The new digital revolution

From the consumer Internet to the industrial Internet

UNITED NATIONS

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eLAC 2018

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This is a revision of the document prepared by the Economic Commission for Latin America and the Caribbean (ECLAC) for the fifth Ministerial Conference on the Information Society in Latin America and the Caribbean, which took place in Mexico City from 5 to 7 August 2015.

The document was prepared by the Innovation and New Technologies Unit of the Division of Production, Productivity and Management of ECLAC. Mario Cimoli and Mario Castillo were responsible for its coordination. It was drafted by Wilson Peres on the basis of documents prepared by Valeria Jordán (chapter I), Fernando Rojas and Laura Póveda (chapter II), and Jorge Patiño and Catalina Achermann (chapter III).

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Foreword

As digital technologies gradually permeate all activities in our societies, they have an ever stronger impact on patterns of economic growth, social inclusion and environmental sustainability. After more than a decade of policies to encourage greater access to and use of these technologies, the countries of Latin America and the Caribbean have made significant progress in terms of access to telecommunications services and the use of applications and social networks, as well as the implementation of policies and programmes for e-education, e-health and e-government and the adoption of the relevant regulatory frameworks. However, the pace of progress varies greatly between the countries of the region and there remain large gaps, both between and also within countries, even as they continue to lag far behind the more developed economies.

A regional dialogue was launched in 2000 on the information and knowledge society in Latin America and the Caribbean, in which the countries affirmed their willingness to design and implement initiatives and programmes for access to and use of information and communications technologies (ICTs), which led to the Declaration of Florianopolis. This process continued in 2003 with the regional preparations for the World Summit on the Information Society (WSIS) and the Bávaro Declaration.

Two years later, with the Economic Commission for Latin America and the Caribbean (ECLAC) as secretariat, the Regional Preparatory Ministerial Conference of Latin America and the Caribbean for the second phase of the World Summit on the Information Society was held in Rio de Janeiro, Brazil. At that event, the first version of the Plan of Action for the Information Society in Latin America and the Caribbean (eLAC 2007) was adopted as a regional vision, which included a commitment to reduce the digital divide and promote access to and use of ICTs as development tools. This process continued with the eLAC 2010 and eLAC 2015 plans, adopted in San Salvador in 2008 and in Lima in 2010, respectively, at the second and third ministerial conferences. In 2013, the fourth Ministerial Conference on the Information Society in Latin America and the Caribbean was convened in Montevideo, where eLAC 2015 was reaffirmed and a work plan was agreed upon for the period 2013-2015.

In August 2015, the fifth Ministerial Conference on the Information Society in Latin America and the Caribbean will be held, organized by the Government of Mexico and ECLAC, in order to take stock of the agreements in place and resume the policy dialogue with a view to the post-2015 world. At the Conference, the regional dialogue, with the participation of stakeholders from the private sector and civil society, will be updated with a view to analysing the effects of the digital revolution and its impact on public policy, within the framework of a sustainable development agenda and its economic, social and environmental components.

The task is to update the regional commitments, identifying new challenges and priorities, and affording particular attention to the effects resulting from the ubiquity of the Internet, technological convergence, high-speed networks, the digital economy, open government and e-government, and the data revolution, without ignoring the need to continue expanding ICT access and use and close existing gaps. This regional agenda will, in turn, serve as an input for the global process of reviewing outcomes and preparing a new agreement in the framework of the World Summit on the Information Society, scheduled by the United Nations General Assembly for late 2015.

ECLAC has participated actively in all stages of this long-term process of regional technological cooperation and remains committed to continue providing close support to its member countries. The purpose of this document is to contribute to the debate and increase awareness in the region of the effects of the technological revolution under way, measure the progress made to date and identify the opportunities and policy areas where governments, businesses and civil society should focus their attention in order to advance towards the goal that was set over a decade ago: to harness the full potential of the digital economy with a view to instigating a shift in the region's production structure towards more knowledge-intensive, higher-productivity sectors, in pursuit of greater equality.

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Introduction

- The roll-out and uptake of digital technologies in the economies and societies of Latin America and the Caribbean, as in the rest of the world, can be described as nothing less than spectacular. Between 2003 and 2015 —just a little over a decade— the number of Internet users more than doubled to comprise 54.4% of the population.[1] The region has more than 700 million mobile telephone connections, with over 320 million unique subscribers,[2] and many of its countries rank among the heaviest users of global social networks worldwide.
- Countries in the region have advanced at very different speeds, as might be expected given their extreme heterogeneity in terms of per capita income, productivity and social development. While the most advanced countries are approaching penetration and usage rates comparable to those of developed countries, those that lag furthest behind are progressing much more slowly and the gap between countries is widening.
- The expansion of access to and uptake of digital technologies in the region was attributable to three positive factors that intensified over the decade: strong economic growth, a reduction in poverty and lower hardware costs and access fees. Against this backdrop, private and public operators ramped up their investment in deploying and expanding networks, particularly third-generation (3G) networks.
- Two of the variables that accounted for this success had changed dramatically by mid-2015. Firstly, economic growth expectations deteriorated substantially, with the rates forecast for 2015-2017 barely a third of what they were between 2003 and 2012, which will drive down investment and consumption accordingly. Poverty levels have plateaued since 2012 and are stuck at close to 28% of the total population. It is unlikely that the coming decade will bring the same expansion of the digital market as between 2002 and 2012, when the middle class grew by 82 million people.
- Unsurprisingly, given the pace of technological progress worldwide, hardware prices are expected to continue falling, even as devices become increasingly advanced in terms of capacity and quality. This positive factor in favour of the region's growing digitization may partly offset the effects of the poor economic outlook, but it also highlights a key structural problem: the progress of digital technologies is fundamentally exogenous and is linked to the economic structure almost exclusively through private consumption. The capacity to produce hardware, software and applications is very weak compared with the advanced economies and is concentrated in only two or three of the region's countries.[3] Digital technologies epitomize the persistence of an economic model based on international integration through low-technology exports and imports of more sophisticated products. The lack of a strategy for structural change towards more technology-intensive economic activities is exacerbating the slow and unsteady economic growth in the region and limiting the development of the digital economy.
- In 2010, during the economic boom prompted by strong commodity exports, the region was urged to fast-track the digital revolution in order to avoid the Red Queen Effect: "here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!".[4] Today this message is more important than ever considering the rapid pace of technological change and the loss of economic momentum in the region.
- The new digital technologies have led to widespread use of cloud computing, recognition of the potential of big data analytics, and significant progress in aspects of the Internet of Things, such as home automation, smart cities and grids and digital manufacturing. In addition to closing gaps in respect of the basic necessities of access and usage, now the conditions must be established for using the new platforms and finding ways to participate actively in the creation of content and even new applications and platforms.

[1] International Telecommunication Union (ITU), *World Telecommunications/ICT Indicators Database*, 2016.

[2] Data from GSMA Intelligence, *The Mobile Economy, Latin America*, 2014.

[3] See Economic Commission for Latin America and the Caribbean (ECLAC), *The digital economy for structural change and equality*, (LC/L.3602), Santiago, Chile, March 2013.

[4] See Lewis Carroll, *Through the Looking-Glass*, 1871, as cited in Valeria Jordán, Hernán Galperín and Wilson Peres (coords.), *Fast-tracking the digital revolution: Broadband for Latin America and the Caribbean*, (LC/R.2167), Santiago, Chile, Economic Commission for Latin America and the Caribbean (ECLAC), Regional Dialogue on the Information Society (DIRSI) and European Union, November 2010.

- In order to take advantage of the new technologies, access conditions must be improved significantly, particularly in the areas of speed and latency. Table 1 shows the bandwidth necessary for various activities that are expected to be at the heart of digital progress in the next five years.

■ Table 1 ■
Bandwidth required by application type
(Megabits per second)

US Ignite and Mozilla Ignite projects	Predicted bandwidth required
Advanced manufacturing	Between 38 and 74
Emergency preparedness and public safety	Between 6 and 18
Education and workforce technologies	Between 38 and 74
Healthcare technologies	Between 38 and 74
Clean energy and transportation	Between 2 and 3
Radar networks for weather and aircraft surveillance	Between 38 and 74
Interactive 3D video	Between 77 and 148

Source: Yanyan Zhuang and others, "Future internet bandwidth trends: an investigation on current and future disruptive technologies", Technical Report, No. TR-CSE-2013-04, Department of Computer Science and Engineering, Polytechnic School of Engineering, New York University, 2013.

- Most of the applications require bandwidth of between 38 and 74 Mbps, though some are less demanding, for example, those related to emergency preparedness and public safety or clean energy and transport. The most demanding activities involve the use of interactive 3D video, for example, in scientific or educational projects that require immersive environments and real-time updates.
- The throughput of fourth-generation (4G) technologies, which peaks at 100 to 300 megabits per second (Mbps), is sufficient for all uses except interactive 3D video. This poses a difficult challenge for the region, however, as just over 5% of connections were 4G in December 2015. Although 4G coverage is expected to expand by 85% per year until 2020, 3G connections will continue to predominate and a sizeable number of 2G connections will remain in operation. The other crucial technology for high-quality connectivity, fibre optics, is also incipient in the region: in 2014, only 3.5% of fixed connections were fibre-to-the-premises (FTTP).[5]
- The world is evolving from an Internet focused almost entirely on consumption to an Internet of consumption and production. Several strategies have been developed to pursue this goal: *Industrie 4.0* in Germany, *Industrial Internet* in the United States and *Made in China 2025* in China. In all three cases, the countries are trying to boost their manufacturing industries through digital technologies and advanced robotics by building on their existing capacity to produce hardware, software and global platforms. Ultimately, the aim is to develop cyberphysical production systems.
- These goals may seem a far cry from the realities of the vast majority of companies in the current production structure of Latin America and the Caribbean, but action taken towards achieving them will spur the competitiveness of firms, and therefore job creation, in the coming decades. The lessons learned from the slow uptake of technology in the past are unmistakeable: failing to join this digital revolution will constrain economic growth and social development.
- This message runs through the three chapters of this book. Chapter I presents the main features of the digital revolution, emphasizing that today's world economy is a digital economy. Chapter II examines the region's strengths and weaknesses with respect to digital access and consumption. Chapter III reviews the main policy debates and urges countries to take a more proactive approach towards, for example, regulation, network neutrality and combating cybercrime.
- The conclusion highlights two crucial elements: first, the need to take steps towards a single regional digital market that can compete in a world of global platforms by

[5] International Telecommunication Union (ITU), *World Telecommunications/ICT Indicators Database*, 2015.

tapping the benefits of economies of scale and developing network economies; and, second, the significance of the new stage of the Digital Agenda for Latin America and the Caribbean (eLAC2018), which will embody the latest updates to a cooperation strategy that has been in place for over a decade.

- It is always easy to dismiss visions of the future as unrealistic, but the digital revolution under way calls for actions that will help build a future with dramatically different patterns of consumption and production. The magnitude of the change was summed up perfectly by Brian Arthur in 2011: [6]

> "The second (digital) economy constitutes a neural layer for the physical economy... The second economy is not a small add-on to the physical economy. In two to three decades, it will surpass the physical economy in size… There's no upper limit to this, no place where it has to end… It would be easy to underestimate the degree to which this is going to make a difference."

[6] William Brian Arthur, "The Second Economy", *McKinsey Quarterly*, October 2011.

I. The new digital revolution

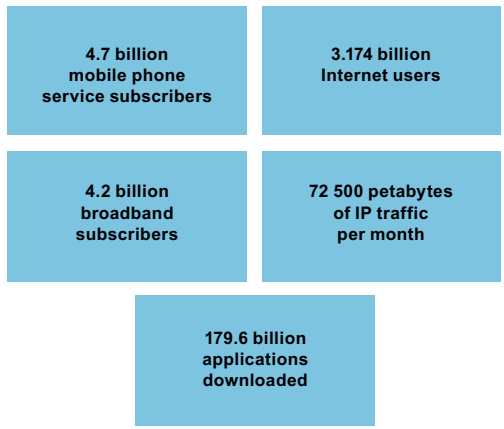
A. The digital economy

1. The world economy is a digital economy

- Flows of goods and services, financial assets, persons, information and communication have grown vigorously over the last few years as a result of economic growth, particularly in emerging countries, and the mass dissemination of digital technologies and the Internet. These technologies are platforms for communication; information; entertainment; trade; education, health and government services; and, more recently, complex production systems. The global economy is increasingly connected, and digitization has spread to such an extent that the world economy today is a digital economy.
- In 2014, it was estimated that 4.7 billion people around the world were individual subscribers to mobile phone services; 3.174 billion individuals, equivalent to 43.4% of the population, used the Internet; that there were over 4.2 billion fixed and mobile broadband subscriptions; Internet Protocol (IP) traffic amounted to 72,580 petabytes per month; and 179.6 billion applications had been downloaded, in other words about 25 per person.
- This broader diffusion of digital technologies fuelled a significant increase in the digital component of global flows between 2005 and 2013. The main effect of digitization has been its capacity to transform all economic flows by reducing transaction costs and marginal production and distribution costs. The impact is caused through three mechanisms: the creation of digital goods and services; the adding of value by incorporating digital features into goods and services that in principle are not digital; and the development of production, exchange and consumption platforms.

■ Diagram I.1 ■

The spread of digital technologies worldwide, 2015

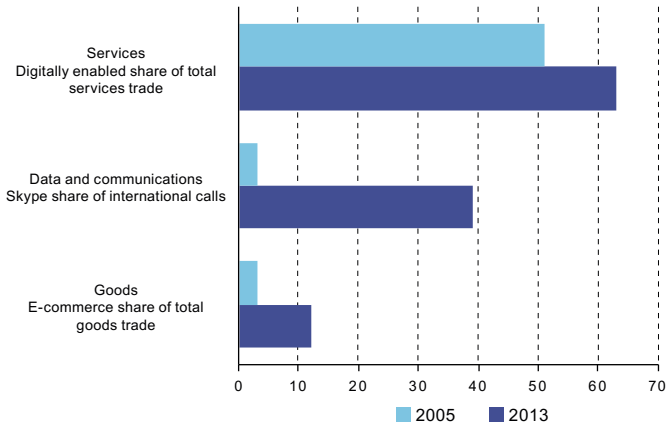


Source: International Telecommunications Union (ITU), *ICT Indicators Database,* 2016; GSMA, *The Mobile Economy 2015*, 2015; and Statista, The Statistical Portal.

■ Figure I.1 ■

Digital component share in global flows of goods, data, communications and services, 2005 and 2013

(Percentages)



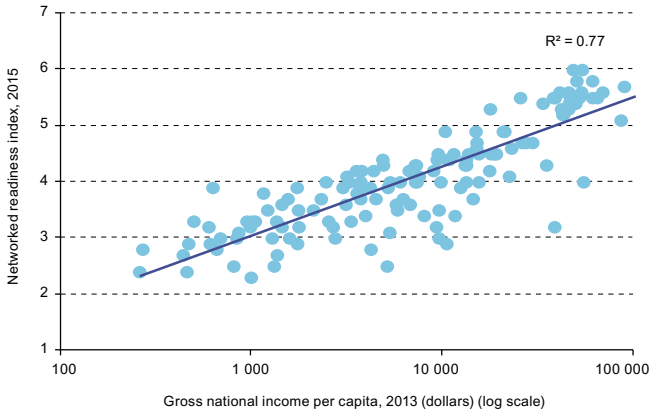
Source: McKinsey, *Global Flows in a Digital Age*, 2014.

2. Countries with more digital technologies: wealthier and closer to the technological frontier

- There is a clear positive correlation between a country's capacities to develop the digital economy, measured by the Networked Readiness Index of the World Economic Forum, and its per capita income. Naturally, the direction of causation cannot be determined with this information, but it does suggest that the countries with the greatest digital capacities are wealthier and that the wealthiest countries have developed those capacities most. The virtuous circle is evident.
- Moreover, there is also a strong positive association between a country's technological capacities, including its information and communications technology (ICT) capital stock, and its distance from the technological frontier. Figure I.3 shows a sample of 68 countries in 2013, which includes 12 from Latin America and the Caribbean. The y-axis represents a country's labour productivity in relation to that of the United States (a proxy variable for the distance, or productivity gap, that separates it from the technological frontier). The x-axis represents an index of the technological intensity of the production structure, which combines four indicators: high-technology share of total exports; research and development (R&D) expenditure as a percentage of GDP; number of patents per million inhabitants; and the percentage of Internet users in the population, which captures the dissemination of ICTs in the economy.
- This association is confirmed by correlating different indicators of the technological intensity of the production structure with relative productivity. If technological intensity indicators are measured both with ICTs and without them, the highest correlation indices are observed when they are included (0.849 compared with 0.726).

Figure I.2

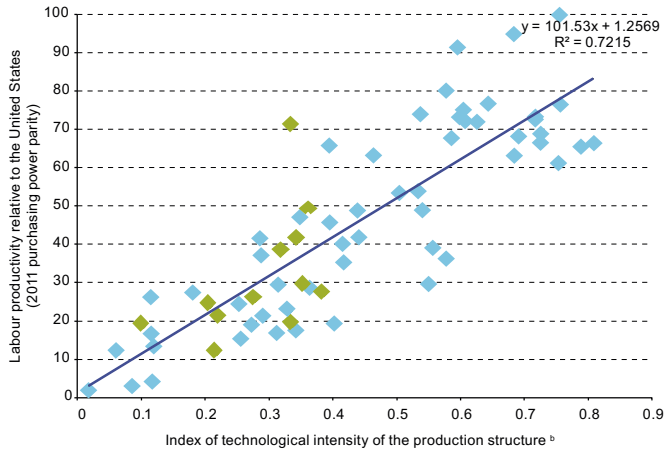
Digital technology capacities and per capita income



Source: World Economic Forum, *The Global Information Technology Report 2015. ICTs for inclusive growth*, 2015.

Figure I.3

Technological intensity of the production structure and relative productivity, 2013 [a]



Source: Economic Commission for Latin America and the Caribbean (ECLAC).
[a] Data for 68 countries; Latin American countries shown in green.
[b] Index = 0.125*patents+0.125*(I+D)+0.25*high-tech share of exports +0.5*ICTs.

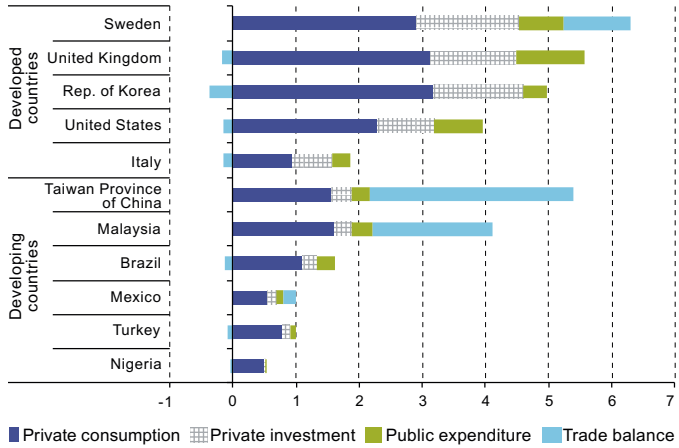
3. Private consumption is the Internet's economic impact channel

- Studies of the economic impact of digital technologies, particularly the Internet, have revealed their positive contribution to GDP growth, productivity and employment. Given the difficulty of measuring the value of intangible goods and services, and the extent to which these technologies permeate all activities, there is consensus that the available estimates understate the impact. Even so, there is evidence that, between 2005 and 2010, the Internet represented between 0.5% and 5.4% of GDP in developing countries, and between 1.7% and 6.3% of GDP in the more advanced economies, with an average contribution to GDP growth of 7% and 21%, respectively.
- The differences in the impact relate to the degree of maturity of the digital ecosystem in different countries, considering factors such as an adequate broadband network infrastructure, the dissemination and intensity of use of these technologies by individuals and firms, and their incorporation into production and organizational processes.
- Private consumption represents the largest part of the Internet's contribution to GDP. This share is proportionally greater in the emerging economies. Consumption related to the Internet, social networks, games, communications and e-commerce are the easiest activities for users to adopt. In the advanced economies, the Internet makes a larger contribution through its effects on private investment and public expenditure, owing to a higher rate of technological adoption by firms and governments.

Figure I.4

Composition of the Internet's contribution to GDP, 2005-2010

(Percentages)



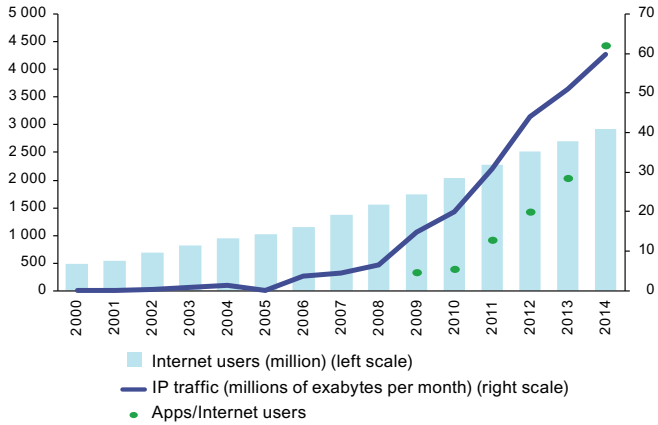
Source: McKinsey & Company, *Online and Upcoming: The Internet's Impact on Aspiring Countries*, 2012; and *Internet matters: The Net's sweeping impact on growth, jobs, and prosperity*, 2011.

4. The pattern of digital consumption is global

- Given the mass dissemination of digital technologies owing to the sustained increase in the number of Internet users, the deployment of broadband networks that facilitate the consumption of multimedia applications, and the greater use of tablets and smartphones, users receive a broader and more diversified supply of services and applications that respond to multiple information, communication, interaction and entertainment needs. Thus, with a smartphone adoption rate of 37% of the world population, which is expected to reach 60% in 2020, Internet activity is increasingly ubiquitous and intense.
- Over 1,700 applications are downloaded per second from the Internet, resulting in an average of about 60 applications per user in late 2014. In that same second, over 44,000 Google searches are made, and over 1,700 Skype calls; over 2 million e-mails are sent, over 300,000 IP messages are transmitted through WhatsApp, and there are over 8,500 tweets; more than 1,800 publications are made in Tumblr and 50,000 in Facebook, over 1,900 photos are uploaded and over 98,000 videos are watched on YouTube and 655 hours of video on Netflix.
- The growing demand for mobile digital applications and services, particularly video, shows a similar consumption pattern among individuals who have access to these technologies, in both developed and in less advanced countries. Generally, apart from the case of local interest items (news or commerce), users seek the same applications and service platforms, and spend similar lengths of time online. In North America and Europe, the average amount of time spent online is 28 hours per user per month, compared with 22 hours per month in Latin America.

Figure I.5

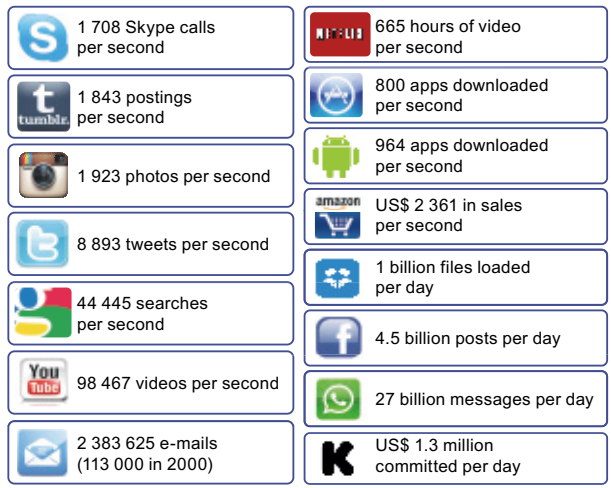
Global growth of IP traffic, number of Internet users and applications downloaded, 2000-2014



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunications Union (ITU), *ICT Indicators Database 2015*, and Cisco, *Cisco Visual Networking Index: Forecast and Methodology, 2014-2019*, 2015.

Diagram I.2

Applications use and activities on the Internet worldwide, 6 July 2015

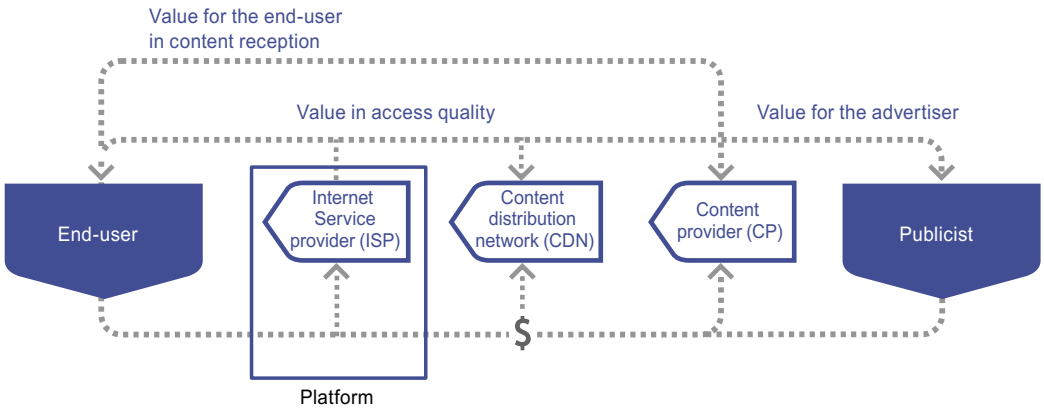


Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Internet Live Stats [online] http://www.internetlivestats.com/.

5. New two-sided markets

- Internet service providers (ISPs) give end users access to the web, making it possible to download and use contents, applications and services. Until recently, this was a single-sided market, with the providers looking mainly to users to sell their services and to upstream Internet access providers to purchase global access.
- As they expand, content distribution networks (CDNs), which act as intermediaries for content providers (CPs), request direct hosting in the final ISPs, that is, with those that have access to the users. So the ISPs start to operate in two-sided or multi-sided markets. These involve at least two groups of agents that interact through intermediaries, called platforms (in this case the ISPs), and operate so that the benefit for one group of joining a platform depends on the size of the other groups that have already joined it. Often firms or individuals that hire publicity (announcers or publicists) participate.
- The dynamic of multi-sided markets in the integrated telecommunications and content chain gives rise to the topic of network neutrality, with a consequent debate over the distribution of the value created in the chain, which is addressed in chapter III. As the economic surplus can be created or destroyed during the interaction of the different groups participating, the platforms must take account of the interaction between the demands of the different groups when they make pricing or investment decisions. Economic analyses by regulators that ignore the characteristics of multi-sided markets can lead to errors, such as deciding that the price is predatory when in fact it is not. Although operators can develop anti-competitive behaviours in a multi-sided market, extreme care must be taken when characterizing them as such.

