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Improving the Measurement of Digital Government
Inter-American Development Bank
FINAL REPORT

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I. Executive Summary

Governments play a critical and dual role in shaping digital transformation, acting as both policy and rule maker to create the enabling environment, and as a strategic investor in digital technology for their own public services[1]. However, both paths have the same purpose: increasing the quality of life of their citizens. Rapid digital transformation already taking place prior to the COVID-19 crisis has accelerated during the pandemic, leading to the expansion of opportunities for digital inclusion[2]. Leaving no one behind also means leaving no one offline.

The following work aimed to analyze various metrics of digital government worldwide to generate a robust framework to measure e-government initiatives in Latin America and the Caribbean (LAC) region. Existing measurement indicators produce inconsistent results, or sacrifice broad applicability by focusing on a narrow set of metrics and government-adjacent entities. After evaluating nine different indices and interviewing seven experts in digital government, the workshop team identified the best practices in digital government measurement, developed recommendations of improvements, and suggested new indicators to be included.

The Theory of Action behind this work consisted in the following understanding of digital government: if the public sector of a country generates the necessary preconditions, provides a digital government strategy with a strong legal framework, and establishes institutional capacities and governance, then governments will effectively implement digital public services that citizens and businesses will use. As a result, both of them will have better access to efficient and innovative public services, that will lead to an improvement in their quality of life.

The main insights of the evaluation and analysis were, first, the narrow existing focus for evaluating preconditions and implementation in a binary and simplistic way. Second, there is a consistent lack of transparency and reliability across indices, and third, there is a tension between the quality and completeness that indices aim for. While the most complete indices, in terms of our theory of action, targeted all the components, they did not get the highest scores in terms of impact. On the contrary, indices that focused only on a few components received higher scores for those components. Overall, the most important conclusion of our project is the need to reconnect the various indices measuring digital government with the final user and their experiences. To that end, we provide new proposed indicators to promote inclusion, user feedback, and impact-based metrics.

[1] InterAmerican Development Bank. (2020c).
[2] United Nations Department of Economic and Social Affairs. (2021).

II. Introduction

Improving the measurement of digital government is not only an opportunity to adapt and modernize public services, but also an ethical imperative to improve accessibility to all citizens and provide a seamless and transparent public system that ensures accountability and high-quality services. The Innovation in Citizen Services Division (ICS) of the Inter-American Development Bank (IDB) is interested in analyzing the various metrics of digital government worldwide to generate a robust framework to measure e-Government initiatives in Latin America and the Caribbean (LAC) region.

Although attempts to measure digital government using systematic frameworks date back nearly twenty years, existing measurement indicators produce inconsistent results, or sacrifice broad applicability by focusing on a narrow set of metrics and inter-government entities. Outside of specialized academic research, there have been few attempts to categorize this existing body of work, despite widespread recognition of the need to move towards more inclusive and user-centered digital government measurement, especially given the increasing demands on governments in LAC as they attempt to navigate the current COVID crisis while building sustainable societies for the 21st century

The objective of this research is to (1) create an inventory of digital government frameworks, (2) categorize and (3) evaluate the existing digital government indicators, and finally (4) provide recommendations on how to improve the digital government indicators and its methodology. In order to conduct this research, the SIPA EPD Workshop team conducted desk research and informational interviews to identify the digital government indicators. Subsequently, the team created a catalogue system of all selected indicators, and an evaluation framework to determine their strengths and weaknesses.

By understanding the frameworks, criteria and indicators behind the different measurement tools of digital governments, the IDB has a unique opportunity to integrate and adapt indicators that will contribute to an accurate and pertinent tool to address LAC contexts and challenges. Due to the pandemic, governments have had to deal with an increasing demand for digital services and public leaders have seen the inequality and accessibility problems that a lack of digitalization brings to the health crisis. Today, more than ever, governments need an accurate pathway to constantly improve their digitization efforts and ensure that they leave no one behind.

III. Background

Client Agency

The Inter-American Development Bank was created in 1959 and is the largest source of multilateral financing in LAC, delivering financial and technical support for countries working to reduce poverty and inequality[3]. By 2019 the IDB's approved lending amounted to US$11.3 billion[4], prioritizing social inclusion and equality; productivity and innovation; and regional economic integration[5]. Within the different departments of the IDB, the Institutions for the Development Sector (IFD) is the team charged with conceptualizing and supporting the execution of IDB's sector operations. The SIPA EPD Workshop Team worked specifically with the Innovation in Citizen Services Division (ICS). This division focuses on reform and modernization of the state and supports governments in LAC in their digital transformation efforts. This includes the redesign of government procedures, the incorporation of digital technologies in government interactions with citizens, and building institutional capacity to coordinate digital reforms across government institutions[6]. The primary purpose of this project and partnership is based on the work of ICS and the promotion of digital governments in LAC.

Digital Government Background and Existing Frameworks

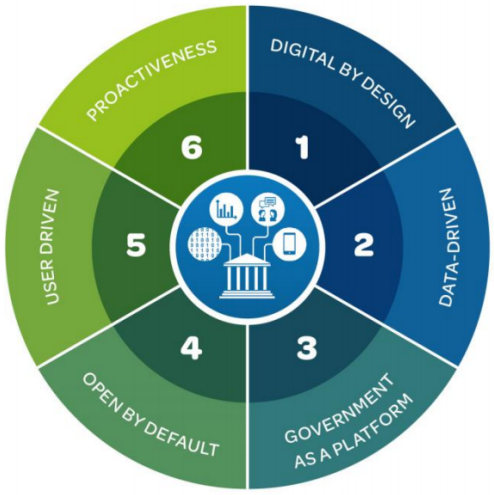
The current COVID-19 pandemic, which has resulted in over 140 million cases and more than 3 million deaths[7] around the world, has placed substantial strain on governments' abilities to respond and has highlighted the need to rethink public services for the 21st century. Moreover, it has underscored the importance of digital technology in building social resilience while highlighting gaps in digital government, which has been defined as *"the use of digital technologies, as an integrated part of governments' modernisation strategies to create public value."*[8] Furthermore, the current context offers an opportunity to improve digital governance initiatives and share key lessons which will shape future reforms and actions, with a successful transition enabling public sectors to operate efficiently and deliver services that are simple, effective, and inclusive.

One of the earliest attempts at systematically defining and measuring digital government was the UN E-Government survey, which began in 2001[9]. This survey identifies a number of approaches governments are implementing, including the delivery of e-Government as a platform, the integration of online and offline multi-channel delivery, agile development of digital services, expansion of e-participations and partnerships, adoption of data-centric approaches, and strengthening of digital capacities to deliver people-centric services[10]. The convergence of innovative technologies such as Big Data, Internet of Things, cloud computing, artificial

[3] Inter-American Development Bank. (2020a).
[4] Inter-American Development Bank. (2020a).
[5] Inter-American Development Bank. (2020a).
[6] Inter-American Development Bank. (2020b).
[7] Johns Hopkins Coronavirus Resource Center. (April 2021).
[8] OECD. (2020).
[9] United Nations Department of Economic and Social Affairs. (2020).
[10] United Nations Department of Economic and Social Affairs. (2020).

intelligence and machine learning, is promoting a dramatic shift towards more data and machine-driven societies, and has been added to the index as well[11]. These approaches, especially in light of COVID-19, have allowed governments to make rapid policy decisions based on real-time data and analytics. However, the most recent e-survey noted that governments continue to face challenges related to resource limitations, lack of digital infrastructure, and insufficient capacities, along with country-specific issues related to digital inclusion, privacy, and cybersecurity.

Recognizing the opportunities and limitations inherent in this type of ad-hoc, survey-based approach to digital government, the OECD developed a Digital Government Policy Framework (DGPG)[12] which is designed to identify a "mature digital government" based on six foundational principles that enable governments to design public services not merely as adaptations of existing policy tools, but as a proactive response to citizens' needs:



1. **Digital by Design** - governments leverage digital technologies to simplify procedures and create new channels of communication with all stakeholders.
2. **Data Driven** - using data as a strategic asset for improved service delivery and decision-making.
3. **Acts as a Platform** - deploying platforms to focus on user needs in public service delivery and design.
4. **User Driven** - end user's needs and conveniences shape the design of processes and inclusive mechanisms.
5. **Proactive** - anticipating user needs.

Figure 1: OECD Digital Government Policy Framework (Source: OECD)

Combined, these general and specific frameworks give a more specific shape and definition to digital government, both as it currently stands and as an aspiration across developed and less-developed countries. While these frameworks are flexible enough to be applied to almost any country context, a regional analysis and examination of facts on the ground can be used to further refine the concept of digital government, both where it currently stands and where citizens' unmet needs occur.

Latin America and Caribbean Context

Latin American and the Caribbean are challenging regions for the implementation of digital government initiatives due to the legacy of inequality, commodity boom and bust cycles, and unstable political climates. COVID has only added to these challenges, with Latin America

[11] United Nations Department of Economic and Social Affairs. (2020).
[12] OECD. (2019a).

being the hardest hit region in the world[13], and the Caribbean forced to shut down vital international tourism industries. These debilitating effects have only further highlighted the need for inclusive digital governance initiatives in a region characterized by government transactions that are difficult, slow, prone to corruption, and non-inclusive[14]. A 2017 survey highlights the continued challenge for governments in implementing digital government initiatives, but also the opportunity to implement digital transactions that are faster, cheaper to provide, and less vulnerable to corruption.

This survey found that completing a government transaction in Latin America took 5.4 hours on average in 2017, with 25% of transactions requiring three or more interactions. Twenty-nine percent of Latin Americans reported paying a bribe for a public service in the last year, with only 7% of citizens reporting that they carried out their last government transaction online. The factors identified by the report for why government transactions are so difficult included ignorance of the client experience, high regulatory complexity, lack of inter-institutional coordination, and a lack of mutual trust between governments and citizens. Finally, the report identified a lack of options to create a transaction online, lack of internet connectivity, and bad online experiences as drivers for the dearth of digital transactions.

These results are unsurprising given the current region-wide trends in digital government investment and spending. 2019 spending on ICT (Information Communications Technology, including hardware, software, and services) was 25 USD per capita in Latin America, compared to a worldwide average of 65.8 USD[15]. Moreover, 32% of this spending went towards modernizing legacy systems, with only 19% directed towards healthcare, exacerbating the stress placed on underfunded national health systems by the current pandemic.

The United Nations has identified a number of challenges to be addressed by Latin American countries:

1. **Connectivity -** In recent years, internet penetration has increased but is still unavailable for about 50 percent of households in Latin America and the Caribbean. Digital government initiatives cannot be fully realized if just one part of the population is connected.
2. **Low Use of Digital Technologies in Small and Medium-sized Companies (SMEs) -** SMEs often lack the resources to invest in digital technologies. According to the UN, *"the region lacks laws and regulations that can help create a solid institutional framework for the introduction and broad dissemination of ICT and its intensive use among commercial businesses—particularly SMEs".*
3. **Lack of Human Capital -** There are not enough qualified staff to properly help digital transformation. As an example, there are proportionally fewer engineers in Latin American and Caribbean countries compared to other countries at comparable stages of economic development.

[13] Enriquez, D., Cabal, S. R., & Centeno, M. A. (2020).
[14] Roseth, B., Reyes, A., & Santiso. (2018).
[15] Anesini, Diego. (2019).

4. **Weak Exchange of Knowledge and Digital Information Within and Between the Public and Private Sector -** Governments alone do not have enough resources (financial and human) to sustain digital government initiatives. They need to rely on the capabilities of the private sector to create successful channels to deliver e-services.
5. **Limited Inclusion -** In most Latin American and Caribbean countries, digital technology usage among vulnerable groups remains limited.

Even governments that credibly commit to digital government transformation can face significant challenges in addition to those described in the previous paragraph. Peru, which began digital government initiatives nearly 30 years ago, continues to lag behind other countries in regards to digital services penetration. According to the UN E-Government Index[16], in 2005 Peru was in 56th place but in 2016 it fell to 81st place. Only 15.1% of the procedures managed by the Peruvian Central Government can be started online and just 4% can be completed digitally. While the conclusions and relevant actions identified in the report are specific to Peru, the broader issues facing the government are broadly applicable to most governments in LAC. Additionally, the continued challenge of e-government initiatives despite longstanding national support highlights the need to accurately and comprehensively measure digital government initiatives using holistic digital government indicators. In their analysis, the OECD identified the following challenges preventing Peru from stronger digital government outcomes, including:

1. **Securing Leadership and Commitment to National Digital Government Strategies -** A lack of interest and political support for a newly-created government office, resulting in insufficient budget and personnel.
2. **Attracting Digital Talent to The Public Sector -** Attracting talent to Peru's public sector is challenging because of political instability and low wages. A possible route to remedy this would be strengthening the digital government capability of the public sector.
3. **Achieving Effective Coordination and Co-operation Among Government Agencies -** While Peru established multi sector committees on digital government, a committee that includes all digital government leaders could enhance horizontal and vertical cooperation.
4. **Having Clear Agendas with Defined Objectives -** Although the national government maintained a baseline commitment to digital government, many of the plans changed with each government and presidential administration.
5. **Linking Budgetary and Policy Decisions -** In order to move towards a long-term digital government, the budget for implementation needs to fully finance the strategy. A specially designated and non-politically volatile fund would help the government achieve this goal and ensure it remains a policy priority in successive governments.

