



TECHNICAL NOTE N° IDB-TN- 02774

The Digital Transformation of Public Employment Services across Latin America and the Caribbean

Willem Pieterse
Dulce Baptista
David Rosas
Andrés Franco

Inter-American Development Bank
Labor Markets and Social Security Division

August 2023



The Digital Transformation of Public Employment Services across Latin America and the Caribbean

Willem Pieteron
Dulce Baptista
David Rosas
Andrés Franco

Inter-American Development Bank
Labor Markets and Social Security Division

August 2023

Cataloging-in-Publication data provided by the

Inter-American Development Bank

Felipe Herrera Library

The digital transformation of public employment services across Latin America and the Caribbean / Willem Pieterse, Dulce Baptista, David Rosas, Andrés Franco.

p. cm. — (IDB Technical Notes ; 2774)

Includes bibliographical references.

1. Public service employment-Effect of automation-Latin America. 2. Public service employment-Effect of automation-Caribbean Area. 3. Employment agencies-Effect of automation-Latin America. 4. Employment agencies-Effect of automation-Caribbean Area. 5. Labor market-Effect of automation-Latin America. 6. Labor market-Effect of automation on-Caribbean Area. I. Pieterse, Willem. II. Baptista, Dulce. III. Rosas-Shady, David. IV. Franco, Andrés. V. Inter-American Development Bank. Labor Markets Division. VI. Series.

IDB-TN-2774

JEL codes: J30, J68

Keywords: Digital transformation, Employment services, Public employment services, Technological change, Labor markets

<http://www.iadb.org>

Copyright © 2023 Inter-American Development Bank ("IDB"). This work is subject to a Creative Commons license CC BY 3.0 IGO (<https://creativecommons.org/licenses/by/3.0/igo/legalcode>). The terms and conditions indicated in the URL link must be met and the respective recognition must be granted to the IDB.

Further to section 8 of the above license, any mediation relating to disputes arising under such license shall be conducted in accordance with the WIPO Mediation Rules. Any dispute related to the use of the works of the IDB that cannot be settled amicably shall be submitted to arbitration pursuant to the United Nations Commission on International Trade Law (UNCITRAL) rules. The use of the IDB's name for any purpose other than for attribution, and the use of IDB's logo shall be subject to a separate written license agreement between the IDB and the user and is not authorized as part of this license.

Note that the URL link includes terms and conditions that are an integral part of this license.

The opinions expressed in this work are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent.





THE **DIGITAL TRANSFORMATION** OF **PUBLIC EMPLOYMENT SERVICES** ACROSS LATIN AMERICA AND THE CARIBBEAN

Dr. Willem Pieterse
Dulce Baptista
David Rosas
Andrés Franco

2023



Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577
www.iadb.org

Copyright © 2023 Inter-American Development Bank ("IDB"). This work is subject to a Creative Commons license CC BY 3.0 IGO (<https://creativecommons.org/licenses/by/3.0/igo/legalcode>). The terms and conditions indicated in the URL link must be met and the respective recognition must be granted to the IDB.

Further to section 8 of the above license, any mediation relating to disputes arising under such license shall be conducted in accordance with the WIPO Mediation Rules. Any dispute related to the use of the works of the IDB that cannot be settled amicably shall be submitted to arbitration pursuant to the United Nations Commission on International Trade Law (UNCITRAL) rules. The use of the IDB's name for any purpose other than for attribution, and the use of IDB's logo shall be subject to a separate written license agreement between the IDB and the user and is not authorized as part of this license.

Note that the URL link includes terms and conditions that are an integral part of this license.

The opinions expressed in this work are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent.





Table of Contents

1. Introduction	1
1.1. Starting point: country standings	4
1.2. Contents of this technical note	5
2. Background	6
2.1. Technological developments	6
2.2. Societal developments	9
2.3. Labor markets	11
2.4. External influences (the COVID-19 pandemic)	12
2.5. Strategic Digital-Maturity Framework	13
3. Consequences of digital technologies	18
3.1. Digital strategies	18
3.2. Back offices: IT, systems, and processes	21
3.3. Front office: Services, channels, and customer contacts	24
3.4. Data and measurement	27
3.5. Organization and innovation	31
3.6. Conclusions	33
4. LAC PES and digital technologies	34
4.1. Digital-maturity status	34
4.2. Digital strategies	38
4.3. Back offices: IT, systems, and processes	42
4.4. Front offices: Services, channels, and customer contacts	43
4.5. Data and measurement	48
4.6. Organization	52
5. Conclusions	56
5.1. Overall conclusion	60
Appendices	61
References	62



1 Introduction

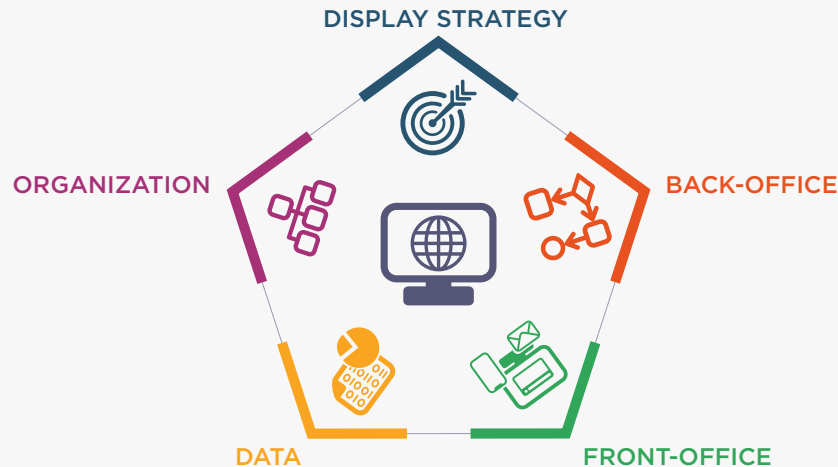
Digital technologies play an increasingly important role in societies. With the arrival of large mainframe computers in the 1960s, new types of information and communication technologies entered the stage and impacted how people communicate with each other and with governments as well as how government agencies operate internally. The most prominent of these technologies are driven by the Internet, which has rapidly spread around the globe since the early 1990s. The Internet has created new channels for service delivery (such as websites and email) and has allowed governments to share and centralize data, facilitate collaboration, and drastically revise processes and workflows.

The development of information technologies has, obviously, impacted the Latin American and Caribbean region (LAC). For example, smartphone adoption increased to 71% in 2020, and about half of all households now have a (broadband) Internet connection¹. Governments across the region are rapidly adopting information and communication technologies, as well.

Public employment services (PESs) play a crucial role in helping workers find jobs and firms fill vacancies, facilitating labor market adjustments, and reducing the impact of economic transitions. To achieve these goals, they perform five main functions:

1. Job brokerage,
2. Provision of labor market information,
3. Execution of active labor market policies,
4. Management of benefits, and
5. Management of labor migration.

¹ United Nations Development Programme. (2022). Digital transformation for inclusive development in Latin America and the Caribbean: A regional perspective.



However, the rapid changes in the technology landscape are also affecting these services, and digital technologies are being used to improve their efficiency, increase the scope of their services, and expand their coverage. Despite the benefits, these technologies also pose risks in terms of access and use, which could lead to inequity. For example, the potential inadequate use of artificial intelligence (AI) could worsen existing labor market disparities. Therefore, it is essential for PESs to harness the potential of digital technologies while mitigating their associated risks. For the above reasons, PESs need to consider five key dimensions to address the rapid changes in the technology landscape. First, they have to be aware of the **strategic** consequences of technologies and how digital technologies are changing their long-term mission and vision. To address the more strategic implications, PESs in general develop digital strategies that help them handle technologies at the highest organizational level and connect them to societal developments.

Second, PESs have to manage the impact of technology in their **back offices**, which is where technology is changing PES processes and the ways PESs collect, process, and store information.

The third dimension concerns how PESs use technology in their **front offices**, which is where PESs interact with their clients. Digital technologies have created a plethora of new channels that change how PESs engage with their clients, thus affecting PES front offices.

Fourth, these developments also affect the PES **organization** itself. For example, digitalization forces PESs to become more agile and adopt different structures, skills, cultures, and communication processes.

Finally, there is the role of **data**. PESs are increasingly turning into data processing organizations, and big data is creating new opportunities and challenges for them. Therefore, digital technologies are changing how PESs work with data.



These five variables are strongly linked and interdependent: a digital back office depends on successful digital data inputs in the front office, and the PES organization needs to grow and change with the evolving role of technology. Coordinating these developments is hard without a strategic perspective. In other words, successful PES digitalization depends on the PES's ability to manage all five aspects and balance growth in the areas across the organization.

However, the degree to which PESs can successfully implement technologies does not solely depend on their ability to work along these five key variables. More factors play a role, such as

The broader development of the *digitalization of society*, in which we see the confluence and interaction of technological and societal changes. For example, mobile technology has allowed us to communicate wherever we want, but this has driven further technological innovation (such as mobile broadband) for people to work anywhere.

- Changes in the labor markets resulting from the digitalization of society, such as automation/robotization of jobs and the gig economy.
- The context of government service delivery that is being influenced by legal developments, government strategies, policies and programs, and government digital initiatives, etc.
- External developments, such as the global COVID-19 pandemic, that have heavily impacted PESs in the past three years.

This leads to a number of questions, such as

- What are the key developments in the areas above, and how are PESs around the world dealing with developments in digital?
- What are LAC PESs doing in the areas listed above, and to what extent are they developing holistic approaches that help them become successful digital organizations?
- What are the opportunities for LAC PESs to learn from each other and PESs in other global regions, and are there specific learning areas?
- What is the impact of external factors, such as the COVID-19 crisis, on PESs?

In this technical note, we seek to answer these questions based on the survey “Digital and Data in LAC PES 2022,” conducted among 16 PESs in the LAC in 2022. This is a follow-up survey completed in the second half of 2019 among nine PESs in the region. Therefore, for nine countries in the LAC, we have the unique opportunity to share insights about changes over time and the impact of the COVID-19 pandemic on digital maturity.



1.1 Starting point: country standings

A large part of this technical note comprises comparisons between the participating countries and lessons from other countries. While examples and lessons from other countries are useful, they need to be put into the perspective of the (governmental) digital maturity of these countries, especially compared to those countries participating in the survey.

The United Nations biannually ranks 193 countries based on their digital government (or e-government) maturity, comparing and contrasting not only the maturity but also the development of the countries involved. Table 1 provides an overview of the participating countries in the study (and shows the countries participating in 2019 & 2022).

TABLE 1 UNITED NATIONS EGOVERNMENT RANKINGS 2016, 2018, 2020 & 2022

Country	Rank 2022	Rank 2020	Rank 2018
Argentina	41	32	43
Barbados	79	62	46
Bolivia	98	97	103
Brazil	49	54	44
Chile	36	34	42
Colombia	70	67	61
Costa Rica	56	56	56
Ecuador	84	74	84
Guatemala	126	121	113
Honduras	155	138	123
Mexico	62	61	64
Panama	82	84	85
Paraguay	94	93	108
Peru	59	71	77
Suriname	108	122	116
Uruguay	35	26	34

The table shows some interesting changes over time. For example, Peru has been climbing the ranks slowly but steadily in the benchmarks, whereas other countries, such as Bolivia and Brazil, have largely remained in the same place.



The UN in 2020 concluded that LAC countries are making remarkable progress overall in improving their eGovernment Development Index (EGDI)²; however, it does not translate into many changes in the index. The leading countries in the UN rankings tend to be Western European (such as Denmark and the United Kingdom), Australia, and Asian (South Korea). The LAC countries tend to lag directly behind most European, developed Asian, and other developed (Western) countries. This aligns with the analysis of the future of work³ as well as regional perspectives that contrast the LAC with other regions in the world, leading to the conclusion that

“Information and communication technologies (ICTs) are expanding in Latin America and the Caribbean, although closing the gap with other regions remains a challenge. ICT development and penetration are lower in the region than in the developed world” (p. 90).

Furthermore, in their analysis, Public Digital concludes,

“Although Latin American and the Caribbean countries are actively implementing digital initiatives and using technology to enhance service delivery, few are designing institutional arrangements and whole-of-government strategies to make them sustainable over the longer term, in a fast-paced tech environment” (p. 64).

This (short) overview of country standings implies that examples provided in this technical note (which often stem from countries somewhat ahead of LAC countries) could serve as an inspiration for LAC. However, they focus on the government in a country as a whole and not just the PESs; furthermore, they are a snapshot in time that might not capture the same elements as captured in this study.

1.2 Contents of this technical note

We organize the remainder of this technical note into three chapters:

- Chapter 2 describes the background of the study; it outlines the framework used to describe the broader context and presents the five key dimensions that guide the empirical study.
- Chapter 3 focuses on results of the Digital and Data survey among PESs in the LAC. Where relevant, we compare the results from 2022 to those from 2019.
- Chapter 4 provides the main conclusions and recommendations. The focus there is the implications for the LAC as a whole, accentuated with relevant country examples.

² The EGDI, is a composite index based on the weighted average of three normalized indices. One-third is derived from a Telecommunications Infrastructure Index (TII), one-third from a Human Capital Index (HCI), and one-third from the Online Service Index (OSI).

³ African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD) & Inter-American Development Bank (IADB) (2018). The Future of Work. Regional Perspectives. Washington, D.C.

⁴ Bracken, M. & Greenway, A. (2018). How to achieve and sustain government digital transformation. Washington DC: Inter-American Development Bank



2 Background

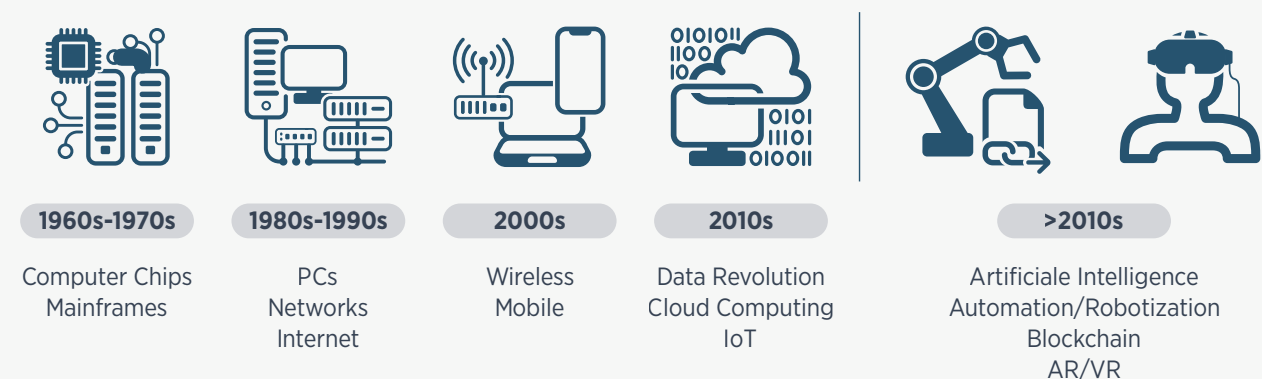
In this second section, we briefly discuss the background behind the technical note. This background is primarily formed with the evolution of digital technologies. With the development of these technologies comes changes to societies and the labor markets in which PESs operate. We discuss these changes briefly in the second subsection of this section. Based on the general developments, we propose a strategic digital-maturity framework that guides the remainder of the technical note.

2.1 Technological developments

The starting point of the development of this framework is the relationship between citizens (or customers) and government agencies. For the purposes of this study and in the context of PES mandates, we narrow this relationship down to two main types:

1. Citizens have rights and obligations, and they often engage in (service delivery) processes with governments where governments do this processing in their back offices, e.g., an unemployed person might register themselves with a PES as a jobseeker and subsequently enter a labor intermediation process.
2. Citizens and governments interact with each other through government front offices. For example, citizens can have questions for which they use a variety of communication channels, and governments can provide citizens information.

The broader digital developments have given rise to a number of generations of technologies, which we outline below.





► Mainframe computing

The first phase happened in the 1960s and 70s and was aimed at large-scale automation, largely in the back office. Public administration was a pioneering user of these systems, which were primarily used to process large volumes of data⁵.

► Personal computing & networks

The second wave involved the adoption of personal computers (PCs), which could more easily be located close to users. This resulted in more innovations to improve effectiveness and quality of service. Examples are systems caseworkers used for data entry. Second, these PCs were connected in networks, first internally (intranets) and later to the Internet, allowing PCs to share information and benefit from central data repositories.

► Wireless networking and mobile technology

The third wave of information technology (IT) innovations concentrated on wireless networking and ubiquity. Several generations of mobile technologies allowed users to go online with their mobile devices, and the advent of the smartphone allowed citizens to use government services on the go and government workers to work remotely. For instance, in the context of the LAC, where a considerable part of the population accesses the Internet through mobile phones, it is recommended to have “mobile first” websites in place to cater to the needs of jobseekers.

► Data, cloud, and the Internet of Things (IoT)

The fourth wave was largely a culmination of previous generations. The connection of many devices on networks and the resulting ability to concentrate large amounts of data led to the “big data”⁶ revolution in the 2010s. The Dutch PES was one of the first ones to start working with big data in 2014, followed by the Flemish PES. Further miniaturization of computer chips has allowed computers to become small enough to be embedded in a wide range of devices, leading to the IoT⁷, further spurring the big data movement. Last, high-speed Internet connections have allowed for further decentralization of data storage and processing in the cloud⁸.

⁵ Djellal, F., Gallouj, F., & Miles, I. (2013). Two decades of research on innovation in services: Which place for public services?. *Structural change and economic dynamics*, 27, 98-117.

⁶ Big data refers to extremely large and complex datasets that are too difficult to manage and analyze using traditional data processing tools and methods.

⁷ The Internet of Things (IoT) refers to a network of physical devices, vehicles, buildings, and other objects that are embedded with sensors, software, and connectivity, allowing them to collect and exchange data over the Internet. This network of devices and objects can communicate with each other and with humans, enabling a range of applications such as smart homes, wearable technology, industrial automation, and environmental monitoring.

⁸ The term “cloud” generally refers to a network of remote servers that are hosted on the Internet and used to store, manage, and process data and applications, rather than relying on a local server or personal computer. Cloud computing allows users to access shared computing resources, such as software and storage, on demand and from any location with an Internet connection.



