DIGITAL TRANSFORMATION
ECONOMIC AND EMPLOYMENT REACTIVATION
IN
LATIN AMERICA AND THE CARIBBEAN
POST COVID-19

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Introduction

Technological revolution was already penetrating all sectors of economic and human activity in an accelerated way before the pandemic in all countries of the world, including in Latin America and the Caribbean (LAC), creating challenges and opportunities. The COVID-19 crisis has further accelerated the technological penetration, particularly digital transformation, creating new opportunities, but also enhancing threats.

This document analyzes digital transformation potential in Latin America and the Caribbean (LAC), and of its great enabler, cloud computing, to promote the reactivation and reconstruction needed to repair damages stemming from the pandemic, but also to simultaneously face several pre-existing conditions, in the form of gaps and dualisms, that the region had been dragging, and that have been deepened and exacerbated by the pandemic.

Digital transformation can help turn the Covid-19 crisis into a new development opportunity, as it provides new tools and opportunities for countries in the region in a wide range of topics and areas: innovations in business and consumption models, transformation of production systems and value chains, generation of new employment dynamics in labor markets, progress towards precision social policies, improvement and modernization of education and health systems, financial deepening and banking, more efficient and innovative public institutions, etc.[1]

Before the pandemic, the use of digital technologies in the region had grown rapidly and the spread of mobile phones and broadband internet had allowed important segments of the population to connect to digital networks. At the end of 2017, 391 million of the 628 million inhabitants of the region were connected, that is, around 62% of the population, compared to just over 50% at the end of 2014. However, 38 % of the population, about 237 million people, were still missing, to achieve universal connectivity. Many companies, particularly SMEs, have little or no access to digital technologies.

However, countries in the region are far from taking advantage of all the potential benefits of greater achieved access, which is not yet translated into sufficiently widespread and productive uses by economic agents and, hence, is not clearly reflected on productivity improvement or other economic and social performance variables.

This is so because the use of digital technologies is not well spread, particularly in multiple applications around business models, organizational practices, educational models, public service supply, financial inclusion, electronic commerce, agile use of talent, etc. The pandemic has caused a leap in use, but there is still a long way to go in all dimensions for a deep digital transformation: connectivity infrastructure, adequate regulatory frameworks (cybersecurity, data protection, public technology purchases, competition policies), training and digital culture among human resources, institutional and governance frameworks suitable for digital transformation.

Much has been written about the legacy of historical gaps and dualisms that the region has not managed to overcome regarding productivity, education and skills, digital skills, by size of company, in territorial terms and in institutional matters, despite advances in several of these areas. Unfortunately, the Covid-19 crisis took the region at a bad time. After the golden era of growth from 2003 to 2013 (explained more by the high demand and prices of primary product exports than by productivity growth), the region's

[1] Ver OECD-ECLAC-CAF-EU (2020), OCDE (2019).

economic growth had become mediocre since 2014, and the economies had consistently shown a low productivity syndrome, with an employment crisis in which 1 in 5 young people was unemployed, 1 in 2 people was in the informal sector, and 30% of the population was under the poverty line.

This article argues that digital transformation, and the corresponding cloud computing, can help not only to rebuild and repair damage caused by the pandemic, but also reduce the legacy of development gaps and traps that characterize the countries in the region, because it offers many opportunities to accelerate productivity, quality employment, SME competitiveness, human talent capabilities, public service supply, innovation, health system improvement, and generally, people's welfare.

The future is digital, and the longer countries take to increase not only access but also intelligent and massive use of opportunities brought about by the new digital economy, the more they will delay taking advantage of its enormous benefits, including the possibility of escaping from the four development traps in the region, which the *2019 Latin American Economic Outlook Report* very usefully and correctly identified:[2] the productivity trap, the social vulnerability trap, the low institutional capacity trap and the environmental trap, all of which are related to the well-known "middle income trap."

Before the COVID-19 crisis, numerous reports and analysts had emphasized the need for policy makers to be more proactive in their efforts to close digital gaps. However, progress has not been as fast as necessary.

It is still a paradox that the COVID-19 crisis, with its devastating burden of negative impacts, is nevertheless having the positive effect of drastically accelerating digital transformation in the region and creating much greater awareness about its importance. The pandemic has also made us more aware that technology is not an enemy, but an ally, and that there are many and very interesting opportunities in technological acceleration for governments, companies, workers, homes and people and in many policy areas, including health, education and public services based on digital government. Net effects depend on the policy responses and actions of governments, businesses, organizations and individuals.

In short, technological acceleration brought on by COVID-19 has created exciting new opportunities to bridge gaps and increase resilience through digital transformation and related cloud services. Success in navigating recovery will require greater efforts in digital solutions. The year 2021 should be one of innovation and renewed efforts and investments in digital transformation in the region's countries. Digital transformation is not a silver bullet, but it is a decisive factor in building more resilient, competitive, prosperous, inclusive and sustainable societies.

The document is organized as follows.

- Section 1 analyzes the pandemic’s socio-economic and employment impacts, how it has exacerbated a number of pre-existing gaps and how it raises the urgency of adequate responses.
- Section 2 suggests the great potential that digital transformation has to address some of the gaps and “development traps” exacerbated by the pandemic.
- Section 3 reviews the main technological and digital transformation indicators in the region’s countries to give an idea of the traveled path and pending challenges. It also presents a conceptual framework for understanding basic factors or drivers in digital acceleration, such as regulatory frameworks for cybersecurity and data protection, human resource conditions, and rules for purchasing technology by public institutions.

[2] OECD-CAF-ECLAC-EU (2019).

- Section 4 reviews transformation progress and prospects in four specific sectors or areas: health; education and vocational training; productive development, electronic commerce and MSMEs; as well as digital government and State transformation.
- Section 5 looks at the importance of various governance and institutional architectures for managing digital transformation.
- Section 6, the final one, makes recommendations as a roadmap for effective digital transformation strategies to aid rebuilding with transformation in the post-pandemic era.

I. COVID-19 crisis impacts in Latin America and the Caribbean and the urgency for appropriate responses

Economic, social and labor impacts

Latin America and the Caribbean (LAC) has been the region in the world most affected by the pandemic. With just 8.2% of the world's population, the region has registered 18% of contagion cases (19 million) and 25% of deaths (601,256) until February 2 2021.

The impact has been stronger than in developed countries (with the exception of the United States). Besides, challenges to respond are more difficult and complex due to several aggravating conditions:

i) the region's countries do not have means comparable to developed countries to support economic activity and employment; the fiscal and financial capacities and execution of public institutions are weaker;
ii) the health and social protection systems, whose basic capacities determine resilience to economic shocks, are also much weaker;
iii) the pandemic impacted the region upon a historical legacy of pre-existing structural gaps and dualisms, deepening and exacerbating them. These are productive, territorial, digital, educational and skills gaps, labor gaps between formal and informal workers, and between men and women at work, between large and modern high-productivity companies and small and micro-enterprises with low productivity where informality predominates. Also,
iv) the pandemic started as a health emergency, but is rapidly evolving into an employment crisis.

As various analysts and international organizations have pointed out, the region's countries will clearly emerge from the pandemic under a critical situation of higher unemployment, higher underemployment, higher informality, higher poverty, drastic reduction in income, and higher inequality. (OECD, ECLAC, ILO, IDB).

The year 2021 is going to be one in which governments and societies are going to be in "crisis management" mode. COVID-19 has created a deep recession and an unemployment and human capital crisis. It is estimated that average contraction in the region must have been between -8% and -9% in 2020. (ECLAC, 2020; IMF, 2020). Unfortunately, the pandemic took many countries in the region at a bad time. LAC's economic growth was already weak before the pandemic: the 2014-19 period was the one with the lowest growth since the 1950s, only 0.4%.

The average employment rate in LAC decreased from 56.5% to 51.1% between I-2019 and II-2020.[3] This is 34 million workers who lost their jobs in the second quarter of 2020. The vast majority of those who lost their jobs did not continue looking for work, that is, they did not increase unemployment numbers, but there was a massive exit from the work force.[4] This explains that the average unemployment rate increased by only 2.2 % to 11.5%, in contrast to higher increases in other crises. According to the ILO, 94% of those who lost their jobs left the labor force (discouraged), only 6% continued to search (unemployed).

More than in previous crises, the impacts on unemployment rates are only the tip of the iceberg and reflect very little of the ravages this crisis has made on labor markets. For a more complete picture, it is imperative to look at the indicators of increased underemployment, reduction of working hours, greater informality and higher poverty and inequality.

The ILO estimates the loss of hours worked in LAC at 21%, compared to an average global reduction of 12%. This suggests a sharp increase in the underutilization of the labor force and a sharp reduction in earnings.

In terms of population groups and categories, the most affected have been women, youth, informal and self-employed workers, and people with less education.

Regarding informality, the IDB has estimated that it may rise to 62% compared to the pre-COVID-19 level of 54%. This would mean returning to informality levels in the late 20th century, two lost decades of progress in reducing informality. [5]

Regarding poverty, ECLAC estimates that there will be an additional 45.4 million poor people (from 185 to 230 million), an increase of 7 percentage points in the poverty rate, from 30% in 2019 to 37% at the end of 2020. And that extreme poverty would increase from 68 to 96 million people, an additional 28 million people: 15.5% of the total population.[6]

An important difference with former crises is the higher inequality impact this crisis is causing. A recently published study by the IDB, *The Inequality Crisis*,[7] analyzes 129 recessions between 1972 and 2018 in 22 countries of the region, and shows that in previous crises the most affected segment on average was the middle class. However, as the study points out, this time a high proportion of the middle class have been able to continue doing remote work; another segment has avoided dismissal thanks to short-time schemes; public employees have been basically protected from the impacts (with the exception of Uruguay for a brief period, no other country in the region has changed their employment or wages); and people with more education have had much less employment incidence than people with less education.

In contrast, most of the informal and poor people do not have access to telework; their employment and livelihoods were strongly affected by confinement measures; their children's education has been tragically impacted; and the segments with the least education have been hit the hardest by unemployment and underemployment. They are the ones that will have the fewest opportunities for recovery and who will

[3] According to ILO (2020a) and based on official information from 9 countries.

[4] This and other data on employment in this section are based on ILO (2020a), except when another source is pointed out.

[5] IDB, How will COVID19 impact employment? Possible scenarios for Latin America and the Caribbean, April, 2020.

[6] ECLAC "Political and social pacts for equality and sustainable development in LAC during recovery from COVID-19", Especial COVID-19 Report, Number 8, October, 2020

[7] Busso and Messina (2020).

be the most damaged in their future income possibilities. All this adds to the situation of social vulnerability that the region already had prior to the pandemic.

Conditional and unconditional cash transfer measures have helped, but not enough to offset the strong impoverishing and regressive effects of the pandemic shock, which are exacerbated by coverage gaps in social protection systems and micro and small companies' vulnerabilities. More unequal and fractured societies are other structural legacies of the pandemic, more than with other crises, a reality that post-pandemic economic and social policies must face.

According to a study, one of the most negative impacts of the Covid-19 crisis is to go back in the progress the region has made in education, not for years, but for decades, to levels in the 60s.[8] According to UNICEF, 97% of children have been out of classes in 2020 in a region where social mobility thanks to education is already low. This setback in education is not only detrimental to affected children, but also to future economic growth and causes inequality. Despite efforts made, access to virtual education is very uneven between the highest and lowest income strata.

Digital transformation acceleration caused by the pandemic and its benefits

But the COVID-19 crisis has also caused a great acceleration of digital transformations on the part of all actors: governments, companies of all sizes, educational systems, households, and individuals. There is a quantitative and qualitative leap here.

The pandemic produced a sharp jump in teleworking. Many workers and employees learned to telecommute, to use digital communication and collaboration tools. It is estimated that only between January and March, 2020 the downloads of Apps that facilitate remote work (such as Zoom, Skype, Microsoft Teams, etc.) multiplied 20 times. A survey of 250 large companies in Argentina in March 2020 found that 93% of them had adopted teleworking as a policy in response to the pandemic.[9]

One of the biggest transformations was the growth of e-commerce towards new companies, customers and product types. Before the pandemic, the use of electronic commerce was limited to a relatively limited number of goods and now it has spread to new products and services that cover every-day needs (food, medicines), as well as to new market segments (senior citizens). (OECD, 2020a) Most analyses argue that this growth is not temporary, but rather a change that is here to stay and consolidate. Some articles on the subject state that “the future has already arrived”.

According to IBM's retail sales index for the United States, the pandemic accelerated the migration from brick and mortar stores to digital purchases by approximately 5 years.[10] The report suggests that department stores must move to multichannel capabilities, and in particular e-commerce, to reach their customers and stay competitive, something that companies like Walmart and Target have done. Walmart had a 97% growth in online sales in the second quarter of 2020, and Target 273%.

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[8] Lustig, Neidhöffer, Tommasi (2020) Back to the 1960s? Education may be Latin America’s most lasting scar from Covid-19”. Americas Quarterly, 3 December. https://americasquarterly.org/article/back-to-the-1960s-education-may-be-latin-americas-most-lasting-scar-from-covid-19/

[9] Berg et al (2020). See footnote 67 for definitions of different kinds of work at home, one of which is teleworking.

[10] https://techcrunch.com/2020/08/24/covid-19-pandemic-accelerated-shift-to-e-commerce-by-5-years-new-report-says/?guccounter=1

McKinsey goes further and has estimated that the pandemic compressed to 3 months all the growth of electronic commerce that was expected to happen in 10 years in the United States.[11]

Amazon International's net sales increased by 28.3% between the first half of 2020 and the same period in 2019. The information on the growth of e-commerce is mostly anecdotal and partial, since there are no systematic and comparable statistics of international e-commerce. Mercado Libre's sales in Argentina increased by 230% in the second quarter, in Mexico by 122% and in other countries by 69%. (Díaz de Astarloa, 2020). The number of Netflix subscriptions in Latin America grew by 30% in the second quarter of 2020, reaching 36 million people.

In Central America, a study estimated that e-commerce rose by 300% during the months of March and April 2020.[12] Around 54% of internet users had purchased food products through applications and the internet by mid-2020 in Brazil, substantially above the 22% registered in 2018 (OECD, 2020a: 6).

Evidence based on the IDB's business social network, ConnectAmericas.com, indicates that companies without a prior digital presence experience a significant increase in their external sales when using the platform.

To a greater or lesser extent, all Latin American and Caribbean countries took measures to sustain the growth of e-commerce: 60% established training programs and websites to strengthen the online presence of companies, particularly SMEs; 50% took measures to facilitate the release of packages in customs and maintain the operation of logistics services; and 20% made changes to the regulatory or legal frameworks for e-commerce. (Díaz de Astarloa, 2020).

Taking advantage of growth opportunities via e-commerce depends not only on the issue of internet access but also on the development by companies of new value propositions for consumers, better knowledge of customers and improvements in how to relate to "customer ecosystems," as well as the so-called last-mile logistics.

On the part of governments, greater trade facilitation efforts are needed, such as mechanisms to guarantee the safe and expeditious processing of the growing number of small-value international packages, better electronic payment systems and corresponding regulations.

And of course, it should not be forgotten that the great common facilitator for the growth of all digital applications, including e-commerce, is computing and cloud services. During the pandemic, countries have realized that the cloud is the only option to manage and analyze large databases, and hence allow service scalability, and to use the information strategically both for public policies in the case of governments and for competitiveness strategies in the case of companies.[13]

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[11] https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/five-fifty-the-quickening#

[12] https://www.eleconomista.net/economia/Comercio-electronico-aumenta-en-Centroamerica-junto-con-sus-amenazas-20200624-0021.html

[13] Cloud computing is the provision of computing services, including servers, storage, databases, networks, software, analytics, and artificial intelligence related to all of the above, through the internet (the cloud) to facilitate faster innovation, flexible resources, and economies of scale. You typically pay only for the cloud services you use, which helps lower operating costs, use infrastructure more efficiently, and scale as the needs of organizations and businesses change. Cloud computing involves a great change in how organizations and

This more intense use of ICTs and cloud computing has made it clear that a digital society is more dynamic, more productive, and more resilient, but also that it is essential to reduce access inequalities and level the playing field to maximize the benefits of these effects. It is imperative for Latin America to build broadband highways that guarantee universal connectivity coverage.

Conclusions

The pandemic has had a combination of negative impacts, which tend to exacerbate pre-existing gaps, but it has also had positive acceleration effects, especially in relation to digital transformation. All this poses huge economic and social policy challenges, but also great opportunities to make leaps in the incorporation of technologies to improve well-being and make important transformations.

Even with the expected economic recovery, this year 2021 is going to be one in which governments and societies will be in "crisis management" mode, that is, managing a perfect storm of several crises at the same time: health, employment, education, economic and social issues, inequality, and -in some countries- taxes.

Therefore, a number of economic and social reforms are urgently needed to promote not only an economic reactivation, but also a reconstruction with transformation that not only achieves a return to growth rates prior to the pandemic, which was unsatisfactory, but also reduces gaps, and directs growth to be higher, sustained and inclusive by creating more and better jobs.

Under this perspective, the frequently used term of economic "reactivation" falls short, because the necessary measure package must not only reactivate economic and productive systems, but also rebuild and transform them at the same time to reduce gaps, structural heterogeneities and historical dualisms that characterize the countries.[14]

Therefore, it is suggested here that the goal in the post-pandemic stage should be "reconstruction with transformation," that is, post-pandemic public policies need a very clear focus and directionality. As Mariana Mazzucato has insisted, economic growth not only has a rate but also a direction and the role of the State is not only to raise but to give direction to growth. Post-pandemic, this becomes more important than ever in Latin America and the Caribbean.[15] However, it faces restrictions and limitations (i) on the side of the capacity to build widely shared visions via social dialogue processes, and (ii) on the side of the weakened technical, operational and political capacities of many state institutions in the region's public sector.