Diagram I.3
Two-sided market model

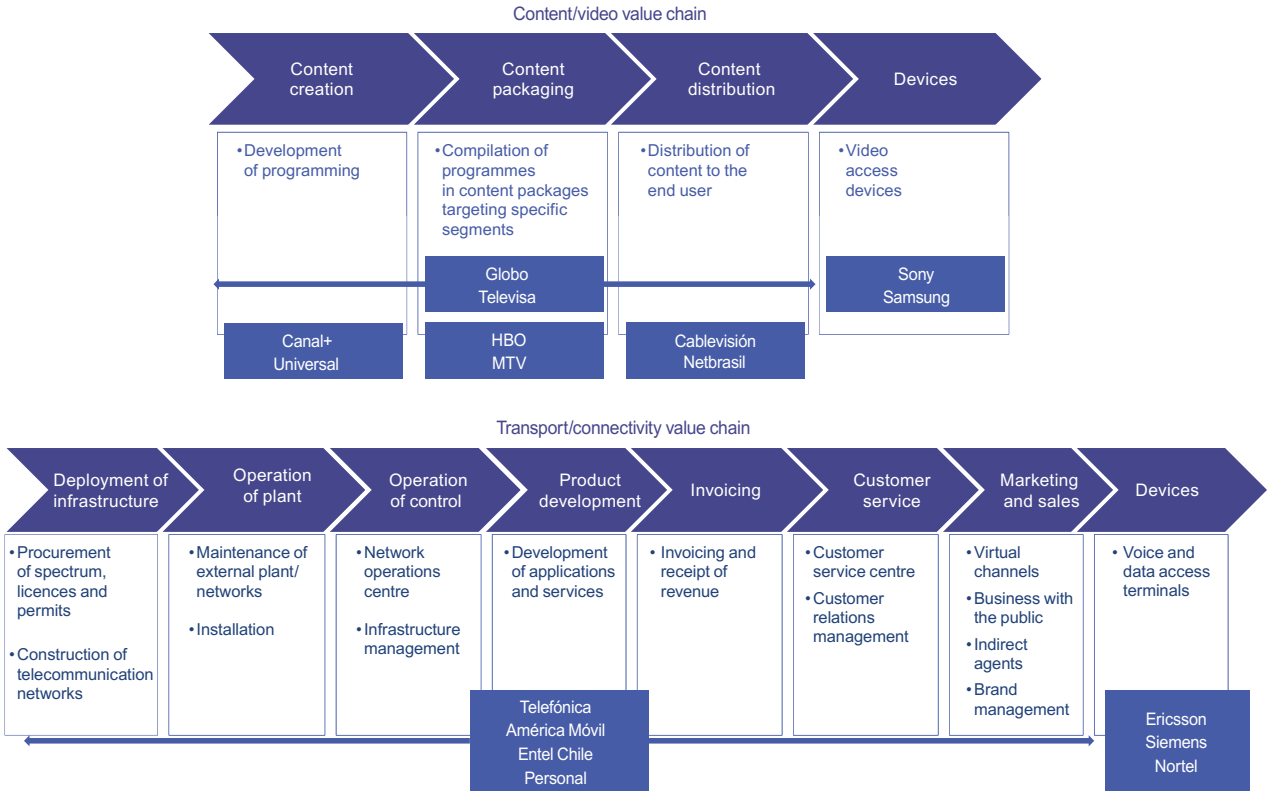


Source: Omar de León, "Desarrollo de la conectividad nacional y regional en América Latina", *Project Documents* (LC/W.502), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2012.

6. Transport and content chains converge in a new structure

- The digitization of content, the development of IP-based transport platforms, dissemination of broadband Internet and the availability of multifunctional devices, have not merely generated changes in the use patterns of telecommunication services, content, and information media; the combined effect of these technologies has transformed the industrial organization of these sectors by facilitating convergence between their value chains in an interdependent structure. This transformation not only changes the business of the existing firms, but also encourages the emergence of new firms that deploy intermediation functions, along with new business models in sectors adjacent to these industries.
- Originally, the industrial organization of the communications media, telecommunications and content sectors consisted of separate parallel value chains that operated independently and fulfilled specific functions (content generation and distribution, and connectivity). Although the participants in both chains recognized business opportunities in the adjacent chain, the technological platforms needed to enable these did not exist.
- The development of digital technologies allows for innovations and interrelationships between existing firms and new players, thereby turning the transport production chain into one of the links of a new integrated configuration: the digital content and services value chain.
- This gives rise to a new industrial organization in which the contribution of existing players changes and new links arise, such as developers of digital applications and services for other markets (purchase of airline tickets, taxi search, home swap, online banking and others); developers of communication applications (Skype, Whatsapp), search platforms (Google, Bing); and social networks (Facebook, Instagram, Twitter). The innovative dynamic in this chain originated outside the initial ecosystem, with the emergence of providers of Internet-enabled over-the-top (OTT) services.
- In this new chain, devices and Internet access terminals are media for connectivity with telecommunications infrastructure, which becomes the basis for aggregation platforms (search engines, social networks). Those reach users with new value proposals stemming from the developers of online applications and services and content providers. Thus, connectivity and transport become the platform that enables the interrelationship between other actors and the end user in a two-sided market.
- A later step, given the transformations that are unfolding with the development of smart solutions for industry, would be the configuration of the machine-to-machine (M2M) value chain, in which the connectivity platform would also play a central role.

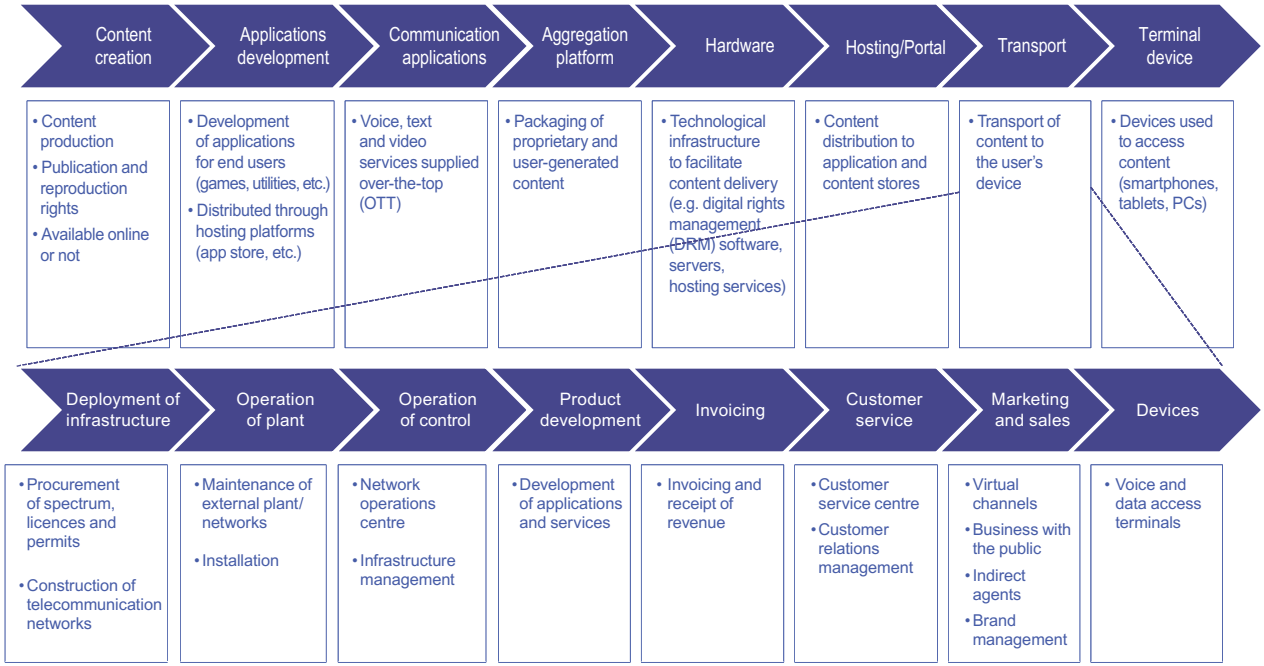
■ Diagram I.4 ■
Original value chains



Source: Telecom Advisory Services (TAS).

Diagram I.5

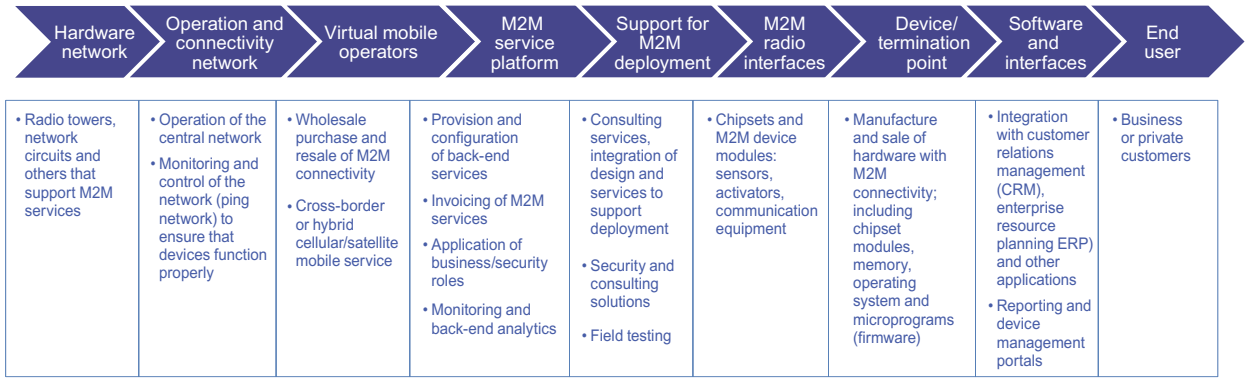
Digital content and services value chain



Source: Telecom Advisory Services (TAS).

Diagram I.6

Machine-to-machine (M2M) value chain



Source: Cartesian, *Accelerating Monetization of M2M/Connected Devices*, 2013.

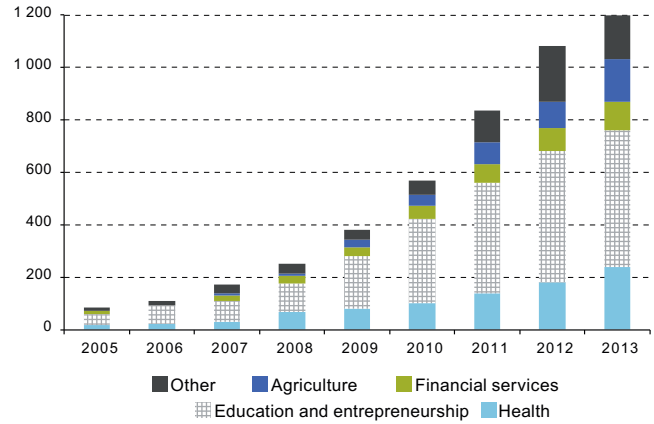
7. Beyond consumption: digitization permeates all economic activities

- As digital technologies become increasingly universal, innovations arise in applications and services in all economic sectors. Greater access to mobile phones and the migration to smartphones have driven the development of solutions on mobile platforms that aim to address social problems.
- Between 2005 and 2013, mobile services in the education, banking, health and agricultural sectors expanded significantly. Supply has focused on education, with solutions, often free, that improve formal and informal education through distance courses and access to multimedia educational material. In the health domain, digital services target remote monitoring of patients, and are particularly useful for reducing maternal and infant mortality and contagious diseases. In the agriculture sector, they make it possible to access information on the market, technologies and the weather, thereby enhancing competitiveness. Access to financial services is universalized through the use of mobile money, which is critically important in countries with low rates of access to banking services.
- The greatest change in the economy is seen in business models based on the connectivity of objects, or the Internet of Things (IoT). Connected domestic applications (household automation, security, electrical appliances and monitoring devices) account for almost half of all connections. Greater advances in health are envisaged, with applications for monitoring, medication dispensers and tele-medicine, and in manufacturing value chains with the development of next-generation M2M services.

■ Figure I.6 ■

Growth of services on mobile platforms by sector, 2005-2013

(Number of active services)

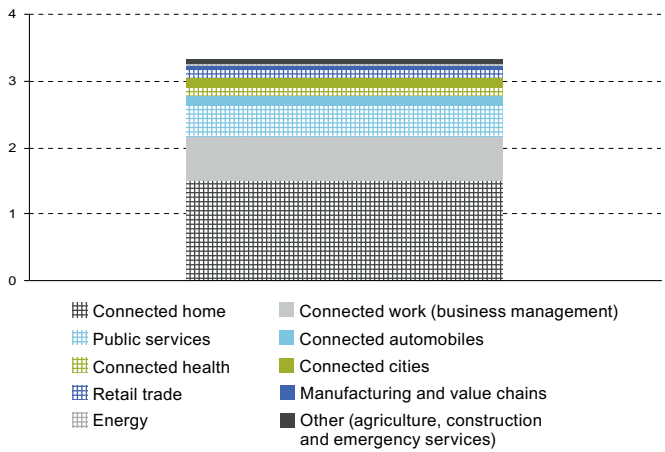


Source: GSMA, *Financing Innovation*, 2014.

■ Figure I.7 ■

M2M connections by sector, 2014

(Billions)



Source: Cisco, *Cisco Visual Networking Index: Forecast and Methodology, 2014-2019*, 2015.

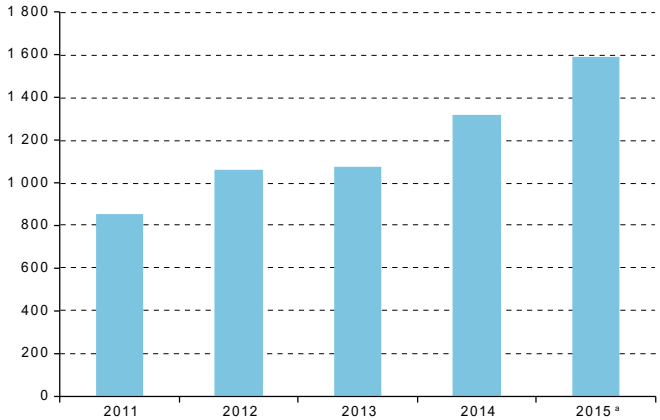
8. Online platforms facilitate commerce, including that of small and medium-sized enterprises (SMEs)

- In 2014, e-commerce sales surpassed US$ 1.3 trillion (almost 2% of global GDP). This growth was driven by a more intensive use of online advertising, dissemination in social networks, automation of data collection processes (which allows for price comparison), the adoption of smartphones by a growing proportion of the population, and a wider range of online platforms with global or national scope. Two countries account for the majority of global e-commerce: China and the United States, with 55% of the world's online retail sales and leading platforms such as Alibaba, e-Bay and Amazon.
- E-commerce platforms are transforming the flow of goods and services, by reducing search costs and standardizing prices worldwide. In addition, they not only favour business-to-consumer (B2C) commerce, but also business-to-business (B2B) and person-to-person (P2P) commerce, which allows small-scale entrepreneurs to enter international trade. For example, over 90% of e-Bay traders sell their products abroad, compared with less than 25% among traditional traders. Small-scale traders located in Chile have sold to 28 countries through that platform, whereas exporters that use traditional means sell to just three countries on average.
- Moreover, small and medium-sized enterprises (SMEs) that invest in digital technologies, such as websites, cloud computing and e-commerce solutions, report greater growth in income, employment and export and innovation capacity. In the less developed countries, better and more efficient transport and logistics systems would make it possible to exploit these advantages still further.

Figure I.8

Growth of e-commerce worldwide, 2011-2015

(Billions of dollars)

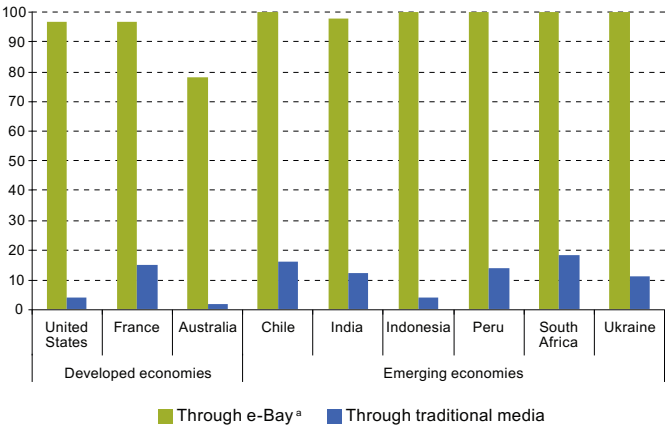


Source: e-Marketer, 2014.
[a] Estimate.

Figure I.9

Proportion of vendors with exports, by sales medium used, 2012

(Percentages)



Source: McKinsey, *Global Flows in a Digital Age*, 2014.
[a] Includes traders with sales of over US$10,000.

B. The technological revolution

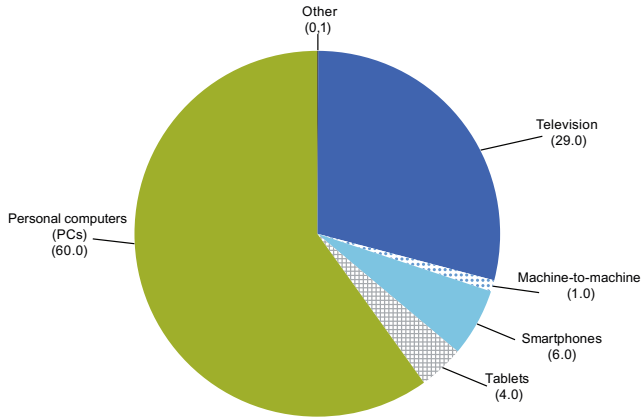
1. The new technologies: the Internet of Things and big data analytics

- Over the last two decades, a new digital revolution has been unfolding. The increase in the power and convergence of transmission, computing and storage capacities, and the extent to which digital technologies permeate the economy, are driving a transformational phase based on the Internet of Things and big data analytics.
- The commercial Internet of the 1990s and its expansion through narrow band meant radical changes in terms of communication and access to information, through e-mail applications and the proliferation of websites. Between 2005 and 2010, when broadband allowed for faster data transmission speeds, convergence between networks, devices and contents became a reality. The emergence of smartphones and tablets fostered the development of applications and solutions in the cloud that facilitated innovations in business models and service provision.
- Owing to the continuous development of high-speed access networks, ubiquity in access with multiple devices, cloud computing, the explosion of data generated by individuals, machines and objects, these technologies are expected to provide the platform of the global economy by 2020.
- Big data and real-time information are new sources of value creation. Big data analytics makes it possible to improve market segmentation by directing supplies and products and innovating in business and production models, while creating new products (combining mass production with personalization) and new business and government-service models. In addition to increasing transparency and efficiency, they allow for better and more timely analysis of the performance of each type of variable and to adjust structures and behaviours in real time.

Figure I.10

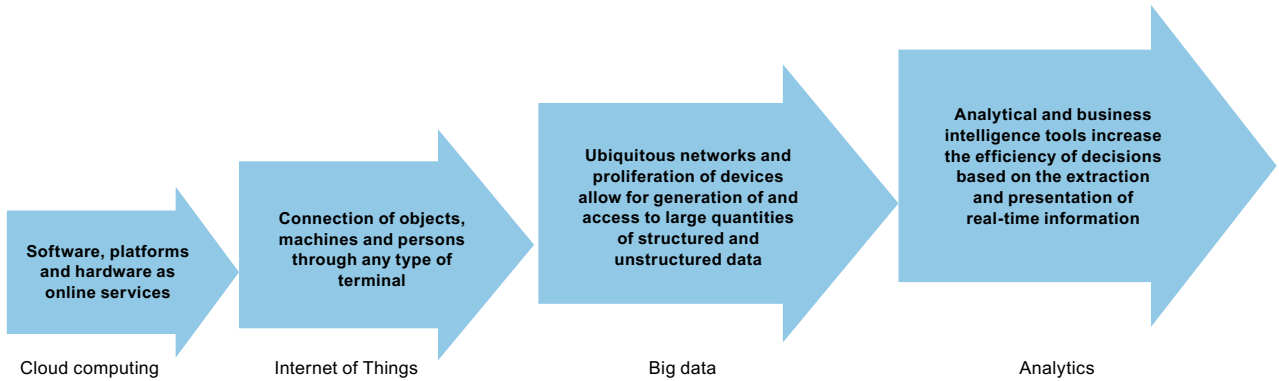
Internet Protocol (IP) traffic by access device, 2014

(Percentages)



Source: Cisco, *Cisco VNI Global IP Traffic Forecast, 2014-2019*, 2015.

■ Diagram I.7 ■
From cloud computing to big data analytics



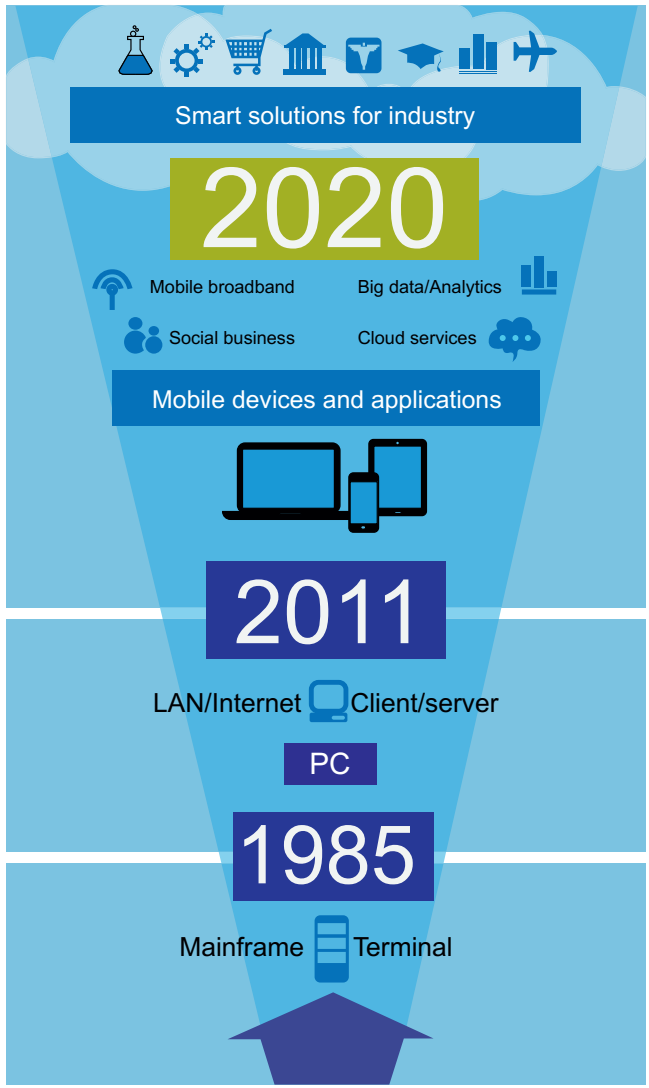
Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Frost & Sullivan's Global Digital Media Research, "Internet of Things, Big Data and Analytics 101" [online] http://es.slideshare.net/mukulkrishna/internet-of-things-and-big-data-101.

2. Towards a third digital platform

- When considered individually, mobile broadband, cloud computing services, big data analytics and social networks represent opportunities for innovation in services provision and business models. Nonetheless, it is their combined use that gives rise to disruptive innovations in the operation of businesses, by facilitating the development of smart solutions that can be applied in any economic sector, such as household automation, smart cities and networks, or the industrial Internet. They are used, not only in business, but also as a tool for innovation in the government domain, in terms of the provision of services and the availability of timely information for decision-making.
- Over the last few decades, digital technologies have developed on three successive growth platforms —each one defined by its technologies and the scale of its dissemination, along with the type of use that it enables. The first was developed with the emergence of information technology based on mainframe computers and terminal equipment. The second platform arose with the invention of personal computers and their dissemination in the 1980s. It was based on the client-server model and the use of local area networks (Ethernet, LAN) and later the Internet, relational database management systems and a new class of business applications. The third, whose development is ongoing, is based on the ubiquity and mobility of connectedness and allows for cloud services, the development of the Internet of Things and big data analytics.
- The first platform included millions of users with thousands of applications and solutions. The second reached hundreds of millions of users and tens of thousands of applications. The third already encompasses billions of users (3.6 billion Internet users) and new applications and solutions (over 1 million applications for iOS and Android).

■ Diagram I.8 ■

The third digital platform and the emergence of smart industry



Source: International Data Corporation (IDC), 2015 [online] http://www.idc.com/.

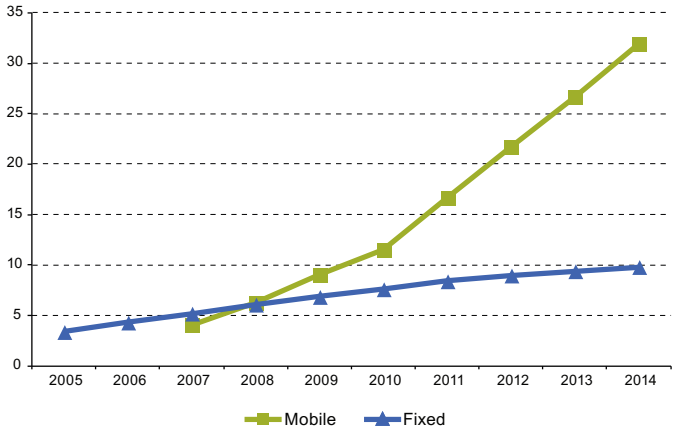
3. Enhanced connectivity and ubiquity through mobile technologies

- The deployment of mobile broadband networks has improved connectivity and made it possible for digital technologies to be used anywhere. Despite the fact that the global dissemination of these networks began only in 2007, in just over one year they had overtaken the penetration of fixed line broadband. Today, they are the main medium of broadband Internet access, reaching 32% of the population, compared with the fixed line connections, which cover only 10%.
- This broader dissemination of mobile technologies and access to networks, devices and applications eliminates constraints of time and place in the use of digital technologies, thereby radically changing daily life in the personal and work spheres. In addition, mobile technologies allow people to use their personal devices for work purposes, which increases the speed of work activities and changes work processes through the incorporation of social business tools. Worldwide in 2013, each user had on average two devices.
- Each generation of mobile technology increases connection speeds and facilitates the use of increasingly advanced applications in the cloud. Although just 43% of connections are currently made through third-generation (3G) and fourth-generation (4G) networks, the deployment of fifth-generation (5G) technology is already envisaged by 2020. It is expected that 5G networks will be able to cover the growing demand for ubiquitous and instantaneous access to applications, reducing response time (latency) to 1 millisecond (ms), whereas 4G networks have latencies of around 50 ms, an interval that rises to about 500 ms in 3G services.