► AI, automation, blockchain, and virtual reality

Currently, we are in the middle of the next and latest wave of digital innovations. Building on big data, advances in computing power and developments in analytics and algorithms led to AI. AI fuels new service channels (such as chatbots) but also is an important driver of the automation of processes and robotization of work. PESs increasingly use AI. The Estonian PES, for example, now uses AI to profile jobseekers and match them with relevant vacancies. AI outperforms humans with a 72% to 58% comparative success rate (based on the percentage of people still employed 6 months later)⁹. On the other hand, a blockchain is a decentralized ledger of transactions with (certain) open characteristics that allow for easy verification of transactions. Last, augmented and virtual reality create new possibilities for service delivery and communication.

These waves have a cumulative nature; successful applications of AI often build on big data. Big data is created by many connected computers and, therefore, relies on networks and computer technologies, etc. This creates certain contingencies of building blocks that need to be in place before a PES can start implementing certain technologies. A PES that wants to implement nationwide competency-based and automated vacancy matching needs to have (at least) the following building blocks in place:

- A central repository of vacancy data.
- A central repository of jobseeker information.
- A system able to process this data and containing the matching algorithm to perform these matches.
- Network connections from all the offices to these central systems for local data to be shared and case workers to see matches.
- If matching has a self-service character, an online portal, or a website connected to these repositories where jobseekers and/or employers can enter data and find matches.

Therefore, a key result is that **the number of technologies** increase and PESs are using an increasing number of digital technologies. In addition, as some authors argue, the **speed of technological development is increasing**, leading to an increasing number of technologies that emerge more quickly. Brynjolfsson and McAfee¹⁰, for example, argue that we are in the middle of a “second machine age.” The result is a period of unprecedented change in which digital technologies will become ubiquitous through robotization and automation¹¹. Last, as people and (parts of) organizations adopt different technologies, the technology landscape becomes increasingly

⁹ See <https://govinsider.asia/innovation/ott-velsberg-estonia-chief-data-officer-ai-powered-government/#>.

¹⁰ McAfee, A., & Brynjolfsson, E. (2016). Human work in the robotic future: Policy for the age of automation. *Foreign Aff.*, 95, 139.

¹¹ Automation is the process of using technology to complete human tasks. It calls for the use of sophisticated microprocessors and computer-like hardware. On the other hand, robotics is the process of designing, building, and employing robots to carry out a certain activity. Robotization may refer to Robotic Process Automation (RPA), a software program that automates business procedures and is controlled by business logic.



fragmented. For example, research shows that different groups of citizens now prefer different types of channels to interact with governments¹².

2.2 Societal developments

These technological developments affect societies and are driven by changes in society. Newer technologies often lead to changes in society. Airplanes and shipping containers, for example, have been drivers of globalization. The reverse also applies; for example, the desire to make flying safe has resulted in many technological developments.

But what types of societal changes, precisely? Several consequences (and drivers) of technological changes have been mentioned in the literature, often in relation to changes in labor markets due to automation and robotization, which we will discuss subsequently:

► Globalization and mobility

Improvements in transportation and communication have led to an increasingly globalized society in which people are much more mobile than before. This could stimulate higher labor mobility, as well, which could impact PES workloads.

► Social and cultural

Naturally, technological innovations, such as the television, the Internet, and mobile phones, have impacted how people communicate and spend their (free) time, but more important in the context of this technical note is the effect on workers. Workers¹³ are affected in three ways: a) the social status of the worker, b) the role that work plays in the individual's identity, and c) the worker's standard of living. These changes could impact how people want to communicate with PES (also, see below).

► Finances and taxation

If robots replace humans in many if not most jobs, this could affect the state's finances, especially if a) more people become unemployed and, therefore, draw on (in most nations) unemployment benefits and b) taxable income decreases. Several thinkers¹⁴ in the field argue that the solution to the problem is to introduce taxation on robots in a fashion similar to which human labor is currently taxed. In 2016, South Korea was the first country in the world to impose a "robot tax."¹⁵

¹² See Pieterston and Ebbers (2020)

¹³ Castel, R. (1995). *Les métamorphoses de la question sociale: une chronique du salariat*. Paris: Fayard.

¹⁴ See https://en.wikipedia.org/wiki/Robot_tax.

¹⁵ See <http://www.telegraph.co.uk/technology/2017/08/09/south-korea-introduces-worlds-first-robot-tax/>.



► Education and training

Technology has always affected people's skills and underlying skill requirements. For example, text production has shifted from writing to typing via typewriters to typing on PCs. Newer technological developments will also pose their own challenges in education and training. In this context, Aoun¹⁶ advocates for a new model of learning, labeled “humanics,” which should be aimed at the following types of skills:

- Human literacy skills. We need to focus on the types of skills where technology is inferior to humans, such as creative problem solving, conflict resolution, communication, and the ability to work on a team.
- Experiential learning. We should not just focus on theoretical learning, the kind that takes place in (traditional) classrooms, but also on experiential learning, in which pupils apply their knowledge to novel, real-world situations. This can help hone future skills and develop new necessary skills.
- Lifelong learning. It is necessary to keep up with advancing technology. Developing human literacy skills and our cognitive capacities through experiential learning can help create a growth mindset, which is necessary to become a lifelong learner.
- Various countries, such as France and Switzerland, are developing programs to stimulate lifelong learning, and various PESs (e.g., the one in Flanders) are shifting their business models to career guidance and development as well as matching jobseekers to training options and vacancies. In general, an increased focus on the development of so-called “21st-century skills” seeks to tackle the challenges of digital technological developments.

The result of the intersection of digital technology developments and societal change can broadly be called the **digitalization of society**. This highlights that societies are increasingly dependent on (digital) technologies as well as the fact that societies are driving innovation. Obviously, this digitalization of society affects labor markets.

¹⁶ Aoun, J.E. (2017). *Robot-Proof: Higher Education in the Age of Artificial Intelligence*. Boston, MA: MIT Press



2.3 Labor markets

Three types of impacts are foreseen that could impact PESs in the relatively near future:

► Job loss

Many studies predict automation will lead to job loss and/or the replacement of workers by robots or AI. One of the most frequently cited (and extreme) is Osborne and Frey's¹⁷ prediction that 47% of all US Jobs will be lost in the next 20 years, but many more studies predict job loss. For example, in 2016, the World Economic Forum¹⁸ predicted that automation would result in the loss of over 5 million jobs across 15 developed nations in 2020. The IDB¹⁹ estimates the number of occupations will drop by 60% in LAC countries in the coming decade.

► Changes in work

However, more important is the prediction that most if not all jobs will change due to automation because automation is more likely to happen at the *task* rather than at the *job* level. Therefore, parts of jobs will be automated rather than entire jobs, possibly leading to several developments, such as more

- people in *alternative work arrangements*, such as part-time jobs and telework
- freelancers working in the gig or platform economy.
- people in precarious income situations.
- workers switching jobs or parts of their jobs.

► Creation of jobs

Last, even though the general consensus is that more jobs will be lost due to automation, new types of jobs will be created. The McKinsey Global Institute²⁰ suggests that the following (broad) types of jobs will see an increased demand in the future (in advanced nations): professionals, care providers, builders, managers and executives, educators, tech professionals, and creatives.

This short discussion of technology's effects on labor markets is not meant to be exhaustive but to illustrate that PESs operate in a dynamic environment. This is further exacerbated by the (sometimes) turbulent environment in which PESs operate and that guide government-citizen interactions in the broadest sense.

¹⁷ Frey, C. B., & Osborne, M. (2013). The future of work.

¹⁸ World Economic Forum. (2016). The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution. Geneva: World Economic Forum.

¹⁹ BID. (2020). El futuro del trabajo en América Latina y el Caribe: ¿Cuál es el impacto de la automatización en el empleo?

²⁰ McKinsey Global Institute (2017). Jobs Lost, Jobs Gained: Workforce Transitions In a Time Of Automation. McKinsey Global Institute.



2.4 External influences (the COVID-19 pandemic)

PESs are affected by numerous external factors, including (supra)national regulations; government plans and initiatives; and financial climate, which impacts labor markets. However, the most significant external factor in recent times has been the COVID-19 pandemic, which has led to worldwide increases in unemployment and informality. In 2019, the number of unemployed young people aged 15–24 reached 67.5 million globally (ILO, 2020). This pandemic generated an unprecedented economic crisis, resulting in widespread job destruction and exacerbating the existing challenges the labor force faces. In 2020, the LAC suffered the largest contraction in GDP and employment worldwide, with a staggering loss of 31 million jobs (BID, 2020). This greatly affected countries such as Chile, Colombia, Mexico, and Peru, which experienced employment contractions of 14.5% in the first and second quarters of 2020, particularly affecting vulnerable groups in the labor force.

The health crisis not only caused the loss of nearly 31 million jobs in the region but also highlighted the structural issues of high informality and unemployment in our labor markets. Currently, the LAC has approximately 117 million informal workers, representing 51% of the regional average, according to data from the Labor Observatory of the Inter-American Development Bank. These statistics underscore the magnitude of the challenges in addressing labor market issues in the region.

In many cases, the pandemic spurred government digitalization. For example, according to a Deloitte report from the midst of the crisis (2021), “Due to the global pandemic, digital has turned from a ‘nice to have’ for governments into an imperative. This stems mostly from three (potential) features of digital government: a) serving efficiently, b) scaling cheaply and c) adapting quickly.” Despite this imperative, Mickoleit and Kaushik (2020) conclude that although governments see the value of digital transformation, digital maturity in governments in general remains low overall. Progress is relatively slow, and governments struggle to measure and report the impact of their initiatives systematically.

It appears without much doubt that the pandemic is increasing digital transformation. For example, 82% of IT executives reported ramping up their use of cloud technologies in direct response to the crisis in an Accenture (2021) study.

Furthermore, the impact of the pandemic often goes hand in hand with existing initiatives. For example, governments are anticipating necessary changes in the workforce to fill future public sector positions. For example, Africa’s Digital Skills for Public Service Employees aims to train the government workforce in Africa with digital skills, an initiative that gained extra impetus

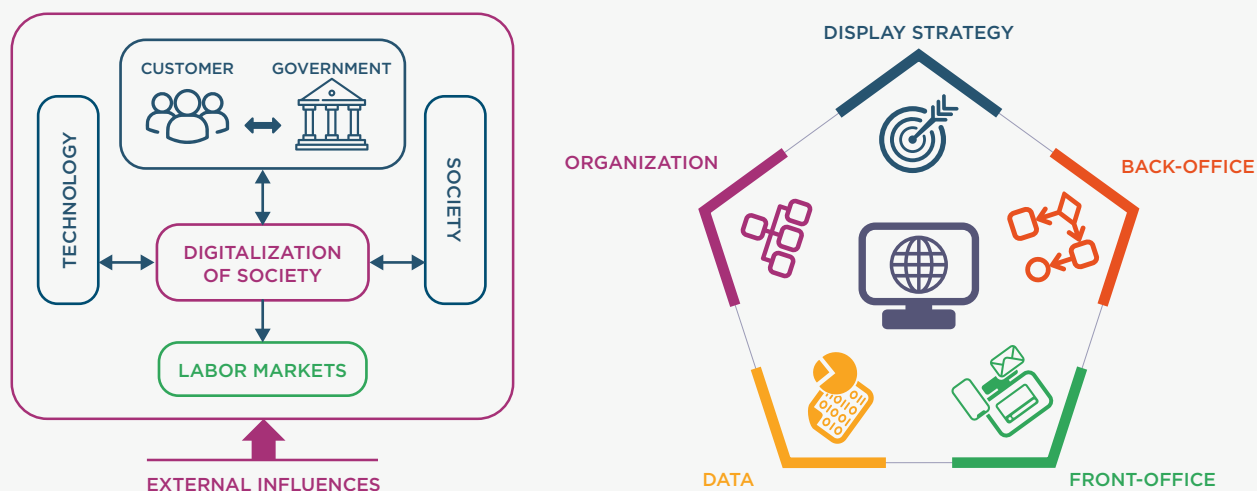


during the COVID-19 crisis²¹. In addition, the pandemic might have affected existing technologies more than new ones. While applications such as videoconferencing (e.g., via Zoom, MS Teams, and Google Meet) have received large-scale adoption because of the pandemic, they are by no means new technologies. It seems the biggest tech trends occurred due to a) evolution of existing technologies and/or b) changes in usage (largely due to COVID-19).

This does not negate the fact that the pandemic has affected PESs and their labor markets, and it remains to be seen how different countries in the LAC can recover from the pandemic.

2.5 Strategic Digital-Maturity Framework

The above discussion presents the key factors that influence the digitalization of society. These factors, along with their relationships, form the foundation of the digital-maturity framework used in this study, as the image on the left shows.



²¹ <https://gov.edacy.com/digital-skills-initiative>.

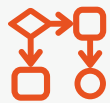


The overview also makes clear that digital technologies will have a lasting and strong influence on PES and will affect PES in different areas. To address these changes, PESs have to develop digital strategies, and the five areas briefly mentioned in the introduction (image right) are those areas that will most significantly affect PESs' digital technologies:



Strategy

Strategy consists of the collection of goals, steps, and actions at the highest level in an organization. Typically, this involves the question of how an organization plans to achieve its *mission*. For PESs, this typically centers on labor intermediation, but more frequently, PESs see a role for themselves in career guidance and career development. Digital strategies are typically focused on digitization (of information as well as processes and/or services) or digital transformation (of the entire organization). The degree to which the PES has key elements of digitalization at the highest strategic level in place determines the maturity in this dimension.



Back Offices

Digital technologies play an increasingly important role in PES back offices. This involves the role of IT in administrative processes of PESs, the degree of digitalization of these processes, and the degree of connectivity within the PES. The latter point refers to the integration, unification, and interoperability²² of systems in the organization and (Internet) connections between parts of the organization as well as the level of integration of PESs' infrastructure with other (governmental) systems. The degree to which the PES has various strategic elements related to technologies in back offices in place determines the maturity in this dimension.



Front Offices

The third dimension covers the role of technology in service delivery and communication in PES front offices. New service delivery channels are emerging, and PES clients' behaviors change. This affects PES models of service delivery. PESs need to consider which channels and technologies to deploy for which purpose and to which client groups. Considerations regarding channels, service delivery, and customer interactions form the basis of maturity in this dimension.

²² Inter-American Development Bank. (2019). El ABC de la interoperabilidad de los servicios sociales: Marco conceptual y metodológico. <https://publications.iadb.org/es/el-abc-de-la-interoperabilidad-de-los-servicios-sociales-marco-conceptual-y-metodologico>.



Data

With the advances in *digital* technology come new possibilities and challenges regarding *data*. Digitization of information has made it easier to manipulate data, and digitalization of processes makes it easier to share, distribute, and (centrally) store data. Furthermore, with increased use of digital technologies comes *system data*; the data created with these technologies can be used to monitor and evaluate these systems and the processes that flow within them. Data has become not only the product that PESs process but also a means to measure PES performance and a vital ingredient for PESs' innovation because many current technological innovations (e.g., those powered by AI) build on available data in an organization. This dimension measures the degree to which the PES is using data as a strategic resource.



Organization

The fifth and final dimension focuses on the role of an organization. To become a more digital organization, an organization needs to evolve. The role of leadership is vital for successful digital transformation, and on the way, many organizational barriers (such as culture, silos, and communication) may arise. Furthermore, to adapt to an increasingly volatile world, a PES organization might want to become more agile and more adept at responding to change. All these could require staff training and careful planning in the context of future automation. These organizational changes and innovations form a core component of successful digital strategies. This dimension measures the degree to which the organization has such components in place.

We can use the overall framework and the five dimensions for three main purposes:

- To determine and show the maturity of PESs at the strategic level in each of the five dimensions. This can help PESs determine which areas to devote special attention to.
- To give an idea of the overall maturity of the PES by looking at the maturity across all dimensions. This could help determine whether attention needs to be paid to specific areas or more broadly in general.
- To give an indication of the balance between the various areas. A PES scoring very high in one area but low in another could benefit from creating a more balanced approach. This builds on the assumption that a gradual approach toward digitalization and digital transformation yields better results than focusing on one area while neglecting others.



2.5.1 Survey development and data collection

The five dimensions from the framework were developed into survey questions that could measure the maturity in each area for the first Data and digital survey, conducted in 2019. In addition, questions were added about the impact of the COVID-19 crisis and the general (government) status of digitalization for the 2022 follow-up survey. By keeping most of the questions the same and having most of the same countries respond, we can track any developments over time and assess the impact of factors, such as the pandemic, on the countries that participated in the 2019 and 2022 surveys.

In both years, survey questions were asked on two levels:

1. Strategic level. To measure higher-level plans and activities. These questions were used to calculate the maturity scores for each dimension.
2. Tactic/operational level. This involves the more concrete and practical initiatives a PES might be working on.

In total, 9 LAC PESs completed the survey in the 3rd quarter of 2019. They were sent the survey through the Inter-American Development Bank (IDB) [SEALC network](#) with the request to complete the survey and submit their responses. The process in 2022 was slightly different. Again, countries were invited to participate in the survey, and 17 PESs from 16 countries completed it between January and March 2022. Table 2 provides an overview of the results.

THE SEALC NETWORK

The Technical Support Network to Employment Services in Latin America and the Caribbean ([SEALC Network](#), its Spanish acronym) has been dedicated to strengthening public employment services in the region since 2009. The network leads and funds initiatives to enhance and strengthen public employment services in the LAC region through workshops, studies, trainings, and technical exchanges. In 2019, the SEALC Network became a [regional public good](#) of the IDB, reinforcing its commitment to its PES members. This new status also allowed member countries to engage more actively through a steering committee, led by Chile, Colombia, Ecuador, and Peru. Currently, the SEALC Network comprises 17 countries in the LAC: Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Haiti, Honduras, Mexico, Peru, Panama, Paraguay, Trinidad and Tobago, and Uruguay.



