MEANINGFUL CONNECTIVITY:

Measurement proposals and the portrait of the population in Brazil

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Measurement proposals and the portrait of the population in Brazil

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PRESENTATION

The role played by the Internet in our daily lives is increasingly relevant, although its presence is sometimes less noticeable. This change in understanding is due to how intertwined technologies are in our routines so the boundaries of their presence become blurred. It is not uncommon, therefore, for "using the Internet" has a less clear interpretation and is susceptible to the perception each one of us has of it. When we understand that the Internet is much broader than the applications we are using at the time, the debate gains nuances that favor the design and implementation of better solutions when it comes to digital inclusion and the necessary conditions to ensure "meaningful connectivity."

Issues related to the quality of the access, the devices available for use, and digital skills, among others, must be considered to promote meaningful connectivity for the population and organizations that use the network. Naturally, this requires a greater effort than just connecting disconnected individuals: It requires a set of policies and initiatives to solve the complex problem of digital exclusion. For the country and society as a whole to effectively benefit from the opportunities offered by the Internet and digital technologies, we must understand the disparities that prevent this beneficial use.

Different initiatives approved by the Brazilian Internet Steering Committee (CGI.br) are implemented by the Brazilian Network Information Center (NIC.br) and aim to contribute to the resilience and constant improvement of the country's Internet infrastructure. Considering the *Principles for the governance and use of the Internet in Brazil*,[1] actions and decisions in the area must, among other aspects, look at universality. Based on this principle, it is understood that Internet access in the country must be universal to ensure that the network is a viable path for social and human development, contributing to achieving an inclusive and non-discriminatory society.

A crucial aspect of ensuring universality is developing and maintaining an adequate network infrastructure. In this

1 More information is available at: https://principios.cgi.br

regard, the Internet in the country has demonstrated characteristics of robustness and resilience that ensure stable connectivity and maintain its quality even in periods of high traffic, as occurred during the COVID-19 pandemic. NIC.br's initiative to establish IX.br (Brazil Internet Exchange), which implements Traffic Exchange Points to optimize the interconnection between networks, is a fundamental pillar for guaranteeing Internet quality in Brazil. Another important initiative in this context is the Internet Traffic Measurement System (SIMET), a tool for measuring the quality of the Internet, which is the responsibility of the Center of Study and Research in Network Technology and Operations (Ceptro.br). The measurements, performed by users instantaneously, collect metrics such as latency, jitter, packet loss, and download and upload speeds.

NIC.br also plays a crucial role in managing security incidents, domain registrations, and the distribution of Internet Protocol (IP) addresses and Autonomous System (AS) numbers, and in producing statistical data on the use of the Internet and information and communication technologies (ICT) in Brazil, which is carried out by way of surveys conducted by the Regional Center for Studies on the Development of the Information Society (Cetic.br). Conducting quantitative and qualitative surveys allow for an in-depth assessment of issues related to access, use and appropriation of ICT by Brazilian society and organizations. In this particular case, the production of statistics enabled the drawing of the panorama presented in this publication, which is an unprecedented study on meaningful connectivity in Brazil.

This edition of NIC.br Sectoral Studies provides a detailed analysis of the gaps that exist in access to, use and appropriation of the Internet in Brazil. It is based on the concept adopted for "meaningful connectivity,"[2][3] using a broad conceptual and methodological approach based on a combination of internationally standardized household indicators to measure the conditions of access to the Internet. The study reveals that although we are moving towards universal access, there is still a long way to go to achieve truly meaningful connectivity. In

2 More information is available at: https://a4ai.org/meaningful-connectivity/
3 More information is available at: https://www.itu.int/umc2030

a scenario in which digital technologies and the Internet are increasingly predominant, adopting a perspective of valuing meaningful connectivity is fundamental. This allows the elaboration and implementation of policies and strategic actions that ensure individuals and organizations can take appropriate advantage of the benefits of such technologies. This study, therefore, not only highlights the areas that need attention but also suggests the paths we must take as we move toward a more effective and inclusive digital integration in Brazil.

Enjoy your reading!

Demi Getschko
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PROLOGUE

A call to promote meaningful connectivity in Brazil

Renata Vicentini Mielli[1]

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The inequalities in the access to and use of information and communication technologies (ICT) in Brazil reflect the society's deep divisions (economic, social, and cultural). Therefore, overcoming the digital divide goes beyond simply guaranteeing access to the Internet. This understanding, which is not new, has been consolidated, guided by a view that, in order to promote effective digital inclusion, it is necessary to overcome the challenges related to providing quality connectivity, with adequate speed and without barriers that limit Internet use, such as the imposition of data caps, for example. In addition, to enable people to fully take advantage of online resources in an effective and meaningful way, it is necessary to understand other dimensions, such as use, digital skills, security, and privacy in the virtual environment.

In this context, the concept of "meaningful connectivity"[2] has gained prominence in national and international debates in recent years, as it provides a more systemic dimension of the challenges for inclusion and the full exercise of citizenship in the digital environment: The need to ensure minimum connectivity conditions, such as speed, the availability of devices, reliable connection, regularity of use, digital skills, among other critical aspects.

The Brazilian Internet Steering Committee (CGI.br) has played a relevant role in the multisectoral dialog on issues related to digital inclusion in the country (Brazil, 2003). An example of this is the survey on ICT use in Brazilian households, ICT Households, conducted by the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of the Brazilian Network Information Center (NIC.br). Since 2005, this survey has been mapping access to ICT in the country's households, as well as the diverse ways in which individuals aged 10 and over use these technologies.

In almost 20 years of producing data and statistics, the Brazilian scenario has changed considerably. While in 2005 the proportion of households with Internet was 13% (NIC.br, 2005),

2 In this text, the concept of "meaningful connectivity" is based on the definitions provided by the Alliance for Affordable Internet (A4AI, n.d.) and the International Telecommunication Union (ITU, 2022).

in 2023 it reached 84%[3] (NIC.br, 2023a). On the individuals' side, the latest survey data show that 84% of people in Brazil are Internet users (NIC.br, 2023b), which is equivalent to more than 156 million individuals, results that indicate that we are close to universal Internet access. However, it is essential to qualify this information with data that allows us to understand how this access occurs, the quality of the connection, and the devices used to access the network, for example. The most recent edition of ICT Households showed that the majority of the population who use the Internet (58%) declared that they only use mobile phones to access it, while 41% use mobile phones and computers[4] (NIC.br, 2023b).

Upon carefully analyzing these data based on the survey's sociodemographic variables, the striking disparities in access across the country become evident (NIC.br, 2023b). For example, 56% of Internet users in urban areas declared using only mobile phones to access the network, versus 77% of those in rural areas. Considering the individual's sex, the figures are 52% and 64% for males and females, respectively; regarding race or color, 49% of self-reported White individuals and 64% of self-reported Black individuals said they accessed the Internet exclusively through this device. Breakdowns by region of Brazil, level of education, age group, and social class, among others, reveal similar scenarios, in which individuals affected by historically unfavorable demographic, socioeconomic, and geographical factors also remain excluded when it comes to Internet access devices.

In the given context, data from the ICT Households survey (NIC.br, 2023a, 2023b) reveal that, despite the increase in the proportion of people with Internet access, the country still grapples with inequalities, particularly when we consider that mobile access is characterized by significant limitations. Part of this stems from the business model of operators, whereby data caps are set at high prices, especially affecting socioeconomically vulnerable individuals. In Brazil, 60% of people who own mobile phones use a prepaid plan (a proportion that drops

3 Internet users are defined as individuals who have used the network at least once in the three months prior to the interview, according to the definition provided by the International Telecommunication Union (ITU, 2020).
4 The term "computer" in this section always refers to "desktop, laptop, and/or tablet."

to 31% for individuals in social class A and rises to 75% for those in social classes DE), which may entail a limited Internet data package insufficient for monthly activities.

By explicitly stating that the majority of users in the country access the Internet exclusively through their mobile phones, the ensuing debate focuses on the constraints for proper use of the network and its applications. An example of this is the discussion surrounding zero rating[5] and the walled gardens of Big Techs. Another example pertains to the digital skills of Internet users: The proportion of those who verified whether information found on the Internet was true is higher among those who use both a computer and a mobile phone simultaneously (71%) than among those who exclusively use a mobile phone (37%). Thus, these various layers of inequality overlap with each other, further deepening disparities in the manner and quality of Internet access.

To tackle a complex issue, it is necessary the coordination of a series of public policies focused on each dimension of connectivity. Public policies must address the obstacles that prevent individuals from navigating online safely, satisfactorily, enrichingly, productively, and affordably (ITU, 2022), and to take advantage of the opportunities facilitated by the Internet. Therefore, if we aim to extract all the economic, social, and cultural potentials that the Internet and its applications provide for society, we need to balance the basic aspects so that people and organizations have sufficient economic conditions and skills to make meaningful use of the Internet.

In addition to policies aimed at ensuring these conditions, investments need to be made in terms of connection infrastructure in the country, including backbones, backhauls, and mobile networks, for example. Policies aimed at renewing the devices used by the population of Brazil are also necessary. In terms of connection, thinking about initiatives to address existing bottlenecks is needed, which should be directed at both small and medium-sized operators (responsible for a large part of the country's connectivity) and large ones.

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5 Practice that consists of zero pricing for the mobile data traffic of certain applications. Therefore, for the purposes of a data caps contracted for Internet access, this traffic is not considered.

Complementary solutions to ensure universality are also necessary and should address community connectivity and overcoming the persistent exclusion of populations residing in remote, hard-to-reach locations, for which commercial solutions on a scale are not efficient. The promotion of community networks, for example, is a possible alternative to serve populations in areas unserved by commercial providers (due to low profitability), in order to promote their digital inclusion (NIC.br, 2022). Actions of this nature can also favor the empowerment of local communities, considering the meeting of latent demands, the improvement of physical capital and infrastructure, and the expansion of local technical knowledge, among others (NIC.br, 2022).

Policies and investments aimed at promoting universal and meaningful connectivity in Brazil must be anchored in the economic, cultural, and social development of the country, recognizing the Internet as an essential tool for access to fundamental rights and the fight inequalities. Finally, understanding that the network is one of the gateways to access fundamental rights, services, and benefits for the full exercise of citizenship, as well as for addressing inequalities, is essential in prioritizing the meaningful connectivity agenda.

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CHAPTER 1

Closing the divide in digital possibilities A call for a universal, meaningful, and affordable broadband

Sonia Jorge[1] and Onica N. Makwakwa[2]

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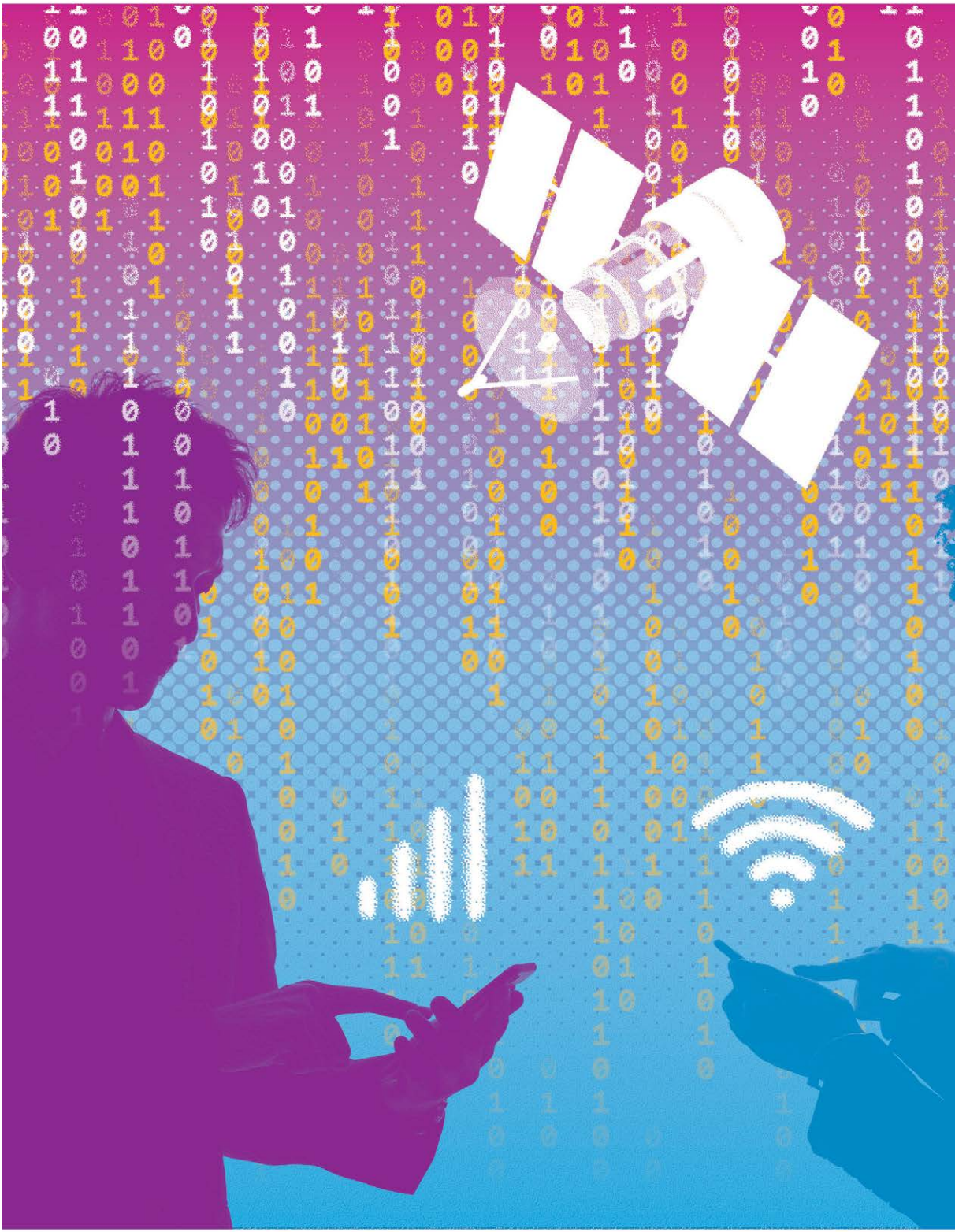

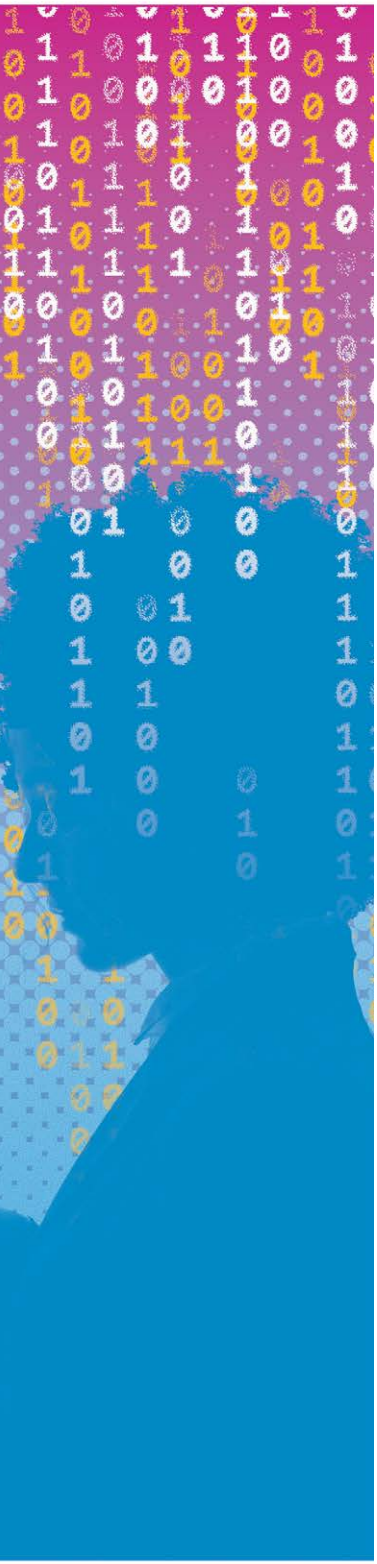

In 2003 delegates agreed to the Declaration of Principles with the World Summit on the Information Society (WSIS):

> We are also fully aware that the benefits of the information technology revolution are today unevenly distributed between the developed and developing countries and within societies. We are fully committed to turning this digital divide into a digital opportunity for all, particularly for those who risk being left behind and being further marginalized. (United Nations [UN] & International Telecommunications Union [ITU], 2003, para. 10)

Twenty years on from that declaration, the digital divide remains. Even further, as more people in the world come online, the lives of those left behind with no Internet access, or limited access, are excluded from the wave of digital transformation spreading across the globe. More must be done to connect the unconnected and for policy frameworks to evolve from the simple assumption that if the infrastructure is built, the people will come.

Policymakers need to address the gaps in skills, safety, and Human Rights to build a supportive social environment for people as they come online for the first time. This will be a responsibility not just for information and communication technologies (ICT) policymakers because it will require collective responsibility that extends across ministries and regulators, as well as the private sector and civil society.

We call upon policymakers to be bolder than they have been before in connecting the unconnected and building a supportive social environment for a vibrant and inclusive online world. Instead of fearing the greater complexity ahead of us, policymakers should recognize the urgency with which we must act.

The Internet opened up a world of possibilities for all of us. Now is our chance to choose the possibility of a better, more inclusive digital future.

WE FACE A DIGITAL DIVIDE OF POSSIBILITIES

The digital divide originated in the binary categories that distinguished between those with access and those without.

It enabled the simple mapping of regions, indicating where the network was present and where the infrastructure was absent (Hartnett, 2019). Previous research conducted by our team added complexity to the picture with its concept of meaningful connectivity and demonstrated how broadband quality could affect user experience and participation (Global Digital Inclusion Partnership [GDPI], n.d.). In addition, research by the Global System for Mobile Communications Association (GSMA) demonstrates that the coverage gap — that is, the number of people without access to a mobile broadband network — is now smaller than the usage gap — the number of people covered by a mobile broadband network, but who do not use it (GSMA, 2023).[3] **Thus, although the maps of the digital divide are no longer as simple as they once were, the divide still remains**.