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companies think about the use of ICTs. https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/#benefits
Cloud computing is the provision of ICT resources on demand through the Internet with prices per use. Instead of buying, owning and maintaining physical servers and data centers, you can access technology services, such as computing power, storage, and databases, as you need them from a cloud service provider like Amazon Web Services. (AWS). https://aws.amazon.com/what-is-cloud-computing/

[14] The *2019 Latin American Economic Outlook* of OECD, ECLAC and CAF identifies four development traps in the region's countries: low productivity, social vulnerability, institutional weaknesses and environmental sustainability. Development traps involve mutually reinforcing circular dynamics that limit countries' possibilities to move forward.
[15] Why drive mission-driven innovation? Interview with Mariana Mazzucato, August 31 Agosto 2017. https://blogs.iadb.org/innovacion/es/por-que-impulsar-la-innovacion-orientada-por-misiones/

In all these tasks, digital transformation and the corresponding cloud computing have high potential to help turn adversity into opportunities for improvement in a wide variety of areas, as discussed in the next section.

II. The contribution of digital transformation in overcoming development traps and the urgent post-pandemic "reconstruction with transformation"

As stated in the introduction, the pandemic aggravated a series of existing structural gaps in the region's countries: educational and skills, labor between formal vs. informal workers, productive and sectoral, territorial, digital, between high productivity in large and modern companies and low productivity in small and micro enterprises where informality predominates. The pandemic also exposed deficiencies in the technical and operational capacities of many public institutions.

Development traps in Latin America and the Caribbean aggravated by the pandemic

A useful way to understand these gaps is to synthesize them into four development traps into which the region seems to have fallen, even before the pandemic. The OECD, CAF, ECLAC and EU have prepared the 2019 Economic Outlook for Latin America Report on the productivity, social, institutional and environmental vulnerability traps. [16]

The concept of development trap refers to certain dynamics, vicious circles or a combination of factors that reinforce each other and that prevent countries from making progress on certain development challenges. Overcoming them requires coordination of collective action, that is, certain forms of governance and institutional capacities.

The productivity trap and the lack of quality employment

Latin America has an important productivity gap with the leading countries that, far from narrowing, is rather widening. The Inter-American Development Bank (IDB) has called this the "tragedy of Latin America"[17], ECLAC has called it the "Achilles' heel of regional economy"[18] and OECD has called it "the productivity trap".[19] Low productivity growth is one of the main indicators that countries in the region are in the "middle income trap"[20].

[16] The idea of traps is not new. In the past there has been talk of the "poverty trap" and also of the "middle income trap". Ideas like Gunnar Myrdal's "cumulative circular causation" and Albert Hirschman's "unbalanced growth" have elements in common with the concept of developmental traps.
[17] Pagés, Carmen (2011).
[18] Alicia Bárcena, first high-level meeting of OECD's Regional Program for Latin America and the Caribbean. Santiago, Chile, October 16, 2016.
[19] OECD et al (2019).
[20] Low economic growth situation where a middle-income country cannot compete internationally in labor-intensive standardized products because its wages are relatively very high, but cannot either compete in high value-added activities on a sufficiently high scale, because its technological capacity and productivity is insufficient to compete with the most advanced countries.

Exports from Latin America and the Caribbean continue to be concentrated, with some notable exceptions, in primary and extractive sectors and in goods of low technological sophistication. Productivity gaps are not only compared to leading countries but also internal: between regions or territories (urban and rural areas), between economic sectors, between formal and informal sectors, between exporting and local companies, and between companies of different sizes. This reflects a poorly diversified and poorly articulated productive structure, with deficiencies in sophistication and technological complexity, which becomes more serious in this era of great technological acceleration and the IV Industrial Revolution.

To escape this trap, it is necessary to promote a broad and diversified base of economic sectors and activities with increasing productivity and technological sophistication, high added value and with the capacity to generate the necessary volume of high-quality jobs.

The toolbox to accelerate productive transformation, influence growth patterns, structural change and employment is mainly in the productive development policies. After decades of doubts and debates about what were formerly called industrial policies, today there is a new paradigm on how to promote productive development policies. Before COVID-19, some governments and international organizations had been paying renewed attention to a new generation of productive development policies (PDP) in the region, with both transversal and vertical elements, prioritizing the promotion of clusters with a territorial focus among the latter.[21]

If before the pandemic the need for a game changer in productive development policies (PDP) was evident, the pandemic has made it one of the highest public policy priorities and a central element of any national reconstruction strategy with transformation and, as will be seen later, digital transformation strategies are a central element of PDPs. And of course, an essential component of PDPs are digital transformation strategies, which can make an important contribution to tackling the productivity trap as explained in detail in the section on “Potential of digital transformation to overcome development traps."

The social vulnerability trap

During the growth golden decade, from 2003 to 2014, the region managed to significantly reduce poverty, reduce informality by a few points, and raise the population proportion that can be classified as middle class. However, even before the pandemic, about 50% of jobs were still informal. Most informal workers, plus many of those who escaped poverty, became not a consolidated middle class, but a group socially vulnerable to economic crises or even personal or family events that affected their fragile income.[22] These are people who have poor-quality jobs, usually informal, with little or no social protection, low and unstable incomes and who are at high risk of being thrown back below the poverty line, which is precisely what the devastating pandemic did.

As noted above, the IDB estimates that the damage caused by the Covid-19 crisis regarding informality is two lost decades of progress in reducing informality. Regarding poverty, ECLAC estimates that it will go from 30% before the pandemic to close to 40%. In other words, the region will become more impoverished from the pandemic and with much greater social vulnerabilities, including in employment and income.

[21] Crespi, et al (2014), OIT (2016b), Salazar-Xirinachs et al (2017).

[22] The OECD estimates that the consolidated middle class (income from $ 13 to $ 70 per day) increased from 21.1% to 35.4% between 2000 and 2016 in LAC. However, according to Latinobarómetro, 40% of the LAC population considers themselves to be middle class. (OECD, et al, 2019, p 119).

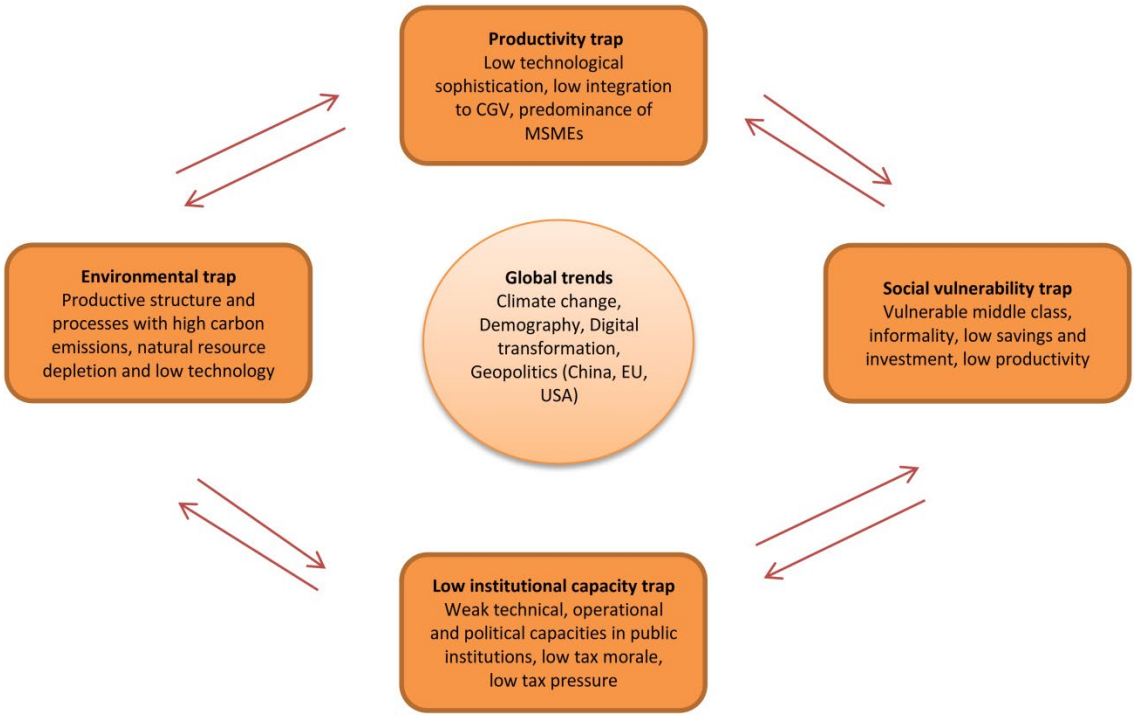
Women, young people and people with lower educational levels will be the most affected.

After the pandemic, lifting these sectors of the population back to rising income levels will require a combination of productive and social inclusion, that is, a combination of successful employment policies and income and social protection policies.

The weak institutional capacity trap

Middle-class expansion in LAC was accompanied by social mobility expectations and aspirations, for which it is essential to have accessible and quality public institutions and services. However, many institutions have not responded effectively to these expectations and demands, because they do not have the technical, operational and political capacities (TOP capacities) to rise to the challenges. The reasons are numerous: lack of fiscal resources to finance them adequately, lack of training and "technocratic" quality of civil servants, inappropriate regimes of recruitment and public employment, corruption, lack of political leadership, coordination failures, and others. All this has created a gap between citizens and institutions, what the OECD calls an “institutional trap”.

Graph 1. Traps against development in Latin America and the Caribbean



Source: Adapted from OECD et. al. (2019)

In the vicious circle that is created, the lack of quality in public services leads to increasing levels of dissatisfaction, mistrust and frustration, and a fall in citizen commitment to pay taxes (low "tax morale") which in turn sometimes creates political barriers to funding public institutions adequately. Furthermore, in many countries there has been a clear tendency on the part of the upper and upper middle classes to prefer private higher quality education and health services than public ones, which these groups can finance. In other words, these groups tend to be disconnected from public services in these areas, which

reduces their commitment to public financing of these services. This type of vicious circle creates fractures and weakens the social contract in the countries. Strengthening the technical, operational and political capacities (TOP capacities) of public institutions is an essential task in the next stage of development in the region, a task in which digital transformation can make an important contribution, as explained in the section on "Potential of digital transformation to overcome development traps." If there is a clear lesson from the COVID-19 crisis, it is the importance of having public institutions with high capacities in their areas of competence.

The environmental trap

The environmental challenges are pressing and diverse in the region. Some of the main challenges are: loss of forests; water management; soil, air, water and ocean pollution; conservation and sustainable use of biodiversity and ecosystems; intensive use of pesticides in agriculture; impacts of climate change on coasts and agriculture; natural disasters, which particularly affect the Caribbean countries, although not exclusively; high carbon emissions. The environmental trap refers to a productive structure dominated by extractive and natural-resource-intensive activities, with high carbon emissions and other unsustainable processes of natural resource use, as well as environmental deterioration.

Part of the problem lies in using traditional technologies dependent on fossil fuels, and part of the solution is to accelerate adoption of modern and more sophisticated technologies, including circular economy principles in industrial processes, greater use of renewable energies, plastic use reduction, greater sophistication in recycling processes, electrification of public and private transport systems, etc. In many of these tasks, digital transformation is important for countries to migrate towards modern monitoring and geo-referencing systems, control and automation of systems and networks (“grids”), etc.

These four development traps reinforce each other in multiple ways, requiring greater coordination and more effective tools to manage policy, another area in which digital transformation can contribute.

If LAC countries were already in these traps that hindered their development before the Covid-19 crisis, the pandemic has clearly made the situation much worse. Post-pandemic policies must not only redress damage to return to the pre-pandemic situation, but also tackle these traps with new vigor and turn these vicious circles into virtuous circles, making the most of opportunities offered by new technologies, including digital transformation, towards these goals.

Digital transformation potential to overcome development traps

Digital transformation potential to exit the productivity trap and the lack of quality employment

“Each business is now a technological business” – McKinsey

Digital transformation has high potential to promote production and productivity transformation and diversification, as well as employment transformation, which are two sides of the same coin, in positive directions. There are both transversal and vertical elements to this. In its cross-cutting elements, digital transformation offers opportunities to improve productivity and competitiveness in a variety of ways:

- building universal high-speed connectivity infrastructure and related services to benefit all stakeholders (companies, governments, educational systems, households and individuals). This includes not only information transmission highways, but also data storage and information processing infrastructure;
- allowing the transformation of business and operating models leveraged on the use of the IV Industrial Revolution technologies (internet of things, artificial intelligence, digital platforms, advanced robotics, additive manufacturing, etc.).
- developing modern skills and work culture in the workforce;
- increasing access to basic services, such as health, education and to the financial system;
- improving public service quality and coverage.

In its vertical and sectoral elements, digital transformation can improve the productivity and competitiveness of companies in specific sectors and clusters (tourism, automotive, aerospace, transport, urban mobility, health, services, agricultural products). It can also improve business models, make marketing strategies and customer relations more effective, and facilitate access to regional and world markets via insertion in global value chains.

The creation of digital capacities in micro and small enterprises (MSMEs) is a particularly important source of productivity increases. On average for 18 countries in the region, 28% of employment is in micro-enterprises (2 to 10 workers) and 20 in small companies (11 to 50 workers). In other words, almost 50% of employment in the region is in micro and small companies. If medium-sized companies are added, it reaches almost 60%. Digital transformation of these segments, which are the ones that find it most difficult to adopt new technologies, has enormous potential for increases in labor productivity and should be a priority in digital transformation policies.[23]

Lack of higher and sustained growth from a more diversified and technologically more sophisticated productive development is, together with the workforce's deficiencies on skills and competencies, one of the deep structural causes of the region's economies' inability to generate quality jobs and create a better labor future, since the latter cannot be conceived or created without a better future for production.

An effective strategy to create more and better jobs and reduce informality, in the region's countries requires policies on the supply side and on the demand side. On the supply side, investment in human resources, with the skills and abilities demanded by 21st century productive systems, is the key element to improve workforce employability. This points to the importance of modernizing education and vocational training systems. Additionally, one of the fundamental competencies to improve employability, because it is demanded by companies in the era of the IV industrial revolution, is precisely digital competencies, the ability of people to interact with "intelligent machines". This is complemented by the so called "soft" or socio-emotional skills.

[23] To complete the information, another 28% of the workforce are self-employed, 3% work in medium-sized companies (from 51 to 100 employees) and 16% in large companies (more than 100 employees). ILO (2015) is the source of this information.

However, it must be recognized that no matter how much effort is made on the supply side, if there is no demand for employment, a good part of the investments on the supply side would go to waste, and a significant proportion of human capital would seek to emigrate (inside or outside the countries) due to the lack of local quality job opportunities. In addition to promoting employment supply and demand, regulatory, fiscal and other barriers that hinder job creation must be reduced.

The toolbox to act on demand is related to productive development policies, with clear bets on clusters and sectors with high dynamism and growth potential.

This should be one of the main approaches on how to build a better labor future in LAC. But of course, prior to the pandemic, there was a broad debate about the impacts of technological revolution on labor. In this debate, which was largely taking place in developed countries, there were "techno-optimists" and "techno-pessimists". Four main themes predominated, which in the post-pandemic era remain more relevant than before.[24]

First, the issue of the processes through which technological revolution has created a new production paradigm (Industry 4.0) based on the convergence of numerous technologies: artificial intelligence, the internet of things, automation, 3D printing, advanced robotics, etc. More and more, all jobs demand a number of new skills, among which digital skills are central.

Second, there is the issue of how robots and automation have permeated workplaces and the risk of unemployment that this creates. Indeed, robots are rapidly entering factories and offices, through the automation of almost all production processes for both goods and services and displacing especially manual or blue-collar workers, but also many cognitive or white-collar workers.[25] However, various studies also show that automation complements or enhances worker productivity and creates new types of occupations. In other words, automation not only generates displacement of human work, it also brings improvements, including the possibility of freeing up time for more creative tasks of human and social value.

Third, we have the acceleration in demand for new advanced and digital skills, and the obsolescence of existing skills. This phenomenon challenges educational and vocational training systems to become updated, and to look forward to technological trends, and changes the paradigm not only for educational systems, but also for companies and individuals. It challenges employers to develop advanced and digital skills in their workforces and all organizations and individuals to move to a mindset and practice of continuous learning.

Fourth, the great expansion of the so-called "gig" economy based on the new business models of digital platforms such as Uber, Uber Eats, Sheworks, and many others. The techno-optimists emphasized the great opportunities including job creation of these platforms, and the most critical worry about the deconstruction of the classic employment relationship that these platforms were generating and the emergence of a variety of new forms of independent work, not covered by classical labor rights.

Fifth, there were concerns that accelerated technological change was producing greater income and social inequality, widening the gap between well-connected and highly skilled digital literates, mostly cognitive workers, on the one hand, and digital literacy workers, on the other, workers with lower or no digital skills, more disconnected and with lower levels of qualifications, mostly manual workers. Those connected and

[24] Salazar-Xirinachs (2017).
[25] Baldwin (2018).

with high qualifications had and have high and increasing incomes, the disconnected and with less qualifications have lower and, in fact, stagnant or declining incomes.

The Covid-19 crisis has accelerated and deepened these trends. The subject is extremely broad, but the point for the objectives of this document is that a common area of solutions to face posed threats and take advantage of opportunities under these five themes and respective trends, is investment in human talent and within this, the importance of digital skills to increase people employability, attract investment and create quality jobs. The pandemic has made it more urgent and strategic than ever to invest in human capital as a fundamental area for reconstruction with transformation.

Digital transformation potential to improve social policies and promote social inclusion

One of the pillars of the emergency response to the pandemic in a majority of countries has been a large expansion of various unconditional cash transfer programs with the aim of compensating for the drop in income of workers laid off, for shortening of work hours, informal workers, independent workers and others, such as the *Programa Proteger* (Protect Program) in Costa Rica, which gave cash transfers to more than 700,000 beneficiaries in 2020, or *Ingreso Solidario* (Solidarity Income Program) in Colombia, which has 2.5 million beneficiaries to date. In fact, in many countries in the world, both developed and developing, the expansion of social programs during 2020 has been so significant that economist Willem Buiter has called this the new "pandemic socialism".[26]

Most beneficiaries in these programs are independent and informal workers who lived daily hand to mouth and who did not have the means to stay at home or stop working for their basic survival. The initial intention and logic of these and similar programs was that they were temporary emergency measures to compensate income and to make health confinement measures feasible for the poorest and most vulnerable groups. International experience shows that emergency cash transfers are cost-effective and help maintain livelihoods.