Figure I.11

Global broadband penetration, 2005-2014

(Percentages of the population)

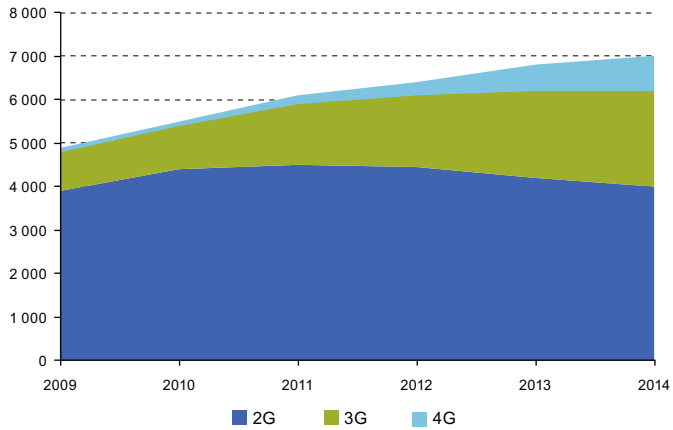


Source: International Telecommunications Union (ITU), *ICT Indicators Database 2015*.

Figure I.12

Mobile connections worldwide by technology, 2009-2014 [a]

(Millions of connections)



Source: GSMA, *The Mobile Economy 2015*, 2015.

[a] Does not include M2M connections.

4. Ultra-fast broadband with low latency

- The availability and analysis of data in real time are becoming vital elements of the economy to be used for decision-making and efficient resource allocation, driving substantial productivity improvements in all sectors.
- As economic sectors make increasing use of cloud services, and the number of connected devices, machines, objects and wearables increases, faster data transmission speeds and lower latency will be needed. Proof of this is the February 2015 decision taken by the United States Federal Communications Commission to define broadband as a network that provides download speeds of at least 25 megabits per second (Mbps) (previously 4 Mbps) and upload speeds of 3 Mbps (previously 1 Mbps). In 2014, 20% of worldwide connections achieved speeds of 10 Mbps, 48% exceeded this, and just 29% passed 25 Mbps, with clear differences in connection speeds across regions.
- The applications of the Internet of Things require instantaneous responses. In addition to using distributed network systems, these interactions require multiple systems that connect to many devices that use different types of communication protocols. In areas such as health, transport and manufacturing, delays in responses can have serious consequences, including putting people's lives at risk.
- Latency data for connections that involve points of Latin America show that there is still a long way to go to obtain an Internet with the quality needed to seriously consider mass e-health programmes and transport with automated vehicles. This situation is particularly difficult when communications use public Internet rather than specialized solutions.
- Although the distance between connection points is a decisive factor in latency, it is impossible to eliminate latency by closing the distance between data centres since the applications and data may be located anywhere the world. This makes it necessary to use batch-processing models and smart-yield tools combined with data intelligence and real-time optimization algorithms.

Table I.1

Broadband connections by speed, 2014

(Percentages)

Region	Over 10 Mbps	Over 25 Mbps	Over 100 Mbps
Asia-Pacific	46.0	26.0	3.0
Latin America	27.0	9.0	1.0
North America	58.0	33.0	2.0
Western Europe	51.0	28.0	4.0
Central and Eastern Europe	53.0	34.0	2.0
Middle East and Africa	16.0	6.0	0.3
World	48.0	29.0	3.0

Source: Cisco, *Cisco Visual Networking Index: Forecast and Methodology, 2014-2019*, 2015; and e-Marketer, 2014.

Table I.2

Network latency in selected links, 11 June 2015

(Milliseconds)

Link points	Through Akamai	Through public Internet
Mexico City-Santiago	181	417
Mexico City-New York	87	381
New York-Shanghai	221	346
Mexico City-São Paulo	193	334
São Paulo-New York	118	263
São Paulo-London	189	245
London-Mumbai	128	235
New York-London	76	118
New York-Los Angeles	66	117
London-Amsterdam	9	18

Source: Akamai, *Network Performance Comparison*, data as of 11 June 2015.

5. The mass uptake of cloud computing

- Business models based on cloud computing enable firms to reduce the costs of acquiring and maintaining hardware, implement pay-per-use pricing schemes, access technological solutions from any geographical point, and scale up new processes without major infrastructure costs.
- The fundamental principles of cloud computing are the separation of the user from the physical and technological characteristics of the hardware and infrastructure; the capacity to adjust rapidly as use and costs can be changed without contracts or penalties; the possibility for multi-tenancy whereby many firms can subscribe to the same computational capacities while maintaining their privacy and security, and payment based on the user's real-time consumption.
- The three main services provided through cloud computing are software as a service (SaaS), the platform as a service (PaaS) and the infrastructure as a service (IaaS), to which one could add the supply of business process outsourcing (BPO) services.
- The worldwide income from public cloud services, in other words those open to any subscriber, is expected to total over US$ 200 billion in 2016. Although Western Europe and North America are likely to be the regions generating most income in the next few years, Latin America, continental China and the Asia-Pacific region are expected to post the highest growth rates.
- The region's relative weight in public cloud services is about 5% of the world total, less than its share of global GDP. Nonetheless, at an estimated annual growth rate of 26.4%, those services are being adopted faster than in Western Europe. The dynamism expected in cloud computing in Latin America is confirmed by considering the regional distribution of the workload of data centres in the cloud. That variable is expected to rise from 700,000 workload units in 2011 to 7.2 million in 2016, representing a cumulative annual growth rate of 60%.

Table I.3

Estimated revenue from public cloud services by region, 2014 and 2016

Regions	2014	2016	Cumulative annual growth rate, 2011-2016
	(billions of dollars)		*(percentages)*
Latin America	4.7	7.6	26.4
Argentina	0.4	0.6	28.5
Brazil	2.7	4.4	25.0
Mexico	1.1	1.8	26.0
Other	0.5	0.8	26.0
Eastern Europe	0.7	1.1	22.2
Asia and the Pacific (emerging countries)	0.9	1.5	31.8
Eurasia	1.4	2.0	25.9
Continental China	7.1	11.2	30.0
Asia and the Pacific (developed countries)	14.0	17.5	14.3
North Africa and the Middle East	0.6	0.9	21.5
North America	89.8	125.4	19.1
Sub-Saharan Africa	0.3	0.5	19.6
Western Europe	34.1	42.5	11.8

Source: Gartner [online] http://www.gartner.com.

Table I.4

Estimated workloads of data centres in the cloud, 2014 and 2016

Regions	2014	2016	Cumulative growth rate, 2011-2016
	(millions of units)		*(percentages)*
Latin America	3.3	7.2	60
Asia and the Pacific	23.2	40.6	43
Central and Eastern Europe	2.5	5.0	50
Middle East and Africa	1.5	4.2	73
North America	21.0	29.7	30
Western Europe	16.2	25.4	39

Source: Cisco Systems.

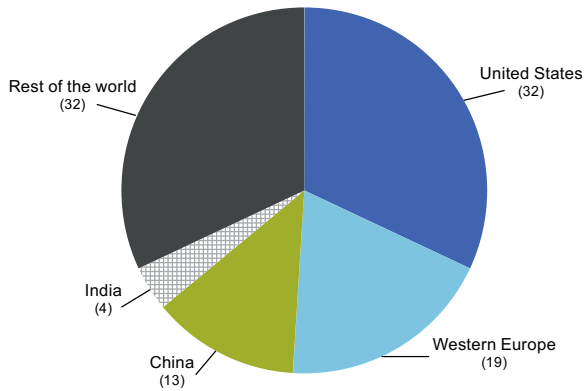
6. The data revolution

- Big data analytics means the processing and use of data sets with sizes that exceed the capacity of the software tools of typical databases used to capture, store, manage and analyse information. Big data originate in the rapid expansion of the quantity, speed and diversity of digital data generated in real-time as a result of the increasingly important role played by information technologies in daily activities (digital exhaust). Their management makes it possible to generate information and knowledge based on complete information in real time, this being understood as a time lapse in which the new information makes it possible to change decisions before they have become irreversible.
- Unlike traditional sources, in which data are collected for one or a few specific purposes, in the field of big data, the data used were generated for other purposes and are reused in ways that were not foreseen when they were generated. The concept of reuse is thus fundamental.
- The increase in the quantity of data and their unstructured nature are combined with a third characteristic: the fact that in their processing and use, the importance of correlations between events has been strengthened as a prediction tool, progressively replacing the scientific paradigm in which the first step in predicting the result of a process is to explain it. The exponential growth in the amount of data easily compensates for their messiness, and opens up alternatives for improving decision-making, overcoming the implicit constraints of the explanation of phenomena based on the preparation and solution of complex systems. In this sense, the major change stems from the shift away from using small and highly refined data samples to working with data for the whole of the universe in question, although their quality is inferior.
- Within this framework, in November 2015, the Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG), appointed by the United Nations Secretary General, published a report entitled *A world that counts: mobilizing the data revolution for sustainable development*. The report highlights the opportunities and challenges involved in the data revolution, and puts forward recommendations and proposals for actions to be undertaken in the near future with a view to overcoming obstacles and optimizing the positive impact of the reuse of data worldwide.
- One of its fundamental points is the development of global principles and standards, for which it is necessary to bring together and aggregate data from the public, private and civil society spheres. To that end, the United Nations is working to encourage stakeholders to create a global partnership on sustainable development data, to make the potential of big data a reality in this field.
- There is rightly a concern that mechanisms must be developed in order to ensure that the less advanced countries have access to big data, avoiding the emergence of a new digital divide. This is particularly important considering the small weight of developing regions in the total amount of data stored: the United States and Western Europe account for 51% of all data stored; a figure that rises to 64% if China is included.

Figure I.13

Cumulative data stock by location, 2012

(Percentages)



Source: Quartz. on the basis of International Data Corporation (IDC). McKinsey Global Institute and official sources in the United States.

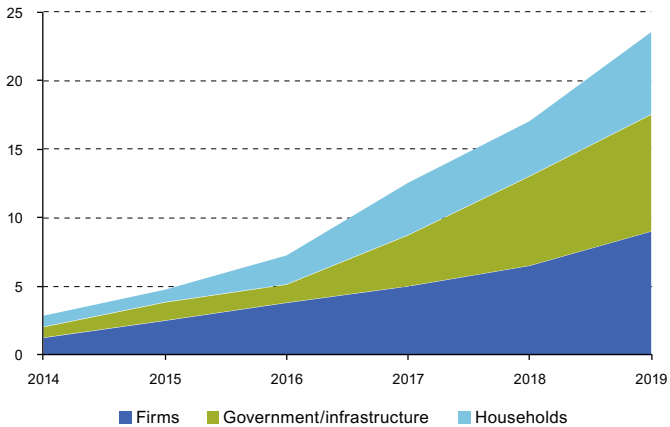
7. The Internet of Things: the third stage of network development

- The Internet of Things means the capacity for objects, machines and persons to interact remotely through the Internet in any place and at any time, thanks to the convergence of technologies. According to the International Telecommunication Union (ITU), this is a global infrastructure at the service of the information society, which provides advanced services through the interconnection (physical and virtual) of things, thanks to the inter-functioning of information and communications technologies (both existing and evolving).
- Its implementation will involve a third stage of network development, with major changes in its scope and content. In the first stage, in the 1990s, fixed Internet connected 1 billion people through personal computers (PCs). In the second stage, in the 2000s, mobile Internet connected over 2 billion users through smartphones, with numbers set to increase significantly in the next five years. In the third stage, the Internet of Things is expected to connect 28 billion objects to the Internet by 2020, ranging from wearables, such as smart watches, to automobiles, household appliances, and industrial machinery.
- Implementing the Internet of Things is having disruptive impacts in all sectors, and is generating profound changes in economic and social processes, particularly in job creation. The boundaries between industries and markets are rapidly changing, generally marked by a strong process of technological convergence. The greatest disruption is its impact in the physical world, which gives rise to products with embedded digital content, referred to by Michael Porter as "smart, connected products". Ultimately, the trend is a move from the digitization of services and changes in business models to changes in production models, in which the sectors most affected are manufacturing, transport and storage, information, commerce, health and finance. This is clearly reflected in the investments that are being made or that are expected to be made by different industries in this technology.

Figure I.14

Estimated number of Internet of Things devices by sector, 2014-2019

(Billions of dollars)

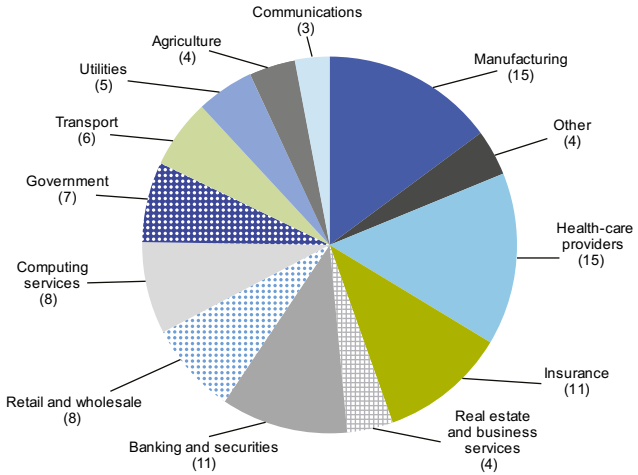


Source: BI Intelligence [online] https://intelligence.businessinsider.com/.

■ Figure I.15 ■

Share in value added of the Internet of Things by sector, 2020

(Percentages)

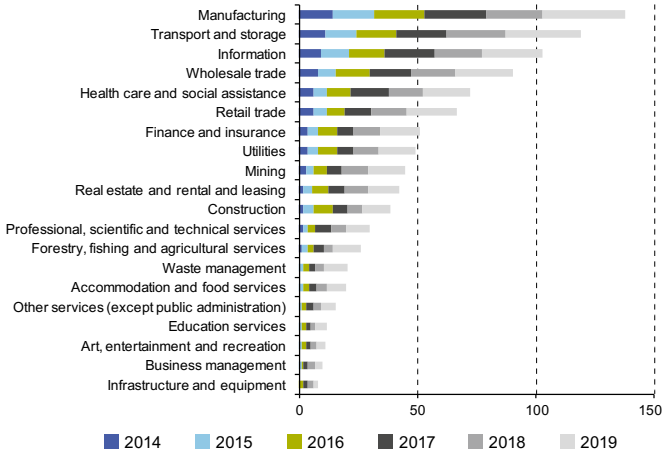


Source: Gartner, "Forecast: The Internet of Things, Worldwide, 2013", November 2013.

■ Figure I.16 ■

Investments in Internet of Things solutions, 2014-2019 [a]

(Billions of dollars)



Source: BI Intelligence [online] https://intelligence.businessinsider.com/.

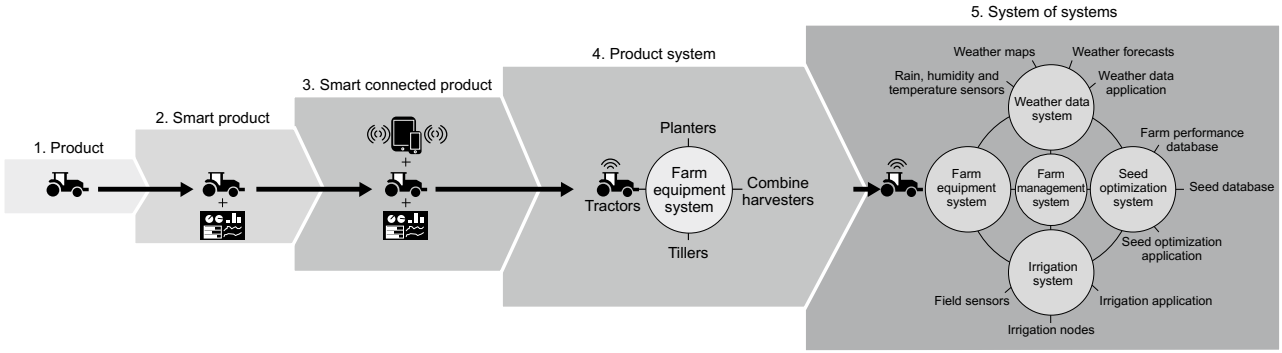
[a] Estimates.

8. The industrial Internet

- The connection of machines, parts and systems creates smart networks that can be mutually controlled autonomously. This radically changes the production process, generating new business models, value chains and forms of industrial organization.
- The new industry is based on cyberphysical systems (CPS) that monitor physical processes, create virtual models (copies) of the physical world, and take decentralized decisions on the basis of those models. Through the Internet of Things, cyberphysical systems communicate and collaborate with each other and with persons in real time. Meanwhile, through the Internet of Services, services are supplied internally and between organizations that are used by the participants of the value chain.
- This process of digitization and linkage of production units in an economy calls for a new quality of connectivity (high speed and low latency), which allows for decoupled, flexible and highly integrated production systems, with widespread use of robots, smart machines and software. Naturally this would increase efficiency and decentralization, although its effects on employment have yet to be determined, which has given rise to a major debate in the more advanced economies.
- The chief characteristics of the current industrial revolution are the shortening of periods for coming to market and greater flexibility and adaptability, based on more complex products, personalized mass production and shorter innovation cycles. In terms of industrial organization, the trend of change runs from structures for manufacturing isolated products, to smart products, to smart connected products, to product systems, and lastly to systems of systems.
- With the development of the industrial Internet, value creation stems from the generation and analysis of data flows that are originated in each link of the value chain and production activities. This innovation improves the supply of products and services, optimizes production processes, enriches customers' experience through after-sales services, and creates revenue sources from new business models based on data analytics. According to the World Economic Forum, firms use these new functionalities to increase their operational efficiency through predictive maintenance, which makes it possible to reduce repair times by 12%, lower maintenance costs by about 30% and eliminate nearly 70% of failures.
- As progress is made towards smart, connected products, software acquires a more important role in the production of physical goods. For that reason, the definition of interoperability standards is crucial for the development of the industrial Internet. As will be shown in chapter III, Germany, the United States and China have strongly promoted the development of the industrial Internet based on their competitive advantages, through policies known as *Industrie 4.0*, *Industrial Internet* and *Made in China 2025*, respectively.
- From this standpoint, a country's competitiveness and growth will depend largely on its integration into global digital infrastructure. This transition makes it necessary to develop the digital ecosystem, improve its infrastructure, human capital and the business environment, and to promote investment, innovation and entrepreneurship. Consideration must also be given to the definition of global standards, the regulation of data flows, intellectual property rights and security and privacy, which are being discussed intensively in the advanced countries and should be addressed with a regional vision.

■ Diagram I.9 ■

From products to systems of product systems



Source: Michael E. Porter and James E. Heppelmann. "How smart, connected products are transforming competition". *Harvard Business Review*, November 2014.

II. Digital consumption and access in Latin America and the Caribbean

A. Diffusion of Internet and broadband services

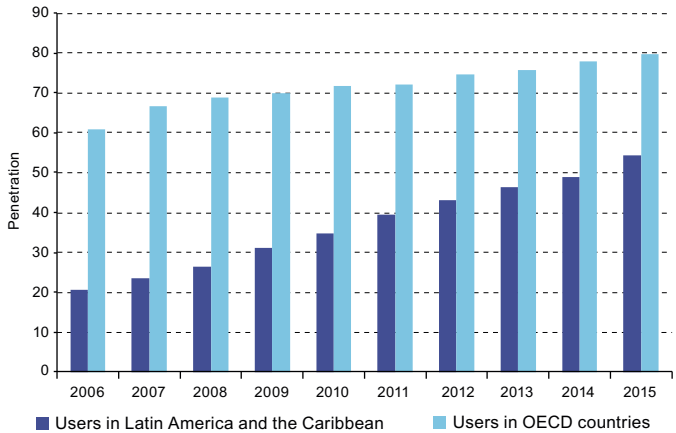
1. Internet penetration in Latin America and the Caribbean soared by 162% between 2006 and 2015

- Reflecting its global expansion, Internet penetration in Latin America and the Caribbean —measured as the percentage of the total population that are Internet users[1]— more than doubled from 20.7% to 54.4% between 2006 and 2015. However, the recent figure remained well below the 79.6% average posted by the countries of the Organization for Economic Cooperation and Development (OECD): a gap of 25.2 percentage points.
- The high percentage of the population that uses the Internet in OECD countries means that, even with low Internet penetration growth (a cumulative annual rate of 3.6%), they are moving towards universal use, while in Latin America, which has greater scope for growth since Internet users account for just over half of the population, the growth rate stood at 12.6%.

Figure II.1

Latin America and the Caribbean and Organization for Economic Cooperation and Development (OECD) countries: [a] Internet users, 2006-2015

(*Percentages of the total population*)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *World Telecommunications Indicators Database*, 2016.

[a] Data for 2016 for OECD countries do not include Chile or Mexico.

[1] The International Telecommunication Union (ITU) defines Internet users as those who use the Internet from any location or device during a given period.

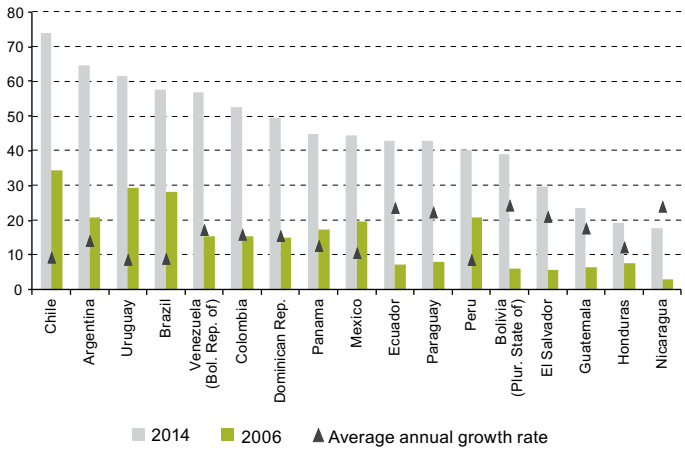
2. The spread of the Internet has been extremely uneven in the region

- As is the case with many other variables, Internet penetration has spread unevenly in Latin America and the Caribbean. The growth achieved between 2006 and 2014 by the furthest behind countries was insufficient to close existing gaps within the region. Both at the beginning and end of that period, Nicaragua had the fewest users per capita and Chile the most, despite Nicaragua having the second fastest average annual growth rate of the 17 countries studied, and Chile one of the slowest. The gap between these two countries, which stood at 31 percentage points in 2006, had widened to 56.5 percentage points by 2014.
- El Salvador, Guatemala and Nicaragua, despite relatively high growth in rates of Internet use, remained towards the bottom of the regional distribution. The gap between Nicaragua, Guatemala and Honduras and the highest ranked countries (Chile, Argentina and Uruguay) was about 47 percentage points. By contrast, growth in Ecuador and, in particular, the Bolivarian Republic of Venezuela, Colombia and the Plurinational State of Bolivia, was sufficient to significantly improve their position within the region.
- Notwithstanding this progress, in 2014 Internet users made up less than 30% of the population in four countries, less than 50% in a further seven, and more than 50% in just six countries.

Figure II.2

Latin America and the Caribbean (17 countries): Internet users, 2006 and 2014

(Percentages of the total population)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *World Telecommunications Indicators Database*, 2015.

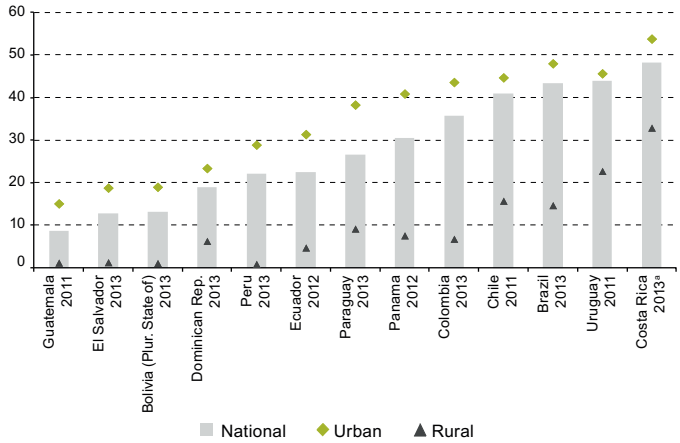
3. Rural areas are lagging behind in Internet penetration

- The countries with the highest percentage of Internet users do not always have the highest percentage of connected households. In several of the region's countries, and especially the least developed of them, Internet cafés, schools and public spaces are among the main alternatives for accessing the service. For example, the Plurinational State of Bolivia has a higher proportion of Internet users than connected households, while the reverse is true in Paraguay.
- Unlike in developed countries, where the mass uptake of the Internet is largely contingent on individual preferences or generational constraints, in Latin America and the Caribbean coverage among households is determined by the availability of infrastructure and other economic, social and demographic variables, such as housing location and income level.
- The access gap between urban and rural households with respect to the percentage of households with a fixed Internet connection was greater than 10 percentage points in all of the 13 countries included in figure II.3. The difference exceeded 30 percentage points in Brazil, Colombia and Panama, and 20 points in Chile, Costa Rica, Ecuador, Paraguay, Peru and Uruguay.
- Though rural households are at a disadvantage, the region's heterogeneity is such that the percentage of rural households with Internet access in Costa Rica and Uruguay is greater than that of urban households in El Salvador, Guatemala and the Plurinational State of Bolivia.

Figure II.3

Latin America (13 countries): households with Internet access by geographical area, 2011, 2012 or 2013

(Percentage of total households in each area)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Observatory for the Information Society in Latin America and the Caribbean (OSILAC), on the basis of household surveys conducted by the national statistical institutes of the relevant countries. For Brazil, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Panama, Paraguay, Peru and the Plurinational State of Bolivia: International Telecommunication Union (ITU), *World Telecommunications Indicators Database*, 2014.

[a] Data refer to dwellings rather than households.

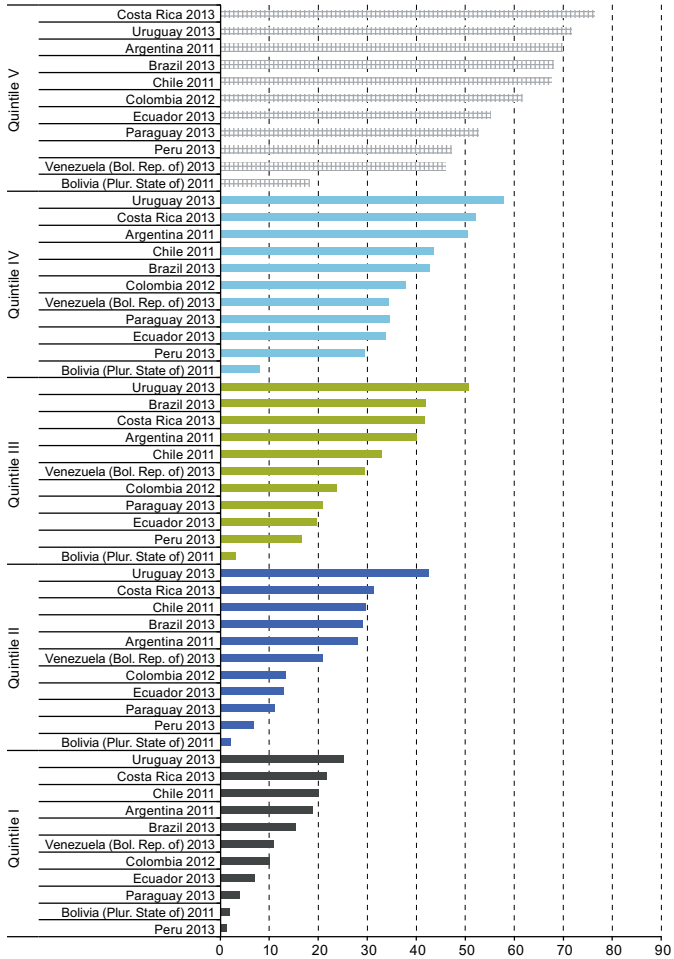
4. Internet access is highly unequal for richer and poorer households

- In Argentina, the Bolivarian Republic of Venezuela, Brazil, Colombia and Uruguay, in the latest year with information available (2011, 2012 or 2013), there were over five times as many connected households in the wealthiest quintile (quintile V) as in the poorest quintile (quintile I). In Ecuador and the Plurinational State of Bolivia, the ratio was greater than 14, and in Paraguay and Peru, greater than 50.
- The differences between countries become sharper as income levels rise. In the poorest income quintile, the gap between the top and bottom ranked countries was 23.9 percentage points, while in the wealthiest quintile it stood at 69.7 percentage points. In the Plurinational State of Bolivia, Internet penetration in the wealthiest quintile (18.1%) was lower than in the poorest quintile in Chile (20.1%).

