerce and transactions. These are the main point of contact between a user and a service, and their success or failure as a business model depends on a multitude of factors, ranging from the suitability of the service to the user experience.

Applications are the breakthrough aspect on which OTTs have based their entrance into the telecommunications industry, controlling the new sources of income emerging from the new potential of the digital economy.

Application development is one of the main strategic focuses on every operator's agenda. It is still a relatively new business that still does not carry significant weight on income statements.

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[25]e.g. the results of Telefónica, Orange and Deutsche Telekom in their home markets have had growth figures in 4Q15 for the first time in several years.

Fig.17. Audiovisual content monetization examples

Source: Developed in-house.

Pending development of applications linked to the new business models addressed in the following sections (Internet of things, M2M, cloud, security, etc.), the monetization of applications entails the development of business models similar to those consolidated by OTTs on the market; that is, the distribution of free or low-priced applications based on freemium models with monetization to a large extent based on personalized advertising, followed by paid downloads of applications and in-app purchases[26].

Internet of things

The Internet of Things (or IoT) is an interconnected network of quotidian objects that are often equipped with ubiquitous intelligence and which are given the capacity to transmit information without the need to interact with a person. The connection of physical devices to the Internet means it is possible to remotely access data from sensors and control the physical world from a distance. Having data collected in this way together with data from other sources (e. g. the internet) is an advance in how services are offered and goes beyond what can be offered by an intelligent system in an isolated object.

The IoT would seem to be the next big leap in the technology industry. The first steps have already been taken (standards, first prototypes and projects, etc.), but, according to different analysts, the Internet of Things will not become more established or common in daily use by companies and consumers until 2020. It is estimated that in 2016 there will be 6.4 billion devices connected around the world[27]. Predictions for 2020 vary according to the source, but all point to significant growth, placing it in the range of 24[28] to 26[29] billion connected devices.

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[26]The term was created to describe the type of application that, while free, includes different purchases inside the app to improve it, extend it or make it easier to use. A common scenario is to pay a small amount to be able to use the app without advertising.
[27]http://www.gartner.com/newsroom/id/3165317.

Fig.18. Examples of new business models

	Telefonica	Vodafone	Orange	Verizon	AT&T
Cloud and Hosting	• Data Centre Services • Cloud Servers • Cloud BackUps • Cloud Storage	• Hybrid Cloud • Managed Hosting • Data Storage • Co-location Services	• Business Together as a Service • Flexible Computing Express (IaaS)	• Cloud Computing • Cloud Storage • Data Assurance Services • Managed Hosting	• Cloud Networking • Private Cloud • Virtual Desktop Service • Managed Hosting
Security	• Metashield Protector Solutions (MSPS) • Cyber Threat Service • Persistent Vulnerability Assessment & Management Service • Anti-DDoS • Web Security Gateway • Clean Email • Smart ID • SealSign	• Threat Management • Secure Remote User Access • Mobile Threat Manager • Secure Device Manager • DDoS Service	• Unified Defense • Secure Gateway • Flexible Identity Authentication • Flexible SSL • Mobile SSL • Web Protection Suite	• Asset and Exposure Management • Monitoring and Analytics • Incident Management and E-discovery • Enforcement and Protection • Identity and Access • Risk and Compliance	• Secure Network Gateway Services • Email Security • Web Security • Firewall Security • Threat Management • Security Incident & Event Management
HealthCare	• Digital Hospital • Remote Patient Monitoring • Self Care and Connected Care	• Condition Management • Hospital to Home • Assisted Living	• Flexible Computing Healthcare	• Health Fraud Management • Health Enable Services • Mobile Health Technology	• Remote Patient Monitoring • Diabetes Obesity Control (Project DOC)
eCommerce	• Hosted Contact Centre • Application to Person (A2P) • Digital Marketing	• V. Process Tracker • V. Contact Centre • V. Media Recording & Analytics	• Contact Centre Access • Contact Everyone • Network IVR	• Digital Signage • Mobile Point of Sale • Business Continuity Management	• Commerce to go • Hybris Commerce Suite • IBM Web Sphere Solutions • Oracle Commerce Solution
IoT/M2M	• Connected Vending • Connected Elevators • Connected Fridges • Tank Telemetry • m2m Managed connectivity	• Asset Tracking • Energy Data Manager • Monitoring and Control • Connected Cabinets • Smart Grid and Metering	• Fleet Performance • Live Objects	• Asset Tracking • Fleet Management • Remote Monitoring • Grid Wide: Intelligent Energy	• Cargo View with Flight Safe • Containers Tracking and Monitoring • Fleet Management • Connected Car
Smart Cities	• Smart Mobility • Smart Environment • Smart Governance	• Intelligent transport • Smart Center	• Smart buildings • Smart grid management • Public service management	• Intelligent Lighting • Intelligent video • Intelligent Traffic Management	• Smart Grid • Prepaid Billing
eBanking	• O2 Banking	• Vodafone Wallet	• Orange Bank	• –	• –

Source: Analysis by Management Solutions.

Current monetization trends are still incipient, while they do appear to coincide with the generation of business models that, through processing high volumes of data collected from devices and/or people, enable offering VSP services to specific sectors, which notably include local government, retail, energy, finance, health and transport due to their current degree of adoption. These all share work with significant amounts of human latency, which can be optimized and even automated with IoT with the consequent potential to create new business models (Fig. 18).

The current extent of IoT development is still an incipient business, with many key aspects pending solutions to be able to make it scalable (from standardization of technologies and protocols to matters of spectrum release or adapting to regulations). However, the increased data collection from "connected things" along with advances in computing capacity and processing, render the IoT one of the main expected sources of growth in the sector for the coming years.

Big Data and Data Science[30]

The technological revolution described in previous sections has a common denominator: the acceleration of data generation through digital means. This acceleration is being achieved with dizzying figures that are hard to image. In addition, this data is no longer generated structurally; on the contrary, 80% is from unstructured sources (videos, images, chats, email, etc.) and comes from a variety of new sources in constant flux: social networks, sensors, logs, transcriptions, browser search histories, etc.

The commoditization of data and the consequent governance of data and models lead to the emergence of new tools and techniques for processing them. This set of tools and techniques comprise a discipline that, while not new, is emergent and receiving growing attention across all sectors: data science[31].

With big data arriving on the scene, all operators have perceived the potential value of the enormous data stream flowing through their networks. There are two types of usage in current monetization trends:

1. Use of big data as an internal monetization strategy for customer information. Practically the entire sector is using some type of advanced analytics linked to data science to improve their activity cash flow. Among the main practices is the notable incorporation of advanced data analysis models into commercial activities (modeling consumption propensities, reducing churn[32] rates, etc.). In addition, specific models are also being incorporated into the network area to improve its dimensioning, performance and optimization.

2. Use of big data as a way to externally monetize customer information. Operators are just beginning to analyze ways to transfer data – with appropriate anonymity – to third parties for a variety of uses. Below, by way of example and not as an exhaustive list, are some of the tendencies detected for the main market segments (Fig. 19):

[28]GSMA, quoted at: http://www.gsma.com/newsroom/press-release/gsmaannounces-the-business-impact-of-connected-devices-could-be-worth-us4-5-trillion-in-2020/
[29]Gartner, Forecast: The Internet of Things, Worldwide, 2013, at https://www.gartner.com/doc/2625419/forecast-internet-things-worldwide-
[30]Addressed in depth by Management Solutions in a specific Newsletter available at https://www.managementsolutions.com/site/esp/publicaciones/whitepapers/Data-Science.html
[31]Ibid.
[32]Churn rate or attrition rate is a business term for the migration, rotation and cancellation of customers.

Fig. 19. Examples of external customer data monetization

Residential — Personalized advertising in IPTV based on user preferences (identified from general information about users).

Firms — Optimized point-of-sale selection based on user traffic and user profile in areas of influence.

Public services — Reduced road congestion by optimizing urban traffic (pedestrian/vehicle…) through the use of their mobility data.

Source: Developed in-house.

- **Examples of the consumer segment:** incorporation of the operators' proprietary differentiated information (e.g. location, online behavior, sociodemographic profile, etc.) in the user profile sought by advertisers. A wide range of uses are applicable, from real-time bidding (RTB) to the personalization of billboards with digital signaling.

- **Public Sector Examples:** use of data aggregated to geopositioning to run analyses and optimize times for citizens' daily movements, relieving congestion in city access roads, actively redirecting urban traffic and improving wait times for passengers at transport stations and stops.