TABLE 2 COUNTRIES SURVEYED IN 2019 AND 2022

	2019	2022
Argentina		X
Barbados		X
Bolivia	X	X
Brazil	X	X
Chile ²³	X	X
Colombia	X	X
Costa Rica	X	X
Ecuador	X	X
Honduras		X
Mexico	X	X
Panama		X
Paraguay	X	X
Peru	X	X
Guatemala		X
Suriname		X
Uruguay		X

All countries were invited to a follow-up detailed interview to verify the results of the survey during the summer of 2022. This served to disambiguate any responses, reduce potential bias, and ensure the researchers fully understood the responses. In some cases, this led to an adjustment of the initial responses. While all care was used to ensure valid responses, all results are **self-reported and based on a self-assessment. Therefore, our findings indicate a perceived status and not an absolute truth.**



The results of this study are self-reported and indicate a (perceived) status.

²³ The two responses from Chile (BNE and SENCE) were similar and the average combined score was used.



3 Consequences of digital technologies

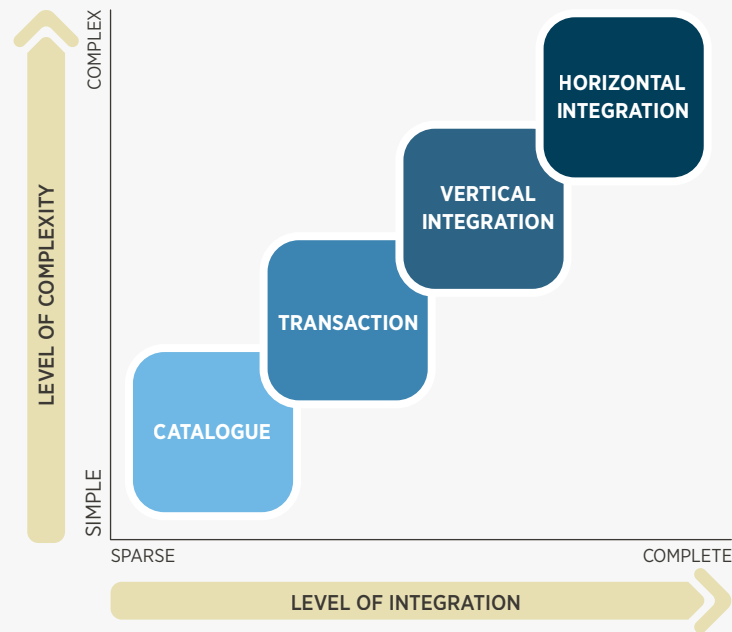
In this third section, we focus on the consequences of digital technologies in general and PES specifically. We do so based on the five dimensions of the framework. First, we discuss the influence at the strategic level. As technologies become more important, organizations must develop digital strategies to address them. Second, we examine the impact of technologies on back offices of organizations. Third, we discuss the influence on front offices and service delivery. Fourth, we examine the role of data and measurement and, finally, how technologies are changing organizational models.

3.1 Digital strategies

The question of how to deal with digital technologies has been around since the 1960s, when the first (mainframe) computers were introduced. However, until the 1990s, these technologies had been mostly the domain of organizational back offices, and their use was mostly confined to the storage of records. Things changed (as outlined above) in the 1990s when network technologies (intranets & the Internet) and PCs allowed for far more widespread changes. Various models, developed in the context of digital government, describe stages agencies pass through as they mature.

The Layne and Lee²⁴ model, for example, shows that more mature digital organizations focus on vertical (i.e., linking local systems to central systems) or horizontal (i.e., integrating systems across functions) integration rather than simply offering information (catalog) or forms (transaction) online. While many of these maturity models exist in different forms and different numbers of “stages,” they have in common that higher levels of maturity entail greater *complexity*. Furthermore, as this complexity increases, so does the scope of any “digital” effort. While simply creating an informational website can be an effort of one department, complete horizontal integration of systems and processes requires planning and coordination among many stakeholders, all with their own agendas and ideas.

²⁴ Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, 18(2), 122-136.



As a result of the increased complexity, technology starts interacting with every single part of the organization. **It becomes less about the technology and more about the organization as a whole²⁵**. This also means that to manage increasingly complex technologies, any digital effort needs to be planned and overseen at an increasingly high level of an organization. Therefore, digital efforts move from operational levels to strategic levels, and unsurprisingly, an increasing number of organizations have developed dedicated *digital strategies* to manage their digital efforts. A digital strategy is a specific type of organizational strategy and can be defined as follows in the context of PESs²⁶:

“A PES digital strategy is the application of information and technology to provide value for jobseekers, employers, and other stakeholders as defined in the PES mission and within the context of its vision.”

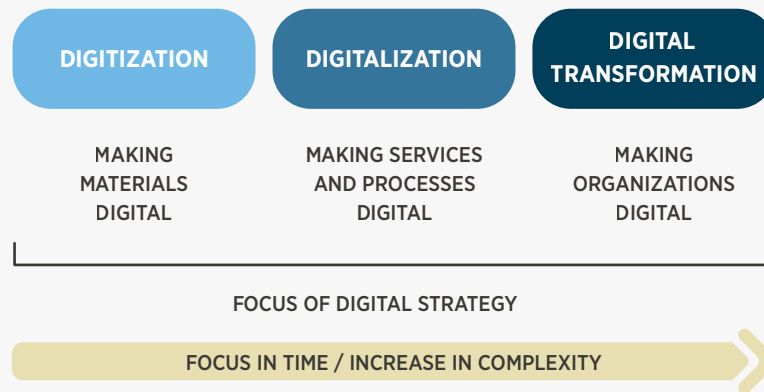
Three types of these digital strategies exist, and they vary in complexity.

²⁵ Pieterse, 2018. Thematic Paper: Creating digital strategies. Brussels: European Commission.

²⁶ Pieterse, 2019. Getting Started with Digital Strategies. A Starting Guide on creating a digital strategy for PES. Brussels: European Commission.



FIGURE 1 TYPES OF DIGITAL STRATEGIES



► Digitization

This refers to making information and materials digital, for example, the creation of digital versions of forms (from paper to PDF) that jobseekers can download and subsequently process offline.

► Digitalization

This concerns the process of making services and/or processes digital end to end. Digitalization in many cases is a logical next step after digitization, and many governments (including PESs) are in the process of digitalization. An example of digitalization is the conversion of pdf forms to completely digital forms (e.g., online forms) that directly connect to PES back office systems.

► Digital transformation

This refers to the realignment of the organization around digital technologies. In a fully digitally transformed organization, technology becomes the leading element around which the organization is structured. This (often) involves changes in organizational structure, a redesign of processes and services, changes in HR functions and talent management, and changes in communication and collaboration.

A 2015 study on the digital success of companies²⁷ showed that companies with a broad all-encompassing digital strategy tend to be more successful. These digital strategies typically embrace the following:

- Integration of technology as part of an entire transformation of business processes (digital re-imagination)

²⁷ <https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/>.



- A focus on talent and employees with the right (and evolving) skills, also making these organizations attractive.
- Risk taking as a cultural norm and driving innovation.
- People at the top drive the digital agenda. Leadership becomes a key enabler for success.

It is increasingly common for countries to have a digital strategy. A review of OECD countries²⁸ in 2014 showed that all OECD countries that completed the survey reported having a (national) digital government strategy. A 2017 survey of LAC countries showed that 17 of 23 countries had developed a digital strategy.²⁹ However, the nature, goals, and scope of these digital strategies may vary, and it is uncertain what the precise objectives of these digital strategies are. More recently, the results of a 2020 ILO survey suggest that technology uptake across PESs is moving forward. By the time the pandemic hit, all PESs (69, across 64 countries) had digitalized or automated at least one core service (ILO, 2022a). This technology uptake happens across the entire PES organization. The survey highlights that web-based technologies are now the most used types of channels to deliver services, and more and more technologies are finding their ways into the heart of PES processes, such as vacancy matching, counseling services, and case management. The newer developments, such as the adoption of AI, are slowly gaining ground. As of now, one third of the responding PESs are deploying one or more types of AI. The most popular applications are in the areas of vacancy matching and LMI production. To guide all these developments, a majority of PESs are now deploying a guiding digital transformation strategy (82%; ILO, 2022a).

In section 4.1, we will further reflect on PESs' digital strategies in LAC PESs.

3.2 Back offices: IT, systems, and processes

The diffusion of IT in organizations in the past is often described as a succession of distinct but overlapping generations of innovation. They resemble the overview presented above:

1. mainframe computing,
2. personal computing, and
3. networking and mobile and ubiquitous IT.³⁰

These technologies impact government organizations and PESs alike. They influence how PESs use technologies to digitalize their processes and service delivery. For example, PESs could use

²⁸ See OECD (2014[2]), "Recommendation of the Council on Digital Government Strategies", OECD, <http://www.oecd.org/gov/digital-government/recommendation-on-digital-government-strategies.htm>.

²⁹ OECD (2016). Government at a Glance: Latin America and the Caribbean 2017. OECD: Paris.

³⁰ Gallouj F. (2002), Innovation in the service economy: the new wealth of nations. Cheltenham, Northampton: Edward Elgar.



robots in their service delivery processes. Although it is difficult to assess the overall impact of technologies on governments, several estimates of the financial benefits exist. Dilmegani, Korkmaz, and Lundqvist³¹, for example, argue,

“Our analysis suggests that capturing the full potential of government digitization could free up to \$1 trillion annually in economic value worldwide, through improved cost and operational performance.” (p. 16)

In general, PESs are observing positive effects from their current applications of digital technologies. The ILO³², for example, argues that PESs can use technology to increase their efficiency, effectiveness, and coverage. For example, PESs can better diagnose the needs of young people and improve targeting and profiling by using biometric and spatial data as well as real-time labor market information. They can also improve such services as matching and counseling by complementing face-to-face interviews with online interactions. In addition, they can use new technology to improve program monitoring and coordination with other service providers. This should help tackle employment and labor market participation barriers in an integrated manner. The relatively low cost of ICT-based intermediation services allows developing countries to provide services to a wider audience than ever before. The challenge, however, is the low rate of Internet penetration³³. As part of a multi-channel strategy to deliver employment services, many emerging and developing countries, such as India, have launched online job portals³⁴. This positive outlook aligns with the effects of digitalization in general. Digitalization has led to an increase in productivity, and this increased productivity could lead to greater remuneration and reduced working time³⁵.

One key area where PESs have applied IT is the automation of processes and digitalization of information in their back offices. Ejler and Sidelman³⁶ observe that digitalization has improved the efficiency of PESs, which, in general, have automated services that give customers access to more and better information. Because PESs are becoming digitalized, PES staff have more time to help clients in other ways, focusing on their specific needs and capabilities rather than dealing with complicated or time-consuming data searching.

³¹ Dilmegani, C., Korkmaz, B., & Lundqvist, M. (2014). Public-sector digitization: The trillion-dollar challenge. McKinsey.com, December.

³² International Labour organisation (ILO). (2017). Global Employment Trends for Youth 2017. Geneva, Switzerland: International Labour organisation

³³ Using data from OECD stat (2017-2021), Novella (2022) finds that the use of the Internet for job search has been increasing rapidly in LAC. However, he also observes important differences between countries. For example, on average 26% of jobseekers in Peru used Internet to look for a job compared to 15% in Ecuador and 1.5 in Bolivia.

³⁴ Inter-American Development Bank (IDB); World Association of Public Employment Services (WAPES); Organisation for Economic Co-operation and Development (OECD). 2015. The world of public employment services (Washington, DC). Novella (2022).

³⁵ Muñoz de Bustillo R., Fernández-Macías E., Antón J. and Estevez F. (2011) Measuring More than Money: The Social Economics of Job Quality, Cheltenham, Edward Elgar Publishing.

³⁶ Ejler N. and Sidelmann P. (2016) Application of process efficiency techniques in PES, Analytical Paper of the European Network of Public Employment Services, Luxembourg, Publications Office of the European Union.



However, the drivers of these changes are external. In a Forrester publication, Gill and VanBoskirk³⁷ argue that “Digital Disruption is Driving Transformation” (i.e., the disruptive nature of (new) digital technologies will push organizations, including governments, to change). This also means that change will be more continuous than ever in a world where the speed of technological change is *increasing*. As a consequence, and again, PESs need to monitor technological changes ever more actively to assess their impact on organizations (also see below).

One of these developments that need to be monitored closely in the future is *blockchain*. Driven by advances in data and analytics, a distinct (and hyped) development known as blockchain has emerged. It is best described as a decentralized ledger of transactions. Transactions are seen as a “block” stored in a long “chain” of transactions, which acts as a ledger. The “crowd” processes and verifies each transaction, and each “member” has their own copy of the ledger. This creates a number of unique characteristics:

- Because of the decentralized nature of blockchain technologies, there is no central authority responsible or in charge, thus minimizing the risk of power abuse.
- Because of this same nature, committing fraud becomes increasingly hard (and virtually impossibly).
- Everybody can access the blockchain to verify transactions, so it provides an extra layer of security.
- Despite this ability to check transactions, the blockchain is anonymous, thus providing good safeguards for the protection of privacy.

Several governments are exploring the possibilities blockchains present. For example, the Estonian government is exploring the option to use blockchain technologies to store data. More closely related to PESs, the UK’s Department of Work & Pensions is looking into ways blockchain technologies could register benefit transactions. Private-sector companies are also exploring uses of this technology, such as the application of a blockchain by job.com to record contracts between jobseekers and hiring organizations.

³⁷ Gill, M. & VanBoskirk, S. (2016). The Digital Maturity Model 4.0. Cambridge, MA. Forrester.



3.3 Front office: Services, channels, and customer contacts

The progress in technological development and resulting generations of information and communication technologies has resulted in an equal number of “service channel” generations. Table 2 presents an overview of these generations of channels³⁸.

TABLE 2 GENERATIONS OF SERVICE CHANNELS

G	Period	Label	Alternative(s)	Example Channels
0	<1990s	Traditional	-	In-person, telephone, mail
1	1990s	Electronic	Digital	Website, email
2	2000s	Social	Social media, Web 2.0, Government 2.0	Social media (e.g., social networking sites, [micro-] blogging, wikis)
3	2010s	Mobile	M-Government	Smart phones, responsive sites, mobile apps
4	2020s	Robot	(Social) Robots, Robotization	social & conversational robots, artificial intelligence, virtual intelligence

Most governments around the world have successfully implemented website channels and (to a lesser degree) email. In many countries, electronic (or digital) channels become important channels for service delivery. For example, in Canada,³⁹ three channels (in person, telephone, and website) have become the leading ones for service delivery, and this situation is relatively stable.⁴⁰

TABLE 3 CHANNEL PREFERENCES FOR GOVERNMENT SERVICE DELIVERY IN CANADA (2014 & 2018)

Channel	2014	2018
In person	37%	33%
Telephone	29%	29%
Website	25%	26%

³⁸ Pieterston, W., Ebbers, W., & Madsen, C. Ø. (2017, September). New channels, new possibilities: A typology and classification of social robots and their role in multi-channel public service delivery. In International Conference on Electronic Government (pp. 47-59). Springer, Cham.

³⁹ Citizen First studies in Canada, see <https://citizenfirst.ca/>.

⁴⁰ Although this chapter will not cover multichannel service, it is important to highlight the fact that some public employment services (PES) offer multichannel service delivery as a strategy to provide jobseekers with access to services through multiple channels. It is a service delivery approach that allows jobseekers to choose the channel that best suits their needs and preferences, including online services, telephone services, and face-to-face services.



However, there is a relationship with the digital maturity of the country. For example, the country leading the 2018 United Nations eGovernment benchmark (Denmark; see Section 1.1) has mandated electronic service delivery for all citizen services since 2017. Other countries, such as the Netherlands, are moving in similar directions.

So, while the electronic channels are gaining maturity around the world, this does not apply to the newer generations of channels, such as the social and mobile channels. Recent research from the Netherlands⁴¹, for example, shows that only very small percentages of citizens prefer to communicate with governments via social media. Mobile channels tend to be on the rise, but the key question regarding them is whether dedicated mobile apps need to be developed or whether responsive web sites or progressive web apps suffice (also see 4.3 for more on these topics from the PES perspective). While governments are still struggling with the implementation of social and mobile channels, those channels are making their appearance on the stage. They are labeled the (social) robot channels and consist of chatbots (such as ChatGPT), conversational bots, and intelligent agents (e.g., Siri & Alexa).

These channels have in common that they are underpinned by developments in AI. The main difference from that perspective between a “chatbot” and traditional chat channels is that AI powers the former and human intelligence the latter. Chatbots are the first of these (social) robots that are being deployed at a fairly large scale for private and public service delivery. Examples can be found in recruiting tools. For example, Mya⁴², short for My Recruiting Assistant, is a chatbot recruiting assistant. It can communicate with candidates via Skype, email, or text. It can pre-qualify candidates and even reject a candidate if the hiring representative decides to pass on his or her application. An interesting example is the Autodesk Virtual Agent (AVA)⁴³, which also responds to emotional signals from the customer to learn and understand whether a customer understands a response and is happy with the answer. In Section 4.3, we will discuss the status quo of these channels in PESs.

Thus, the channel landscape is continuously evolving, creating challenges for PESs. PESs need to make decisions about which channels to deploy, for which types of services, for what client groups, and in which situations. As there are (large) costs involved with the deployment of each channel⁴⁴, PESs need to think strategically about costs and benefits to justify investments. Various types of channel strategies exist, and the thinking about how to position the different channels opposite each other has evolved over time. While most governments followed a strategy of deploying strategies parallel to each other before the arrival of the electronic channels, many

⁴¹ Ebbers & Pieterse, 2017. Daar Gaat een Blauwe Envelop. Enschede: Universiteit Twente.

⁴² [Hiremaya.com](https://hiremaya.com)

⁴³ See <https://www.youtube.com/watch?v=mKZ84O1666g>.

⁴⁴ Pieterse, W. (2017). Multi-channel management in PES: From blending to omni-channelling. Analytical paper. European Commission. <https://doi.org/10.2767/73549>.



governments now see channels as supplements (using certain channels for certain services) or use integrated, blended, or omni-channel strategies in which various levels of integration and channel marketing are being deployed. Appendix 2 provides an overview of the channel positioning strategies and their characteristics.