[16] United Nations Department of Economic and Social Affairs. (2020).

Current Digital Government Indices

In terms of digital government indices, a number of different approaches have been adopted to measure the full extent of digital government progress between nations. While a majority of these focus on the European context, they are broadly applicable to the larger international global digital government prioritization and review.

The first digital government indices were created in 2001, starting with the **E-Participation Index** from the United Nations whose efforts are concentrated in promoting participation of the citizenry as the cornerstone of socially inclusive governance[17]. Its framework is based on three pillars of information, consultation and decision-making. Similarly, the European Union's **eGovernment Benchmark** focuses on public-sector supply-side digital government. This index presents the results of assessments of e-Government services in 34 EU member states, along with Iceland, Norway, Montenegro, Serbia, Switzerland, and Turkey[18]. It covers the four priority areas of the EU eGovernment Action Plan 2016-2020, which also provides insights on the current progress on the principles set forth in the Tallinn Declaration on eGovernment. Each priority area is measured by one or more indicators, specifically: user centricity; transparent government; cross-border mobility; and key enablers (including pre-conditions for e-Government service delivery such as electronic identification). The results of the 2018 survey showed strong progress in user-centricity and mobile-friendliness, although more efforts are required in cross-border mobility.

In 2002 the World Economic Forum launched the **Network Readiness Index** to reflect how technology and people need to be integrated within an effective governance structure in order to have the right impact on our economy, society and the environment[19]. In 2020 the NRI renewed its methodological focus and is now centered on digital transformation. A year after the launch of the NRI, the **UN E-Government Survey** was published by the UN Department of Economic and Social Affairs (UN DESA). This Index looks at how digital government can facilitate integrated policies and services across 193 UN member states. The survey supports countries' efforts to provide effective, accountable and inclusive digital services to all and to bridge the digital divide.[20] In 2004 the World Economic Forum also created the **Global Competitiveness Index,** whose aim is to evaluate the economic competitiveness of a large sample of countries[21]. In 2018 this measurement tool was transformed into the new Global Competitiveness Index 4.0, a much-needed new economic compass with focus on the fourth industrial revolution and globalization. In 2005, the Institute of Digital Government of WASEDA University created the **WASEDA Digital Government Index** that showcases development strategies, policy implementation, and publishing of online services by national governments.

[17] United Nations E-Government. (2020).
[18] European Commission. (2018).
[19] Polutans Institute (2020).
[20] United Nations E-Government. (2020).
[21] World Economic Forum. (2004).

The next generation of indices began in 2014 with the **European Commission's Digital Economy and Society Index (DESI)[22],** which summarizes relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness using 5 main criteria: broadband connectivity; human capital and digital skills; use of internet services and online activities; integration of digital technology by enterprise; and digital public services, as measured by the quality and usage rates for egovernment initiatives. When this framework was expanded to include an additional 17 non-EU countries, the **International DESI (I-DESI)** found that South Korea was the leading non-EU country, and that while European countries perform well compared to their peers in term of skills and internet usage amount the broader public, they tend to lag other countries in terms of digital public services. Finally, a subset **Women in Digital (WiD) Scoreboard** analyzed women's inclusion in digital jobs, careers, and entrepreneurship. In 2019 the OECD launched the **Digital Government Index,** an effort to translate the OECD Digital Government Policy Framework into a measurement tool to assess the implementation of the OECD Recommendation on Digital Government Strategies and benchmark the progress of digital government reforms across OECD Member and key partner countries[23].

While these previous frameworks focused on the European and occasionally Asian contexts, the **GovTech Index 2020 of Iberoamerica[24]** expanded the geographical focus to Central and South America along with Spain and Portugal, a key point of differentiation compared to other European-centric development indicators. It also shifts the scope of analysis to GovTech, which is defined as "the ecosystem in which governments cooperate with startups, SMEs and other actors that use data intelligence, digital technologies, and innovative methodologies to provide products and services to solve public problems," providing substantial cost savings. The index consists of three main pillars: start up, government, and procurement. This updated framework, which links more established digital governments in Europe with rapidly maturing initiatives in other regions while expanding the scope of analysis to private sector actors, provides a glimpse of what an integrated e-Government measurement platform for LAC might look like. However, significantly more work must be done to gain a systematized view of what metrics currently exist, where they fall short, and how they can be improved.

Rationale

The Innovation in Citizen Services Division of the IDB supports governments in LAC in their digital transformation efforts. This includes conducting measurement exercises for diagnostics (e.g. to identify priority reforms within one country), project design (e.g. baseline and target indicators), and motivational purposes (e.g. regional/global comparisons that get policymakers' attention). However, IDB does not have a complete view of all the available frameworks and indicators that are currently measuring digital government in the different regions of the world.

A systematized map of measurement tools with analytical recommendations will allow

[22] Digital Public Services | Shaping Europe's Digital Future. (2020).
[23] OECD. (2019).
[24] Zapata, E., Stirling, R., Pasquarelli, W., & Shearer, E. (2020).

the IDB to create guidelines and better assess LAC countries on its digitization efforts. By putting the needs of citizens at the center of government actions, the IDB supports national government efforts to reform civil services, improve the ability of executive branches to implement and monitor programs, and use technologies to make service delivery more effective and transparent, while ensuring data and statistics underpin all government programs[25]. Therefore, as governments of the LAC region (and the world) increasingly turn to digital transformation as their answer to business continuity during the pandemic and a key piece of economic reactivation efforts, the digital government agenda will cease to be a niche area of public policy. In a world that must adapt to the new dynamics of the digital economy and exponential data growth, governments must become nimbler and adopt technological innovations and digital solutions that empower both public officials and citizens[26]

IV. Objectives

The project has four objectives:

1. Create an inventory of digital government frameworks (indicators and methodology).
2. Categorize the existing digital government indicators (what are they measuring, how are they measured).
3. Evaluate the existing digital government indicators (what are their strengths and weaknesses).
4. Provide recommendations to improve the digital government indicators, its methodology, and propose new indicators.

V. Conceptual Review

In order to understand the dimensions of digital government and its application in a Latin American and Caribbean context, several sources were consulted and reviewed, including experts in digital government and documents from the OECD, IDB, the Performance Institute, and national governments. This review allowed us to formulate a definition of digital government and its main pillars, and analyze its correlation with the policy life cycle. Subsequently, a theory of action was created to envision the public sector goals and the proposed actions aimed at achieving a better provision of innovative public digital services. Finally, we define the types of digital public services offered by governments and a glossary of terms to provide a common framework on the definitions that will be used across this document.

[25] Inter-American Development Bank. (2020b).
[26] Inter-American Development Bank. (2020b).

A. Expert Interviews Summary and Key Points

To identify relevant measurement frameworks and understand the context, limitations, and implications of its adaptability in Latin America and the Caribbean, seven interviews were conducted with experts in the area. The experts were members of academia, e-Government advisors, and multilateral organization officials.

Across all interviews, the experts commented that existing indicators are too linear and input/output focused, and international rankings and comparisons are not helpful enough to establish which changes must be made within each country to improve their digital public services offer and delivery. The summary and key points of each interview are presented as follows:

Table 1: Experts Interviewed

1. Morten Meyerhoff Nielsen, eGov Advisor
    a. Existing indicators fall short in that they assume steps happen sequentially (rather than in parallel across front and back office), attempt to measure too much, and chase new-emerging concepts/ technology (blockchain, etc). They need to have an outcomes/output focus, and have more granular KPIs which can be aggregated and disaggregated horizontally and vertically e.g., across levels of government and service delivery channels.
    b. Preconditions should take into account the actual use/uptake of comparable private sector services (access, value, skills all demonstrated through, for example, use of eBanking). The benchmark should be between equivalent internal online public services rather than comparisons between countries.
    c. User satisfaction should be included in the measurement framework not only as a general inclusion measurement but also as a proxy for service integration across service channels, and can serve as a moving target for performance.
2. Elsa Estevez, Adjunct Professor at National University of the South
    a. More focus on regional / country specific indicators. Each country or region has its own needs that are not necessarily reflected in the available measurement frameworks.
    b. Need to look at indicators focused on the demand side of the services (indicator does not show how citizens actually benefit from services) and outcomes (impacts).
    c. Four important categories should be included in relevant measurement frameworks: Infrastructure, Human Capital, Services (health, education, etc), Government Capacity (institutions, legal and regulatory framework).
    d. Models she recommends to explore: WASEDA, UN eGovernment development index.
3. Yolanda Martinez, IDB Representative in Chile
    a. Increase collaboration between international organizations that are measuring digital government. How do we identify common data and common indicators?
    b. Provide national and local levels of measurements that can generate a

dialogue with their own internal digital strategies.

c. Understand the context of each Latin American country, not all governments have a robust modernization team that can keep up with measurement tools while implementing digital government projects.
d. The most useful measurement tools are the ones that can compare through time, like the UN Survey that started in 2010.
e. The results of measurements should be useful for government officials to convince decision-makers to invest in digital government projects. Especially during Covid.

4. Tomasz Janowski, Head of the Department of Applied Informatics in Management at the Faculty of Economics and Management, Gdańsk University of Technology, Poland;
    a. Regarding measures of outcomes, most initiatives pay limited attention to the effects of digital transformation. The actual value added is in changing the focus of digital government measurement from inputs, process and outputs, to outcomes and impact. For instance, Network Readiness Index (NRI) measures user satisfaction, but cares little about the impact on policy and governance.
    b. Tomasz considers that one global model that fits all is not very useful for countries. They are useful for public relations and for political purposes, but not for improving in their outcomes. These types of models give support to a dangerous idea that countries can compensate for lack of progress in their governance systems by simply digitalizing them.
    c. Digital Government measurement should transition from worldwide indicators to variable or country-specific indicators that are not necessarily comparable in an aggregate level across countries. Every measurement instrument should track the value chain (inputs, actions, outputs), but it should also allow us to plug in different objectives into the measurement depending on the policy priorities and on the strategy that the government is trying to pursue (i.e., effectiveness, transparency, lack of corruption, rule of law, accountability).
    d. Models he recommends to explore:
        i. UN e-Government Survey: Look how the narrative is diverting from what they are measuring since 2003. What they are measuring is the same as in 2003, and what they are writing about is totally different.
        ii. Network Readiness Index (World Economic Forum) innovative measuring user satisfaction.

5. Benjamin Roseth, Modernization of the State Specialist at the IDB
    a. Existing indicators are often incomplete, and produce implausible responses (Colombia ranked high in the OECD DGI), and we lack a complete understanding of what is being measured and how across indices.
    b. Some indicators excel in some areas but not others. The EU Government Benchmark provides a good approach in some aspects, but we need to define what we mean by digital government, including key categories such as infrastructure connectivity, and user-satisfaction (although the latter is often has reduced comparability due to cross-cultural differences in user satisfaction.

6. Juan Carlos Salazar and Juan Pablo Noriega. Digital Government, Colombia
    a. Digital Government in Colombia has two main elements: An e-government

policy from 2015 with ICT for the state and for society. The second element is the implementation of the policy, where indices are used to identify best practices from other countries and to integrate useful indicators for their own assessment.

b. Some critical observations are that the different indices are that there is no index that balances national and territorial level, some methodologies are not accessible, and the indices are normally published every two years so we lack real-time comparison, and there is a major challenge in evaluating impact.

Source: SIPA team's analysis. Unless otherwise indicated, information contained in subsequent tables is also based on the team's analysis.

B. Towards An Understanding of Digital Government

There are several approaches to defining digital government, and within similar understandings the strategies from country to country also vary. The Mexican government provides a definition for e-Governments as all those activities based on modern computer technologies that the state develops to increase the efficiency of public management, improve the services offered to citizens and provide government actions with transparency[27]. These activities cover internal aspects of the management of public bodies, the massive dissemination of information on government actions, as well as the provision of more and better services to those administered. For the OECD digital government is defined as "the use of digital technologies, as an integrated part of governments' modernisation strategies, to create public value. It relies on a digital government ecosystem composed of government actors, non-governmental organisations, businesses, citizens' associations, and individuals which supports the production of and access to data, services, and content through interactions with the government"[28]. The Performance Institute defines citizen-centered e-Government as initiatives strategically employing information technology to provide government products or services to intended users resulting in enhanced value. Enhanced value is characterized as improved cost efficiency, enhanced quality and availability of product and/or services, shorter timeliness, better accessibility, and greater mission achievement[29]. The IDB considers digital transformation of government as "the change of corporate culture, organizational model, methods and processes that take advantage of information and communication technologies (ICT) **so that public institutions meet the needs of citizens and companies in an efficient, transparent and safe way."**[30]

For the purposes of our analysis, and for a coherent definition of digital government to use in our examination of completeness of index evaluations of digital government, we will define digital government as **the use and promotion of digital technology by governments to increase the transparency, efficiency, and accessibility of government services so that public institutions can meet the evolving needs of citizens and companies while enhancing inclusion of the most vulnerable populations.** This process of transformation can

[27] Mexican Government. (2021).
[28] OECD. (2016).
[29] The Performance Institute. (2002, p. 14)
[30] Internal IDB correspondence. (2021).

be examined across five key pillars: **preconditions (infrastructure and digital literacy), processes, organizational models, needs of citizens, and culture.** These pillars are not exclusive categories, rather they help draw out the features of successful digital government implementation across sometimes overlapping pillars. The below table provides further explanation and features of each pillar:

Table 2: Pillars of digital government

Pillar	Features
Preconditions: Infrastructure and Digital Literacy	Information and communication technology (ICT)-related resources (such as technical infrastructure) and instruments (such as legal framework and budgetary authority for digitization initiatives) that generate the conditions for digital governments, as well as digital talent within government and the ability of the broader public to take up digital services.
Processes	Processes (such as mandated user satisfaction review and cross-department technical standards) that improve the efficiency of public management, bring technology to the forefront of government planning, and increase transparency.
Organizational Models	Digital management, unified systems, and technological improvements to existing services that may increase efficiency and decrease costs of public programs, thereby enabling value creation for public and private actors.
Citizen and Businesses Needs	Initiatives that strategically employ information technology resulting in enhanced value for citizens and businesses. Enhanced value is characterized as: improved cost efficiencies, quality and availability of product and/or service, shorter timeliness, better accessibility, a greater mission achievement, and tools to receive feedback to improve public services.
Culture	The generation of an organizational culture within public services, defined digital government strategies, and specific internal determinations that promote the transversality of digital services and shape an outcome-oriented, user-first mindset.