Figure II.4

Latin America (11 countries): households with Internet access by income quintile, 2011, 2012 or 2013

(Percentages of total households in each quintile)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Observatory for the Information Society in Latin America and the Caribbean (OSILAC), on the basis of household surveys conducted by the national statistical institutes of the relevant countries, latest year for which data are available.

5. Inequality in Internet access is falling, but is far from being eliminated

- Inequality in Internet access, measured by the Gini coefficient,[2] diminished in four South American countries (Brazil, Colombia, Paraguay and Uruguay). Uruguay recorded the greatest improvement, while the coefficients of Colombia and Paraguay in 2013 fell sharply, but remained higher than those of Uruguay and Brazil in 2010 and 2011, respectively.
- These conclusions are illustrated below in Lorenz curves for each of the four countries, in which the x-axis represents the cumulative percentage of households, and the y-axis the cumulative percentage of households with Internet access.[3] The curve for Uruguay is notable for its closeness to perfect equality in Internet access.
- As regards the devices used, data for Chile in 2011 showed that households in the wealthiest quintile were 10 times as likely to have Internet access via smartphone as households in the two poorest quintiles. Similarly, the Gini coefficient for smartphone ownership in Ecuador was 0.58 in 2012, compared with just 0.04 for non-smart mobile telephones.

Table II.1

Latin America (selected countries): Gini coefficients, 2010 and 2013

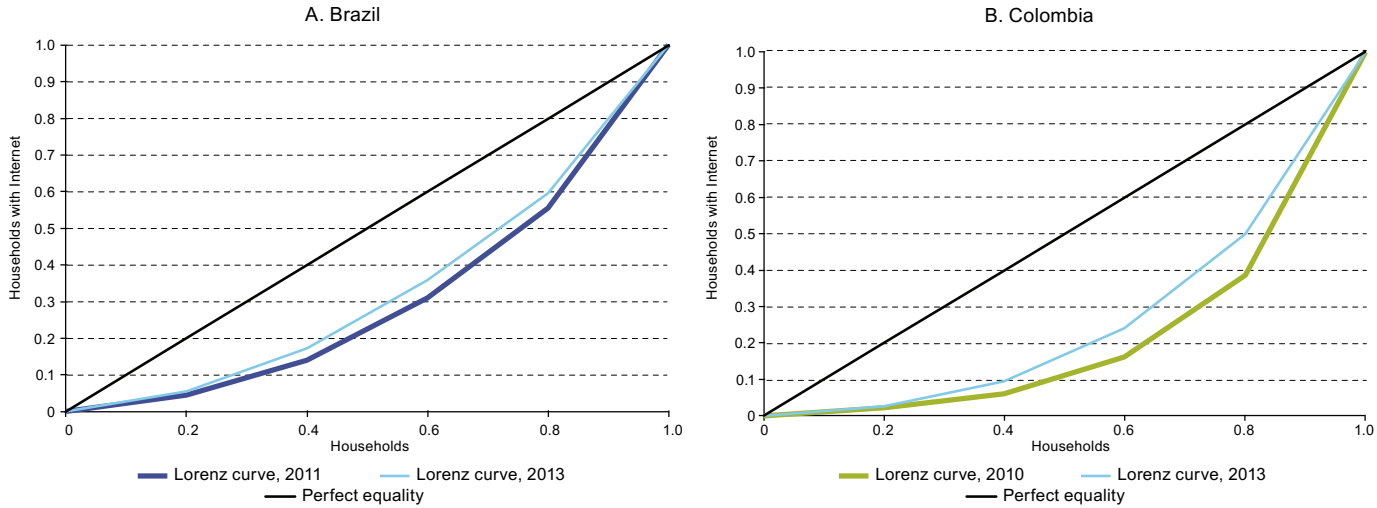
	2010	2013
Uruguay	0.39	0.13
Brazil	0.38 [a]	0.33
Paraguay	0.58	0.44
Colombia	0.55	0.46

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of household surveys conducted by the national statistical institutes of the relevant countries.
[a] Data from 2011.

Figure II.5

Latin America (selected countries): concentration of Internet access

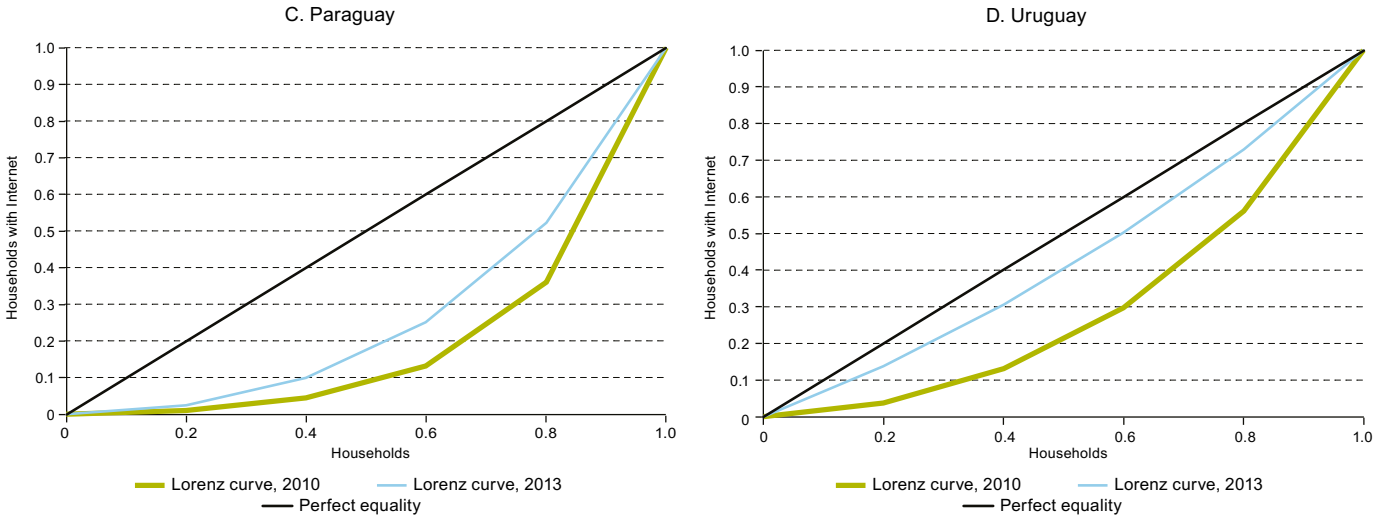
(Percentages)



[2] The Gini coefficient is a number between 0 and 1, where 0 expresses perfect equality and 1 perfect inequality.

[3] Each point on the Lorenz curve is read as a cumulative percentage of households. The curve begins at the origin (0, 0) and ends at the point (1, 1). If the distribution of Internet access was perfectly equitable, the curve would follow the 45-degree gradient that passes through the origin. In a case of perfect inequality (in other words, if only one household had Internet access), the curve would follow the horizontal axis to the point (1, 0) and then jump to the point (1, 1).

Figure II.5 (concluded)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of household surveys conducted by the national statistical institutes of the relevant countries, latest year for which data are available.

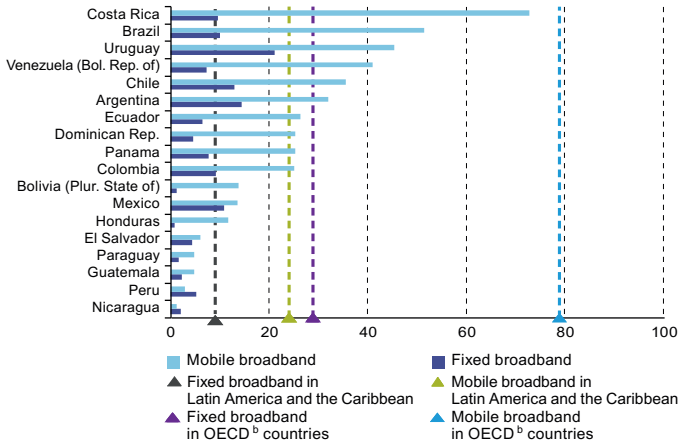
6. Mobile broadband is more widely used than fixed broadband

- Mobile broadband is more widespread in the region than fixed broadband, thanks to the diversity and affordability of mobile devices and the growing coverage of mobile networks.[4] In 2013, average mobile broadband penetration in OECD countries was 79%, while that of fixed broadband was 29%; in Latin America the figures were 30% and 9%, respectively.
- Mobile broadband had greater penetration than fixed broadband in 16 of the 18 countries represented in figure II.6. For the region as a whole, the growth rate for fixed broadband between 2006 and 2013 was 5%; that of mobile broadband was 22%. While the diffusion of fixed broadband was slightly greater than that of mobile broadband in Peru and Nicaragua, the average annual growth rates of mobile broadband subscriptions were higher than those of fixed broadband.
- The greatest difference between the countries was observed in mobile broadband. In Costa Rica, this technology has a high level of penetration, similar to the average of OECD countries and far higher than in the other countries of the region. Brazil, the second-ranking country in terms of mobile broadband penetration, lagged 21.3 percentage points behind Costa Rica, while Uruguay was in third place, 27.2 percentage points behind. Nicaragua had the lowest level of mobile broadband penetration among the countries studied, lagging Costa Rica by 71.5 percentage points. As regards fixed broadband, the differences between countries were smaller, with the gap between the countries with the highest and lowest penetration (Uruguay and Honduras) measuring only 20.2 percentage points.

Figure II.6

Latin America (18 countries): penetration of fixed and mobile broadband,[a] 2013

(Number of active subscriptions per 100 inhabitants)



Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of International Telecommunication Union (ITU), *World Telecommunications Indicators Database*, 2014.

[a] Mobile broadband refers to Internet connections via technologies such as USB modems, built-in SIM cards and mobile devices such as tablets and smartphones.

[b] Organization for Economic Cooperation and Development.

[4] For the purposes of this study, broadband refers to fixed connections with speeds faster than 256 kilobits per second (kbps) and mobile connections with 3G technology or better.

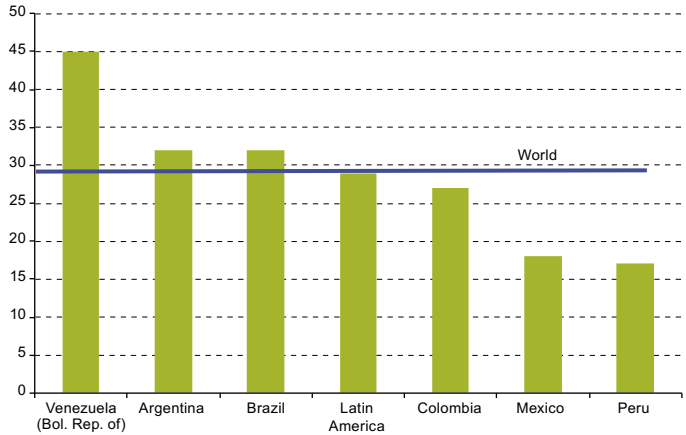
7. The use of smartphones for connecting to the Internet is increasing

- In 2014, 14.9% of users in Latin America utilized devices other than personal computers to access the Internet. In Argentina, the Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Mexico and Peru, mobile telephones were the main device used, followed by tablets and others (mainly games consoles). The trend is towards mobile telephones becoming the main platform for access, as the share of personal computers dropped from 92.8% to 85.1% between May 2013 and May 2014, while that of mobile telephones increased from 5.2% to 12%. In Argentina, Brazil, Chile and Mexico, Internet access from mobile devices surged by 100% or more during the same period.
- Latin America was the world's third fastest growing region in terms of the number of smartphone connections, with an annual growth rate of 77% between 2010 and 2013. Smartphones accounted for 200 million mobile connections in 2014, almost 30% of the regional total, a proportion broadly in keeping with the global average. Argentina, Brazil and, in particular, the Bolivarian Republic of Venezuela exceeded the regional average. It is estimated that Latin America will be the second fastest growing region by 2020, with more than 600 million smartphone connections, equivalent to more than two thirds of total connections.
- Brazil has the region's highest proportion of 3G connections (133 million in 2014), covering 92% of the population thanks to the rapid deployment of 3G networks and the buoyant rate of smartphone adoption (90 million units). The world's fifth largest smartphone market, Brazil is also a leader in 4G connections (of which there are 4.6 million). As of August 2014, 44 Long-Term Evolution (LTE) networks had been launched in 18 countries across the region.

Figure II.7

Latin America (6 countries): smartphone adoption, third quarter of 2014

(Percentages of total connections)



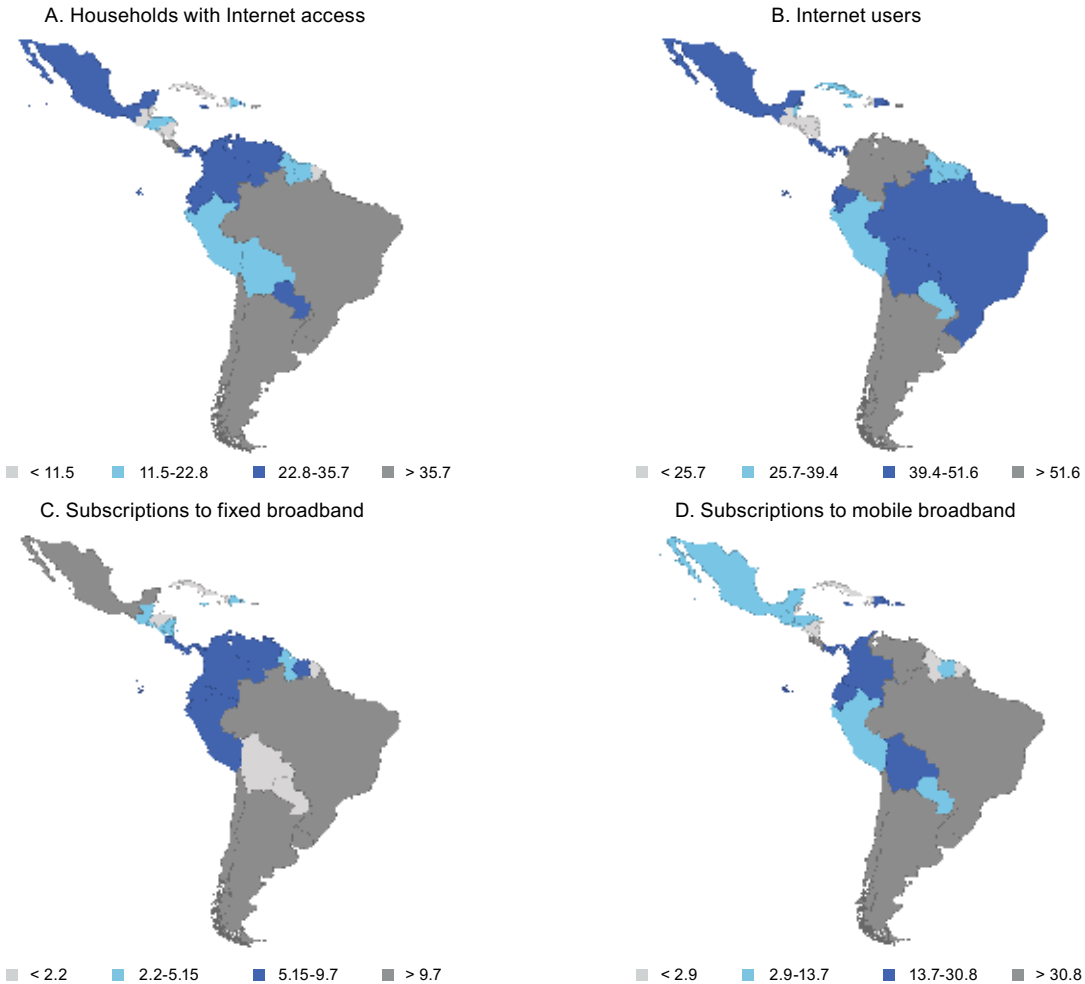
Source: GSMA Intelligence, *The Mobile Economy, Latin America 2014*.

8. Internet diffusion in Latin America and the Caribbean

- Map II.1 shows the percentage of households with Internet access, the percentage of Internet users, and the penetration of fixed and mobile broadband services. In each case, Latin American and Caribbean countries are categorized in four groups according to the performance of the respective variable.

Map II.1

Latin America and the Caribbean: households with Internet access, Internet users and fixed and mobile broadband subscriptions, 2013
(Percentages)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

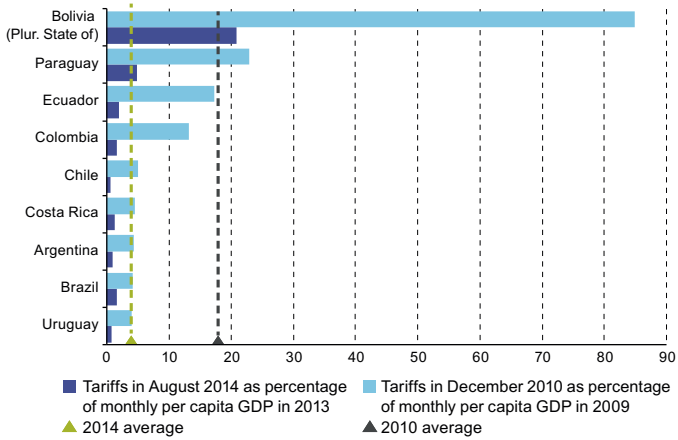
9. Fixed broadband access became more affordable between 2010 and 2014

- The affordability of fixed broadband is measured by the average cost of a 1 megabit per second (Mbps) package, and that of mobile broadband by the average price of a postpaid mobile Internet plan,[5] in both cases as a percentage of monthly per capita GDP. This indicator gives an approximation of the proportion of income required to pay for broadband access; the lower the proportion, the greater the affordability.
- Between 2010 and 2014, the affordability of fixed broadband improved significantly in the nine Latin American countries considered in figure II.8. The average proportion of income needed to pay for the service fell from 17.8% in 2010 to just 3.8% in 2014. The greatest strides were taken by the Plurinational State of Bolivia, where the figure fell from 84.8% to 20.9%. Ecuador, Colombia and Paraguay also made considerable progress, with the proportion of income falling on average by 15 percentage points.

Figure II.8

Latin America (9 countries): 1 Mbps fixed broadband tariffs, 2010 and 2014

(Percentages of monthly per capita GDP)



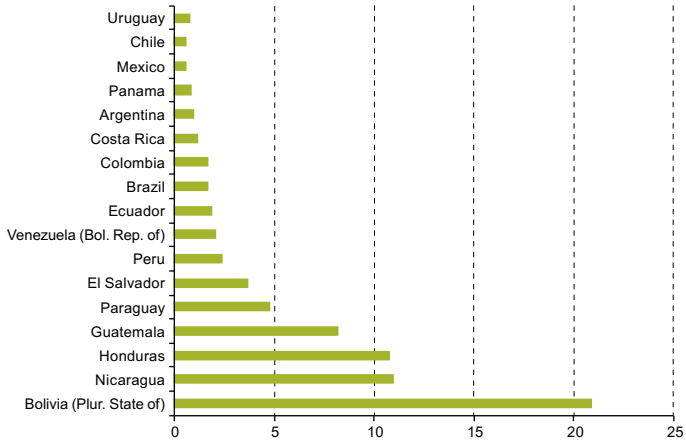
Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

- In advanced economies such as France, Japan and the United Kingdom, broadband services cost less than 0.1% of monthly income. By comparison, in Latin America the figure stood at below 1% in five countries; between 1.5% and 5% in eight countries, between 8% and 11% in three countries, and above 20% in one country (see figure II.9). In South America, broadband services were least affordable in the Plurinational State of Bolivia, where they amounted to a fifth of income, and Paraguay, where they equated to 5%.[6] This situation is related to the high transit cost of Internet traffic, in part because of the distance of these countries from undersea cables. Between 10% (in developed countries) and 30% (in developing countries) of the cost of broadband is comprised of transit costs required for interconnection between service providers.[7]

Figure II.9

Latin America (17 countries): 1 Mbps fixed broadband tariffs, August 2014 [a]

(Percentages of 2013 monthly per capita GDP)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

[5] Not including voice and data packages offered by mobile telephony service providers.

[6] Tariffs for 1 Mbps are calculated on the basis of 2 Mbps plans.

[7] Development Bank of Latin America-CAF, *Expansión de infraestructura regional para la interconexión de tráfico de Internet en América Latina*, Caracas, 2014.

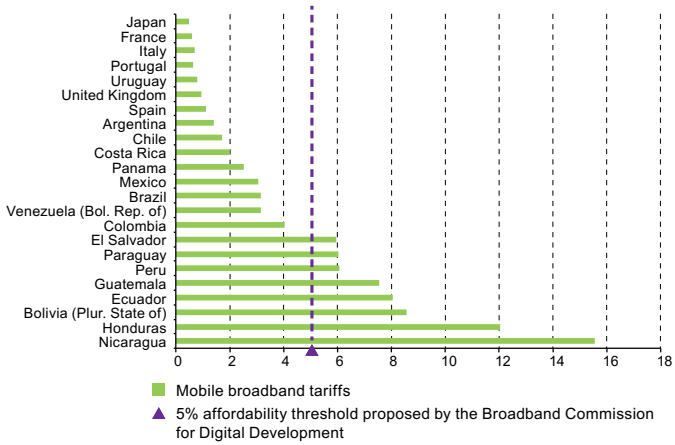
10. The cost of mobile broadband exceeds the 5% affordability threshold in eight of the region's countries

- The Broadband Commission for Digital Development has proposed an affordability threshold for mobile broadband equivalent to 5% of monthly per capita GDP.[8] In advanced countries, the percentage of income required to access a postpaid broadband service is in the order of 0.6%. In Latin America, the most affordable mobile broadband (costing less than 2% of income) is to be found in Argentina, Chile, Costa Rica and Uruguay. Figure II.10 shows that the cost of mobile broadband was between 1.5% and 5% of monthly per capita GDP in nine Latin American countries, between 6% and 8.5% in six countries, and above 10% in two countries. In South America, where the lowest tariffs (below 2%) were in the Southern Cone, broadband costs were equivalent to between 3% and 6% of monthly income in five countries, and about 8% in two countries.
- Latin America suffers less of an affordability gap, compared with advanced countries, in the case of fixed broadband. Fifteen percentage points separated Nicaragua, the country with the least affordable fixed broadband in the region (with tariffs equal to 15.5% of income) and Japan, the advanced country with the most affordable fixed broadband in the study group (0.5% of income).

Figure II.10

Latin America (17 countries) and developed countries (6 countries): postpaid mobile broadband tariffs, August 2014

(Percentages of 2013 monthly per capita GDP)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

[8] See [online] http://iif.un.org/content/broadband-commission-digital-development.

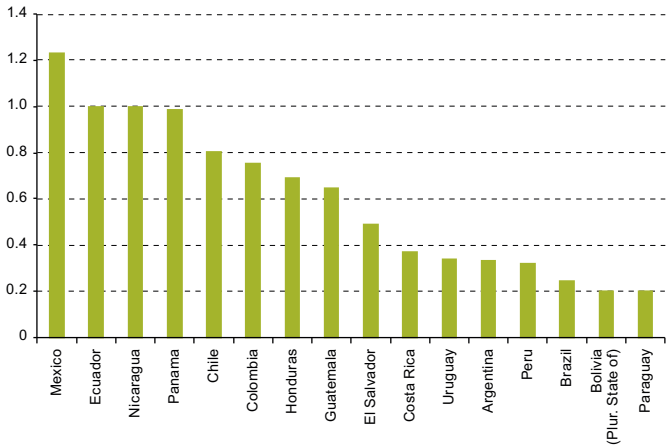
11. Prepaid services are more affordable

- As indicated above, if the 5% affordability threshold proposed by the Broadband Commission for Digital Development is taken as a benchmark, then postpaid mobile broadband services are not considered affordable in 8 out of the 17 Latin American countries studied.
- In terms of prepaid services, which have more users in the region, a large variety of data plans, packages and bundles are on offer, with different validity periods, limits and capacities, chiefly with the goal of reaching population groups that cannot afford a postpaid plan.
- Figures II.11 and II.12 show the cheapest market tariffs for prepaid data bundles (which generally have a one-day validity period) and for 30-day data bundles with a maximum capacity of approximately 1 gigabyte (GB), as of April 2015.
- It is striking that the ranking of several of the countries with the cheapest and most expensive postpaid services shifted significantly when it came to the affordability of prepaid services. For example, the Plurinational State of Bolivia was among the countries with the cheapest prepaid broadband, while Costa Rica and Mexico had the most expensive tariffs.