PES clients and service delivery are also influenced by technology. Client and market pressures are often impetuses for organizational change. In Brazil, for example, citizens' needs and their use of digital channels to voice these needs have contributed to the development of digital government in Brazil⁴⁵. This point is probably best illustrated by citizens' channel behaviors over time. As new channels are deployed, citizens start using them and governments start building more services on them. Clients' use of these channels will likely evolve. Indeed, a study in the Netherlands shows that the most frequently used channels have shifted over ten years from traditional (mostly in person and written) channels toward electronic channels (website and emails). However, with this shift in channel usage comes shifts in the channels citizens *prefer* to communicate with governments (see Figure 2, right). In ten years, the preferences have also shifted toward electronic channels albeit at a slower pace. This means PESs should always monitor the behaviors of their clients to see how their expectations and behaviors are evolving over time. This extends not only to channel preferences and behaviors but also to the underlying access to channels and the (digital) skills needed to operate these channels successfully.

Notably, digital skills are more than the ability to operate a computer. Besides these **operational** skills, several other types of skills are relevant. Van Deursen et al.⁴⁶ distinguish four additional types of digital skills. The first is **mobile** skills, which refers to the ability to use mobile devices. This is different from the normal operational skills, as mobile devices tend to utilize different interfaces and navigation paradigms. The second is **information navigation** skills, which involve the ability to find and interpret relevant information online (e.g., using proper search queries and operators). The third type is **social** skills, which refers to sharing information, communicating with others, and curating relationships (e.g., whom to trust and how to convey information with the intended meaning). The last type of digital skill is **creative** skills, which involve the ability to create online content.

These digital skills are increasingly becoming a function of people's education (rather than age and gender). This, in turn, leads to the digital divide (the difference between those with sufficient access and skills and those without) becoming an increasingly clear reflection of traditional media use patterns in society, with a sharp divide between people who consume media and those who use media for their (strategic) benefit, or as Zillien and Hargittai⁴⁷ put it,

⁴⁵ OECD (2018), Digital Government Review of Brazil. Towards the Digital Transformation of the Public Sector. p. 44.

⁴⁶ See van Deursen, A.J., Helsper, E.J. and Eynon, R., (2016). Development and validation of the Internet Skills Scale (ISS). *Information, Communication & Society*, 19(6), pp.804-823.

⁴⁷ Zillien, N., & Hargittai, E. (2009). Digital distinction: Status-specific types of Internet usage. *Social Science Quarterly*, 90(2), 274-291.



“Those already in more privileged positions are reaping the benefits of their time spent online more than users from lower socio-economic backgrounds.” (p. 287)

Therefore, technological developments are affecting PES clients and their service interactions. PESs could anticipate these changes by monitoring channel behaviors and skills and use these results in their channel and service delivery strategy.

3.4 Data and measurement

Hand in hand with technological (and societal) developments come developments in data, most notably:

1. Data as the product being processed by PESs. Linkages and integration of systems mean PESs are more data-driven, and this creates its own set of challenges and opportunities (e.g., around re-use of data and using the output of one activity as the input for another, such as job-seeker profiling feeding into matching). With increasingly connected and rich data come new opportunities for PES to improve existing processes and services.
2. Data as a means to measure performance and other aspects of the organization, such as the behavior of clients and their satisfaction. For example, newer types of virtual assistants can read people’s emotions and, based on this, adjust the conversation. The availability of more data enables measuring more aspects of an organization to achieve more complete overviews of what is transpiring.
3. Data as a means to innovate and improve the organization. Data, in conjunction with digital, are creating new opportunities to create new services, processes, tools and applications. For example, AI creates new opportunities for job matching based on deep learning of unstructured data sets. Many data-driven innovations, while still in their infancy, have the opportunity to drastically alter PESs in the near future.

In a sense, the evolution of data reflects the evolution of information technologies and evolution of the channel landscape⁴⁸:

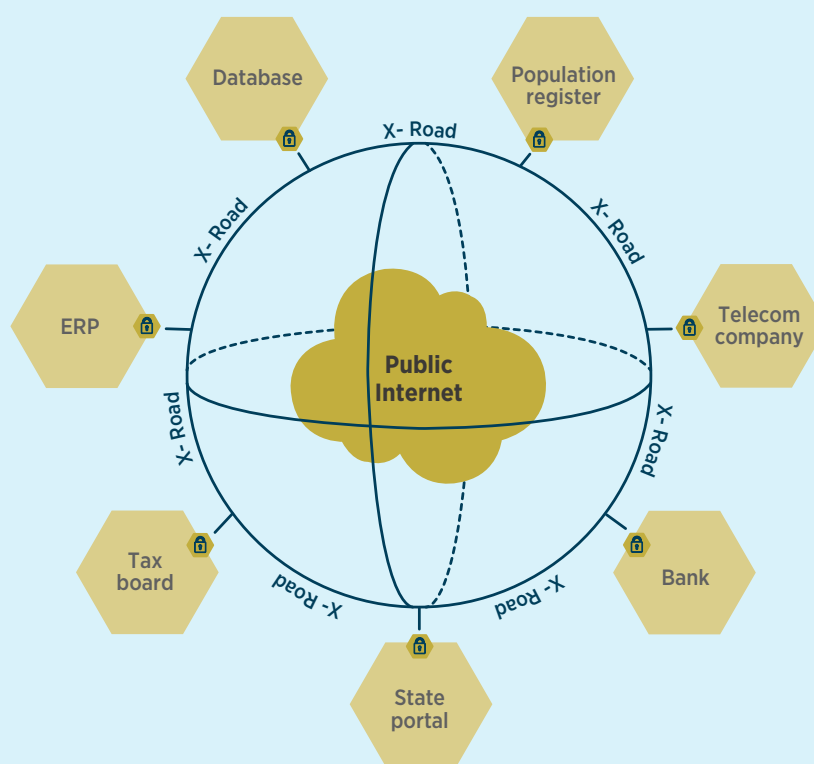
- 1960s: data processing;
- 1970s–1980s: information applications;
- 1990s: decision-support models;
- 2000s: data warehousing and mining; and
- 2010s: big data.

⁴⁸ Kim, G. H., Trimi, S., & Chung, J. H. (2014). Big-data applications in the government sector. *Communications of the ACM*, 57(3), pp. 78-85.



Even though the main focus in the data landscape was on data warehousing and data mining during the early parts of this century, these are still relevant for governments and PES today. Data integration across governments is a major theme in many countries, and Estonia's X-road serves as an inspirational example on how to achieve this.

DATA INTEGRATION EXAMPLE: X-ROAD IN ESTONIA



The X-Road is Estonia's infrastructure that connects databases from a multitude of governmental agencies. It is best described as a distributed service bus that allows databases to interact, making integrated e-services possible. This, however, also creates opportunities for data integration that can be used for data analytics. Currently, more than 219 databases are connected to X-Road.

The initiative was so successful that it has been implemented in Finland, Kyrgyzstan, Faroe Islands, Iceland, Japan, and other countries. This even allows various X-Roads in different countries to be connected. This led to a link between Estonia and Finland in February 2018.

More information: <https://e-estonia.com/solutions/interoperability-services/x-road/>



While the focus for many countries is on integration of data sources across the government, the past five years saw an increased attention for the volumes of data that become available: big data. In its simplest form, big data simply refers to very large data sets, although there is no unified idea of what ‘big’ entails (which arguably is also a moving target). In a more defined sense, commonly, big data is defined by the three Vs⁴⁹:

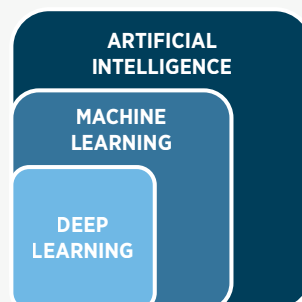
- Volume (referring to the quantity of information),
- Variety (referring to the multitude of information types),
- Velocity (referring to the speed with which data is stored, analyzed and/or changed).

While this is a useful way of conceptualizing what big data is, it ignores various aspects of data that have recently become more important, such as the proper protection of data and ensuring high data quality. For this reason, we focus on ‘smart’ rather than ‘big’ data. Smart data is the combination of various aspects pertaining to the proper (smart) use of the data rather than simply focusing on the volume of the data itself, such as its utility, security, protection, and quality.

Most attention in the era of big data is paid to the field of advanced analytics (or big data analytics), in part, because advanced analytics were developed at roughly the same time and, in part, because of the need for large volumes of data to aid in advanced analytics. In a sense, advanced analytics can help to create the utility out of big data in order to create smart data. These advanced analytics often rely on large data sets to create sophisticated models and validate these models. Many of these advanced analytics are based on concepts rooted in AI, and we can make a distinction between the following types:

► Artificial Intelligence

AI is used to create smarter technologies that can make decisions or support decision-making. AI is a broad concept that encompasses machine learning and deep learning and intersects with other types of analytics, such as data mining and statistics.



⁴⁹ Burns, R. (2015). Rethinking big data in digital humanitarianism: practices, epistemologies, and social relations. *GeoJournal*, 80(4), 477-490.



► Machine learning

Machine learning is used to create better functioning algorithms and models by learning from ongoing analysis. Machine learning is a subset of AI. In machine learning, there is a clear emphasis on learning from data and applying that analysis for future iterations.

Examples are predictive models and recommender systems (e.g., suggesting relevant courses to jobseekers based on their data and data from similar jobseekers).

► Deep learning

Deep learning is used to explore highly unstructured and abstract data and tries to create generalizations from this data. Deep learning is a subset of machine learning, and the key difference between the two is that deep learning focuses heavily on unstructured and abstract data as well as the combination of many layers of data. One example could be the analysis of freely formatted CVs by jobseekers to discover patterns.

Relevant areas where advanced analytics are being applied currently (often in contexts comparable to but outside of PES) or could provide value are:

- fraud detection, prediction, and prevention (already in use, mostly at tax agencies around the world);
- personalization of services (e.g., through user profiling);
- vacancy matching (by going beyond traditional variables, methods, and models used for matching); and
- better labor market information (LMI) through improved prediction of labor market developments.

A big area of development and attention is that of checking data and fraud detection. Advances in computational power and sensor capability are now making it easier to check records and, for example, detect fraud. Investments of the banking and insurance industries, government intelligence, and border security are big drivers of progress in this area, and in coming years, applications in this area are likely to trickle down to other fields.

One example is the development of advanced neural networks (such as Convolutional Neural Networks⁵⁰) that are much better at detecting anomalies in patterns that previous generations of algorithms could not spot as easily. Another area to which such applications can be applied is that of monitoring computer network traffic and user behaviors to discover hacks, attacks, and so forth. Several companies are working on solutions to monitor constantly the networking infrastructure of organizations and detect potential dangers⁵¹. A last area of that is the use of

⁵⁰ See <http://ufldl.stanford.edu/tutorial/supervised/ConvolutionalNeuralNetwork/>.

⁵¹ See for example Darktrace: <https://www.darktrace.com/en/technology/>.



AI to classify records and check them against rules, for example, to see if information is General Data Protection Regulation compliant⁵².

3.5 Organization and innovation

Government (and therefore PES) organizations are also changing under the influence of digital technologies, often leading to organizational change or modernization programs, the focus of which changes over time. By the mid-1980s, when information and communication technology was radically advanced, computers were introduced, and skill demands on workers began to change, not only through the emergence of service sector jobs but also through an increasingly global division of labor, PESs began a new phase of modernization, largely driven by the philosophy of New Public Management (NPM). On the one hand, the 1990s were characterized by PESs shifting from systems based on “management by regulation” to “management by objectives”⁵³. This move was often accompanied by attempts to decentralize PES governance, thus improving local flexibility, and by efforts to reorient PES staff toward embracing a new “customer orientation” and private business management mentality.⁵⁴ On the other hand, many governments also sought to increase external competition in the provision of services, especially with regard to skill training. Another important step toward more “competition” included the abandonment of long-held placement monopolies for state agencies, which allowed new private sector actors to enter the market and thus “forced” PESs to modernize.⁵⁵

These changes were accompanied by different perspectives on the organizational models behind PES. Large organizations typically are organized as hierarchical bureaucracies. There is a hierarchy; there are layers, based on the level of authority and autonomy of the worker. Additionally, high levels of specialization lead to a very strict division of labor. However, technologies are challenging these models (see Van Dijk, 2012), and many argue that network models are replacing hierarchies. Key characteristics of these networks are the lack of hierarchy and the number of connections across and between layers in the organization. As technologies facilitate communication, organizations can become *flatter* and more *agile*. Another alternative is that of a market model in which hierarchies and networks are fluid and, depending on supply and demand, can take either form. Markets, hierarchies, and networks have often been presented as either alternative complementary, substitutional, or rival modes of governance. So, while it seems

⁵² See for example applications such as Checkr <https://checkr.com/product/>.

⁵³ Larsson, A. (2001). A Turning Point for Employment Policy. *Europa. Novas Fronteiras*, 9/10 (June/December), pp. 49-54.

⁵⁴ Weishaupt, J. T. (2010b). *Governing Public Employment Services: Recent Trends in Social Partnership and Privatisation*. Mannheim: University of Mannheim.

⁵⁵ Weishaupt, J.T. (2011). *Social Partners and the Governance of Public Employment Services: Trends and Experiences from Western Europe*. Labour Administration and Inspection Programme LAB/ADMIN, Working Document Number 17. Geneva, International Labour Organisation.



apparent that digital technologies are challenging organization models, the exact direction of these changes in organizational models is uncertain.

This does not, however, challenge the fact that technologies are changing organizations and organizations are not very well-equipped to handle these changes. A majority of all change initiatives in organizations related to IT fail,⁵⁶ and PES are no exception. More evidence-based working implies that the number of changes in organizations impacted and the pace with which these occur will increase. The bureaucratic nature of most PESs will, therefore, not facilitate the agility needed to cope with these changes. For this reason, PES should start rethinking how their organizational structure fits a more data-driven workflow. Fishenden and Thompson⁵⁷ argue that the failures of IT projects result at least partially “from the creation of a culture of IT-enabled service delivery with little incentive to innovate and introduce newer, standardized technologies that would generate a platform for greater competition and greater value for money” (p. 984).

The cultural or behavioral aspects are often ignored in change initiatives but can have a key impact. To give an example: In Finland, a statistical profiling tool introduced to case workers within the PES was withdrawn in 2007⁵⁸. The profiling tool was part of an integrated IT system that calculated a risk estimate for the jobseeker at registration using administrative data. The caseworker used the risk estimate during the interview with the jobseeker to guide their decision on segmentation and targeting. Caseworkers did not think the tools were helpful or useful for the jobseeker, and overall results were not trusted. However, the model was found to be 90% effective at estimating the likelihood of a jobseeker being unemployed for over 12 months⁵⁹.

The success of IT often depends on the degree to which it is embedded successfully in the organization. Garicano and Heaton⁶⁰, for example, found that IT investments were linked to increased productivity but only when combined with complementary organizational changes. This creates an immediate link to the concept of innovation. As organizations struggle with the adoption of technologies, they are wondering how to innovate and not just implement technologies as they appear on the market, how to be part of the technological developments so that they can prepare themselves better for required organizational changes.

⁵⁶ See http://www.businessperform.com/articles/change-management/change_management_practice.html and <http://www.forbes.com/sites/victorlipman/2013/09/04/new-study-explores-why-change-management-fails-and-how-to-perhaps-succeed/>.

⁵⁷ Fishenden, J., & Thompson, M. (2013). Digital government, open architecture, and innovation: why public sector IT will never be the same again. *Journal of public administration research and theory*, 23(4), pp. 977-1004.

⁵⁸ Loxha, A., and Morgandi, M. (2014). *Profiling the unemployed. A review of OECD experiences and implications for emerging economies*. Washington DC, USA: World Bank Group.

⁵⁹ Kureková, L. M. (2014). *Review of profiling systems, categorisation of jobseekers and calculation of unit service costs in employment services implications and applications for Slovakia. (CELSI Research Report No.8)*. Bratislava, Slovak Republic: Central European Labour Studies Institute.

⁶⁰ Garicano, L., & Heaton, P. (2010). Information technology, organisation, and productivity in the public sector: evidence from police departments. *Journal of Labor Economics*, 28(1), 167-201.



In certain organizations, “innovation” has become a specific performance objective for government administrators. However, to become more innovative, the organization has to change⁶¹. This transition requires two things: first, innovation must be tied to specific goals and objectives within the organization. Second, the organizational structure must support the changes that are necessary for innovation to thrive.

However, in general, public organizations struggle with this and public organizations often lack key capabilities to undergo this transition. The key reasons for the lack of innovation in the public sector are the following:

- Monopolistic nature, reducing competitive pressures.
- Political pressure, moving innovation to the margin of the rationalistic economics of innovation.
- Lack of resources for risky innovation projects.
- No incentives for innovators and intrapreneurs (also see the example in Section 4.5).
- Little pressure from consumers, and if there is pressure, it is dispersed by the rigid bureaucratic structures that induce inertia⁶².

3.6 Conclusions

In this section, we presented a brief overview of the impact of various technological developments on (PES) organizations. Technology impacts every aspect of every type of organization, whether private, public, or PES (as a specific form of public organization). The technological changes impact processes in back offices and service delivery in the front office. As a result, organizational models are being challenged, and PES must deal with organizational changes. The role of data could help with change management but poses its own set of challenges. Lastly, technology, as it penetrates the organization, becomes increasingly important and thus becomes a more strategic topic. Therefore, more and more organizations are developing digital strategies that help manage these changes, and PESs are no exception.

⁶¹ Gil-Garcia, J. R., Helbig, N., & Ojo, A. (2014). Being smart: Emerging technologies and innovation in the public sector. *Government Information Quarterly*, 31, pp. 11-18.

⁶² Djellal, F., Gallouj, F., & Miles, I. (2013). Two decades of research on innovation in services: which place for public services? *Structural Change and Economic Dynamics*, 27(December), pp. 98-117.



4 LAC PES and digital technologies

In this chapter, we focus on the current status quo of PES across the LAC as well as changes since 2019. The results from the survey are presented, and these results are contrasted to findings from other PES and/or other organizations. We first discuss the overall maturity status, followed by a deeper dive into each of the dimensions.

4.1 Digital-maturity status

4.1.1 Overall maturity

The survey asked PESs about strategic initiatives in all five dimensions. Using these questions, we can calculate a self-reported overall status score that indicates the overall maturity of the PES. Furthermore, we can compare the status of the participants in 2019 to those in 2022.