- **Examples applicable to the Business segment:** improved positioning of retail distribution companies' sales points, helping to improve the profiling of the movements and behavior of the surrounding target audience. Operators have enough basic information on users   to much more efficiently help to determine the positioning of new sales points, and be able to run more precise dimensioning of the number of members of staff needed to attend to customers at a given time of day or certain days of the week.

As a final consideration for this section, it is appropriate to address the matter of customer data privacy, given its vital importance in the adequate design of any of these new business opportunities. The protection of this privacy is one of the main concerns of telecommunications operators when it comes to evaluating the potential of monetization – especially externally – of their customers' data. These customers expect their connectivity provider to adequately protect their data and guarantee their rights and privacy. A breach of these obligations would lead to an enormous loss of trust, damage the brand image and risk regulatory intervention and financial penalization. These risks need to be properly managed adding data anonymously, to ensure that individualized confidential information can never be revealed.

Cloud[34]

Cloud computing is a paradigm that enables offering computing services through a network, usually the Internet.

In this type of computing all that can be offered by an information system is offered as a service, so that users can access the services available in the Internet cloud without knowledge (or at least without being experts) of management of the resources they use. According to the IEEE Computer Society[35], cloud computing is a paradigm in which information is permanently stored on servers on the internet and cached temporarily on clients that include desktops, entertainment centers, portable devices, etc. They are therefore Internet servers tasked with addressing requests at any time. Access can be gained to the information or service, by means of an internet connection from any mobile or fixed device located anywhere (Fig. 20).

In the 2015 financial year, half the cloud business was in the hands of four providers: Amazon, Microsoft, IBM and Google, with 54% of the cloud market[36], and the market appears to be consolidating the breach between these four main cloud providers and the remaining players[37]. This progressive concentration is mainly due to the competitive advantage acquired by the need for "scalability at a global level" required

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[33]Understanding of consumer profiles, in conjunction with their urban mobility sponsors, their history of preferences, interests and cost profiles, along with sociodemographic information.
[34]Addressed in depth by Management Solutions in a specific publication, available at https://www.managementsolutions.com/site/esp/publicaciones/whitepapers/La-nube-oportunidades-y-retos.html
[35]The IEEE Computer Society is an organization dedicated to information science and technology. By size it is the largest in the world, with more than 60,000 members https://www.computer.org/web/about/
[36]Synergy Research Group, data from second quarter 2015.
[37]According to this same report, these four players increased their market share by 4% in 2015, and their Cloud Computing turnover grew by 84% compared with 33% growth for the rest of the market.

Fig. 20. Cloud Computing
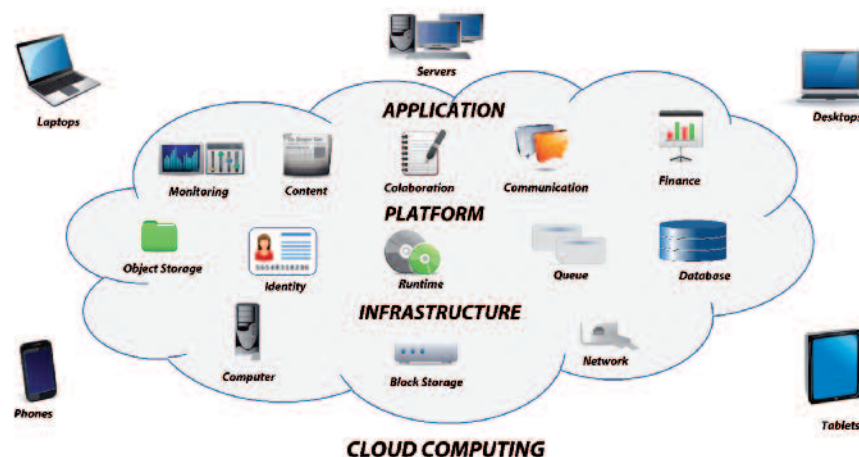
Source: Developed in-house.

to develop data center infrastructure and the associated maintenance operations, at competitive costs.

Despite this dominant position of four players, operators are identifying niche business opportunities in specific markets and local geographic areas, opportunities according to the complexity of this business, characterized by a multiplicity of service options (public[38], private[39], hybrid cloud[40]; SaaS[41], PaaS[42] and IaaS[43] models, etc.), so that making suitable decisions is not easy for customers.

In this context operators are addressing the monetization of the cloud in two ways:

▸ Developing the figure of the "data broker". This new role comes with the responsibility of managing the information for each company efficiently, though this means having to "cohabit with third party networks". The objective is for clients to maintain their database and the broker orchestrates the storage and management of this information.

▸ Offering an "all in one" in the cloud. Over and above the companies that require infrastructure or platform services, the majority of customers seek providers that can also incorporate their own software into the same cloud offering.

In both cases, operators are focusing on the competitive advantage of having a proprietary infrastructure for incorporating new business lines focusing on providing cloud services, offering customers an integrated offering and mitigating any difficulties arising in the relationship between the service provider and the network infrastructure.

Financial restrictions

The recent weak revenue performance and the progressive fall of ARPUs, is putting pressure on the operators' financial capacity. In this context, the operators have focused on optimization of their financial structures to sustain the investments they require in their growth areas. This optimization is being addressed on several fronts:

▸ **Geographic focus:** the first set of measures affects the redefinition of the scope of the operators' geographic perimeters in terms of their size and competitive advantage in certain markets. In this regard, the operators – especially European ones – have opted to concentrate their activities in their key markets, abandoning those in which their positioning or capacity for growth is more limited. Cases

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[38]Public clouds: services offered are found in servers external to the user, who may have free or paid access to applications. They are handled by third parties and the jobs of many different customers can be mixed in the servers, the storage systems and other cloud infrastructure.
[39]Private clouds: the platforms are found within the user installations and do not tend to offer services to third parties.
[40]Hybrid clouds: combine public and private cloud models. This allows a business to maintain control of its main applications, and at the same time benefit from Cloud Computing where it makes sense.
[41]Software as a Service (SaaS): a software distribution model where the software and the data it processes are stored in the servers of an information and communication technology (ICT) company, which are accessed via Internet from a client. The ICT provider handles maintenance, daily operations and support for the software used by the client.
[42]Platform as a Service (PaaS): a category of cloud computing services that provides customers with a platform to enable development, execution and administration of applications without the complexity of building and maintaining the infrastructure typically associated with the development and launch of an application.
[43]Infrastructure as a Service, IaaS: outsourcing of computers used to support operations, including storage, hardware, servers and network components.
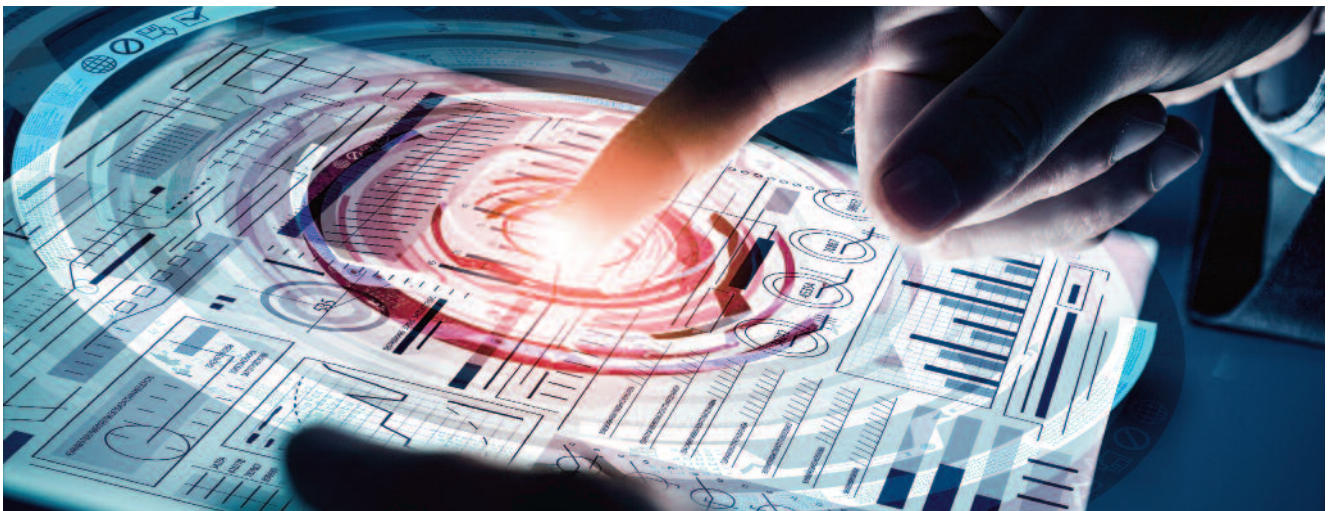
such as Vodafone withdrawing from the United States[44], or Telefónica from Ireland and the Czech Republic[45] and the intention to leave the United Kingdom are some examples.