Figure II.11

Latin America (16 countries): minimum tariffs for prepaid mobile broadband data bundles (shortest possible validity period), April 2015

(Dollars)

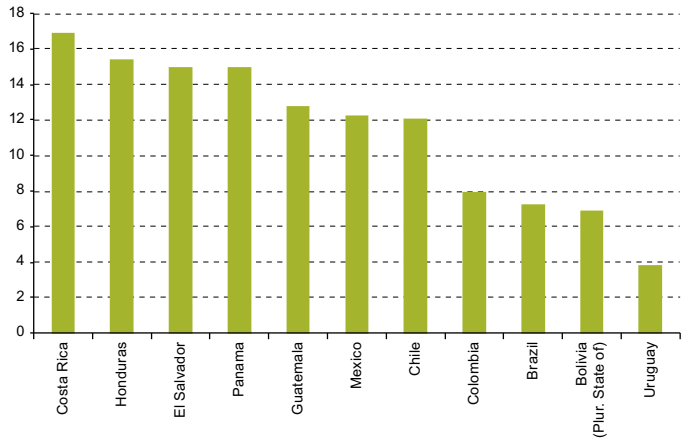


Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

Figure II.12

Latin America (11 countries): tariffs for prepaid mobile broadband data bundles with a 30-day validity period and data transfer capacity of approximately 1 gigabyte (GB), April 2015

(Dollars)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

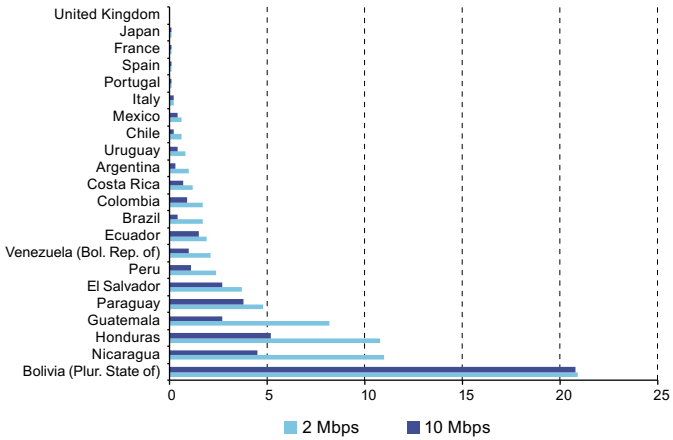
12. Plans that offer faster connection speeds are cheaper per megabit per second

- Figure II.13 compares the cost, relative to monthly per capita income, of 1 Mbps of download speed in mobile broadband plans offering speeds of 2 Mbps and 10 Mbps, respectively, in August 2014.[9] While 10 Mbps plans are naturally more expensive than 2 Mbps plans in all countries, the unit cost is cheaper in plans that offer faster connection speeds.
- The difference between 2 Mbps and 10 Mbps plans, in terms of the cost of 1 Mbps, varied from country to country: the largest differences were observed in Nicaragua (6.5 percentage points), Honduras (5.6 percentage points) and Guatemala (5.8 percentage points). In South America, the smallest difference was noted in the Plurinational State of Bolivia (0.05 percentage points).
- The lower unit cost of plans offering faster speeds does not mean that accessibility increases, since the decisive factor is ultimately the total price that must be paid to subscribe to a plan. Moreover, areas that are geographically isolated or have fewer resources may be subject to infrastructure constraints that prevent access to high-speed plans.

Figure II.13

Fixed broadband tariffs: cost of 1 Mbps in 2 Mbps and 10 Mbps packages, August 2014

(Percentages of 2013 monthly per capita GDP)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

[9] Two Mbps is considered the minimum download speed for adequate access to over-the-top (OTT) content offered by operators.

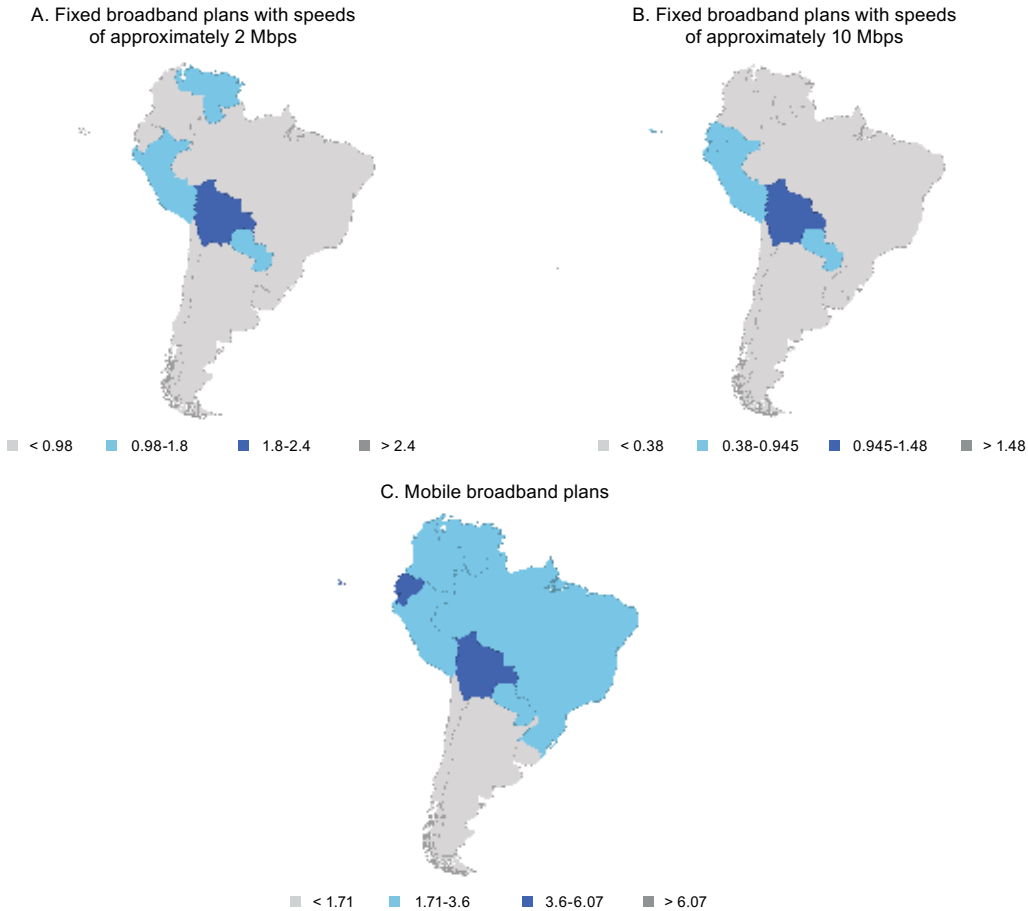
13. Fixed and mobile broadband tariffs in South America

- The following maps show tariffs per 1 Mbps of download speed in 2 Mbps and 10 Mbps fixed broadband plans in South American countries, as well as those for mobile broadband plans. Countries fell into three groups according to the value of the respective variable. Argentina, Chile and Uruguay had notably lower costs across all variables.

Map II.2

South America: tariffs per 1 Mbps of download speed in 2 Mbps and 10 Mbps fixed broadband packages, and in mobile broadband plans, August 2014

(Percentages of 2013 monthly per capita GDP)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA).

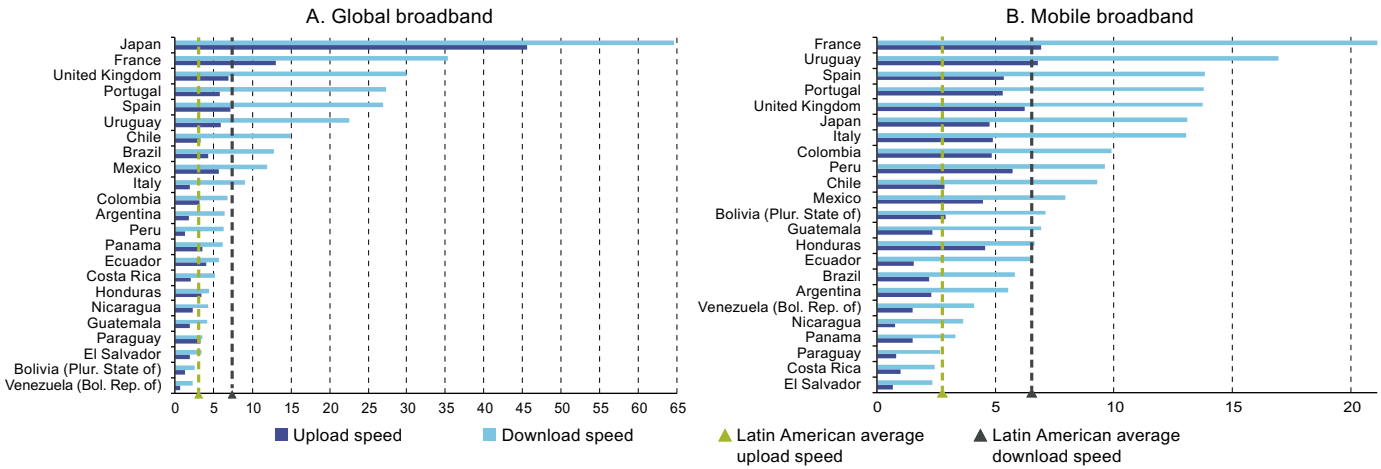
14. Upload and download speeds as indicators of service quality

- The most commonly used benchmark for measuring service quality is connection speed, in respect of both uploads and downloads. The other important variable, latency (or delay), understood as the time it takes for a package of information to reach its destination and return, is used less owing to the difficulty of accessing data on this indicator.
- The average global broadband[10] download speed is 7.3 Mbps for Latin America and 32.2 Mbps for advanced economies. Only four countries —Brazil, Chile, Mexico and Uruguay— outperformed the regional average. In 2012, Chile ranked first in Latin America, with an average download speed of 8 Mbps, though in late 2014 Uruguay took the top position with 22.6 Mbps (similar to Portugal, Spain and the United Kingdom). Aside from Uruguay, the fastest download speeds were found in Brazil and Chile, and the slowest in the Bolivarian Republic of Venezuela, Paraguay and the Plurinational State of Bolivia.
- As expected, download speeds were much (approximately 2.5 times) faster than upload speeds, both in Latin American and advanced countries. The average upload speed is 2.9 Mbps for Latin America and 13.4 Mbps for advanced countries. Uruguay (5.9 Mbps) leads the region, followed by Mexico (5.7 Mbps) and Brazil (4.2 Mbps). Argentina, Peru and the Plurinational State of Bolivia had the slowest upload speeds, which in Argentina's case contrasted with its mid-ranking position in mobile broadband and global broadband download speeds.
- In mobile broadband, Uruguay again ranked highest for both upload and download speeds, with its download speed of 16.96 Mbps outperforming the average of advanced economies (14.8 Mbps), followed by Colombia (9.9 Mbps) and Peru (9.6 Mbps). Uruguay (6.8 Mbps) and Peru (5.7 Mbps) both achieved upload speeds surpassing the advanced-country average of 5.6 Mbps; Colombia ranked third with 4.8 Mbps. Colombia, Peru and the Plurinational State of Bolivia (whose global broadband speeds were unremarkable) managed to secure good rankings in the mobile broadband category. By contrast, Brazil ranked much lower in mobile broadband than in global broadband.

■ Figure II.14 ■

Actual global broadband and mobile broadband connection speeds, 31 December 2014

(Megabits per second)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of figures provided by Ookla.

[10] Data on connection speeds are from Ookla (see [online] http://www.netindex.com/), in the global broadband and mobile broadband categories.

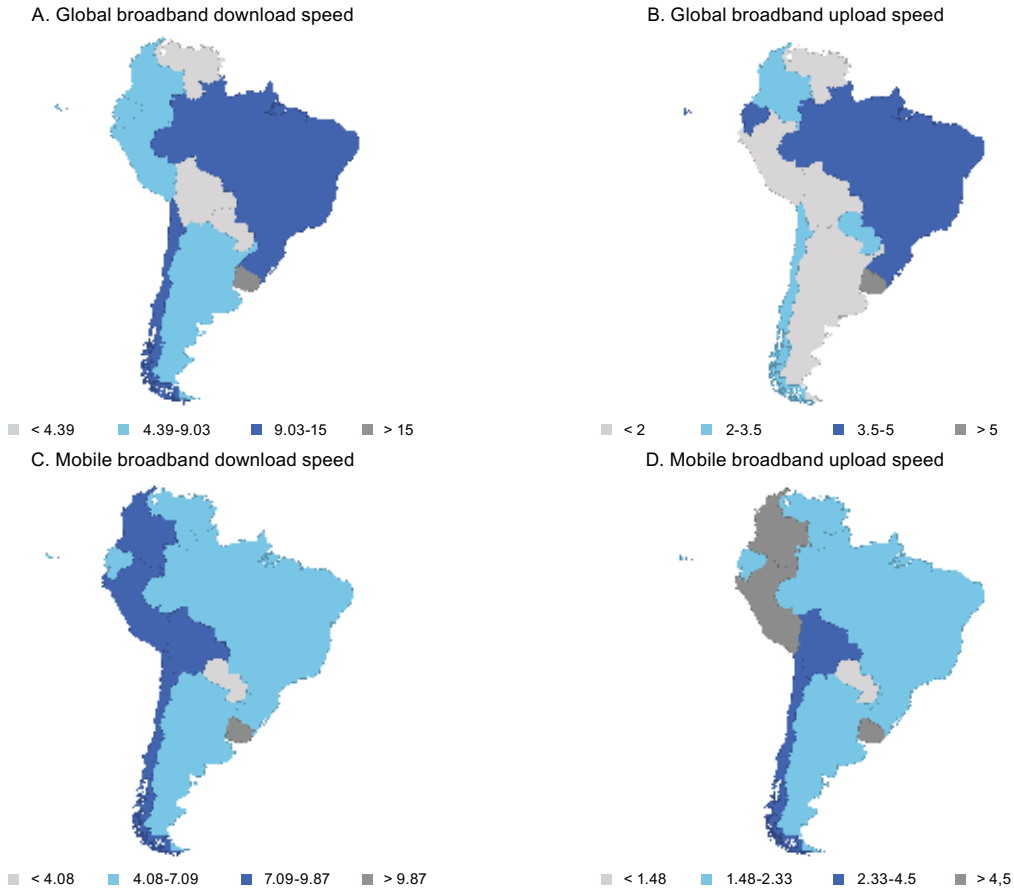
15. Upload and download speeds for global and mobile broadband in South America

- Map II.3 shows upload and download speeds, for both global broadband and mobile broadband,[11] in South American countries. Countries are classed in four groups according to the performance of each variable. Uruguay performs strongly in all four cases, accompanied by Colombia and Peru in respect of mobile broadband upload speed.

Map II.3

South America: upload and download speeds for global broadband and mobile broadband, 31 December 2014

(Megabits per second)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of figures provided by Ookla.

[11] Data on connection speeds are from Ookla (see [online] http://www.netindex.com/), in the global broadband and mobile broadband categories.

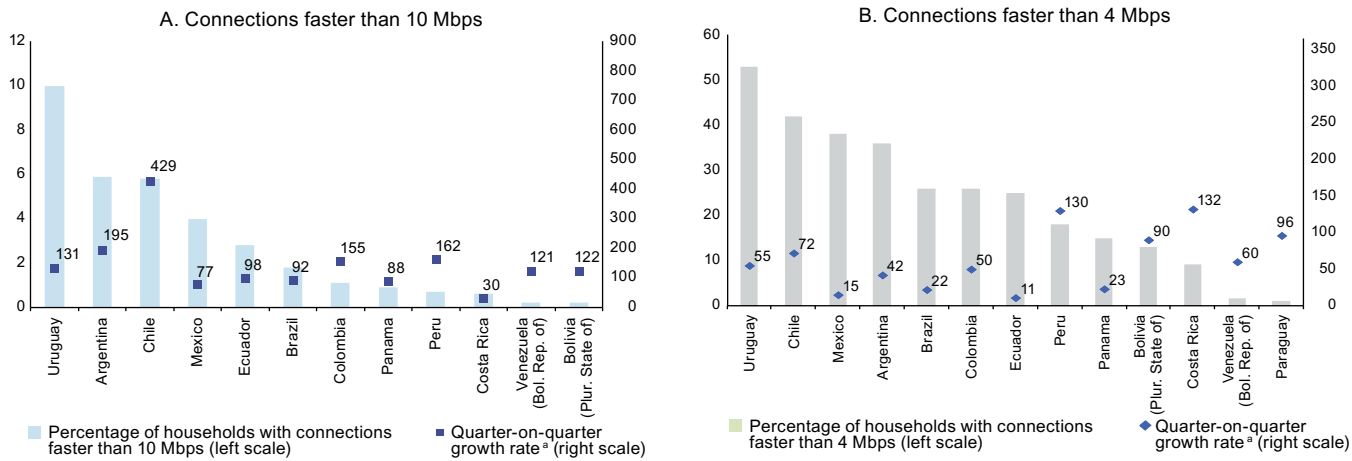
16. Faster connections are seeing more vigorous growth

- Figure II.15 shows the percentage and quarterly growth rate in the number of households with connection speeds faster than 4 Mbps and 10 Mbps, respectively.[12] The number of connections faster than 4 Mbps posted robust growth of about 50%, rising as high as 132% in Costa Rica, but this average rate was eclipsed by the expansion of 10 Mbps connections (with average quarterly growth of about 120%, peaking at 429% in Chile). The percentage of connections faster than 4 Mbps rose fastest in Costa Rica, Paraguay and Peru, which were also the countries with the smallest percentage of subscribers at that speed. Chile and Argentina had the highest growth in connections faster than 10 Mbps (429% and 195%, respectively) and were the second- and third-placed countries in terms of the percentage of subscribers (5.8% and 5.9%, respectively); Peru ranked third with growth of 162%.

Figure II.15

Latin America (selected countries): broadband connections by speed, 2013

(Percentages)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Regional Broadband Observatory (ORBA), on the basis of *Akamai's State of the Internet, 2014 Report*.
[a] Growth rate in the second quarter, compared with the preceding quarter.

[12] Growth rates refer to the second quarter of 2013, compared with the preceding quarter.

B. Digital consumption

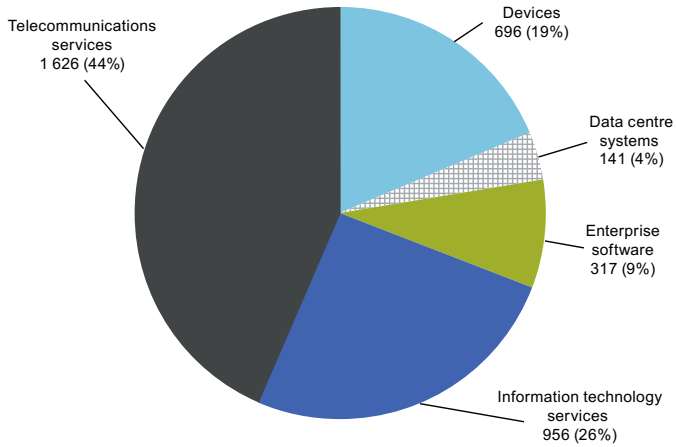
1. Latin America's spending on digital goods and services is 20% that of the United States and 60% that of China

- In 2014, worldwide spending on information and communications technologies (ICTs), in other words, digital technologies, stood at US$ 3.7 trillion. Of this figure, almost half was allocated to telecommunications services and a little more than a quarter to information technology services. Devices, data centres and software made up almost one third of the total.
- A different source maintains than Latin America spent some US$ 133 billion on information technology, 63% of which went on hardware and the remainder on software (16%) and information technology services (21%). This pattern is similar to that found in the BRIC countries (Brazil, Russian Federation, India and China) and contrasts with advanced economies such as the United States, in which most spending is earmarked for software and services since there is already an existing stock of hardware.
- Using disaggregated data for Brazil, India and the Russian Federation as a reference, it has been estimated that China spent approximately US$ 230 billion on these technologies, in other words 70% more than Latin America. Meanwhile, the region's spending on digital technologies was equivalent to less than 20% of such spending by the United States.

■ Figure II.16 ■

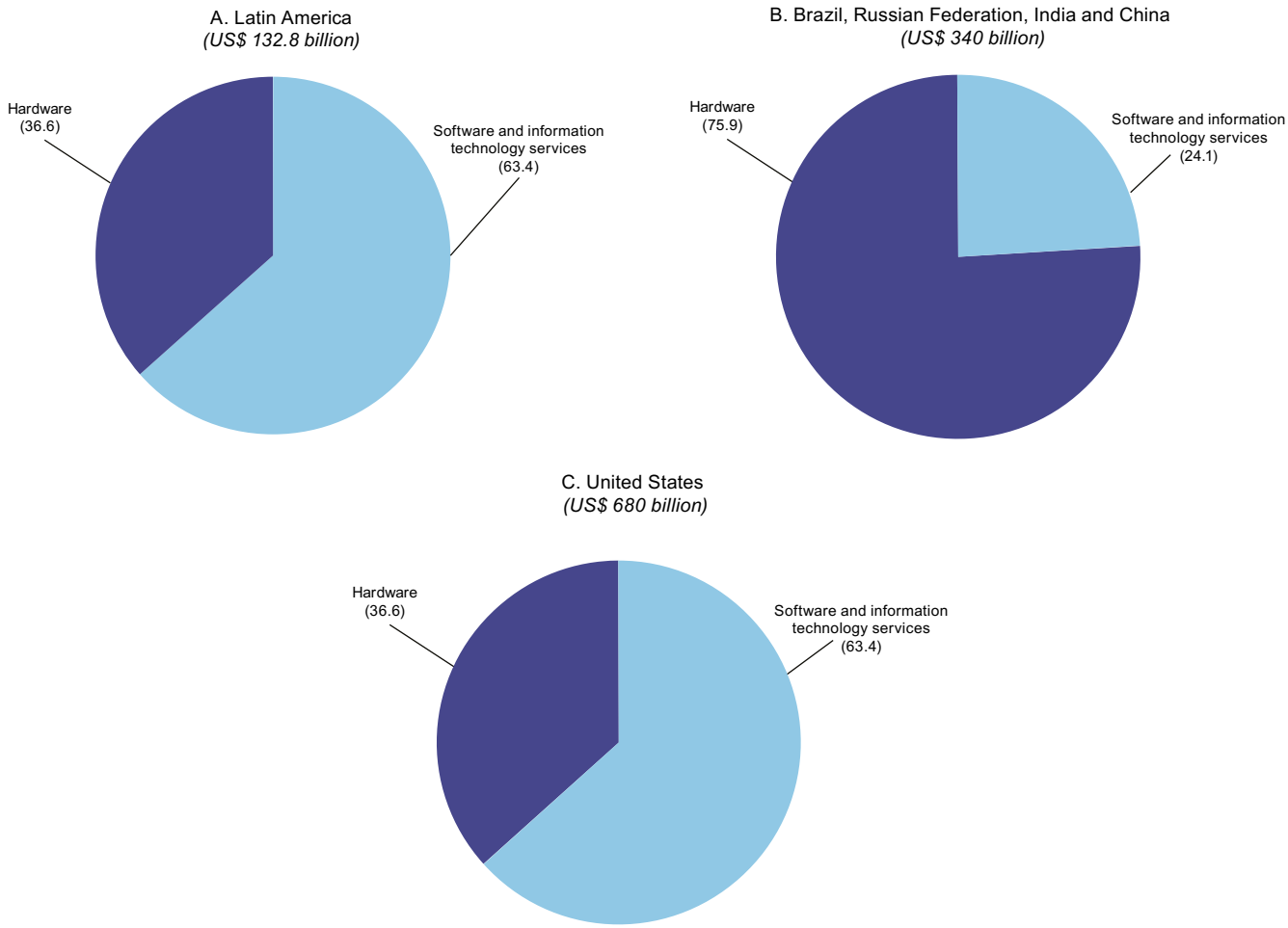
Global spending on information and communications technologies, 2014

(Billions of dollars and percentages)



Source: Gartner, January 2015, [online] http://www.gartner.com/newsroom/id/2959717.

■ Figure II.17 ■
Spending on information technologies by region, 2014
(Percentages)



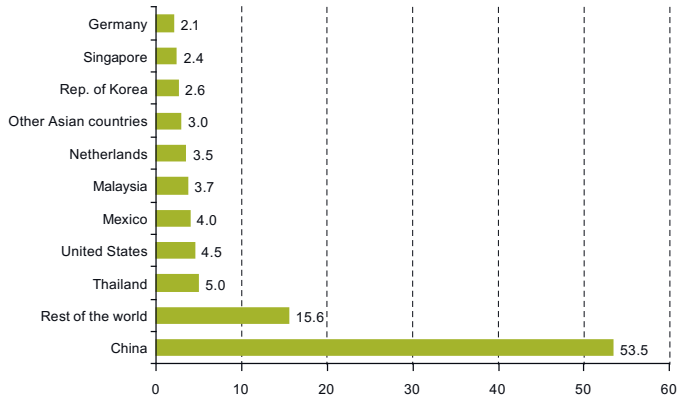
Source: The Statistics Portal [online] http://www.statista.com/statistics.

2. A small number of countries account for most of the region's information technology-related goods exports

- In 2013, global trade in data processing equipment and parts amounted to US$ 441 billion, of which China accounted for 54%. With exports of US$ 17.582 billion and a market share of 4%, Mexico was the only Latin American country to figure among the world's top 10 exporters of these goods. Considering the size of its economy, Costa Rica was notable in that it ranked 16th with a market share of almost 1%, ahead of Brazil with 0.03%.
- Of the main exporters of these goods to Latin America and the Caribbean, China expanded its market share to 62% of the region's total imports, worth approximately US$ 27.7 billion in 2013. Those imports grew by 3.7% annually in value terms between 2005 and 2013. While imports from China held comfortably the largest share, those from Mexico (8.1%) and Singapore (5.5%) posted the fastest growth.
- These data reflect the weak integration of virtually all the region's countries in global production chains for information technology-related goods. The two success stories were a response to efforts that combined preferential trade agreements, industrial policies to promote the sector, and investment decisions that considered the strategies of transnational corporations.

Figure II.18

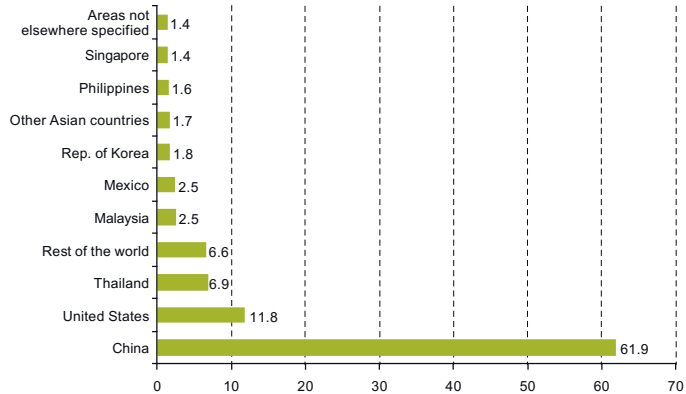
Share of the global computer and computer parts market, 2013 [a]
(*Percentages*)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), TradeCAN, 2015.
[a] Includes headings 752 (automatic data processing machines and units thereof) and 759 (parts, not elsewhere specified, of or accessories for the machines falling within heading 751 or 752) of the Standard International Trade Classification (SITC), Revision 2.

Figure II.19

Latin America and the Caribbean: computer and computer parts market, share of imports, 2013 [a]
(Percentages)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), TradeCAN, 2015.
[a] Includes headings 752 (Automatic data processing machines and units thereof) and 759 (Parts, not elsewhere specified, of or accessories for the machines falling within headings 751 or 752) of the Standard International Trade Classification (SITC), Revision 2.

3. Latin American Internet users spend an average of almost 22 hours online each month

- In Latin America and the Caribbean, the average Internet user spends 21.7 hours per month online; an hour less than the global average of 22.8 hours. The United States and Europe reported above-average figures of 35.9 and 25.1 average hours per user per month, respectively. Within the region, Brazil reported 29.4 hours and Uruguay 32.6 hours per user per month, while users in other countries spent on average between 15 hours and 20 hours per month online.