FIGURE 4 SELF-REPORTED OVERALL MATURITY STATUS

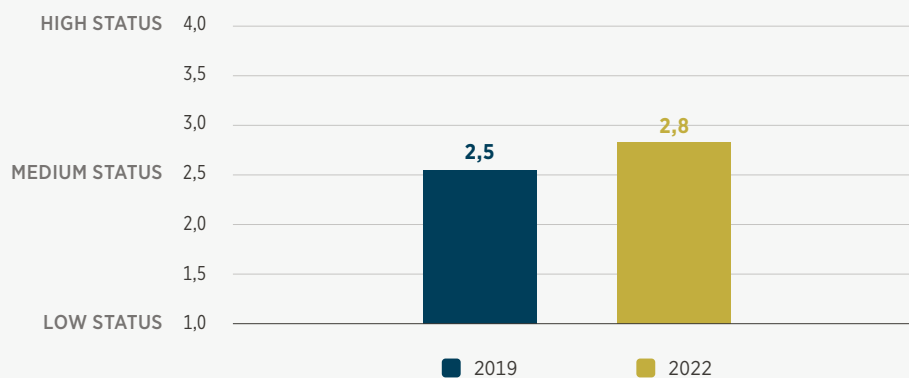


Figure 4 shows that PESs across the region have a slightly above-medium level maturity status. They have foundational elements in place but plenty of room to grow. Moreover, an important finding is that PESs have improved in the past three years, with the overall maturity score improving.

Similarly, we see maturity scores improving across all dimensions. The figure below shows the scores in 2019 and 2022 in each of the five dimensions, with the values for 2022 shown.



FIGURE 5 SELF-REPORTED OVERALL MATURITY STATUS PER DIMENSION

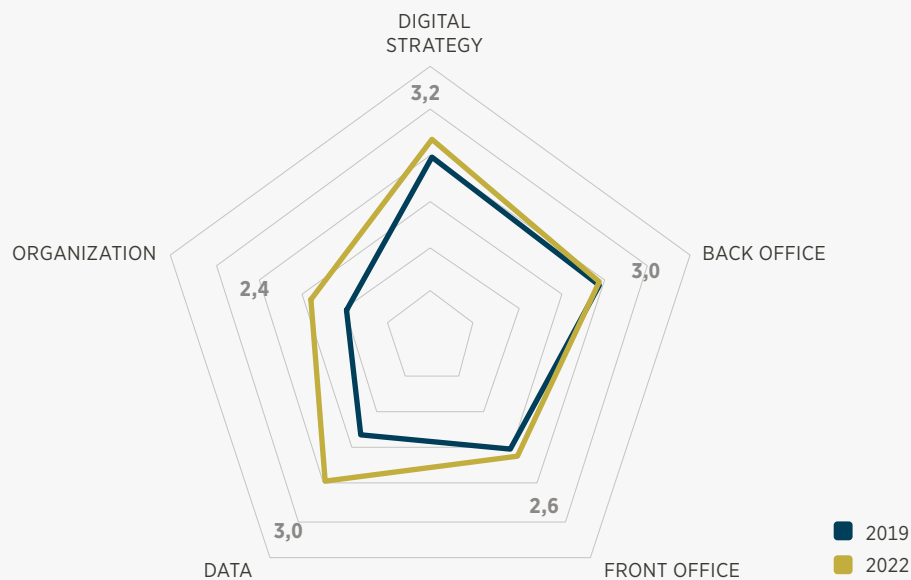


Figure 5 shows that PESs have improved their statuses in all five dimensions; however, the degree varies per dimension. Most progress has been made in the data and organization dimensions, whereas PES back offices have seen the least change. The scores above are the scores of *all* participating countries, thus comparing the 9 countries from 2019 to the 16 countries in 2022. Below we compare the scores of only the recurring countries that participated in both years (figure 6).



FIGURE 6 SELF-REPORTED OVERALL MATURITY STATUS | RECURRING PARTICIPANTS

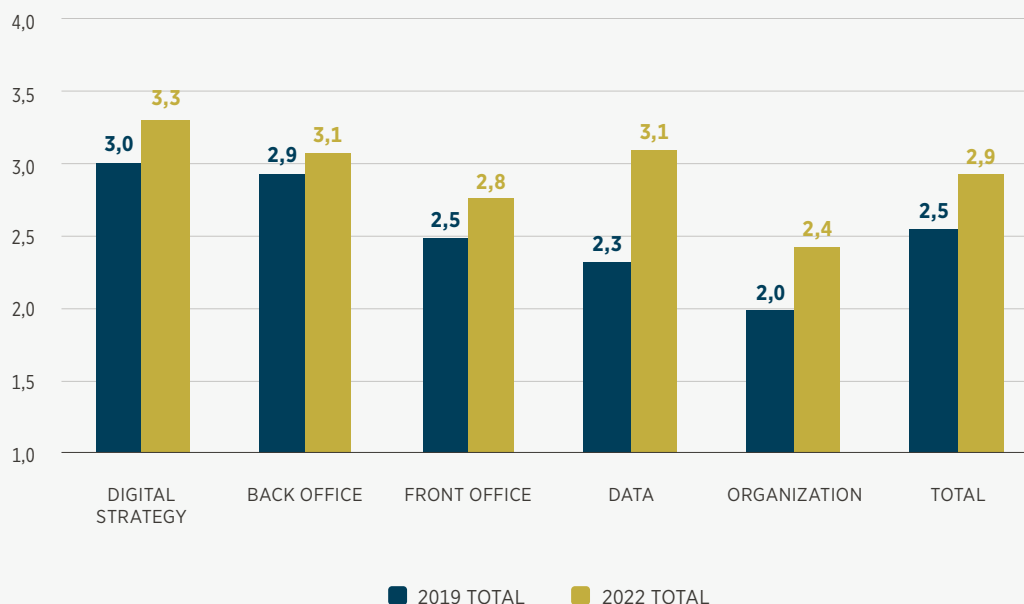


Figure 6 shows that the scores of the recurring countries are higher than the results from all countries; the main explanation is that the recurring countries in general are more mature. Therefore, this comparison paints a slightly more positive picture of the development of digital maturities within LAC PESs.

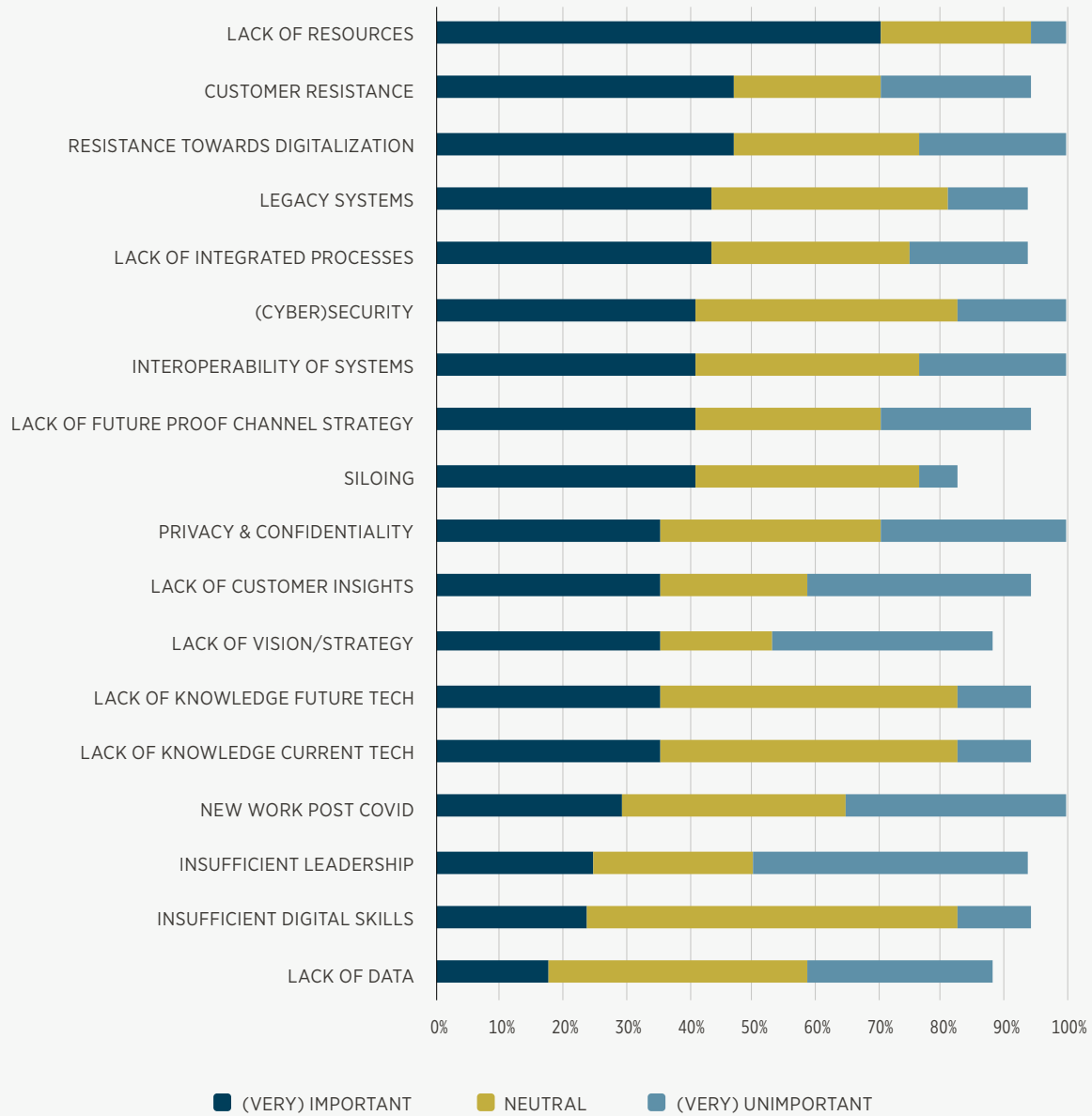
Relevant in this context are the obstacles that PESs encounter with further digitalization. PESs were asked in both 2019 and 2022 which obstacles were most important, and the results between 2019 and 2022 are largely comparable.

The first most important obstacle (see Figure 7), mentioned by a majority of LAC PESs in 2019 and 2022, is the lack of (financial or other) resources. This is similar to the EU as well as Asia-Pacific⁶³ and thus is likely a global phenomenon. Interestingly, many of the most important obstacles are 'soft', i.e. they don't relate to (hard) technical aspects such as hardware and software but rather focus on organization aspects. The most important ones are customer resistance and organizational resistance towards digitalization. Other notable soft obstacles are the lack of future proof channel strategies and siloing in the organization.

⁶³ See Pieterse, 2018 (EU) and Pieterse 2023 (Asia-Pacific).



FIGURE 7 OBSTACLES REGARDING DIGITAL AND DATA ACROSS LAC PESS





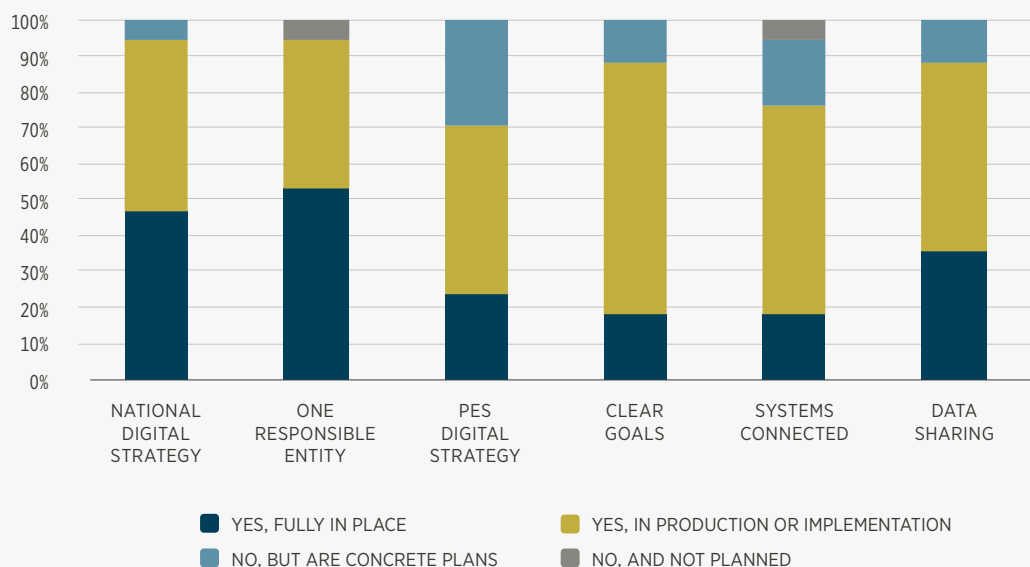
4.2 Digital strategies

The first dimension concerns the presence of digital strategies and higher level initiatives within PES. As outlined in the previous chapter, a digital strategy can help PESs with implementing digital technologies and support the transformation to a digital organization. But what are PESs doing, and what is the focus of these digital strategies? Furthermore, what has been the impact of the COVID-19 pandemic.

4.2.1 Digital strategies

Countries participating in the survey either have a digital strategy already in place, or are in the processes of implementing it. In the survey, the participants were asked to indicate the extent to which various strategic aspects were in place (see Figure 8).

FIGURE 8 DEGREE TO WHICH ELEMENTS OF DIGITAL STRATEGIES ARE IN PLACE IN 2022



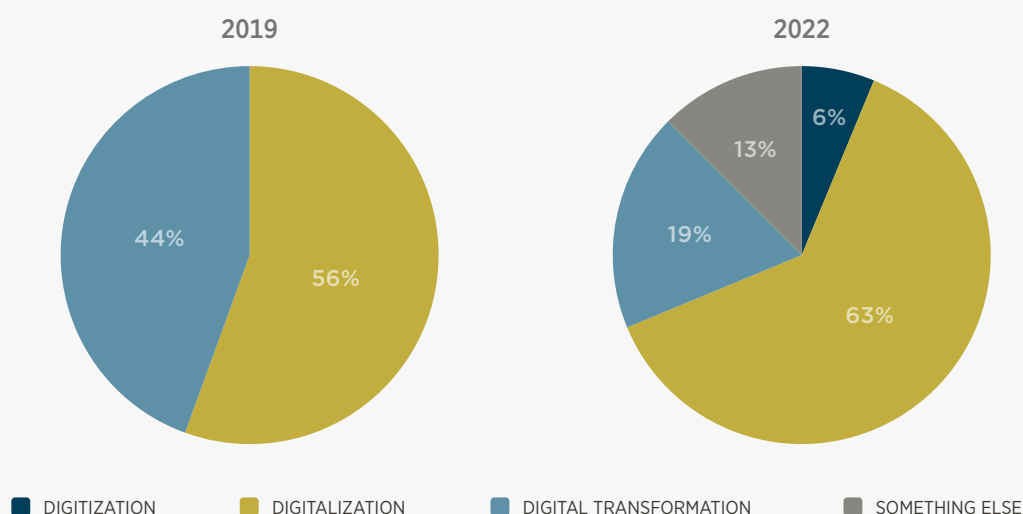
The figure shows that LAC countries in the majority have one responsible government entity for digitalization and digital strategies. About one quarter of the participating countries have a national digital strategy, as well as a PES digital strategy fully in place. For most strategy elements, PESs are in the implementation or production stage. This applies, for example, to the development of clear goals and the sharing of data across the government. The degree to which



government systems are connected is lagging, as these are not in place in most LAC countries, but in most cases, there are concrete plans to change this. However, in general, the picture in 2022 is more positive than in 2019, especially the degree to which systems are connected and data being shared has progressed.

At present, most PESs around the world do not have broad digital strategies that encompass the entire organization and assess the impact of new technologies across it. Most PESs currently seem to be in the stages of digitizing their information and digitalizing their processes, rather than transforming their organization around digital technologies⁶⁴. The situation across the LAC seems slightly more promising as it evolves (Figure 7).

FIGURE 9 FOCUS OF DIGITAL STRATEGIES IN 2019 AND 2022



In 2019, half the participating PESs indicated that their focus was on the *digitalization* of processes and services. In 2022, this applies to almost two thirds of all PESs. Interestingly, the percentage of PESs focusing on digital transformation (re-designing the organization and public sector to optimally benefit from digital technologies) is lower in 2022 than it was in 2019, which can be explained twofold. On the one hand, we surveyed more countries in 2022, and often the newly added countries were less digitally mature. On the other hand, shifting interpretations of digital transformation combined with more rigorous data collection in 2022 may possibly have shifted results. One PES investing heavily in their digital strategy is Le Forem, the Belgium-Wallonia PES (see below).

⁶⁴ Pieterse, W. (2018b). Creating Digital Strategies. Thematic Paper. Brussels: European Commission / PES Network.



DIGITAL STRATEGY EXAMPLE: LE FOREM

Le Forem, the PES in Wallonia/Belgium created a digital strategy in 2017 based on the motto “we are phygital”⁶⁵, a portmanteau for ‘physical’ and ‘digital’. This is meant to indicate how the organization seeks to combine digital ways of working with human or personal contact. The organization aspires toward a “digital switchover” and the goal is to offer more services to more users, as well as to ensure better accessibility and quality. The objectives of this digital transformation are threefold:

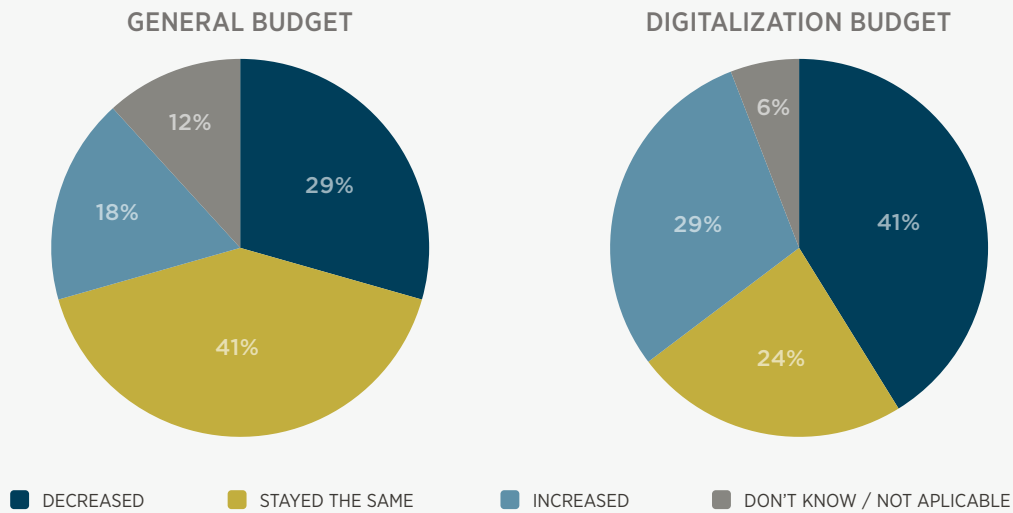
1. Users: the ambition is to provide more customized services according to users’ needs, offering users more autonomy, available 24 hours a day, 7 days a week.
2. The organization: thanks to a system of automation and self-service, resulting in time savings, Le Forem intends to expand its service offerings and succeed in taking charge of more users.
3. Employees: as key players in the digital transformation, employees will need to focus on high value-added tasks and adopt a “coaching” mentality toward users to support them in their efforts.