These pillars roughly overlap with the generally accepted components of policy life cycle, which include Strategy and Legal Framework, Institutional Capacity and Governance, Implementation, Use, and Results/Impact. The first pillars such as Preconditions and Processes tend to feature strongly in the earlier phases of policy life-cycle, such as Strategy and Institutional Capacity. Later pillars are more holistic (but also more difficult to measure), with the pillar of Citizen and Business Needs including aspects of strategy along with Implementation, Use, and Impact:

Table 3: Pillars of digital government (Orange=Overlap)					
Pillars / Policy Cycle	Strategy and Legal Framework	Institutional Capacity and Governance	Implement ation	Use	Results (or Impact)
Preconditions: Infrastructure and Digital Literacy					
Processes					
Organizational Models					
Citizens and Businesses Needs					
Culture					

C. Theory of Action[31] for Digital Government

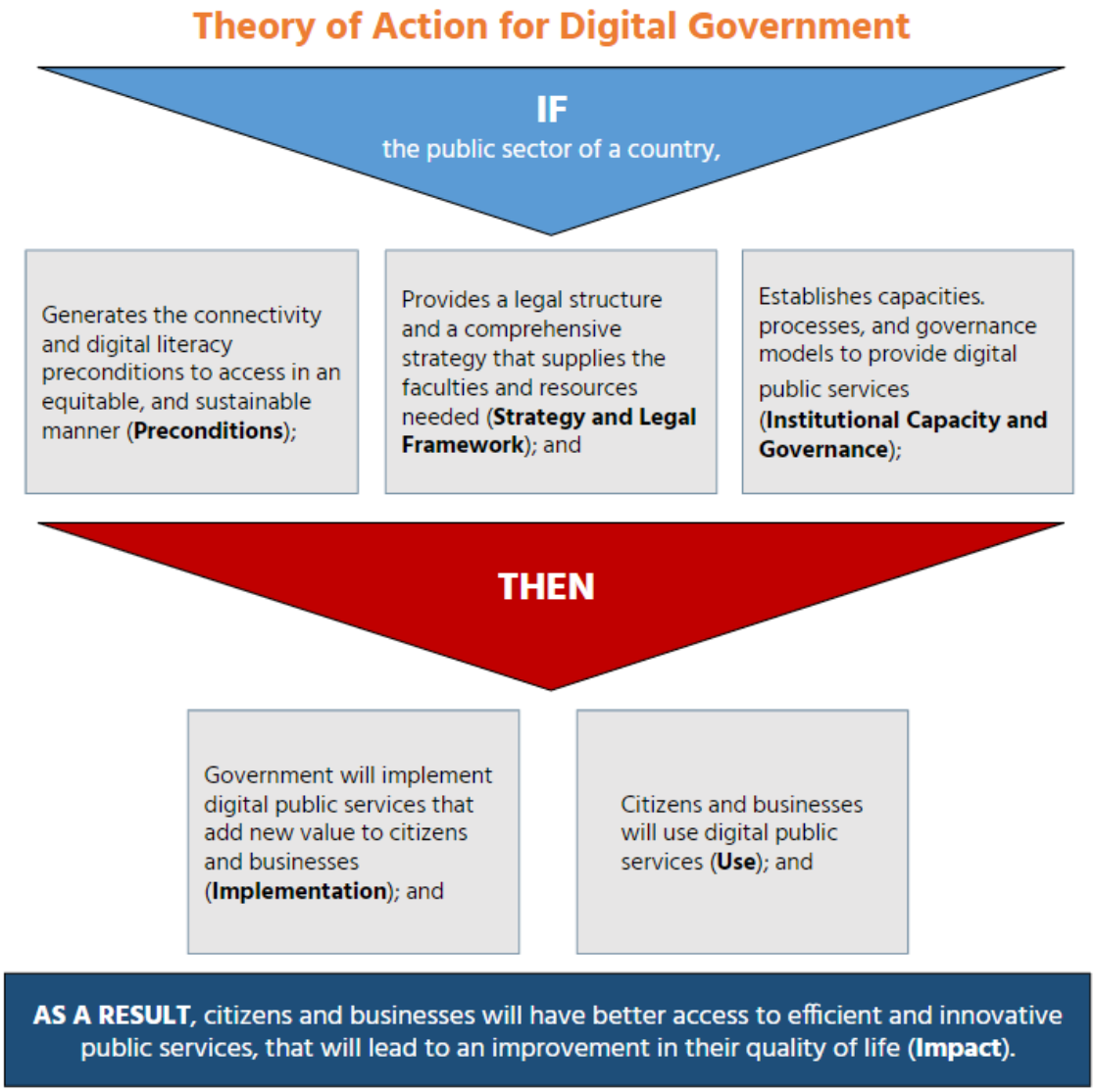
Given these broad overlaps and measurement difficulties, to perform the evaluation of digital government indices we created a Theory of Action for Digital Government. A theory of action presents an organization's goals and the proposed actions aimed at achieving these outcomes. It articulates both "means" and "ends" in the form of concrete strategies that enable an organization (or in this case, the public sector of a country) to achieve its macro-level goals. In other words, it allows an organization to move from its current state to a desired or envisioned future. An effective theory of action:

- Includes measurable actions and outcomes;
- Clarifies the causal relationship between actions and outcomes;
- Is relatively stable but subject to modification through an iterative process; and
- Clearly communicates the importance of the work being undertaken.

The Theory of Action for Digital Government will be composed of six components that will represent an "If", "Then", or "As a result" statement: **Preconditions**, **Strategy and Legal Framework**, **Institutional Capacity and Governance**, **Implementation**, **Use, and Impact.**

[31] University of Washington (2014).

Figure 2: Theory of Action for Digital Government



While no measurement framework may be able to measure the six components of the digital government policy cycle, stronger frameworks will include a greater emphasis on later components, as those more directly translate into end-user experiences and improvements despite presenting greater measurement difficulties.

D. Types of Digital Public Services According to Digital Government Phases

A public service is a service which is provided by the government to citizens[32] within its jurisdiction, either directly (through the public sector) or by financing private provision of services.[33] These services can be further divided into core services whose use is required by citizens (such as construction permits and drivers' licenses), and value-add services (including non-compulsory civic attendance and quality of life improvements) that are not legally mandated but improve citizens' quality of life.[34] Services such as voting may be core or value-add depending on local legislation which may make some services compulsory or optional. We can classify the different types of digital public services, including both core and value-add, using the following phases:

Table 4: Digital Government Phases

Digital Government Phases[35]	Description	Examples of Digital Public Services
Presence	This stage is classified by a simple information-providing Web site of a passive nature.	- Informational websites - Tourist and recreational information
Interaction	The interaction stage offers simple interactions between government and citizens (G2C), government to business (G2B), or government agency to government agency (G2G).	- Processes and platforms of coordination between government agencies - Downloaded forms for social benefits - Tax filing
Transaction	Users can actually pay for services or conduct financial transactions online.	- License renewals online - Paying taxes or fees - Submitting bids for procurement contracts - Online appointments for health services
Transformation	The highest stage, most closely aligned with the concept of governance, involves a reinvention of how government functions and services are conceived and organized.	- Unified systems or one-stop window - New data structures - New applications (online healthcare attention, online public education)

Source: SIPA team's analysis, based on Gartner Research (2017)

[32] Citizens defined as both individuals living within and businesses operating or based in a governments' jurisdiction.
[33] Science Daily. (2020).
[34] Meyerhoff, Nielsen and Krimmer. (2015).
[35] Isaac. (2007).

E. Addressing Tensions for a Measurement Tool of Digital Government

As mentioned in several expert interviews, and analyzed across indices, designing a tool to measure digital government comes with several technical and political decisions. Tradeoffs must be made in order to adapt to contextual and structural challenges. The purpose of this project is to recommend an effective, yet applicable measurement framework to evaluate digital government in the LAC region. To do so we will address four different tensions identified through our research that should be taken into account for any digital government measurement framework. With a multistrategy approach, decision-makers will be able to consider different scenarios for Latin America and base the decision on both quantitative and qualitative analysis.

Generation of locally based indicators versus cross-country comparison:

A primary tension noted through the experts' conclusions is **the challenge of promoting a focus on regional / country specific indicators.** Each country or region has its own needs that are not necessarily reflected in the available measurement frameworks. The expectations when conducting a type of comparative research in the e-government area is to gather data about main government organizational processes within different contexts. However, collecting data from multiple countries for the purpose of comparative research may involve different types of challenges that may lead to unreliable data, such as the nonequivalence of key terms or concepts and the comparability of research instruments[36]. On the other hand, the advantages of cross-country comparisons for digital government are widely relevant for international development. It leads to deeper understanding of the most critical issues that are of central concern in different countries, it helps to sharpen the focus of analysis of the subject under study by suggesting new perspectives, and it leads to the identification of gaps in knowledge[37]. This particular tension is addressed by countries with different levels, using local and national indicators in their own measurement tools.

Measuring processes versus outcomes and impacts:

Regarding measures of outcomes, most initiatives pay limited attention to the effects of digital transformation. The actual value added is in complementing the focus **of digital government measurement from inputs, process and outputs, to outcomes and impact**. For instance, Network Readiness Index (NRI) measures user satisfaction, but cares little about the impact on policy and governance. According to Aaron Maniam, the Deputy Secretary in the Singapore Government, indices assessing e-government are flawed and insufficient because they do not include impacts. They focus on numerical measures of the *presence* of digital technology in government (output measures), but do not evaluate the *use and quality* of digitalised government (outcome/impact measures)[38]. Also, measurement of the effectiveness of e-Government focuses primarily on the front-office, primarily counting the number of services offered and not on the back-office processes[39]. This tension is addressed in the

[36] Pardo, Guerrero, and Gharawi. (2009).
[37] Pardo, Guerrero, and Gharawi. (2009).
[38] Maniam, A. (2020)
[39] Isaac. (2007)

recommendations of this project, providing novel indicators that measure impact within a feasible framework.

Data comparable over time vs adaptability:

Some indices have the advantage of having measured all United Nations recognized countries for many years, which gives the possibility to have a **credible comparison** over time. However, indicators are also adapting to **new technologies of measurement** and data. Whatever the data collection methods, e-Government indicators should be consistent, thereby enabling reliable evidence of change over time. The longer-term challenge remains how should indicators evolve given the technological change without losing the capacity to track that change over time[40]. This tension is addressed in the evaluation section by analyzing each index in terms of reliability of data and updating criteria.

Effectiveness versus feasibility:

The main objective of performance measurement in public organizations is to support better decision-making by management, leading to improved outcome for the community, and to meet external accountability requirements[41]. According to Willy Isaac, a PhD on Information Systems, many measurement instruments take a simplistic view and focus on measuring what is easy to measure[42]. It is extremely important that the measures of performance used by a public organization be created with as much input as feasible. However, it is also important to **understand the context** of each Latin American country, as not all governments have a robust modernization team that can keep up with measurement tools while implementing core or value-add digital government services. This tension is addressed in the evaluation section by analyzing each indicator in terms of relevance to digital government.