▶ **Generation of asset value:** the second set of measures focuses on extracting the – total or partial – value of assets following individualized analysis by each operator of its "core and non-core assets". These measures cover a wide range of possibilities ranging from the sale of non-strategic infrastructure such as mobile phone towers, data centers, core networks, underwater infrastructure (see Fig. 21), to the partial IPOs of certain businesses, through lease back of property assets.

▶ **Optimization of the Capex and the Opex:** last, in recent years several efficiency programs have commenced. These measures, derived from the same analysis of "core/non-core" activities indicated in the previous point, cover all the business and support areas, highlighting the outsourcing of commercial operations (e. g. call center activities or sales points logistics); sales to BPOs providers of certain support activities (e. g. accounting); as well as the outsourcing of certain network activities (p. g. installation, reverse logistics); or deployment of networks shared among several operators in some markets.

This entire set of measures is focused on improving investment profitability and associated maintenance costs, as well as maximizing Cash Flow generation.

Regulatory framework

Telecommunications operators are subject to considerable sector regulations that strongly influence how they make strategic decisions. Now, aspects such as spectrum release, net neutrality, network sharing, data privacy, the degree of competence required by each market or cancellation prices are among the main concerns of all managers in the sector.
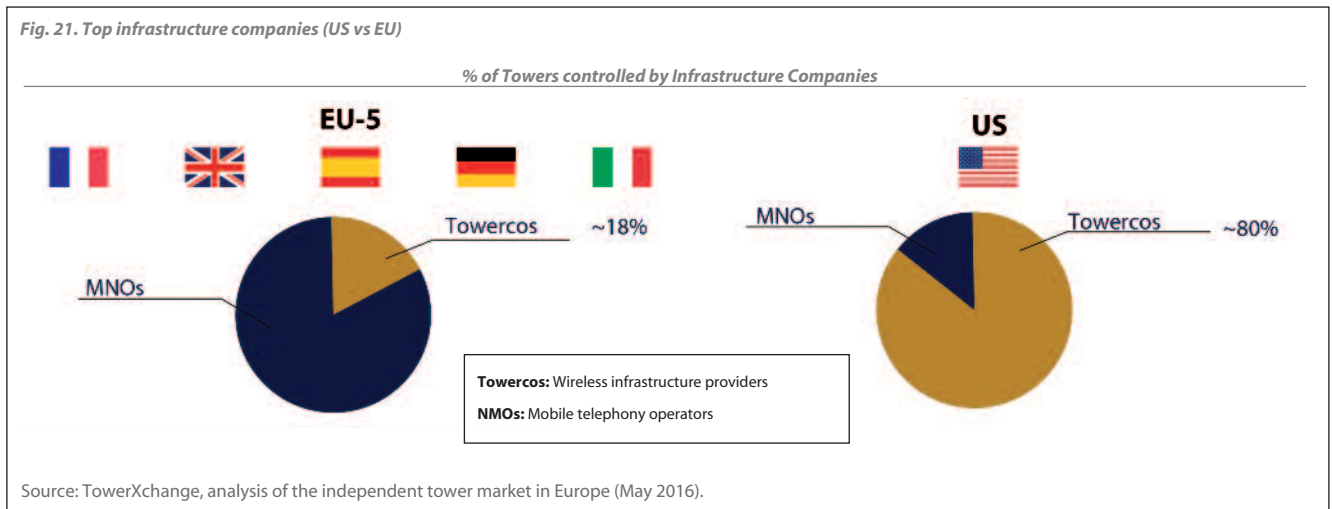
In addition, today operators are one more aspect of the accelerated digitization of the economic and social environment. For this reason, regulatory management of the progressive asymmetry between the different players, both in geographic terms (United States vs. Europe), and terms of scope (entities subject to the law vs. the rest) is particularly relevant.

Last, it is notable that the effects of regulation on the telecommunications sector transcend the returns of the companies that compose it as they have a direct impact on the economic growth and social development of all economic spheres. Currently, there is no doubt that the internet is driving the progress of the different economic sectors, is increasingly more present in the different spheres of life and is modifying economic, social and cultural models. The role played by regulation is of prime importance in this development, by establishing the conditions for which ICT[46] markets may prosper thanks to the draw of investments and fostering innovation, along with sufficient incentivization to broaden universal access to the digital economy. To achieve this, the evolution of the regulation must follow the high speed of change of the digital economy.

[44]Sale of its 45% financial stake in Verizon Wireless (2014).
[45]Sale of O2 Ireland (2013), of Telefónica Czech Republic (2013).
[46]ICT, an acronym for Information and Communication Technologies. ICTs are the set of technologies developed to manage information and send it from one place to another. It covers a very broad range of solutions. It includes technologies for storing and later retrieving information, sending and receiving information from one place to another, and processing information to calculate results and write reports.

Fig. 21. Top infrastructure companies (US vs EU)

% of Towers controlled by Infrastructure Companies

EU-5

MNOs — Towercos ~18%

US

MNOs — Towercos ~80%

Towercos: Wireless infrastructure providers
NMOs: Mobile telephony operators

Source: TowerXchange, analysis of the independent tower market in Europe (May 2016).

The global development of the regulation has gained momentum in the last decade (Fig. 22). In general, the regulatory environment has consistently improved[47] as it has been introducing reforms and has set out the objective of legislating more flexible regulations. This positive perspective reflects the dynamic rhythm of technological and business innovations faced by telecommunications regulators, a reality that means a challenge to the adaptation of the new order of the digital world.

To adapt to current market conditions, the main regulatory aspects on the agendas of the sector are the following:

▸ Spectrum release[48] to address growing demand: to the extent that the number of connected devices increases, operators need additional mobile spectrum to address this increased demand. Plans to deploy mobile broadband (3G/4G), along with the increasing number of devices connected to the IoT renders spectrum a scarce resource that requires good management by the various international and national bodies involved in their administrative management.

The generalization of IoT is going to add a significant load to wifi and 4G networks. Regulators are going to have to facilitate spectrum availability for short-range communication, increase the capacity of backhaul[49] networks and foster the implementation of small-cell[50] and 4G. Assuming that they meet these conditions, the new spectrum needs will include[51]: narrow and broadband frequencies; short and long-range spectrum; continuous data transmission, and short burst data transmission; plus licensed and unlicensed spectrum.

▸ Data protection and privacy: the regulatory aspects related to data protection and privacy, as well as their ownership and portability, are one of the most important aspects of the coming years. Ensuring appropriate use of personal and professional user information has become one of the main priorities of all business organizations, and of

telecommunications operators in particular, which play a primary role in providing the adequate privacy and protection of their customers. At a legal level, in depth regulatory measures are being approved in different geographic areas, which are going to require that companies adapt their models of government and compliance to adapt to changes in privacy and data sovereignty laws. Recent actions such as the repeal of Safe Harbor between Europe and the United States[52], or the modifications to data privacy and protection laws in various locations[53], mean that separating the information subject to these privacy regulations from that which is not, and managing the transfer of personal information across frontiers are critical issues that are difficult to manage.

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[47]Source: UIT Trends in Telecommunications Reforms (2015).
[48]Radio spectrum is considered a strategic sector in all national legislation and, therefore, States reserve the right to its administration, regulation, control and management.
[49]Low, medium and high speed connections that connect to computers or other telecommunications devices tasked with circulating information. Wireless backhaul connects data networks and cell phone networks and is a fundamental structure of communications networks. Backhauling is used to interconnect networks using different types of wired and wireless technologies. An example of backhauling are the radio links used to connect cellular base stations with the main node of this network.
[50]Low-powered radio access nodes that operate in licensed and unlicensed spectrum. They have a scope of 10 metres to 1 or 2 kilometers.
[51]UIT Report Harnessing the Internet of Things for Global Development.
[52]Court of Justice of the European Union. October 2015. Ruling in case C-362/14. Under negotiation at the date of publication of this document.
[53]Proposal for Regulation of the Commission on data protection in the EU area approved in December 2015.