Although the need and benefits of this type of programs are unquestionable, their cost is very high and during the reopening stage of economic activities, countries face strategic and fundamental questions regarding these programs: whether to reduce and eliminate them in accordance with the original temporary intention in response to the emergency, or rather transform them into other types of programs -conditional transfers, for example-; or how to migrate their beneficiaries to other social programs existing before the crisis.

Partly because of the surprising expansion of the Welfare and Solidarity State and policy dilemmas around emergency cash transfer programs, and partly because of demographic changes such as aging populations, and the need to expand coverage and guarantee the health and pension systems' sustainability, the pandemic has stimulated a wide debate that points towards a rethinking of the Welfare State and the redefinition of social pacts.
Ideas of social protection that seemed radical, at least to some, before the pandemic, such as universal basic income, or universal health insurance, have become reality in a matter of a few months.

It is important to understand that this expansion of social policies has been possible thanks to sophisticated technological systems that combine big-data, data analytics, and allow a fine and precise targeting of social policies, as well as electronic payment systems that allow transfers to reach beneficiaries. It is the use of modern technology applied *en masse* to social policies.

[26] Buiter (2020).

The need to invest in this type of digital capabilities in the next stage of social protection policies and precision social policies is a permanent lesson that the pandemic has left.

Digital transformation potential to overcome the institutional trap

Digital Transformation can help public institutions to be more credible, efficient, inclusive and innovative, and with this to improve governance and trust in institutions (OECD et al 2020). Open government, with wide access to information and data, can contribute to improve credibility and overcome mistrust in government by reducing corruption instances, diversion of funds and by making the management of public institutions more transparent. Digital technologies can achieve improvements in areas prone to corrupt practices, such as public procurement, investment in infrastructure and fund transfers of between national and local authorities. [27]

Digital technologies and technologies such as the cloud -which allows data storage, processing and analysis- enable institutions to be more efficient and effective in formulating public policies and making decisions. The cloud is the enabling technology for the use of databases, data analytics, and artificial intelligence. These technologies can also help increase public service efficiency, by simplifying procedures and reducing time and deadlines for processing operations (certificates, fines, stamps, permits, registrations, tax payment, etc.) and administrative costs.[28] Digital Transformation affects a wide range of public policies. More broadly, digital and cloud technologies make it possible to migrate towards a citizen-centered public management model, with its implications in terms of innovation, agility, transparency, accountability and greater citizen participation. This topic is elaborated in section 4.

Digital transformation potential to overcome the environmental trap

Digital transformation can help overcome the environmental trap in multiple ways. For example, every day paperwork forces thousands, if not millions of citizens in each country to carry out their errands before various public administrations in person, which produces a large carbon footprint, in addition to urban congestion. Increasing of civil servant and private sector worker teleworking is also an important contribution to decarbonization, as transport is the second most important component of the ecological footprint. Rather than adding more lanes to road infrastructure, countries should consider increasing connecting megabits to all homes, schools, and workplaces, at much lower cost.[29]

And there is little doubt that with the business travel digital footprint is also going to be significantly reduced after the pandemic due to the shift toward more Work From Home, which includes telecommuting but goes beyond that.[30]

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[27] Santiso, C. and B. Roseth (2017) “Cómo los datos pueden ayudar a destapar la corrupción”, IDB blog, https://blogs.iadb.org/administracion-publica/es/los-datos-ayudan-destapar-la-corrupcion/

[28] Roseth, Reyes and Santiso (2018) *El fin del trámite eterno: ciudadanos, burocracia y gobierno digital*, IDB.

[29] Roberto Sasso (2020) “La digitalización protege el medio ambiente”, Club de Investigación Tecnológica, 3 de febrero. https://www.clubdeinvestigacion.com/la-digitalizacion-protege-el-medio-ambiente/

[30] https://www.bbc.com/worklife/article/20200731-how-coronavirus-will-change-business-travel
https://www.wsj.com/articles/the-covid-pandemic-could-cut-business-travel-by-36permanently-11606830490

BBVA launched the "*Analogic to Digital - A2D*" project in Argentina in 2018. It included a "paperless" initiative to reduce paper use within the Bank. Through this project in the branch network, around 18 million paper sheets were eliminated. [31]

More broadly, digital transformation is helping businesses and organizations achieve sustainability goals in a number of ways. Some examples are: more interconnected and smart cities; better responses to natural disasters; reduction in air pollution; smarter and more sustainable buildings and residences; new models of precision agriculture with Industry 4.0 principles including the use of drones; automated processes for water management and irrigation systems; robotics and the Internet of Things ecosystems are helping manufacturers unlock value from recycling by automating the sorting of electronic waste; greater "greening" of supply chains due to greater efficiencies in the use and mobility of parts and components, and inventory reduction and intelligent management.[32]

According to the European Commission, data collection and publication on environmental matters has been one of the priority points concerning Open Data in a variety of topics since 2014: polluting emissions, air quality, pests, meteorological information, state of the sea, water quality and management, waste management, protected areas and species, etc.[33]

Digital transformation increases resilience of economies and societies

One of the main lessons from the pandemic is that a digital society is not only more dynamic and productive, but also more resilient, that is, it has greater capacities and flexibility to react to shocks and crises of various types: economic, health, environmental. For example, during the pandemic, digital platforms and tools have helped multiple sectors to partially maintain their activity. They have facilitated commercial transactions (Amazon, Mercado Libre, Rappi), financial services (Ant Financial, Avant, Mercado Pago, Nubank), communication services and social networks (Facebook, Skype, WhatsApp, Zoom, Google Teams, etc.), tourism and accommodation services (TakeOff, Booking, Airbnb), job search (Laborum, LinkedIn, Workana, Freelancer) and training (Coursera and others).

Conclusions and messages:

- A digital society is not only more dynamic and productive but also more resilient, that is, it has greater capacities and flexibility to react to shocks and crises of various kinds. But for these results it is essential to build the necessary digital infrastructure (connectivity and data storage and information processing infrastructure) that the 21st century requires, reduce access inequalities and level the playing field.

- Digital technologies can significantly and in multiple ways help the recovery of the post-pandemic region. Success in navigating recovery will require greater efforts in digital solutions.

[31] https://www.bbva.com/es/ar/la-digitalizacion-de-procesos-y-su-impacto-en-el-medioambiente/
[32] La transformación digital está haciendo al mundo más sostenible, https://itnews.lat/la-transformaci-n-digital-est-haciendo-el-mundo-m-s-sostenible.html
[33] Rodríguez-Bustamante, P (2016) Medio Ambiente y la influencia de la transformación digital, http://momento.digital/medio-ambiente-la-influencia-la-transformacion-digital/

- The COVID-19 crisis has created exciting new opportunities and new momentum to carry out the reforms and investments necessary not only to repair the damage caused by the Covid-19 crisis but to help countries get out of the development traps and increase resilience to future shocks and crises.

- Technology in general, and digital transformation in particular, is not an enemy, but an ally, there are many and very interesting opportunities in technological acceleration for governments, for companies, for workers, for homes and people and for education. The net effects depend on governments' policy responses and on the actions of companies, households and individuals.

III. Digital transformation in Latin America and the Caribbean and its driving factors

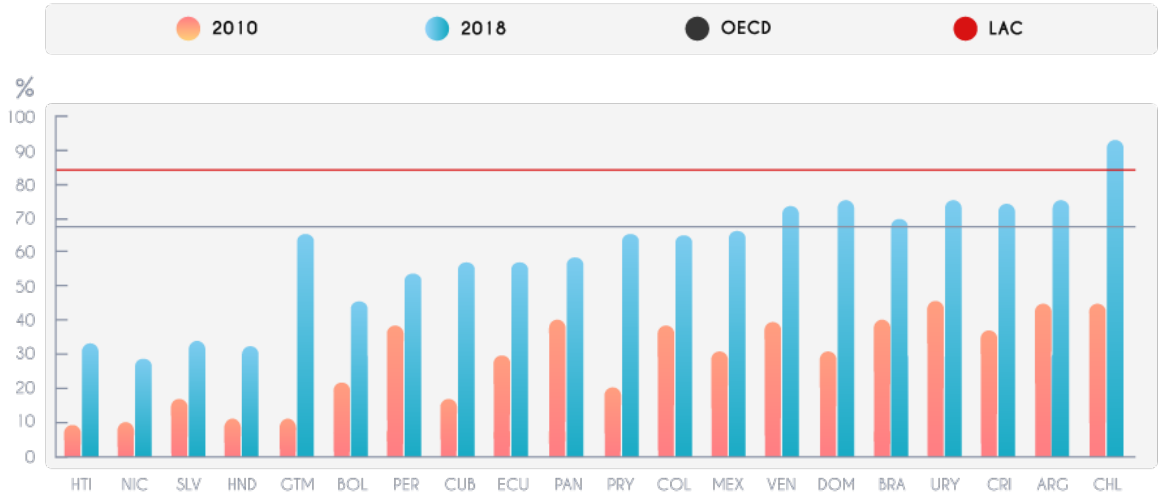
This section contains a brief diagnosis of where the region is regarding digital transformation and an analysis of the basic factors driving digital transformation.

Technological penetration

New technologies have been penetrating relatively quickly in Latin America and the Caribbean, but in a very heterogeneous way between and within countries, and the region lags behind other regions. This presents important opportunities for economic growth and well-being.

Regarding the use of the internet, the region has experienced an important expansion. In 2018, 68% of the population used the internet regularly, almost twice as much as ten years earlier, 2010. But this is still 16 percentage points below the OECD average (84%) (Figure 2). In 2020 internet penetration and particularly its use in certain applications such as e-commerce and education has substantially expanded as a result of the pandemic. For various reasons, it is to be expected that this leap is not temporary, but rather a structural and permanent change. Several reports speak of a "flight to tech" (digital migration) in Latin America and the Caribbean as from the pandemic and suggest that the region is at a turning point, with many trends pointing towards a great digital transformation in the next decade (Atlántico, 2020; OECD-CAF-ECLAC-EC, 2020).

Graph 2. Internet user percentage in selected Latin American and Caribbean countries, 2010-2018 (or last available year)



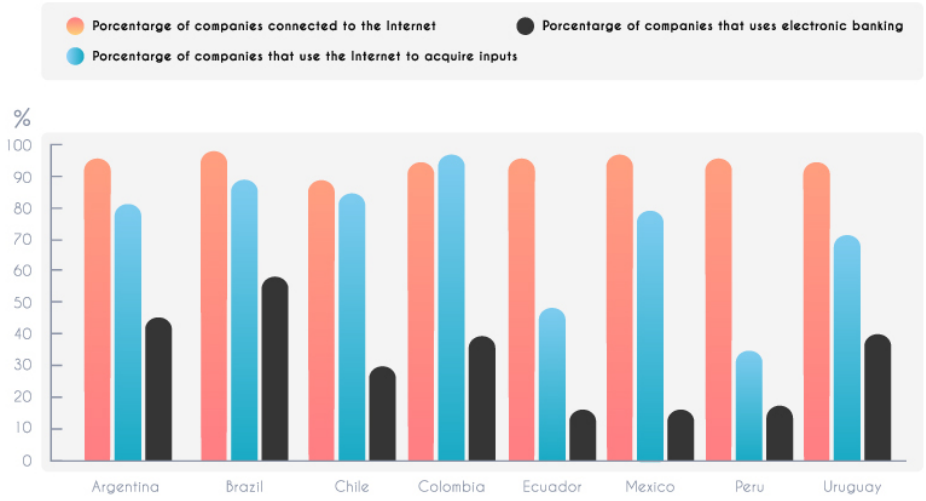
Source: OECD-CAF-ECLAC-EC (2020), based on ITU (2020) World Telecommunications/ICT Indicators Database 2020. https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx

Naturally, access, connectivity and connection quality vary significantly between and within countries. Furthermore, despite sustained improvement in connection speeds, the region continues with connection speed levels below the world average, which is a barrier to the use of digital services and applications. (OECD-CAF-ECLAC-EC, 2020, p 30).

Despite improvement in internet access and use in the region, there are significant gaps between people and households by income level, age and territory. For example, there are almost 40 percentage points of difference between the percentage of people who use the internet in the richest quintile (75% of use) and the poorest (37% of use). In OECD countries this gap is 25 points on average. (OECD-CAF-ECLAC-EC, 2020, p 32). The proportion of users in urban areas is much higher than in rural areas.

In terms of use by companies, although the percentage of companies connected to the internet before the pandemic was relatively high, in several countries the percentage of use for their banking activities was relatively much lower, and even lower was the use to manage your supply chain. (Graph 3). This suggests a wide field of opportunity for the digitization of companies during the post-pandemic recovery, from information to improve management, to the use of robotics and automation in production, and to reach customers through digitized advertising and for the delivery of goods and services. In fact, in several of these dimensions, the pandemic has triggered the use of digital technologies, particularly in terms of digital platforms for the delivery of products and services.

Graph 3. Digitizing value chains, 2018.



Source: OECD-CAF-ECLAC-EC (2020) based on CAF (2020b).

It is important to note that, although most of the new technology penetration and in particular digital technologies has been based on foreign companies, there has been a very significant growth of local companies in the digital space. Companies such as Mercado Libre in Argentina, with a presence in ten countries in the region, or Magalou or Magazine Luisa in Brazil, have become large virtual market or electronic commerce companies with original business models. And there is a growing company ecosystem with strongly digital business models in many countries in the region in a variety of sectors, from home delivery (Rappi, iFood), entertainment, finance, and others.

In fact, the "gig economy" has become one of the largest employers in the region.

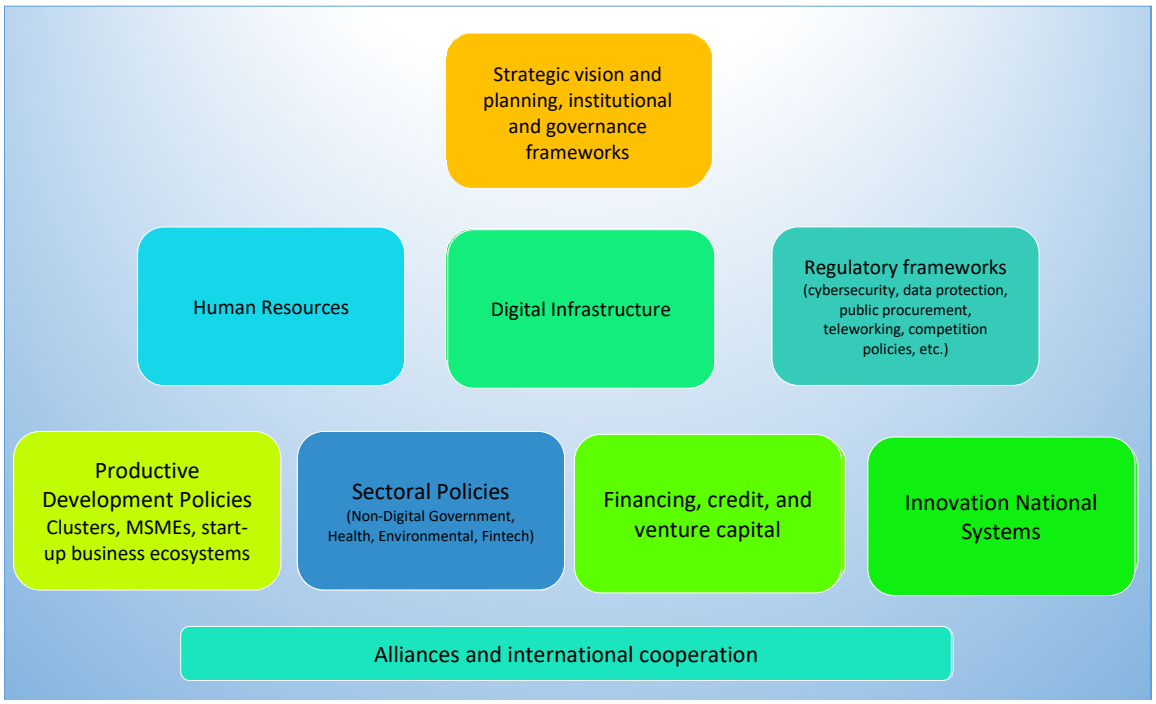
Basic drivers of digital acceleration

Being a complex and multidimensional phenomenon, it is not a simple task to define the factors that influence digital acceleration. However, based on abundant literature on the subject, a short list of basic factors or drivers can be made, which serves as a conceptual framework to think about the challenges and opportunities, and which includes the following:

- The existence of a policy strategic vision for digital transformation, with an appropriate institutional and governance framework for its coordination and execution.
- The quality of digital infrastructure for connectivity
- Human resources with digital skills
- Legal and regulatory frameworks on issues such as cybersecurity, data protection and privacy, and standards for the purchase of technologies by the public sector.
- Policies for productive development, cluster promotion and support for MSMEs and new ventures
- Sectorial digital transformation policies, in key sectors such as digital government, health, environmental and financial sectors.
- The existence of credit and risk capital
- The quality of national innovation systems
- As a cross-cutting element, the existence of alliances and international cooperation.

All of these factors affect the speed, extent, and magnitude of digital transformation. The more favorable and aligned all these elements are in a country, so that they reinforce each other, the friendlier and favorable the environment will be to promote digital acceleration.

Graph 4. Digital Transformation: nine basic drivers



Source: Prepared by the author.

The kind of actions needed to improve and align these factors are discussed in section V.