MEANINGFUL CONNECTIVITY IS JUST ONE PART OF THE SOLUTION

When our team set out to define meaningful connectivity as members of the Alliance for Affordable Internet (A4AI), we focused on the quality of broadband that would be necessary for someone to do whatever they wanted. From our field research, we received a clear message: People want to be able to stream video. They want to have a video call with relatives, attend online classes, watch the news, and participate fully in society.

That is why we focus the definition of meaningful connectivity on four key pillars[4] of quality and use:

SPEED	DEVICE	DATA	FREQUENCY
At least a 4G connection	A smartphone that you own	An unlimited broadband connection at home, work, or place of study	Internet use on a daily basis

3 This research covers 3G and 4G mobile broadband. In our opinion, mobile broadband needs to be of 4G quality or higher to be truly meaningful for someone to be able to benefit from the Internet's full impact.

4 To access the full debate on the proposal, see *Advancing meaningful connectivity: Towards active and participatory digital societies*. Available at: https://globaldigitalinclusion.org/wp-content/uploads/2022/12/Advancing-Meaningful-Connectivity.pdf

This framework allows policymakers to set tangible targets for each of all four elements of meaningful connectivity, establish benchmarks, and track progress.

Along with changes to the digital divide, we have witnessed the way ICT transform how we worked, learned, and lived over the past two decades. Contactless and digital forms of payment exploded over the course of the COVID-19 pandemic and are expected to continue growing (Mastercard, 2020; PricewaterhouseCoopers [PwC], 2021). In addition, 90% of countries implemented some kind of remote learning policy (United Nations Children's Fund [UNICEF], 2020). Even before the pandemic, governments had been moving entire programs online — e.g. Huduma Kenya Service Delivery Programme (HKSDP), the Targeted Delivery of Financial and Other Subsidies, Benefits and Services (Aadhaar) in India, and Ingreso Solidario in Colombia (British Broadcasting Corporation [BBC], 2013; Hong, 2023; Better Than Cash Alliance, 2022). Social media has changed the way people connect with family and friends and political participation throughout the globe (Silver & Clancy, 2022). **In addition, someone's ability to use the Internet regularly and affordably determined their resilience during the pandemic and influences the options that are available to them in life today**.

WHAT IMPACT DOES MEANINGFUL CONNECTIVITY HAVE?

When we set out to carry out our field research to start measuring meaningful connectivity and to understand the impact it has, some consistent trend lines emerged:[5]

5 To access the full debate on the proposal, see *Advancing meaningful connectivity: Towards active and participatory digital societies*. Available at: https://globaldigitalinclusion.org/wp-content/uploads/2022/12/Advancing-Meaningful-Connectivity.pdf

MEASURING CONNECTIVITY	Estimates of meaningful connectivity were substantially smaller than national Internet use figures — with a gap as large as one meaningfully connected user for every 160 Internet users in one country.
CONNECTIVITY DISPARITIES	Men and those living in urban areas were more likely to have meaningful connectivity, thus exposing a wide disparity across gender and rurality than national figures project.
IMPACTS OF MEANINGFUL CONNECTIVITY	While Internet access in general increased informational confidence, users with meaningful connectivity were around a third more likely to do essential activities online, like accessing healthcare, taking a class, looking for a job, or participating in the digital economy.

In this trend we see gaps, not just in access but in human possibility. The difference no longer lies in simply having Internet access or not: **The digital divide is now a question of what possibilities in education, employment, and public participation are available to an individual, based on the kind of Internet access they have**. In turn, the burden of not having Internet access grows for people as more and more of modern human life moves online. **In this sense, being unconnected means closing the future possibilities in a young person's life**.

Today we call this problem "digital possibilities divide." Someone without Internet access or without meaningful connectivity now lacks the same opportunities to learn, work, live, and connect that their peers with Internet access have.

This inequality creates a fundamental injustice in our world and imposes a limitation on the possibilities for billions of people around the world in terms of the kind of life they may live. Not only do we now know more about the consequences of being offline, but the consequences themselves are starker than they were when the global community committed to turn the digital divide into a digital opportunity in 2003.

Closing the digital possibilities' divide is a moral imperative and an economic necessity. For someone without Internet access, it is the difference between having the opportunity to learn or not. For a community, it is the potential difference between having access to specialist healthcare or not. For a country, it can mean the difference between a digital sector that is growing or not.

The cost is simply too high for us all not to bridge the digital possibilities' divide.

WE HOPE FOR A WORLD WITH UNIVERSAL, MEANINGFUL, AND AFFORDABLE BROADBAND

Achieving meaningful connectivity starts with closing the gaps from a holistic perspective. Indeed, infrastructure remains a fundamental part of the digital divide that still must be bridged. In addition, there are now questions around digital skills and literacy so users can be confident and secure. Networks must be more resilient and offer a higher quality service to enable users to do more online and to be able to rely on the Internet as a resource. Protecting Human Rights online is essential for ensuring freedom of expression and access to information that make open dialogue possible in a vibrant digital society; therefore, failing to address any one part of this is a failure to bridge the digital possibilities' divide.

PROPOSING A HOLISTIC VIEW OF BROADBAND POLICY

To close the digital possibilities' divide, we need policymakers to set an ambitious vision of universal, meaningful, and affordable broadband. Each of these components plays a part in building together a holistic view of what broadband policy needs to become, the work that remains to be done, and the progress we have yet to achieve.

UNIVERSAL	MEANINGFUL	AFFORDABLE	BROADBAND
The Internet should be available to everyone to use and benefit from. This includes closing disparities in gender, rurality, and age to ensure that digital transformation projects are inclusive and available to all.	In addition to infrastructure, people need adequate skills and rights to participate online. They need adequate policy and regulatory frameworks that provide network security, personal safety, and local content ecosystems that encourage new users to participate in the online world.	Access cannot be so expensive as to be available only to some, or only with limited rationing based on someone's ability to pay. Devices and data tariffs need to be sufficiently affordable at multiple income levels for connectivity to be meaningful for us all.	The quality of connectivity has an impact on user experience and the possibilities of this technology to transform lives. To be meaningful, broadband needs to have at least 4G speed with an unlimited access point at home, work, or a place of study. Everyone should have a smartphone they can use independently on a daily basis.

GDIP will support policymakers in broadening their approach to a broadband policy that addresses all of these elements and puts forward a bold vision for what ICT can do for us in the future.

In addition to comprehensively closing the gaps from a top-down perspective, policymakers need to pay attention to where inequalities in the world today are repeating themselves online. Most urgent is the stubborn digital gender gap that has stalled over recent years (GDIP, 2023). In addition, rural and remote communities scattered across the globe will increasingly rely on alternative forms of networking and innovations in technology to provide reliable, affordable, and meaningful broadband (Siyam et al., 2023; Kusuma et al., 2021; Campbell & Lane, 2023). Age, literacy, and ability all pose their own unique challenges which, if not properly addressed, could exclude millions across the globe. **Connectivity can be meaningful to the individual when provided, but it must be universally affordable for the Internet to be socially meaningful and for societies to grow**.

If we are successful in achieving universal, meaningful, and affordable broadband, the Internet can become an inclusive and vibrant online world. High-income countries, with all their privileges, have been able to demonstrate the benefit of ubiquitous, affordable Internet access. Contactless payments, online appointments, e-learning, innovations in entertainment and the creative arts, and the explosion of localized and personalized content are all examples of these benefits, which should not be mere privileges but reasonable expectations in anyone's life, no matter their circumstances and no matter where they live in the world.

Universal, meaningful, and affordable broadband holds benefits for us all – social and economic. The Internet has enabled a blossoming of new financial services, such as mobile money, that have secured individual savings and made it easier for people to access credit or loans on short notice (World Bank, 2021). New digital sectors are able to grow around a sustainable user base when people are meaningfully connected. These benefits, therefore, help us answer why the digital divide remains an urgent problem for us all. **The benefits of universal, meaningful, and affordable**

broadband are not just for individuals — we all benefit as more of the world goes online.

BROADBAND POLICY NEEDS TO CHANGE

Infrastructure is still an issue in several parts of the world. The latest ITU estimates suggest that over 2.5 billion people have never used the Internet (ITU, 2022). Similar research by GSMA suggests that only around 400 million people live beyond the reach of a mobile broadband network, while another 3 billion, despite having network coverage, do not use mobile Internet (GSMA, 2023). The unconnected who remain will be the most difficult to connect: They are disproportionately rural, poor, older, and women. New technologies, business models, and public policy strategies will be required to reach them.

Beyond just the infrastructure, however, policy needs to consider the other barriers to universal, meaningful broadband. These barriers range from concerns around affordability, skills, content, safety, resilience, and rights. Because of this, ICT policy can no longer be developed in a silo: It requires broad coordination across sectors and has to be built along with the dynamics of other policy areas to create the incentives that will help close the digital possibilities' divide. **Broadband is no longer just another piece of infrastructure – it is a critical means by which governments can accelerate their attainment of the Sustainable Development Goals (SGD), economies can scale, and individuals can grow**.

THE BROADBAND POLICY HORIZON: UNIVERSAL, MEANINGFUL, AND AFFORDABLE CONNECTIVITY

Our ambition calls for a holistic review of broadband policy. In too many instances, the targets that have been set are insufficiently ambitious, stakeholders have not been adequately engaged, or the policy framework remains uncertain. These are most frequently true in the Least Developed Countries (LDC) where the need for policy intervention is also the most critical.

WHAT LIES AHEAD FOR BROADBAND POLICY?

FIGURE 1

- **Broadband planning and universal access strategies remain key foundations for a successful policy framework**. These documents provide years-long strategic direction and measures of accountability that ensure consistent progress towards long-term goals. In best practice, they are responsive to the needs of a country's specific circumstances, create accountability, and reflect a diversity of inputs from all relevant stakeholders. Fundamentally, they create accountability in public stewardship of the ICT sector by policymakers and regulators, and foster trust amongst all stakeholders.
- **ICT policy, however, can no longer be developed in a silo: We must embed meaningful connectivity in different parts of public policy**. Going forward, this task is no longer just for those interested in broadband infrastructure but for those interested in the possibilities of what affordable, meaningful broadband enables. Strategies need to be more holistic than before, which requires both cross-sectoral inputs in broadband policy (e.g., what does broadband access mean for education) and also embedding broadband policy within other strategies (e.g., how can greater access support better public health outcomes). In this sense, it can build key links across stakeholder groups to maintain accountability and demonstrate the importance of continued attainment in moving toward broadband planning targets.
- **In addition to reaching out to different ministries, ICT policymakers need to become better and more inclusive leaders among all relevant stakeholders**. One dimension of this is that ICT ministries and regulators need to engage with their peers in other public

institutions to gather a wide range of inputs on how broadband can affect a country's attainment of the SDG. Furthermore, policymakers must engage a wide network of stakeholders, including the private sector — such as service providers and other stakeholders — and civil society — representing the diversity of the people for whom these services create the possibility of a better life. This reflects our experience with multistakeholder national coalitions, which bring together all relevant voices to the discussion.

- **The reimagining of broadband policy and the setting of new goals will require new measurements**. It is one thing for us to rethink broadband policy and write down our new ambitions, and quite another to adequately develop the right indicators and measures that will demonstrate progress, create transparency, and foster accountability across the sector. This process, however, is critical for maintaining the legitimacy of a long-term national broadband plan or a universal access strategy.
- **Sharing good practices can accelerate our progress toward achieving universal, meaningful connectivity**. Each country is on its own path of economic development and may have lessons to share with peer countries with similar ambitions. This emphasizes the importance of international and regional engagement by ICT policymakers to collaborate and exchange knowledge about policy development and program implementation. International organizations play a critical role in facilitating this exchange and in turn accelerating our global progress towards the SDG. Just as governments will need to adopt a more holistic perspective and engage more broadly, so too will the different international organizations that facilitate broadband policy development.

Although the scope of broadband policy must change, several key features remain the same. Broadband planning is a critical feature in the long-term development of the ICT sector. Broad stakeholder engagement builds trust and creates accountability. Indicators and measurement create transparency and maintain political momentum. Knowledge exchange can help accelerate

the process in different countries for attaining universal, meaningful, and affordable broadband.

Closing the digital possibilities' divide will not be achieved in a short period of time: It will require consistent, long-term action from a wide range of stakeholders. These policy principles for universal, meaningful, and affordable broadband set us on the right course.

IT IS UP TO US

Closing the digital divide is no longer just about infrastructure. **Policymakers looking to make large scale advances need to understand the human barriers to Internet access**. This requires consideration of digital skills, online safety, network resilience, and Human Rights, since they all affect the social environment in which we use the Internet every day. In this sense, while it will help connect investment with human impact, it will require new ambitions and new expertise in ICT policymaking.

Policymakers that fail to rescope their agendas to a more holistic perspective will miss out on the greatest effects of digital transformation. ICT have enabled a widespread transformation in society, the economy, and governance, which affects the way we interact every day. This reflects the way that locally relevant content and services can generate greater demand for broadband services and create a positive feedback loop between the demand for affordable and universal broadband and how meaningful that access will be.

We are engaging with governments and regulators that are ready to change. Political will is the critical first ingredient toward ensuring a positive change in broadband policy frameworks. Where that will exists, organizations like GDIP are willing to help and engage with stakeholders to begin the process of reviewing and reimagining what broadband policy could be and should be. Although this process is complex and multifaceted, the benefits are there for policymakers that are committed and ambitious to achieve lasting change.

It is up to us to close the digital possibilities' divide and build an online world that empowers us all.

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CHAPTER 2
Achieving universal and meaningful digital connectivity Setting a baseline and targets for 2030[1]

International Telecommunications Union

Disclaimer

The present document presents the outcomes of the work of a multistakeholder consultation that took place in 2021, including within a subworking group convened by the Roundtable on Global Connectivity as a follow-up to the United Nations Secretary-General's *Roadmap for Digital Cooperation*.

The baseline and the targets in this document are a first version established based on existing data, statistics, and evidence available today. They will necessarily evolve to capture new concepts and indicators and to ensure relevance through 2030.[2]

The designations relative to geographical entities in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations or the International Telecommunication Union (ITU) concerning the legal status of any country, territory, city, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Contact: indicators@itu.int.

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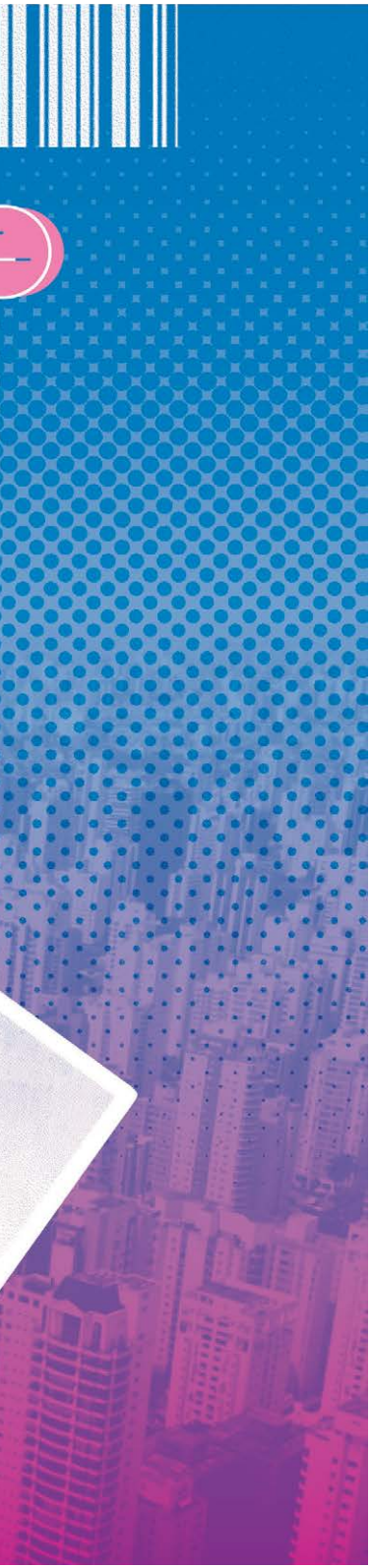
1 This chapter has been adapted from the publication *Achieving universal and meaningful digital connectivity. Setting a baseline and targets for 2030* with the authorization of the International Telecommunication Union (ITU). Sole responsibility for the adaptation lies with the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of the Brazilian Network Information Center (NIC.br). The ITU version shall prevail in the event of any discrepancy between the adapted publication and the ITU official version. The original article is available at: https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030_BackgroundPaper.pdf

2 See Section 3, "Measuring universal and meaningful digital connectivity," for details.



INTRODUCTION

The world is becoming increasingly digital, further exposing us to both the vast promise and peril of digital technologies. To maximize the benefits of digital technologies and address the challenges, in 2018-2019 the United Nations Secretary-General convened a *High-level Panel on Digital Cooperation*.[3] In 2020, based on the panel's report and following further multistakeholder consultations, the Secretary-General issued his report *Roadmap for Digital Cooperation*,[4] which includes, at its core, a commitment to "connect" all people to the Internet.

The need to promote digital connectivity is clear and urgent: At the beginning of this Decade of Action, more than one-third of the world population – 2.9 billion people – remains offline (ITU, 2021). In the United Nations (UN) designated least developed countries, less than 30% of the population uses the Internet, according to a 2021 estimate (ITU, 2021). The COVID-19 pandemic has increased the cost of being offline: Connectivity is no longer a luxury but a lifeline for working, learning, keeping in touch, and accessing essential services. And among those already online, many face barriers that prevent them from harnessing fully the potential of connectivity.

In this context, the United Nations Secretary-General's Roadmap details specific actions that the UN will undertake "to ensure that every person has safe and affordable access to the Internet by 2030, including meaningful use of digitally enabled services, in line with the Sustainable Development Goals (SDG)," including specific supporting efforts to establish a baseline of digital connectivity that individuals need in order to access the online space, as well as a definition of "affordability," including universal targets and metrics.

The multistakeholder Roundtable on Global Connectivity, co-chaired by the United Nations Children's Fund (UNICEF) and International Telecommunication Union (ITU), with the support of the Office of the Secretary-General's Envoy on Technology, works to follow up on the Roadmap by implementing its recommendations.