23

Fig. 22. Improved Regulations
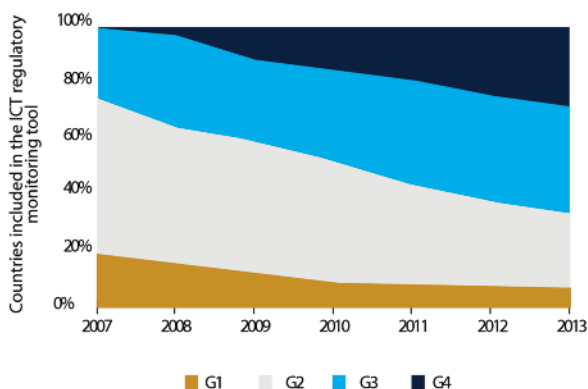
Scores breakdown

1st generation	>=0	<40
2nd generation	>=40	<70
3rd generation	>=70	<85
4th generation		>=85

G1 Publicly-regulated monopolies – planning and control approach.

G2 Basic reform - partial liberalization and privatization of successive layers.

G3 Investment, innovation and access are made easier – focused on stimulating competition, the provision of services and the supply of contents, and on consumer protection.

G4 Flexible and integrated regulation based on economic and political goals.

■ G1   ■ G2   ■ G3   ■ G4

Source: ITU (specialized agency of the United Nations that is responsible for issues that concern Information and Communication Technology – ICT).

▶ Regulation of the Internet of things: IoT services can be implemented using a variety of communications technologies, both wired and wireless. However, many of these services are going to require flexibility or the mobility of wireless technology, and will therefore be dependent on spectrum availability to support connectivity. In addition, a large part of the success in developing new business models based on the IOT lies with having the support of a series of essential resources, such as spectrum and telephone numbers and addresses.

Making these resources available has significant ramifications as they cover a wide range of regulatory areas (granting licenses, spectrum management, laws, competence, security, privacy, etc.), part of which do not come under the responsibility of telecommunications operators. For this reason, deploying the IoT is going to require a high degree of coordination among the telecommunications sector regulators, along with their counterparts in data protection, competence and even with those responsible for emergency health services, transport, etc.

▶ Regulation of OTT services: to the extent that OTT services have become widespread among consumers, regulators are facing the challenge of leveling the playing field among traditional telecommunications companies and OTT providers (Fig. 23), which may impose increased regulatory burden on the latter, or instead, a deregulation of the legal framework for telecommunications operators.

The central issue of discussion lies with the current differences in the regulatory treatment of ECS[54] and OTT services. Due to the current and projected evolution of new online services, the limit between the ECS and the content

services provided through electronic communications networks (the latter outside the scope of application of the regulated framework) is increasingly blurry.

The definition of ECS[55] was established in a different context of technological evolution, with services based on the internet in a very early stage of their development. However, this definition poses challenges in the current environment as it is not clear to what extent the current ECS definitions cover some types of OTT services (e. g. OTT voice services that have the possibility to make or receive calls). Therefore, from the regulatory point of view, the key question is to determine if any OTT services need to be qualified as ECS, as established in Article 2 (c) of the framework directive, in order to determine whether it is applicable or not.

▶ Net neutrality: neutrality is understood as the principle by which any Internet information package cannot be blocked, diverted, slowed, prioritized or manipulated due to its contents, protocol, platform, application, origin or destination, but must be treated equally and without discrimination. There are currently two significant trends being faced in this regard: content providers, who seek protection against the block or degradation of their services, and access providers, which tend to offer rival content and fear that their networks will be saturated. The

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[54]ECS electronic communication services. Directive 2002/21/EC of 7 March 2002 on a common regulatory framework for electronic communications networks and services.
[55]As defined in Article 1 of the Framework Directive: "Electronic communications service" means a service normally provided for remuneration which consists wholly or mainly of the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks used for broadcasting, but exclude services providing, or exercising editorial control over, content transmitted using electronic communications networks and services; it does not include information society services, as defined in Article 1 of Directive 98/34/EC, which do not consist wholly or mainly of the conveyance of signals on electronic communications networks".

Fig. 23. Examples of asymmetric regulation	Regulatory requirements	
Parameters	Telecos	OTT
Charges for use of the radiofrequency spectrum and wireless communications (from national spectrum auctions to municipal usage charges)	☑	☒
Investment requirements for the deployment of networks or infrastructures.	☑	☒
Free customer service and complaint, claim and incident resolution models.	☑	☒
Quality requirements for the services provided (minimum content of contracts, billing accuracy, detailed breakdown of bills, treatment of events that may lead to significant impairment of the quality of service such as coverage or service interruptions, etc.)	☑	☒
Universal service requirements to provide a certain quality, price, availability, etc.	☑	☒

Source: Developed in-house.

principle of net neutrality prohibits any action intended to in any way limit the free transmission of contents from these platforms under the same conditions as other services, and the creation of fast lanes for certain products.

Laws regulating net neutrality are the subject of intense debate in all markets. Chile became the first country to regulate this concept[56] in 2010 under the reform of its General Telecommunications Law; the Netherlands was the first European country to approve, in 2012, a net neutrality law[57] that prohibits cell phone operators from blocking or charging consumers an extra fee for the use of particular services; Brazil approved it in 2014 under the Internet Civil Framework[58]; and in general terms the concept is being gradually incorporated into a wide range of national legislations.

In Europe, the EU parliament approved a law regulating the single European electronic communications market[59] to create a connected continent in October 2015. This law guarantees net neutrality, directing traffic by means of technical and non-commercial directives, so that blocking or slowing measures can only be used to prevent network congestion or for security reasons. Nor is it permitted to prioritize traffic by means of paying providers so that their packages go faster, favoring competition and the entry of new pages and platforms without them being overwhelmed or their contents marginalized. The agreement framework also establishes the quality levels required to offer IPTV services or video-conferencing with the appropriate standards.

▸ Adaptation to new accounting laws: the sector faces implementation of new international accounting legislation on revenue recognition from customer contracts[60]. The law

is going to change the way that different stakeholders interpret the financial statements of these types of companies from a focus on income recognition based on turnover to a focus on customer contracts (Fig. 24). Other accounting laws that, in one way or another, are affecting companies in the sector are those related to the calculation of provisioning for credit risk based on expected loss calculation methods , as well as those affecting the calculation of leases with a high impact on the renter[62].

[56]Law N° 20.4533.
[57]http://www.europapress.es/portaltic/internet/noticia-holanda-aprueba-neutralidad-red-20110624125852.html.
[58]http://www.efefuturo.com/noticia/brasil-aprueba-ley-que-consagra-la-neutralidad-de-internet
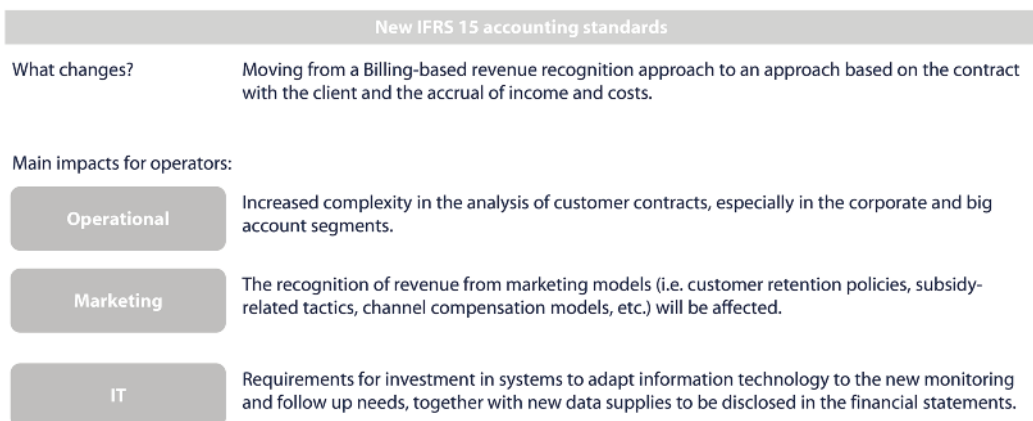[59]European Parliament and Council Regulation establishing access to an open internet and amending Directive 2002/22/EC related to universal service and user rights regarding networks and electronic communications services and Regulation (EU) no. 531/2012 on roaming on public mobile communications networks within the Union. Available at http://data.consilium.europa.eu/doc/document/ST-10788-2015-REV-2/es/pdf
[60]IFRS 15. Law passed definitively in May 2014. This law, the date of application of which was initially projected for 1 January 2017, was delayed by the IASB (International Accounting Standard Board), until 1 January 2018.
[61]NIIF 9
[62]NIIF 16

Fig. 24. Alignment with new Accounting standards

New IFRS 15 accounting standards	
What changes?	Moving from a Billing-based revenue recognition approach to an approach based on the contract with the client and the accrual of income and costs.
Main impacts for operators:	
Operational	Increased complexity in the analysis of customer contracts, especially in the corporate and big account segments.
Marketing	The recognition of revenue from marketing models (i.e. customer retention policies, subsidy-related tactics, channel compensation models, etc.) will be affected.
IT	Requirements for investment in systems to adapt information technology to the new monitoring and follow up needs, together with new data supplies to be disclosed in the financial statements.