IV. Digital transformation perspectives and examples in specific sectors

Many sectors are fertile ground for digital transformation, partly because of the speed of technological change taking place in them and partly because of existing entrepreneurship, but the speed of change will depend heavily on policy frameworks and general and sector-specific regulatory and leadership and governance of digital transformation. Sectors or areas of high dynamism in terms of technological change and digital transformation are:

i. The financial sector has been one of the most dynamic in the region in adopting new technologies from payment systems and microcredit schemes, to electronic banking with integrated services, including the "fintech" phenomenon. The pandemic represented a positive disruption, such as the leap in banking that was necessary to make unconditional cash transfers reach millions of poor and vulnerable people to face income reduction associated with lockdowns. This is an example of what can be achieved with new technologies when a public policy priority coordinates well with an innovative private sector.

ii. The health sector, which is experiencing a huge revolution with the application of artificial intelligence for diagnostic processes, surgical procedures, new generations of medical devices of all kinds (surgical,

prosthetic, pharmaceutical, wearable monitoring devices, etc.), administration of large patient databases, telemedicine, applications for traceability of people and symptoms, and many others. In many of these areas, the pandemic has produced an enormous acceleration in what was already a vertiginous process of technological development.

iii. The education and vocational training sector is another one in which the pandemic has produced an enormous acceleration in virtual education systems.

iv. The area of social policies, where, based on new technologies and analysis of large databases, a clear trend towards precision social policies has been consolidating to identify and deliver aid to beneficiaries.

v. Employment policies, in which the digital revolution is allowing qualitative leaps with digital job boards, the so-called e-formalization, and digital infrastructures for job placement, recruitment and management of human talent at all levels.

vi. Productive development policies, with the digitization of companies in all areas (production, management, marketing, delivery of products and services, etc.), as well as with the so-called industry 4.0 that is generating smart factories, smart products, supply chains, digitally coordinated value and inventory management, among other changes in production paradigms.

vii. And finally, on this short but impactful list, digital government and applying digital transformation for modernizing institutions and public services. This is a field of enormous importance in Latin America and the Caribbean in view of the low institutional capacity trap in which public institutions find themselves in many of the countries of the region, which generates frustration and discontent in large sectors of the population. Digital technologies can help restore trust in public institutions, making them more credible, efficient, inclusive and innovative.

This section reviews transformation progress and perspectives in the following four of these sectors or specific areas: health, education, productive development in particular of MSMEs, and digital government, introducing some concrete examples in each case.

Health

Although the levels of access to health services and their quality in LAC are heterogeneous, on average the region has poor health services compared to OECD countries. A brief overview of the main statistics:[34]

- Out-of-pocket spending on medical services in LAC is on average 34% of total health spending, while in OECD countries it is only 21%. And there are 12 countries where these expenses are 40% or more. This indicates that the region has weaker health systems and lower coverage levels.
- In terms of human resources, on average the region has two physicians for every 1000 inhabitants, compared to 3.5 in the OECD. Only Cuba, Argentina and Uruguay are above the OECD number, while Haiti, Honduras and Guatemala have only 0.3 doctors per 1000 inhabitants. The gap on nurse availability[35] per 1000 inhabitants is even larger: the region has about one third of the OECD's average number of nurses (3 versus 9).

[34] All these statistics have been taken from OECD-World Bank (2020).
[35] Although this is changing, most of them are women.

- In terms of hospital infrastructure, the average number of hospital beds just before the pandemic was 2.1 per 1000 inhabitants, less than half of the 4.7 in the OECD. And there are 13 countries where the number was less than 1.5.
- In terms of the use and analysis of data by digital means, the average rate in the use of electronic health records or forms is much lower in LAC than in the OECD, which is largely explained by the low use of technologies such as cloud that allows the management and analysis of large amounts of data.
- Regarding the population's access to health services, inequalities are high. Health systems have very diverse coverage between countries and within countries according to territories and socio-economic groups. Upper and middle income groups have access to high quality services, based on their own income or on private health insurance.
- Average spending on health in the region's countries is 3.8% of GDP compared to 6.6% of GDP in the OECD. The proportion of these expenses covered by government or by mandatory insurance schemes is much lower: 54.3% versus 73.6%.
- In addition, there is evidence of much waste and inefficiencies in health spending, as well as corruption.

The Covid-19 crisis exposed many of these weaknesses and is an opportunity to carry out long-term structural reforms in health systems, to build systems with greater coverage, higher quality, and more integrated towards the desirable objective of universal health coverage. This has been understood in many countries in the region not only to face the current pandemic and future epidemics, but also to provide the basic quality health services to which their populations are entitled. However, a majority of countries are very far from this goal.

Generally, the technological and digital revolution are having the most disruptive and transformative impacts in the health sector for the good: new instruments and techniques for diagnosis and laboratory tests, new operative procedures, implants of all kinds, more effective medicines , wearable products to read vital signs, telemedicine, artificial prostheses, people and quarantine traceability systems, single medical record systems, infectious disease and pathogen monitoring systems, digital systems to manage the relationship with patients , etc. The development in less than a year of several highly effective COVID-19 vaccines, some of them based on new mRNA (Messenger Ribonucleic Acid) technology is an impressive example of what technological convergence can achieve. In countries such as Brazil and Mexico, significant growth in health and medical care startups has been documented.[36]

In short, there is a huge potential for the use and growth of digital and data solutions to detect, record, monitor, diagnose, prevent and respond to diseases, both individually and in terms of threats to public health, and to do so effectively and efficiently.

There are abundant examples of the use of digital technologies to respond to the Covid-19 crisis.[37] Box 1 shows an example of using the cloud and two traceability applications to track infections in Chile. Box 1 shows an example of using the cloud and two traceability applications to track infections in Chile.

Box 1. Solutions related with Covid-19 in Chile.

[36] Atlántico (2020).

[37] See ECLAC-CAF (2020) and https://www.who.int/news-room/feature-stories/detail/tracking-covid-19-contact-tracing-in-the-digital-age

Chile's Ministry of Health (MinSal) is using the cloud for various COVID-related solutions, such as data monitoring at the national level. One of the solutions is Epivigila, the electronic notification system for "Mandatory Notification Diseases" that requires the treating physician to notify the case. The list of diseases includes Covid-19.

Another more recent application is used to control and validate the risk coming from immigrants, and it is the first "health passport" for coronavirus in Latin America and the Caribbean. Form c19.cl is used for travelers coming from abroad. Amazon Web Services (AWS) worked with partner Cloudhesive to extend the c19.cl application to a serverless architecture.

The application now shares information with the national pandemic system that also uses the cloud via AWS and other applications. It includes reports showing risk and statistics for different countries. The application uses CloudFront, API Gateway, Lambda, S3, QuickSight, Aurora Serverless, Secret Manager, and other serverless services. Finally, they use Cognito to authenticate residents against the National Authentication System (ClaveUnica).

c19.cl supports more than 285 thousand immigrants or travelers between states per day, and more than 17 million entry requests have been created. President Piñera said that c19.cl and Comisaría Virtual (a solution that controls quarantines, which also runs in the cloud) are the best solutions to control the pandemic in Chile.

Sources:

- http://www.clinicasdechile.cl/noticias/salud-alista-plataforma-para-agilizar-trazabilidad-amazon-proveera-nube-de-almacenamiento/
- https://www.t13.cl/noticia/nacional/coronavirus-plataforma-trazabilidad-minsal-amazon-01-07-2020

Beyond specific examples, it is clear that LAC countries' policies must bet on digital transformation, on their path towards modernization, coverage expansion and quality of health services improvement in the region.

Human Resource education, professional training digital competences

The Covid-19 crisis threatens to cause a sharp setback in the progress the region had made in education, sacrificing an entire generation of young people and has put education systems in a situation of unprecedented crisis. A central element to mitigate or avoid these effects is the use of digital tools.

Schools and colleges were closed throughout the region in 2020. Most of the students did not attend face-to-face classes and this situation does not seem to have changed much in the first semester of 2021. Distancing measures have forced schools and colleges to establish distance learning initiatives that have contributed to mitigating the damage. But no country was prepared to mass-expand virtual education to replace face-to-face education on a sufficient scale. And it is particularly complex, if not impossible, to ensure that these initiatives are effective for all students equally, regardless of their socioeconomic status, disability, gender, or geographic location.

Inequalities in access to essential distance learning tools (such as the Internet, a computer, and even a desktop) can deepen educational inequalities during and after the pandemic. Children in the highest income group are consistently more likely to have access to e-learning tools.

Lustig, Neidhöfer, and Tommasi (2020) estimate that the probability of students completing secondary education may drop from 61% before the pandemic to 46%, with large differences between socioeconomic groups. For young people from low-income and low-educated households, the probability of completing secondary education can be reduced by almost 20 points, from 52% to 32%, the levels that the region had on average in the 1960s. In contrast, children and youth from families with higher income and higher education will be minimally affected. This education gap widened by the pandemic can cause

devastating damage to social mobility and equal opportunities unless governments act quickly. The authors warn that it is in education where the Covid-19 crisis threatens to leave one of the most permanent scars.

The Covid-19 crisis threatens to widen educational gaps that were already significant before the pandemic and to do heavy damage to human capital in the region. The region's countries not only face physical barriers - limitations in infrastructure, software and IT equipment, Internet connection quality - but they must also overcome the barrier of lack of personnel and teachers with ICT knowledge-. The lack of digital pedagogy also affects the potential for positive effects of ICT access on learning outcomes. Technological tools are useful only if you know how to use them.

Added to this situation are important deficiencies and lags in vocational training systems. Of several studies on the subject, the IDB is the most critical, stating that these systems "tend to be outdated, discredited and disconnected from private sector needs", "their operations are ineffective, their coverage rates are deficient, and quality and relevance levels are low".[38] However, there are some excellent vocational training institutions in the region.

Some of the recommended actions that are in the region's countries' public debate to avoid the worst educational scenarios are: opening educational systems as soon as it is safe; replacement classes; summer and evening programs; more personalized instruction; and, of course, much greater use of virtual education through a leap in digital connectivity complemented by the necessary equipment and training, doing everything possible to reduce the problem of students' unequal access to distance learning tools. [39]

It is important to note that the use of digital tools is associated with better educational results. The best performing students in the OECD PISA tests were those who started using digital devices at an early age, before the age of 9. Digitization increasingly influences how students learn, do homework, interact with their peers and use their free time. In addition, ICT broadens opportunities for lifelong and continuing education. Educational systems that are not intensive in digital tools are failing in the education and labor preparation of generations in the digital age and Industry 4.0.

As documented in the OECD Report et al. (2020) in the last two decades, the region has developed a generous offer of training programs in digital technologies. More than 1,600 universities in Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay - 52% of the total number of universities in the seven countries - offer more than 6,390 undergraduate and graduate programs of this type. (Katz and Callorda, 2018).

There are also many examples of concrete and successful efforts to scale virtual education during the pandemic. Box 2 describes the Plurall platform example in the Sao Paulo state in Brazil that managed to raise the number of registered students from 3.5 to 5 million. Box 3 describes the case of the Colombian Institute for the Evaluation of Education (ICFES) in identifying and verifying students.

Box 2. We are Educaçao and Plataforma Plurall, Sao Paulo, Brazil

[38] IDB (2014). Also see ILO (2017) and CAF (2014).

[39] For details on necessary actions during educational system reopening and lessons from several countries, see Ariel Fiszbein (2020). https://www.latinamerica.undp.org/content/rblac/es/home/blog/2020/-como-proteger-los-resultados-educativos-ante-la-crisis-del-covi.html

The São Paulo State Secretary of Education hired Amazon Web Services (AWS) to expand education services at the K-12 level. It started with 3.5 million students and it expanded to 5 million in November 2020. These students benefit from receiving classes on their mobile phones, computers or digital TV, including in rural areas.

The *Somos* Educação program combines different solutions to help secondary schools and K-12 build a high-quality learning experience. The company is part of *Cogna Educaçao (COGN3 Bovespa)*, the largest educational group in Brazil, with 8 business lines and serving more than two million students through more than 20 educational brands.

AWS also aided *Casa do Saber,* a non-profit NGO a to migrate to Plurall, enrolling 2 million new students. The average duration of online interaction on Plurall's platform increased from 47 minutes to 3-4 hours per day, and the volume of data generated by online classes grew by 47 million percent since the pandemic began.

In addition, students, teachers, coordinators, and tutors have also accessed Plurall's resources, including performance and gap reports for improvement, focusing on specific cases of both student segments and individuals.

The Plurall platform is available on cell phones, tablets, and desktop computers. This platform is now the 61st most used platform in the world, with a total of active users comparable to that of Harvard University and the Brazilian Ministry of Education.

Sources: Several reports, including:

- https://veja.abril.com.br/educacao/pandemia-transforma-plurall-na-maior-plataforma-de-ensino-digital-do-pais/
- https://exame.com/negocios/por-coronavirus-somos-colocara-13-milhao-de-estudantes-em-aulas-online/

Box 3. ICFES Colombia- student identity verification

The Colombian Institute for Education Evaluation (ICFES) is the organization charged with evaluating quality of education at all levels in Colombia, from basic and secondary education to higher education. ICFES uses the cloud for its databases. In 2020 they started a new "Saber T&T" assessment for 75,000 students who completed the Vocational Professional Technologist and Technologist (T&T) programs using Amazon Rekognition to do student identification and verification.

Source: https://aws.amazon.com/es/solutions/case-studies/icfes-video/

Work skills -and among them digital skills- are essential to take advantage of new technology benefits, increase workforce employability, and reduce unemployment and underemployment in the era of the IV Industrial Revolution. Unfortunately, few workers in LAC use or know how to use digital tools at work. The *Adult Competency Survey*, which is part of the OECD *Program for the International Assessment of Adult Competencies* (PIACC) provides information on the frequency with which individuals perform tasks related to ICTs (Information and Communication Technologies). Less than half of Latin Americans between the ages of 15 and 65 covered by the survey (in four countries - Chile, Ecuador, Mexico, and Peru) have used a computer or had enough experience using one for basic professional tasks. The most common use of the internet, at least once a week, are simple tasks such as obtaining information (73%) and e-mail (69%). Less than 10% of workers use digital media for more advanced tasks. And only a third of workers use ICTs at work compared to more than half in Europe (OECD et al. 2020).

In a recent study carried out in Costa Rica by the Center for the Implementation of Public Policies for Equity and Growth (CIPPEC) of Argentina, it was estimated that only 26% of employed workers have

the necessary skills for the digital age, the remaining 74 % requires readjustment of their skills.[40] And this in one of the LAC countries with the best educational and vocational training indicators.

Developing human capacities for the digital age is important for productive and employment reasons and labor inclusion. On the employment side, skills for the digital age are essential for most of the 21st century quality jobs, based on the IV Industrial Revolution productive paradigm and the great digital transformation that is taking place in the labor world. The lack of this type of skills is one of the main factors behind the so-called "skill mismatch": the paradox having at the same time a high percentage of people seeking employment and a high percentage of companies seeking employees, but without finding the right profile. This in turn is one of the factors behind unemployment, underemployment, informality and social exclusion in the region. And, on the productivity side, this is because workforce capabilities, including digital ones, are necessary for rapid dissemination of new technologies, and increased productivity. The new productive paradigms in all sectors (agriculture, industry, services) are based on digitization.

An interesting example of using digital platforms to prepare unemployed people, partly as a result of the pandemic, for their job placement is the alliance of the Costa Rican Investment Attraction Agency (CINDE) with the Coursera platform, described in Box 4.

Box 4. Coursera Scholarship Program in Costa Rica

Coursera is today the educational platform with the largest number of users in the world, some 5 million, highly aligned with the needs of specific skills required by productive sectors and with the philosophy of continuous learning and retraining (reskilling). Their courses are validated either by the academy or by business entities, so that people who have obtained Coursera certificates are generally well positioned with companies. One of Coursera's important learning lines is digital skills.

In response to the pandemic, Coursera established a global program called *WorkForce Recovery* in 2020 and made alliances with specific entities in various countries around the world. In the case of Costa Rica, the alliance was with CINDE for 60,000 scholarships or learning accesses. The goal was to distribute 60,000 learning licenses among unemployed people who had applied to *Programa Proteger*, an aid program established by the Government for unemployed workers as a result of the pandemic in charge of the Ministry of Labor and Social Security (MTSS) that acted also as a counterpart of the program collaborating with CINDE.

The requirements for applicants were 3: being unemployed, having applied to the *Proteger* Bonus and having a complete high school diploma. Of the more than 900,000 applicants for the *Proteger* Bonus, only 62,000 had a complete high school diploma.

An alliance was created with two universities to provide constant support to students. There is currently a 10-person support center. It is estimated that one person is needed for every 2000 students. In addition, a Mentor Community of more than 500 people was created. And 3 training pilots were hired in English and French. Knowledge of English makes a big difference in job opportunities. Unlike other more traditional job placement processes, CINDE's approach has been the generation of talent strategies for each individual company. This in order to maximize the impact of employment.

There were important learnings in the application of the program in Costa Rica: after one month only 20,000 people had registered. This led to refining the profiles of eligible beneficiaries to include individuals with higher potential. "Learning paths" were built to serve as models for course selection. It was coordinated with universities and employers to encourage groups of people not only to enroll, but also to finish enrolled courses. A failure percentage was due to people who overestimated their English level, for the learning paths that required English.

[40] Albrieu, R., M. Rapetti, C. Brest-López, P. Larroulet, A. Sorrentino (2019) *Inteligencia Artificial y crecimiento económico: Oportunidades y desafíos para Costa Rica*, CIPPEC, Argentina.

One lesson is that these types of courses require a lot of self-discipline that was not a characteristic of a significant proportion among those enrolled. In addition, the concept of creating learning experiences with strong accompaniment of each student was emphasized, as well as mentoring and individualized attention, such as platform complementary elements.

Today there are 42,000 people using the platform, which is a good percentage of use as compares to other countries. One of the rules that was introduced was that if the person did not use the platform in a month, the license was removed, this in order to leave the licenses assigned to people with sufficient motivation.

Currently CINDE, together with Coursera, is designing another new program, no longer part of *WorkForce Recovery*, to expand skills training based on the digital platform and is trying to insert people to proactively obtain job certificates, based on the database of more than 1,300 companies that have built CINDE, both multinational and national, filling required talent roles in specific companies.