F. Glossary of Concepts

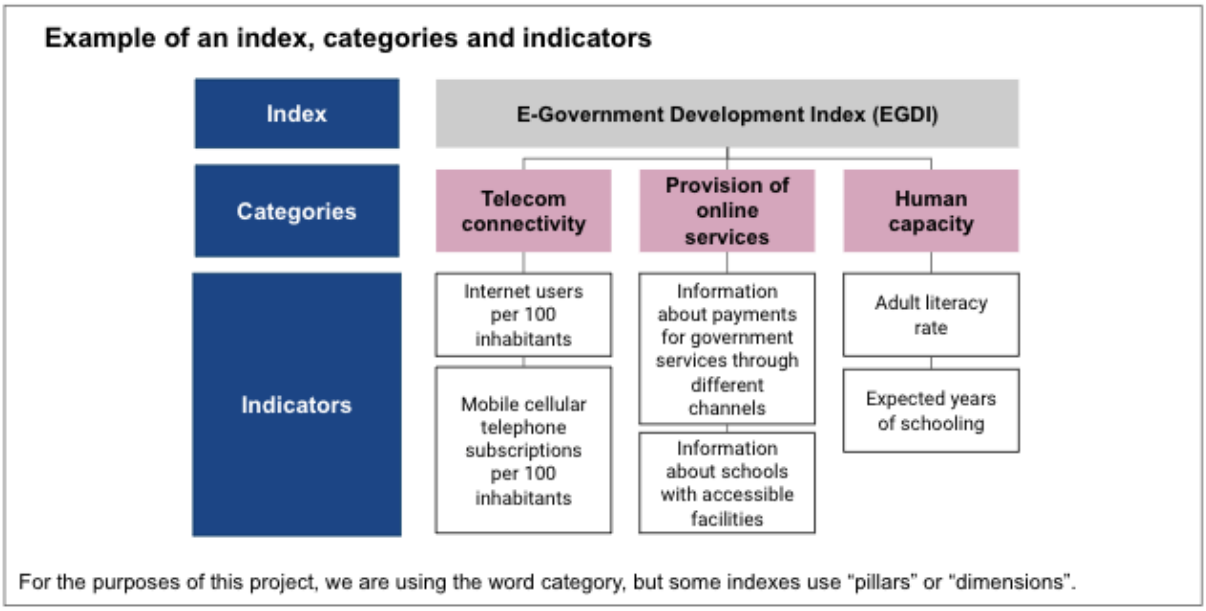
A glossary is included below in order to highlight important terms and provide a common analytical framework:

- **Indicator:** An indicator is a measurement or value that gives the user an idea of the underlying concept of interest[43]. For our purposes, we will define indicators as the lowest level of measurement.
- **Category:** Generic term for items at any level within a classification, typically tabulation categories, sections, subsections, divisions, subdivisions, groups, subgroups, classes and subclasses.[44] Our analysis defines categories as groupings of indicators according to a common theme.

[40] Partnership on measuring ICT for development. (2012).
[41] Isaac. (2007).
[42] Isaac (2007)
[43] Collins Dictionary. (2020).
[44] OECD. (2020).

- **Index:** A compendium of weighted indicators with a common object or measurement purpose. Our analysis looks at ten major e-Government indices.
- **Criteria:** A standard or principle for judging, evaluating, or selecting something. Criteria are the ideals or requirements on which a judgment, evaluation, or selection is based.[45]
- **Measurement Framework:** A systematic evaluation of relevant outputs and outcomes within a coherent intellectual framework. For our purposes, it can include e-Government indices along with other qualitative methods of evaluation.

Figure 3: Glossary Orientation



VI. Methodology

In order to complete all project objectives, the team began with the creation of an analytical framework, and through a literature review and several experts interviews this framework was conceptualized into our own theory of action for digital government. This theory of action was the transversal pillar to evaluate and analyze all indices. It is based on 6 different components: **Preconditions**, **Strategy and Legal Framework**, **Institutional Capacity and Governance**, **Implementation**, **Use**, and **Impact**. The methodology to perform the new digital government measurement framework consists of the following four stages:

A. Existing e-Government Index Review
B. Quantitative Index Review and Scoring
C. Analysis of Evaluation and Areas of Improvement of Indicators and Indices
D. Build a New Measurement Framework: Recommend New or Modified Ways to Better Measure Digital Government

[45] Dictionary. (2020).

VII. Existing e-Government Index Review

From our literature review and experts interviews, we selected nine indices compiled by seven different organizations. Each index was reviewed to identify and systematize key information such as countries included, categories, indicators, and criticism, which is needed to proceed to evaluate them and provide recommendations.

Table 5: List of indices Reviewed and Managing Organization
1. E-Government Development Index (EGDI) - UN E-Government Survey
2. Digital Economy and Society Index (DESI) - European Commission
3. WASEDA International Digital Governments Ranking Report
4. E-Participation Index (EPI) - UN E-Government Survey
5. EU Government Benchmark - European Commission
6. GovTech Index of Iberoamerica - CAF
7. Network Readiness Index (NRI) - World Economic Forum
8. The Global Competitiveness Index - World Economic Forum
9. Digital Government Index (DGI) - OECD

Indices Descriptive Tables

1: E-Government Development Index (EGDI) - UN E-Government Survey[46]	
Institution in charge	United Nations
Year of first report - Year of last Report	2003-2020
Periodicity	Biennial
Number of countries included in the latest report	193 countries. All the Member States of the United Nations.
Number of LAC countries included	33 countries. Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.
Number of categories	3
Number of indicators	155
Objective	The E-Government Development Index (EGDI) is used to measure the readiness and capacity of national institutions to use ICTs to deliver public services.
Methodology	The EGDI is an average of three normalized scores on three dimensions of e-government: (1) scope and quality of online services (Online Service Index, OSI), (2) development status of telecommunication infrastructure (Telecommunication Infrastructure Index, TII), and (3) inherent human capital (Human Capital Index, HCI). The three dimensions have the same weight. The values for the OSI are obtained from the Online Service Questionnaire (148 questions). Each question calls for a binary response. A total of 212 volunteer researchers along with 32 UN members are in charge of completing the survey by assessing each country's national websites.
Categories	Online Service Index (33.3%), Telecommunication Infrastructure Index (33.3%) and Human Capital Index (33.3%).
Data Sources	Primary sources: UN-E Government Survey (Online Service Questionnaire). Secondary sources: The International Telecommunication Union, UNDP, UNESCO-UIS, UN-E Government Survey.

[46] United Nations. (2020).

2: Digital Economy and Society Index (DESI)[47]	
Institution in charge	European Commission
Year of first report - Year of last Report	2014-2020
Periodicity	Annual
Number of countries included in the latest report	29 countries. 28 European Union Member States and the United Kingdom.
Number of LAC countries included	0
Number of categories	5
Number of indicators	37
Objective	The Digital Economy and Society Index (DESI) monitors Europe's overall digital performance and tracks the progress of EU countries in their digital competitiveness.
Methodology	DESI overall index is a percentage score, calculated as the weighted average of the five main DESI dimensions. They use Eurostat surveys and the European Data Portal to gather the data used to calculate the indicators.
Categories	Broadband Connectivity (25%), Human Capital and Digital Skills (25%), Use of Internet and Online Activities (15%), Integration of Digital Technology (20%), and Digital Public Services (15%).
Data Sources	Primary sources: Eurostat Community survey on ICT usage in Households and by Individual, Eurostat Labour force survey, Eurostat ICT Enterprises survey. Secondary Sources: eGovernment Benchmarking Report, European Data Portal.

[47] European Commission. (2020).

3: WASEDA-IAC International Digital Government Rankings[48]	
Institution in charge	Waseda University Institute of Digital Government
Year of first report - Year of last Report	2005 - 2019/2020
Periodicity	Annual (Except 2019/2020)
Number of countries included in the latest report	64 Countries around the world (down from 65 in previous survey due to resource constraints). Sample of OECD, EU, Africa, Middle East, and CIS countries. Planned expansion in coming years.
Number of LAC countries included	8 countries. Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, Uruguay.
Number of categories	9
Number of indicators	35
Objective	A world-wide overview of digital government at the national level, showing development strategies, policy implementation, and published online services.
Methodology	A ranking survey based on questionnaires filled out by government officers who work in a ministry concerning digital government and academic experts. Each category is assigned a raw score and then normalized on a 0-100 scale. Weightings for each category are provided below, although no information is available on how 35 indicators are calculated, or on how the indicator scores determine category scores.
Categories	Network Infrastructure (11.1%), Management Optimization (11.1%), Online Services (11.1%), National Portal (11.1%), Government CIO (11.1%), Digital Government Promotion (11.1%), E-Participation (11.1%), Open Government Data (11.1%), Cybersecurity (11.1%).
Data Sources	Primary Source: Proprietary ranking survey. Secondary Source: National-level data used to verify responses to survey and for quality control. No publicly available information on respondents, how they are selected, or on secondary data used.

[48] WASEDA. (2020).

4: E-Participation Index[49]	
Institution in charge	United Nations
Year of first report - Year of last Report	2001-2020
Periodicity	Biennial
Number of countries included in the latest report	193. All United Nations member states.
Number of LAC countries included	33 countries. Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.
Number of categories	3
Number of indicators	14
Objective	The objective of this measure is to offer insight into how different countries are using online tools in promoting interaction between the government and its people, as well as among the people, for the benefit of all.
Methodology	The E-Participation Index (EPI) is a complementary Index of the E-Government Development Index (EGDI), which uses EGDI's methodology. This index is based on a comprehensive accessibility information management of the online presence of all 193 Member States, which assesses national websites and how e-government policies and strategies are applied in general and in specific sectors for delivery of essential services. The results of the assessment are tabulated and combined with a set of indicators embodying a country's capacity to participate in the information society. Its value is calculated for every country by adding the values for each of the selected features and dividing the total by the maximum possible value for normalization. The criteria are periodically re-evaluated, although specific details are not readily available. This index is based on binary responses, with total scores based on a 0-1 scale.
Categories	E-information sharing (33.3%), E-consultation (33.3%), and E-decision making (33.3%).
Data Sources	Primary sources: UN-E Government Survey (Online Service Questionnaire). Secondary sources: The International Telecommunication Union, UNDP, UNESCO-UIS, UN-E Government Survey.

[49] United Nations.(2020).

5: EU Government Benchmark[50]	
Institution in charge	European Commission
Year of first report - Year of last Report	2001-2020
Periodicity	Annual
Number of countries included in the latest report	34 countries. 28 European Union Member States, Iceland, Norway, Montenegro, the Republic of Serbia, Switzerland, and Turkey.
Number of LAC countries included	0
Number of categories	4
Number of indicators	14
Objective	Help ensure the provision of efficient online public services in an increasingly digital world and, more importantly, their accessibility for all citizens of the EU28+.
Methodology	Performance of online public services is evaluated against four categories that give the eGovernment performance of a country, from 0% to 100%. The current eGovernment Benchmark uses the Mystery Shopping[51] method, in which citizens are trained to evaluate services using a questionnaire that is predefined in conjunction with the countries' representatives. The categories are assessed on the basis of eight life events that represent common public services that citizens or businesses will go through (Businesses: BusinessStart-Up, Regular business operations; Citizens: Losing and finding a job, Studying, Family, Starting a small claims procedure, Owning and driving a car, Moving).
Categories	User centricity (25%), Government transparency (25%), Cross-border mobility (25%), Key enablers (25%).
Data Sources	Primary Sources: Mystery shopping questionnaires.

[50] European Commission. (2020).

[51] The Mystery Shopper's job is to act as a prospective user while following a detailed, objective and standardised evaluation checklist provided by the European Commission. They apply Mystery Shopping consistently for all top-level benchmarks under review, except for the assessments of Mobile Friendliness and Cybersecurity which they evaluate using automated tools. The representatives are involved in the complete, end-to-end evaluation process; from approving which websites should be studied and identifying key characteristics of services under assessment, to validating the findings and collaborating with relevant public entities and correcting inaccurate findings.

6: GovTech from Iberoamerica[52]	
Institution in charge	CAF
Year of first report - Year of last Report	2020 - 2020
Periodicity	Yearly
Number of countries included in the latest report	16 countries. Spain, Portugal, Chile, Brasil, Mexico, Uruguay, Colombia, Argentina, Costa Rica, Peru, Panama, Dominican Republic, Bolivia, Peru, Paraguay and Venezuela.
Number of LAC countries included	14 countries. Chile, Brasil, Mexico, Uruguay, Colombia, Argentina, Costa Rica, Peru, Panama, Dominican Republic, Bolivia, Peru, Paraguay and Venezuela.
Number of categories	7
Number of indicators	28
Objective	Promote the use of data and digital technologies as enablers of effectiveness, efficiency, and transparency in the provision of public services.
Methodology	The weight of the dimensions and indicators included in the index were validated with digital government experts from different countries. . To calculate the overall scores for each country, each indicator was normalized to give a score between 0 and 1.
Categories	Innovation environment (23%), digital environment (5%), industry environment (5%), policy environment (26%), digital government (7%), procurement frameworks (19%), and procurement culture (15%).
Data Sources	Secondary sources: WEF Network Readiness Index, WEF Global Competitiveness Index, World Bank World Governance Indicators, and desk research.

[52] CAF. (2020).

7: Network Readiness Index (NRI)	
Institution in charge	World Economic Forum
Year of first report - Year of last Report	2002 - 2020
Periodicity	Yearly
Number of countries included in the latest report	134 countries. Economies that collectively account for almost 98 percent of global gross domestic product (GDP).
Number of LAC countries included	17 countries. Argentina, Brasil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador,Guatemala, Honduras, Jamaica, El Salvador, Mexico, Trinidad and Tobago, Panama, Paraguay, Peru, Venezuela.
Number of categories	4
Number of indicators	60
Objective	NRI covers issues ranging from future technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) to the role of the digital economy in reaching the Sustainable Development Goals (SDGs).
Methodology	The computation of the NRI is based on successive aggregations of scores, from the indicator level (i.e., the most disaggregated level) to the overall NRI score. In general, the unweighted arithmetic mean has been used to aggregate (i) individual indicators within each sub-pillar, (ii) sub-pillars within each pillar, and (iii) the pillars comprising the overall index.
Categories	Technology (25%), Impact (25%), People (25%), and Governance (25%).
Data Sources	Secondary sources: International Telecommunication Union, The GSMA Mobile Connectivity Index, Trade in Commercial Services database, World Economic Forum, Executive Opinion Survey, UNESCO Institute for Statistics, World Bank, World Development Indicators, and World Health Organization, and Global Health Observatory (GHO) database.