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3 Find out more at: https://www.un.org/en/sg-digital-cooperation-panel

4 The full publication is available at: https://www.un.org/en/ content/digital-cooperation-roadmap/

Within this Roundtable, a sub-working group (SWG) led by ITU was convened and tasked with developing a baseline and formulating targets for digital connectivity.[5] Underpinning the mandate was the expectation that such a tool would serve global monitoring, prioritization, and advocacy efforts, thus contributing to the Roadmap's overall objective.

The SWG was guided by two questions: (a) What is the level of connectivity of countries today? And (b) where should countries be in 2030? The baseline aims to answer the former question, the targets the latter. The SWG followed a four-step process:

1. Defining the concept of "universal and meaningful connectivity" and developing an analytical framework.
2. Measuring universal and meaningful connectivity.
3. Computing the baseline.
4. Setting 2030 targets for selected indicators.

A FRAMEWORK FOR UNIVERSAL AND MEANINGFUL DIGITAL CONNECTIVITY

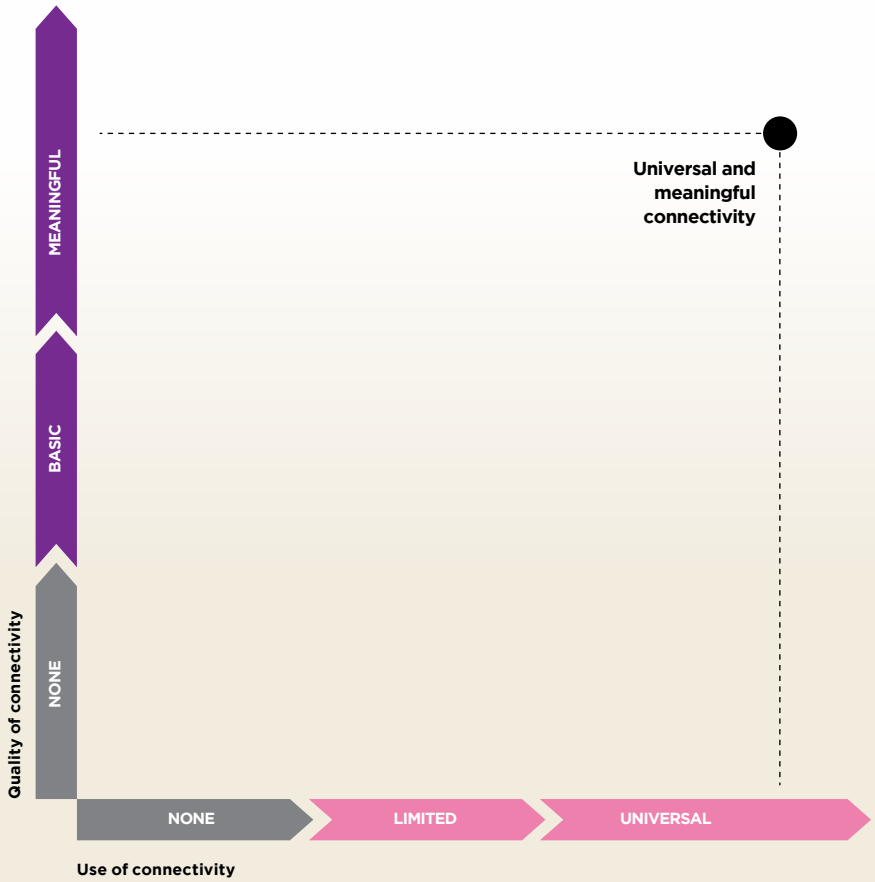
To maximize its impact on society and the economy, digital connectivity[6] must be *universal* and *meaningful*.[7] Figure 1 illustrates the two dimensions: Use – ranging from "none" to "universal" – and quality – ranging from "no connectivity" to "meaningful connectivity."

5 The work started in December 2020 and was led by ITU's ICT Data and Analytics (IDA) Division. The SWG met virtually five times from January to July 2021. In addition to those meetings, input was collected through written submissions by, and consultations with, individual members of the SWG, and members of the Roundtables on Global Connectivity and on Digital Inclusion. Other experts, ITU staff and participants of several webinars at which the work of the SWG was presented also provided feedback and suggestions.

6 Connectivity in this context is defined as the use of the Internet by individuals.

7 For readability, from here on we omit the word "digital" when referring to connectivity.

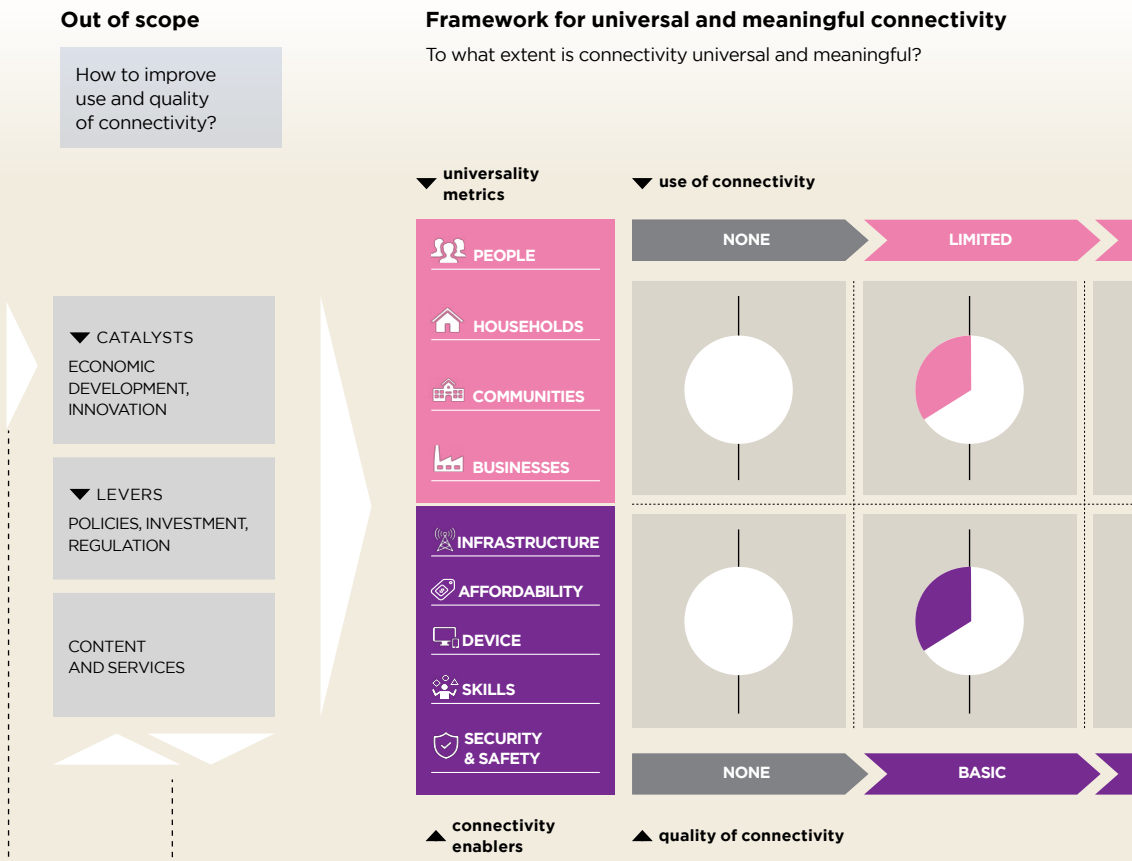
FIGURE 1 - THE TWO DIMENSIONS OF CONNECTIVITY



SOURCE: PREPARED BY THE AUTHORS.

"Universal connectivity" means connectivity for all. "Meaningful connectivity" is a level of connectivity that allows users to have a safe, satisfying, enriching, and productive online experience at an affordable cost. The two dimensions are complementary; neither universal connectivity with poor quality nor meaningful connectivity for the few will yield significant, society-wide benefits. At the same time, the two dimensions obviously reinforce each other: More use can lead to more meaningful connectivity, and vice versa.

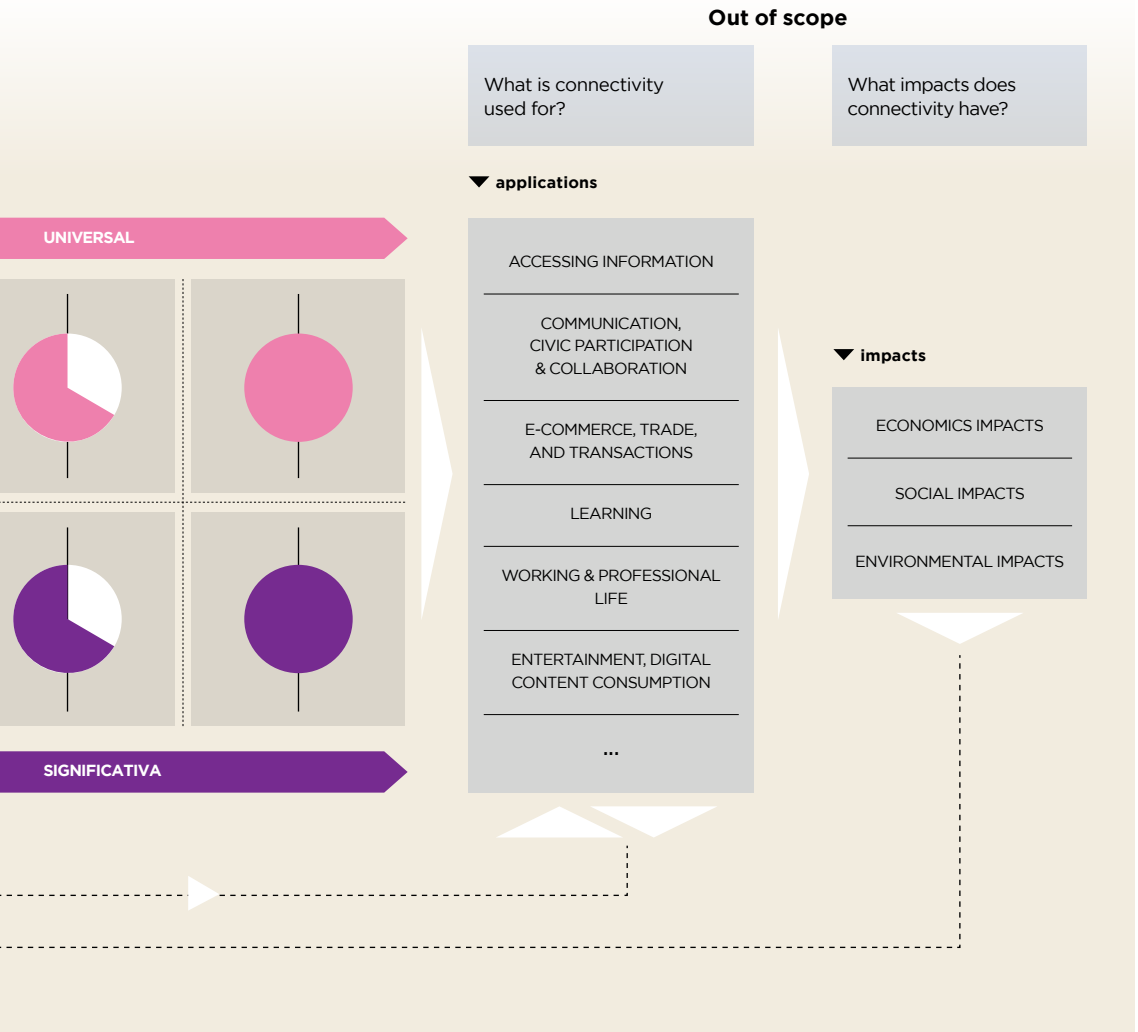
FIGURE 2 - FRAMEWORK FOR UNIVERSAL AND MEANINGFUL CONNECTIVITY



SOURCE: PREPARED BY THE AUTHORS.

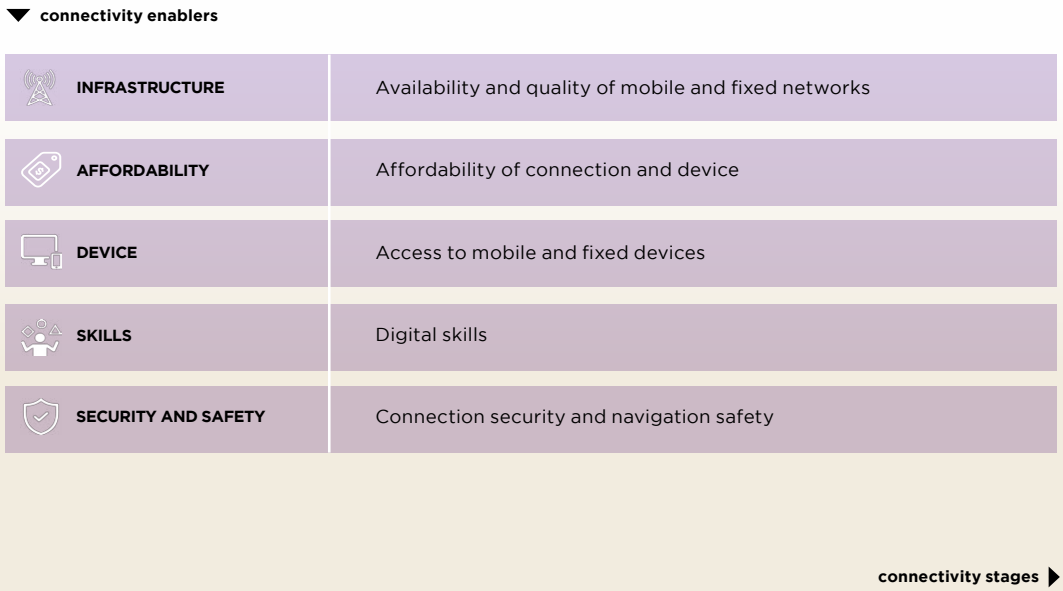
Based on the definition of universal and meaningful connectivity, the SWG developed an analytical framework (Figure 2). For presentation purposes, the two dimensions of connectivity are superimposed, rather than presented as orthogonal vectors (as in Figure 1).

Measuring universality (top half of Figure 2) relies on a set of "universality metrics," instead of relying on a single measure, such as the share of the population that is connected.



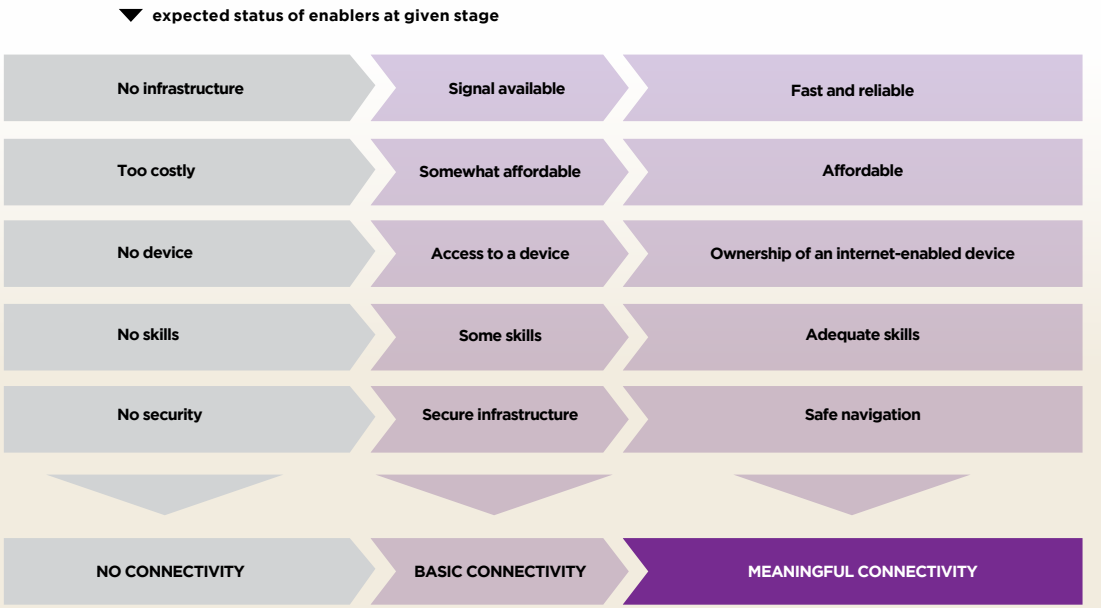
These metrics are organized in four categories: People, households, communities, and enterprises. The latter three represent the main places where people can connect: At home, in schools and community centers, and at work. Meaningful connectivity depends on several factors, called "connectivity enablers" for the purpose of this exercise: Infrastructure, affordability, device, skills, and safety and security (bottom half of Figure 2).

FIGURE 3 - EXPECTED STATUS OF ENABLERS BY STAGE OF CONNECTIVITY



SOURCE: PREPARED BY THE AUTHORS.

Figure 3 presents an expected status for each enabler and each stage of development. Although not explicitly mentioned, universality is implied for each enabler: For a status to be met, that outcome must be for everyone. For instance, in the meaningful connectivity stage, infrastructure would be fast and reliable for everyone: Everyone would own a smart device. To enhance the quality of connectivity, a certain threshold of performance must be reached on each of these factors, as each represents a binding constraint: There is no connectivity without infrastructure; no one will want to connect if it is prohibitively expensive; one cannot connect without a device; and connecting is possible but hazardous without any security. Similarly, there is no meaningful connectivity without improvement by all enablers. If a country completely neglects, say, digital literacy, the capacity of its population to make good use of connectivity is irremediably compromised, even if all the other factors are in place.



The analytical framework defines the scope and sets the boundaries of the exercise (see headings in Figure 2). The following aspects of connectivity are therefore out of scope.

- **Levers**: The enablers of connectivity represent areas where policymakers and other stakeholders can intervene using tools or "levers," such as investment, policies, and regulation (left hand-side of Figure 2). This includes issues such as fiscal policy (e.g. taxation and value-added tax), trade policy (tariffs) or competition policy. While these levers undoubtedly have an impact on connectivity, they are not included in the framework; it is deliberately agnostic about the means to improve on the various factors, as there is no single pathway and no one-size-fits-all policy mix that can be prescribed to all countries.
- **Catalysts**: Furthermore, the framework does not include broader factors and trends (called "catalysts"

in Figure 2), such as economic development and technological innovation, which contribute to improving the quality enablers. For instance, economic development increases purchasing power and therefore makes connectivity more affordable. Innovation can reduce the cost of infrastructure and the price of devices or increase the quality of connectivity. This approach implies that the framework excludes drivers of economic development that have a bearing on the level of connectivity, for example, electricity and literacy are very much prerequisites for connectivity. However, the objective of the present exercise is not to replicate the SDG, but to complement them, by offering much more granularity on the theme of digital connectivity, which is captured by only seven indicators in the SDG framework.