Figure II.2

Internet usage: average hours per user per month, 2013
(*Hours*)

North America	35.9
Europe	25.1
World	22.8
Latin America	21.7
Asia and the Pacific	17.6
Middle East and Africa	13.7

Uruguay	32.6
Brazil	29.4
Argentina	20.8
Peru	18.9
Chile	17.6
Venezuela (Bolivarian Republic of)	16.1
Colombia	15.2
Mexico	14.8

Source: Telecom Advisory Services (TAS) on the basis of comScore data; Alejandro Fosk and others, "The Latest LatAm and US Hispanic Digital Trends", paper presented at the 2014 Latin America & US Hispanics Digital Summit [online] http://blog.aotopo.com.br/wp-content/uploads/2015/02/2014-08-LATAM-Digital-Future-in-Focus.pdf.

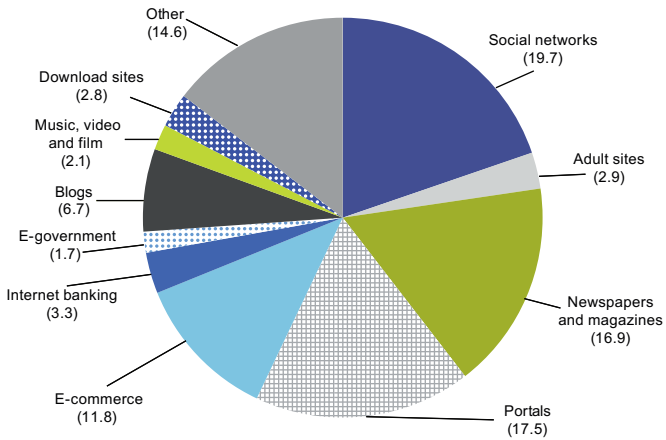
4. Latin American Internet users prefer sites from outside the region

- Measured by Internet traffic, the region's most popular sites are social networks, e-commerce sites and newspapers and magazines which, regardless of the origin of the platform, disseminate chiefly local content. Conversely, Internet banking (3.3% of total traffic) and e-government services (1.7%) account for a low proportion of sites visited.

- While the profile of online consumption in Latin America is similar to that of advanced economies, there is a major difference as regards the origin of the service consumed. While in China, Japan, the Republic of Korea and the Russian Federation users prefer to connect to local sites, in Latin America most users access sites from outside the region, such as Google, Facebook, Microsoft, Yahoo and Wikipedia.

Figure II.20

Latin America: most popular types of website, around 2013
(Percentages)



Source: Raúl Katz and Fernando Callorda, "Desarraigo cultural en contenidos de Internet: un análisis para América Latina", Bogota, 31 May 2014 [online] http://www.teleadvs.com/wp-content/uploads/CPR_LATAM_2014_Katz_Callorda_Presentacion_v2.pdf; and Raúl Katz, "Telecomunicaciones", *Infraestructura en el desarrollo de América Latina, 2014*, Caracas, Latin America Development Bank (CAF), 2014.

Table II.3

Latin America: largest websites by number of unique visitors per month, 2014

Rank	Website	Unique visitors per month *(millions of people)*
1	Google websites (Google, YouTube, etc.)	168.1
2	Facebook	144.9
3	Microsoft websites (Bing, MSN, etc.)	127.9
4	Yahoo websites (Portal, Tumblr, etc.)	110.6
5	Wikipedia	60.5
6	Terra	58.9
7	UOL	54.1
8	Ask	48.1
9	R7	45.5
10	Mercado Libre	45.2

Source: Telecom Advisory Services (TAS), on the basis of comScore data; Alejandro Fosk and others, "The Latest LatAm and US Hispanic Digital Trends", paper presented at the 2014 Latin America & US Hispanics Digital Summit [online] http://blog.aotopo.com.br/wp-content/uploads/2015/02/2014-08-LATAM-Digital-Future-in-Focus.pdf.

5. Latin America has the world's most intensive use of social networks

- In 2013, 78.4% of Internet users in Latin America participated in social networks, a much higher rate than that of North America (64.6%) and Western Europe (54.5%), regions with a greater degree of Internet penetration.
- With 145 million unique visitors, Facebook was the most used social networking site, followed by ShareThis (93 million), LinkedIn (38 million), Taringa (29 million) and Twitter (29 million). Facebook also ranked first in terms of time spent (95% of total time on social networks), with Twitter a distant second (1.4%). Latin American site visitors also spent the most time per visit, with an average of 17 minutes in April 2014.
- Use of social networks is not directly correlated with income levels. Accordingly, Argentina, Chile, Colombia, Mexico and Peru are among the 10 countries with the highest percentage of social network users. Reduced costs for hardware and Internet access, and the globalization of consumption patterns, explain this uniformity and the increased number of hours spent on Internet-based activities in the region. Though not among the 10 countries with the highest percentage of social network users, Brazil leads the region in terms of the most daily visitors to these sites, the most minutes per visit and the most pages visited.

Table II.4

Monthly social network users, 2013

Region	Internet users *(number of people)*	Social network users *(number of people)*	Social network users *(percentages of Internet users)*
Eastern Europe	116 075 787	82 286 947	70.9
Commonwealth of Independent States and Russian Federation	142 783 276	46 020 576	32.3
Sub-Saharan Africa	144 755 195	37 118 175	25.6
Middle East and North Africa	168 185 445	64 898 306	38.6
North America	298 096 344	192 685 415	64.6
Western Europe	327 712 663	178 490 451	54.5
Asia and the Pacific	1 217 686 014	891 194 019	73.2
World	2 699 899 374	1 715 868 503	63.6
Latin America	284 604 650	223 174 613	78.4

Source: Telecom Advisory Services (TAS), on the basis of International Telecommunication Union (ITU), World Telecommunications/ICT Indicators database; Internet World Stats and Owloo.

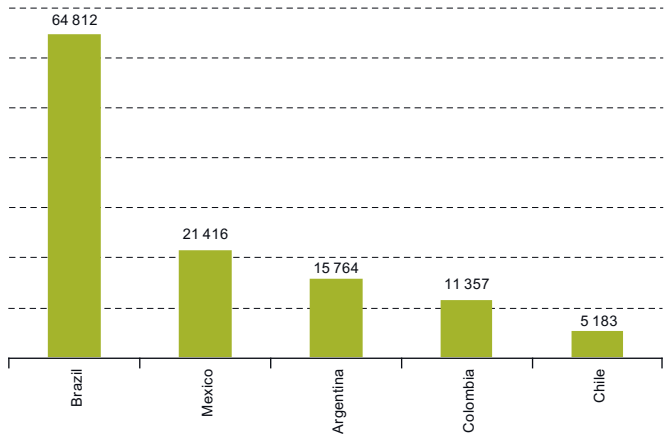
6. Global platforms dominate the supply of visual content

- Significant local providers of visual content include Televisa in Mexico, Globo in Brazil, Grupo Clarín in Argentina and El Mercurio in Chile; however, this market is dominated by Google websites (led by YouTube, the world's third most visited site after Google and Facebook). Facebook has been gaining ground in the region, and in many countries is the second most visited site.
- In 2014, the two largest markets were Brazil, with 64.8 million unique visitors per month, who spent an average of 3.5 minutes per video viewed, and Mexico, with 21 million unique visitors per month, spending an average of 6.1 minutes per video. The world average was 4.8 minutes per video.
- Meanwhile, the video streaming market was dominated by Netflix, with 7.3 million subscribers, followed by Google Play with 3.1 million and Apple TV with 1.8 million.

Figure II.21

Latin America (selected countries): online video audience, June 2014

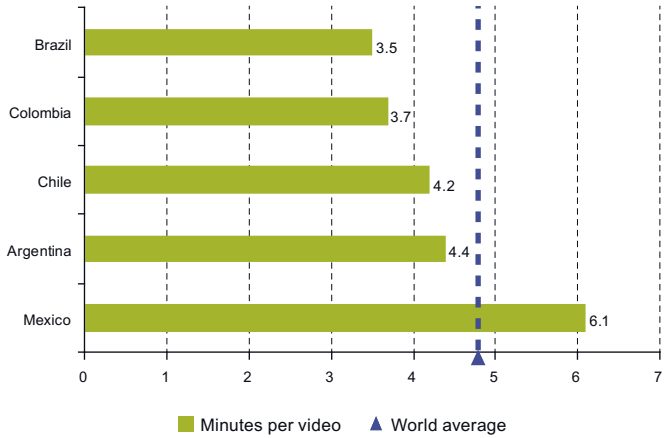
(Thousands of unique visitors)



Source: comScore, *Futuro Digital América Latina*, 2014.

Figure II.22

Latin America (selected countries): average minutes per online video viewed, 2014



Source: comScore, *Futuro Digital América Latina*, 2014.

7. Home-grown social networks and search engines are lacking in Latin America

- Nine of the ten most used social networks in Latin America are global platforms, the most important of which is Facebook, followed at a distance by LinkedIn, which has only a quarter of the number of unique visitors. The region's only home-grown platform is Taringa, which ranks fourth on the list.
- Google dominates the Latin American search engine market, with over 90% of market share. This is consistent with its global position as the world's most visited website, according to data from Alexa. There are no regional platforms in this category.

■ Table II.5 ■

Latin America: social networks by number of unique visitors per month, 2014

Rank	Network	Number of unique visitors
1	Facebook	144 900 000
2	LinkedIn	34 700 000
3	Twitter	29 153 000
4	Taringa	27 600 000
5	Ask	14 000 000
6	Tumblr (Yahoo)	14 715 000
7	Badoo	5 800 000
8	Yahoo Profile	5 000 000
9	Scribd	4 800 000
10	Pinterest	4 600 000

Source: Telecom Advisory Services (TAS), on the basis of comScore data; Alejandro Fosk and others, "The Latest LatAm and US Hispanic Digital Trends", paper presented at the 2014 Latin America & US Hispanics Digital Summit [online] http://blog.aotopo.com.br/wp-content/uploads/2015/02/2014-08-LATAM-Digital-Future-in-Focus.pdf.

■ Table II.6 ■

Latin America (selected countries): share of search engine market, 2014
(*Percentages*)

Country	Google	Microsoft Bing	Yahoo	Other
Argentina	92.1	2.0	2.9	3.0
Brasil	94.5	...	...	...
Mexico	93.7	2.9	3.4	...

Source: Telecom Advisory Services (TAS), on the basis of comScore data; Alejandro Fosk and others, "The Latest LatAm and US Hispanic Digital Trends", paper presented at the 2014 Latin America & US Hispanics Digital Summit [online] http://blog.aotopo.com.br/wp-content/uploads/2015/02/2014-08-LATAM-Digital-Future-in-Focus.pdf.

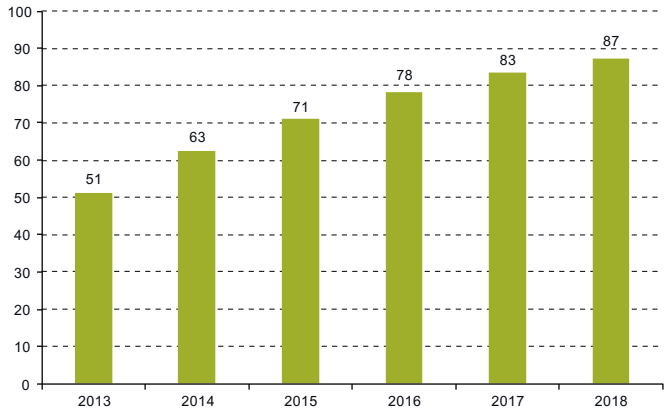
8. E-commerce is expected to enjoy sustained growth, albeit from a small base

- Business-to-consumer (B2C) e-commerce in Latin America is expected to enjoy sustained growth between 2014 and 2018, with sales rising from US$ 63 billion to US$ 87 billion. However, the region's share of the world market is set to diminish, despite already being quite small (about 4%).

Figure II.23

Latin America: business-to-consumer (B2C) e-commerce sales, 2013-2018 [a]

(Billions of dollars)

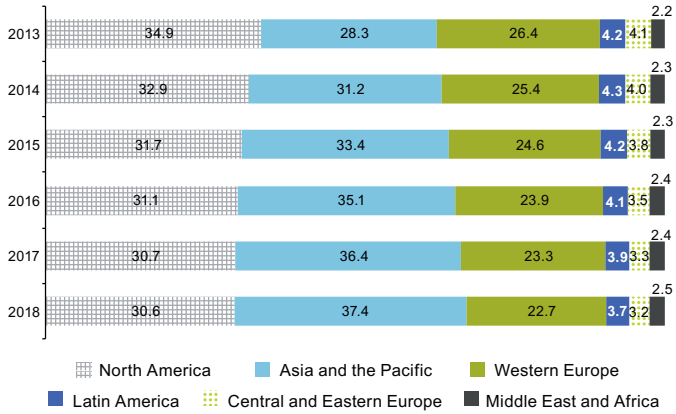


Source: eMarketer [online] http://www.emarketer.com/.
[a] Data for 2015 to 2018 are estimates.

Figure II.24

Business-to-consumer e-commerce sales by region, 2013-2018 [a]

(Percentages)



Source: eMarketer [online] http://www.emarketer.com/.
[a] Data for 2015 to 2018 are estimates.

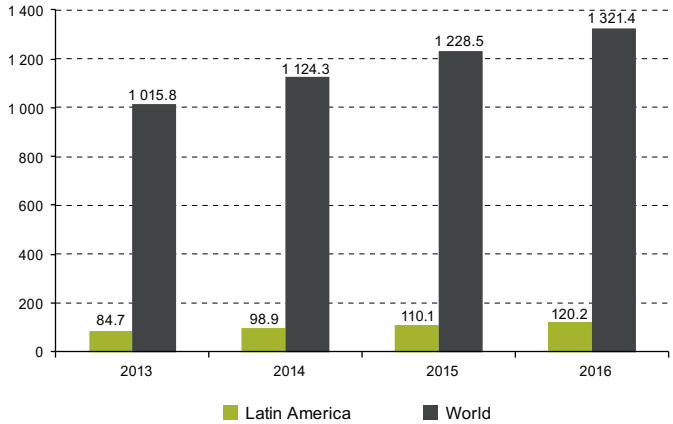
9. The region's share of digital buyers is similar to its share of the world population

- Latin America ranks higher for the number of online shoppers in the region than it does for the relative value of its e-commerce sales. While Latin America's share in global online sales was 8.8% in 2014, the region could claim almost 100 million digital buyers out of an estimated world total of over 1.1 billion. This percentage was in keeping with the region's share of the world population (8.6%). The number of digital buyers in the region is expected to exceed 120 million in 2016.

Figure II.25

Estimated number of digital buyers, 2013-2016

(Millions of people)



Source: eMarketer [online] http://www.emarketer.com/.

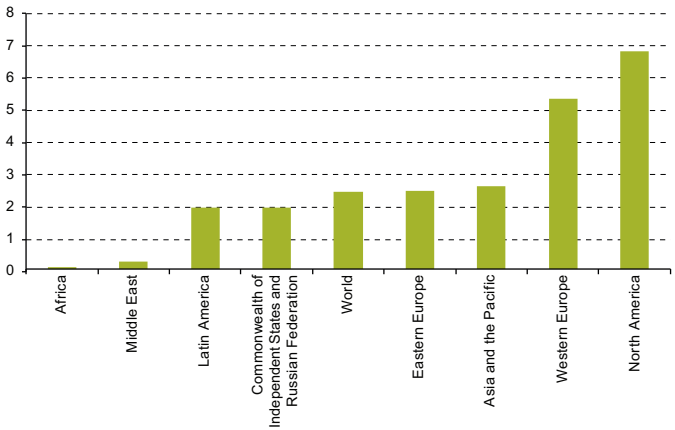
10. E-commerce still represents only a fraction of retail trade

- As a region, Latin America has one of the smallest percentages of e-commerce in relation to retail trade as a whole. At just 2%, the figure is less than half of that posted in North America and Western Europe. Within the region there are large differences: for example, in the Plurinational State of Bolivia, the share of e-commerce is negligible, while in Brazil it accounts for almost 3% of retail trade.

Figure II.26

E-commerce by region, 2013

(Percentages of retail trade)

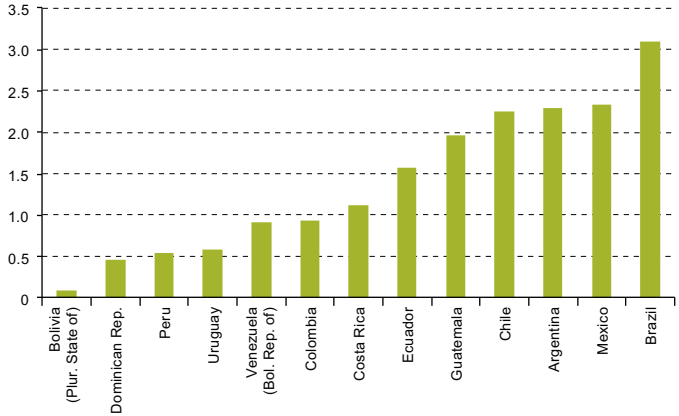


Source: Telecom Advisory Services (TAS), on the basis of figures provided by Passport, Euromonitor International.

Figure II.27

Latin America (13 countries): e-commerce, 2013

(Percentages of retail trade)



Source: Telecom Advisory Services (TAS), on the basis of figures provided by Passport, Euromonitor International.

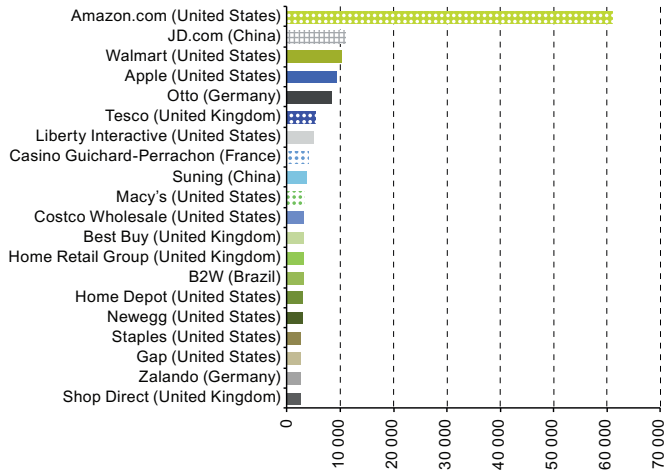
11. Only one Latin American firm ranks among the world's 20 largest online retailers

- Just one Latin American firm (B2W Digital, owned by Brazil's Lojas Americanas S.A.) figured among the world's 20 largest online retailers in 2013. Seventeen of these companies were based in the United States or Western Europe, with the remainder in China (one of which occupied second place in the ranking). Amazon led the way with US$ 60.9 billion in income, with online sales accounting for 100% of net income, excluding third-party sales using the same platform. It is the only firm to rank among the 10 largest in the United States, Europe, Asia and Latin America.

Figure II.28

World: income of leading online retailers, 2013

(Millions of dollars)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of figures provided by The Statistics Portal (Statista).

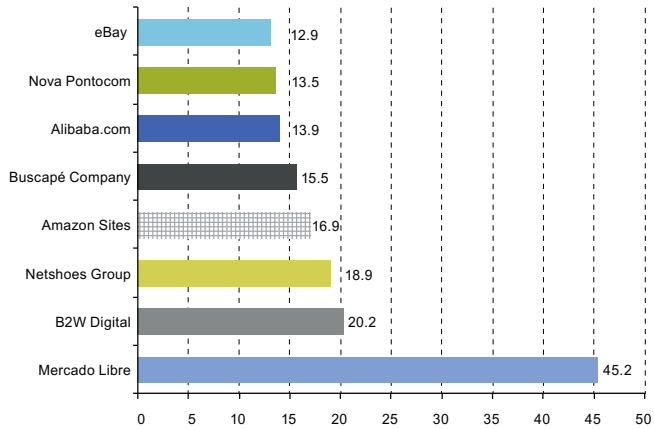
12. In Latin America, the main e-commerce enterprises are from the region

- Six firms from Brazil, three from the United States and one from Chile made up the ten largest online retailers in Latin America in 2013.
- Latin America's most visited e-commerce sites are based in the region. Mercado Libre is the platform with the heaviest use, having received more than 45 million unique visitors in June 2014, though several Brazilian firms and websites were also leaders in this category. Unlike the other types of digital service analysed, e-commerce is noted for having greater regional content, partly owing to logistical issues associated with the physical distribution of goods.

■ Figure II.29 ■

Latin America: most popular online retail websites, June 2014

(Millions of unique visitors)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of figures provided by The Statistics Portal (Statista).

■ Table II.7 ■

Largest online retailers by region [a]

Rank	United States, 2013	Europe, 2013	Asia, 2012	Latin America, 2013
1	Amazon.com (United States)	Amazon.com (United States)	Alibaba Group (China)	B2W Digital (Brazil)
2	Apple (United States)	Otto (Germany)	Rakuten (Japan)	Nova Pontocom (Brazil)
3	Staples (United States)	Staples (United States)	360buy.com (China)	SACI Falabella (Chile)
4	Walmart (United States)	Home Retail Group (United Kingdom)	Amazon.com (United States)	Walmart Latin America (United States)
5	Sears Holdings (United States)	Tesco (United Kingdom)	Suning Commerce (China)	Netshoes (Brazil)
6	Liberty Interactive (United States)	Apple (United States)	Jia.com (China)	Máquina de Vendas (Brazil)
7	Netflix (United States)	Cdiscount.com (France)	eBay (United States)	Dell (United States)
8	Macy's (United States)	Tengelmann (Germany)	51buy.com (China)	Amazon.com (United States)
9	Office Depot (United States)	Shop Direct Group (United Kingdom)	HappiGo (China)	Magazine Luiza (Brazil)
10	Dell (United States)	Sainsbury's (United Kingdom)	Vancl (China)	Saraiva e Siciliano (Brazil)

Source: United Nations Conference on Trade and Development (UNCTAD), on the basis of internetretailer.com.

[a] The retailer's country of origin is indicated in parentheses.

13. All of the region's countries have at least one mobile money service

- Mobile money or payment services include those that enable financial transactions via mobile devices. These transactions may take the form of payment for goods or services, or money transfers between individuals. In the last five years, mobile money services have expanded rapidly in developing countries, and there are now more than 250 active services in almost 90 countries.
- In Latin America and the Caribbean, in 2014, three mobile money services were available in Brazil, Colombia and Mexico, while two services were available in five countries, and at least one service was available in a further 10 countries.

■ Map II.4 ■

Latin America and the Caribbean: number of active mobile money services, December 2014 [a]

Source: GSMA, *The Mobile Economy*, 2015.
[a] No data were available for countries shaded in grey.

III. Policies for the digital economy

A. Regulation

1. A modern regulation is essential in the digital economy

- The spread of digitization is creating new value chains, where telecommunications operators, manufacturers of access devices, multimedia firms, content providers, and suppliers of software services and applications operate in an integrated way. These changes have given users new capacities for choice and the chance to participate actively in creating content. This scenario poses significant challenges for the design of policies and regulatory frameworks that generate the conditions needed for individuals and enterprises to participate in the digital economy.
- Regulation is one of the three institutional levels available to governments for applying digital policies, along with the formulation of national strategies and sectoral policies, which together project development goals and the application and adoption of technology in areas such as education, health and government.
- Independent telecommunications regulators, created under liberalization, privatization and market-opening reforms, have established themselves as part of the sector's institutional framework. In 2014 such regulators existed in 25 of 28 Latin American and Caribbean countries.

Table III.1

Institutional structures

Function	Agency
Policy development (national strategy)	Central government ministry or agency responsible for digital policy
Sector strategies (education, health, etc.)	Sector ministry or government agency
Regulation	National regulatory authority
Network operation and service provision	Operator and service supplier

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *Telecommunications Regulation Handbook*, 2011.

Table III.2

Latin America and the Caribbean: countries with an independent regulatory body subject to reporting requirements, 2014

Total number of countries		28
Countries with an independent regulatory body		25
Authority to which the regulator reports	President/Head of State	2
	Parliament/Legislature	7
	Head of Government/Prime Minister	6
	Annual report to the sector ministry	20
	Report to another ministry	8
	No requirements	1
	Other	6

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *ICT-Eye*, 2014.

2. New markets, trust and security: the challenges of regulation

- Technological convergence has eliminated the traditional segmentation of telecommunication services, with a more integrated value chain, new participants and competition on a global scale. This requires a review of the regulatory approach and levels of intervention, together with greater institutional coordination and flexibility. The regulatory function in the telecommunications sector involves ensuring effective competition, managing scarce resources and protecting consumers' rights.
- As a result of the shift from voice- to data-centred markets, the regulatory authorities have had to review their actions in markets whose structural characteristics prevent them from becoming effectively competitive without intervention. Ex ante regulation is no longer applied to retail markets but at the wholesale level, so that the number of regulated markets has decreased and the main focus is now on physical access to the network. In this framework, the relevant markets and supply chains are analysed using approaches that focus on ensuring access and provisioning.
- Generating trust and security has become a fundamental concern for consumers and firms when using digital media. Issues of security, privacy, data and consumer protection should attract the attention of the regulatory authorities, who must apply specific regulations or guidelines to encourage a more secure and trustworthy digital environment, coordinating with other specialized agencies that have a mandate to oversee and ensure the fulfilment of these aspects.
- These actions require greater regulatory flexibility and the adoption of measures that prevent distortions in liberalized markets. Moreover, the traditional metrics used to monitor the deployment of communications technologies (based only on access and price) should also be reviewed as part of efforts to monitor consumer well-being, with a view to incorporating new indicators and methodologies that take account of service quality (effective speed and latency).
- Digital technologies can play an important role in sustainable development, and also serve to exploit the opportunities potentially provided by a green economy. Regulation can generate incentives in this regard.

Table III.3

Challenges of regulation for digitization

Objective	Functions	Challenges
Market efficiency	Definition of market	Which markets should be regulated?
	Supply models	How should supply be organized in these markets?
	Quality of supply	To what extent should the quality of suppliers be dictated?
Management of scarce resources	Supply of spectrum	What is the status of spectrum supply in the market?
	Use of spectrum	What are the constraints on spectrum use: harmonized or liberalized?
Protection of consumer rights	Adoption	What measures promote the adoption of services by the end user?
	Security	What is the scope of security measures for supply and demand?
	Privacy	How is consumer privacy protected through these services?
	Digital consumption	How is the consumer protected in a globalized services environment?
	Environment	What environmental protection measures are adopted by the regulators?