8: The Global Competitiveness Index	
Institution in charge	World Economic Forum
Year of first report - Year of last Report	2004-2019
Periodicity	Annual
Number of countries included in the latest report	141
Number of LAC countries included	21 countries. Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Haiti, Jamaica, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Trinidad and Tobago, Uruguay, Venezuela.
Number of categories	1[53]
Number of indicators	5
Objective	Provide a detailed map of the factors and attributes that drive productivity, growth and human development.
Methodology	The computation of the GCI is based on successive aggregations of scores, from the indicator level (the most disaggregated level) to the overall GCI score (the highest level). At every aggregation level, each aggregated measure is computed by taking the average (i.e. arithmetic mean) of the scores of its components, with a few exceptions. The overall GCI score is the average of the scores of the 12 pillars.
Categories	The Global Competitiveness Index consists of twelve pillars[54] (pillars are equivalent to categories) and one of those is "ICT adoption" which is comparable to the "Infrastructure" category of the other indices. Each pillar weights 8.3%.
Data sources	Secondary sources (only for the ICT Adoption Pillar): International Telecommunication Union.

[53] Only one of the twelve pillars of the Global Competitiveness Index is related to Digital Government (ICT Adoption).

[54] Institutions, Infrastructure, ICT Adoption, Macroeconomic Stability, Health, Skills, Product Market, Labour Market, Financial System, Market Size, Business dynamism, Innovation capability.

9: Digital Government Index (DGI)[55]	
Institution in charge	OECD (Organisation for Economic Co-operation and Development)
Year of first report - Year of last Report	2019-2019
Periodicity	TBD
Number of countries included in the latest report	33 countries. 29 OECD Members and 4 Partner Countries.
Number of LAC countries included	6 countries. Argentina, Brazil, Chile, Colombia, Panama, Uruguay.
Number of categories	10 (6 Dimensions + 4 Transversal Facets)
Number of indicators	75
Objective	Measuring the maturity level of digital government strategies in OECD member and partner countries, and assessing governments' strategic approaches in the use of data and digital technologies.
Methodology	Survey composed of 94 questions, responded to by high-level digital government officials, applying to the central/federal level of government and covering all central/federal ministries and agencies. Responses are recorded with a maximum value of 1 for best practices. Each question is assigned to one of six dimensions and one of four transversal facets. The dimension score is defined as the average of all question scores assigned to each dimension, with the main composite score calculated based on the average of all dimensions (regardless of size of each dimension). Transversal facets are only used for qualitative purposes and do not factor into scoring.
Categories	6 Dimensions: Digital by design (16.7%), Data-driven public sector (16.7%), Government as a platform (16.7%), Open by default (16.7%), User-driven (16.7%), Proactiveness (16.7%); and 4 transversal facets: Strategic approach (0%), Policy levers (0%), Implementation (0%), Monitoring (0%).
Data Sources	Primary Source: OECD Survey on Digital Government 1.0. Detailed survey questions, responses, and assignments to each dimension are not publicly available.

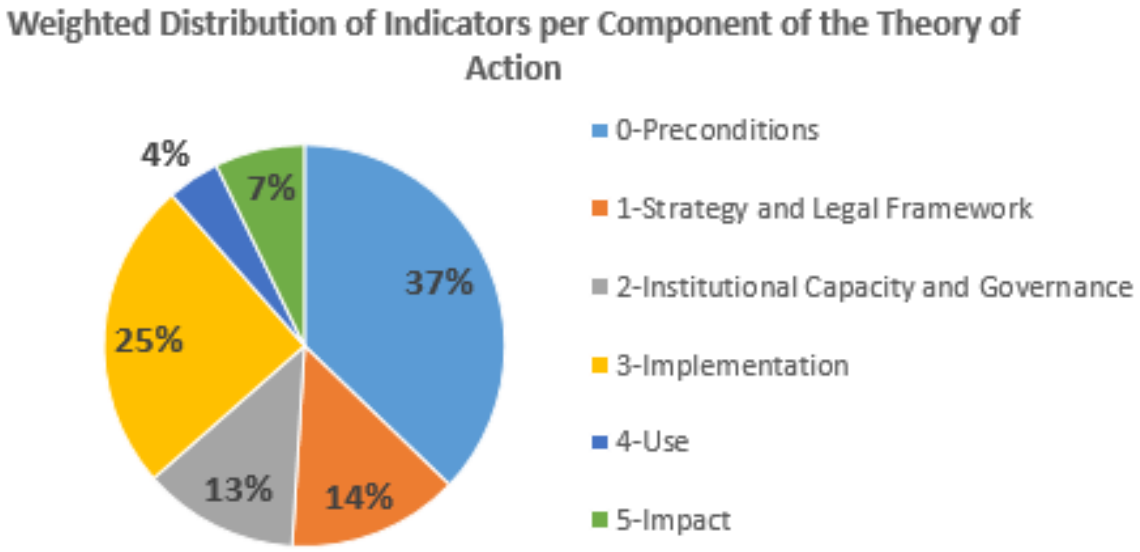
[55] OECD. (2020).

VIII. Quantitative Index Review and Scoring

A. Mapping the Existing Indicators with the Theory of Action Components

Each of the 381 indicators across all 9 indices were assigned to one Component of the Theory of Action for Digital Government: Preconditions, Strategy and Legal Framework, Institutional Capacity and Governance, Implementation, Use, and Impact. The following graph shows the weighted distribution of existing indicators per component of Theory of Action:

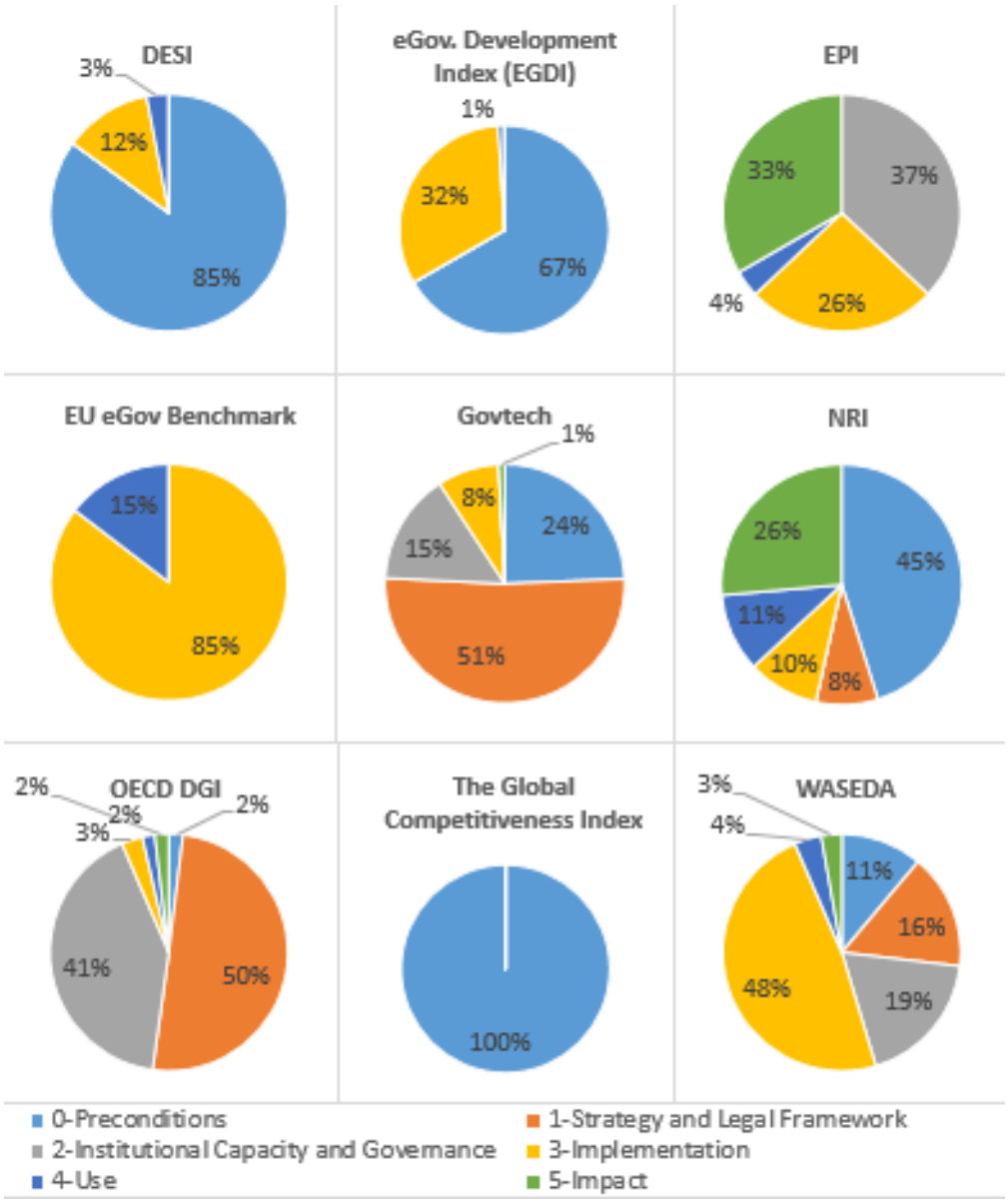
Figure 4: Weighted Distribution of Indicators per Component of Theory of Action



When reviewing the distribution of indicators, we found out that most of them are focused on measuring Preconditions (23%) and Implementation (40%) components. Strategy and Legal Framework and Institutional Capacity represent 14% and 13% of the indicators' weight, respectively. The least represented components are Use and Impact of digital public services with only 4% and 7% of the indicators' weight , respectively. This demonstrates that the aggregate focus of the most popular digital government indices is on easily-measurable inputs and processes measures, which is not surprising given the difficulty in constructing high quality indicators for the outcomes and impact components.

We also examined the weighted distribution of indicators within each index to easily identify which component of the Theory of Action they focus on, obtaining the following results:

Figure 5: Weighted Distribution of Indicators per Index

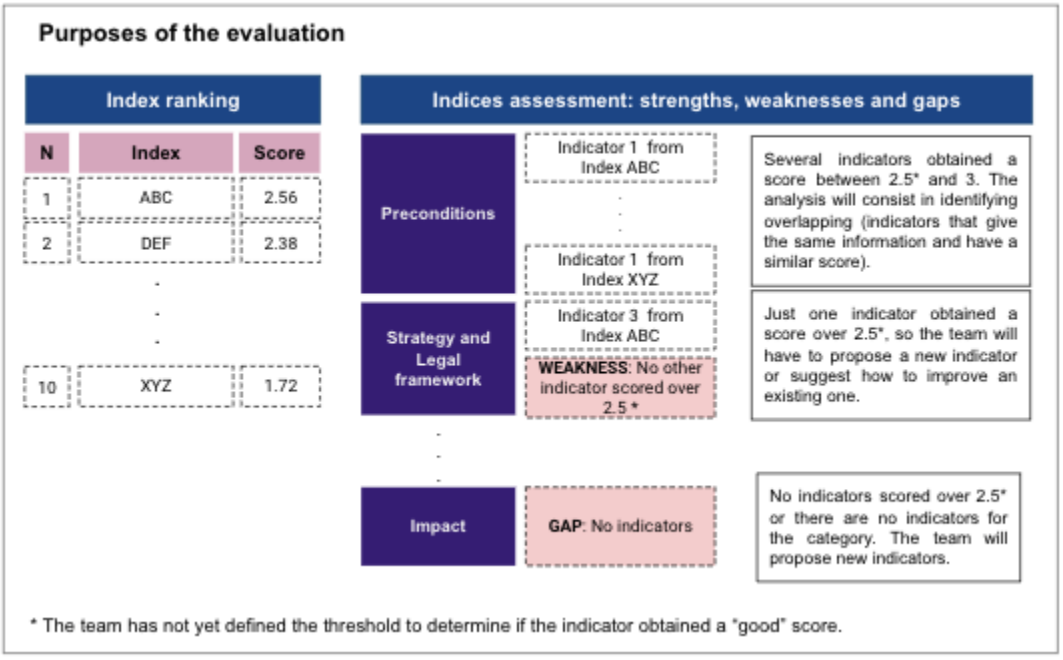


B. Evaluation System

Based on our extensive research and expert interviews, we have developed a comprehensive evaluation criteria for the existing indices and indicators (see definitions and examples in Glossary of Concepts). The purposes of the evaluation are: (1) obtain a ranking to assess the existing indices; (2) examine and evaluate the relative strengths, weaknesses and gaps of the existing components of each index to propose new indicators, which may include a combination of existing index components and new measurement techniques. For the proposal of the new index and the analysis we will focus on the components of the policy cycle explained

in Towards An Understanding of Digital Government. The evaluation consists of three stages: (1) the indicator evaluation; (2) the component evaluation; and (3) the index evaluation.