- **Content and services**: The availability and quality of online content and services are treated as a lever: The more content and services are available, accessible, and relevant, the more likely people are to connect. The relationship is two-way: The more people go online; the more content creators and service providers are incentivized to create additional content and services. There were extensive discussions on whether content and services are an enabler of connectivity, but the conclusion was that content and services do not directly influence the quality of connectivity: Which is what the baseline aims to assess. Content and services determine what connectivity can be used for, i.e. its applications.
- **Applications**: The framework is deliberately agnostic about *applications*, and what people do with connectivity. The exercise is about measuring the use and quality of connectivity, rather than assessing what people do online. The neutrality of use cases is paramount: One cannot prescribe specific online behaviors by decreeing a list of meaningful, useful, relevant, or impactful applications. Although applications, content, and services are closely related, and indeed influence each other, they are distinct because the former represents the purpose, whereas the latter are the means.

- **Impacts**: By extension, the societal, environmental, and economic impacts of connectivity and its applications are well beyond the scope of the exercise.[8]

Some of these aspects, including levers and applications, for which indicators exist, may be included at a later stage among the contextual indicators in the envisaged dashboard (as presented in Section 6, "A dashboard for tracking universal and meaningful digital connectivity").

MEASURING UNIVERSAL AND MEANINGFUL DIGITAL CONNECTIVITY

Measuring universal and meaningful digital connectivity globally is challenging for two reasons:

- **Concept relevance**: In a rapidly evolving field such as information and communication technologies (ICT), tracking new technologies, needs and behaviors is challenging and yet critical to ensure the relevance of the model through 2030.
- **Data availability**: The lack of data is a perennial issue. The best indicators are often available only for a few developed economies. If the baseline only comprised these indicators, it would be of little value to most countries, including the least connected. This trade-off between the quality and availability of indicators significantly constrains the selection of indicators.

To help address both challenges and ensure relevance through 2030, the baseline is built as a flexible, evolving model that will be reviewed regularly: As new indicators become available, data coverage improves, or new empirical evidence emerges, indicators will be added, dropped, and refined.

To help navigate the quality–availability trade-off, the indicators for the first iteration of the baseline were organized into two tiers, based on their level of maturity (Table 1).

8 Empirical research shows that the impacts are largely positive: Economic opportunities, access to basic services, productivity gains, etc. But these outcomes are influenced by a multitude of other factors – not just connectivity.

TABLE 1 - INDICATOR CLASSIFICATION BASED ON MATURITY

		POSSIBLE FUTURE INCLUSION
CRITERION / MATURITY STAGE	TIER 1: HIGH	TIER 2: MEDIUM
Addressing a single issue	Yes	
Reliable data available	For many countries	Some may be available
Methodology	Internationally agreed methodology	Proven methodology, but may require further harmonization
Independently verifiable	Yes	
Collection periodicity	At least every 2 years	Regular, even if lower frequency
Curator	Reputable organization in charge	Potential curators identified
Open data status	At a minimum: Readily and freely accessible, reusable with attribution	

SOURCE: PREPARED BY THE AUTHORS.

Tier 1 indicators are those that can be included immediately in the baseline because they are readily available, their methodology is robust, and country coverage is sufficient or is expected to increase rapidly. The maturity of the indicator is more important than the immediate availability for many countries. Tier 2 indicators are less mature and therefore are not included in the first iteration of the baseline, because they are only available for a very limited number of economies, data were only collected once, or their methodology requires further harmonization. Tier 2 indicators will be listed separately in the baseline. Data will be reported when available, even if only for a handful of economies, to encourage harmonization efforts and adoption by more administrations.

Outside these two categories, many other indicators were identified but not retained. These indicators may be based on a methodology that needs to be improved, vetted, or have very limited geographical coverage. Furthermore, a curator, a strategy, and/or the resources needed to collect the underlying data on a regular basis, at a large scale, and/or with sufficient quality, may be lacking. For these reasons, these indicators are unlikely to be included in the baseline anytime soon; however, they should be monitored and considered for inclusion once they reach a sufficient level of maturity.

The tiering system only assesses the quality and coverage of the indicators considered for inclusion. It is not an indication of the importance or relevance of the concept measured by the indicator. A concept measured by a tier 2 indicator or not measured at all may be just as important as a concept captured by a tier 1 indicator. In addition, not all tier 1 indicators will have a target associated with it (as presented in Section 5, "Setting aspirational targets for 2030").

Box 1 at the end of this section lists some of the concepts that were suggested by the SWG, but eventually rejected because they did not fit in the framework.

DISAGGREGATED DATA

The baseline is an assessment of the current state of connectivity of countries. However, country-level data can conceal vast differences across segments of the population and locations, especially in large countries. Disaggregation provides a more granular assessment and helps design better, more targeted, and ultimately more effective, policy interventions. Common disaggregation dimensions include gender, age, occupation, income, highest education level, and labor force status, as well as geography (e.g. location and administrative divisions). The availability of disaggregated data usually depends on the ability of a country to administer an ICT household survey. Only a survey can provide information on the use of ICT by the respondent, and his or her socio-demographic status, household composition, location, etc. Despite their enormous value for policymaking, less than half of the countries conduct ICT household surveys on a regular basis, and often, survey instruments only include a few of the dimensions listed above. In addition, some marginalized and vulnerable groups, such as forcibly displaced people or people with disabilities, are often under-represented (if represented at all) in the survey samples.

Consequently, disaggregated data remain scant. The first iteration of the baseline includes disaggregation by gender and location for several tier 1 indicators. However, the model can easily accommodate new disaggregated data as they become available.

LIST OF INDICATORS FOR THE FIRST ITERATION OF THE BASELINE

A list of indicators included in the first iteration of the baseline is presented below.

UNIVERSALITY METRICS

Universality means that everyone should be able to go online. The set of metrics to measure the use of connectivity includes the share of the population using the Internet and the proportion connecting daily. These two measures are complemented by measures of connectivity of households, communities, and enterprises.

Tier 1 indicators:

- Percentage of individuals using the Internet, total and by gender, age, and urban/rural location;
- Percentage of households with access to the Internet, total and by urban/rural location;
- Percentage of enterprises using the Internet, total and by size;
- Percentage of schools with Internet access, by education level (based on International Standard Classification of Education [ISCED]);
- Percentage of individuals using the Internet, by frequency of use;
- Active mobile-broadband subscriptions per 100 inhabitants;
- Fixed-broadband subscriptions per 100 inhabitants.

CONNECTIVITY ENABLERS

The indicators used to measure the quality of connectivity are listed by each enabler.

Infrastructure

A first requirement for basic connectivity is that infrastructure is in place and functioning. To be meaningful, infrastructure must be of high quality, allowing for a fast and reliable connection. This framework adopts a technology-neutral approach. Satellite connectivity, and fixed and mobile terrestrial networks, all can contribute to

connecting people to the Internet.[9] Indicators on mobile and fixed coverage are already included. While satellite already covers 100% of the world population, indicators on take-up will be included once available.

Tier 1 indicators:

- Percentage of population covered by a mobile network, by technology, total, and by urban/rural location;
- Population within reach of transmission networks, by distance;
- International bandwidth usage, per Internet user and per capita;
- Average monthly mobile broadband Internet traffic per active mobile broadband subscription;
- Average monthly fixed broadband Internet traffic per fixed broadband subscription;
- Median upload and download speeds;
- Number of Internet exchange points.

Tier 2 indicators:

- Percentage of households covered by fixed networks;
- Amount of spectrum allocated for International Mobile Telecommunications (IMT) systems, in megahertz (MHz);
- Amount of spectrum licensed for IMT systems, in MHz.

Additional concepts to consider for the infrastructure enabler

This first iteration of the baseline is not exhaustive. There are elements that are important for meaningful connectivity, but that are not yet covered by indicators. Some of these concepts and indicators are highlighted here.

To fully capture the availability of connectivity infrastructure, alternate technologies to mobile and fixed networks could be considered, such as fixed wireless deployments and dynamic spectrum allocation. Since satellite, fixed, and mobile terrestrial connectivity can all contribute to achieving meaningful connectivity, it would be relevant to include an indicator on

9 Connectivity from satellites of the types of geosynchronous equatorial orbit (GEO), medium-earth orbit (MEO), and low-earth orbit (LEO).

satellite take-up. Best practices encourage the creation of coverage maps as a superior form to estimate coverage, which would also allow users to see areas covered or not covered by any technology. Various maps exist, but no open-source maps containing all technologies.

ITU is currently exploring the creation or compilation of coverage maps, which should be added to a future iteration of the baseline. More indicators on the quality of service should also be included, such as uptimes, latency, jitter, and packet loss.

Spectrum indicators could be broadened to cover not only IMT but also other wireless technologies, such as satellite and fixed wireless technologies. They should therefore include relevant bands for these other technologies, including for Wi-Fi and other license-exempt uses of spectrum to provide Internet connectivity.

AFFORDABILITY

One of the main barriers for people to go online is affordability, but it is also important for moving from basic connectivity to meaningful connectivity.

Tier 1 indicators:

- Price of an entry-level mobile broadband subscription as a percentage of gross national income (GNI) per capita, total, and by top/bottom 40% of earners;
- Price of a next-level mobile broadband subscription as a percentage of GNI per capita, total, and by top/bottom 40% of earners;
- Price of an entry-level fixed broadband subscription as a percentage of GNI per capita, total, and by top/bottom 40% of earners.

Tier 2 indicators:

- Smartphone affordability;
- Affordability of other Internet-enabled devices (e.g. computers and tablets).

DEVICE

Access to an Internet-enabled device is required to go online. The baseline considers both mobile phones and desktop computers, recognizing that the most basic models of the former

are cheaper, while the latter admittedly allows for a richer experience. For mobile phones, the baseline considers use and ownership, recognizing that mere access to a device imposes constraints, including when and for how long one can be online.

Tier 1 indicators:

- Percentage of households with a computer, total, and by urban/rural location;
- Percentage of individuals owning a mobile phone, total, by gender, by urban/rural location, and by type of mobile phone;
- Proportion of households with telephone, by type of phone;
- Proportion of individuals using a computer;
- Proportion of individuals using a mobile cellular telephone, by type of mobile phone.

Tier 2 indicators:

- Percentage of Persons of Concern[10] with chip/devices registered in their own names.

SKILLS

An important barrier for people to go online is a lack of skills. Meaningful use of the Internet requires that people are digitally literate.

Tier 1 indicators:

- Percentage of individuals with ICT skills, total and by gender.

SECURITY AND SAFETY

A safe and secure Internet is important for people to have the trust to go online. The two indicators identified focus on infrastructure. In future iterations, it will be important to add concepts focusing on the users.

Tier 1 indicators:

- Global Cybersecurity Index score;

10 "Persons of concern," according to the Office of the United Nations High Commissioner for Refugees (UNHCR, 2017, p. 1), include refugees, asylum seekers, internally displaced persons, returnees, stateless persons and others falling under the mandate of UNHCR.

- Secure servers per 1 million people.

Tier 2 indicators:

- Government websites' default use of Hypertext Transfer Protocol Secure (HTTPS).

BOX 1 - CONCEPTS AND INDICATORS NOT RETAINED

Members of the SWG suggested several indicators that were not retained because of conceptual issues or lack of direct relevance. Among them:

- **Intentional network disruptions/ shutdowns**: Disruptions or outages are an indication of the reliability of infrastructure if they are the result of a technical issue. They are an indicator of weak security if they are the result of a cyberattack. If the shutdowns or disruptions are intentional, they are the consequence of a political decision, which cannot be considered an indicator of the reliability of infrastructure. In addition, the concept is related to the content, which is excluded from the framework, as explained in Section 1, "Introduction." Finally, a concept with a significant political dimension would likely be controversial and could divert the discussion away from the real objective of this exercise.
- **Taxation**: As explained in Section 1, "Introduction," the framework is agnostic about the means to improve connectivity (levers in Figure 2), notably by making it more affordable. Second, singling out taxation would be wrong, as several other levers, such as competition and trade policies, also influence retail prices. Third, the optimal level of taxation depends on a myriad of economic and social considerations, and a lower tax rate is not necessarily more desirable.
- **Skills**: A suggestion was made to include the number of graduates in ICT-related fields of study as a proxy for the level of digital skills. Such an indicator might be relevant in the context of a discussion about the future of work or technological innovation, but less so in the context of this framework. The digital skills required for meaningful connectivity ought to be acquired as part of the curriculum and efforts for upskilling the population.

COMPUTING THE BASELINE

The baseline describes a country's current state of connectivity in terms of use and quality, based on the list of indicators established in the previous step.

As explained above, the set of indicators that compose the baseline will necessarily evolve to capture new concepts and indicators and ensure relevance through 2030.

The baseline is designed as an open, flexible tool that can accommodate those changes. The baseline draws on the latest data. Data are sourced from the relevant organization that is responsible for the global data collection of the respective indicator. Many of these organizations are members of the multistakeholder Partnership on Measuring ICT for Development.

The degree of completeness and timeliness of the assessment will vary, depending on data availability.

Once populated with data, the first iteration of the baseline will provide an important reference point against which future performance can be assessed. When possible, historical data will be included for time series analysis and a better understanding of a country's dynamics. The baseline will then be updated yearly, but the "snapshot" of the iteration will remain available.

Table 2 lists only tier 1 indicators included in the baseline. The table identifies those indicators for which it is proposed to set a target.[11]

Indicators are grouped according to the four groups of universality metrics (connected people, connected households, connected communities, and connected enterprises) and the five connectivity enablers (infrastructure, affordability, device, skills, and security and safety).

The core indicators capture the general concepts and are complemented by disaggregated indicators (as explained in Section 3, "Measuring universal and meaningful digital connectivity"), which provide a more granular assessment and additional policy guidance. Targets are set for selected core indicators and selected disaggregated indicators.

Finally, tier 2 indicators are not listed in Table 2. They will be featured in a separate section of the baseline, and data reported for countries for which they are available.

The baseline is not an index (or "composite indicator"). Individual indicators are not aggregated, and there are no overall rankings. This does not mean, however, that indicators will be considered in isolation, and the baseline will

11 For more details, see Section 5, "Setting aspirational targets for 2030."

feature information such as the number of indicators for which a country is on track to meet the 2030 targets, and the number of indicators where a country is below/above/in line with its peers.

While the country will likely remain the main "unit of analysis," a baseline could later be computed for country groups (e.g. regions, income levels, and development status), and possibly for the world. The baseline could also easily be computed at the subnational level, provided data exist at that level.

TABLE 2 - PRELIMINARY LIST OF INDICATORS INCLUDED IN THE BASELINE AND TARGETS[12]

Indicator category and disaggregation dimension	Indicator with units	Main source	Coverage	
Connected people				
	Internet users, % population	ITU	151	
Age	Aged 15 years or older	ITU	118	T
Location	Urban	ITU	57	
	Rural	ITU	55	
Gender	Men	ITU	112	
	Women	ITU	112	
	Gender parity score (1 = parity)	ITU	112	T
Level of education	Primary	ITU	59	
	Lower secondary	ITU	61	
	Upper secondary	ITU	64	
	Tertiary	ITU	64	
	Individuals connecting at least once a day, % users	ITU	61	
Frequency	Pelo menos uma vez por semana, mas não todos os dias	ITU	70	
	Menos de uma vez por semana	ITU	69	
	Mobile broadband subscriptions per 100 inhabitants	ITU	191	

12 Under "indicator type," "Disaggregated" indicates a disaggregation dimension (see Section 3, "Measuring universal and meaningful digital connectivity," for more details). "Coverage" indicates the number of economies for which data is available for the period 2018-2020 (as of March 2022). The "T" symbol identifies indicators for which a target has been set (see Section 5, "Setting aspirational targets for 2030," for details).