Lastly, we look at the impact of the COVID-19 crisis on PES. Participating PESs were asked to what extent the crisis impacted general and digitalization budgets (Figure 10).

⁶⁵ Phygital as a concept was first used by Pôle Emploi, the French PES. See <https://www.pole-emploi.fr/region/auvergne-rhone-alpes/informations/du-phygital-a-pole-emploi-des-services-digitaux-et-physiques-@/region/auvergne-rhone-alpes/article.jspz?id=472576>.



FIGURE 10 IMPACT OF COVID-19 ON PES BUDGETS



Surprisingly, because of the role they could play during COVID-19 and the economic situation, PESs in general have been hit hard by the COVID-19 crisis. Almost one in three PESs report that their general budgets have decreased because of the pandemic, whereas one in five report that their general budgets have increased. The situation is a bit more extreme for digitalization budgets. Over 40% of PESs mention that digitalization budgets have decreased because of the crisis, and roughly 30% report the opposite (an increase in budgets). A possible explanation is how governments in general have responded to the crisis, with a worsening economic situation often resulting in public budget reductions, while at the same time creating the necessity to invest in newer and more efficient technologies.

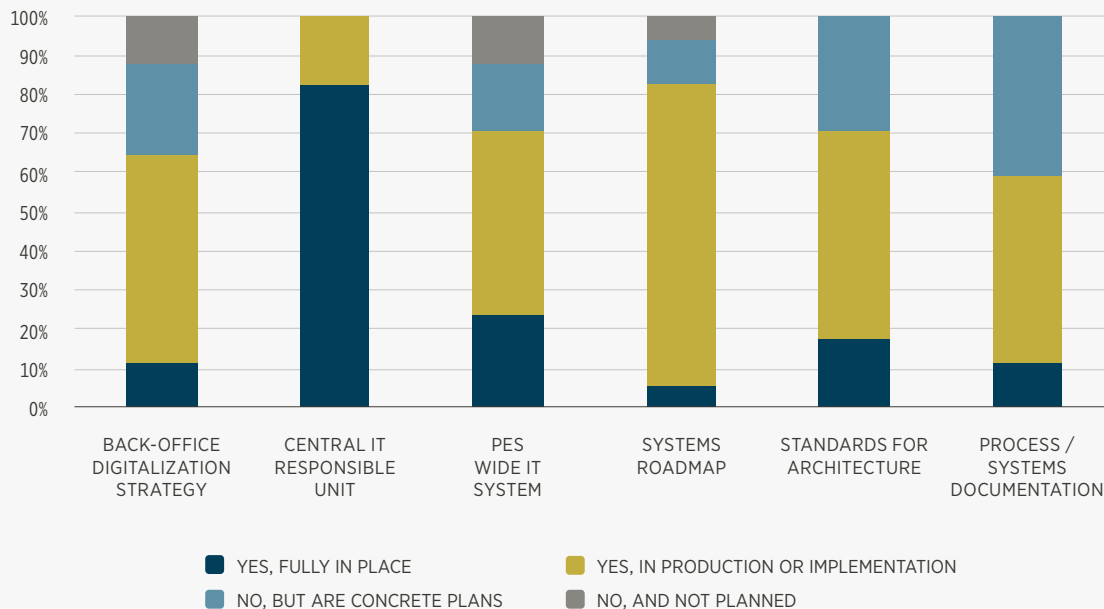


4.3 Back offices: IT, systems, and processes

The second dimension is that of PES back offices, the most traditional area of technology use in PES. What are PES currently doing in this area at the strategic level and how has this changed since 2019?

The survey asked several questions about PESs' IT strategy in both 2019 and 2022, and the results from 2022 are shown below.

FIGURE 11 DEGREE TO WHICH PES HAS COMPONENTS OF AN IT STRATEGY IN PLACE IN 2022



Results indicate that in most LAC PESs, the building blocks of an IT strategy are under development, but at the same time, the situation has improved since 2019. For example, while 50% of all PESs in 2019 had one central unit responsible for all IT, this percentage grew to 82% in 2022. Similarly, more PESs have PES-wide IT systems in place. Though the situation is progressing, there is still plenty of room for improvement. For example, the use of standards and having proper documentation are and remain relatively low.



4.4 Front offices: Services, channels, and customer contacts

The third dimension is formed by applying technologies in front offices to provide services to PES clients. This is another area with much development, with new channels developing frequently and technology itself playing an increasingly important role in supporting clients and PES staff alike.

The more advanced PESs in this area have developed advanced channel strategies in which they blend traditional and digital service channels to optimize the effectiveness and efficiency of their service delivery. More novel for PES is the adoption of ‘omni-channel’ strategies in which all channels seamlessly integrate and create smooth customer journeys.

Many PESs, however, are still developing their online offerings with the introduction of new digital channels, for example, through mobile devices. India has developed a national policy that aims to harness service delivery and social empowerment through the internet and mobile devices (Digital India). In line with this strategy, the PES is developing web-based services. A national portal facilitates the registration of jobseekers, vacancies, training providers, career counselors, and private employment agencies, allowing users to obtain information and connect with service providers. This facility extends to “unorganized workers” (home-based workers, self-employed, and other informal sector workers) who can connect to potential customers via the portal (ILO, 2017). While mobile is growing as a channel, this does not mean all investments in mobile channels are paying off. The Danish PES, for example, has already abandoned their app activity because maintaining apps for all platforms (Android, iOS, and Windows Mobile) is. Furthermore, as web technologies advance (e.g., through progressive web apps), the practical benefits of having dedicated singular apps diminishes.

The direction of service channel offerings across PESs is clear: toward digital (online) channels and increasingly mobile. However, few PESs seem to have figured out the puzzle of which channels to offer to which customer for which services as well as how to deal with customers who lack access to online channels and/or digital skills. Furthermore, as argued above, the channel landscape keeps growing, and PESs are starting to explore new types of channels. The Swedish PES, for example, has been offering a chatbot for several years now, and since December 2018, this chatbot can assist jobseekers with questions about their activity reports (as part of their individual action plan (IAP), thus increasing the level of personal service offered by the chatbot. Norway has a chatbot (called ‘Frida’) that acts like a personal avatar. The Slovenian PES had an interactive assistant (called ‘IZA’) that can be queried on their website. While the level of AI of IZA is relatively low, it is a promising direction and innovative way to explore customer contact options. LAC countries are starting to adopt these chatbots in general as well (see example below).



FIGURE 10 ICON OF THE SWEDISH CHAT BOT



CHANNEL EXAMPLE: CHATBOT IN BRAZIL

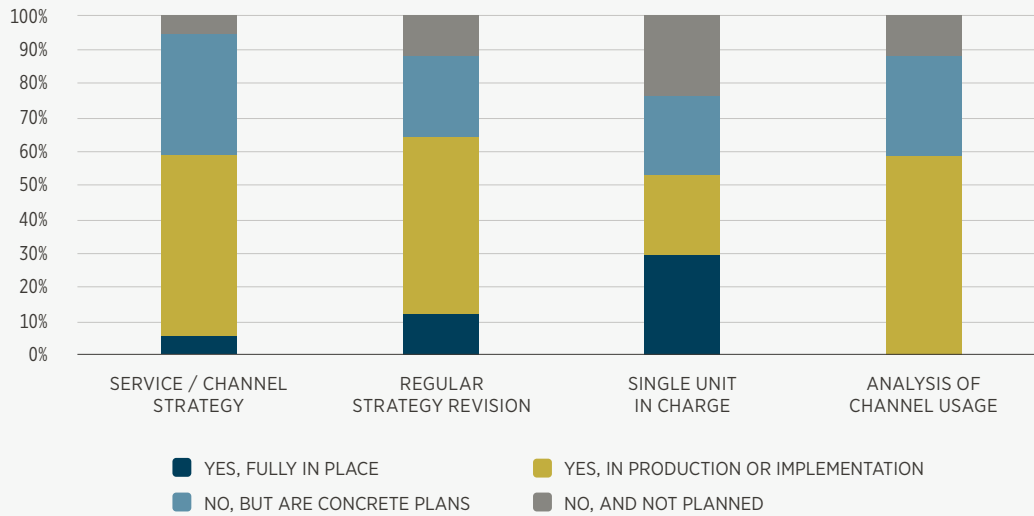
As an example of the progressive adoption of emerging technologies in the Brazilian public sector, the Services Portal (Portal de Serviços) has deployed a chatbot. This chatbot, called 'Beta', answers questions and provides information on several available services (e.g., passports, university allowances, tax exemptions). Although not very sophisticated and entirely dependent on the quantity and quality of the information and data that supports its functioning, the chatbot is a good example of the value of using emerging technologies for service delivery in the LAC.⁶⁶

But what is happening across LAC PESs? First, we asked about several aspects of service and channel strategies (Figure 12). As of now, most elements are being developed or planned across PESs. The most advanced area is where 30% of all PESs have one single unit in charge of all service channels, a major improvement from 2019 when no PESs had this in place. This helps with the design of channels, synchronicity of content, and transfer of customer journeys across channels. With most PESs not having most elements in place, it is unsurprising that regular updates are also not in place (yet). However, overall, the situation is improving from 2019.

⁶⁶ See https://www.oecd-ilibrary.org/sites/9789264307636-en/1/2/6/index.html?itemId=/content/publication/9789264307636-en&_csp=924f5d17184e76f412684f6bf2f09995&itemIGO=oe&itemContentType=book#chapter-d1e9751

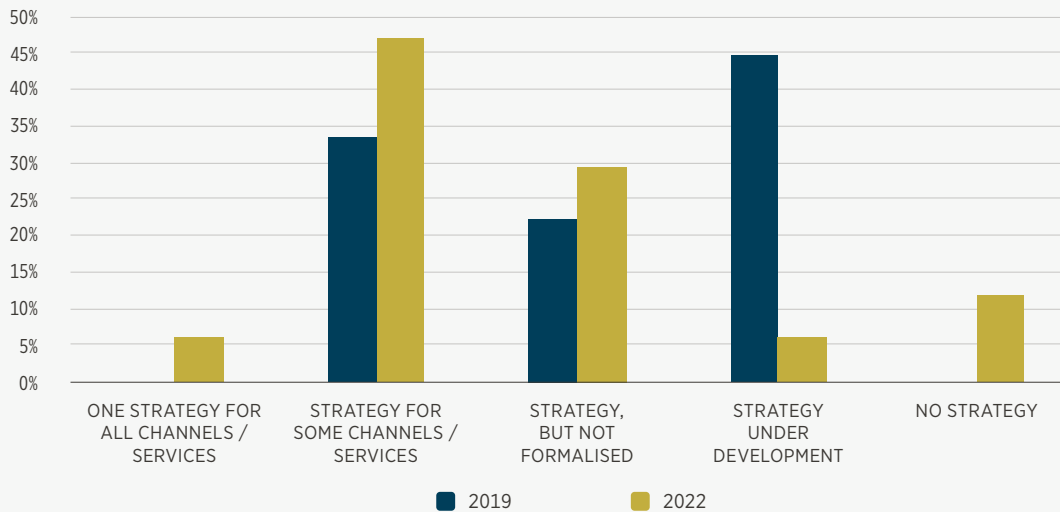


FIGURE 12 PRESENCE OF A SERVICE AND/OR CHANNEL STRATEGY WITHIN LAC PESS



With no overarching service delivery strategy in place, most PESSs also have no formalized strategy across all channels in place. However, most PESSs have a strategy that covers some services and channels, and this figure has improved since 2019. Moreover, while the largest group of PESSs was developing a strategy in 2019, most PESSs now have *something* in place (Figure 13).

FIGURE 13 APPROACH TOWARD SERVICE CHANNELS WITHIN LAC PESS IN 2019 & 2022





CHANNEL STRATEGIES: INTEGRATING CHANNELS FOR INTERVIEW PREPARATION IN SLOVENIA

The Slovenian PES tried to improve service delivery with the goal of improved employability of jobseekers. The service targets jobseekers with a preference for personal counseling, who have an interview scheduled at a prospective employer. When PES staff recognize the needs of a job searcher, he/she posts this candidate for the mentioned service.

After the jobseeker has been identified during in-person counseling as a relevant candidate, the jobseeker receives a phone call to prepare for the job interview. During the preparation, the counselor guides the jobseeker with key questions regarding his/her competencies and how to present him/herself in best possible way to the employer.

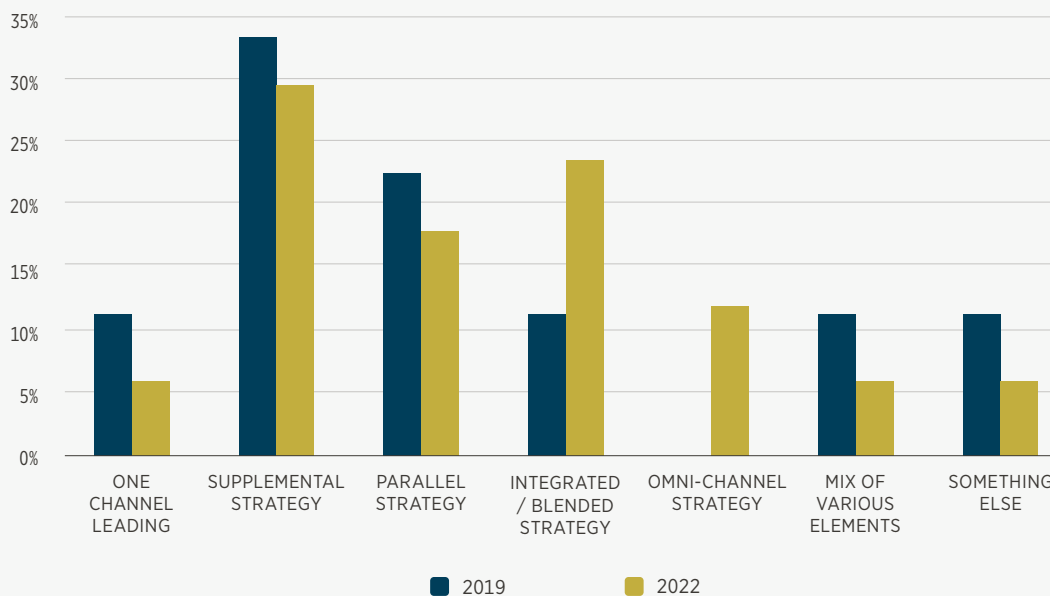
The results of this integrated service, in which different channels are deployed and the jobseeker is steered from one channel to another, are positive. The following key outcomes have been identified:

- Empowerment of jobseekers prior to the job interview,
- Support for the counseling process, and
- Higher satisfaction of employers with referred candidates.

While there may not be a formalized strategy in place, there are typically some underlying assumptions regarding channels and how they are positioned opposite each other. As seen above there are different ways of positioning or integrating channels. What is the nature of channel strategies in LAC PESs and how has that changed over time (Figure 14)?



FIGURE 14 APPROACH TOWARD SERVICE CHANNELS WITHIN LAC PESS IN 2019 & 2022



LAC PESSs are most likely to focus on one channel or use channels as supplements. However, integrated/blended approaches are on the rise. Omni-channel strategies are now (2022) also being followed. The actual channels being deployed mirror these strategies. PESSs tend to focus either mostly on offering all their services online or in person or follow a supplemental strategy in which certain services are conducted in person (such as CV/interview training and employment counseling) and others mostly via the website (such as vacancy registration, profiling, and matching). While LAC countries offer fewer channels than their EU counterparts (e.g., in the use of social media, email, and telephone service), the prominence of website and in-person channels is similar across both regions. This does not mean there are no plans for more advanced or newer multichannel strategies. The Mexican PESS, for example, is now moving toward an omni-channel strategy, in which it seeks to treat the channels as an integral entity where the customer’s journey is continuous, and all content is updated simultaneously on all appropriate channels.

PESSs can achieve different things with these channel or service strategies, for example improving the efficiency or effectiveness of their service delivery. We asked LAC PESSs to indicate which goal(s) underlie their current service strategies. All PESSs mention different goals, and the improvement of effectiveness (n = 15) was mentioned most frequently, followed by improving perceived service quality and improving client coverage (inclusion; n = 11), which is roughly comparable to 2019.



4.5 Data and measurement

The fourth dimension of digital strategies comprises data, which is increasingly important because an important side effect of the increase in technology and digitalization of products and services is the generation of and access to large amounts of data. This largely stems from four phenomena.

The digitalization of information and storage of records in data systems⁶⁷ has made information more accessible and turned data into a resource to create or improve offerings.

The connection of data systems through networking technologies (both intranets and the Internet) has greatly increased the amount of data available.

Information and communication technologies themselves create data (for example server logs) that can be used to optimize processes or other purposes.

The increase in number of digital devices connected to the Internet (e.g., IoT sensors) allows for the creation of additional information to tailor or refine offerings.

As a result, and as mentioned above, the amount of data available to PESs is increasing drastically, leading to the label of 'big data' or 'smart data' (see Chapter 2). The use of data becomes increasingly important for PESs in several areas. The first of these is the use of data to measure success in the organization. Not many PESs around the world have comprehensive measurement strategies in place. However, several PESs are developing plans in this area. The most prominent is the PES in Estonia that has developed a set of key performance indicators (KPIs). The PES in Slovenia is following along similar lines.