Figure 6: Evaluation Methodology



1. Stage 1: Indicator Evaluation

One of the main goals of the evaluation is to establish a baseline of the existing indicators' quality (with ratings between 1 to 3). This will allow us to identify which indicators to use, improve or discard, and to evaluate the indices to which they belong. This evaluation is also an initial step to proposing new indicators.

First, we will evaluate the indicators based on three criteria:
(1) Transparency: The objective of this criterion is to evaluate the extent to which the data sources of each indicator, the formula and the data collection methodology are complete and accessible for the public.
(2) Reliability: The objective of this criterion is to assess the extent to which data have been updated in recent years, and whether there are established data gathering methods to ensure that the indicators are comparable across countries (e.g., Involvement of the National Institute of Statistics, Ministry of each country, or promoted by International entity validation).
(3) Relevance: The objective of this criterion is to assess to what extent the indicator can be classified into one or more components of the Theory of Action for Digital Government: Preconditions, Strategy and Legal Framework, Institutional Capacity and Governance, Implementation, Use, and Impact.

Each indicator will be given a score of a one, two or three (1 = Disagree, 2 = Neither agree nor disagree, 3 = Agree), with the rating established in the following table:

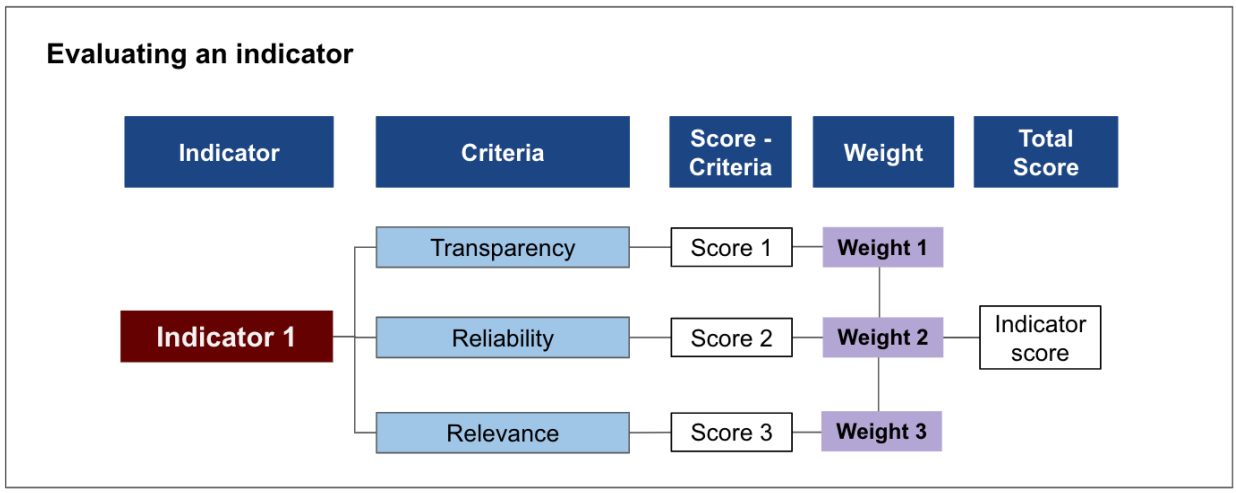
Table 6: Indicator Rating			
Criteria	**Disagree (1)**	**Neither agree nor disagree (2)**	**Agree (3)**
Transparency Are the data sources, formula, and the data gathering methodology to calculate the indicator accessible?	The data sources, formula and data collection methodology for this indicator are neither accessible nor complete (none or only 1).	The data sources, formula and data collection methodology for this indicator are accessible (at least 2 of 3).	The data sources, formula and data collection methodology for this indicator are accessible and complete (all 3).
Reliability Is the indicator updated and comparable?	- Updated: The data is not updated within the past 3 years for most of the countries (more than 50%), **and**, - Comparability: The data is gathered by Ministries or private institutions and not promoted by an International entity (for example Eurostat, IDB, World Bank).	- Updated: The data is updated within the past 3 years for some of the countries (less than 50%), **or**, - Comparability: The data is gathered by the National Institute of Statistics of each country and not promoted by an International entity (for example Eurostat, IDB, World Bank, among others).	- Updated: The data is updated within the past 3 years for most of the countries, **and,** - Comparability: The data is gathered by the National Institute of Statistics or a Ministry of each country and promoted by an International entity (for example Eurostat, IDB, World Bank).
Relevance Is this indicator relevant for Digital Government?	The indicator is not related to any of the components of the Theory of Action for Digital Government given in Section B.	The indicator is somewhat related (for example, definition refers to digital services but not specifies government) to the components of the Theory of Action for Digital Government given in Section B.	The indicator is directly related to one of the components of the Theory of Action for Digital Government given in Section B.

The final score of the indicators will be calculated as the weighted average of the scores of each criteria:

Figure 7: Indicator Scoring[56]

$$Indicator\_score = w_1(Transparency) + w_2(Reliability) + w_3(Relevance)$$

[56] For this project the weights used were: w_1=0.25, w_2=0.25, w_3=0.5.



2. Stage 2: Component Evaluation

In the second stage, we will assign one of the six components of the policy cycle to each individual indicator and calculate a score for each component. The score of each component is the simple average of the score of its indicators. If a component does not have any indicator, it receives a score of 0 (meaning that the index is not measuring that component).

$$Component\ Score = Simple\ Average\ of\ Indicator\_score \mid 0\ if\ no\ indicators$$

3. Stage 3: Index evaluation

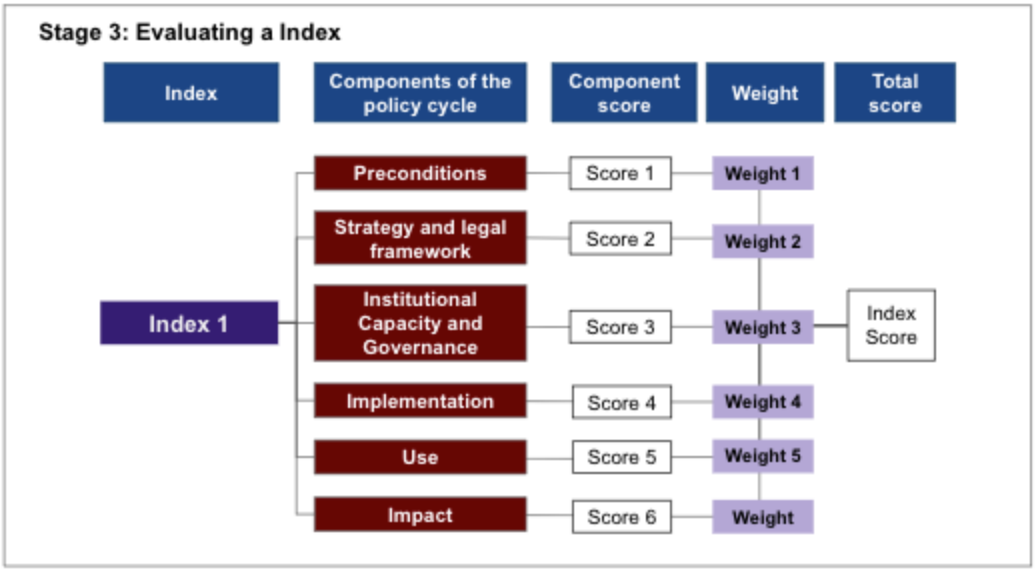
The third stage consists in calculating the weighted average of each component to obtain the final score for the index. Each index will get a score between 0 and 3. This method will allow us to obtain a score that measures the technical quality of each index and how complete it is (which components of the policy cycle are considered).

Figure 8: Index Scoring[57]

$$Index\_score = w_1(P) + w_2(SLF) + w_3(ICG) + w_4(I) + w_5(U) + w_6(IMP)$$

$$P = Preconditions$$
$$SLD = Strategy\ and\ legal\ framework$$
$$ICG = Institutional\ capacity\ and\ governance$$
$$I = Implementation$$
$$U = Use$$
$$IMP = Impact$$

[57] For this project the weights used were: w_1=0.1, w_2=0.1, w_3=0.2, w_4=0.2, w_5=0.2, w_6=0.2.



4. Evaluation System Test

In order to verify the efficacy of the evaluations system, and how the results could be influenced by individual bias/errors on the part of the evaluators, we conducted a test in which each group member individually evaluated the Digital Economy and Society Index (DESI). We then collected and compared both the individual and aggregate scores for indicators, categories, and the index itself. **Note: this evaluation was carried out between Feb12-Feb14, before two meetings with the client and the advisor that led to changes in the evaluation methodology. However, most of the conclusions and the action items remain valid.**

Table 7:Evaluation Test Results

Evaluator	Transparency	Reliability	Relevance	Index Indicators Mean	Index Completeness	Total Index Score
A	2.86	2.43	1.97	2.42	3.00	2.71
B	2.89	2.89	2.32	2.70	3.00	2.85
C	3.00	3.00	2.11	2.70	3.00	2.85
D	3.00	3.00	2.51	2.84	3.00	2.92
E	2.89	2.89	1.97	2.59	3.00	2.79
Mean	2.93	2.84	2.18	2.65	3.00	2.83
Std. Dev.	0.07	0.24	0.24	0.16	0.00	0.07

Note 1: The letter under “Evaluator” corresponds to each member of the group.
Note 2: Index completeness measures how many components of the policy cycle are considered in the index.

Main conclusions from the test:

1. The mean of the indicators per criteria (Transparency, Reliability, Relevance and Index Completeness) is similar across evaluators.
2. For Transparency and Index Completeness there is less variability in the scores given by each evaluator. There is higher variability for the Reliability and Relevance criteria.

3. There is a larger range of ratings for the Relevance, than for the other criteria.
4. Technical terms: Some indicators, specially the ones related to connectivity required technical knowledge about telecommunications concepts to better assess the quality of the indicator.

C. Analysis of Evaluation and Areas of Improvement of Indicators and Indices

After the evaluation of the indices, we proceed to rank the best index by the overall index score. This result will give us an overview of which indices were the most complete and had a better score across all the components of the Theory of Action. Later, each index is ranked by component to determine which index is best at measuring each single component.

1. Index Evaluation Scores

Using the index scoring and evaluation methodology, all the indices were evaluated and ranked according to the results. The highest-ranked index was evaluated for its “completeness”, meaning that the majority of the indicators within the index performed better on Transparency, Reliability, and Relevance. Also, the indices with the highest score had indicators across all the components of the Theory of Action.

Table 8: Index Evaluation Scores

Index	Index Score
OECD DGI	2.26
EPI	2.13
Govtech	2.01
WASEDA	1.93
NRI	1.80
DESI	1.48
EGDI	1.34
EU eGovernment Benchmark	1.10
The Global Competitiveness Index	0.30

Using the index scoring and evaluation methodology detailed above, we can observe in Table 8 that the highest scoring index based on the standard weighting was OECD DGI with 2.26, followed by EPI with a total score of 2.13, and Govtech with a score of 2.01. This default index score is lowered by Theory of Action components that are not present in the index. Therefore, as mentioned before, this score can be viewed as a “completeness” score across all theories of action. This ranking shows which indices measure best all the components of the theory of action.

Subsequently, we decided to measure the indices according to what they measure best, with our score weighting based on the de-facto focus of certain portions of the theory of action (such as Preconditions or Strategy and Legal Framework). By design or result, there are indices that have no indicators for other components of the Theory of Action, obtaining several zeros in the evaluation, which causes a lower average score. When measuring how good each index is at what it attempts to measure (once these zero categories are removed, with weighting based on the observed focus of the index), average scores increase, and some narrowly-focused indices score substantially higher. In Table 9, we can observe that The Global Competitiveness Index, which focuses exclusively on Preconditions, receives the highest score of 3.0, while DESI scores a 2.86 and similarly focuses almost exclusively on Preconditions. EU eGov and EGDI, which have large Implementation components, receive the next highest scores of 2.73 and 2.70, respectively. These relatively higher scores compared to the standard index score indicate that existing indices are much better at focusing on a few components of the Theory of Action, rather than all stages from Preconditions to Impact, and highlight the tension between index completeness across Theory of Action components and the quality of these measurements.

Table 9: Index Evaluation Scores (Weighted by Index Component Focus)

Index	Index Score (weighted by index component focus)	Weighted Distribution of Indicators per Component of Theory of Action
The Global Competitiveness Index	3.00	• Preconditions: 100%
DESI	2.86	• Preconditions: 85% • Implementation: 12% • Use: 3%
EU eGovernment Benchmark	2.73	• Implementation: 85% • Use: 15%
E-Government Development Index (EGDI)	2.70	• Preconditions: 67% • Implementation: 32% • Use: 1%
EPI	2.68	• Institutional Capacity and Governance: 37% • Implementation: 26% • Use: 4% • Impact: 33%
Govtech	2.34	• Preconditions: 24% • Strategy and Legal Framework: 52% • Institutional Capacity and Governance: 15% • Implementation: 8% • Impact: 1%
NRI	2.31	• Preconditions: 45% • Strategy and Legal Framework: 8% • Implementation: 10% • Use: 11% • Impact: 26%
OECD DGI	2.30	• Preconditions: 2% • Strategy and Legal Framework: 50% • Institutional Capacity and Governance: 41% • Implementation: 3% • Use: 2% • Impact: 2%
WASEDA	2.00	• Preconditions: 11% • Strategy and Legal Framework: 15% • Institutional Capacity and Governance: 19% • Implementation: 48% • Use: 4% • Impact: 3%

Across all indicators, the average score for Relevance was 2.65, compared to 2.35 for Transparency and 2.21 for Reliability. Although these scores have a relatively low absolute difference, they indicate that more work needs to be done to improve Transparency and Reliability in existing digital government measurement systems.