Source: Interview with Paola Bulgarelli, Manager, Investment Climate Strategic Projects, CINDE, San José, Costa Rica, January 27, 2021.

In the medium term, governments and educational authorities should seize the moment to accelerate the education modernization vocational training with an eye not only to avoid a lost or extremely delayed cohort by the impact of coronavirus in 2020, but also with the focus is on reducing the gaps in coverage, quality and relevance that characterize the countries and to fully insert them in the IV Industrial Revolution era. There is here a new area of coordination among Ministries of Industry and other production managers, Ministries of Labor and Employment, Ministries of Education, and academic and vocational training institutions. The Covid-19 crisis has made digital transformation in education at all levels a high priority and is one of the clear lessons from this crisis. Reform of education and vocational training systems must incorporate their digital transformation as a priority objective.

Reactivation, productive development and employment: promoting clusters, MSMEs and entrepreneurial ecosystems

As stated in section 2.1, if the need for a game changer in productive development policies (PDP) to get out of the productivity trap was evident before the pandemic, the damages brought on by pandemic in the productive system and employment should make PDPs one of the public policy highest priorities and a central element of any reactivation, reconstruction and transformation strategy.

In the short term, due to health reasons, the pandemic has generated renewed attention to sectoral challenges and policies (in tourism, restaurants, various types of factories, and service activities) and to sectoral public-private coordination to get out of lockdown, define protocols for reopening and safe return to work. There is an opportunity here to take advantage of these consultation efforts and sector strategies to strengthen microeconomic policies with a cluster approach in the medium term.

This is so because safe return to work and support and reactivation actions require solutions in the whole range of reactivation challenges in each productive activity: health, financial, employment and human talent, market, digital transformation, etc. Most of the support from public institutions must have a sectoral landing to be effective.

For example, there are some countries, for which tourism is a fundamental and mature sector, such as several Caribbean countries, and countries such as Costa Rica, have the technical, operational and political capacities, both in the public and private sectors, to propose collaborative strategies for reopening and

reactivation. Even so, the task will not be easy at all, but they have the capacities and the mechanisms for social dialogue to propose roadmaps, and they are doing so. In terms of attracting investment, investment promotion agencies (APIs) in several countries are reflecting deeply on the opportunities that the great rearrangement (nearshoring and related phenomena) in global value chains will open up.

Colombia has been intensively using cluster initiatives to develop sectoral "economic reactivation agendas" focused on four main themes: safe return to work, sales reactivation, business reinvention and digital transformation acceleration.

A pilot project by the IDB and ECLAC for digitizing production processes in Peru has determined that, in the case of the fishing value chain, technological solutions with great potential for improvement include capture sensor tracking systems , views of banks and the seabed, geolocation systems for fleets, digitization of supplier-customer relationships and inventory management, and automation of product auctions.[41]

In the medium and long term, sectoral and cluster policies are the centerpiece of the new PDP paradigm. What the microeconomic level with a cluster approach provides is coordination and governance, that is, it provides collaboration processes between all relevant public and private actors, at sufficiently disaggregated levels to offer solutions across the range of challenges in each productive activity, including digital transformation challenges.

Cluster policies have been very successful in promoting innovation, competitiveness, linkages, quality jobs and internationalization in many countries around the world. The European Observatory of Clusters and Industrial Transformation has identified 2,950 clusters in Europe, in 51 export sectors, which represent almost one out of every four jobs (61.8 million jobs), and half of the jobs in export sectors.[42] There is a well-known success story in the Basque Country.[43] The Bogotá-Cundinamarca region has one of the most successful cases of cluster policies in Latin America with 17 clusters that have been active for 5 years. From 2000 to 2016, different entities of the IDB Group had supported some 322 cluster initiatives in LAC for a total of 490 million dollars.[44]

Mexico's car, aerospace and software cluster policies are among the most notable policies of successful clusters in Latin America.[45] Argentina's farming machinery is also a case in point,[46] among many others.

Cluster and sector-level work is receiving great post-pandemic attention. Cluster initiatives are a powerful tool to promote digital transformation, scale in value chains towards greater technological sophistication, training human talent with specific necessary skills, promoting innovation, and managing companies, value chains and public-private cooperation in a world characterized by volatility, uncertainty, major disruptions and new dynamics in the labor world.

For their part, MSMEs account for 99% of companies, 62% of employment and 25% of production in the region. However, there are large gaps in the adoption of technologies and internet use between large companies and micro and small companies. This means that MSME digitization can make an important

[41] OECD et al. (2020: 99).
[42] EC (2020).
[43] Monge-González and Salazar-Xirinachs (2017).
[44] Maffioli, Pietrobelli, Stucchi (2016: 8).
[45] OITAmericas (2018a).
[46] OITAmericas (2018b).

difference for reactivating and economic growth, productivity, formalization and employment in the region's countries.

However, the use of digital instruments by a majority of MSMEs is limited in use extent and nature: the most widespread use is email, the least frequent is that companies have their own website (it is estimated that less than 3% of MIPYMES in the region have their own website), and even less so that they use digital technologies in an integral way in their management, administration, and relationship with clients and marketing and procedures with public institutions.[47]

Data available on digital technology penetration in MSMEs are very deficient (poorly detailed and not up-to-date), but existing evidence suggests that the region experiences great lags, as is widely documented in Heredia (2020). Furthermore, MSMEs need to understand how their business models must change to take advantage of digital technologies and increase their productivity and profitability. This requires supports ranging from human resource training in basic digital skills, to training and mentoring for owners and managers.

There is a great diversity of experiences and institutions in the region's countries in support of MSMEs in general and in terms of digital transformation. During the pandemic, there was a significant increase in support measures for SMEs to facilitate their online presence and adaptation of their business models to the virtual world. A frequent policy to achieve this has been the establishment of dedicated web pages with information and recommendations for MSMEs, administered by the ministries of economy, production, industry and commerce, depending on the country, or by specialized agencies. An example is the Argentinean Ministry of Productive Development's "Digital Assistance Network for SMEs."[48] In Brazil, SEBRAE is well known for offering a wide range of resources to train and empower MSMEs, including on issues of digital transformation.

The reality is that even if they have access to relevant information, having low degrees of e-readiness, that is, low digital skills among their owners and employees, makes it difficult for MSMEs to understand where to start and how to advance in their digital transformation. For this reason, support programs must be more proactive and go beyond simply providing information on web pages, and must encompass capacity building schemes that include technical assistance, supply of specific tools, guidance and close coaching. In this type of support, it is particularly important to focus efforts, among other groups, on women micro entrepreneurs, who, for a number of reasons, face more difficulties in accessing digital services.

Unfortunately, institutions specialized in promoting MSMEs with appropriate resources, a certain degree of autonomy and professional stability remain an exception in the region. Beyond the historic institutions of Chile (SERCOTEC, INDAP, CORFO) and Brazil (SEBRAE), progress is scarce. CONAMYPE in El Salvador and INNPULSA and the services of the Ministry of Industry and Commerce in Colombia have been consolidated more recently, but the same has not happened with INADEM of Mexico, and in the other countries the responsibility for MSMEs policies lies in government instances with scarce human and financial resources and limited technical, operational and political capacities.[49]

Finally, it is not only about supporting existing companies but also new ventures and startups. It is about creating the conditions to have a healthy and dynamic ecosystem for new ventures. From the classic

[47] Heredia (2020).
[48] https://www.argentina.gob.ar/produccion/asistencia-digital-para-pymes
[49] Dini and Stumpo (2018).

article by Daniel Isenberg, Director of the Babson College Business Ecosystem Project, from 2010, entitled: "*How to start a business revolution?*"[50] this is a field of knowledge that has developed a lot in the last decade. For example, there is a world report published by the Startup Genome project, which evaluates 270 ecosystems in 100 countries and ranks the 30 best globally, as well as the most promising in the last 2020 volume.[51] The evaluation criteria are classified into 6 categories: performance, financial resource availability , market reach, connectivity, human talent and knowledge. With the exception of the business ecosystem in Sao Paulo, Brazil, which is ranked number 30, there is no other ecosystem in Latin America in the top 30. Moreover, with the exception of Sao Paulo, there is no other ecosystem of a Latin American country or city among the 270 evaluated ecosystems. The vast majority of the most dynamic ecosystems are in Asia Pacific countries.

Having a vigorous and dynamic entrepreneurial ecosystem is essential for reactivation and job creation because the evidence around the world is that most of new jobs are generated precisely not by established companies, but by new businesses that grow and develop. The core elements in a strong business ecosystem include regulatory frameworks, government support policies, existence of institutions such as business incubators and accelerators, financing schemes not only bank credit but venture capital and angel investors, business culture in society, educational institutions, human talent and others.

In this matter, Latin America and the Caribbean have taken some steps, but most countries are far from having a comprehensive policy to support new venture ecosystems. It is of interest to note that there are increasingly a number of new ventures already starting in the digital age with a fully digitized business model and using cloud services. This means that cloud services are an important component of startup ecosystems.

An example of this type of company is SkyAlert, a technology company that contributes to timely alert millions of people who live in vulnerable areas, promoting a culture of prevention against natural risks. Currently SkyAlert can send more than 7 million alerts in 20 seconds.[52] AWS has the AWS Activate service, which provides tools, resources, and other facilities at no cost to startups so they can quickly start using cloud services. At a certain cost, technical support services, training and other resources are added.[53]

Digital government

As seen in section 2, digital tools can help escape the “of low institutional capacity trap” [54] by making institutions more transparent, credible, efficient, inclusive, and innovative. This in turn can contribute to some extent to better meet citizen demands, reduce social discontent, restore trust in public institutions and strengthen social pacts.

Three stages can be distinguished in the progression towards public institution digital transformation, as represented in Figure 5. Analogue, electronic, and digital government. The first was the one that existed prior to the ICT and Internet revolution. The electronic, post-internet, is focused on technology, facilitates

[50] Isenberg (2010).
[51] Global Startup Ecosystem Report 2020. https://startupgenome.com/report/gser2020
[52] https://www.youtube.com/watch?v=tW-cceeIKG4
[53] https://aws.amazon.com/es/activate/
[54] Several authors linked to Harvard University have studied the problems of low institutional capacities (*capability traps*) and policy implementation failures in developing countries. See Andrews (2013), Pritchett, Woolcock, and Andrews (2010). For its part, the OECD has specifically analyzed what it calls the “institutional development trap” for Latin America (OECD et al, 2019).

more content and information through the internet, but has little interaction with citizens and hierarchical management practices persist. Digital government uses digital tools but as one of the components of an integrated approach to public administration modernization that includes rethinking processes and services. It generates an interaction ecosystem between socioeconomic actors in a country and public institutions. It entails a paradigm shift in the conception of the public sector with respect to participation, policy formulation, public service delivery and collaboration.[55]

The OECD Digital Governance Framework outlines six dimensions: digital in design, citizen/user-centric, government as a platform for co-creating public value, open systems as the default, data-driven and proactive.[56]

LAC countries are in different stages of government digital transformation. One of the indices used is the United Nations *E-Government Development Index* (EGDI). (Table 1).[57] Uruguay, Argentina, and Chile are among the top 40 countries out of 193. Cuba, Belize, Nicaragua, Suriname, Guatemala, and Venezuela are among the worst-performing countries in the region, although at an intermediate level among the 193 countries. There are several detailed analyses in the OECD *Digital Government Studies* series for Argentina, Brazil, Chile, Colombia, Mexico, and Peru. According to the EGDI sub-indices, the greatest challenges for LAC countries concern infrastructure, telecommunications, and human capital.[58]

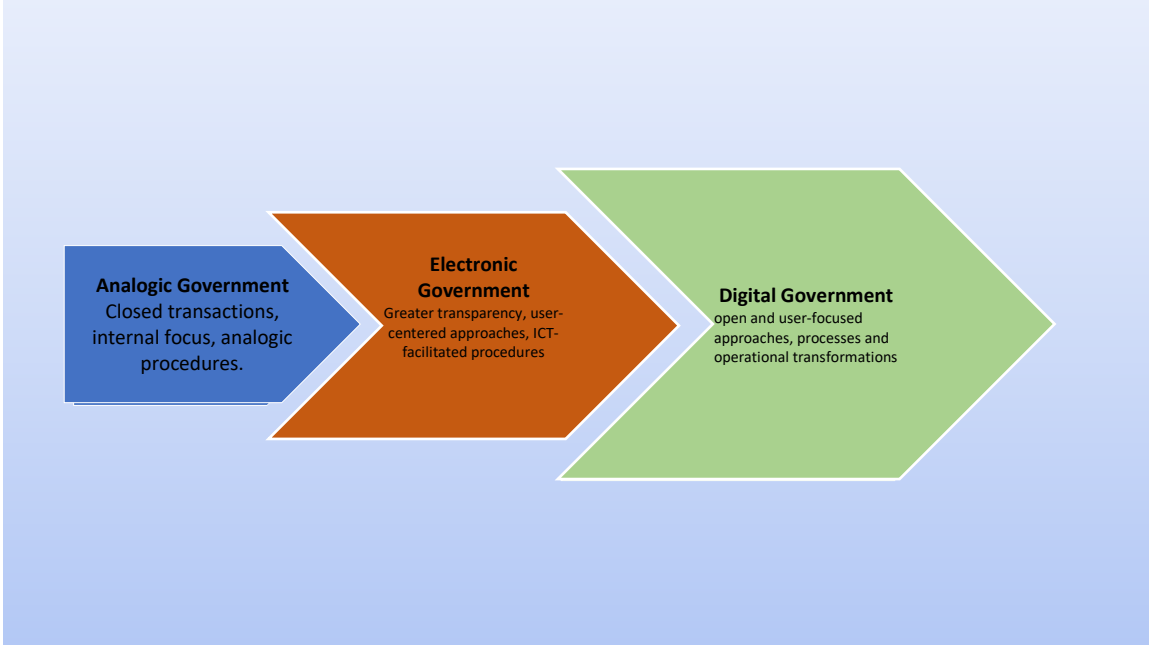
Graph 5. Progress towards a Digital Government

[55] OECD (2019a).

[56] OCDE el al. (2020: 206).

[57] There are other government digital transformation indices that are international references: the OECD's Digital Government Index, the OECD's OURdata Index of open data, the Waseda University's international ranking of Digital Government, the Government AI Readiness Index of Oxford Insights, and the Open Data Barometer of the World Wide Web Foundation, among others. Depending on the selected index, the leading and lagging countries in the region may vary.

[58] The OECD is currently formulating a new generation of digital government indicators that better focus on this concept and not just the concept of e-government. (OECD et al, 2020: 208).



Source: OECD (2019a), "Strengthening digital government", *OECD Policy Note on Going Digital*, OECD Publications, Paris. https://www.oecd.org/going-digital/strengthening-digital-government.pdf

Digital transformation is relevant to many areas of public policy: procedures of all kinds, payment of services and taxes, public sector purchases, customs administration, tax administration, social policy, environmental policy, information and response to doubts by citizens (proactive services), interactive consultations with citizens, dialogue forums, statistical databases in all relevant policy areas (open data), etc. Despite notable exceptions, the justice system remains one of the least digitized sectors of public administration in LAC. On the other hand, electronic invoicing is one of the areas of digitization in which the region's governments have advanced the most.

Some examples of Government digital transformation in the region are presented in the following boxes. Box 5 presents the case Tax Administration Superintendence (SAT) of Guatemala. Box 6 does so regarding the Guatemala Constitutional Court.

Table 1. Ranking of LAC countries in the United Nations Global Digital Government Index, 2020

Top 20					
Ranking	**Country**	**EGDI**	**Ranking**	**Country**	**EGDI**
1	Denmark	0.9758	11	Singapore	0.915
2	Rep of Korea	0.956	12	Iceland	0.9101
3	Estonia	0.9473	13	Norway	0.9064
4	Finland	0.9452	14	Japan	0.8989
5	Australia	0.9432	15	Austria	0.8914
6	Sweden	0.9365	16	Switzerland	0.8907
7	UK	0.9358	17	Spain	0.8801
8	New Zealand	0.9339	18	Cyprus	0.8731
9	U. S	0.9297	19	France	0.8718
10	Holland	0.9228	20	Lithuania	0.8665
Latin America and the Caribbean					
26	Uruguay	0.85	84	Panama	0.6715
32	Argentina	0.8279	93	Paraguay	0.6487
34	Chile	0.8259	95	St Kitts and Nevis	0.6352
54	Brazil	0.7677	97	Bolivia	0.6129
56	Costa Rica	0.7576	109	St Vincent and Grenadines	0.5605
61	Mexico	0.7291	112	St Lucia	0.5444
62	Barbados	0.7279	118	Venezuela	0.5268
67	Colombia	07164	121	Guatemala	0.5155
71	Peru	0.7083	122	Suriname	0.5154
74	Ecuador	0.7015	123	Nicaragua	0.5139
81	Trinidad and Tobago	0.6785	136	Belize	0.4548
82	Dominican Republic	0.6782	140	Cuba	0.4439

Source: Prepared by the author based on *UN E-Government Survey 2020*, Department of Economic and Social Affairs, UN, New York.

Box 5. Guatemala Tax Administration Superintendence (SAT)

The Tax Administration Superintendence (SAT), the tax authority in Guatemala, is focused on modernizing the tax administration. The institution did not have the capacity to implement the electronic invoice system to achieve the 100% national coverage goal. The system was going to have to receive two billion documents in one year and data security had to be increased through new technologies. After a public tender and the design of a cloud-based architecture, AWS provided a solution that allowed SAT to implement the system and significantly reduce costs.

Source: https://aws.amazon.com/es/solutions/case-studies/satguatemala/

Box 6. Guatemala Constitutional Court

The Guatemala Constitutional Court is the body that administers and leads the country's constitutional justice system. The digital transformation project consisted of creating electronic files for all new system cases and the use of digital signatures. File availability and saving security in the cloud was a fundamental issue. The solution, provided by AWS with the support of two local partners, MyAppSortware and Datum, reduced digital document transfer and request times by 50%. The cloud architecture integrated several components such as electronic reception, actions carried out by lawyers and internal users, and electronic notification of decisions.