⁶⁷ By data system we refer to any type of database infrastructure, including data bases, data warehouses, data marts, and data lakes.



KPIS IN PRACTICE: GOAL & KPI CASCADE IN ESTONIA

In collaboration with the University of Tartu, the Estonian PES (EUIF) has started a project to identify and evaluate a set of KPIs based on organizational strategic goals.

In their project, they created a cascade of goals (ultimately resulting in an overall composite KPI: EUIF utility).

At the heart of the cascade lie the four broad strategic goals of EUIF:

1. Reduce unemployment
2. Support the employed
3. Increase labor supply
4. Cost-effectiveness

Based on these goals, the EUIF created a series of KPIs (in blue), based on several underlying indicators (in green). The weight of each indicator is based on expert evaluations by the board members of EUIF (consulted in April 2018), and these are subject to change as the work is still ongoing.

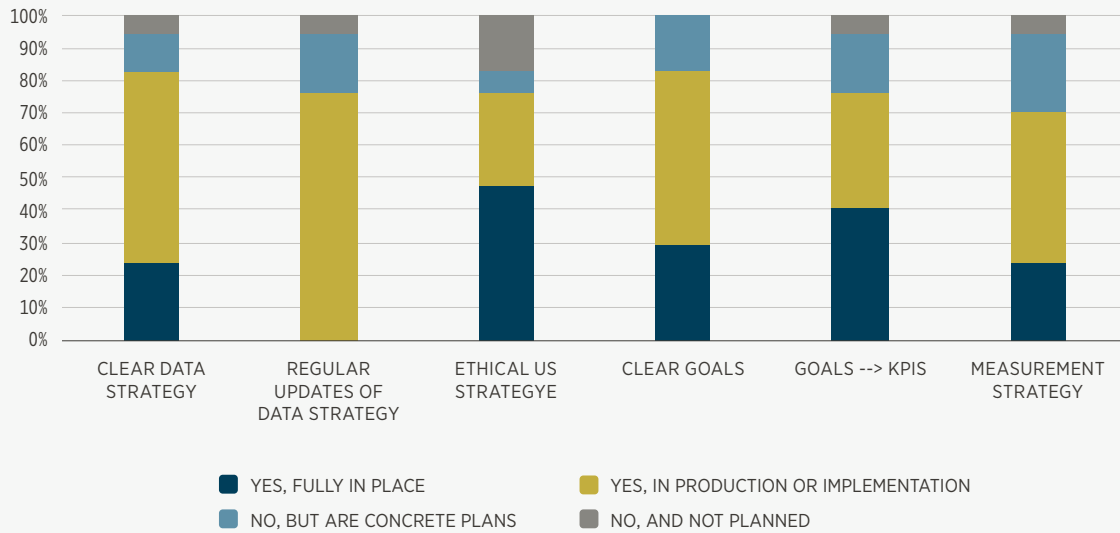
More information about performance management within EUIF can be found in the best practice fiche:

<https://ec.europa.eu/social/BlobServlet?docId=20526&langId=en>.

PESs across the LAC were asked to indicate the extent to which they have various elements of a data and measurement strategy in place, and this area saw significant improvement compared to 2019. For example, where only one PES had both (clear) goals and KPIs in place, now five (29%) and seven (41%) do, respectively. In 2019, PESs were not asked whether they had an ethical data use strategy in place, which constitutes the most mature area in 2022 with almost half the PESs having this fully implemented. The one area lacking is updates of the strategy. While almost 80% of PESs report that they are actively working on this, no PES has this fully in place, indicating an area of opportunity for PESs.

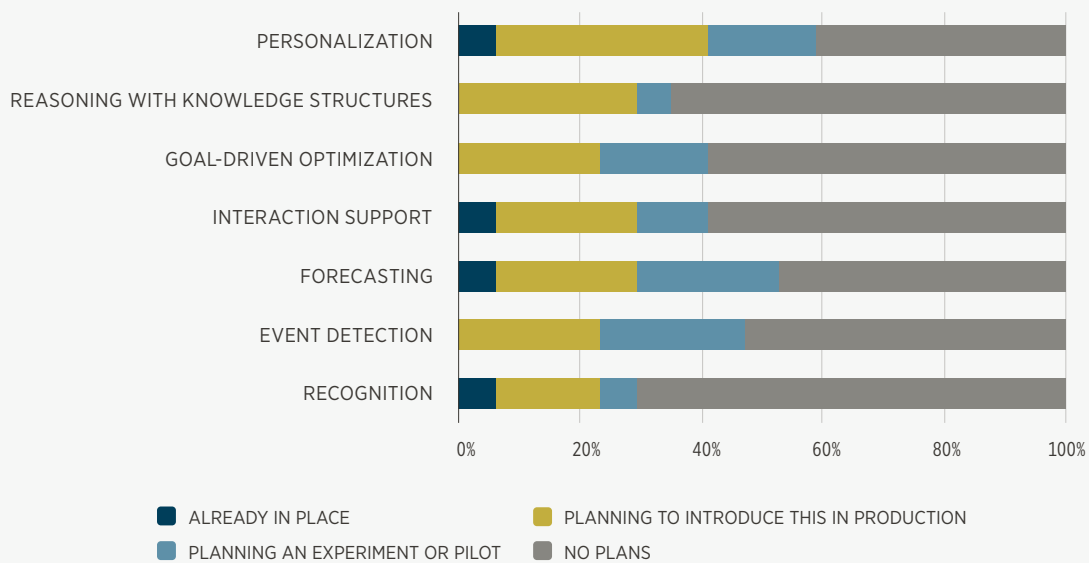


FIGURE 15 DEGREE TO WHICH LAC PESS HAVE A DATA AND MEASUREMENT STRATEGY IN PLACE



Because it is an important topic in the field, we also asked PESs about the use of data for the purpose of advanced analytics (with questions derived from the ILO 2020 survey). This generally covers a variety of AI applications.

FIGURE 16 DEGREE TO WHICH LAC PESS HAVE AI APPLICATIONS IN PLACE





The use of these applications is currently still low, with large numbers of LAC PESs either experimenting or planning to put in place AI applications. The biggest application area is personalization, and this aligns with other PESs around the world, where personalization is often used as part of better matching engines when more personal labor intermediation is used. One key example is machine learning-based matching at the Flemish PES (VDAB) and the implementation of AI in the labor intermediation platform of Peru's PES.

USE OF IA | JOB EXCHANGE WITH ARTIFICIAL INTELLIGENCE SYSTEM: THE CASE OF PERU

With the support of the IDB, the National Employment Service in Peru has been making efforts to strengthen the services it offers jobseekers and companies. These efforts have been accompanied by implementing new technologies, such as incorporating AI in its updated job intermediation platform.

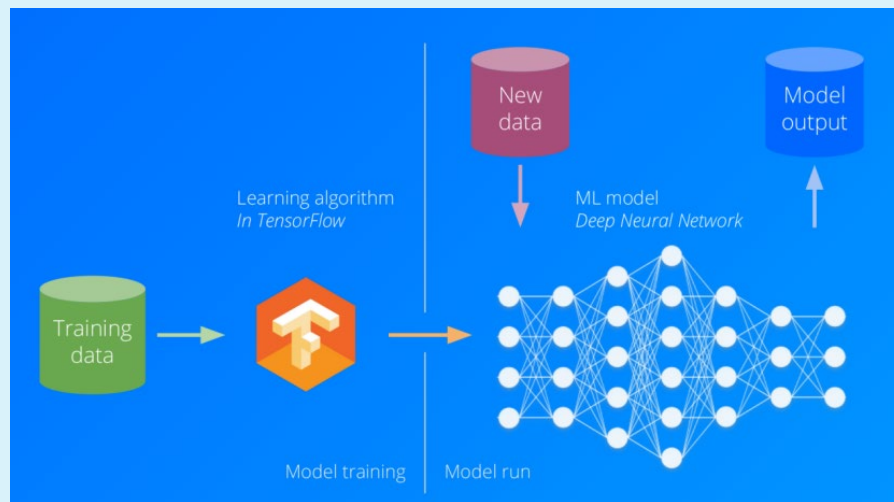
This AI-enhanced job platform facilitates a better match between talent and available vacancies based on assessing different dimensions: education, experience, occupations, and skills. It also makes it possible to improve the analysis of the gap between the applicant's profile and what the labor market demands; eventually, it will generate a framework of recommendations and training offers to strengthen workforce skills.





USE OF DATA | MACHINE LEARNING AT VDAB

The PES in Belgium-Flanders (VDAB) is at the forefront of these developments and is using deep learning to create new approaches toward vacancy matching. In this approach, the Neural Network model tries to discover patterns in vacancy texts and jobseekers resumé and tries to match those based on similarities.



4.6 Organization

The last dimension of digital strategies is the organization (and to a lesser extent, the role of innovation in an organization). The success of any digital or data-related initiative depends less on the technological aspects itself but often on ‘softer’ aspects related to organizational factors. If anything, it seems the ‘human’ or soft aspects of digital are garnering more attention across PESs, mostly driven by the realization that often technical factors do not challenge the success of digital but rather human-related factors, such as the organizational culture, siloing, and the role of leadership. The importance of the last aspect is illustrated in the drop in UN eGovernment rankings by the United Kingdom between 2016 and 2018 from place 1 to 4 and a UK parliament investigation⁶⁸ concluded that the UK government’s digital strategy had lost momentum because of a lack of political leadership.

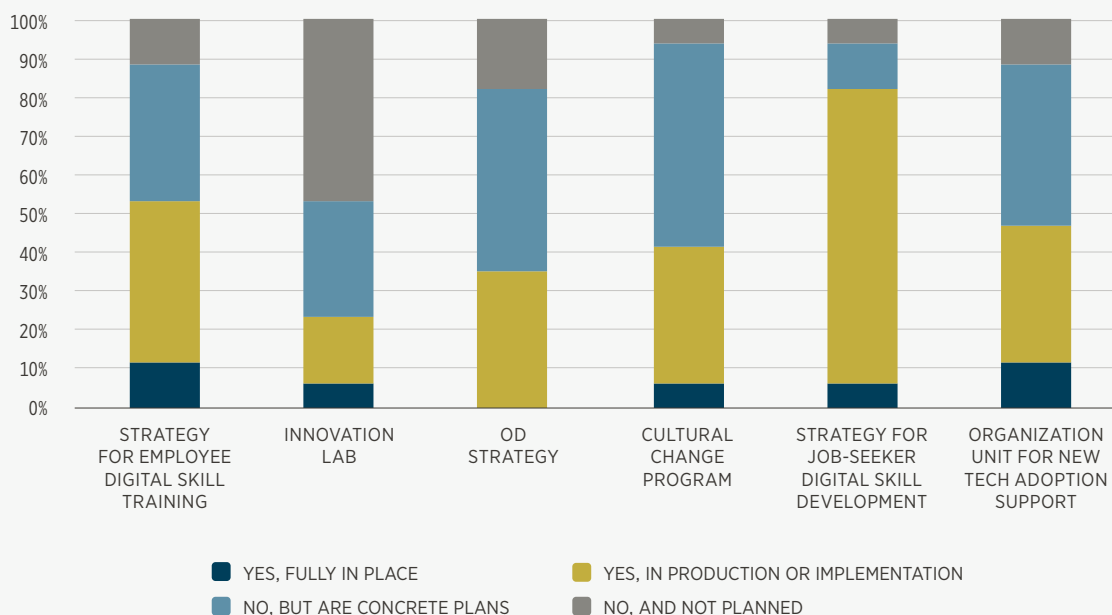
⁶⁸ See <https://www.globalgovernmentforum.com/uks-digital-strategy-has-lost-momentum-say-mps/>.



Furthermore, specific organizational factors are often cited as the most important barriers toward digital initiatives. For example, organizational siloing was listed as the most important obstacle towards PESs' abilities to create successful multichannel service strategies⁶⁹. Therefore, organizational variables are an often ignored but very important key aspect of the success of any digital initiative, and for this reason, several questions regarding this topic were asked. Thus, in general, it is important that PESs have an organizational strategy in place.

The LAC PESs were asked to indicate the extent to which they have certain initiatives regarding the organization and organizational development in place to ease the transition to a digital organization. The results are shown below (Figure 17).

FIGURE 17 STRATEGIES PERTAINING TO ORGANIZATION AND INNOVATION IN LAC PESS



⁶⁹ See Pieterse, 2017.



Scores on most elements are (still) relatively low but are improving since 2019. In that year, most PESs reported that they had *concrete plans* in most organizational areas. In 2022, many elements being developed have been put in production/implementation. For example, only 22% of participants had a strategy for employee digital skill training in place or in development, and in 2022, this grew to over half the participants. The biggest jump is in jobseeker digital skill development (from 22% in place/production in 2019 to over 80% in 2022). One area that was and is lacking is the use of dedicated spaces (or labs) for innovation.

The Flemish PES (VDAB) was (probably) the first PES in the world to start an innovation lab. Its focus is primarily on the use of data and AI (including machine learning and deep learning) to create innovative solutions. The 'Machine learning at VDAB' example above resulted from the work in this lab. The French PES (Pole Emploi) launched their lab in in 2017. Its focus is slightly broader than the lab at VDAB and tries to create an environment that stimulates innovation in the broadest possible sense (see box below). More recently (mid-2019), the Swedish PES (Arbetsförmedlingen) announced a collaboration with the AI Sustainability Center. The goal is to create an innovation lab focused primarily on the possibilities and consequences of AI with the underlying goal to ensure that the transition to AI considers the impacts on society together with other efficiency gains, and that risks are accounted for and mitigated early in the process.

Because so many innovation labs are sprouting up across the EU, the European PES network is working on an EU-wide (PES) innovation lab, possibly the first transnational PES innovation lab in the world.



INNOVATION | THE INNOVATION LAB IN FRANCE (LE LAB AT PÔLE EMPLOI)

The French PES has created an environment in which it tries to stimulate innovation (in which the lab plays a central role). In this environment:

- Any PES employee can pitch an innovative idea to the PES's Le Lab.⁷⁰ If the idea is accepted, the employee can become an "Intrapreneur".
- The Intrapreneur can develop his/her idea within or with help from Le Lab to develop and test it.
- If the idea is viable, the idea can be developed further within an internal 'startup' and made market-ready within the PES's incubator "La Fabrique"⁷¹
- Successful ideas can be implemented organization-wide. For example, applications can be adopted within the organizations' own digital services marketplace for employment and training (or application store: emploi-store.fr) where customers can find applications and tools that can help with a job search or career development.

Trouvez tous les sites et applis dédiés à l'emploi !

Parcourez les thèmes qui vous intéressent :

Choisir un métier	Se former	Préparer sa candidature	Trouver un emploi	Créer une entreprise	International
Les bonnes pratiques pour construire son projet professionnel	L'essentiel pour concrétiser son projet de formation	Les outils pour une candidature efficace	Les clés pour postuler et réussir ses entretiens	Les supports pour créer ou reprendre une entreprise	L'indispensable pour une recherche d'emploi à l'étranger

⁷⁰ Le LAB provides a dedicated, physical space for French PES employees and stakeholders to come together and think through problems and solutions related to employment services in a creative and innovative way. See the PES practice for more information at: <https://ec.europa.eu/social/main.jsp?catId=1206&langId=en>.

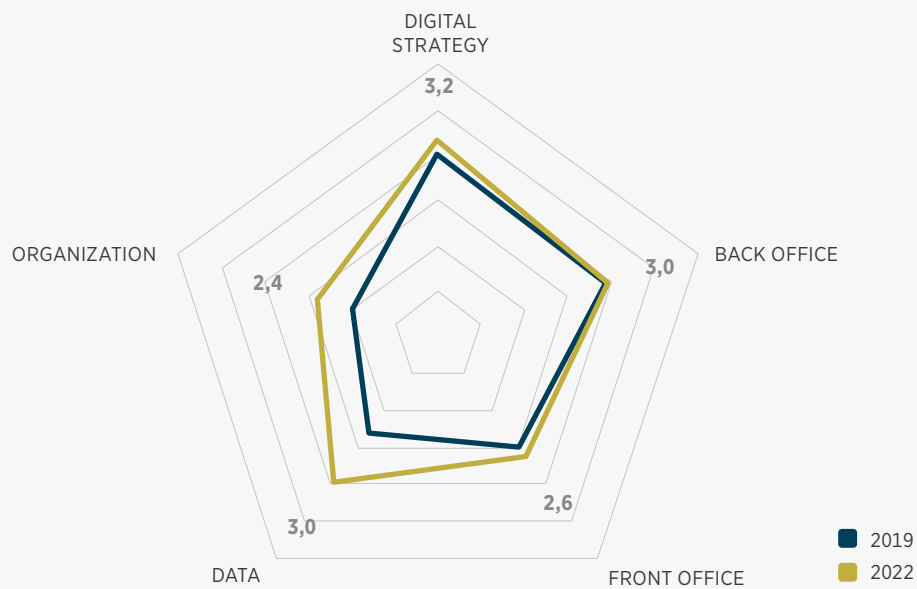
⁷¹ La Fabrique also hosts external start-ups, for more information see the PES Practice at <https://ec.europa.eu/social/main.jsp?catId=1206&langId=en>.



5 Conclusions

Based on the previous sections, we can draw a number of key conclusions and accompanying recommendations. In this final section, we present the five most important conclusions and considerations, and for each, we formulate several recommendations as well. A number of these conclusions are based on the strategic maturity scores as presented for each of the five dimensions in the previous chapter. The following figure (Figure 18, as also shown above) shows the self-reported status of each dimension in 2019 and 2022, as well as the 2022 scores.

FIGURE 18 STRATEGIC DIGITAL MATURITY STATUS OF LAC PESS



Overall strategy still under development

Digital technologies are here to stay, and both public and private sector organizations around the world are rapidly digitizing their information and digitalizing their processes. The front runners in the world are now focused on a digital transformation in which the entire organization is realigned around digital processes, services, and workflows. What lessons these organizations make clear, and in line with the increasing number of publications on the role of digital technologies in organizations, is the fact that digital is becoming an increasingly strategic topic for many organizations as its importance grows.