2. Evaluation of Indicators and Indices by Components of the Theory of Action

By ranking each Index scores by component of the Theory of Action, we can see in more detail which index is better at measuring each component, which is key to identify later the best indicators available and the existing gaps.

Table 10: Index Scores by Component of Theory of Action - Preconditions

0 - Preconditions			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
The Global Competitiveness Index	3.00	5	100%
DESI	2.84	32	85%
NRI	2.58	29	45%
E-Government Development Index (EGDI)	2.50	7	67%
OECD DGI	2.25	2	2%
WASEDA	2.25	3	11%
Govtech	2.11	11	24%
EPI	0.00	0	0%
EU eGovernment Benchmark	0.00	0	0%
Total Preconditions	2.50	89	

Examining the component Preconditions, the Global Competitiveness Index had the highest score for its 5 indicators which composes 100% of the index, while DESI had an average score of 2.84 across 32 indicators or 85% of the index. Therefore, the clear focus of both indices is on preconditions, and the indicators from them have the highest priority to be taken into account for the new index[58].

[58] This does not mean that indicators from other indices will not be used, but given the scores, the GCI and DESI indicators would have priority.

Table 11: Index Scores by Component of Theory of Action - Strategy and Legal Framework

1-Strategy and Legal Framework Count			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
NRI	2.65	5	8%
OECD DGI	2.32	38	50%
Govtech	2.16	8	51%
WASEDA	1.85	5	16%
The Global Competitiveness Index	0.00	0	0%
DESI	0.00	0	0%
E-Government Development Index (EGDI)	0.00	0	0%
EU eGovernment Benchmark	0.00	0	0%
EPI	0.00	0	0%
Total Strategy and Legal Framework	2.23	56	

On Strategy and Legal Framework, NRI had the highest score of 2.65, although the index does not focus on measuring the component. Meanwhile, the OECD DGI and Govtech indices focuses on Strategy and Legal framework by 50% and have a score of 2.32 and 2.16 respectively, which shows that both indices might be more complete in measuring this component, but they still require an improvement in the quality of their indicators.

Table 12: Index Scores by Component of Theory of Action - Institutional Capacity and Governance

2-Institutional Capacity and Governance			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
Govtech	2.81	4	15%
EPI	2.58	3	37%
OECD DGI	2.28	30	41%
WASEDA	1.75	6	19%
NRI	0.00	0	0%
The Global Competitiveness Index	0.00	0	0%
DESI	0.00	0	0%
E-Government Development Index (EGDI)	0.00	0	0%
EU eGovernment Benchmark	0.00	0	0%
Total	1.89	43	

Examining the component Institutional Capacity and Governance, we find that Govtech leads the ranking, although it does not focus on measuring the component. However, given its score, its indicators should be analyzed for the final index. EPI and OECD, are in the second and third place, respectively, and both focus on measuring Institutional Capacity and Governance.

Table 13: Index Scores by Component of Theory of Action - Implementation

3-Implementation			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
DESI	3.00	4	12%
Govtech	2.88	4	8%
EPI	2.75	7	26%
EU eGovernment Benchmark	2.73	12	85%
E-Government Development Index (EGDI)	2.71	106	32%
NRI	2.45	5	10%
OECD DGI	2.25	2	3%
WASEDA	2.11	16	48%
The Global Competitiveness Index	0.00	0	0%
Total Implementation	2.61	156	

On table 13, DESI had the highest score, followed by Govtech, EPI, EU eGovernment Benchmark and EGDI. However, only the EU eGovernment Benchmark strongly focuses on measuring the component. This means that the indicators of the first five indices are high quality (score higher than 2.5), but the EGDI is more complete at measuring this component and still has a good measuring quality.

Table 14: Index Scores by Component of Theory of Action - Use

4-Use			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
DESI	3	1	3%
EPI	2.75	1	4%
EU eGovernment Benchmark	2.75	2	15%
E-Government Development Index (EGDI)	2.75	3	1%
OECD DGI	2.5	1	2%
NRI	2.25	6	11%
WASEDA	2.25	1	4%
Govtech	0	0	0%
The Global Competitiveness Index	0	0	0%
Total	2.58	15	

Examining the Use component ranking, DESI, EGDI and EU eGov have the highest scores, although the lack of focus of the indices for the Use component limits the usefulness of this comparison. Use is one of the components with the least representation across all indices.

Table 15: Index Scores by Component of Theory of Action - Impact

5-Impact			
Index	**Avg Score**	**# of indicators**	**Relative weight of the component within the index**
EPI	2.58	3	33%
Govtech	2.25	1	1%
OECD DGI	2.00	2	2%
NRI	1.67	15	26%
WASEDA	1.50	1	3%
DESI	0.00	0	0%
EU eGovernment Benchmark	0.00	0	0%
E-Government Development Index (EGDI)	0.00	0	0%
The Global Competitiveness Index	0.00	0	0%
Total Impact	2.00	22	

Finally, the Impact component presents a similar issue as Use, which has a limited quantity of indicators. EPI received the highest score. The results of this component show that

the indices studied are falling short at measuring the outcomes of digital government services and strategies.

IX. Building a New Measurement Framework: Recommend New or Modified Ways to Better Measure Digital Government

In this section we present a new index for digital government that combines the best features of existing indices with new inputs, and provide our recommendations for its implementation in Latin America and the Caribbean. For each component of the Theory of Action we summarize the best existing indicators and new or modified indicators.

1. Preconditions

Best Existing Indicators

After analyzing the Preconditions indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- The selected indicators are from DESI and Global Competitiveness Report.
- Six indices measure infrastructure related indicators such as: mobile broadband subscriptions, fixed broadband subscriptions and internet use. All indices used the same source: World Telecommunication/ICT Indicators database.
- Only three indices included indicators related to digital literacy skills.
- Two indicators (People who used the Internet to use online banking and people who ordered goods or services online) were used as a proxy to measure the capabilities of the citizens to perform transactions online.

As a result, we selected the following indicators as the ones that would give the most comprehensive assessment of the preconditions component:

Table 16: Best Existing Indicators: Preconditions

Index	Indicator Name	Definition	Data Source
DESI	At least Basic Digital Skills	People with "basic" or "above basic" digital skills in each of the following four dimensions: information, communication, problem solving and software for content creation	Eurostat - Community survey on ICT usage in Households and by individual (2002-2020; currently EU only); Expanding to LAC would require replicating its application to each country
DESI	ICT graduates	People with a degree in ICT	Eurostat - Labor Force Survey (2009-2020; currently EU only); Expanding to LAC would require replicating it to each country
DESI	Banking	People who used the Internet to use online banking	Eurostat - Community survey on ICT usage in Households and by individual (2002-2020; currently EU only);

			Expanding to LAC would require replicating its application to each country
DESI	Shopping	People who ordered goods or services online	Eurostat - Community survey on ICT usage in Households and by individual (2002-2020; currently EU only); Expanding to LAC would require replicating its application to each country
The Global Competitiveness Index	Mobile-broadband subscriptions	Mobile-broadband subscriptions per 100 pop	International Telecommunication Union Statistics (1975-2020); Currently for 200 economies around the world and 21 countries in Latin America
The Global Competitiveness Index	Fixed-broadband Internet subscriptions	Fixed-broadband Internet subscriptions per 100 pop	International Telecommunication Union Statistics (1975-2020); Currently for 200 economies around the world and 21 countries in Latin America
The Global Competitiveness Index	Internet users % of adult population	People who use the Internet at least once a week	International Telecommunication Union Statistics (1975-2020); Currently for 200 economies around the world and 21 countries in Latin America

New or Modified Indicators

Some possible areas of improvement include:

- Addition of a gender-focused indicator about female ICT graduates: “Percentage of female citizens with a degree in ICT” based on DESI’s existing indicator.

Therefore, we propose to include or modify the following indicators:

Table 17: New or Modified Indicators: Preconditions

Index (Based on)	Indicator Name	Definition	Proposed Data Source
DESI	Female ICT graduates	Percentage of female citizens with a degree in ICT	Countries’ National Labor Force Survey

2. Strategy and Legal Framework

Best Existing Indicators

After analyzing the preconditions indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- The OECD DGI provides excellent coverage of the existence of strategies and legal frameworks for digital governments along with the existence of formal mechanisms for review (unsurprising given the mission and focus of the OECD as an organization).

- Moving OECD indicators from buzzword categories like “digital by design” and “data-driven public sector” into the Strategy and Legal Framework component makes the indicators more coherent and useful to practitioners.
- Current indicators lack specificity and measure existence rather than comprehensiveness and enforceability of existing strategies/legal frameworks.

As a result, we selected the following indicators as the ones that would give the most comprehensive assessment of the preconditions component:

Table 18: Best Existing Indicators: Strategy and Legal Framework

Index	Indicator Name	Definition	Data Source
OECD DGI	Existence of a National Government Strategy 12 (NGDS)	Does your central/federal government have a national digital government strategy (NDGS)?; If Y, what is the strategy; how was it formulated; Which of following elements form part of process of central/federal government strategy or overarching policy;	OECD Survey on Digital Government
OECD DGI	Legislative implications*	Mechanisms in place to assess the implications of new legislation on government's digital needs	OECD Survey on Digital Government
OECD DGI	Public sector data policy*	Existence of a public sector data policy as well as its objectives (e.g. foresight for trends spotting and evidence-based policymaking; engagement of societal stakeholders; development of user-driven services; public sector productivity and efficiency; policy evaluation; monitoring and organisational learning)	OECD Survey on Digital Government
OECD DGI	Data gathering standards*	Standards and specific initiatives in data gathering methods, sources, quality and relevance; data discoverability/inventories, sharing and interoperability; text and data mining (TDM) requirements for public sector organisations to (re)use data; open data	OECD Survey on Digital Government
OECD DGI	Single data inventory*	Formal requirements and the existence of a single data inventory for the central/federal government	OECD Survey on Digital Government
OECD DGI	Once-only requirements*	Formal requirements for once-only principle and right to have access to their data as well as consent or refuse data sharing from citizens and business	OECD Survey on Digital Government
OECD DGI	Data release guidelines*	Government-wide guidelines on the digital release of government data, policy design and decisions in a timely and comprehensible manner	OECD Survey on Digital Government

**Name created by summarizing indicator definition*

New or Modified Indicators

Some areas of improvement are:

- How frequently the regulatory framework is updated/reviewed
- Ability of citizens to petition/modify government strategy/legal framework

Therefore, we propose to include or modify the following indicators:

Table 19: New or Modified Indicators: Strategy and Legal Framework

Index (Based on)	Indicator Name	Definition	Proposed Data Source
OECD DGI	Political Independence of NGDS	Qualitative ranking (1-10) of political independence of appointees to NGDS creation/evaluation boards	Qualitative evaluation by eGov experts, and/or confidential survey of eGov practitioners
OECD DGI	Legislative implication timeliness	How often (1-3 years, 3-5 years, 5+years) is NGDS legal framework updated/reviewed	Expansion of existing DGI survey to include timeliness questions
OECD DGI	Stakeholder input	Perception of citizen ease of input to petition/modify government legal framework/strategy	Perception survey similar to World Bank Doing Business Index

3. Institutional Capacity and Governance

Best Existing Indicators

After analyzing the institutional capacity indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- The selected indicators are from OECD DGI index, that has the largest number of indicators (31) for this component.
- However, some of the indicators were overly specific or had some overlap with others, so we selected 9 indicators that had the highest score in the relevance criterion.
- Many indicators of the institutional capacity and governance component are evaluating the existence of strategies, KPIs, involvement of stakeholders, among others.

As a result, we selected the following indicators as the ones that would give the most comprehensive assessment of the preconditions component:

Table 20: Best Existing Indicators: Institutional Capacity and Governance

Index	Indicator Name	Definition	Data Source
OECD DGI	Public sector organization leader*	Public sector organization responsible for leading and coordinating decisions on digital government, as well as advisory and decision-making responsibilities	OECD Survey on Digital Government, already including 6 Latin American countries
OECD DGI	Enabling frameworks	Enabling frameworks in place (e.g. common interoperability, base registries, shared ICT	OECD Survey on Digital Government, already including 6

	in place*	infrastructure and services, open source software, common data architecture/infrastructure)	Latin American countries
OECD DGI	Coordination between strategies*	Coordination between the NGDS and other national strategies in place	OECD Survey on Digital Government, already including 6 Latin American countries
OECD DGI	Key performance indicators*	Key Performance Indicators (KPI) linked to the NDGS to monitor progress in its implementation	OECD Survey on Digital Government, already including 6 Latin American countries

**Name created by summarizing indicator definition*

New or Modified Indicators

Some areas of improvement are:

- Include bias awareness on the use of digital technology by the public sector: "Capacity building/training programmes in place to sensitise legislators and raise awareness of the implication *and possible biases* on the use of digital technology by the public sector" based on a OECD DGI existing indicator.
- Include the "Existence of open innovation initiatives to engage tech startups in digital solutions for public services (Govtech funds, public challenges)" based on Govtech's index.