Source: Developed in-house.

Main challenges for Telecommunications operators

"I think that the biggest killer of companies, especially in fast-changing industries such as ours, is rejection of adapting to change"

Bill Gates,
co-founder of Microsoft

As described above, telecommunications operators are immersed in the transformation process, attempting to reinvent their role in the new digital ecosystem, in order to expand their current function of facilitating connectivity to other growth areas of the economy. The main challenges they face to advance in this direction are described below.

Reinvention of the customer relations model

The origin and development of telecommunications operators comes from a centuries-old business based on one product (fixed voice connectivity) through a network (copper) with a single type of customer (called home[63]). In recent decades, the progressive digitization of society has radically altered this model. These days, operators have customers permanently connected through multiple devices that use fixed and mobile high- or ultra-high-speed networks to communicate in a broad sense[64], consuming audio and video contents, and running daily tasks that have been digitalized through apps.

This digitization is having a strong effect on customer empowerment[65] in all industries, which in the case of telecommunications operators is increased by a degree of distancing, with new players having interjected in the operator/customer relations model . In this context, the entire sector (the same as for other industries) is aiming to put the customer at the center[66] of their business models.

Below are details of some of the main challenges that telecommunications operators are facing:

▸ Building on a solid definition of "customer": this affirmation, which can appear obvious at first, is no easy task for telecommunications operators (Fig. 25). By way of example, to integrate customers with fixed network access contracts and those with access to mobile networks into a single database, it is difficult to homogenize the respective

definitions[67]; the products and services of the applications and media business require the incorporation of the concept of user; and the business linked to the publicity requires the concept of advertiser.

These examples are intended to show that the passage from a "product focus" based on the number of accesses to a "customer focus" which adequately defines the different business cases of the current business of the operators, is no minor issue, nor is it resolved in the market.

▸ Aligning the new product catalog and turnover with the new market demands: in the last twenty years, with the expansion of mobile connectivity and the arrival of the internet, the operators' catalog of products and services has been multiplying, making the operating processes linked to management difficult to the point of limiting the operators' capacity to competently offer the services currently in demand in the market.

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[63]In the past the contract owner was called the "subscriber", and was normally one of the members of the family unit living at the home where the service was provided. Currently, in the fixed-line realm, the term "connected unit" is used for homes that already have the possibility to receive the service, and "homes passed" for those that have already contracted the service.
[64]Voice calls, multi-conferences, video calls, chats, text messaging, social networks, etc.
[65]Term commonly used in the business sphere to describe the increase in customer power on current business models.
[66]Through specific programs ("customer centric"; "customer 360ª", etc.).
[67]The concept of "customer" in the fixed business tends to be associated with the physical address of the service provision, while the mobile business tends to be associated with the SIM used in the handset, and historically the management models (annual budget, commercial follow-up, setting commercial objectives, management analysis of the management control area, etc.) have been based on the "number of accesses".
[68]Some 60% of telecommunications companies have 50 or more revenue management systems for their daily operations. Source: OVUM: 2016 Trends to Watch: Telecoms Operations and IT.

Fig. 25. Build a solid view of the customer

Source: Developed in-house.
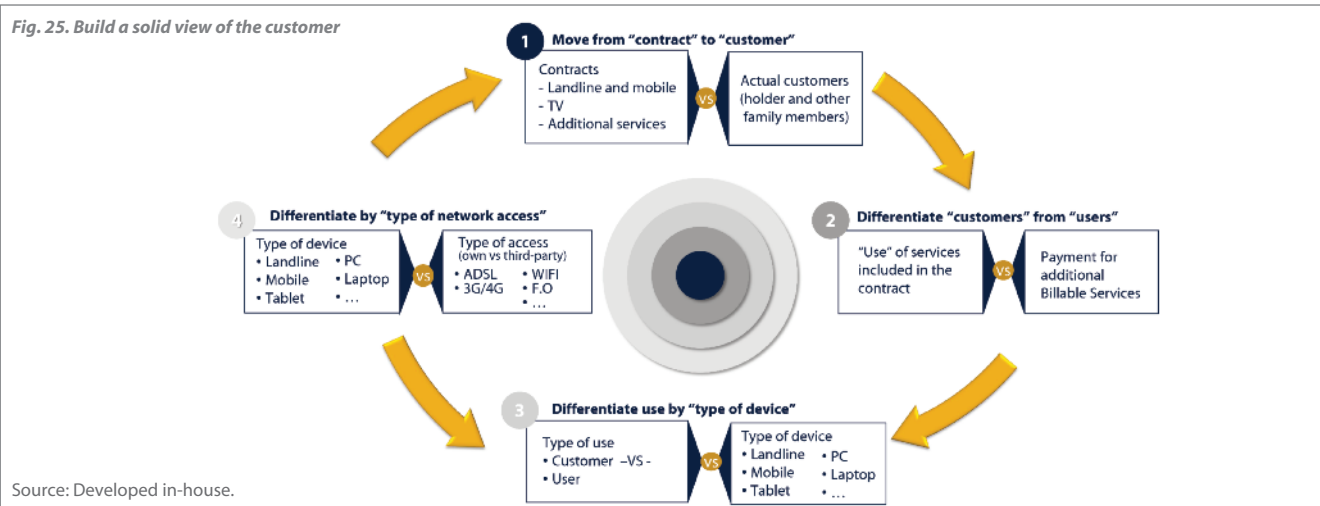
Aspects such as improving the capacity to follow through orders in real time , decommission obsolete products, customize deals, incorporate third party products and services, and make more flexible functionality to enable dynamic change in services, rates and price packages according to the type of customer, are key aspects of the plans to improve on legacy items in the catalog, and the related billing processes.

▸ **Improving the monetization of customer data flow:** all operators are addressing strategies to monetize the huge variety of data generated by their customers and users through the transformation of their BI areas, Big Data programs and use of data science techniques. To date, advances in collecting and storing such data are making good progress, including the collection of new unstructured data sources. However, transforming the data into information and actively using it in new business strategies still isn't showing truly differential results. The monetization of this information to generate new lines of repeat revenue based on the provision of OTT services will be one of the main challenges faced by operators in the coming years.

▸ **Transforming sales models:** the distribution models used in the connectivity expansion phase of recent years have become out of step with the current market context. Operators primarily used models focused on collection to be able to respond to the strong market expansion, along with deals specializing in product silos (fixed lines, cell, internet) according to the degree of market fragmentation[69].

Currently, the maturity of the main markets requires a rebalancing of sales efforts towards customer loyalty, and acquisition strategies focused on capturing a share of wallet[70] from new customers. In addition, the customer

experience demanded by users, as well as changes in the value proposition (bundling deals, elimination of handset subsidies, future arrival of the eSIM, etc.) are fostering the development of Omnichannel programs, redesigning the role of the channels to create a consistent multichannel experience, redimensioning them in line with current market needs[71], and incorporating quality of service as a key deal differentiator. All this involves the adaptation of the business follow-up metrics, incorporating them into models of action.

▸ **Refocusing of commercial process outsourcing models:** Traditionally, customer contact is outsourced for practically the entire commercial cycle. Sales are mainly made through indirect channels, provision of service is outsourced, and in post-sale customer care the use of third party contact centers predominates. In sum, the main moments of truth with the customers are in the hands of third parties.

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[69]Before the effective arrival of the convergence process of recent years, operators maintained a high level of specialization in types of access (e. g. Vodafone in the cellphone world) and the old incumbents offered landlines and cell through companies that were independent of each other.
[70]"Share off wallet" – SOW – is a marketing term that refers to the portion of the customer's total spending that a company acquires for its products and services.
[71]Mainly in relation to the rebalancing of the mix among physical stores, ContactCenters and online channels.