Indicator category and disaggregation dimension	Indicator with units	Main source	Coverage	
Connected households				
	Households with Internet access, %	ITU	130	T
Location	Urban	ITU	66	
	Rural	ITU	71	
Connected communities				
	Schools connected to the Internet, %	—	—	T
Level of education	Primary		87	
	Lower secondary	UNESCO Institute for Statistics (UIS)	88	
	Upper secondary	UIS	92	
	Secondary	UIS	91	
Connected enterprises				
	Enterprises using the Internet (0 employees or more), %		—	T
Size	Micro	United Nations Conference on Trade and Development (UNCTAD)	—	
	> 10 employees	UNCTAD	—	T
	Small	UNCTAD	—	
	Medium	UNCTAD	—	
	Large	UNCTAD	—	

Indicator category and disaggregation dimension	Indicator with units	Main source	Coverage	
Infrastructure				
	Mobile network coverage, % da população			
Technology	2G	ITU	195	T
	3G	ITU	195	T
	4G	ITU	184	T
	5G	ITU	—	T
	Internet exchange points, contagem	Packet Clearing	209	
	Distance to transmission networks, % da população			
Radius	Within 10 km	ITU	202	
	Within 25 km	ITU	202	
	Within 50 km	ITU	202	
	Within 100 km	ITU	202	

Indicator category and disaggregation dimension	Indicator with units	Main source	Coverage	
	Fixed broadband speed, % de assinaturas			
Speed	< 2 megabits per second (Mbps)	ITU	149	
	2 - 10 Mbps	ITU	152	
	>10 Mbps	ITU	154	T
	Download speed composite, score 0 – 100	—	>140	
	Upload speed composite, score 0 – 100	—	>140	
	Fixed broadband Internet traffic per subscription, gigabytes (GB)	ITU	123	
	Mobile broadband Internet traffic per subscription, GB	ITU	142	
	International bandwidth usage per Internet user, kilobytes per second (Kbps)	ITU	151	
	International bandwidth usage per capita, Kbps	ITU	116	
	School connectivity			
Speed	Minimum download speed, Mbps	Giga	30	T
	Minimum Kbps per student	Giga	—	T
	Minimum data allowance, GB	Giga	—	T
Affordability				
	Entry-level mobile broadband subscription price	ITU and Alliance for Affordable Internet (A4AI)		
Income	% monthly, GNI per capita	ITU and A4AI	189	T
	% average income of bottom 40% of population	ITU and A4AI	110	
	Next-level mobile broadband subscription price	ITU and A4AI		
Income	% monthly, GNI per capita	ITU and A4AI	188	
	% average income of bottom 40% of population	ITU and A4AI	110	
	Entry-level fixed broadband subscription price	ITU and A4AI		
Income	% monthly, GNI per capita	ITU and A4AI	177	T
	% average income of bottom 40% of population	ITU and A4AI	106	T
Device				
	Households with a computer, %	ITU	124	
Location	Urban	ITU	58	
	Rural	ITU	56	
	Households with a mobile phone, %	ITU	70	
Technology	Smartphone	ITU	30	

Indicator category and disaggregation dimension	Indicator with units	Main source	Coverage	
	Individuals using a computer, %	ITU	76	
	Individuals using a mobile phone, %	ITU	57	
Technology	Smartphone	ITU	22	
Gender	Men	ITU	56	
	Women	ITU	56	
	Gender parity score (1 = parity)	ITU	56	T
Location	Urban	ITU	42	
	Rural	ITU	39	
	Individuals owning a mobile phone, %	ITU	85	
Age	Aged 15 years or older	ITU	38	T
Technology	Individuals owning a smartphone, %	ITU	22	
Gender	Men	ITU	77	
	Women	ITU	77	
	Gender parity score (1 = parity)	ITU	77	T
Location	Urban	ITU	30	
	Rural	ITU	29	
Digital skills				
	Individuals with basic skills, %	ITU	87	T
Gender	Men	ITU	51	
	Women	ITU	51	
	Gender parity score (1 = parity)	ITU	51	T
	Individuals with intermediate skills, %	ITU	86	T
Gender	Men	ITU	50	
	Women	ITU	50	
	Gender parity score (1 = parity)	ITU	50	T
	Individuals with advanced skills, %	ITU	80	
Gender	Men	ITU	44	
	Women	ITU	43	
	Gender parity score (1 = parity)	ITU	43	
Security and safety				
	ITU Global Cybersecurity Index, score 0 – 1	ITU	195	
	Secure servers, per 1 million inhabitants	Netcraft	261	

SOURCE: PREPARED BY THE AUTHORS.

SETTING ASPIRATIONAL TARGETS FOR 2030

One of the main goals of establishing a baseline is to set indicative targets for 2030 that are consistent with the United Nations Secretary-General's ambition of ensuring "that every person has safe and affordable access to the Internet by 2030, including meaningful use of digitally enabled services, in line with the Sustainable Development Goals" (NU, n.d., para. 1).

For setting targets, it was decided to (a) set the same target value for all countries; and (b) be aspirational, by setting the value corresponding to the ideal state for the concept measured by the target, even if the target is not necessarily attainable by all countries within the considered timeframe. The reasons are the following:

- The targets should reflect, and be consistent with, the spirit and ambitions of the SDG and the United Nations Secretary-General's Roadmap for Digital Cooperation.
- A target that applies to all countries and corresponds to the ideal state is simple and easy to grasp, which is critical for communication and advocacy purposes, especially to a larger public outside the development community.
- Differentiated targets by development status or region would sow confusion. Differentiated targets could also suggest a deterministic approach: Countries at a certain development stage will remain in that stage and should therefore only aspire to meet the lower target and will thus remain below the ideal state. It also rules out the possibility that a new technology suddenly allows leapfrogging in a certain area, making the lower target obsolete. Differentiated targets could lead to complacency, whereas the intent with this exercise is to create a sense of urgency.
- On the road to 2030, intermediate targets could be set, for example, for 2025, but introducing a second set of targets could again create confusion. This approach could also encourage the pursuit of "quick wins" at the expense of careful planning, notably for investments. There are other ways to monitor progress and ensure countries are "on track," (as described in the next section), notably by computing a "time to reach the target."

Table 3 lists the indicators for which a target of 2030 ought to be set, the proposed target value, and the rationale for setting a particular value. If an indicator with a target is a disaggregated indicator, its parent indicator is listed, too, for clarity, regardless of whether a target has been set for that parent indicator. This section explains the rationales in more detail.

TABLE 3 - INDICATORS WITH 2030 TARGETS

Indicator with units	2030 target	Guiding principle
Universality metrics		
Internet users, % population		
Aged 15 years or older	100	Universality
Gender parity score (1 = parity)	1	Parity
Households with Internet access, %	100	Universality
Schools connected to the Internet, %	100	Universality
Businesses using the Internet (0 employees or more) %	100	Universality
> 10 employees		Universality
Connectivity enablers		
Mobile network coverage, % population		
3G	100% for the most advanced technology already present in the country, with minimum coverage of 40%	Universality
4G		
5G		
Fixed-broadband speed, % subscriptions		
> 10 Mbps	100	Universality
School connectivity		
Minimum download speed, Mbps per school	20	Technology
Minimum download speed, Kbps per student	50	Technology
Minimum data allowance, GB	200	Technology
Entry-level broadband subscription price		
% GNI per capita	2	Affordability
% average income of the bottom 40% of population	2	Affordability
Individuals using a mobile phone		
Gender parity score (1 = parity)	1	Parity
Individuals owning a mobile phone, % population		
Aged 15 years or older	100	Universality
Gender parity score (1 = parity)	1	Parity

Aged 15 years or older population with basic skills, %	70	Very high prevalence
Gender parity score (1 = parity)	1	Parity
Population aged 15 years or older with intermediate skills, %	50	Majority of population
Gender parity score (1 = parity)	1	Parity

SOURCE: PREPARED BY THE AUTHORS.

UNIVERSALITY TARGETS

When setting targets for some of the universality metrics, the concept of universality – literally everyone or every household – must be interpreted loosely.

For individual usage, it is neither expected nor desirable that all children use the Internet. Indeed, approaches to bringing children online varies across geographies. Consequently, the target is set for the population aged 15 years or older. As an additional benefit, this helps improve cross-country comparability: While the minimum age of the in-scope population varies from survey to survey – from 3 to 16 years old – the segment of the population aged 15 years or older is within the scope of most surveys. When picking a target value, one must also consider that, among the population, some individuals do not want to use the Internet, even if they have access to it and can afford it. Finally, even if every individual aged 15 years or older in a country is effectively online, measurement errors could still produce a share lower than 100%. For these reasons, the target for Internet users will be considered "met or nearly met" when the share of Internet users among the population aged 15 years or older is 95% or higher.

The same approach applies to the indicator "individuals owning a mobile phone," part of the connectivity enabler "device." This indicator only considers the population aged 15 years or older. And while universality is the objective, the target is considered "met or nearly met" when the share is 95% or higher, because some people may not want to own a device.

For the indicator "households with internet access," consistent with the approach described above, the target is considered "met or nearly met" if the share of households with access is 95% or higher, acknowledging that some households may not want to have access at home and accounting for possible measurement errors.

Finally, for the universality metrics related to schools, communities, and enterprises, the targets are set to 100%.

GENDER PARITY TARGETS

The digital gender gap is of particular concern, given that women account for roughly half of the world's population. Efforts to achieve universal connectivity involve specific efforts for boosting connectivity among women. For gender-related indicators, the digital gender gap should be computed, and the target is set to parity. This measure complements a measure of adoption among the general population by tracking adoption by gender regardless of the general level of adoption. Between two countries with a low level of adoption, the one closer to gender parity is better off.

The gender parity score is computed as the ratio of the share of the female population meeting the criterion (e.g. using the Internet) and the share of the male population meeting the criterion. A value of 1 means gender parity. A value greater than 1 means that the share of the female population meeting the criterion is greater than the share of the male population meeting that criterion. For example, if 80 out of 100 women (80%) and 90 out of 100 men (90%) own a mobile phone, the gender parity score is 0.89 (i.e. 0.8/0.9).

The target value is set to 1. However, for practical reasons, for a country with a ratio between 0.98 and 1.02, the target will be considered met.

INFRASTRUCTURE TARGETS

For indicators derived from administrative sources, targets are set to 100%. However, there may be practical reasons why the ideal state may not be attainable, including measurement errors. Consequently, the target is considered "met or nearly met" if the value is 98% or higher.

The baseline assumes that a mix of fixed and mobile technologies is needed to reach universal and meaningful connectivity, and both technologies are not perfect substitutes. It does not set specific targets for usage but sets targets for availability and quality. Nevertheless, because of the flexibility that a mobile connection offers, a target is set for mobile network coverage. Considering it is difficult from technical and financial standpoints for operators to maintain multiple

generations of cellular networks simultaneously, the target of 100% only applies to the latest generation that covers at least 40% of a country's population. For instance, if 30% of a country's population is covered by 4G, the target of 100% coverage will apply to 3G until 4G coverage reaches 40% of the population, at which point the target will apply to 4G and no longer to 3G. For fixed-network coverage, it is not possible to set a target, because the data do not allow the establishment of a baseline.

SPEED TARGETS

Accessing the Internet does not allow for meaningful use if the speed of the connection is too slow. For that reason, the target is that fixed-broadband subscriptions should have a speed of 10 Mbps or more. For schools, based on research done by the Boston Consulting Group (BCG) for Giga (2021), the UNICEF-ITU initiative to connect all schools to the Internet, the target is a download speed of 50 Kbps per student, with a minimum of 20 Mbps per school, an upload speed of 5 Mbps and a minimum of 200 GB data allowance.

AFFORDABILITY

In line with the target set by the Broadband Commission for Sustainable Development for 2025 (ITU, n.d., para. 1), entry-level broadband services should cost less than 2% of monthly GNI per capita. Universality implies that this target should apply to low-income segments in a country, too. Geographies, where income disparities are large may meet the target on average but remain unaffordable for the individuals at the bottom of the income distribution. Accordingly, a target is set for the average income of the bottom 40% of earners.

SKILLS TARGETS

Ideally, individuals should have "basic" ICT skills, which include activities such as copying and pasting, sending messages, and transferring files or applications between devices. For effective Internet use, it would also be beneficial if individuals had "intermediate" ICT skills, which include working with spreadsheets or presentation software and connecting and installing new devices or software and apps. These indicators are

measured on an activity basis, meaning that respondents are asked if they have performed various activities in the last three months. Furthermore, the aggregate basic and intermediate skills are calculated as the average value of the underlying activities. For these reasons, it cannot be expected that countries reach, or get close to, 100%. Therefore, based on the baseline for the countries for which there are data, the targets are set at 70% for basic skills and 50% for intermediate skills. This is also an SDG indicator (for SDG target 4.4).

A DASHBOARD FOR TRACKING UNIVERSAL AND MEANINGFUL DIGITAL CONNECTIVITY

As part of the implementation of this work, ITU intends to establish and maintain an interactive country dashboard to track universal and meaningful digital connectivity. Such a tool would facilitate access and adoption of the baseline and associated targets. It will inform on where a country currently stands (baseline), and where it ought to be by 2030 (targets), while trends and benchmarks will contribute to a more holistic and nuanced picture. For instance, a country may be far from a target, but its performance may be improving rapidly and be largely in line with its regional peers.

A rudimentary mock-up[13] of what such dashboard may look like includes:

- **Indicators**: Title, units of measurement, type of indicator. Additional metadata – including a long description, exact sources, and notes for all data points – would be shown in an overlay. Methodologies for computing indicators would be available in a methodology section.
- **Baseline**: Information about where the country currently stands based on the latest available data.
- **Targets**: For selected indicators only; value for 2030; status of country – e.g. (almost) met, on track, not on track; number and share of countries having met each of the targets.

13 The example of the mock-up is available in full (p. 20). Available at: https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030_BackgroundPaper.pdf

- **Trends**: Distance to target; growth over the past year/ five years; indicative time to target, based on actual growth rate.
- **Benchmarks**: Regional average; the difference with regional average (+/-); regional best; average of income group; world average; additional descriptive statistics – such as global mean, minimum and maximum values – can be included.

Users will be able to switch between a compact version (showing only core indicators) and an expanded version (with all the disaggregated indicators). Filters will allow users to restrict the selection of indicators based on certain criteria, e.g. status for 2030 target and below/above peer group average. Visualizations of key indicators will improve readability and the overall user experience.

The dashboard will also list tier 2 indicators and report the available data. For additional context and insights, future versions of the dashboard may include selected indicators related to the levers (e.g. policy and regulation, availability of content and service), the catalysts (e.g. economic development), and applications. To complement the default country view, data tables would report the performance of all countries on any given indicator.

CONCLUSION

Universal and meaningful digital connectivity is key for enabling digital transformation. Connectivity for all – embedded in the notion of universality – is not enough. Meaningful connectivity entails a safe, satisfying, enriching, and productive online experience at an affordable cost. This definition guided the development of the analytical framework for universal and meaningful connectivity. This framework in turn was used to set up a baseline and formulate targets for 2030. The targets are that the objectives and the baseline indicate where countries are today and how close they are to meeting these objectives.

The framework is deliberately agnostic about the interventions needed to achieve universal and meaningful connectivity and the applications of connectivity. It is neither possible nor desirable to propose a one-size-fits-all policy mix to all

countries. Similarly, it would be misguided to prescribe what people ought to do online.

With the inevitable changes in technologies, needs, applications, and behaviors, the concept of meaningful connectivity is bound to evolve. More data and indicators will become available. The baseline will need to be adapted and refined on a regular basis to reflect this evolution and developments. The version of the baseline presented in this document should therefore be seen as the first of many.

Despite the constraints and limitations inherent to such an exercise – notably in terms of data availability, quality, and granularity – it is hoped that the baseline and targets will help with prioritization, monitoring progress, and evaluating policy effectiveness. They will contribute to galvanizing efforts to achieve universal and meaningful connectivity by the end of the decade.

ANNEX - ACKNOWLEDGEMENTS

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CHAPTER 3

Meaningful connectivity in Brazil: A portrait of the population

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INTRODUCTION

In recent years, the debate around the impact of digital technologies in society has intensified and expanded. In this scenario, the use of the Internet and digital devices such as computers[2] and smartphones has grown exponentially, driven by the development of new applications and services, an advance that has brought about significant changes in people's lifestyles. For example, street guides have become obsolete and have been replaced by digital navigation systems, access to public and private services has been radically transformed and gained new forms and possibilities, and the patterns of sociability and cultural practices of the population have changed significantly. In addition, the occupational structure is undergoing a profound transformation, with the emergence of new forms of work and income, while some professions and specific types of commercial relationships have become obsolete.

In this horizon of accelerated transformations, Artificial Intelligence (AI), the Internet of Things (IoT) and a new digital economy driven by the constant and massive production of data are phenomena that demand (and will demand) increasing connectivity from individuals. This connectivity is necessary so that they can take advantage of the opportunities created by these changes and, at the same time, manage and mitigate the potential risks associated with them.

Taking advantage of these opportunities, safely and for the benefit of human development, depends initially on the conditions in which the population has access to this whole horizon of possibilities. In recent years, it has become evident situations of vulnerability resulting from limited access to connectivity, with the COVID-19 pandemic possibly being the most revealing factor of the digital divide. The isolation measures to contain the pandemic required a major and rapid effort to adapt and migrate to digital modes of work and education, for example. In that context, even in households with Internet users and access to some device, numerous barriers

2 The term "computer" in this study always refers to "desktop, laptop, or tablet."

to use were revealed. The unavailability of sufficient devices to guarantee simultaneous Internet access for adults for work and children for school activities quickly became a major problem, as did the poor quality or low speed of the connections for the activities that began to be carried out online. In addition to this, there are financial constraints in acquiring data plans or suitable devices to meet the different connectivity demands; or, furthermore, difficulties in accessing social benefits made available via digital platforms, which required some degree of digital literacy. In this sense, the pandemic has highlighted the differences in the possibility of taking advantage of the opportunities facilitated by the Internet by revealing very unfavorable access conditions.

Even before the pandemic, there were already debates about the different uses of digital technologies and their implications for social development. Some questions that arise from these debates are: Do users with exclusive mobile phone access have the same opportunities as those who use computers? How do financial constraints affect the daily use of the Internet, especially when the data packages contracted are insufficient? Is it possible to take advantage of the opportunities to access information and services online without having a household connection? Furthermore, what would be the minimum connection speed required to guarantee effective use of the network for professional and/or educational activities?

The questions at hand do not have easy answers and, even if found, they would not be definitive or absolute. The rapid advances in digital technologies require continuous adaptations in access devices, heightened bandwidth demands, and the expansion of Internet usage locations. The complexity of the current scenario has required a redefinition of our understanding of the population's digital inclusion, consequently redefining the concept of connectivity. This has led to broadening the criteria employed for evaluating connectivity, wherein the measurement scope extends beyond mere Internet access, as it is not enough to consider a country's level of connectivity based solely on the number of Internet users in that population. In recent years, this understanding has generated an emerging but rapidly expanding debate on the need to think about the connectivity of the population in a more comprehensive and meaningful way.

Such understanding presupposes a set of access conditions that go beyond the mere use or non-use of the Internet.

CONCEPTUAL PILLARS OF MEANINGFUL CONNECTIVITY

Meaningful connectivity is a multifaceted concept that encompasses several fundamental dimensions to comprehend the interaction between individuals and the online world. These dimensions incorporate important concepts for a comprehensive and in-depth analysis of the dynamics of Internet access and usage.

In recent years, the literature on digital inclusion has incorporated the debate on the correlation between meaningful connectivity and the empowerment of socially marginalized individuals and communities and its importance in reducing digital inequalities (Alliance for Affordable Internet [A4AI], 2022a; Radhakrishnan et al., 2023; Katz & Gonzalez, 2016). However, there is a scarcity of empirical studies[3] focused on measuring this phenomenon. This section explores the conceptual pillars that underpin this study from a measurement perspective.