Therefore, we propose to include or modify the following indicators:

Table 21: New or Modified Indicators: Institutional Capacity and Governance

Index (Based on)	Indicator Name	Definition	Proposed Data Source
OECD DGI	Bias awareness on the use of digital technology	Capacity building/training programmes in place to sensitise legislators and raise awareness of the implication and possible biases on the use of digital technology by the public sector	Expansion of existing DGI survey to the rest Latin American countries
Govtech	Promotion of tech startups for public services	Extent to which there are open innovation initiatives to engage tech startups in digital solutions for public services (Govtech funds, public challenges)	Qualitative evaluation or desk research done by eGov experts

4. Implementation

Best Existing Indicators

After analyzing the implementation indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- The large number of high quality indicators in Implementation allows us to select 4 from DESI, 2 from EPI, 3 from EGDI and 1 from EU eGov.
- While EGDI had the largest single number of indicators (106), many were overly specific and were better captured by broader indicators such as availability of online information for online services from EPI and online service completion from DESI.
- Existing indicators are more focused on existence and availability rather than quality of the provision of digital government.

- We consider that there are no substantial gaps, but improvements can be made in the quality of the indicators.

As a result, we selected the following indicators as the ones that would give the most comprehensive assessment of the preconditions component:

Table 22: Best Existing Indicators: Implementation

Index	Indicator Name	Definition	Data Source
DESI	Pre-filled forms	Amount of data that is pre-filled in public services' online forms	eGovernment Benchmarking Report (2014-2020; currently EU only); Expanding to LAC would require hiring citizens from each country to act as prospective users and follow a detailed, objective and standardised evaluation checklist
DESI	Online Service Completion	The share of administrative steps related to major life events (birth of a child, new residence, etc) that can be done online	eGovernment Benchmarking Report (2014-2019; currently EU only). Life events include: Regular business operations and Business Start-up, Moving, Owning and driving a car, Starting a small claims procedure, Family, Career and Studying; Expanding to LAC would require hiring citizens from each country to act as prospective users and follow a detailed, objective and standardised evaluation checklist
DESI	Digital public service for businesses	The share of public services needed for starting a business and for conducting regular business operations that are available online for domestics as well as for foreign users	European Commission (2014-2020). Average of the national and cross-border online availability for basic and extended services within the business-related Life Events from the last two years (Business Start-up and Regular Business Operations); Expansion to LAC would require expanding data set surveys to include relevant countries.
DESI	Open Data	This composite indicator measures to what extent countries have an Open Data policy in place (including the transposition of the revised PSI Directive), the estimated political, social and economic impact of Open Data and the characteristics	European Data Portal (2019-2020; currently EU only). Comprises 4 dimensions i) Open Data Policy; ii) Open Data Impact; iii) Open Data Portal; and iv) Open Data Quality; Expansion to LAC would require expanding data set surveys to

		(functionalities, data availability and usage) of the national data portal	include relevant countries
EPI	Social information access*	Availability of online information (on policies and budgets) in the areas of education, health, social protection, employment, environment and justice	UN e-Government Survey; Extracted from summary of e-participation features assessed by the 2020 e-Gov survey
EPI	Public procurement*	Availability of public procurement notifications and tender results online	UN e-Government Survey; Extracted from summary of e-participation features assessed by the 2020 e-Gov survey
EGDI	Mobile app*	Existence of a mobile app to provide e-government services	UN e-Government Survey
EGDI	National portal*	Existence of a **national portal**, an open data portal	UN e-Government Survey
EGDI	Data modification*	Ability to access/modify own data	UN e-Government Survey
EU eGov	Mobile friendliness	Mobile friendliness of basic and extended services	EU e-Government Benchmark, Based on the Mystery Shopping method; Expanding to LAC would require hiring citizens from each country to act as prospective users and follow a detailed, objective and standardised evaluation checklist

*Name created by summarizing indicator definition

New or Modified Indicators

Some areas of improvement are:

- Combining existence indicators with quantitative measurements of accessibility, quality, and completion percentage for online life events.
- Using experts or local surveys to determine the accessibility of existing forms.
- Applying mystery shopper techniques to qualitative analysis of life event forms.
- Determining quality of national “one stop shop” portals.

That is why we propose to include or modify the following indicators:

Table 23: New or Modified Indicators: Implementation

Index (Based on)	Indicator Name	Definition	Proposed Data Source
EGDI	Completeness of National Data Portal	Percentage of life event processes that can be initiated from the national “one stop shop” portal	Mystery shopper survey (similar to EU eGOV but expanded for LAC); Expanding to LAC would require hiring citizens from each country to act as prospective users and follow a

			detailed, objective and standardised evaluation checklist
EU eGov	Mobile friendliness of life events	Percentage of life events that can be completed using solely a mobile device	Mystery shopper survey (similar to EU eGOV but expanded for LAC), with specific training for mystery shoppers on ease of use of mobile services using most common low-cost smartphones in LAC
EGDI	Ease of access of online help	Difficulty (1-10) of receiving online help while completing life event forms for researching information	Expansion of EGDI shopping method to include survey on ease of online help availability, with specific metrics for availability of easy online help access

5. Use

Best Existing Indicators

After analyzing the use indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- This component of the theory of action is the least representative of the total of indicators studied, with 14 indicators only, or 4% of the total of indicators evaluated, although the average score was relatively high at 2.58.
- From those 14 indicators, 3 indicators were selected as the best: 1 from DESI, 1 from EU e-Government Benchmark, and 1 from OECD DGI.
- These indicators do not provide specific information on the use of digital services and should be expanded to obtain more details about digital government transactions.

As a result, we selected the following indicators as the ones that would give the most comprehensive assessment of the preconditions component:

Table 24: Best Existing Indicators: Use

Index	Indicator Name	Definition	Data Source
DESI	e-Government Users	People who sent filled forms to public authorities, over the internet, previous 12 months (% of individuals who need to submit official forms to administrative authorities)	Eurostat - Community survey on ICT usage in Households and by individual (2002-2020; currently EU only); Expanding to LAC would require replicating its application to each country
OECD DGI	Use of digital platforms to proactively engage stakeholders external to the public sector in policy making and service delivery processes	Use of digital platforms to effectively engage through consultations; digitally-enabled decision making; opening up government data and fostering re-use.	OECD Survey on Digital Government; already includes 6 Latin American countries

New or Modified Indicators

Some areas of improvement are:

- We decided to improve an indicator of NRI to obtain information about the use of digital government services by businesses.
- We included and adapted 7 indicators from Latinobarometro, a cross-sectional survey in Latin America. These indicators provide an overview of the number of digital transactions of specific government services compared to the number of in-person transactions of the same services.
- These indicators can be expanded to more specific government services to have a complete overview of the rates between digital and in-person use of digital services.

Table 25: New or Modified Indicators: Use

Index (Based on)	Indicator Name	Definition	Proposed Data Source
EPI	Use of digital channels (including mobile devices/platforms) and open data technologies in the areas of education, health, social protection, employment, environment and justice	Existence of use of digital channels and open data technologies in the areas mentioned by individuals	Adaptation of Eurostat - Community survey on digital channels usage in Households and by individual (2002-2020; currently EU only); Expanding to LAC would require replicating its application to each country
NRI	Business use of digital government services	% of transactions performed by the private sector on digital government platforms	Adaptation of survey performed by Latinobarometro in 2017 focusing on a sample of businesses in LAC; People surveyed: 20,200, Countries: 18.
Latinobarometro	Channel of Service Delivery - Identity or civil registration	% of identity or civil registration transactions performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18.
Latinobarometro	Channel of Service Delivery - Vehicle	% of vehicle transactions performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18.
Latinobarometro	Channel of Service Delivery - Education or health	% of education or health transactions performed performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18.
Latinobarometro	Channel of Service Delivery -	% of crime reportings performed	Replicate survey performed

	Reporting a crime	partially or fully digitally	by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18.
Latinobarometro	Channel of Service Delivery - Social Program	% of social program transactions performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18
Latinobarometro	Channel of Service Delivery - Tax payment, insurance, pensions	% of Tax payment, insurance, pensions transactions performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18
Latinobarometro	Channel of Service Delivery - Starting and closing a business	% of Starting and closing a business transactions performed partially or fully digitally	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18

6. Impact

After analyzing the use indicators of all the existing indices and their qualitative evaluation, we came to the following conclusions:

- The average score of the indicators was 1.96, the lowest among the six components of the Theory of Action of Digital Government.
- It would be difficult to estimate the isolated effect of digital government on welfare variables related to health, education or employment. Hence, impact indicators of digital government should focus on time, satisfaction and trust.
- Impact indicators focus on the end user. If a country improves in these indicators then this could mean that the government efficiency is also improving.
- There is no need to create new measurement methodologies since Latinobarometro has measurements related to time and satisfaction.

Table 26: New or Improved Indicators: Impact

Index (Based on)	Indicator Name	Definition	Proposed Data Source
Latinobarometro 2017	Time in government transactions	Hours Needed to Complete a Government Transaction	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18
Latinobarometro 2017	Time in government transactions - Education and Health	Hours Needed to Complete Education or Health-Related Transactions	Replicate survey performed by Latinobarometro in 2017; People

			surveyed: 20,200, Countries: 18
Latinobarometro 2017	Time in government transactions - taxes, insurance and pension	Hours Needed to Complete Tax Payment, Public Health Insurance, and Pension Transactions	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200; Countries: 18
Latinobarometro 2017	Time in government transactions - staring/closing a business	Hours Needed to Start o close a business	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18
Latinobarometro 2017	Satisfaction with government services	% of people somewhat satisfied or very satisfied with government services	Replicate survey performed by Latinobarometro in 2017; People surveyed: 20,200, Countries: 18
-	Trust in public services online transactions	Do you trust doing government transactions online (paying taxes, fees, water, electricity)?	Countries' National Household Surveys; In addition, the Latinobarometro 2017 survey has a similar question (Trust of Government Transactions) that could be modified to include online transactions

Recommendations Summary

In conclusion, we propose a new index of 66 indicators, of which 43 are indicators of the nine analyzed indices and 23 are new indicators. The summary of all indicators is shown in the following table:

Table 27: Summary of Existing and New or Modified Indicators

	Preconditions		Strategy and Legal Framework		Institutional Capacity and Governance	
	Number	Sources	Number	Sources	Number	Sources
Best existing indicators	7	- DESI (4) - GCI (3)	7	- OECD DGI	4	- OECD DGI
New or modified indicators	1	-	3	-	2	-
Total	8		10		6	

	Implementation		Use		Impact	
	Number	Sources	Number	Sources	Number	Sources
Best existing indicators	10	- DESI (4) - EPI (2) - EGDI (3) - EU eGov (1)	2	- OECD DGI (1) - DESI (1)	0	-
New or modified indicators	3	-	9	-	6	-
Total	13		11		6	

X. Conclusion

Through a systematization of expert interviews and literature review we designed a framework based on a validated Theory of Action to evaluate 9 indices of digital government and their respective indicators. The Theory of Action consisted of the following understanding of digital government: if the public sector of a country generates the necessary preconditions, provides a digital government strategy with a strong legal framework, and establishes institutional capacities and governance, then governments will effectively implement digital public services that citizens and businesses will use. As a result, users will have better access to efficient and innovative public services, which in turn will lead to an improvement in their quality of life. Behind this conceptual framework there is a strong conviction that for digital government to be successful it must consider inclusion, equity, and the final user experience as critical pillars. The definition of a contextual, yet effective framework for the region has the potential to improve the capacity of governments to promote digital transformation, and more importantly, to generate better digital public services

After going through a rigorous evaluation process of almost 400 indicators, the main insights were, first, the narrow existing focus on evaluating preconditions and implementation, with most existing indicators evaluating success in a binary and simplistic way. Less than 10% of indicators included in the different indices targeted use and impact of digital government. Second, there is a consistent lack of transparency and reliability across indices, and third, there is a tension between the quality and completeness that indices aim for. While the most complete indices, in terms of our Theory of Action, targeted all the components, they did not receive the highest scores in terms of quality. On the contrary, indices that focused only on a few components received higher scores for those components. Overall, the most important conclusion of our project is the need to reconnect the various indices measuring digital government with the final user and their experiences. To that end, we provide new proposed indicators to promote inclusion, user feedback, and impact-based metrics. These proposed indicators will build on existing surveys (for example, adding additional questions in household surveys), replicate the methodology of one-time surveys performed in the past, and require the expansion of European-focused data to include Latin America and the Caribbean. Moreover, they will need to adapt their measurement of life events to incorporate the experience of mobile-focused and first-time digital government users in the region.

Most international indices are used by national government leaders and digital government managers to identify best practices related to their own national strategies and apply them. Beyond this project there is a challenge of promoting collaboration between countries to share best practices and lessons learned from digital government measurement frameworks. Even though each country sets its own Digital Government Strategy, the design and implementation of a measurement framework in one country might benefit from another country’s knowledge. A benchmark of best practices from high-ranked countries could decrease the costs of implementation and improve the efficiency of digital government improvements.

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