In this context, aiming for "customer centricity" requires review of the outsourcing models, shifting from a focus excessively based on cost/SLA to models that focus on the differential value of approachability and capacity for customer care of the operators more than the OTTs.

▸ **Customer care models focusing on "continuous improvement of the customer experience":** to date, all companies in general, and telecommunications operators in particular, have operating models that ensure the execution of their processes is robust and reliable. At the same time, they have set levels of service, through KPIs[72] or SLAs[73] (theoretical quality) that monetize their performance (real quality) and ensure compliance with the standards set by each operator for each of its processes. This focus on comparing real quality with theoretical quality is the traditional vision of the customer care quality management model of recent years.

However, the digitization of the economy, and the consequent empowerment of the customer, has led to the evolution of this focus incorporating customer perception (perceived quality) with the performance measurement systems of the customer care model. In practice, this comes from the generation of new metrics that facilitate the monetization of the customer experience[74] and establish programs for continuous improvement of the customer care model (Fig. 26).

Simplification and efficiency

The progressive maturity of the markets and increased competitive pressure are putting pressure on operators' revenues, rendering cost management key to maintaining levels of competitiveness and profitability for telecommunications operators. In parallel, the digitization of society is transforming the demand for products and services, with upward pressure on investments and the structural costs necessary to adequately respond. This scenario is obliging operators to reinvent their models of approach to significantly reduce their cost structures, without neglecting the new market needs (fig. 4.2.1). To achieve this, the sector as a whole is immersed in simplification programs that seek to increase the degree of effectiveness and efficiency of their cost base.

The simplification requires undertaking changes over three essential axes: processes, systems and organization. Some details of the main challenges linked to this include:

[72]KPI (Key Performance Indicator) is a measure of the degree of performance of a process.
[73]SLA (Service Level Agreement) is a written contract between a service provider and its customer designed to set the degree of quality of the service agreed.
[74]There is no standard definition of the concept of "customer experience". For the purposes of this study, we define it as a multidimensional, interactive process between a brand and a person. It is developed through contact points that link them, whether or not these are under the control of the company. It covers all stages from brand recognition and recommendation, to purchasing experiences, use and, if applicable, consultations and complaints.

Fig. 26. Example on customer sign up, one concept and three different views
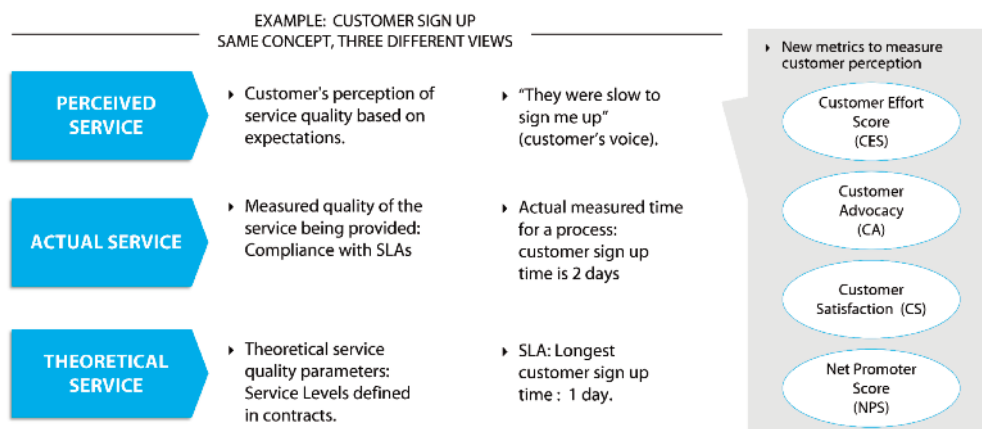
Source: Developed in-house.

- **Digitization of processes:** the new technological capacities favor the development of processes with a higher degree of automation and strength and are failsafe, shifting from a traditional execution based on the physical to a digital setting with little or no human presence. These new processes facilitate the development of a customer relations model (Fig. 27), in terms of experience in customer-provider interaction, by incorporating new customer relations channels that favor the development of a high number of touch points . In addition, this more intensive interaction transforms these customers into providers of information with which it is possible to anticipate needs and adapt better solutions (products and services).

  The sector as a whole has seen the value of the opportunity to address process redesign programs that enable digitization of the customer relations model, simplifying and aligning the operations models with the consequent associated cost savings. Sectoral initiatives exist in this regard (e. g. eTOM[75]) focused on the creation of benchmark models and sharing best practices for implementation.

- **Rationalizing systems:** the IT areas in the majority of telecommunications operators are immersed in inherited systems which in some cases are obsolete. Maintaining these systems absorbs a significant portion of their resources, and acts as a brake on digitization by draining its capacity to dedicate itself to the key projects required by the business.

  A significant part of the improvement programs in IT areas focus on improving the use of resources through simplification of the systems map, thereby releasing the capacity to focus investments on new transformation projects. There are three main challenges to this:

- Decommissioning the inherited systems under medium-term replacement models, given the impossibility of slashing them in one fell swoop.

- The digitization of commercial activities, with special focus on Big Data programs, aligning technology with the re-engineering of structural processes, incorporating new capacities (Fig. 28), using new methodologies for IT project management (Lean, Agile, etc.), and enhancing their role as a guarantor of information security.

- Improving efficiency of the network areas through the application of new IT solutions such as Network Function Virtualization (NFV) and Software Defined Networking (SDN) which involves abstracting the design and operation of the network from its physical hardware components, improving monitoring and control functions and giving greater agility to product development and significant cost savings[76].

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[75]eTOM (Enhanced Telecom Operations Map) is a Framework for Business Processes and, therefore, a benchmark model for categorizing all the business activities of the ICT (Information and Communications Technologies).
[76]In the MWC held in Barcelona 22-25 February 2016, several vendors advertised some very promising results: Ericsson showed potential TCO reductions that could reach 80%, and Coriant indicated that its multi-layer SDN solution could achieve operating cost reductions of around 75%.

Fig. 27. Technology elements included in the digitization process
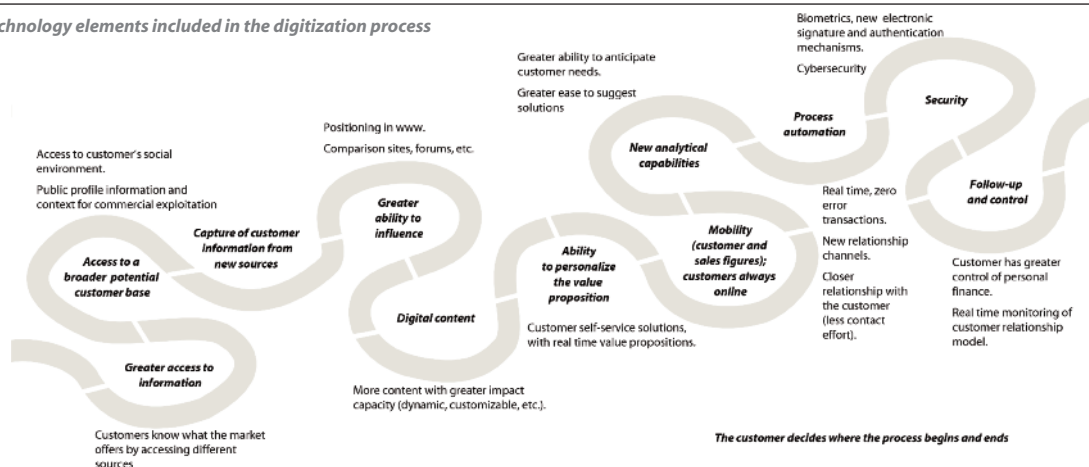
Source: Developed in-house.

- **Simplification of the organizational structure:** the operators' organizational models are being adapted to new market needs to ensure consistency of turnover[77], the labor force employed and the associated staffing costs. There are three main challenges:

  - *Breaking the inherited silos:* the operators' structures tended to generate organizational silos as technological[78] advances took place . The current challenges involve eliminating these silos and adapting the organizations to market needs[79].

  - *Simplifying organizational models:* the development of new lines of business, (landlines, voice, data, contents, B2B, B2C, B2B2C, etc.), and the increased size of operators linked to the concentration process, is demanding the simplification of organizational processes that eliminate duplicities among units, level out structures to gain agility, guarantee correct alignment between global and local functions and ensure an appropriate mix of outsourcing with current business needs[80].