In 2020, the A4AI published the document *Meaningful connectivity: A new target to raise the bar for Internet access*, which, right from the start, expresses the importance of the agenda:

> Not everyone connects to the Internet in the same way. If policymakers only rely on this broad, binary metric, their efforts to improve access for all will not succeed. Indeed, ignoring the huge differences in how people connect will only exacerbate inequalities online and offline. (A4AI, 2020, p. 3)

Based on this observation, the document proposes that the concept of meaningful connectivity should be a tool for improving Internet access indicators, stimulating policies that address digital development, with more ambitious objectives (A4AI, 2020). As a measurement tool, the proposal presented

3 For more information on empirical studies, see A4AI (2022b) and Gomes et al. (2022).

by the organization, resulting from consultation with different international experts and subsequent application in various contexts (adopting multiple research methods), defines four minimum dimensions for measuring meaningful connectivity: (a) connection speed; (b) devices; (c) data package; and (d) frequency of use.

In 2022, the International Telecommunication Union (ITU) published a document based on various consultations held throughout 2021, in which is proposed the establishment of a conceptual framework for universal and meaningful connectivity, defined as: "'Meaningful connectivity' is a level of connectivity that allows users to have a safe, satisfying, enriching and productive online experience at an affordable cost" (ITU, 2022, p. 2).

Based on this two-dimensional concept, the document proposes metrics for both the universalization dimension and the "connectivity enablers." This comprehensive conceptual proposal encompasses aspects such as infrastructure, affordability, users' digital skills, as well as the security of both the connection and online browsing. The proposal (ITU, 2022, p. 6) is aligned with the goals outlined in the 2030 Agenda for Sustainable Development (United Nations [UN], 2015). It emphasizes the importance of ensuring that every individual has not only a basic access, but also a secure, affordable, and meaningful Internet connectivity. This includes access to digital services that facilitates a satisfying, enriching, productive and secure online experience at an affordable cost. Promoting the meaningful connectivity agenda is crucial to achieving the broader goal of universal access to information and technology as advocated in the Sustainable Development Goals (UN, 2015, p. 25).

It is noteworthy that, although the agenda regarding indicators for measuring meaningful connectivity is still under construction and remains open to numerous possibilities, the topic has progressed in different formats and gained increasing relevance in public debate. This is especially true as a starting point for qualifying the discussion on the actual needs of the population to harness the opportunities offered by the digital world.

In recent years, there has been an intensification in the public debate on the theme of meaningful connectivity.

In Brazil alone, the National Telecommunications Agency (Anatel) organized at least two international events on the subject in 2023.[4] Simultaneously, multilateral organizations have stimulated working groups and initiatives in this area, as illustrated in the final chapter of this publication, authored by Fernando Rojas (United Nations Economic Commission for Latin America and the Caribbean [ECLAC]). The issue has also become a priority for various civil society organizations globally, including the Global Digital Inclusion Partnership (GDPI), the institution of the authors of the first chapter in this book. In Brazil, several initiatives stand out, such as the project developed by the Institute for Research on Internet and Society (IRIS) in 2022, focusing on the theme of meaningful connectivity in Brazilian communities (Gomes et al., 2022). Finally, one of the most striking examples is the commitment that Brazil, upon assuming the presidency of the Group of Twenty (G20) in 2024 and leading the Digital Economy Working Group (DEWG), has established the theme "universal and meaningful connectivity" as one of the four priorities (Ministry of Communications [MCOM], 2023). Within the context of the G20, the DEWG focuses its efforts on crucial aspects of the digital economy, such as connectivity, inclusion, cybersecurity, digital transition, and international cooperation.

Considering this scenario, the objective of this study was to undertake an analytical exercise, incorporating a broader framework of indicators, to portray the current situation of the Brazilian population through the lens of meaningful connectivity. The study was based on two important international references (A4AI, 2020; ITU, 2022) which served as a starting point for an in-depth overview of the access conditions of digital technologies that influence the effective engagement of individuals across diverse social, economic and cultural contexts in Brazil.

The following sections will present: (a) the general objectives of the study and the parameters adopted for its execution, featuring appropriate methodological considerations on the

4 More information available at: https://www.gov.br/anatel/pt-br/assuntos/noticias/anatel-realiza-evento-sobre-conectividade-significativa-com-enfase-em-habilidades-digitais and https://www.gov.br/anatel/pt-br/assuntos/noticias/anatel-abre-conecta-brasil-2023

indicators selected for analysis; (b) an analysis of the results observed for the country over the last six years and across different dimensions (territorial, sociodemographic and socioeconomic); and (c) an analysis of the activities carried out on the Internet and the online skills of the population, based on the different levels of meaningful connectivity.

BOX 1 - INTERNET USERS IN BRAZIL

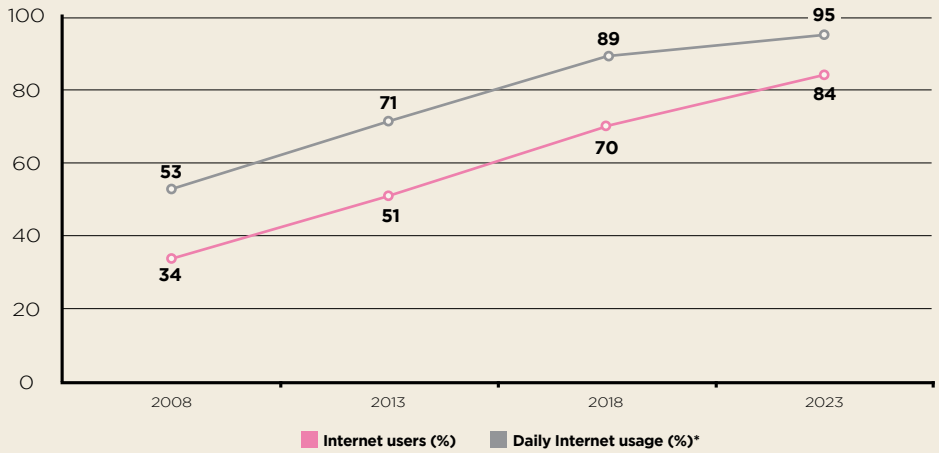
In Brazil, 84% of the population aged 10 and above are Internet users (Brazilian Network Information Center [NIC.br], 2023a). A user is defined as someone who has accessed the network at least once in the last three months, a criterion set by the ITU (2020, p. 77). Although the concept seems broad, since it considers usage as a single access over a relatively extended period, it was established in a context when Internet access was limited to small segments of society, with usage patterns vastly different from today's. Currently, 95% of Internet users in Brazil access the net every day or almost every day (Chart 1).

The incidence of Internet users in Brazil, based on an internationally established parameter, reveals a scenario of rapid transformation over a short period. Within just 15 years, between 2008 and 2023, the proportion of Internet users in Brazil went from 34% to 84% of the population aged 10 and above, revealing the Internet's swift and vertiginous presence in the country (Chart 1). Despite the progress, it should be noted that including the remaining 16% of citizens living in Brazil is not a simple task: This proportion represents a contingent of more than 29 million inhabitants, a population equivalent to that of Venezuela.

Public policies targeting remote areas and especially vulnerable groups are crucial to address the specificities posed by Brazil diversity and alleviate the lack of access for this population. However, it does not ensure that digital inclusion is guaranteed and fully functioning for the other group, the majority of the population already using the Internet, which is the subject of this study.

CHART 1 - INTERNET USERS AND FREQUENCY OF INTERNET USE

Total population (%)



SOURCE: NIC.BR (2008, 2013, 2018A, 2023A).
*FOR INTERNET USERS ONLY.

GENERAL OBJECTIVES OF THE STUDY AND METHODOLOGICAL ASPECTS

The aim of this study is to present an initial portrait of the Brazilian population in terms of meaningful connectivity, based on the reprocessing of quantitative indicators from the survey on the use of information and communication technologies (ICT) in Brazilian households, the ICT Households.[5] Conducted by the Regional Center for Studies on the Development of the Information Society (Cetic.br), department of NIC.br, linked to the Brazilian Internet Steering Committee (CGI.br), this is a longitudinal and probabilistic sample study.

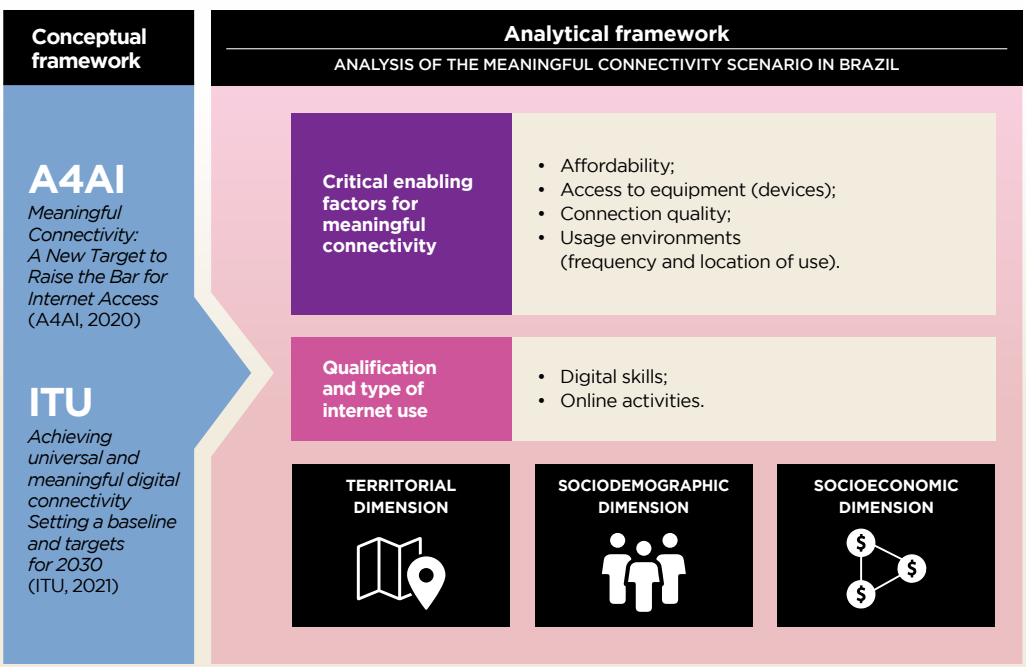
The study's focus lies in investigating the quality of the population's digital technology access, employing the concept of meaningful connectivity as an analytical reference. To this end, this analysis does not aim to establish a single, definitive definition of meaningful connectivity, as it acknowledges its broad and evolving nature. Instead, the study seeks to contribute

5 More information available at: https://cetic.br/en/pesquisa/domicilios/

to the global debate based on the analysis of Internet access and usage indicators in the Brazilian context, with the intent to stimulate further research, methodological approaches, and enriching discussions based on a concrete experience.

The conceptual and analytical framework (Figure 1) of this study incorporates a two-tiered analysis: enabling factors for meaningful connectivity and qualifications for Internet use, considering territorial, sociodemographic and socioeconomic aspects. Each of these dimensions is critical to a comprehensive understanding of how connectivity manifests itself and impacts different segments of Brazilian society. The territorial dimension examines the geographical distribution and quality of access, while the sociodemographic dimension analyzes connectivity in relation to variables such as age, gender, and race. Finally, the socioeconomic dimension considers the relationship between connectivity and the economic conditions, relevant for assessing the social development of individuals and communities. Together, these layers offer a nuanced understanding of digital connectivity in the national context.

FIGURE 1 - CONCEPTUAL AND ANALYTICAL FRAMEWORK OF THE STUDY



SOURCE: PREPARED BY THE AUTHOR.

The analysis was based on some fundamental premises, with the primary one being the utilization of the ICT Households survey as a data source. This survey is renown as the most comprehensive household sample survey specializing in digital technologies in Brazil. It adheres to international methodological standards, produces comparable data and has been conducted annually, without interruption for the past 19 years. The survey provides indicators for both individuals and households, enabling various controlled analytical approaches through its microdata dataset. Furthermore, as this is a survey based on international methodological frameworks and with a long historical series, it is possible to analyze the indicators retrospectively, in order to gauge the country's potential progress to date while simultaneously ensuring the ongoing monitoring of these issues into the future.

Moreover, the ICT Households survey microdata dataset ensures a more precise understanding of the individuals' situation across their social, economic, and territorial diversity, allowing a deeper understanding of the phenomenon based on analyses that combine population access types with their Internet uses and activities. The choice to adopt the ICT Households survey as a data source, although it has numerous advantages, also restricts the possibilities of analysis to the variables present in the survey.[6]

Using the indicators, prepared based on the microdata from the ICT Households survey, an exercise was carried out to match the variables available in the survey with the dimensions identified in the literature as crucial for understanding individuals' level of meaningful connectivity.

In the selected literature, the conceptual frameworks proposed by the A4AI and ITU, briefly presented in the introduction to this chapter, served as initial references. The A4AI proposes four dimensions and defines minimum criteria for each of them in order to achieve meaningful connectivity, as detailed in its document published in 2020 (A4AI, 2020). The dimensions and criteria are vital for understanding and evaluating the quality and effectiveness of individuals' Internet access and are enabling factors for meaningful connectivity.

6 Box 2 (p. 95) presents examples of complementary studies that can be used for a broader view of Brazil's connectivity conditions, including indicators on the levels of digitalization and access to technologies for enterprises, schools, health facilities, civil society organizations, among others.

TABLE 1 - GUIDELINES FOR MEANINGFUL CONNECTIVITY PROPOSED BY A4AI

DIMENSION	JUSTIFICATION	PARAMETER
Speed	The connection must be reliable, with sufficient bandwidth and low latency to allow users to take full advantage of the network	Minimum connection equivalent to 4G
Device	Access to an individual device must be appropriate in order to enable productive use of applications, multifunctionality, portability and easy handling	Access to a smartphone
Sufficient data	Access to a connection must have a sufficient data plan so that usage is not interrupted, at an affordable cost	Access to unlimited broadband connection at household, the workplace and/or local of study
Frequency of use	Regular use of the Internet is necessary to maximize productivity gains and guarantee continuous access to information	Daily use of the Internet

SOURCE: A4AI (2020).

In the case of the ITU, metrics for universal access have been outlined along with the proposal for five essential conditions for meaningful connectivity: (a) infrastructure, which considers the availability and quality of fixed and mobile networks; (b) affordability, which refers to the cost of connections and devices; (c) Internet access devices, which highlights the availability of mobile and fixed equipment; (d) digital skills, which allow individuals to take advantage of the opportunities offered by the network; and (e) connection security and navigation safety, which are crucial for the user experience on the Web (ITU, 2022). Thus, according to the ITU, an individual with meaningful connectivity is one who has access to a reliable and fast infrastructure at an affordable cost, owns one or more Internet access devices, has adequate digital skills tailored to their needs, and ensures safe navigation (ITU, 2022).

Based on the conceptual frameworks drawn up by the A4AI (2020) and the ITU (2022), the analysis of the historical series of the ICT Households survey resulted in the selection of nine indicators, grouped into four dimensions. It is worth noting that the selected indicators do not have a hierarchical order, and the dimensions do not have different degrees of importance.

In the indicator selection strategy, priority was given to those relating to access, while those dealing with types of Internet use, skills to manage digital technologies and individual privacy and security practices were not included. This choice was a deliberate strategy to initially identify possible access barriers that could impact meaningful connectivity. Uses, skills and other individual characteristics regarding online life management are also associated with factors, such as: individuals' life stages, specific contexts and daily activities, and various cultural aspects, which can vary in intensity due to the presence of technologies.

Nevertheless, these other essential elements for understanding the effective digital inclusion of individuals from the perspective of meaningful connectivity, such as digital skills and the types of Internet uses, were considered and analyzed in their association with the set of nine indicators. These analyses are found in the final sections of this chapter.

Among the nine indicators selected from the ICT Households survey, four describe individual attributes, while the other five reflect household characteristics. The inclusion of these two types of indicators made it possible to extend the analysis beyond the specific connectivity of the individual, also considering possible direct and indirect effects of the household connectivity environment. With this broadened scope, it was possible to identify some degree of connectivity even among apparently excluded groups, such as non-Internet users. Additionally, this analytical approach also improves the understanding of the actual connectivity situation among users, allowing for a more comprehensive and accurate view of the connectivity dynamics across different segments of the population.

In concrete terms, it is plausible to assume that a non-Internet user who lives in a household with an Internet connection has a better chance of taking advantage of any service offered in the virtual environment than a non-user without any kind of

Internet connection in their household,[7] even if these services are mediated by other members of their household.

Even among Internet users, the infrastructure of their homes is an essential point to consider in order to understand possible limitations imposed by the connectivity environment. Users without a household connection or who live in households with a limited number of devices per resident face significant barriers to using the network. The absence of household connections and a limited number of access devices per resident were factors that, during the pandemic, excluded students from school activities and professionals from work activities, for example (Benítez-Largui et al., 2023).

INDICATORS SELECTION

The selection of the nine indicators was made considering their adherence to the propositions found in the literature and the specificities of the survey used as a source (ICT Households), in order to balance the presence of both individual and household indicators. Table 2 details the indicators and their corresponding dimensions of analysis.

7 An example of this scenario are households with an intergenerational family composition. Although the elderly make up the population groups with the lowest incidence of Internet access, when they live in places with an Internet connection, they can benefit from the use made by other residents (whether to obtain information about social security or to schedule appointments and exams, for example), even if this access indirectly generates dependency.

TABLE 2 - DIMENSIONS AND INDICATORS OF MEANINGFUL CONNECTIVITY

DIMENSION	INDICATOR	TYPE OF INDICATOR	DESCRIPTION
Affordability	Cost of household connection	Household	Cost of the Internet connection less than 2% of the household income
	Mobile phone plan	Individual	Post-paid mobile phone plan
Access to equipment (devices)	Devices per capita	Household	Total number of individual access devices (mobile phone, desktop, laptop, or tablet) per resident aged 10 or older to be greater than 1
	Computer in the household	Household	Presence of computer in the household
	Diversified use of devices	Individual	Use of mobile phone and computer
Connection quality	Type of household connection	Household	Fiber optic or cable household connection
	Speed of household connection	Household	Speed of the main Internet connection in the household more than 10 megabits per second (Mbps)
Usage environment	Frequency of Internet use	Individual	Internet usage every day or almost every day
	Diversified usage locations	Individual	Internet usage at home and in at least one other institutional location (school, work, and/or free and paid Internet access centers)

SOURCE: PREPARED BY THE AUTHOR.