PESs are no exception and many PES around the world are developing digital strategies to deal with the consequences of technologies on the highest possible levels in the organization.

The good news is that LAC PESs are making rapid progress with the development of their digital strategies. A majority of LAC PESs in this study either have a digital strategy in place or under development, a step-up from the situation in 2019. However, the focus of these strategies in most cases is on the digitalization of processes and services and less on the *overall digital transformation* of their organization. Therefore, many obstacles result from organizational (and less technical) factors, such as resistance and siloing.

Thus, while LAC PESs are on the right track, the work is not done yet, and we recommend:

- Moving forward from developing strategies to implementing these digital strategies.
- Making these digital strategies as inclusive as possible. They should not just include the strategic goals of the PES but also, at the very least, the other elements from the framework and tie into national strategies.
- Focusing less on the purely technical aspects of digitalization and more on the transformation of the organization as whole.

Back offices could benefit from standards and documentation

Besides the overall strategy, LAC PESs are most mature in back-office strategies and data. While PESs in 2019 already were relatively mature, it is also an area where relatively less progress has been made. There has been progress in IT centralization across most PESs in the region, and in many areas, PESs have moved from ‘having plans’ to ‘executing these plans’ (moving to development or implementation stages), which overall is an encouraging development.

However, this does not mean that the work is complete. Many elements are not fully in place yet across most PESs, and certain areas could benefit from more attention. The development of standards and documentation is lagging.

Thus, while making good progress on back-office digitalization, we recommend that:

- LAC PESs try to minimize fragmentation in their approaches toward back-office digitalization by adopting cohesive back-office strategies.
- LAC PESs pay special attention to the adoption of standards in their IT development as well as emphasize the importance of proper documentation.



Front office could benefit from focus and plans

Developments in technology in front offices are also moving extremely fast. The number of service channels is increasing rapidly and clients' behaviors are increasingly volatile, calling for front-office strategies that allow for flexibility and adaptability. Currently, it appears that front-office strategies at LAC PESs are underdeveloped, an area of relatively little progress since 2019. Most LAC PESs have no cohesive service/channel strategies in place, and those under development do not focus on all channels and services.

Currently, PESs across the LAC also follow different approaches toward services and channel management, and this divergence creates one of the bigger opportunities for PESs across the region to learn from each other and other PESs around the world. For example, PESs that have no strategies in place could learn from those that focus on all channels. PESs that do focus on all channels but deploy them in parallel could learn from those with more integrated or omni-channel strategies.

Recommendations are that LAC PESs could benefit from:

- Holistic and integrated channel and service strategies that encompass all channels, services, client groups, and situational constraints.
- Developing broader knowledge about their service delivery models in order to develop strategies that help them manage services effectively and efficiently.
- Mutual learning across the region should focus on equalizing the playing field and finding the right partner for each PES with a general upward movement toward integrated or omni-channel approaches.

Data & analytics under development

Data are the new frontiers of digitalization. With the increasing use of digital technologies come increasing possibilities to generate data and use them to learn and improve. Most PESs around the world are embracing the possibilities of data.

LAC PESs are following this trend, and moreover, PESs in the region have made significant progress in this area. PESs are now developing or have in place data strategies, plans to develop goals, and plans to translate these into KPIs. Perhaps most importantly, the ethical use of data is relatively well-developed across the region. Despite this overall progress, updating data strategies is not something any PES does but could be beneficial given the rapid developments in the field.



Furthermore, and similar to 2019, there is very little experience with the use of advanced analytics, such as machine learning and artificial intelligence. PESs are interested in the phenomenon to improve matching or personalize services in other areas, but the maturity in this area remains low.

PESs in the region could benefit in the coming years from:

- Not only putting data strategies in place but also learning from and updating them. Having regular evaluations and subsequent revisions could prevent these from becoming stagnant and ensure the PES remains current.
- Shifting their attention toward advanced analytics. Possibilities of AI, machine learning, and deep learning are considerable, and more advanced PESs in the world are reaping the benefits from, for example, better vacancy matching. Exploring how this could work for PESs in the region should be high on the agenda in the coming years.

Organizational aspects create opportunities

Experiences from other countries and organizations suggest that organizational aspects are a key enabler and/or blocker of the success of any digital effort. Furthermore, as this (and other) studies show: often organizational factors, such as siloing and resistance to change, hamper digitalization progress. Moreover, moving from digitalization to digital transformation requires a rethinking of the entire organization and, therefore, (by definition) increases the importance of organizational aspects in transformation efforts.

The organizational dimension remains the least developed across all five dimensions within LAC PESs. No PES has an organizational development strategy, and less than 10% have programs that focus on cultural change. Nevertheless, the situation is much better than in 2019. Whereas PESs in 2019 had plans to focus on their organizations, they are now developing or implementing these plans. Digital skill development for both employees and jobseekers are key areas of progress.

However, PESs in the LAC could benefit from an ongoing focus in this area, and therefore, we recommend that:

- PESs intensify their focus on organizational aspects of digital strategies and incorporate key elements pertaining to the organization in their existing and/or future strategies.
- Given that this area is where all PESs in the region are lagging, this creates a great opportunity for the region as a whole to create learning initiatives. By joining forces, the region could prevent ‘the wheel from being reinvented’ several times and catch up rapidly by pooling resources. Spaces to experiment and innovate (such as innovation labs) could drive this development.



5.1 Overall conclusion

The LAC PESs are digitalizing rapidly in most areas of their organization, and the results of this study are a testament to this progress. PESs continue to embrace the benefits of technology and are steadily incorporating technology in every aspect of their organization. While not world leaders, many of the LAC countries closely follow these leaders and often communicate. The LAC PESs are in an excellent position to climb the ranks and reap the benefits from digital strategies. It is a positive development that leaders in the region are moving toward digital transformation in which they realign their organization around digital technologies.

All of this (positive) development is despite the impact of the COVID-19 crisis that has had deeply affected labor markets in the region and has often led to financial (and organizational) challenges for LAC PESs.

As in 2019, the digital strategies in the region are relatively unbalanced. There has been much progress in the field of data, and PESs have made improvements in their organizational strategies; however, their front offices are not as digital as their back offices, and their organizations are not ready for digital transformation. While PESs have overall digital strategies, many (organizational or softer) aspects are still missing. In many areas, PESs are ‘thinking’ or ‘developing’ rather than ‘having things in place’ and learning from experience to advance to the next level.

Thus, PESs in general in the region could benefit from:

- Having digital strategies that are holistic and focus on the overall strategic direction, their back offices, front offices, use of data, and organizational development.
- Learning from successful practices in the region and the world in those areas where they have the greatest opportunities to have the biggest future impact.



Appendices

Appendix 2 | Channel positioning strategies

	Channel(s)											
	1	1	2	1	2	1	2	1	2	1	2	∞
Services [or part thereof]												
Channel Classification	Single Channel		Multiple Channel		Multi-Channel				Cross-Channel		Omni Channel	
Channel Strategy	—	Replacement	Parallel	Supplemental	Integrated	Blended	Holistic					
Key Characteristic	—	New channels make older channels obsolete	All channels offer all services in parallel	Certain services offered via certain channels	Users are guided towards preferred channels during entire customer journey	Channels increasingly integrate and/or are used simultaneously	Channels are fully integrated and create fully seamless service processes					
Organisational Integration	none	none	none	low [coordination]	low/medium [coordin/integration]	medium/high [coordin/integration]	high [integration]					
Process Integration	none	none	none	low [coordination]	medium [coordin/integration]	medium/high [coordin/integration]	high [integration]					
Systems Integration	none	none	none	none/low [coordination]	medium/high [coordin/integration]	high [coordin/integration]	very high [integration]					
Data Integration	none	none	none	none/low [coordination]	medium/high [coordin/integration]	high [coordin/integration]	very high [integration]					



References

- Accenture. (2021). Technology Vision 2021: Leaders Wanted Experts at Change at a Moment of Truth. <https://www.accenture.com/content/dam/accenture/final/a-com-migration/thought-leadership-assets/accenture-tech-vision-2021-executive-summary.pdf>.
- Aoun, J.E. (2017). Robot-Proof: Higher Education in the Age of Artificial Intelligence. Boston, MA: MIT Press. <https://mitpress.mit.edu/9780262535977/robot-proof/>.
- Arthur Mickoleit, A. K. (2020, April). Digital Maturity in Government: Lofty Ambitions Seldom Lead to Tangible Impacts.
- Burns, R. (2015). Rethinking big data in digital humanitarianism: practices, epistemologies, and social relations. *GeoJournal*, 80(4), 477-490.
- Cem Dilmegani, B. K. (2014, December 1). Public-sector digitization: The trillion-dollar challenge. mckinsey.com: <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/public-sector-digitization-the-trillion-dollar-challenge>.
- Checkr. (n.d.). Product. <https://checkr.com/product/>.
- Citizen First. (n.d.). Citizen First studies in Canada. <https://citizenfirst.ca/>.
- Deloitte. (2021). Government Digital Transformation Strategy. <https://www.deloitte.com/global/en/our-thinking/insights/industry/government-public-services/government-digital-transformation-strategy.html>.
- DIJK, J. A. (2012). The Evolution of the Digital Divide The Digital Divide turns to Inequality of Skills and Usage. <https://www.utwente.nl/en/bms/vandijk/news/The%20Evolution%20of%20the%20Digital%20Divide/Evolution%20of%20the%20Digital%20Divide%20Digital%20Enlightment%20Yearbook%202012.pdf>.
- Digital Skills Initiative. (n.d.). Retrieved August 8, 2023. <https://gov.edacy.com/digital-skills-initiative>.
- Djellal, F., Gallouj, F., & Miles, I. (2013). Two decades of research on innovation in services: which place for public services? *Structural Change and Economic Dynamics*, 27 (December), pp. 98-117
- Ebbers & Pieterse, 2017. Daar Gaat een Blauwe Envelop. Enschede: Universiteit Twente. https://ris.utwente.nl/ws/portalfiles/portal/21708068/Onderzoek_EBV_Belastingdienst_meting_3.pdf.



- Ebbers, W., & Pieterse, W. (2017, September). New channels, new possibilities: A typology and classification of social robots and their role in multi-channel public service delivery. In International Conference on Electronic Government (pp. 47-59). Springer, Cham.
- Ejler N. and Sidelmann P. (2016) Application of process efficiency techniques in PES, Analytical Paper of the European Network of Public Employment Services, Luxembourg, Publications Office of the European Union. <https://ec.europa.eu/social/BlobServlet?docId=16189&langId=en>.
- European Commission. (n.d.). Public employment services (PES). <https://ec.europa.eu/social/main.jsp?catId=1206&langId=en>.
- Fishenden, J., & Thompson, M. (2013). Digital government, open architecture, and innovation: why public sector IT will never be the same again. Journal of public administration research and theory, 23(4), pp. 977-1004.
- Frey, C. B., & Osborne, M. (2013). The future of work.
- Garicano, L., & Heaton, P. (2010). Information technology, organisation, and productivity in the public sector: evidence from police departments. Journal of Labor Economics, 28(1), 167-201.
- Gallouj F. (2002), Innovation in the service economy: the new wealth of nations. Cheltenham, Northampton: Edward Elgar
- Gill, M. & VanBoskirk, S. (2016). The Digital Maturity Model 4.0. Cambridge, MA. Forre
- Global Government Forum. (2019). UK's digital strategy has lost momentum, say MPs. <https://www.globalgovernmentforum.com/uks-digital-strategy-has-lost-momentum-say-mps/>.
- Gray, A. (2017, August 9). South Korea introduces world's first robot tax. The Telegraph. <https://www.telegraph.co.uk/technology/2017/08/09/south-korea-introduces-worlds-first-robot-tax/>.
- IBM. (n.d.). Cloud computing. <https://www.ibm.com/topics/cloud-computing>.
- (n.d.). Robotic process automation (RPA). <https://www.ibm.com/topics/rpa>.
- International Labor Organization. (2020). Global Employment Trends. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_737648.pdf.
- (2020). Global report Technology adoption in public employment services Catching up with the future. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_840767.pdf.



- (2017). GLOBAL EMPLOYMENT TRENDS FOR YOUTH 2017. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_840767.pdf.
- Inter-American Development Bank. (2019). El ABC de la interoperabilidad de los servicios sociales: Marco conceptual y metodológico. <https://publications.iadb.org/es/el-abc-de-la-interoperabilidad-de-los-servicios-sociales-marco-conceptual-y-metodologico>.
- (2020). El futuro del trabajo en América Latina y el Caribe: ¿Cuál es el impacto de la automatización en el empleo? <https://www.iadb.org/es/trabajo-y-pensiones/el-futuro-del-trabajo-en-america-latina-y-el-caribe-cual-es-el-impacto-de-la>.
- (2020). How to Achieve and Sustain Government Digital Transformation. <https://publications.iadb.org/en/how-achieve-and-sustain-government-digital-transformation>.
- (2020). How to Achieve and Sustain Government Digital Transformation. <https://publications.iadb.org/en/how-achieve-and-sustain-government-digital-transformation>.
- (2020, October 20). Impacto del COVID-19 en el mercado laboral. Blog del BID. <https://blogs.iadb.org/trabajo/es/impacto-del-covid-19-en-el-mercado-laboral/>.
- (2023). Observatorio Laboral. <https://observatoriolaboral.iadb.org/es/>.
- Inter-American Development Bank, African Development Bank, Asian Development Bank, & European Bank for Reconstruction and Development. (2018). The Future of Work: Regional Perspectives. <https://publications.iadb.org/en/future-work-regional-perspectives>.
- Inter-American Development Bank; World Association of Public Employment Services; Organization for Economic Cooperation and Development. (2016). The World of public employment services. Retrieved from <https://publications.iadb.org/en/world-public-employment-services>.
- Kane, G., Palmer, D., Phillips, A. N., & Buckley, N. (2015). Strategy drives digital transformation. MIT Sloan Management Review. <https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/>.
- Kim, G. H., Trimi, S., & Chung, J. H. (2014). Big-data applications in the government sector. Communications of the ACM, 57(3), pp. 78-85.
- Kureková, L. M. (2014). Review of profiling systems, categorisation of jobseekers and calculation of unit service costs in employment services implications and applications for Slovakia. (CELSI Research Report No.8). Bratislava, Slovak Republic: Central European Labour Studies Institute



- Larsson, A. (2001). A Turning Point for Employment Policy. *Europa. Novas Fronteiras*, 9/10 (June/December), pp. 49-54.
- Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, 18(2), 122-136.
- Loxha, A., and Morgandi, M. (2014). Profiling the unemployed. A review of OECD experiences and implications for emerging economies. Washington DC, USA: World Bank Group. <https://documents1.worldbank.org/curated/en/678701468149695960/pdf/910510WP014240Box385327B-OPUBLICO.pdf>.
- McAfee, A., & Brynjolfsson, E. (2016). Human work in the robotic future: Policy for the age of automation. *Foreign Aff.*, 95, 139.
- McKinsey Global Institute (2017). Jobs Lost, Jobs Gained: Workforce transitions in a time of automation. McKinsey Global Institute. <https://www.mckinsey.com/-/media/BAB489A30B-724BECB5DEDC41E9BB9FAC.ashx>.
- Muñoz de Bustillo R., Fernández-Macías E., Antón J. and Estevez F. (2011) *Measuring More than Money: The Social Economics of Job Quality*, Cheltenham, Edward Elgar Publishing.
- Ng, A. Y. (n.d.). Convolutional Neural Network. In *Unsupervised Feature Learning and Deep Learning Tutorial*. <http://ufidl.stanford.edu/tutorial/supervised/ConvolutionalNeuralNetwork/>.
- Organisation for Economic Co-operation and Development. (2018). Digital Government Review of Brazil: Towards the Digital Transformation of the Public Sector. <https://doi.org/10.1787/9789264307636-en>.
- Organisation for Economic Co-operation and Development. (2014). Recommendation on digital government strategies. <https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf>.
- (2017). Government at a glance: Latin America and the Caribbean 2017. <https://www.oecd.org/gov/government-at-a-glance-latin-america-and-the-caribbean-2017-9789264265554-en.htm>.
- Oracle. (n.d.). What is big data? <https://www.oracle.com/big-data/what-is-big-data/>.
- (n.d.). What is the Internet of Things (IoT)? <https://www.oracle.com/internet-of-things/what-is-iot/>.



- Ott Velsberg, Chief Data Officer of Estonia. (2022, March 8). AI-powered government: The future of public services in Estonia. GovInsider Asia. <https://govinsider.asia/innovation/ott-velsberg-estonia-chief-data-officer-ai-powered-government/#>.
- Pieterston, W. (2017). Multi-channel management in PES: From blending to omni-channelling. Analytical paper. European Commission. DOI: 10.2767/73549 <https://ec.europa.eu/social/BlobServlet?docId=18865&langId=en>.
- . 2018. Thematic Paper: Creating digital strategies. Brussels: European Commission. <https://ec.europa.eu/social/BlobServlet?docId=20126&langId=en>.
- Pieterston, W., Ebbbers, W., & Madsen, C. Ø. (2017, September). New channels, new possibilities: A typology and classification of social robots and their role in multi-channel public service delivery. In International Conference on Electronic Government (pp. 47-59). Springer, Cham.
- Robot tax. (n.d.). In Wikipedia, The Free Encyclopedia. https://en.wikipedia.org/wiki/Robot_tax.
- StepStone Group. (n.d.). MYA. <https://www.thestepstonegroup.com/en/mya/>.
- United Nations Department of Economic and Social Affairs. (n.d.). UN e-Government Development Index. <https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index>.
- . (2018 - 2022.). UN e-Government Surveys. <https://publicadministration.un.org/en/Research/UN-e-Government-Surveys>.
- United Nations Development Programme. (2022). Digital transformation for inclusive development in Latin America and the Caribbean: A regional perspective. Retrieved from <https://www.undp.org/sites/g/files/zskgke326/files/2022-09/undp-rblac-Digital-EN.pdf>.
- World Economic Forum. (2016). The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution. Geneva: World Economic Forum. https://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf.
- Zillien, N., & Hargittai, E. (2009). Digital distinction: Status-specific types of Internet usage. Social Science Quarterly, 90(2), 274-291.