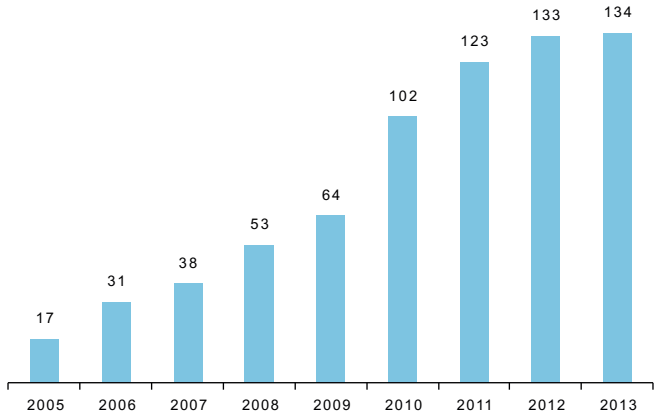
Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of *Strategy & Rethinking ICT Regulation*, 2014.

3. Access to digital services remains fundamental

- Disparities still persist in terms of digital technology access and appropriation, which require the provision of services in areas that are not currently served, and incentives to promote appropriation of digital technologies by some population segments. The growing demand for broadband services highlights the need to implement national plans with direct intervention by the State, through subsidies or loans at preferential rates.
- In the last few years, policies to promote access to telecommunications services have focused on strengthening the broadband structure by implementing national broadband plans which, with different strategies (legislation, policy frameworks and financing mechanisms, among others), seek to translate the positive effects of broadband into economic growth, competitiveness and innovation. In 2013, 134 countries had national plans; and 17 countries in the region adopted such plans between 2010 and 2013.

Figure III.1

World: number of countries with national broadband plans, 2005-2013



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *ICT-Eye*, 2014.

Table III.4

Latin America and the Caribbean: national broadband plans and sources of financing, 2010-2013

Total number of countries		31
Have they adopted a national broadband plan?	Yes	17
	No	14
Sources of financing for the plan (more than one financing source is possible)	Exclusive broadband development fund	1
	Universal service fund	3
	Government subsidies or other direct financing mechanism	3
	Public-private partnerships	8
	Other	6

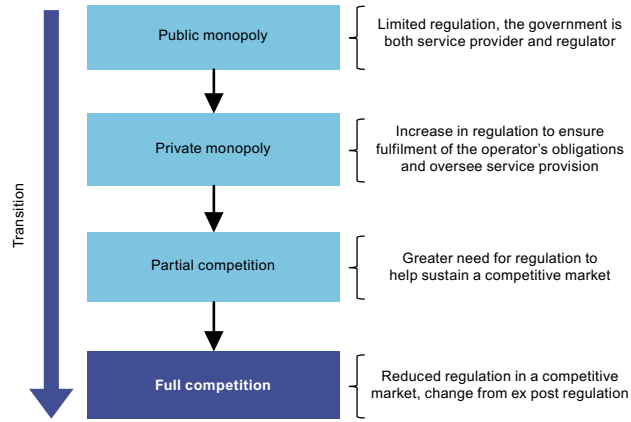
Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of International Telecommunication Union (ITU), *ICT-Eye*, 2014.

4. Towards fourth-generation regulation

- The development of the region's telecommunications sector has taken place in four stages. In the first stage, from the sector's creation to the Second World War, the sector was basically private and dominated by foreign companies. The second stage, from the 1950s to the late 1980s, was characterized by nationalization processes and State monopolies. The third stage, which began in the early 1990s and continues until the present day, is a period of liberalization and market openness, privatizations and changes in regulatory institutional arrangements.
- The fourth stage, now emerging, is characterized by growing demand for broadband services and a new technology dynamic, with applications and services that enable new forms of interaction, experimentation and innovation. This gives rise to a new extended digital-industry value chain, with greater convergence and interaction between telecommunications services and digital products.
- Diagram III.1 shows the different regulatory needs depending on markets' structures and levels of competitiveness. Table III.5 sets out the key characteristics of fourth-generation regulation.

Diagram III.1

Stages of regulation models



Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of International Telecommunication Union (ITU), *Telecommunications Regulation Handbook*, (2011).

Table III.5

Characteristics of fourth-generation regulation

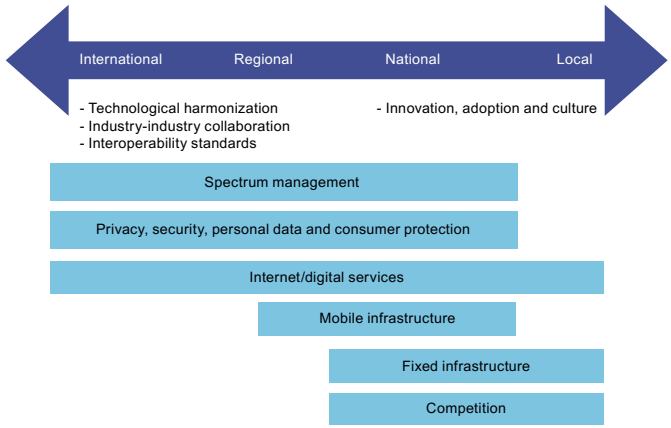
- Adopt a "soft" regulatory approach, intervening only when necessary while ensuring that market forces work without restrictions in favour of innovation.
- Guarantee the principles of fair, equitable and non-discriminatory treatment of all market agents to ensure equal conditions between regulated and unregulated agents.
- Streamline procedures for facilitating market entry and stimulating competition and innovation.
- Analyse markets to assess their situation in a convergent environment.
- Adopt a regulatory framework that eliminates barriers to new participants.
- Include competitive provisions that ensure a healthy relationship between all authorized agents in the market in question (operators, Internet providers, over-the-top (OTT) service providers, and others).
- Train consumers to take informed decisions by developing online tools to test download speed, service quality, prices and plans.
- Monitor the use of traffic management techniques to ensure there is no unfair discrimination between market agents.
- Promote shared use of the network and facilities through "soft" measures (for example, mapping the deployment of infrastructure with a view to coordinating civil works).
- Guarantee transparency and openness (for example, making sure that market data and regulations are available).
- Encourage consultation of multiple stakeholders in regulatory policy and affairs.
- Ensure regulatory predictability and promote co-regulation wherever possible.
- Work with all stakeholders to reduce or eliminate practical barriers to broadband deployment.

Source: International Telecommunication Union (ITU), *Trends in Telecommunication Reform*, 2014.

5. A global governance of the Internet requires greater institutional coordination

- Many aspects of standardizing and harmonizing technologies, such as the revision of technical specifications and methodologies applicable to Internet functioning and interoperability, are dealt with through international forums for cooperation and scientific exchange, such as the Internet Engineering Task Force (IETF). Regulatory bodies must pay attention to these forums and promote stakeholder participation. They must also identify the levels of intervention they will apply according to the topics that are reviewed. Whereas policies for promoting innovation and adopting technologies have a national or local dimension, technological standardization and harmonization require regional and international perspectives.

Diagram III.2
Intervention levels



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of World Economic Forum (WEF), *Delivering Digital Infrastructure, Advancing the Internet Economy*, 2014.

B. Standards

1. Standards and interoperability for digital-economy development

- Developing and harnessing the potential of the digital economy, in particular, that of the industrial Internet, requires the right technical and regulatory conditions in various industries and sectors, including behavioural changes in governments, enterprises and consumers.
- Achieving a positive economic impact requires greater adoption of new technologies, which depends on measures related to security and the protection of personal data, privacy and intellectual property, together with the promotion of interoperability between devices and systems.
- Interoperability is particularly important for generating value through the use of industrial Internet applications. According to the McKinsey Global Institute,[1] interoperability between applications and systems will account for about 40% of the total value that can be unlocked by the Internet of Things. Although the impact varies across sectors, interoperability is more critical in retail trade and its environment (banks); workplaces in the oil and gas, mining and construction industries; and in factories and hospitals and smart cities, which are the areas most affected by the Internet of Things.
- The main barriers to interoperability are the lack of common software interfaces, standard data formats and connectivity protocols. The efforts required by interoperability are complex, because it involves the integration of multiple systems and suppliers, often in different sectors. This entails collaboration between firms and organizations, solution providers and political authorities to establish the necessary standardization norms.

Diagram III.3

Enablers of the Internet of Things

Source: McKinsey Global Institute, *The Internet of Things: Mapping the value beyond the hype*, 2015.

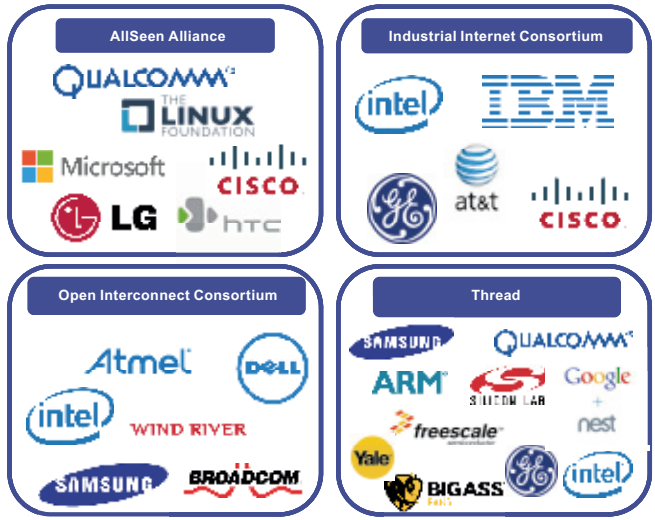
[1] See McKinsey Global Institute, *The Internet of Things: Mapping the value beyond the hype*, 2015.

2. Consortiums are created to define industrial Internet standards

- Since the Internet of Things and particularly the industrial Internet are in an early phase of their development, the adoption of norms and standards is still under discussion. The interoperability of digital systems can be achieved in two ways. One is by using translation or aggregation platforms (for example, middleware, which is located between an operating system and the applications), including the applications programming interfaces (API) that are needed to manage communication between the different applications. These enable users to extract and manage information from multiple devices. The other mechanism involves creating a common language for the different systems in a data network, through widely accepted interface standards. This requires collaboration by industrial associations, technology providers and political authorities.
- The rapid development of the industrial Internet is eliciting the emergence of consortiums to address the growing demand for solutions in terms of systems' security and interoperability. These include the Industrial Internet Consortium (IIC), Thread, the AllSeen Alliance and the Open Interconnect Consortium (OIC). The aim of the IIC is to promote the adoption and deployment of industrial Internet applications, while the other three consortiums are focused on device connectivity. This group may be said to include Apple, whose HomeKit, based on iOS, seeks to create a framework of high-level device connectivity that enables applications to interact with physical accessories.

■ Diagram III.4 ■

Industrial Internet standards consortiums [a]



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

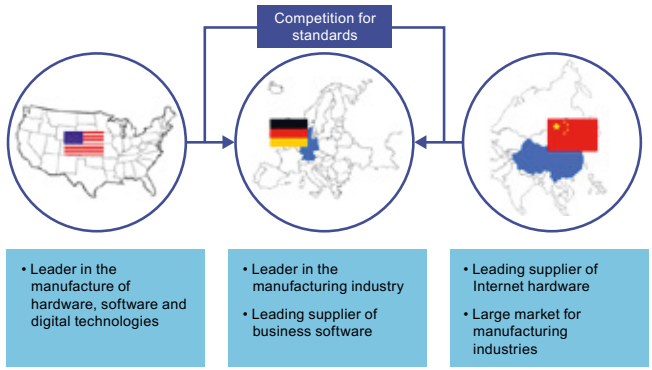
[a] The figures for Thread and the Industrial Internet Consortium show only the founding partners, since they currently have more than 500 and 100 members, respectively.

3. China, Germany and the United States: the race for standards

- Over the last few years, China, Germany and the United States have used their competitive advantages as a basis for championing the development of the industrial Internet. Germany has a strong position in the manufacturing industry, the United States is a leader in the manufacture of hardware, software and digital technologies, and China is positioned as a supplier of Internet and telecommunications hardware and also provides a huge market for manufactures.
- Germany took the initiative with its Industry 4.0 strategy, in which the development of standards has a central role in creating a platform of production processes within sectors, and also between industries. In March 2015, Deutsche Telekom, SAP SE and manufacturing firms agreed to cooperate to speed up system standardization. The United States is moving in this direction with its advanced manufacturing initiative, the industrial Internet strategy promoted by General Electric, and the creation of the Industrial Internet Consortium (IIC) in 2014. China, for its part, has implemented the "Made in China 2025" strategy to improve its manufacturing industry through digital technologies and advanced robotics.
- In addition to national initiatives, countries also collaborate with each other. At the government level, Germany and China have started a high-level dialogue to analyse how to work together to speed up progress towards the industrial Internet. Meanwhile, Siemens and Bosch, major players in the German strategy, have joined IIC of the United States; and IBM and Hewlett-Packard are active members of the German Industry 4.0 strategy.

Diagram III.5

Competition and collaboration on industrial Internet standards



Source: Wolfgang Wahlster, "Industrie 4.0: The Fourth Industrial Revolution Based on Smart Factories", German Research Centre for Artificial Intelligence (DFKI), October 2014.

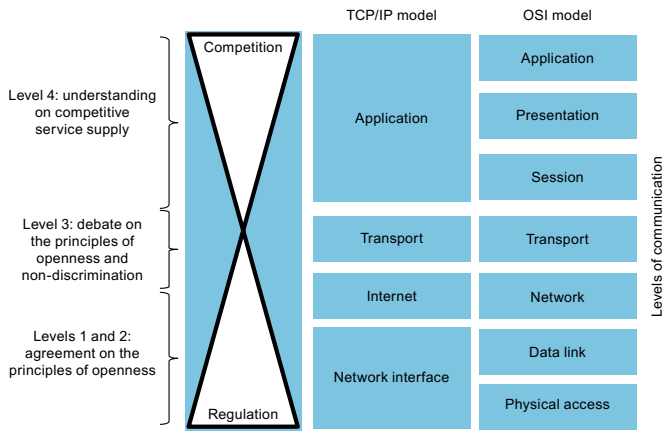
C. Network neutrality

1. The tension between regulation and the competitive supply of services

- Changes in the telecommunications sector, particularly the exponential growth of Internet traffic, create tensions between regulation and the competitive supply of services in certain segments of the network. When there is evidence of full competition, the regulatory burden should be reduced, giving rise to ex post (level 4) supervision. Nonetheless, that reality is only applicable in a few cases owing to the asymmetries and entry barriers that exist in certain markets. In this case, there is consensus on ex ante regulatory mechanisms to ensure network access (levels 1 and 2), with the possibility of third-party use, for example through obligations on access provision. Where there is an ongoing debate is on the application of the regulatory burden and the principles of openness and non-discrimination at the transport level (level 3).
- The principle of openness in the transport segment is a topic of debate because it can generate disincentives to investment and network deployment. Telecommunications operators tend to consider that implementation of the principle of non-discrimination, which would be applied to the content and transport protocols, could affect network management and expansion. By contrast, global content platforms support that principle because it underpinned the development of the Internet and could have a positive effect on the generation of new digital services.

Diagram III.6

Regulation or competition in the network



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommuniation Union (ITU), *Open Access Regulation in the Digital Economy*, GSR Discussion Paper, 2011.

2. The aim is to ensure Internet openness

- A network is neutral when it treats all content, sites and platforms equally, which allows it to carry every form of information and support every kind of application.[2] However, the argument in favour of traffic management is based on the need to optimize network use in scenarios where traffic demand could put pressure on supply. In this context, service providers maintain that they have to make large investments and ensure that other agents share the costs of the infrastructure.
- It is often held that the Internet already makes a de facto classification of signals through Transmission Control Protocol and Internet Protocol (TCP/IP), and that part of its success stems precisely from this capacity. Moreover, the differences between types of communication (voice and video, among others) and the conditions required in some cases to maintain the quality of the signal are topics for consideration in relation to traffic management. Although differentiated treatment of traffic is justifiable from a technical standpoint, in cases where this is driven by commercial considerations its negative impact on prices is a major risk, which could produce unwanted side effects.
- Currently, signal termination fees are not applied to Internet use; costs are generated only for network access, with differences in terms of quality, capacity and time. For that reason, the network operates as a communication and collaboration space, where users and content providers participate without restrictions on accessing each other, in contrast to other services such as cable television, where supply is differentiated on the basis of additional charges. It is also claimed that this characteristic has given rise to network economies and benefits in two-sided markets. To the extent that a given user group produces a positive externality for another group, the non-payment of signal termination fees by the content providers (who also are users) generates a cross-subsidy that promotes innovation and the development of new services. In this scenario, increasing transaction costs and the complexity of Internet access price structures could reduce its use and efficiency, as well as the volumes transacted.
- Another ongoing debate concerns the different regulatory treatment received by telecommunications services and Internet services. Although regulatory frameworks do vary between countries, the Internet is frequently defined as a value added information service, and its treatment and regulatory burden are therefore different to those of basic telephony services (for example fixed-line and mobile telephony). From this standpoint, as the Internet is not a basic service, it is not subject to the same requirements and regulatory conditions as the rest of the services, where the suppliers maintain a dominant position that could enable them to exert market power. It is argued that this differentiation, or deregulation, has been a major driver of the expansion of Internet services. This is not a trivial argument, since there is evidence that deregulation has a positive impact on levels of digitization and technological innovation.

Table III.6

Arguments in respect of Internet non-discrimination

In favour
▪ Generation of network economies
▪ Two-sided and efficient markets
▪ Innovation and the creation of new services
▪ Unnecessary transaction costs are avoided
Against
▪ Differentiation of service quality by class of traffic
▪ Charging different prices to different types of traffic
▪ Blockage of traffic from devices that can reasonably be considered damaging to the network or its users
▪ Financing of network expansion
▪ Helping to balance market power between telecommunications operators and content suppliers

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

[2] Tim Wu, "Network Neutrality FAQ" [online] http://www.timwu.org/network_neutrality.html [date of reference: 20 July 2015].

3. Convergence of regulations on network neutrality

- Network neutrality has been a topic of discussion for some time and has been dealt with in different ways by different countries. The regulations on neutrality have incorporated issues relating not only to traffic management but also to topics such as transparency in the provision of services, the blocking of harmful content, data protection, privacy and service quality. Although in some regulatory schemes, such as that of the United States, the principle of non-discrimination in the network is key, and any type of blocking, degradation of legitimate traffic or paid prioritization is prohibited, in other cases treatment is softer (see table III.7). Much of the current debate focuses on traffic management and on what constitutes reasonable management thereof, accepting that network operators occasionally need to adopt certain practices that guarantee an efficient use of their networks. Nonetheless, the fact that some suppliers discriminate or downgrade services for non-technical reasons, particularly commercial ones, detracts from Internet openness, with the consequent costs that have been indicated above.
- In June 2015, the European Parliament and the European Council reached an agreement to definitively enshrine the principle of network neutrality in European Union legislation. Until then, some aspects of neutrality had been protected under directives on the regulatory framework for electronic communications networks and services[3] and the provisions on access and universal service.[4] The new legislation will establish users' freedom to access the content of their choice, and will not allow the unjustified degradation or blocking of traffic, or paid prioritization.

[3] European Union, "Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002, on a common regulatory framework for electronic communications networks and services" [online] http://eur-lex.europa.eu/legal-content/EN-ES/TXT/?uri=CELEX:32002L0021&from=EN and "Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorization of electronic communications networks and services" [online] http://eur-lex.europa.eu/legal-content/EN-ES/TXT/?qid=1436470561711&uri=CELEX:32009L0140&from=EN.

[4] European Union, "Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No. 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws" [online] http://eur-lex.europa.eu/legal-content/EN-ES/TXT/?qid=1436470977982&uri=CELEX:32009L0136&from=EN.

■ Table III.7 ■

Regulations on the network neutrality principle

Topic	United States (Federal Communications Commission 15-24 of 2015)	European Commission (Directives 2002/21 and 2002/22)	Chile (Network Neutrality Act, Law No. 20.453, 2010)	Brazil (Civil Framework of the Internet, Law No. 12.965, 2014)
	In favour	In favour	In favour	In favour
Transparency	Requires broadband suppliers to disseminate, in a consistent format, promotional rates, commissions and charges, and maximum volumes of downloadable data.	Provides for the transparent, comparable, adequate, and up-to-date publication of information on the applicable prices and rates in the contracts.	Requires the publication of the characteristics of Internet access, speed, quality of link, distinguishing between national and international connections, and the nature and guarantees of the service.	Clear and complete information on service provision contracts, giving details of the data protection regime, and network management practices.
	Against	Against	Against	Against
Blocking	Broadband suppliers cannot block access to legal content, applications, services or devices that are not harmful.	Makes it obligatory to support citizens' interests by promoting access and distribution of information or the use of the applications and services of their choice.	Prohibits blocking, interfering, discriminating, disrupting or restricting any content, application or legal service through the Internet.	The entity responsible for the transmission, switching, or routing has a duty to treat all data packages equally, without distinction on the grounds of content, origin and destination, service, terminal or application.
	Against	Open	Open	Against
Traffic discrimination	Prohibits paid prioritization and traffic discrimination or degradation. Suppliers cannot favour some lawful Internet traffic over other traffic in exchange for consideration.	Any traffic measurement or management actions, taken by suppliers to avoid exhausting or saturating network links, must be reported.	Suppliers will be able to adopt measures or actions needed for traffic management and network administration, provided they are not intended to affect free competition or could do so.	Traffic discrimination or degradation can only be the result of essential technical requirements and the prioritization of emergency services.

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

D. Cybersecurity

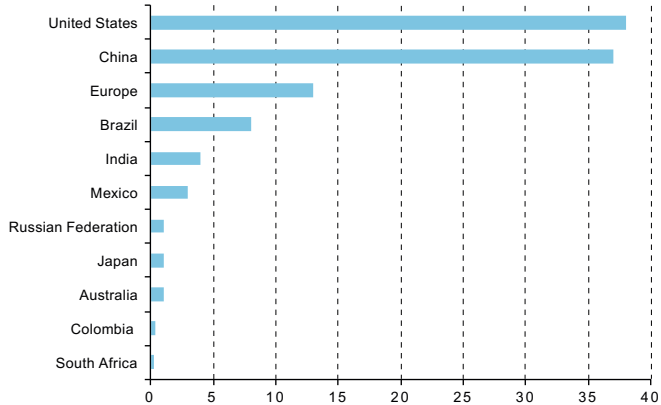
1. Cybercrimes are increasingly damaging the digital economy

- The costs of cybercrime totalled some US$ 113 billion in 2013, according to data from Symantec[5] for 24 of the world's countries. Those costs are estimated to have amounted to US$ 8 billion in Brazil, US$ 3 billion in Mexico and US$ 464 million in Colombia. About 378 million individuals were affected by this type of crime worldwide, with an average cost per victim of US$ 298. This represents an increase of 50% on the 2012 figure of US$ 197. As much as 83% of the direct costs were caused by fraud, repairs, thefts and losses.
- The same study showed that 50% of users had been victims of cybercrime or negative online situations, for example, receiving nude images from strangers or being bullied or stalked online; and 41% had been victims of attacks by malicious programs (malware), viruses, scams, frauds and thefts. Nonetheless, the survey respondents stated that the convenience of being online outweighed any security risk.

Figure III. 2

World (selected countries): cost of cybercrimes, 2013

(Billions of dollars)

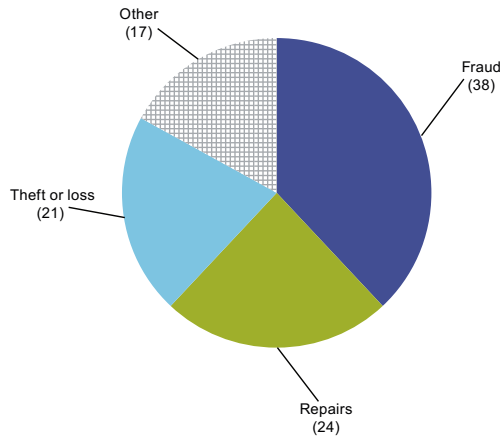


Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Symantec, *2013 Norton Report*, 2013.

Figure III.3

World: breakdown of the cost of cybercrimes, 2013

(Percentages of total cost)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Symantec, *2013 Norton Report*, 2013.

[5] See Symantec, *2013 Norton Report*, 2013.

2. Attacks on personal data and businesses are on the increase

- The main cybersecurity threats and trends in Latin America and the Caribbean include the exponential growth of personal data breaches (for example credit card numbers, dates of birth, identity documents, private home addresses and clinical records), attacks directed at individuals and organizations, and bank robberies. There has also been an increase in practices involving attacks that infect and restrict access to information technology systems and subsequently demand a ransom (ransomware), social media scams, mobile-computing vulnerabilities and risks, malware, unwanted e-mail (spam) and identity theft with specific objectives (spear-phishing).
- Spear-phishing and the use of malware are the main methods used to steal sensitive or confidential information in firms. In 2013, the sector most targeted by spear-phishing in the region was the manufacturing industry, which accounted for 30% of all attacks perpetrated, followed by construction and professional services. By size, firms with over 2,500 employees were by far the most susceptible to attacks.

Table III.8

Latin America: main cybersecurity incidents by country of origin, 2013

(Percentages)

Country	Ranking	Spam	Country	Ranking	Web attacks
Peru	1	29.3	Brazil	1	44.1
Argentina	2	20.0	Venezuela (Bolivarian Republic of)	2	13.3
Colombia	3	12.0	Mexico	3	9.8
Chile	4	9.6	Argentina	4	7.6
Uruguay	5	9.4	Uruguay	5	5.6
Brazil	6	7.7	Chile	6	5.5
Mexico	7	4.2	Colombia	7	4.6
Venezuela (Bolivarian Republic of)	8	1.6	Peru	8	1.9
Bolivia (Plurinational State of)	9	1.4	Costa Rica	9	1.6
Dominican Republic	10	1.1	Puerto Rico	10	1.5

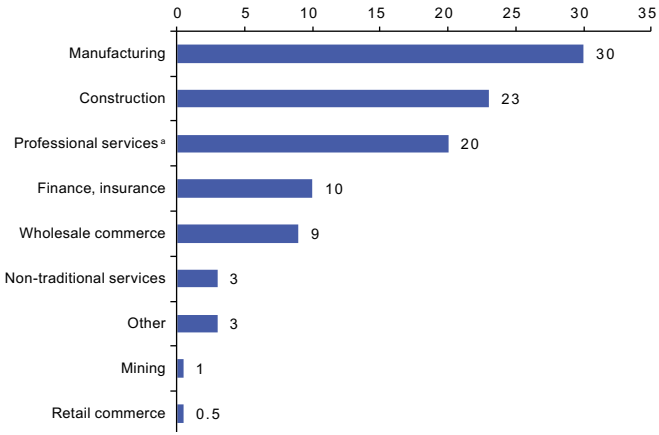
Country	Ranking	Spear-phishing	Country	Ranking	Malware
Brazil	1	39.7	Brazil	1	42.8
Mexico	2	14.6	Mexico	2	19.8
Argentina	3	13.1	Colombia	3	5.3
Chile	4	6.1	Argentina	4	5.1
Uruguay	5	5.2	Peru	5	4.1
Colombia	6	5.1	Uruguay	6	4.0
Venezuela (Bolivarian Republic of)	7	5.0	Chile	7	4.0
Peru	8	2.8	Venezuela (Bolivarian Republic of)	8	3.6
Dominican Republic	9	1.1	Ecuador	9	1.9
Puerto Rico	10	0.9	Dominican Republic	10	1.4

Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of Symantec, *Cyber Security Trends in Latin America and the Caribbean*, Secretariat of Multidimensional Security (SMS), and Inter-American Committee against Terrorism (CICTE) of the Organization of American States (OAS), June 2014.