Source: https://aws.amazon.com/es/solutions/case-studies/cortecguat/

Digital transformation can improve areas that are particularly prone to corruption, such as public procurement, investment in infrastructure and transfers between government levels.

For example, *MapaInversiones* is an IDB initiative whose objective is to help create digital platforms for data visualization and allow citizens to exercise control over the use of public funds. Several countries have already put such platforms into operation. For example, the *Maparegalías* platform in Colombia, which shows the origin and destination of financial resources obtained from exploitation of natural resources.[59]

Digital platforms for public institutions' procurement and contracting have been proliferating. Costa Rica has installed the *Integrated Public Procurement System* (SICOP), which unifies 20 procurement systems and 10 legal schemes. *ChileCompra and Colombia Compra Eficiencia* are other platforms with similar objectives.

One of the most promising areas of digital solution application is procedure simplification, in a region that systematically fails in time indicators and in the steps necessary to carry out a procedure before the public administration, as shown by the excellent study *El Fin del Trámite Eterno: ciudadanos, burocracia y gobierno digital (The End of the Eternal Procedure: citizens, bureaucracy, and digital government)*.[60] According to this study, there are great opportunities, and benefits, of digital transformation in terms of procedures. Mexico and Chile are the only countries in LAC in which more than half of the procedures with the public administration can be initiated and concluded through the Internet. Argentina's *Ventanilla Unica Digital y Presencial* (*Digital and Face-to-Face One-Stop Shop),* and the Chilean *Chile sin Papeleo 2025* and *Chile Atiende Online (Chile without Paperwork 2025 and Chile Delivers Online)*, are initiatives to unify online access to government procedures.

Another area of great potential and benefit is making different systems interact with each other. The automatic collation of fiscal, patrimonial, social, and labor data could increase efficiency in the tasks of targeting social transfers and detecting cases of tax evasion (OECD, et al. 2020: 216).

A recent innovative application has been geolocation via GPS systems to determine the behavior of mobility flows and congestion patterns in large cities and to improve urban mobility systems.

[59] Lauretta, Rossi, Cruz and Arisi (2019).
[60] Roseth, Reyes and Santiso (2018).

I. Governance for digital transformation: regulatory frameworks and institutional architectures

Good governance is a key element to accelerate and reap the benefits of digital transformation. There are two dimensions of governance that are key as facilitating factors, or obstacles depending on their characteristics, of the digital transformation: i) regulatory frameworks and ii) institutional architectures, planning, execution, and leadership of the issue within governments.

Regulatory frameworks

Seven areas of the legal and regulatory framework are critical to creating an enabling environment that drives digital transformation:[61] digital security (cybersecurity), data protection, rules for public purchases, rules for teleworking, the adaptation of labor laws to the new realities of labor hiring, a regulatory environment conducive to electronic commerce, and the promotion of competition. This section comments on each of them.

Digital security (cybersecurity)

Digital security is critical to spreading the benefits of digital transformation. Violations and incidents of insecurity can lead to all kinds of economic, national security, financial, competitive damage, loss of reputation and loss of trust in digital services. There have been abundant examples suggesting the great damage digital security breach incidents can do.

Most countries in Latin America and the Caribbean are moving towards a long-term strategic vision in terms of digital security (OECD-IDB, 2016). In 2019, 13 countries in the region had a national digital security strategy (IDB-OAS, 2020).

However, there is a long way to go. According to the Global Cybersecurity Index,[62] measuring five dimensions (legal, technical, organizational, capabilities and international cooperation), LAC is the region least committed to digital security after Africa. This index combines 25 indicators in one and its value ranges from 0 (no cybersecurity initiative) to 1. Only in Uruguay cybersecurity is relatively high, since it obtains a score of 0.68, which places it in 51st place out of 175 countries. The rest of the region scores medium or low.

The most noticeable advances have been made in legislation: 30 countries have laws on cybercrime and cybersecurity regulations, and 10 have rules to stop the sending of unwanted email *(spam).* Regional initiatives have also focused on formulating digital security strategies; however, they have neglected other aspects. (OECD et al. 2020: pp 196-198).

In 2018 the OAS and AWS published a comprehensive guidance document for governments on national cyber risk management.[63]

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[61] Ministerial meeting question 4

[62] https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx

[63] OEA-AWS (2018a).

New laws and regulations are welcomed because it is important to advance on policies and regulations that improve digital security and data protection. On the other hand, when designing these policies and regulations, it should be borne in mind that there are other equally important policy objectives such as promoting innovation and promoting information flows that support trade and the digital economy. It is important to achieve a balance between the two types of objectives.

Cloud security policies should require the use of accreditation assessments and certifications such as: ISO 27001 (Global Security Standard); ISO 27017 (Specific Security for the Cloud); and ISO 27018 (Protection of Personal Data), as well as SOC 1, 2, 3 (Security, Confidentiality, Availability).

There are several resources that companies, and organizations can use to increase their digital security. One of them is the NIST *(National Institute of Standards and Technology* of United States*)* Cybersecurity Framework that helps businesses of all sizes better understand their cybersecurity risks, manage and reduce their risks, and protect their networks and data. This Framework is voluntary. Provides businesses with an overview of best practices to help them decide where to focus their time and money on cybersecurity protection issues.[64]

One issue that has become especially important when talking about cybersecurity and migration initiatives to the cloud in all countries of the world is the geographic location of data. Because of concerns about the security of their data, particularly the databases of public sector organizations, some governments have decided that public sector data, or at least certain categories of it, should have national residence, that is, they must remain within the country's borders, not in the cloud on servers located in other countries. This supposedly to better protect that data not only from hackers but from other governments.

However, those perceptions are counterproductive to the goal of effectively securing public sector data. Experts and organizations such as the World Economic Forum[65] have argued that this concern is not well justified, partly because security standards that large cloud service providers offer are extremely high, even higher than those that governments may have locally, and partly because by putting in practice strict residency requirements governments are limiting their potential to move towards efficient and innovative digital government services. Part of the argument is that the security of the physical facilities where the servers that store the data are located is not the central point, because the vulnerabilities are not mainly local physical attacks but remote attacks via the internet, which is what exposes data to a wide threat space. Another part of the argument is that in most cases in which databases are penetrated, they are attributable to human errors or carelessness in the handling and use of passwords, which allows attackers to enter the systems as if they were authorized users; or successful tricks used by attackers against authorized users; or improper or malicious acts performed by people inside the organization. The physical location of data has nothing to do with these realities. If data protection architectures and mechanisms are not “state of the art” or best practice, a national localization policy may rather increase threats rather than reduce them.

[64] See https://www.ftc.gov/es/tips-advice/business-center/small-businesses/cybersecurity/nist-framework-es. It is also useful to see OEA-AWS (2019a) and OEA-AWS (2018b)

[65] https://www.weforum.org/agenda/2020/06/where-data-is-stored-could-impact-privacy-commerce-and-even-national-security-here-s-why/

Countries should refrain from enacting data residency laws, considering the disadvantages for local consumers, industries, technological development, and labor markets. Public policy must evolve to meet the changing realities of technology and the world it helps create. Otherwise, governments will continue to delay in updating their operations, serving their citizens and adopting the most modern and secure solutions.

Data Protection

Digital technology allows the accumulation of huge amounts of millions of people's personal data and raises many sensitive issues about the potential such information misuse: these personal data are not only traditional ID or passport numbers, or addresses but geolocation, biometric data, electronic purchases, electronic payments, and many others. Improper and uncontrolled use of personal databases can violate not only the right to personal privacy, but also lead to risks of restricting personal freedoms and even threats to democratic governance. Many issues of an ethical nature are even raised about data management and use, and the necessary codes of conduct for companies and public and private organizations that generate or acquire digital databases, in areas such as the need to request informed consent to collect and disseminate data (for example the recent change in the rules for Facebook and WhatsApp caused the abandonment of these platforms by millions of people around the world), respect for anonymity, the need to act with transparency, etc.

There is a set of OECD guidelines on protection and privacy of personal data transboundary flows, which continue to represent the international consensus about desirable and general guidelines on the personal information collection and management. (OECD, 2013).

The EU General Data Protection Regulation (GDPR) has had a great impact on regulatory frameworks in the region. The regulations outlook in this matter is very fluid now in the region and is constantly evolving. In August 2018, Brazil approved the *Lei Geral de Proteçao de Dados*, which will come into force in 2021. A new framework is being debated in Chile, and Argentina and Uruguay have recently updated the legislation to make it consistent with the EU GDPR. Lack of coordination on national regulations is one of the main obstacles for transferring personal data between jurisdictions, so an important recommendation is the harmonization of regulatory frameworks in this matter with a regional scope.

Additionally, concerns about data security and privacy in cloud migration can be resolved through the issuance of policies for data classification and handling. Classifying data into discrete categories (for example, low, medium, and high risk) allows governments (and indeed any organization, both private and public sector) to better protect information. It is important to issue guidelines for all units to use harmonized classification systems for information and data by level of sensitivity. This avoids fragmentation and discretion in each entity. An excellent guide with country cases and recommendations for establishing a data classification system is White Paper 6, released by the OAS and AWS.[66]

Progress on data protection regulatory frameworks in LAC has been uneven, because although most countries in the region have one in place, their common characteristics vary considerably. For more details on this topic, see OECD et al (2020: pp 198-201).

[66] OEA-AWS (2019b).

Public technology procurement [67]

Virtually all information and services from a government can be migrated to cloud computing solutions. A rapid adoption of digital technologies by governments requires agile systems and good practices for procuring technology and migration to digital systems in the cloud by public institutions. However, in this matter there are situations of delay in many countries.

The main characteristic of cloud computing services is that they are highly standardized to allow high efficiencies and economies of scale and achieve the cloud's hyper-scalability, observing high security and privacy standards. This requires that cloud service providers (CSP-Cloud Service Providers) to make very large investments in data centers. Therefore, the number of CSPs with the capacity to provide cloud services on a large scale is small.

The main difference between cloud computing and "traditional" or IT computing is that, in the cloud model, it is not necessary to buy the necessary physical assets (servers, network equipment, cables, physical space to maintain the equipment with air conditioning, etc.). This means that, with the cloud, governments need not process the purchase of cloud services as if they were fixed assets, but as operating expenses.

In this way, governments' digital transformation requires a transition from traditional technology public procurement frameworks and procedures such as asset procurement, to the new cloud computing paradigm, which is service procurement. Many governments, or specific institutions within each government, have not modernized their procurement frameworks or trained their procurement staff with the necessary skills, and these are major barriers to digital transformation of governments.

A good practice in leading governments in terms of digital transformation and technology procurement is the so-called "cloud first" policy. It is a government directive, legislation, executive order, or presidential decree that by default directs government agencies to build and run IT systems in the public cloud. This demonstrates a commitment to migrate to the cloud. Several countries in the region have adopted this policy, including Argentina, Brazil, Chile, Colombia, Mexico, and Peru. Although in the case of Brazil only for the Executive Branch.

The cloud adoption process has multiple stages, and these types of guidelines are just the first step. As stated by García-Zaballos, et al. (2020):

"Managing IT infrastructure and services requires having high levels of maturity in areas as diverse as technical capacity, operational planning, budget stability, inter-institutional coordination, data protection legislation, and public policy robustness for promoting responsible and efficient use of digital technologies by public institutions. In other words, a complex multidisciplinary framework of challenges. The contracting of cloud services requires clear guidelines and solid knowledge, both technical and public procurement."

It is essential that governments generate the necessary guidelines in their public procurement policies and train the personnel in charge of purchasing under the new business models of new technologies. In this sense, another good practice is to have the so-called appropriate "procurement vehicles", one of these vehicles is the so-called "framework agreements".

[67] This section is based heavily on García-Zaballos et al. (2020) and Amazon Web Services Institute (2019). It is also benefited from an interview with Catalina Vergara, AWS Public Procurement Manager for Latin America, held on January 20, 2021.

A framework agreement is an agreement between one or more contracting authorities - usually the central public procurement agency representing the entire government - and one or more economic operators and suppliers, the objective of which is to establish technical and commercial conditions that govern the contracts to be awarded during a specified period for the provision of certain goods or services to the agencies. Framework agreements are instruments to aggregate demand and standardize requirements, in contrast to the traditional processes of individual tenders for each public entity. In fact, 70% of OECD countries have some kind of framework agreement for using cloud-based technologies.

In addition, there is a whole issue on design and budget management to finance expenses or investments in the cloud. Besides the need to stop classifying these purchases as capital expenditures on equipment and assets, and classify them as services, it is important to make the list of headings or items that procurement officials must include in purchase budgets. These items include software licenses, expenses for cybersecurity software and services, investments in data protection services, etc. It is also necessary to move away from the budgeting paradigm of a one-time purchase that will last several years and adopt a multi-year budgeting approach for services.

Adoption guides for cloud services should also consider adoption of international standards on cybersecurity, data protection and privacy. When countries adopt sui generis standards that are not aligned with international standards, serious problems of all kinds are created in terms of compatibility.

All these types of characteristics and conditions must be clear in the procurement vehicles and respective contracts.

Teleworking

Until before the pandemic, the region’s countries had made little progress in appropriate regulation to improve reconciliation between personal life and work, with the exception of teleworking, in which several countries had taken important steps. It is in the European Union where the most progress has been made with labor flexibility measures such as staggered working hours, flexible arrangements and working-hour banks.

In Latin America and the Caribbean there has been a regulatory boom in teleworking in the last 10 years, hand in hand with the advancement of ICT. In some countries it is regulated under the category of "home-based work, in others as "remote working" and in others as "teleworking". However, the incidence of teleworking before the pandemic was still limited.

Unfortunately, despite the growing interest in the use of teleworking, there is still no statistical information that is strictly comparable, or even that adequately reflects its use. What is available is mostly non-comparable country-by-country information.[68] For the United States, it has been estimated that, on average, approximately 37% of jobs could be done from homes and 40% in Europe. The potential for telework is related to country income, being lower in the lower income countries. For Latin America and the Caribbean, the teleworking potential has been estimated in a range that varies between 7% and 30% depending on the country and the methodology used for the estimation. [69]

To facilitate the expansion of teleworking during the pandemic and to set forth clear rules, numerous countries in the region established new legislation for teleworking in 2020. The following countries adapted their laws on teleworking in 2020: Panama (February), El Salvador (March), Chile (March), Argentina (August), Uruguay. [70]

Past year events have shown that jobs that were impossible to do remotely can be done remotely after all, adopting new digital tools and new work practices. But remote work also has drawbacks, such as making collaboration with others more complex, loneliness, and difficulties in disconnecting. These and others are aspects that should be considered in teleworking laws and regulations.

The main legislation provisions regarding teleworking include: teleworking and teleworker legal definition, employment rules and conditions (rights, time or work hours and their organization, access to the workplace), data protection and privacy conditions, references to occupational health and safety, specific provisions on costs assumed by parties (equipment transport and maintenance, etc.), training, work organization (days, frequency, workload, performance metric evaluation, reports, monitoring), right to disconnect, etc.

The possibility of teleworking is limited by four main causes: lack of adequate legislation that contemplates this new work modality, characteristics of the occupations, lack of reliable connectivity and sufficient bandwidth, and lack of the necessary tools to telecommute. These are the main areas that countries and companies should address to promote remote work.

[68] ILO (2020), p 91.
[69] ILO (2020), p 89.
[70] ILO (2020), p 93.

Adaptation of labor regulations to new labor market realities and the tendency to "work at home" accelerated by the pandemic.[71]

In relation to digital transformation, required adaptations in labor laws are not only related to teleworking rules and provisions, but the issue is also related to a much broader category of situations that are being talked about and are being analyzed as work at home *(Working from Home - WFH)*, or even work from anywhere (*Work from Anywhere – WFA*).[72]

Before the pandemic, ILO estimated that 7.9% of the world's workforce (260 million workers) worked at home permanently. Although some of these workers were teleworkers, others were not, and encompassed a wide range of occupations including outsourced industrial workers (embroiderers or sewers -mostly women-, cigarette or cigar rollers, etc.), artisans, self-employed business owners, independent workers of various types (*freelancers*), as well as various employees. Employees made up one in 5 home-based workers, but the number was higher, 1 in two, in high-income countries. Globally, among employees, 3% were working exclusively at home before the pandemic.[73]

Since the beginning of the pandemic, there have been several studies on the potential of home-based work as a response to the crisis. Dingel and Neiman (2020) estimated for the United States that 34% of occupations could plausibly be performed from home. Albrieu (2020), Foschiatti and Gasparini (2020) and Guntin (2020) applied the same methodology in Argentina and Uruguay, respectively, and estimate that between 26% and 29% of workers in Argentina, and between 20% and 34 % of Uruguayan workers are in occupations that can be done remotely. Boeri et al (2020), using a slightly different methodology, estimated potentials of 24% for Italy, 28% for France, 29% for Germany, 25% for Spain and 31% for Sweden and United Kingdom. [74]

Berg, et al. (2020) used another methodology based on the Delphi method, and estimate that, in countries with the necessary infrastructure, on average 18% of workers could work from home, but this average is 27% in developed countries, 16% in middle-income countries, and 12% in low-income countries. These country differences are not surprising considering the differences in connectivity, education and digital skills between different groups of countries.

The underlying issue, beyond the degree of precision in these estimates, is that the economic and technological reality is extremely dynamic and changing and change was drastically deepened by the pandemic that accelerated arrival of the "future of work", on which there was so much debate before the pandemic. In the 21st century, one of the most important reasons for modernizing and adapting labor law is technological acceleration and the associated new business and hiring models. Since before the pandemic, there has been a marked transition towards new labor relations, such as temporary

[71] For an extensive and in-depth analysis of trends and challenges associated with the growing tendency to work at home see a recent ILO report (2021).