- *Strengthen digitization of the activity:* operators wishing to capture more revenue through the new business models arising from OTT services are developing innovation programs with an organizational implementation that differs depending on its degree of disruption. The most innovative projects are channeled through an independent structure that acts with enormous autonomy compared with the rest of the organization, and the projects with incremental innovation are run within the areas (Fig. 29).

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[77] By way of example: volume of income, EBITDA, cash flow.
[78] For instance the main silos tend to involve separation of the prepaid cellphone business from the post paid contract model; separation of customer acquisition areas from customer care – channels included –; separation of network areas from the rest of the organization, including within the network area; organization according to silos in terms of the technologies they comprise, etc.
[79] By way of example, the coordination of the network areas with the commercial areas to jointly plan the deployment of new networks, or the unification of the business intelligence areas that were traditionally dispersed in each area responsible for a segment, or the centralization of certain support activities.
[80] Telecommunications operators have traditionally used a high degree of outsourcing. To date, the mix of outsourcing is being reviewed to ensure that it continues to serve its original purpose (detachment from "non-core" activities, the outsourcing of which generates operational efficiencies and improves the level of service).

Fig. 28. Management layers in a typical technology model

Source: Developed in-house

Fig. 29. Organizational trends in incorporating innovation from new digital business models
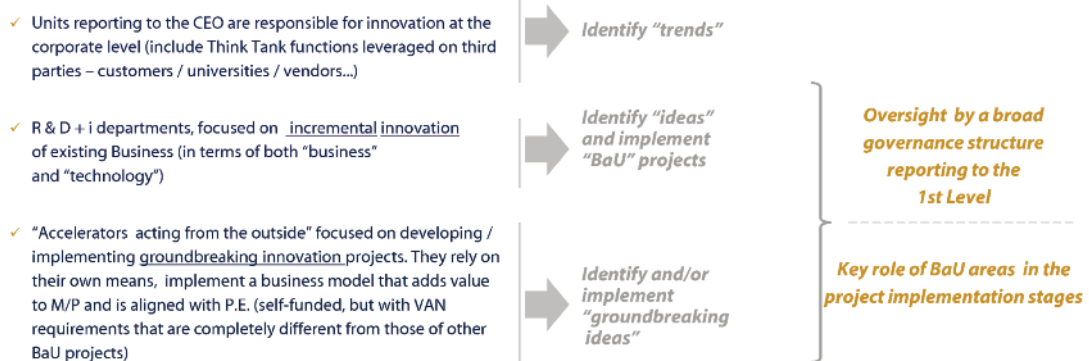
Source: Developed in-house.

Financial flexibility

As mentioned in section "Financial restrictions", the pressure on revenue from the new competitive environment along with the increased need for resources due to the high need for network investments, the development of the content business and financing the consolidation process, are putting pressure on the operators' financial structures. Currently, the sector shows high rates of leveraging (Fig. 30), weakening its capacity to maneuver with the challenges posed by the market in the coming years. In this context, achieving greater financial flexibility with which to address these challenges will be one of the main priorities of the coming financial years, and is going to require continued advances in the models described in section "Financial restrictions", essentially focused on two axes:

- Generating value from non-strategic assets: the models initiated still have a way to go to include a higher number and type of assets tending towards the progressive segregation of distribution and commercialization current in other industries (e. g. electricity and gas).

- Optimization of Opex and Capex: the former need to be able to continue advancing in strategic agreements among operators in order to scale procurement, as well as in the deployment of selected networks shared in certain markets. Regarding the latter, gaining efficiency in network maintenance costs thanks to virtualization is still at an incipient stage of implementation and its generation will mean very significant overall savings. In addition, the shutdown of certain business models still has a long way to go, from copper, to certain businesses that, while they require regulatory modifications, currently represent sunk costs which their actual utility does not seem to justify (e. g. public telephone booths –TUPs-).

Risk management

Risk is always present in any business activity and is associated with the possibility of an occurrence that generates loss or the uncertainty that certain objectives will be met. In this regard, as is logical, the activity carried out by telecommunications operators (and their challenges and opportunities described in the above sections) are also subject to different risks that must be identified, controlled and managed.

In recent years, many companies are making significant efforts to strengthen their management and risk control functions derived from three factors:

- Higher demands from interest groups and new regulations. The strengthening of risk management in organizations is highly encouraged, and in certain aspects regulated, both

Fig. 30. Net debt of some of the top Telecommunications operators

Name	Net-debt / EBITDA
BT Group	x1,5
Deutsche Telekom	x2,4
Orange	x2,0
Telefonica[1]	x3,02
Vodafone	x2,5
AT&T	x2,3
Verizon	x2,3
Average	*2,29*

[1]Net debt over OIBDA

Source: Company financial statements (1Q16 except for Deutsche Bank and Verizon whose data are for 4Q15).

by supranational organizations and local regulators, as well as by company groups and associations, the academic world and independent institutions (e. g. COSO). The position of all these bodies is convergent and points to greater development of the function as one of the key aspects of corporate management and governance.

▶ The materialization of certain different types of significant risk events, both in the telecommunications sector (impacts on the financial statements of currency depreciation, fines for service inadequacies, leaking of private data or cramming[81] and other acts, etc.) and in other sectors (with special relevance to the financial sector).

▶ The internal awareness of added value that the integration of a solid risk management and control model contributes to businesses as decision-making support.

The risks telecommunications operators are subject to can be encompassed in five main categories (see Fig. 31). While it is not the purpose of this study to provide intricate details of the current circumstances of operators in this regard (which substantially differs in terms of the business strategy and markets in which each of them operates), it is possible to identify some examples that represent each of these categories:

▶ **Strategic Business Risks:** in which the possible regulatory responses to the breakthrough of OTTs are notable, as are the regulatory conditions on the consolidation processes for some regions (especially Europe) and their spectrum policies.

▶ **Operational and Technological Risk:** in which privacy and security risks gain critical importance, especially with the push of the new cloud environments and the increase in customer information handled by the operators. Also of interest are the risks of damage to network components (due to natural causes, theft or vandalism), failings in logical or physical security systems and obsolescence of the platforms providing services to the company.

▶ **Financial Risk:** while the risks inherent to market access have diminished, concerns persist regarding the drive to make network investments profitable and the capacity to acquire scale with the current degree of leveraging (beyond the familiar problems of exchange rate and interest rate fluctuations and the problem – relevant in some circumstances – of credit risk).

▶ **Compliance Risk:** the tendency toward the toughening of fines by regulatory bodies, especially regarding data protection and regulated service levels, has increased concerns for the reinforcement of risk control and compliance functions, to ensure an adequate framework of control and to mitigate possible claims.

▶ **Risk Model**[82]**:** while this is a recently conceptualized risk, the operators are becoming aware of the increasing number of decisions on outputs of complex models that govern the execution of many of their main activities[83], and, with this context, they are beginning to assess the desirability of addressing management improvements and governance of their models (identification, classification, validation, documentation, etc.).

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[81]Charging for unauthorized amounts, which has led to significant fines for instance to AT&T ($105 million in 2014).
[82]For more details see "Model Risk Management: quantitative and qualitative aspects of risk model management" available at https://www.managementsolutions.com/site/esp/publicaciones/whitepapers/Model-Risk-Management.html)
[83]For instance the use of BigData in core areas such as Network or IT.

Fig. 31. Risk categories for telecommunications operators

Strategic/Business	Operational/Technology	Financial	Compliance	Model(1)
Include environment-related risks (from the macro-economic situation to the competitive environment) in addition to adverse business decisions, incorrect implementation of decisions or unresponsiveness to changes in the environment.	Risks that can result in loss due to inappropriateness or failures in internal processes, personnel and/or systems (includes legal risk)	Includes both market risk (mainly exchange rate and interest rate) and credit, counterparty, liquidity and structural risk	Includes any impacts arising from non compliance with rules and regulations applicable to the industry and company (fines, sanctions, exclusions ...) as well as accounting risk	Refers to any adverse consequences resulting from decisions based on incorrect outcomes or reports from models, or from model misuse

(1) For further detail please refer to "Model Risk Management: Quantitative and qualitative aspects of model risk management" available at https://www.managementsolutions.com/site/esp/publicaciones/whitepapers/Model-Risk-Management.html)

Source: Developed in-house.

In response to this context, operators are strengthening their risk control management along various lines, focusing efforts mostly on the following:

▶ Definition and approval by top management of a strong risk management and control framework that enables the company to incorporate general policies, norms and integrated procedures into their business management.