Table 3 shows the correspondence between the indicators selected for this study and the indicators standardized internationally by the ITU. This relationship is fundamental to ensure that the analysis carried out is aligned with globally recognized metrics, allowing for a consistent and reliable comparison with other international data and studies in this field.

TABLE 3 - MAPPING OF THE SELECTED INDICATORS ONTO THE ESTABLISHED BY THE ITU

INDICATORS SUGGESTED IN THIS STUDY			CORRESPONDING INDICATORS - ITU		
Dimension	**Type of indicator**	**Indicator**	**Indicator**	**Base-code**	**Description of the base-code**
Affordability	Household	Cost of the household connection	Is not part of the *Long questionnaire on ICT access and use by households and individuals* (ITU, n.d.)		
	Individual	Mobile phone plan	Is not part of the *Long questionnaire on ICT access and use by households and individuals* (ITU, n.d.)		
Access to equipments	Household	Devices per capita	Is not part of the *Long questionnaire on ICT access and use by households and individuals* (ITU, n.d.)		
	Household	Computer in the household	HH4	HHA422	Households with a computer
	Individual	Diversified use of devices	HH10	HHU271s	Individuals who use a mobile phone
			HH5	HHU422	Individuals who used a computer from any location in the last three months
Connection quality	Household	Type of household connection	HH11	HHA4213fb	Households with Internet access via fixed broadband
	Household	Speed of household connection	Is not part of the *Long questionnaire on ICT access and use by households and individuals* (ITU, n.d.)		
Usage environment	Individual	Daily use of the internet	HH12	HHU4212fd	Individuals using the Internet at least once a day
	Individual	Diversified usage locations	HH8	HHU4212h	Individuals who used the Internet at home
			HH8	HHU4212w	Individuals who used the Internet at work
			HH8	HHU4212E	Individuals who used the Internet in local of education
			HH8	HHU4212ah	Individuals who used the Internet in someone else's home
			HH8	HHU4212fop	Individuals who used the Internet in a facility open to the public
			HH8	HHU4212cf	Individuals who used the Internet in a community Internet access facility
			HH8	HHU4212mob	Individuals who used the Internet while commuting, by transportation or by walk

SOURCE: PREPARED BY THE AUTHOR.

For data processing and subsequent analysis of the results, all nine selected indicators were dichotomized to reflect the presence or absence of a given characteristic for each individual in the sample. In this sense, when the individuals met the criterion, they were assigned a score of one (1) and when they did not, a score of zero (0) were assigned. For example, considering the "diversified use of devices" indicator of the "access to equipment" dimension, individuals who declared themselves as users of a mobile phone and, simultaneously, a computer[8] received a score of 1. Conversely, a score of 0 was assigned to all the other individuals: those who stated (a) not using a mobile phone nor a computer; (b) using only one of the two types of devices (mobile phone or computer); and/or (c) being unable to answer whether they used one of the two (or both) types of devices.

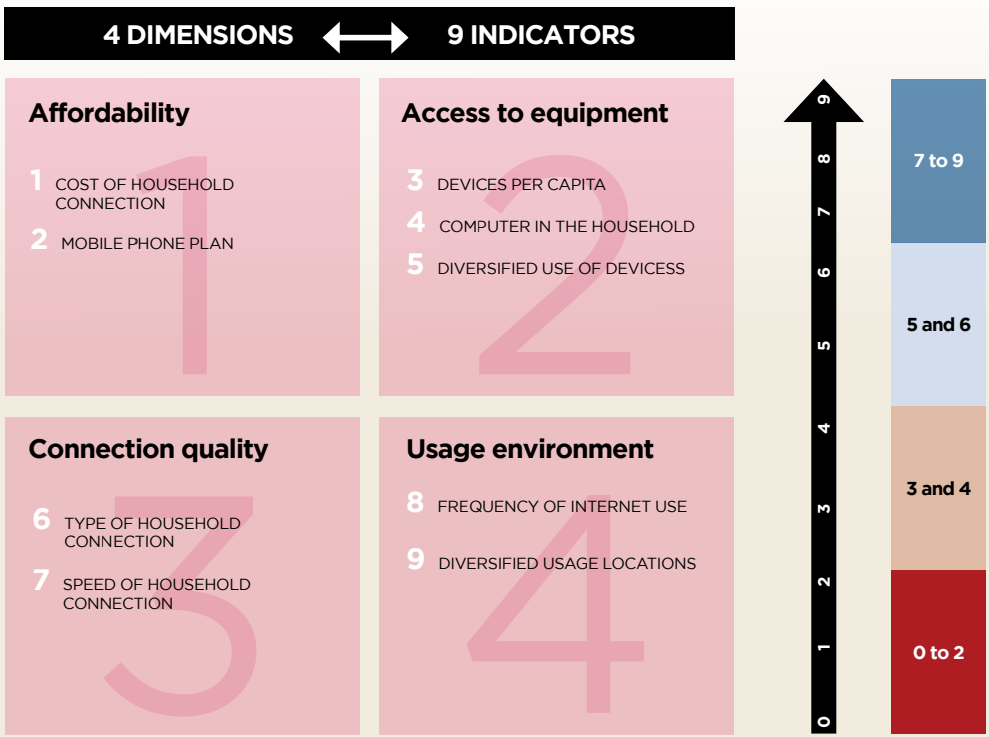
Using the dichotomized indicators, different levels (scores) of meaningful connectivity were developed based on the sum of the nine selected variables, which resulted in a scale ranging from zero to nine for each individual in the sample, where the score represents the total number of characteristics observed among the nine considered in the analysis. A score of 0 indicates the absence of all the measured characteristics, while a score of 9 denotes the presence of all the measured characteristics. In an intermediate situation, for example, an individual with a score of 5 is one who possesses 5 out of the 9 characteristics measured.

A score of 9 on the scale indicates an individual who lives in a household with a computer and an Internet connection (via fiber optic or cable connection), with speeds exceeding 10 Mbps and at a cost lower than 2% of the household income. Moreover, in this household, there exists more than one individual Internet access device (such as a mobile phone, desktop, laptop, and/or tablet) per resident aged 10 or more. Finally, this individual is a computer and mobile phone user (with a post-paid plan) and accesses the Internet on a daily basis, both from home and other locations. This shows that the criteria for achieving the maximum score on the scale are representative of robust connectivity, but not exceptional.

8 Computer users are understood as those who declare that they have used a desktop, laptop, or tablet in the last three months.

While the construction of the meaningful connectivity scale allows analysis for each individual in the sample, enabling different analytical cuts, four levels of meaningful connectivity were established (Figure 2), which represent a simple categorization of the population based on the score observed for each individual. The first group encompasses individuals with the worst connectivity conditions, with scores between 0 and 2; the second group, which is still vulnerable, comprises individuals with scores of 3 or 4; the third group includes individuals with scores of 5 or 6, indicative of intermediate access conditions. Finally, the fourth group, with the highest scores (7 to 9), represents the population enjoying the most favorable conditions for meaningful connectivity.

FIGURE 2 - LEVELS OF MEANINGFUL CONNECTIVITY



SOURCE: PREPARED BY THE AUTHOR.

Based on the construction of the scale, structured into four ranges of meaningful connectivity, the analysis was conducted in two pathways, detailed in the next sections of this chapter. The first pathway seeks to identify the main factors associated with different levels of meaningful connectivity in Brazil, exploring the gaps for digital inclusion. To this end, the data was analyzed for the total population who are 10 years-old or more, based on territorial, sociodemographic and socioeconomic cut-off points. The second pathway aimed to examine the relationship between the different levels of meaningful connectivity and the types of Internet use and the qualification of individuals for this use. In this case, based on the levels of meaningful connectivity, the individuals' online skills and the activities they perform on the Internet were analyzed. To do this, the results were processed only for the total of Internet users in Brazil, which corresponds to 84% of the population.

BOX 2 - TOWARDS AN EXPANDED PERSPECTIVE ON UNIVERSAL AND MEANINGFUL CONNECTIVITY IN BRAZIL

This chapter portrays the different levels of meaningful connectivity of the Brazilian population, based on individual and household indicators of ICT access and use. However, for a more in-depth view of the country's degree of universal and meaningful connectivity, complementary analyses are needed on the different environments that organize social life: community centers, companies, schools, workplaces, among others, as the ITU proposes in relation to universality metrics.[9] Although the section presented in this chapter did not include indicators from these other environments, the Cetic.br|NIC.br surveys are fundamental sources for a more complete understanding of Brazil's connectivity scenario. National, representative, and continuous sample surveys on the degree of digitization, access and use of technologies are conducted in the most diverse sectors, such as the ICT in Education,[10] ICT in Health,[11] ICT Enterprises,[12] ICT Nonprofit Organizations,[13] among others. There are also complementary studies on cross-cutting and emerging agendas, such as the mapping of existing community networks in the country (NIC.br, 2022b), the evaluation of the broadband quality in Brazil (NIC.br, 2018c) and an investigation of the theme privacy and data protection from the perspective of individuals, enterprises and the government (NIC.br, 2022c). Some examples of available indicators are shown below.

9 More information is available in Chapter 2 (p. 43) of this publication.

10 More information in: https://cetic.br/en/pesquisa/educacao/

11 More information in: https://cetic.br/en/pesquisa/saude/

12 More information in: https://cetic.br/en/pesquisa/empresas/

13 More information in: https://cetic.br/en/pesquisa/osfil/

TABLE 4 - INTERNET ACCESS AND TYPE OF CONNECTION FOR DIFFERENT ESTABLISHMENTS IN BRAZIL.

INDICATOR	RESULT	SOURCE
Enterprises with Internet access	98%	ICT Enterprises 2021
Enterprises with optic fiber connection	85%	
Schools with Internet access	94%	ICT in Education 2022
Schools with Internet access for students use	80%	
Schools with Internet access for students use in urban areas	86%	
Schools with Internet access for students use in rural areas	68%	
Schools with optic fiber connection	51%	
Healthcare facilities with Internet access	98%	ICT in Health 2022
Healthcare facilities with a cable or optic fiber connection	93%	
Nonprofit organizations with Internet access	82%	ICT Nonprofit Organizations 2022
Nonprofit organizations with optic fiber connection	64%	

SOURCE: PREPARED BY THE AUTHOR.

The data and surveys conducted by Cetic.br|NIC.br are accessible on the institution's website (https://www.cetic.br). There, the tables containing the results of quantitative surveys are available for consultation and download, along with the microdata of the surveys. Additionally, there is a data visualization platform where historical series of indicators can be easily accessed. Besides aiding public and private decision-makers and facilitating various academic works, it is expected that the availability of these data and surveys will be a source for new analyses and developments.

ICT SURVEYS

MICRODATA SETS

DATA PORTAL

MEANINGFUL CONNECTIVITY SCENARIO IN BRAZIL

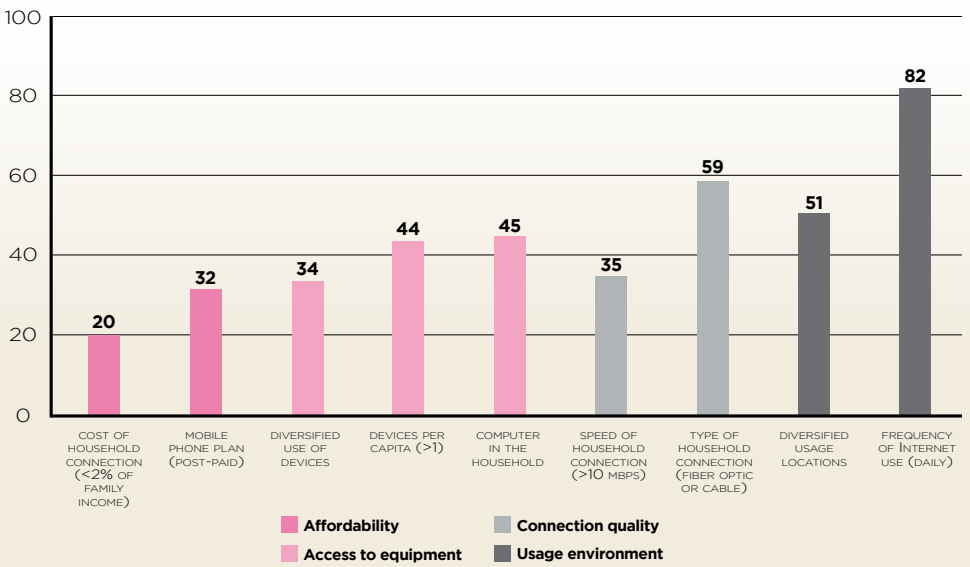
This section presents the results of the analysis conducted on the levels of meaningful connectivity. Beyond offering on overview of Brazil's current status, this section presents the levels of meaningful connectivity of the population across different social groups, territories, and economic situations. As explained, the objective of this study is to understand the population's level of meaningful connectivity, based on an initial exercise that proposes a more comprehensive view of the minimum dimensions required to provide individuals with an online experience that enables them to take advantage of the opportunities offered by the web. To this end, as detailed in the previous section, the levels of meaningful connectivity proposed result from the combination of the nine selected indicators, which correspond to the four fundamental dimensions of meaningful connectivity.

Analyzed individually, the nine selected indicators reveal important barriers to access, which go beyond simple use or non-use of the Internet.[14] Of the four dimensions analyzed, the affordability indicators are the worst performers, followed by the access to equipment and connection quality indicators. As for the indicators relating to the usage environment, they stand out especially for the high frequency of Internet users who access the network daily (Chart 2).

14 Today, as data from ICT Households 2023 survey (NIC.br, 2024) show, 84% of the Brazilian population who are 10 years old or more are Internet users, 88% have a mobile phone and 84% of all Brazilian households have an Internet connection.

CHART 2 - INDICATORS OF MEANINGFUL CONNECTIVITY IN BRAZIL (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

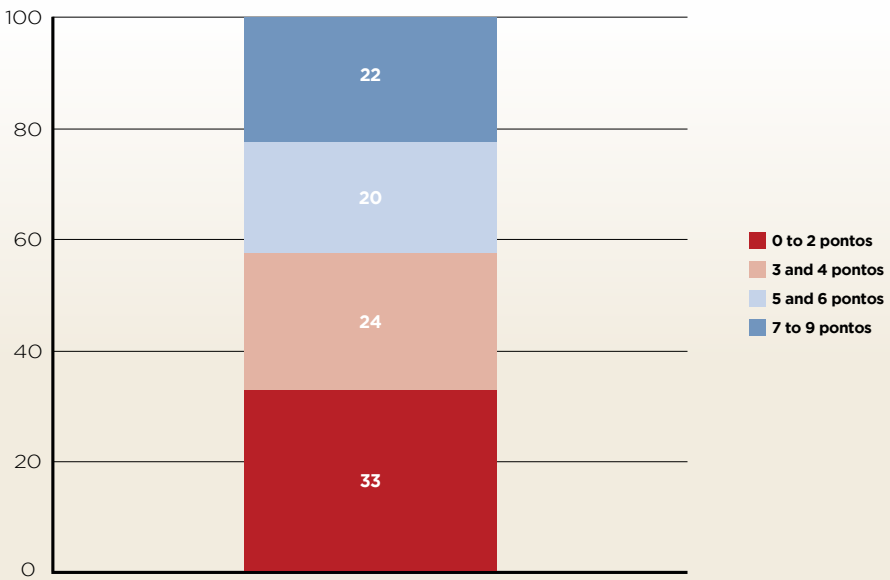
By analyzing the selected indicators, we can see the complexity of the situation of meaningful connectivity in Brazil, which broadens our understanding of the challenges to be faced in formulating effective policies aimed at the digital inclusion of the population. The results by meaningful connectivity levels draw attention, since among Brazilians who are 10 years-old or more, only 22% are in the highest score range (between 7 and 9 points). It is worth pointing out that being in this range does not indicate an extraordinary condition in terms of meaningful connectivity, but rather have all or most of the factors considered as minimums to ensure the benefits of the network.

The largest group observed in the study is that with the lower scores (scoring up to 2 points), which represents a third (33%) of the Brazilian population. When combined to the group scoring 3 or 4 points (24%), representing those with less than half of the proposed conditions, they account for more than

half of the Brazilian population. In other words, the majority of individuals aged 10 or more in Brazil are in a situation of low meaningful connectivity (Chart 3).

CHART 3 - DISTRIBUTION OF THE POPULATION AGED 10 OR MORE BY LEVELS OF MEANINGFUL CONNECTIVITY (2023)

Total population (%)

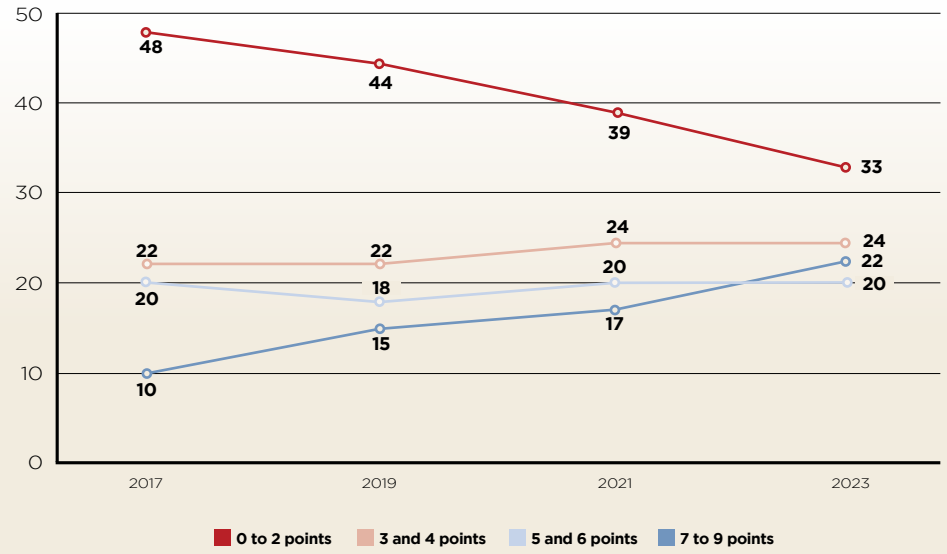


SOURCE: NIC.BR (2023C).