[72] The ILO distinguishes three types of work at home: i) industrial work at home which refers to production of goods made by workers at home either as part of, or replacing, factory production, but also artisanal production such as the making of handicrafts; ii) teleworking itself, which refers to employees who use ICTs to do their work remotely. And iii) home-based platform digital work, which refers to service sector tasks performed by workers according to specifications from the employer or intermediary, in situations where workers do not have the autonomy and economic independence to be considered independent workers according to national legislation. See ILO (2021) p vi.

[73] Berg et al. (2020).

[74] This review of the literature on home-based work estimates is based on Berg et al. (2020).

employment; part-time and "on demand" work; temporary work through agencies and other multi-party modalities; disguised employment relationships and economically dependent self-employment. [75] New forms of employment have proliferated for multiple reasons including: service sector growth, globalization competitive pressures, new platforms and technological advances, and changes in company organizational strategies.

Labor legislation, if it is not well adapted to these realities, can contribute to negative results such as labor market segmentation, informality increase, unlevel the playing field and create discrimination between groups of workers and, in general, to rigidities for economic and digital transformation and resilience. On the other hand, the concern of organizations such as the ILO is that it is important that in the growing trend towards increasing work at home and new forms of hiring, care is taken so that working conditions do not deteriorate.

In other words, the challenge posed by technological revolution and the potential of working at home, beyond the smaller category of teleworking, is to achieve balances and agreements between the need to adapt the rules to accommodate the transition to the new forms of contracting generated by the digital era, on the one hand, and respect for classic labor rights and social coverage and protections (wages, health insurance, pensions, etc.) that were designed under the old productive paradigm of the industrial era and the corresponding classical employment relationship, which is in the process of shrinking, even disappearing altogether.

And of course, the challenge is not only nationwide, because the digital world is global, and many tasks that can be contracted, or possible labor relations, are cross-border. For example, how to facilitate, but at the same time properly regulate, the sale of cross-border professional services? Considering the recent tremendous growth in modern services such as call centers, back office services, and other categories, these questions are critical.[76]

The subject is deep and complex, and it is noted here as being of enormous importance in relation to digital transformation and associated new contracting modalities. However, delving into it is beyond the scope of this paper.

Regulatory environment conducive to electronic commerce

Many countries maintain regulations that prevent or hinder companies, particularly SMEs, or individuals, from engaging in e-commerce. For example, regulations that maintain artificial distinctions between online commerce and physical commerce, even though companies increasingly want to operate with business models that combine both elements; urban planning or zoning rules that prevent the reconditioning of physical establishments for activities related to electronic commerce; or regulations that hinder or prohibit innovative delivery methods, such as drones; or regulations that make electronic payments more expensive or impossible. (OECD, 2020a).

[75] ILO (2016a). Atypical employment in the world: Challenges and perspectives. Geneva: ILO. http://www.ilo.org/global/publications/books/WCMS_534522/lang--es/index.htm

[76] Most of the workers in call centers or for business services are locally hired by subsidiaries of the respective multinational companies, whereby local law applies for that employment relationship. But there are important and growing categories of buying and selling professional services of a cross-border nature.

As recommended by the OECD, regulatory approaches and reforms for electronic commerce should, to the extent possible, allow for experimentation, and be transparent and flexible. This can be done through the so-called "regulatory sandboxes", that is, areas or spaces for experimentation to draw lessons before generalizing the regulations to the whole country.

A regulatory environment conducive to electronic commerce should also create good conditions for electronic transactions in the areas of connectivity, international logistics and trade. For example, customs and postal services that allow efficient circulation of small packages, as well as their home delivery.

In addition to the regulations themselves, as discussed in the section on promoting clusters, MSMEs and startup business ecosystems, there are a variety of technical and promotional assistance actions that governments, and in some cases large companies, can establish or strengthen to support MSMEs in their digital transformation and towards cloud computing, such as making available digital platforms with guidance and technical assistance for their productive use.

Promotion of competition

Another of the key regulatory areas related to digital transformation is competition policy. In general terms, policies to promote competition are important to avoid monopolistic and oligopolistic practices that harm consumers, or damage innovation by creating barriers for new companies to enter the market, and other restrictive practices when few companies develop great market power. However, in the digital age, specific characteristics of digital ecosystems and platforms and data economy make competition policies face new challenges, due to three elements: 1) extreme scale economies of digital services which results in great competitive advantages for established companies; 2) the so-called network externalities, that is, the fact that the convenience of using a service increases exponentially with the number of users, the more users the more attractive it is for other users to use the same service and the easier it is for an established company to attract a critical mass of users; and 3) the role of data. Data is the essential raw material of the digital world, the ability to accumulate it infinitely and to analyze and use it in competitive strategies based on AI, increases the competitive power of companies and organizations that accumulate large databases.

The consequence of these three characteristics is the presence of strong "economies of scope", which favor the development of ecosystems and companies in the center of those ecosystems, providing them enormous competitive advantages. Therefore, in the digital age the concepts, doctrines, and methodologies, as well as competition policies' compliance mechanisms require adaptation and refinement.[77] As reality has shown, dominant digital companies have strong incentives and tools to engage in anti-competitive practices. Furthermore, by being innovative in terms of the business model, many platforms, especially those that create markets, act as regulators of the markets they create, because they themselves set the rules and institutions through which users interact. This also poses special challenges for competition policy. Currently, this field of competition policies in the digital age is

[77] European Commission (2019).

characterized by a fluid situation and there are important discussions, in view of the great novelty of many of the business models in the digital world and their characteristics.

Some LAC amendments, such as the 2013 Mexican telecommunications sector amendment, highlight the importance of active competition, strong regulatory frameworks, and investment support, particularly in remote areas and rural areas. An independent regulatory authority with high technical and political capabilities is essential for the public to have confidence in the integrity of regulatory decisions. Independent bodies are needed to deal with problems of market dominance or to impose regulations when necessary. A good framework and policies to promote competition is another element that not only facilitates digital transformation, but also helps guarantee innovation and access for new market participants, as well as equity and well-being for consumers.

Institutional architectures for planning, execution, and leadership

Institutional architectures for planning, execution, and leadership of digital transformation processes within governments are the other fundamental element for digitization speed and benefits.

Planning frameworks: the role of National Development Plans (NDPs) and digital agendas

The leading countries in the digital transformation field have active planning frameworks, policies, and strategies to advance digital transformation, both for governments and for society at large. As higher-level policy instruments, National Development Plans, widely used in LAC as planning frameworks, are a fundamental document where the countries' digital agenda must be present. As stated by the OECD, ECLAC, CAF, EU (2020: 226): "the digital era requires integrating digital transformation as an essential and cross-cutting pillar of national development plans and the formulation of specific digitization programs."

However, in the excellent analysis made by the OECD et al (2020) report on the subject, it is concluded that the attention to and modality of incorporation of digital subjects in the LAC NDPs is uneven and there is a wide scope for a more complete and effective incorporation. Based on an analysis of the NDPs in 16 LAC countries, the report contains the following main conclusions: (1) digital transformation is most frequently mentioned in relation to growth and productivity issues, and much relating it to social or health issues, even less to institutional capacities, and the least number of links is to environmental issues; (2) Except for Argentina, Brazil, Chile, Colombia, Mexico and Uruguay, no other country mentions the complementary expansion of the regulation on digital security in their PNDs. (3) attention paid to the development of digital economy continues to be scant, with only a small number of proposals relating to promoting electronic commerce, open banking, or financial technology companies (*fintech*); (4) references to regional economic integration are frequent, but in most cases to energy, border, and trade integration issues. Few countries include digital integration among their goals.

In summary, although the digital transformation issue has entered prominently in a majority of NDPs in LAC countries, there are shortcomings, imbalances, and opportunities for improvement.

The NDPs are not the only relevant policy framework. Since the mid-1990s, LAC governments have been developing digital agendas or ICT strategies. Most of the LAC countries currently have a digital agenda. Digital agendas cross-cut different sectors, address various objectives and a wide series of policies in areas

such as infrastructure, access to ICTs, broadband networks, acquisition of digital skills, legal framework, digital government, ICT in educational centers, digitization of SMEs, electronic commerce, etc. The use of ICTs in health policies is not mentioned as frequently, something that will certainly change post-pandemic. Nor is the use of digital tools frequently mentioned in environmental policies.

Some countries also have independent digital government strategies. In this regard, as García-Zaballos et al (2020: 6) state:

Among other factors that have made it possible to transform public administrations, providing better services to citizens and companies, it is worth to highlight: effective priority by the heads of governments who put great dedication to implementation of these policies, supporting regulatory or institutional changes , appointing high profile and capable managers; stability of digital agendas, with long-term goals and projects, supported by public-private partnerships; resource availability, reflected in budgetary facilities for transformation; creation and continuity of governing or managerial digital transformation institutions, with powers to coordinate, provide tools and monitor progress. In turn, efforts to advance digital government are enhanced if they are embedded in broader strategies for the technological transformation of a country."

Leadership and governance architectures for execution

Expanding digital transformation by individuals, businesses, and public and private organizations requires comprehensive, innovative, and coordinated policy efforts. Effective coordination between public bodies and with the private sector is essential for implementing a digital agenda in a coherent and effective way. It also requires high-level political and technical leadership that ensures incentives for implementers at all levels, as well as rigorous monitoring and accountability. Just as digital transformation is a disruption in productive and organizational paradigms, it is also an institutional disruption in the traditional ways of managing public policy.

Examples of inter-institutional coordination are observed in different LAC country digital agendas, but few countries have consolidated mechanisms for effective execution. The models in operation to manage digital agendas vary by country. There are two basic models or architectures, with variants or combinations: one consists of assigning responsibility to a specialized ministry or agency, this is the case of Argentina, Brazil, Costa Rica, the Dominican Republic, Ecuador, Honduras, and Paraguay, among others. In some cases, it is a specialized agency, in others it is one of the functions of the Ministry of Science and Technology.

The other model is to assume leadership and coordination from an Office or Hierarch at a level higher than the ministerial level, which reports directly to the President of the Republic, and which is often physically in the Presidency of the Republic. This is the case of countries like Bolivia, Colombia, Panama, Peru, Uruguay, and Mexico.[78]

In some cases, the leadership model is complemented by the existence of a Commission or committee for intergovernmental coordination of the digital agenda and coordination mechanisms with the private sector and with multiple interest groups for consultation, implementation and monitoring of the agenda. Few countries have explicit budgets or funds to finance digital transformation. In the literature review made for this work, no rigorous evaluation of these two models has been found to say which of the two is more effective.

Another central element of the institutional management architecture is to have an effective monitoring framework of progress in the execution of digital agendas with measurable goals, which allows learning, correction of the course and improvement of policies and programs over time. For example, the OECD's *Going Digital Toolkit* helps countries assess progress and formulate policies. The release of *Measuring Digital Transformation: A Roadmap for the Future* (OECD, 2019), is also an important contribution in terms of indicators and measurement.

Two good governance and leadership practices for digital transformation in LAC are Uruguay and Colombia, whose experiences are summarized in boxes 7 and 8, respectively.

Box 7. Towards an information society in Uruguay

Uruguay is one of the leading countries in Latin America and the Caribbean in public sector technological development. A decade ago, it did not stand out in any ranking and now it leads the EGDI *ranking* of the region and is part of the D9, a group of countries that represents the most digitized nations.

Several components may explain its success, including: having generated a sustainable digital agenda, with innovative projects and clear goals, which has remained stable, but has evolved every few years; having an advanced institutional framework, led by a highly professional entity -the Agency for Electronic Government and the Information and Knowledge Society (Agesic)-, with extensive powers and resources; having established a comprehensive regulatory framework, with instructions and regulations that enable advanced use of technologies; providing tools to public entities, especially a technological infrastructure that has facilitated the implementation of hundreds of solutions. Uruguay has opted for installing a private community cloud, which is managed by Agesic, and provides services to all government agencies.

The results of this strategy have had an impact on practically all areas of government. More than 1,000 procedures for citizens and companies (70% of the total) can be carried out one hundred percent digitally from start to finish. It has an integrated health platform, salud.uy, one of whose applications is the National Electronic Medical Record, which can serve 80% of the Uruguayan population, to facilitate diagnoses and treatments. Likewise, Plan CEIBAL has been running for more than a decade, which provides a computer connected to the Internet to all children, together with access to educational resources that have transformed the ways of teaching and learning. The digital identity system was implemented to transfer most of the interactions and procedures that do not require physical presence to the Internet. Government resources are managed today through a GRP (*Government Resource Planning*), the digital file and e-

[78] OECD et al. (2020: 231).

notifications were created, among dozens of other applications aimed at promoting the development of digital government and Government efficiency.

More information in: agesic.gub.uy
https://www.gub.uy

Source: Copied from García-Zaballos (2020), p 6.

Box 8. The governance of digital transformation in Colombia

Digital transformation policies in Colombia had been coordinated by the Ministry of Information Technologies and Communications (MINTIC). As of August 2018, when the government of President Iván Duque began, a Counselor for Digital Transformation installed in the Presidential House was established to be a great articulator of the digital transformation policy. The logic for this decision was that, as it is a multi-sectoral and cross-cutting issue, it was important to have a leader and interlocutor to facilitate coordination in the government team between different ministries and agencies.

In terms of planning instruments, Colombia has an extremely solid framework as well as a strong group of normative levers and guidelines. The *2018 National Development Plan* included the pacts for Science, Technology and Innovation and Colombia's digital transformation. In November 2019, the National Council for Economic and Social Policy (CONPES) published Document CONPES 3975 *Política Nacional para la Transformación Digital e Inteligencia Artificial (National Policy for Digital Transformation and Artificial Intelligence)*. The CONPES documents in Colombia are high-level policy frameworks that set out the objectives, goals, and concrete lines of action for various policy areas, as well as the mechanisms of governance, execution, and accountability. This was followed by other CONPES documents in areas such as electronic commerce, cybersecurity, logistics, and post-COVID economic reactivation that have digital transformation components.

Since 2018, several important laws have been issued for digital transformation such as the one related to modernizing the ICT sector, the electronic medical record interoperability, the creation of the Ministry of Science, Technology and Innovation, and others as well as decrees, circulars and strategies related to a variety of topics such as regulatory "sandboxes", Artificial Intelligence, Smart Cities and Territories, ethical framework for AI.

The policy framework covers almost all areas of digital transformation, including among others: digital government, telemedicine, digital education (Aprender Digital (Digital Learning) Program), Electronic Commerce, Fintech, application of digital technologies to social policies (Ingreso Solidario (Solidarity Income) Program) and more recently an overview of the use of technologies to face the COVID-19 crisis. It also covers the complementary areas of cybersecurity and data protection.

The Digital Counselor's office is made up of 8 officials. The office ensures progress in the general strategy contained in relevant CONPES documents and maintains digital transformation issues present in the Council of Ministers' agenda. The Counselor and his office also coordinate with various commissions and working groups on specific issues, made up of senior officials and middle managers in various relevant ministries and agencies, thus becoming a powerful network of specialists and counselors of other hierarchs within public administration.

In addition, there are several instances of close coordination with the private sector, including a Technology Trade Union Council and a Digital Advisory Council in which representatives of key companies and major

business organizations participate. Colombia has a strong national competitiveness system, one of whose chapters is focused on promoting the digital economy. The Counselor's office also coordinates closely with this chapter.

As a result of these efforts, Colombia has risen significantly in recent years in various indicators and international rankings. It is in 3rd place among 33 countries, and # 1 of 6 in Latin America, in the *2019 Digital Government Index* of the OECD; and is in 3rd place out of 24 Latin American countries included in ILDA's *Regional Open Data Barometer for LAC 2020.*

Source: Prepared by the author based on an interview with Mr. Víctor Muñoz, Presidential Counselor for Economic Affairs and Digital Transformation of Colombia, held on January 28, 2021; CONPES 3975 (2019) *Política Nacional para la Transformación Digital e Inteligencia Artificial (National Policy for Digital Transformation and Artificial Intelligence)*, National Council for Economic and Social Policy, Republic of Colombia, National Planning Department, November 8, 2019; and Avances de Transformación Digital del Gobierno Colombiano 2018-2020 (*2018-2020 Digital Transformation Advances of the Colombian Government*), PPT Presentation by Counselor Víctor Muñoz.

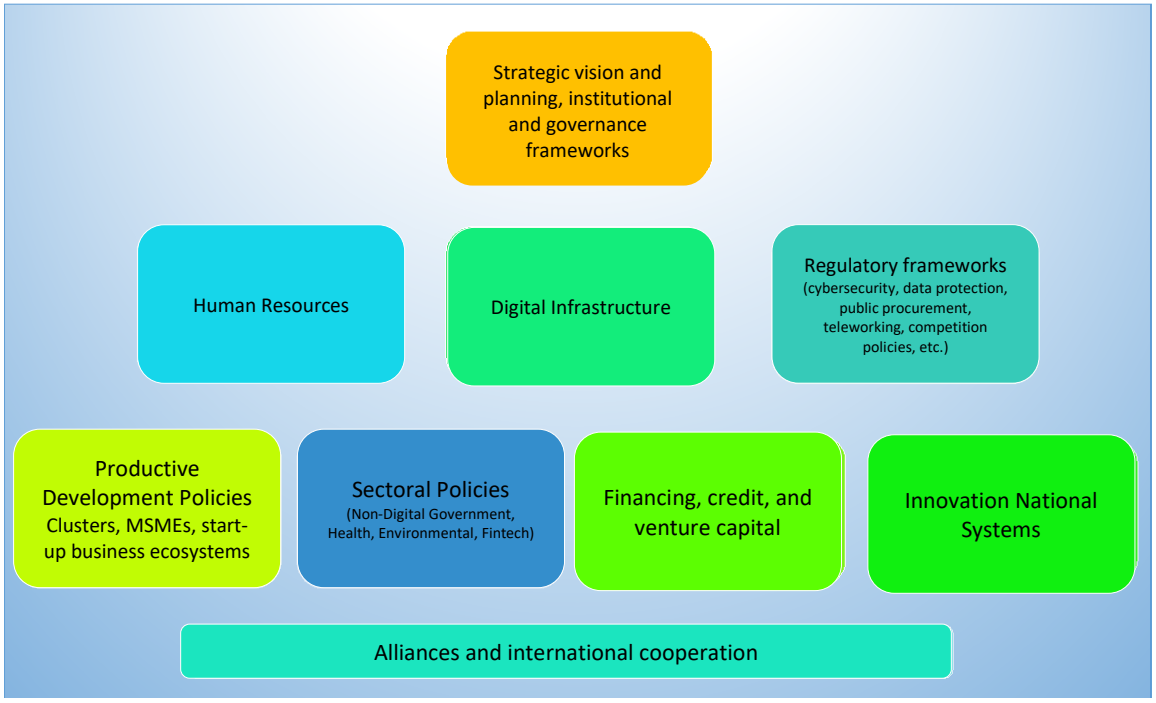
V. Roadmap for digital transformation and reactivation with transformation

As it has been argued and shown in this document, digital transformation has high potential to help economic reactivation and post-pandemic recovery, and to, simultaneously, accelerate the necessary transformations to face various development traps in which the region's countries were positioned even before the pandemic: the low productivity trap and the weak creation of quality jobs; the social vulnerability trap; that of weak institutional capacities and the environmental trap (Section II). This potential was illustrated with an analysis of perspectives and some examples in four areas: health, education and human resource skills; productive development and employment and digital government and modernization of Government (Section IV).