▶ Establishment of a risk appetite that is consistent with the business plans while allowing them to be challenged and a set of quantitative and qualitative indicators establishing the extent of risk the organization is willing to (for instance, as a result of requests for information from regulators such as the CNMV in the case of Spain).

▶ Strengthening the organization and governance of risk functions, distributing responsibilities across three lines of defense (management, control and supervision), comprising an independent risk function that supports Upper Management in establishing the risk appetite and ensures monitoring and compliance with that appetite and the defined policies, strengthening the structure of the governing bodies[84] and gaining support from other complementary functions (Internal Control, Compliance, etc.).

▶ Advancing in the suitable identification, evaluation and control of all kinds of risks that affect companies, from the most traditional (such as strategic and financial risks) to operational, compliance and model risks.

▶ Strengthening analytical capabilities focusing on a quantitative evaluation of risk that enables monitoring the evolution of the risk profile and checking it against the approved appetite, including advances in the creation of risk maps consolidated at the company level using homogeneous taxonomies across different business units and corporate areas, obtaining expected shortfall and maximum loss measures[85] to facilitate comparisons of and prioritize various risks.

▶ Optimization of the IT support and creation/revision model of a risk reporting framework. It has become a trend (with varying degrees of maturity) to have a systems architecture leveraged on a combination of holistic and specialized solutions in the risk area. This architecture must also include the generation of reporting that needs to be adapted to each recipient with varying frequency and granularity of the information.

▶ Effective integration of risk management into business processes and support, aiming to meet the company's objectives as far as possible in a way that is streamlined with the defined risk appetite. There are relevant examples of this such as the development of customer intake and recovery processes, self-rating management, the optimization of insurance programs, financial risk policies and the evaluation of investments under profitability criteria adapted to risk.

[84]For example by setting up a Board Risk Committee, BRC.
[85]These quantifications are made both at the individual level (for each risk type) and in aggregate (considering the effect of risk diversification), ultimately obtaining a measure of the company's economic capital.

Glossary

ANRs (National Regulation Authority): regulator or institute responsible for applying sectoral regulations

ARPU (Average Revenue Per User): mean or average earnings per user in a given period by a services company with a broad user base.

ASP (Application Service Provider): a company providing an end customer with an information service.

B2B (Business-to-Business): business model in which the transactions of goods or the provision of services takes place between two companies.

B2C (Business-to-Customer): direct sales business model, meaning that transactions of goods or the provision of services are made directly, without intermediaries, between the company and the end consumer.

B2B2C (Business-to-Business-to-Customer): e-commerce model that aggregates B2B and B2C.

Backhaul: low, medium or high speed connection of computers or other telecommunications devices tasked with circulating information.

Big data: IT term that makes reference to the storage of large amounts of data and to procedures used to find repeat patterns within it.

BPO (Business Process Outsourcing): subcontracting business process functions to service providers whether internal or external to the company.

Bundling: the packaging of several services into a single product.

CA (Customer Advocacy): a form of service to the customer in which the company focuses on the best thing for the customer.

CAGR (Compound Annual Growth Rate): specific business and investment term meaning the mean annual growth rate of an investment over a specified period of time.

CAPEX (Capital Expenditures): amount of money invested in the acquisition or improvement of the capital assets of a particular company and which generates income.

CES (Customer Effort Score): parameter measuring the efforts and satisfaction of a customer for the service received in a single question.

Chum: rate of customer cancelation referring to customer migration, rotation or cancelation.

COSO (Committee of Sponsoring Organizations of the Treadway Commission): initiative of 5 bodies to improve the internal control of organizations.

Cramming: charging undue amounts to customers of telecommunications services.

CS (Customer Satisfaction): marketing term that measures how the products and services received have achieved or exceeded customer expectations.

Data science: procedure by which valuable information is obtained from data.

Data lake: repository storing all the data of a company, structured and unstructured, without any kind of reprocessing and without any kind of diagram for later analysis.

EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization): financial indicator representing gross operating profits calculated before the deduction of financial expenses.

ECS (Electronic Communication Services): regulatory framework for services and electronic communications networks**.**

eTOM (Enhanced Telecom Operations Map): business process framework, and therefore, a benchmark model for categorizing all the business activities of ICT sector companies.

Freemium (Contraction of Free&Premium): business mode that functions by offering basic free services, while charging for other more advanced or special services.

FTTx (Fiber to the x): generic term to designate any broadband access on fiber optic that fully or partially replaces the copper of the access loop.

IaaS (Infrastructure as a Service): outsourcing the computer infrastructure used to support operations, including storage, hardware, services and network components.

IFSR15, NIIF9 and NIIF16: accounting regulations

Cloud infrastructure: high availability infrastructure including computers, storage, the network, and the related components and installations necessary for cloud computing and IT as a service.

Internet of things (IoT): interconnected network of quotidian objects that are often equipped with ubiquitous intelligence and those that are given the capacity to transmit information without the need to interact with a person.

in-app: type of application that is free but includes different purchases inside the app to improve, expand it or make it easier to use.

IP (Internet Protocol): number assigned to every device that is linked to a network.

ISPs (Internet Service Provider): company tasked with connecting its customers to the Internet.

KPI (Key Performance Indicator): measure of the performance of a process.

Lease-back: a financial transaction in which the owner of an asset, movable or immovable, sells it to a leasing agency and then leases the same asset via a financial lease contract.

M2M (Machine-to-machine): a system of direct communication between two devices using any communications channel.

NFV (Net Functions Virtualization): consists of virtualizing (applying Cloud technology) components essential to the network.

NPS (Net Promoter Score): a tool that measures customer loyalty.

Hybrid clouds: combine private and public cloud models. Allow a company to have control over their main applications, while benefiting from Cloud Computing in places where this makes sense.

Private clouds: platforms are found inside user installations and do not tend to offer services to third parties.

Public clouds: services offered are found in servers external to the user, who may have free or paid access to applications.

MVNOs (Mobile Virtual Network Operators): mobile telephone company that does not have a frequency spectrum concession and therefore, does not have its own radio network.

OPEX (Operating Expenditure): permanent for the functioning of a product, business or system.

OSs (Operations Support System): information systems employed by telecommunications operators.

Over the top (OTTs): content, service or application provided to the end user over the Public Internet.

PaaS (Platform as a Service): a category of cloud computing services that provides a platform to customers that facilitates the development, execution and administration of applications without the complexity of building and maintaining the infrastructure typically associated with the development and launch of an application.

Procurement: term used for the action of acquiring goods and/or services.

Quadruple-play: is defined as packaging of services and audiovisual content: fixed and mobile voice, broadband and television.

Real-Time Entertainment: entertainment in real time through video and audio streaming.

RTB (Real-time Bidding): buying and selling of online ad impressions through real-time programmatic auctions that occur in the time it takes a webpage to load.

SaaS (Software as a Service): software distribution model in which the software and data it handles are stored in the servers of an information and communications technology (ICT) company, which are accessed by Internet.

SDN (Software Defined Networking): a set of computational network area techniques designed to facilitate the implementation of network services in a way that is deterministic, dynamic and scalable, preventing sub-optimum management of these services by the network administrator.

Share of Wallet (SOW): a marketing term that refers to the portion of the customer's total spending that a company acquires for its products and services.

SLA (Service Level Agreement): is a written contract between a service provider and its customer in order to establish an agreed level for that service.

Small-cell: low-powered radio access nodes that operate in licensed and unlicensed spectrum.

SMS (Short Message Service): refers to cellphone text messaging.

Streaming: technology used to reproduce audio and video files directly from the internet without previously downloading them onto a device.

TCO (Total Cost of Ownership): method of calculating the costs involved in the administration of technology infrastructure in companies.

ICT (Information and Communication Technology): concept covering everything related to the conversion, storage, protection, processing and transmission of information through electronic devices.

Time to market: reaction capacity of organizations to create or maintain competitive advantages in the face of market challenges and competitors.

Touch Point: defined as any way in which a consumer can interact with a company, whether person to person, through a webpage, an application or any form of communication.

Triple-play: packaging of audiovisual services and content: fixed voice and mobile, broadband and television.

Upselling: sales technique by which the seller induces the customer to buy more expensive goods, updates or other extensions to make higher profits on their sale.

VoIP (Voice Over Internet Protocol): used to define a category of hardware and software that allows the user to transmit telephone calls over the internet.

VSP (Vertical Service Provider): is an ASP that covers the needs of a specific vertical market or industry.

WAP (Wireless Application Protocol): a secure standard that allows users to access information instantaneously with their mobile wireless devices.

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