■ Figure III.4 ■

Latin America and the Caribbean: sectors targeted by spear-phishing, 2013

(Percentages)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Symantec, *Cybersecurity Trends in Latin America and the Caribbean*, Secretariat of Multidimensional Security (SMS), and the Inter-American Committee against Terrorism (CICTE) of the Organization of American States (OAS), June 2014.

[a] The professional services category includes accounting and legal, engineering and health services.

■ Table III.9 ■

Latin America and the Caribbean: firms targeted by spear-phishing attacks by size, 2013

Number of employees	Percentage
Over 2 500	56.4
501 to 2 500	28.2
1 to 500	15.4

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of Symantec, *Cybersecurity Trends in Latin America and the Caribbean*, Secretariat of Multidimensional Security (SMS), and the Inter-American Committee against Terrorism (CICTE) of the Organization of American States (OAS).

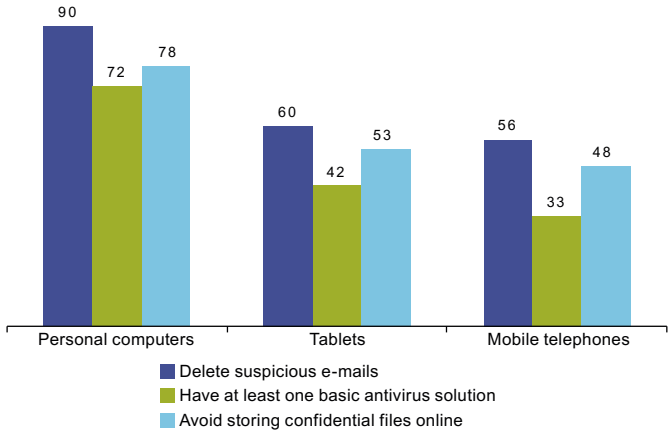
3. Users are more lax with security on their mobile devices

- People increasingly use mobile devices (particularly smartphones and tablets), but do not maintain the security practices they use on desktop computers. As the level of protection of desktop computers is higher, cybercriminals are shifting attention towards mobile devices, where consumers are more vulnerable. As mobile devices are increasingly used not only for personal activities (entertainment and leisure) but also for work-related activities, the risk to firms increases. Moreover, many firms do not have information security or cybersecurity policies, and even when they do, employees often do not respect them.

Figure III.5

World (24 countries): security practices by type of device, 2013

(Percentages of users)

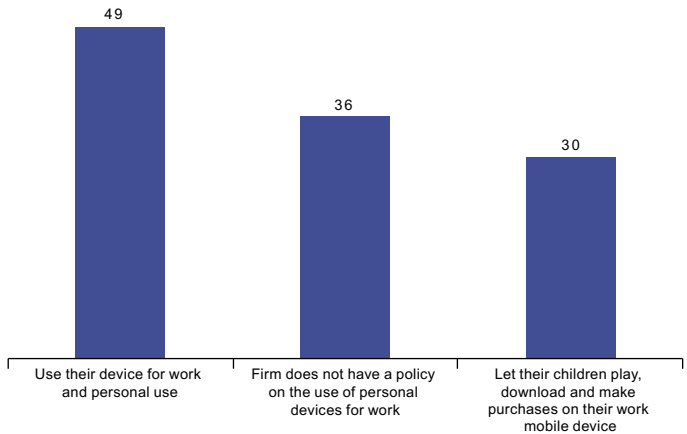


Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of Symantec, *2013 Norton Report*, 2013.

Figure III.6

World (24 countries): use of mobile devices, 2013

(Percentages of users)



Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of Symantec, *2013 Norton Report*, 2013.

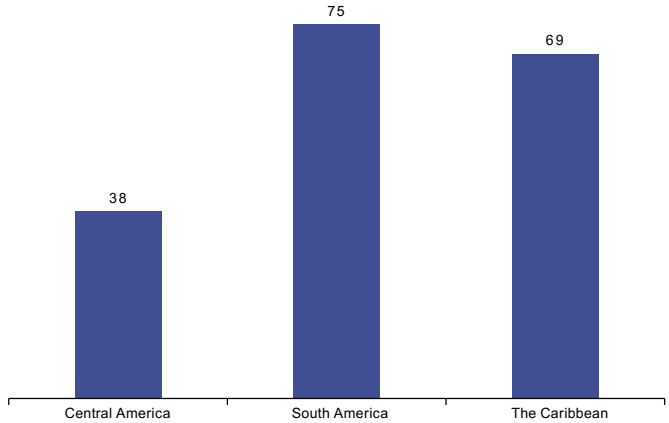
4. The adoption of cybercrime regulatory frameworks is making headway

- Combating cybercrime across borders poses complex problems, meaning that international coordination and cooperation are fundamental for creating a secure environment. The main regulatory instrument at the international level for mobilizing responses to cybercrimes is the European Council Convention on Cybercrime (known as the Budapest Convention on Cybercrime). This instrument was adopted by the Committee of the European Council of Ministers in 2001, and has served as a guide for designing regulatory frameworks. It is a binding instrument and covers the most important areas of cybercrime legislation (criminal law, procedural law and international cooperation).
- Major progress has been made in adopting cybercrime regulatory frameworks around the world: 60% of countries now have legislation on the subject. Although the region has outperformed the world average in this regard, it still lags behind the developed economies. In 2014, 21 of the 33 Latin American and Caribbean countries had legislation on cybercrime. Nonetheless, the situation varies between subregions: 75% of countries in South America had regulations of this type, compared with 69% in the Caribbean and 38% in Central America.

Figure III.7

Latin America and the Caribbean (33 countries): countries with legislation against cybercrime, 2014

(Percentages of countries in each subregion)

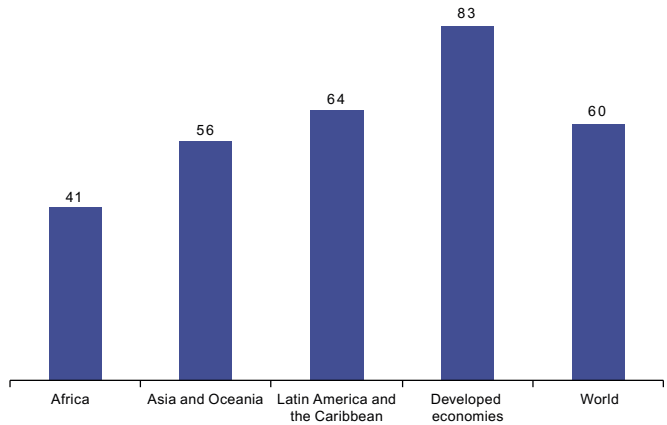


Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva 2015.

Figure III.8

World: countries with legislation against cybercrime, 2014

(Percentages of countries in each region)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva 2015.

5. There are technical and organizational weaknesses in the fight against cybercrime

- The Global Cybersecurity Index (GCI) prepared by the International Telecommunication Union (ITU), within the framework of the Global Cybersecurity Agenda (GCA), measures each country's degree of commitment to cybersecurity, using a series of individual indicators on legal, technical and organizational measures, capacity-building and international cooperation efforts. The indicators are prepared on the basis of a survey that reviews laws, regulations, computer security incident response teams (CSIRTs), national policies and strategies, standards, certifications, vocational training, awareness-raising and partnerships.
- An analysis of the findings of the 2015 index shows that Latin America and the Caribbean is below the world average, and only surpasses Africa. Nonetheless, the values of the index vary widely between subregions and countries. For example, while the index value for South America is above that of Asia and the Pacific and close to that of Europe, the value for the Caribbean subregion is lower than Africa's. Moreover, three of the region's countries rank in the index top 10: Brazil, Colombia and Uruguay.
- A comparison of the index values for Latin America and the Caribbean with those of North America and Europe shows that the greatest differences concern the technical and organizational measures that governments adopt and capacity-building. The technical measures include the establishment of CSIRTs, and the adoption and certification of internationally recognized cybersecurity standards. The organizational measures cover national cybersecurity policies and strategies, the creation of agencies specialized in the application of the national strategy and comparative evaluation exercises to measure progress on cybersecurity. Capacity-building includes public and private initiatives on standards research and development, training and the certification of professionals and agencies.

Table III.10

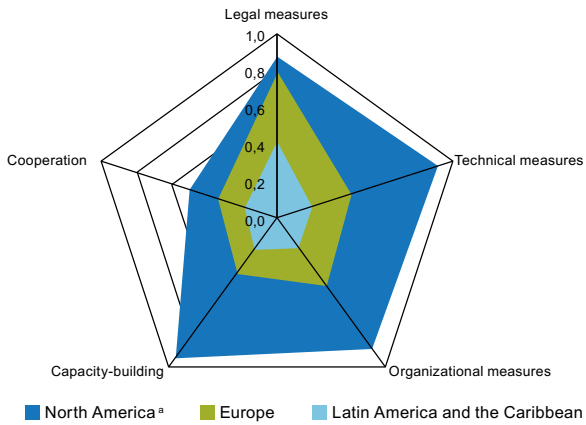
World: Global Cybersecurity Index by subindicators, 2014
(Indicator values)

Region \ Measures	Legal	Technology	Organizational	Capacity-building	Cooperation	Index
North America [a]	0.88	0.92	0.88	0.94	0.50	0.81
Europe	0.79	0.42	0.45	0.37	0.34	0.45
Asia and the Pacific	0.41	0.30	0.30	0.27	0.25	0.29
Arab States	0.42	0.24	0.27	0.26	0.23	0.27
Comunidad de Estados Independientes (CEI)	0.73	0.31	0.19	0.13	0.26	0.27
Latin America and the Caribbean	0.42	0.20	0.20	0.21	0.19	0.22
South America	0.58	0.43	0.36	0.41	0.28	0.39
Central America	0.25	0.29	0.20	0.20	0.20	0.22
The Caribbean	0.39	0.02	0.09	0.09	0.13	0.12
Africa	0.31	0.13	0.17	0.11	0.16	0.16
World	0.50	0.27	0.28	0.24	0.24	0.28

Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of International Telecommunication Union (ITU), *Global Cybersecurity Index*, 2015.
[a] Includes the United States and Canada.

Figure III.9

Latin America and the Caribbean, Europe and North America: Global Cybersecurity Index (GCI) by subindicators, 2014
(Indicator values)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of International Telecommunication Union (ITU), *Global Cybersecurity Index*, 2015.
[a] Includes the United States and Canada.

E. Protecting consumers online

1. The complaints lodged by consumers in the region are similar to those of consumers worldwide

- The region is not exempt from the risks of e-commerce. The International Consumer Protection and Enforcement Network (ICPEN) —a network of public authorities from 56 countries that participate in the task of protecting online consumers— reported having received 23,437 complaints of violations of e-commerce standards from around the world between January and December 2013. The list of leading countries in terms of the number of complaints included three Latin American countries (Argentina, Brazil and Mexico). Problems of misleading descriptions and failures to deliver products and services were the main reasons for complaints around the world.

Table III.11

World: top 10 countries of residence of consumers or companies involved in online complaints, 2013

(Number of complaints)

Origin of consumer complaints	Number	Origin of company complaints	Number
United States	13 445	United States	4 731
Australia	1 914	China	3 996
France	1 100	United Kingdom	1 213
United Kingdom	767	India	469
Canada	694	Canada	285
Brazil	555	Australia	264
Israel	448	France	246
Argentina	341	Germany	220
India	311	Mexico	158
Spain	295	Spain	144

Source: United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva, 2015, on the basis of information from econsumer.gov.

Table III.12

World: top violations reported by online consumers, 2013

(Number of complaints and percentages of the total)

Type of complaint	Number	Percentage
Other misrepresentation	5 691	19.2
Merchandise or service never received	4 864	16.4
Failure to honour refund policy	3 248	11.0
Cannot contact merchant	2 435	8.2
Defective/ poor quality product	1 886	6.4
Unauthorized use of identity	1 200	4.1
Bill for unordered merchandise or service	1 088	3.7
Failure to honour warranty or guarantee	830	2.8
Merchandise or service not in conformity with order	822	2.8
Merchandise or service received late	650	2.2

Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of econsumer.gov.

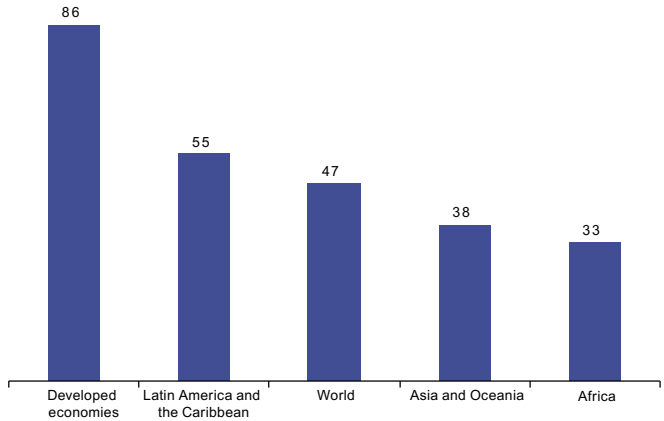
2. Laws protecting online consumers differ widely between countries

- Although the region has made headway with legislation to protect online consumers, there are still differences with respect to the developed economies. In 2014, 55% of the 33 Latin American and Caribbean countries had legislation on the subject, compared with 86% of developed economies. The situation varies between subregions, however: in Central America, 88% of the countries analysed have laws on the subject, compared with 75% of South American countries and just 15% of Caribbean countries. According to the United Nations Conference on Trade and Development (UNCTAD), the main reason for the slow uptake of this type of framework is a lack of knowledge or training on the part of decision makers and legislators.

Figure III.10

World: countries with legislation protecting online consumers by region, 2014

(Percentages)

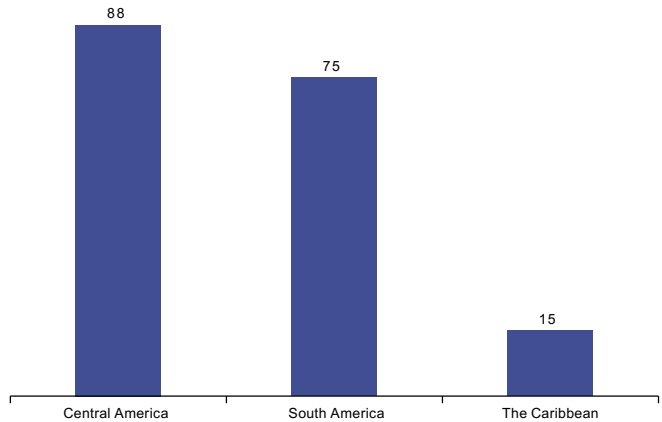


Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva, 2015.

Figure III.11

Latin America and the Caribbean (33 countries): countries with legislation protecting online consumers by subregion, 2014

(Percentages of the total)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva, 2015.

3. Consumers of intangible digital products also need protection

- The cross-border nature of, and the asymmetries that exist in, e-commerce transactions have become a challenge for generating trust in online purchases. The aim of international frameworks for consumer protection in e-commerce has been to persuade governments to formulate standards, policies and practices to protect consumers effectively, implement self-regulation schemes, and provide clear guidance on the essential characteristics of information disclosure and fair commercial practices. The main international reference frameworks are the Guidelines for Consumer Protection in the Context of Electronic Commerce, published by the Organization for Economic Cooperation and Development (OECD), and the United Nations Guidelines for Consumer Protection.
- With the aim of expanding digital markets and enhancing the protection of online consumers, in January 2014, OECD presented a proposal for Consumer Policy Guidance on Intangible Digital Content Products, targeting digital products that are acquired through e-commerce and received by the consumer electronically.
- A new approach to the consumption of digital products became essential owing to the inadequate dissemination of information; misleading or unfair commercial practices; the collection, use and exchange of personal data; inadequate dispute settlement and appeal mechanisms; and concerns about unauthorized charges associated with the use of online applications and games. In this sphere, promoting digital competition encompasses a wide range of products, including communications media and entertainment items (films, music, games, virtual world programs, electronic books, magazines, images, news and Internet Protocol television (IPTV) services), as well as personalization applications and services such as ring tones and screensavers. These products, which tend to be the subject of licence agreements, are generally delivered in environments where the consumer experience is subject to terms and conditions determined by various actors. Similarly, the policy principles can be applied to circumstances in which the products are sold bundled with other goods and services.

■ Table III.13 ■

International reference frameworks for protecting online consumers

United Nations Guidelines for Consumer Protection	Recommendation of the Organization for Economic Cooperation and Development (OECD) Council concerning Guidelines for Consumer Protection in the Context of Electronic Commerce	Consumer Policy Guidance on Intangible Digital Content Products
Focus	Focus	Focus
To maintain a strong consumer protection policy, taking into account the guidelines contained in international agreements.	Applied to business-to-consumer e-commerce, but not to transactions between firms.	Applied to digital products acquired through e-commerce and received in electronic format.
General principles	General principles	General principles
• Consumer protection from health and safety hazards • Promotion and protection of consumers' economic interests • Consumer access to adequate information • Consumer education • Possibility of effective consumer redress • Freedom to form consumer and other relevant groups or organizations and for such organizations to present their views in decision-making processes affecting them • Promotion of sustainable consumption patterns	• Transparent and effective protection • Fair business, advertising and marketing practices • Online disclosures • Information about the business • Confirmation process • Dispute settlement and redress • Alternative dispute settlement and redress mechanisms • Privacy • Education and awareness	• Digital content product acquisition and usage conditions • Privacy and security • Fraudulent, misleading and unfair commercial practices • Child safety • Dispute resolution and redress • Digital competence

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

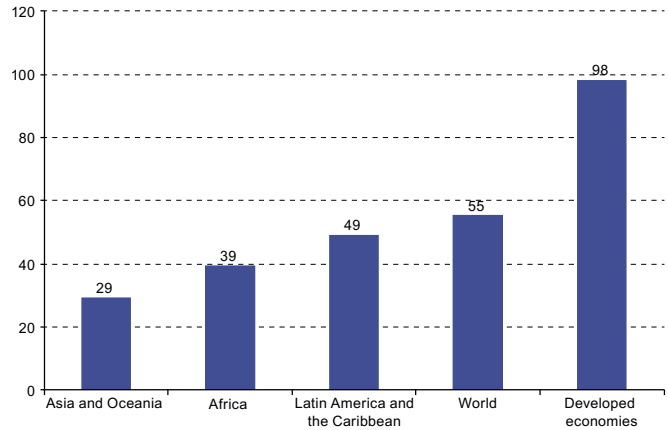
4. The region must increase personal data protection

- The digital economy involves risks in terms of personal data protection. According to Symantec, in 2014 over 552 million identities were exposed worldwide as a result of data breaches, putting credit card information and financial and medical data at risk. This type of crime includes attacks against individuals and organizations, scams in social networks, damage caused by the use of banking trojans and theft.
- Around the world, 107 countries have legislation on privacy and personal data protection. In Latin America and the Caribbean, 49% of countries have laws on this subject, although there are differences between subregions: the percentage is 67% in South America, 39% in the Caribbean and 38% in Central America. The regulatory frameworks that serve as a benchmark on the subject are the OECD Guidelines for Consumer Protection in the Context of Electronic Commerce, the European Union's Data Protection Directive and the Privacy Framework of the Asia-Pacific Economic Cooperation Forum (APEC).

Figure III.12

World: adoption of legislation on privacy and personal data protection, 2014

(Percentages of countries)

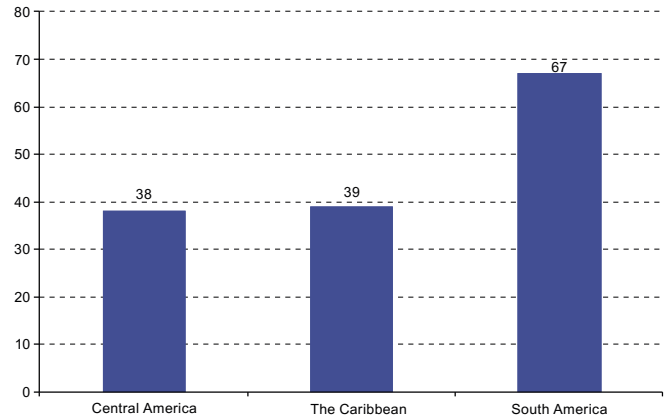


Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva, 2015.

Figure III.13

Latin America and the Caribbean: adoption of legislation on privacy and personal data protection, 2014

(Percentages of countries)



Source: Economic Commission for Latin America and the Caribbean (ECLAC) on the basis of United Nations Conference on Trade and Development (UNCTAD), *Information Economy Report 2015 - Unlocking the Potential of E-commerce for Developing Countries*, Geneva, 2015.

F A digital economy for Latin America and the Caribbean

1. The need for a single digital market

- Many variables influence the expansion of the digital economy and have an impact on the deployment of infrastructure, the entrepreneurial development of services and digital applications, and the adoption of technology by firms and individuals. A 2014 study by the Boston Consulting Group (BCG)[6] reviewed the main factors that prevent consumers, firms and countries from taking full advantage of the digital economy. That study, which presented an index consisting of 55 subindicators using data from 65 economies, analysed problems relating to infrastructure, the sectoral variables that limit the abilities of firms and individuals to participate in online transactions, constraints on the individual access to the Internet and the availability of online content. These problems are also known as e-frictions.
- The countries of the region included in that analysis were found to be at a disadvantage with respect to all components: infrastructure, industry, individuals and content. The e-frictions in question hindered the exploitation of cross-border synergies that could be achieved with a uniform institutional and regulatory framework. A common digital bloc or market could significantly support regional efforts to expand the digital economy. In fact, telecommunications operators have also identified the potential economies of scale, reductions in regulatory complexity and elimination of functional overlaps that may exist in firms.
- A similar problem has recently been considered by the European Commission, which has proposed a Digital Single Market strategy to guarantee the free circulation of digital goods and services and to provide firms with greater opportunities for expansion. This strategy is based on three pillars: improving online access to digital goods and services for consumers and firms; creating an environment where digital networks and services can prosper; and maximizing the growth potential of the digital economy.

Table III.14

Index of factors that hold back the digital economy (e-friction index), 2014

Country	Infrastructure	Industry	Individual	Information	Final ranking	Score
United States	7	10	17	2	6	22
Germany	10	20	8	9	11	26
Spain	35	35	27	35	33	47
Panama	28	24	36	49	34	48
Chile	46	29	34	48	41	57
Argentina	48	65	56	36	49	67
Mexico	50	48	58	45	51	68
Brazil	51	51	50	53	52	69
Colombia	55	58	54	47	56	71
Venezuela (Bolivarian Republic of)	49	64	59	43	55	71
Peru	63	53	61	41	60	75

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of The Boston Consulting Group, *Greasing the Wheels of the Internet Economy*, 2014.

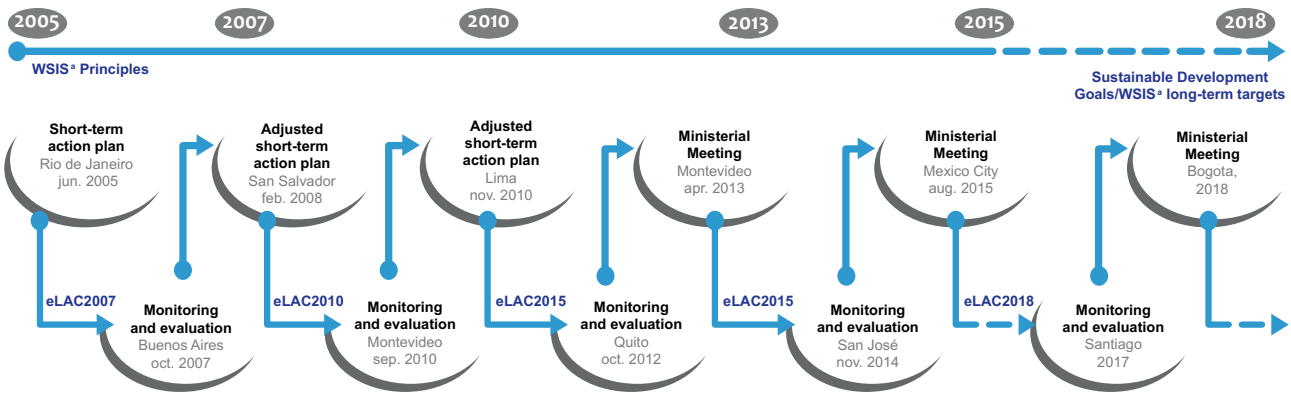
[6] See Boston Consulting Group, *Greasing the Wheels of the Internet Economy* [online] https://www.bcgperspectives.com/content/articles/digital_economy_telecommunications_greasing_wheels_internet_economy/?chapter=2.

2. The new Latin American and Caribbean agenda for the digital revolution

- Most of the region's information society strategies originated in the early 2000s as part of the process driven by the first and second phases of the World Summit on the Information Society (2003 and 2005), the Millennium Development Goals and the Plan of Action for the Information Society in Latin America and the Caribbean (eLAC2007, eLAC2010, eLAC2015 and eLAC2018). The countries have continued to move in this direction by renewing their national digital policies and promoting third- and fourth-generation agendas, as in Chile, Colombia, Mexico and Uruguay.
- In this new phase, Internet-related technologies continue to play a prominent role in digital agendas as key drivers of economic growth, social inclusion and sustainable development. In this context, connectivity and broadband infrastructure remain a priority, along with the promotion of digital skills and capacities, e-government, innovation and digital entrepreneurship, as well as the application of technology in social domains (education and health). New items included in digital agendas are fostering digital innovation based on the use of public information, open government data, and the importance of Internet governance models based on multi-stakeholder involvement in policymaking.
- At the fifth Ministerial Conference on the Information Society in Latin America and the Caribbean, held in Mexico in August 2015, the region renewed its cooperation agreements on digital issues, with a focus on the challenges arising from the new trends surveyed in this document, the development of the Internet of Things, big data analytics, technological convergence, and the opportunities that these trends present in the social, economic and environmental domains. This regional digital agenda proposal is built on five pillars: access and infrastructure, the digital economy, e-government, social inclusion and sustainable development, and governance.

■ Diagram III.7 ■

Stages of the Plan of Action for the Information Society in Latin America and the Caribbean (eLAC), 2005-2015



Source: Economic Commission for Latin America and the Caribbean (ECLAC).
[a] World Summit on the Information Society.

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