Section III presented a framework of the main digital transformation drivers, summarized in Figure 4, which is reproduced below for ease of use. Section V delved into challenges in the areas of regulatory, planning, institutional and governance frameworks.

In this last section, a roadmap for digital transformation with specific guidelines was proposed for the consideration of governments. These guidelines are presented in a synthetic way, without further elaboration, as a conclusion of the analysis of this document and the review of the literature.

Graph 4. Digital Transformation: nine basic factors or drivers.



Source: Prepared by the author.

The following 21 guidelines are suggested in the 9 critical areas that have been identified to promote digital transformation as an instrument for reactivation with economic and employment transformation and to build more prosperous, inclusive, sustainable, and resilient societies in LAC.

Digital infrastructure

1) Increase access to digital technologies and connectivity coverage. A digital society is not only more dynamic and productive but more resilient, that is, it has greater capacities and flexibility to react to shocks and crises of various kinds. However, for these results, it is essential to build the infrastructure for connectivity as well as for data storage and information processing that the 21st century requires, reducing access inequalities and leveling the playing field. However, internet access without effective use and innovation is not going to translate into improvements in productivity and well-being. Until now, policies to drive digital transformation have prioritized access and connectivity over use. Digital transformation requires investments not only in capital equipment but in complementary intangible assets such as digital work skills, organizational changes, process innovation, intellectual property, R&D, and new business models. In these areas, LAC countries have strong delays. Several of the following guidelines refer to these other aspects.

Planning, institutional and governance frameworks

2) Insert the digital agenda in the main policy frameworks and strategies, such as in the National Development Plans and in specific programs on digitization such as Digital Agendas. This must be done under an integrated, multilevel, and multi-sectoral approach, with cross-cutting and vertical dimensions in specific sectors. The approach must have comprehensive policies and programs to promote digital transformation, at least in the four areas in which the region finds itself in development traps: Productivity, institutional capacities, social vulnerabilities and inequalities, and environmental risks.

3) Adopt a solid model of governance, coordination, and political and institutional leadership to promote digital transformation. Although there are several possible institutional architectures, the option of establishing a Counselor or hierarch for digital transformation at a higher level than the ministerial level, who reports directly to the President of the Republic, has the attraction of helping to break down the failures of public-public coordination. In addition to public-public coordination mechanisms at both the political and technical levels, the institutional scheme must also include effective coordination mechanisms with the private sector and other relevant actors. There must also be an effective monitoring framework with measurable goals that allows for learning, course correction, and improvement of policies and programs over time. Just as the digital transformation is a disruption in productive and organizational paradigms, it is also an institutional disruption in the traditional ways of managing public policy.

Regulatory frameworks

4) Strengthen frameworks, policies, and measures for digital security. The increased use of digital technologies must be accompanied by policies and measures to improve digital security to strengthen the trust of all users and the security of databases. There are great delays in the Latin American countries in this matter. The improvement of digital security is a process that involves legal, organizational, and technical capabilities and this in different areas of digital technologies. Cloud security policies should require the use of internationally accepted accreditation assessments and certifications. In addition, it is important to issue policies for the classification

and management of data in categories, harmonized as far as possible. Data geo-location policies can be counterproductive, the best mechanism to protect, detect, respond, and recover data is the use of "state of the art" technologies from cloud service providers.

5) Strengthen the frameworks and measures for the protection of personal data. A good reference as a set of good practices is the General Data Protection Regulation (RGPD) of the EU, which has influenced regulations on this matter in several countries in the region. The APEC Cross Border Privacy Rules System (CBPR) could be another international standard to consider. It is important to move towards a harmonization of regulations at the regional level to remove obstacles to the transfer of personal data between countries/jurisdictions.

6) Align the rules and procedures for public purchases of technology with the characteristics of the new cloud computing technologies. The existence of rules and procedures for the purchase of technology written for the old paradigm, of technology as the purchase of physical assets, is one of the main obstacles for the rapid and efficient migration to digital systems in the cloud of public institutions, where what being purchased is a service. This requires changes in focus and administrative and budgetary rules and procedures, as well as staff training. Good practices of leading governments in terms of digital government are the "cloud first" policy, the "framework agreements" as purchasing vehicles to aggregate demand and harmonize the technical specifications of various institutions, the adoption of appropriate budgeting procedures, the development of guides for cloud services, and staff training.

7) Promote legislation and regulations that facilitate teleworking. The main provisions of the legislations regarding teleworking include: legal definition of teleworking and teleworker, rules and conditions of employment (rights, time or hours of work and their organization, access to the workplace), conditions of data protection and privacy, references to occupational health and safety, specific provisions on the costs assumed by the parties (transport and maintenance of the equipment, etc.), training, work organization (days, frequency, workload, performance metric evaluation, reports, monitoring), right to disconnect, etc.

8) Promote labor regulations that improve the reconciliation between personal life and work under the new work modalities generated by the digital revolution. The economic and technological reality is extremely dynamic and changing and the change was drastically deepened by the pandemic that accelerated the arrival of the "future of work", about which there was so much debate before the pandemic. In the 21st century, one of the most important reasons for modernizing and adapting labor law is technological acceleration and the associated new business and hiring models. The challenge posed by the technological revolution and the potential for work at home, beyond the smallest category of teleworking, is to achieve balances and agreements between the need to adapt the rules to accommodate the transition to the new forms of hiring generated for the digital age, on the one hand, and respect for classic labor rights and social coverage and protections (health insurance, pensions, etc.) that were designed under the old productive paradigm of the industrial era and the corresponding classic employment relationship, which is in the process of shrinking, if not completely disappearing.

9) Promote a regulatory environment conducive to electronic commerce. Many countries keep regulations that prevent or hinder companies, particularly SMEs, or individuals, from engaging in electronic commerce. For example, regulations that maintain artificial distinctions between online commerce and physical commerce, even though companies increasingly want to operate with business models that combine both elements; urban planning or zoning rules that prevent the

reconditioning of physical establishments for activities related to electronic commerce; or regulations that hinder or prohibit innovative delivery methods. These types of obstacles must be removed.

10) Policies to promote competition and open markets that take into account the specific characteristics of digital platforms and ecosystems and the data economy. Digital technologies are characterized by scale extreme economies, network, and data effects, which tend to induce concentration and market power in existing companies, offering them great competitive advantages and posing risks of anti-competitive practices. That is why competition policies are important in the digital space, although there are significant challenges in adapting and refining doctrines and methodologies, as well as in the mechanisms for compliance with competition policies in the digital age.

11) Promote flexible regulation schemes. Considering the rapid pace of innovation in the world of digital business models, it is important to promote flexible regulatory schemes that allow experimentation in controlled environments, such as so-called “regulatory sandboxes.”.

Development of digital skills of human resources

12) Develop digital competencies in human resources through specific programs and innovations in educational and vocational training systems. Less than half of the people in LAC use computers for professional tasks, and only a third of the workers use ICTs at work. Most of the population uses their mobile phones for entertainment, not for productive use. The COVID-19 crisis has put education systems in an unprecedented crisis that threatens to widen the educational gap, bring the region to the educational levels it had in the 60s and do great damage to human capital. Virtual education is one of the actions that can contribute the most to repairing the damage and building the resilience of education systems for the future. Extending the possibilities of virtual education is a complex task that involves overcoming physical barriers (infrastructure, computer equipment and programs, quality of the Internet connection), as well as overcoming the lack of personnel and teachers with ICT knowledge. Digital skills development programs are essential to increase people's employability, and many of them can be offered through virtual means with platforms such as Coursera, for example. The challenge is not only to mitigate the damages caused by the COVID-19 crisis in the learning processes of children and young people, but also to establish the systems of continuous learning and retraining (*re-skilling*) that the workforce of all the companies requires ages in the era of the IV Industrial Revolution.

Productive Development Policies

13) Strengthen productive development policies (PDPs), cluster development, support for MSMEs and the promotion of entrepreneurship to get out of the low productivity trap. If before the pandemic the need for a game change in PDPs to get out of the low productivity trap was already evident, post-pandemic PDPs must be a central element of reactivation and transformation strategies. It is in the PDPs where the toolbox is to ignite new growth engines, diversify economies with a territorial vision, and increase economic complexity through the sophistication of production processes, digital transformation, and the better alignment of human talent with production. Fundamental components of the PDPs are the cluster development policies, support for MSMEs and the promotion of solid business ecosystems, in general and for the segment of new ventures and start-ups (business incubators, mentoring and support systems, networks of angel investors, etc.).

14) Promote quality jobs for all: Creating a better future of work requires an integrated policy package including improvements in education and vocational training, productive development policies, promotion of formalization, changes in labor legislation, improvement in the intermediation systems between supply and labor demand, and other policies and measures to facilitate job transitions. Digital tools can help with all these tasks.

Sectoral policies

15) Promote **precision social policies** to mitigate the trap of social vulnerability. One of the most transformative applications of the new digital tools and Artificial Intelligence is the area of social policies. New technologies allow precision social policies with fine targeting to identify beneficiaries, register them, send them money transfers (aid, pensions, subsidies) through banking alliances and electronic payments with the financial sector, reducing corruption and errors, and following up on the results. They also allow increasing financial inclusion by reducing the costs of serving microenterprises and micro-transactions, and inclusion in public services in general through digital government.

16) Promote digital transformation to address the **environmental vulnerability** trap. Digital transformation is helping companies and organizations achieve sustainability goals in several ways: more interconnected and smart cities; better responses to natural disasters; reduction in air pollution; "smarter" and more sustainable buildings and residences; new models of precision agriculture with Industry 4.0 principles including the use of drones; automated processes for water management and irrigation systems; robotics and the Internet of Things ecosystems are helping manufacturers unlock value from recycling by automating the sorting of electronic waste; greater "greening" of supply chains due to greater efficiencies in the use and mobility of parts and components and reduction and intelligent management of inventory.

17) Promote **digital government** to strengthen the capacities of public institutions and get out of the trap of low institutional capacities. Digital transformation is relevant to many areas of public policy: procedures of all kinds, payment of services and taxes, public sector purchases, customs administration, tax administration, social policy, environmental policy, information, and response to doubts by the citizenship (proactive services), interactive consultations with citizens, dialogue forums, statistical databases in all relevant policy areas (open data), etc. Strengthening the technical, operational, and political capacities (TOP capacities) of public institutions is an essential task in the next stage of development in the region, a task in which digital transformation can make an important contribution. If there is a clear lesson from the COVID-19 crisis, it is the importance of having public institutions with high capacities in their areas of competence.

18) Promote the digital transformation of **hospital and health systems**. Although the levels of access and quality of health services in LAC are heterogeneous, on average the region has poor health services compared to OECD countries. The Covid-19 crisis exposed many of these weaknesses and is an opportunity to carry out long-term structural reforms in health systems, to build systems with greater coverage, higher quality, and more integrated towards the desirable objective of universal health coverage. The health sector is one in which the technological and digital revolution is having the most disruptive and transformative impacts. The potential for the use and growth of digital and data solutions to detect, record, monitor, diagnose, prevent, and

respond to diseases, both individually and in terms of threats to public health, and to do so effectively and efficiently, it is gigantic**.**

Financing, credit and venture capital

19) Mobilize the resources needed for digital transformation from multiple sources. The cross-cutting, multilevel and multisectoral, but also sectoral nature of digital transformation requires a creative, decentralized, and multidimensional resource mobilization strategy. On the one hand, it is essential to finance the necessary broadband connectivity infrastructure. On the other, there will be countless sector and specific projects to build a comprehensive digital transformation. Resources from multiple internal funds, as well as external multilateral and regional sources, as well as creative partnerships with the private sector should be considered. A solid ecosystem of business ventures, with venture capital funds and support, is also an important element to consider.

National Innovation Systems

20) Strengthen national innovation systems. Science, technology, and innovation are powerful allies to come out from the Covid-19 crisis, for the reactivation and the necessary transformations to create more prosperous, productive, inclusive societies, with better and sustainable jobs. Countries must build capacities in their science, technology, and innovation systems, which, in general, are characterized by strong weaknesses and delays. These systems are essential to interact with all the areas mentioned in the previous guidelines and contribute to putting into practice concrete solutions adapted to the realities of the region.

Alliances and international cooperation

21) Promote alliances and international cooperation. Cooperation and establishment of international alliances in support of digital transformation is more important today than ever. This cooperation can take place at various levels and with various actors: i) There are abundant good practices in all relevant policy areas for digital transformation listed in the previous guidelines, from regulations to digital government and health, which defines an important knowledge and cooperation agenda; ii) there is a whole agenda in terms of digital commerce and cross-border matters: tax, cybersecurity, privacy and data protection, intellectual property, fake news, etc. that can only be solved with international cooperation. For example, the European Commission's digital single market strategy has generated significant benefits for Member States. The General Data Protection Regulation of the EU (RGPD) is a step forward whose model is influencing several LAC countries; iii) financing from banks and multilateral, regional, and bilateral organizations, as well as technical cooperation, is a great ally for the digital transformation of countries; iv) partnerships with leading companies and other private sector actors can also make an important contribution to digital transformation efforts. From the *ECLAC Ministerial Conference on the Information Society in LAC 2015* the idea of creating a regional digital market arose and this became a priority of the Digital Agenda for Latin America and the Caribbean (eLAC2020) adopted at the Sixth Conference Ministerial in April 2018. Given that eLAC covers the entire region, it could be the indicated cooperation platform to harmonize and consolidate regional and sub-regional initiatives in the digital field.[79]

Box 9 presents a summary of these 21 guidelines in the 9 critical work areas. There are two important items to add on this roadmap. The first item refers to the prioritization of the actions contained in it. The starting point and the specific conditions of each country are very different; therefore, it would not be correct to propose a generic or universally applicable order of priority for these different actions. Its prioritization is something that must be defined at the level of each country based on the diagnosis of the situation, the deficiencies and the gaps at the national and local levels and a broad dialogue with experts and with all interested parties.

The second item is that, although all actions require work and execution nationwide, and in practically all of them there is potential to make alliances and benefit from multilateral cooperation exercises, there are some areas in which cooperative work with other countries and governments , or agents within those countries, is particularly important, either because there is a lot of potential for mutual learning, or because they are areas where a convergence or even harmonization of approaches and regulations is desirable in order to facilitate cross-border flows of information, goods and services needed in the digital age. The last column of Box 9 has identified the areas where multilateral cooperation, whether regional or global, is considered particularly important.

[79] For more details and elaboration on the role of international cooperation in the digital age see OECD et al. (2020), Chapter 5.

Box 9. The roadmap for digital transformation and reactivation with transformation, summary

Critical area	Guidelines	Scope of execution
Digital infrastructure	1) Increase access to digital technologies and connectivity coverage	National
Planning, institutional and governance frameworks	2) Insert the digital agenda in the main policy frameworks and strategies, such as in the National Development Plans and in specific programs on digitization such as the Digital Agendas. 3) Adopt a solid model of governance, coordination, and political and institutional leadership to promote digital transformation.	National National
Regulatory frameworks	4) Strengthen frameworks, policies and measures for digital security. 5) Strengthen the frameworks and measures for the protection of personal data. 6) Align the rules and procedures for public purchases of technology with the characteristics of the new cloud computing technologies. 7) Promote legislation and regulations that facilitate teleworking. 8) Promote labor regulations that improve the conciliation between personal life and work under the new work modalities generated by the digital revolution. 9) Promote a regulatory environment conducive to electronic commerce. 10) Policies to promote competition and open markets that consider the specific characteristics of digital platforms and ecosystems and the data economy. 11) Promote flexible regulation schemes	National/MLT National/MLT National/MLT National/MLT National/MLT National/MLT National/MLT National
Development of digital skills of human resources	12) Develop digital competencies in human resources through specific programs and innovations in educational and vocational training systems	National
Productive development policies	13) Strengthen Productive Development Policies, cluster development, support for MSMEs and the promotion of entrepreneurship to get out of the low productivity trap. 14) Promote quality jobs for all	National National
Sectoral policies	15) Promote precision social policies to mitigate the trap of social vulnerability. 16) Promote digital transformation to address the environmental vulnerability trap. 17) Promote digital government to strengthen the capacities of public institutions and get out of the trap of low institutional capacities. 18) Promote the digital transformation of hospital and health systems	National National National National
Financing, credit, and venture capital	19) Mobilize the resources needed for digital transformation from multiple sources	National/ International
National Innovation Systems	20) Strengthen national innovation systems	National
Alliances and international cooperation	21) Build alliances and take advantage of international cooperation	National/ international

Source: Own elaboration. Note: MLT means Multilateral.

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ECONOMIC AND EMPLOYMENT REACTIVATION
IN
LATIN AMERICA AND THE CARIBBEAN
POST COVID-19

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