Although today a small portion of the population (22%) enjoys satisfactory connectivity conditions, it is worth highlighting its gradual improvement over the course of the historical series. Although it is not possible to guarantee whether there will be progress or stagnation in this scenario, a retrospective analysis of the levels of meaningful connectivity reveals a reduction in the disparity between the groups with the least and most connectivity, suggesting a positive trend (Chart 4).

CHART 4 - EVOLUTION OF MEANINGFUL CONNECTIVITY LEVELS IN BRAZIL (2017, 2019, 2021 AND 2023)

Total population (%)



SOURCE: NIC.BR (2018C, 2020B, 2022A, 2023C).

In 2017, 48% of the population scored between 0 and 2 and only 10% scored between 7 and 9, i.e. the difference between these two groups was 38 percentage points. In 2019, the difference between them fell to 29 percentage points; in 2021, it decreased further to 22 percentage points; and in 2023, it reduced to 11 percentage points. Although the situation is progressively improving, the speed in which connectivity inequalities are reduced is crucial for policymaking: The persistence or sluggishness in mitigating strong inequality can result in significant portions of the population being left behind. This means that inequalities in quality access to digital technologies make the obstacles to the social and economic development of vulnerable groups practically insurmountable.

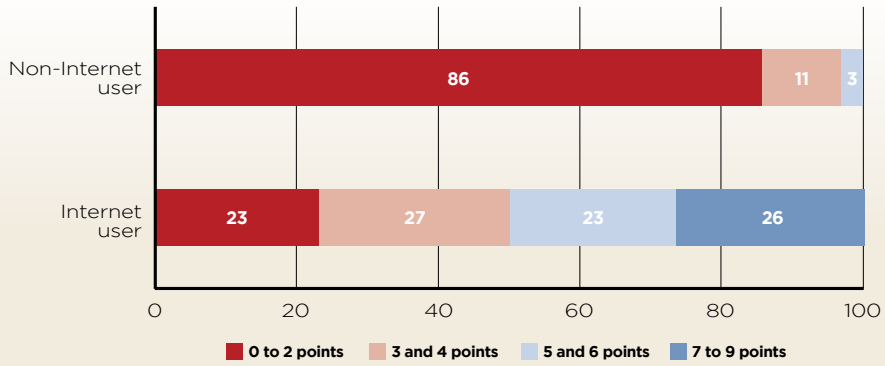
As the demands of the information society grow and evolve rapidly, it is essential that the lenses for observing the phenomenon be revised with a similar speed. Additionally, bolder policies and measures are needed to effectively tackle

the challenges of connectivity. In this regard, it should be emphasized that although this study aims to be a starting point for understanding the population's needs in order to achieve minimum conditions for meaningful connectivity, it is not a definitive parameter for the conditions to be ensured in the near future.

It is important to note that, on the one hand, not using the Internet is a fundamental predictor of low meaningful connectivity, being an Internet user does not guarantee that the individual will obtain good levels of meaningful connectivity. Therefore, accessing the Internet does not in itself enable satisfactory, relevant, productive, and safe use of the online environment. A comparison of the various levels of meaningful connectivity between Internet users and non-users underscores this premise: The population of Internet users is distributed almost equitably among the different ranges of meaningful connectivity (Chart 5). In other words, the heterogeneity in access conditions among the Internet user population is remarkable.

CHART 5 - MEANINGFUL CONNECTIVITY LEVELS AMONG INTERNET USERS AND NON-INTERNET USERS IN BRAZIL (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

The current scenario directly reflects the inequalities that mark the country's social structure. An analysis of the indicators using territorial, sociodemographic and socioeconomic cuts shows that the worst conditions for meaningful connectivity are concentrated among historically excluded population groups. It is therefore essential to identify the difficulties faced by these different groups in order to devise strategies that favor the development of a fairer society, with greater equity in taking advantage of the opportunities made possible by the information society.

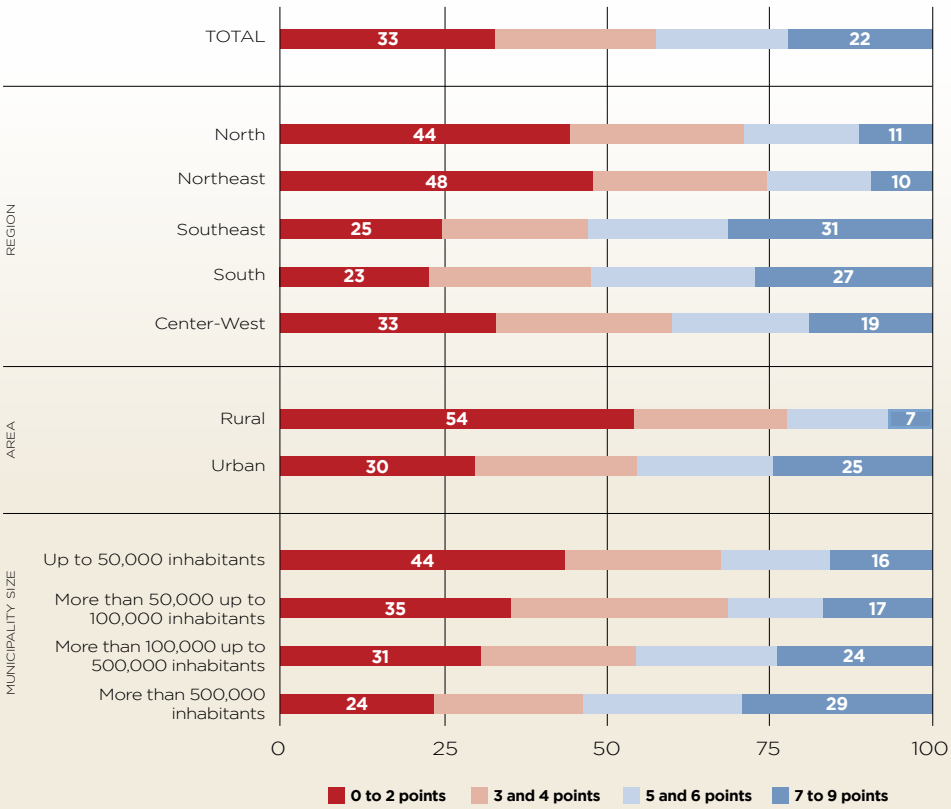
MEANINGFUL CONNECTIVITY AND THE TERRITORIAL DIMENSION

This section details the various levels of meaningful connectivity within the population, focusing on the territorial dimension. The levels of meaningful connectivity will be analyzed across the following variables: (a) regions of the country, (b) areas (rural and urban) and (c) municipality size, based on population size; finally, the results will be presented for each of the 27 federation units (FU).

The analysis of the levels of meaningful connectivity according to territorial dimension reveals the overlapping of situations of greater vulnerability in disadvantaged regions of the country (Chart 6). Among the five regions, the North and Northeast exhibit the worst conditions, with only 11% and 10%, of their populations, respectively, enjoying the highest level of meaningful connectivity (between 7 and 9 points). While 33% of Brazil's population falls within the group with the worst conditions (up to 2 points), this figure rises to 44% in the North and 48% in the Northeast. The Center-West demonstrates incidences close to the national average, with 33% of the population scoring between 0 and 2, and 19% achieving the highest level of meaningful connectivity (between 7 and 9 points). The South and Southeast regions are those in a better situation: 27% and 31% of their populations, respectively, enjoy the best conditions for meaningful connectivity (between 7 and 9 points). In addition to better conditions than the others, the South and Southeast regions are the only regions where the proportion of the population in the highest range of meaningful connectivity surpasses that in the lowest range.

CHART 6 - MEANINGFUL CONNECTIVITY LEVELS AND TERRITORIAL DIMENSION IN BRAZIL (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

The area and size of the municipality of residence also show a strong association with performance at the meaningful connectivity level. Residents of large municipalities, considering the size of the population, and in urban areas have significantly better connectivity conditions than those in small municipalities and rural areas. While a third (30%) of residents in urban areas are in the group with the worst meaningful connectivity (up to 2 points), more than half (54%) of the population in rural areas is in this condition. The

association between population size and better conditions of meaningful connectivity is direct (Chart 6): The larger the municipality, the better its performance in terms of meaningful connectivity. In the smaller municipalities (up to 50,000 inhabitants), 44% of the population is in the worst range of meaningful connectivity; on the other hand, in the larger municipalities (more than 500,000 inhabitants), 24% are among the most disadvantaged.

These results indicate a persistent lack of connectivity infrastructure in remote and sparsely populated areas, which are generally of less commercial interest to the operators that offer connectivity. In this sense, in order to fill the gap for these populations, policies and strategies must address the particularities of these localities. Experiences such as community networks, for instance, could be one of the strategies implemented to mitigate access difficulties for populations further away from large urban centers.[15]

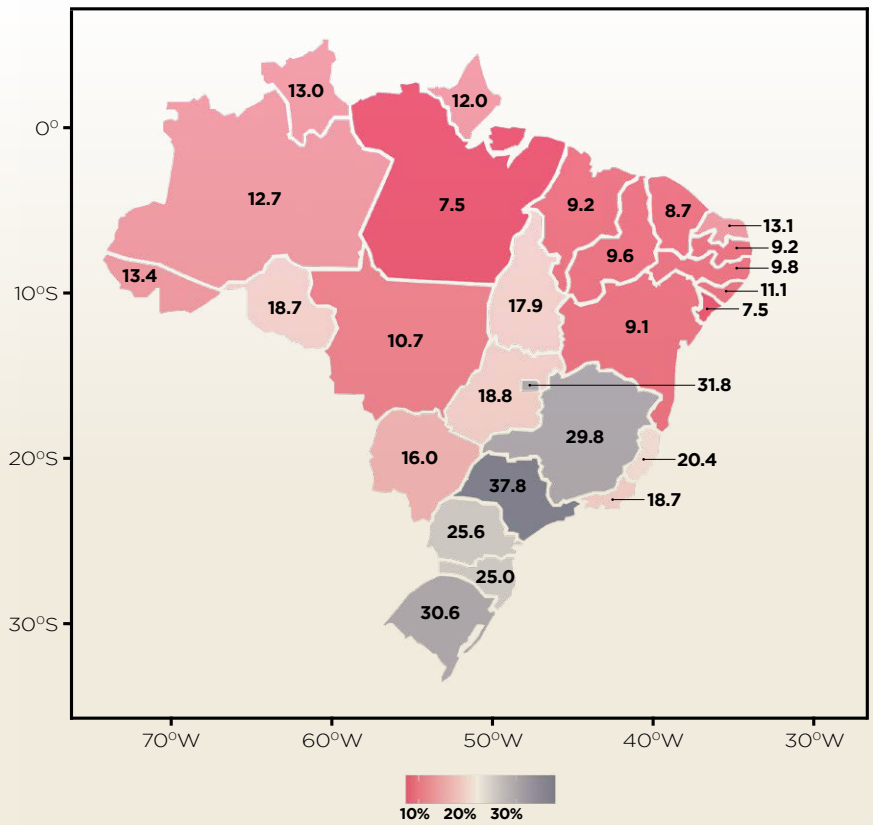
The territorial disparities are evident, such as when reading the results according to regions of the country, rural and urban areas, and the municipalities size. By examining the level of meaningful connectivity across the 27 states, inequalities are also evident (Figure 3). All the states in the North, Northeast and Center-West regions (with the exception of the Federal District) perform below the national average (22% of Brazil's population scores 7 to 9 points of meaningful connectivity).

In the Northeast region, it is noteworthy that only two (Rio Grande do Norte and Alagoas) out of the nine states have more than 10% of their populations in the highest range of meaningful connectivity. In the North, Pará, the region's most populous state (with more than 8 million inhabitants), has the worst performance, with only 7.5% of its population in the range with the best conditions for meaningful connectivity.

15 For more information on community networks and their stage of development in Brazil, see NIC.br (2022b).

FIGURE 3 - PROPORTION OF POPULATION WITH HIGHEST LEVEL OF MEANINGFUL CONNECTIVITY (SCORE BETWEEN 7 AND 9 POINTS), BY FU (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

These data reinforce the historical backdrop of the multiple situations of inequality that overlap characterizing Brazilian territories. The states with the worst indicators of meaningful connectivity (North and Northeast) coincide with the areas that concentrate the highest proportion of municipalities characterized by high social vulnerability, considering aspects such as urban infrastructure, human capital, and income (Institute for Applied Economic Research [IPEA], 2015).

However, even among the best-performing regions (Southeast and South), there are significant internal disparities.

In the Southeast in particular, São Paulo stands out as the top-performing state in the country: 38% of its population has adequate conditions for meaningful connectivity (scoring between 7 and 9). With Brazil's largest economy, accounting for 30.2% of the country's Gross Domestic Product (GDP) in 2021 (Table 5), it is unsurprising that São Paulo also has the most favorable conditions for meaningful connectivity. Nevertheless, a large part of the state lacks the minimum conditions necessary for connectivity that would enable the utilization of opportunities offered by new technologies.

The picture is even more challenging for the state of Rio de Janeiro which, despite being the second largest economy in the country (10.5% of the national GDP in 2021), the proportion of the population with better connectivity conditions (18.7%) is lower than the national average. These two cases show the complexity of the discussion: If, even in the most developed economies, reasonable conditions for meaningful connectivity are restricted to a small portion of the population, the revealed problem becomes even more problematic in economically disadvantaged areas.

Large-scale policies to universalize access are essential, but they will only be effective if they understand access in its complexity, across multiple dimensions (as proposed here) and address the specific challenges for different localities. To enhance the understanding of the diverse realities faced by different national territories, based on the limits of the sample used, the results for each state (FU) are presented below for each range of meaningful connectivity. This analysis breaks down the data within each range, offering a more granular view of regional variations in access and connectivity quality. This approach enables the identification of specific connectivity patterns and discrepancies between regions and FU, in order to facilitate the identification of areas that require priority attention in digital inclusion policies.

TABLE 5 - GDP AND POPULATION DISTRIBUTION BY LEVELS OF MEANINGFUL CONNECTIVITY, BY FU

REGION	BRAZIL AND FU	GDP AT CURRENT PRICES (2021)		LEVEL OF MEANINGFUL CONNECTIVITY (2023)			
		GDP (value in BR$ 1,000)	GDP	0 to 2	3 and 4	5 and 6	7 to 9
	Total	9,012,142,000.00	100.0%	33.1%	24.5%	20.1%	22.3%
North	Rondônia	58,170,096.00	0.6%	29.3%	34.7%	17.3%	18.7%
	Acre	21,374,440.00	0.2%	44.9%	23.5%	18.2%	13.4%
	Amazonas	131,531,038.00	1.5%	48.5%	25.1%	13.6%	12.7%
	Roraima	18,202,579.00	0.2%	55.3%	20.7%	11.0%	13.0%
	Pará	262,904,979.00	2.9%	47.2%	26.3%	19.0%	7.5%
	Amapá	20,099,851.00	0.2%	38.3%	29.3%	20.3%	12.0%
	Tocantins	51,780,764.00	0.6%	35.0%	26.6%	20.5%	17.9%
Northeast	Maranhão	124,980,720.00	1.4%	48.3%	30.2%	12.3%	9.2%
	Piauí	64,028,303.00	0.7%	52.6%	20.6%	17.2%	9.6%
	Ceará	194,884,802.00	2.2%	42.3%	36.5%	12.5%	8.7%
	Rio Grande do Norte	80,180,733.00	0.9%	42.8%	24.2%	19.9%	13.1%
	Paraíba	77,470,331.00	0.9%	37.1%	29.8%	23.9%	9.2%
	Pernambuco	220,813,522.00	2.5%	48.8%	24.6%	16.7%	9.8%
	Alagoas	76,265,620.00	0.8%	39.3%	31.2%	18.4%	11.1%
	Sergipe	51,861,397.00	0.6%	50.1%	32.1%	10.3%	7.5%
	Bahia	352,617,852.00	3.9%	55.3%	19.3%	16.3%	9.1%
Southeast	Minas Gerais	857,593,214.00	9.5%	22.9%	24.0%	23.2%	29.8%
	Espírito Santo	186,336,505.00	2.1%	38.5%	19.4%	21.8%	20.4%
	Rio de Janeiro	949,300,770.00	10.5%	32.4%	24.3%	24.6%	18.7%
	São Paulo	2,719,751,231.00	30.2%	21.8%	20.8%	19.5%	37.8%
South	Paraná	549,973,062.00	6.1%	16.8%	25.5%	32.0%	25.6%
	Santa Catarina	428,570,889.00	4.8%	26.0%	29.1%	19.9%	25.0%
	Rio Grande do Sul	581,283,677.00	6.5%	27.1%	21.4%	20.9%	30.6%
Center--West	Mato Grosso do Sul	142,203,766.00	1.6%	34.1%	31.7%	18.2%	16.0%
	Mato Grosso	233,390,203.00	2.6%	35.8%	29.9%	23.5%	10.7%
	Goiás	269,627,874.00	3.0%	34.6%	27.0%	19.6%	18.8%
	Federal District	286,943,782.00	3.2%	25.6%	18.7%	23.8%	31.8%

SOURCE: IBGE (2023) AND NIC.BR (2023C).

MEANINGFUL CONNECTIVITY AND THE SOCIODEMOGRAPHIC DIMENSION

This section details the different levels of meaningful connectivity in the population, focusing on the sociodemographic dimension. This second segment of the analysis allows for a deeper understanding of the different levels of meaningful connectivity in the population, with the results presented by the following individual characteristics: (a) age group; (b) gender; (c) residence (or not) in households with school-age children (between 6 and 17 years old); and (d) self-declaration of color or race[16] (Chart 7).

The age dimension has historically served as a barrier to digital inclusion, even in economically developed countries (Helsper, 2009; Mubarak & Suomi, 2022). It's no different in Brazil (Santos, 2022): As data from ICT Households survey have shown since its first edition, the older population is historically the one with the lowest percentage of Internet users. In 2023, 51% of Brazilian residents aged 60 or over were Internet users, while the overall country figure was 84%. Various factors have been listed as conditioning factors for the digital exclusion among the elderly, from possible reluctance on the part of this population in adopting technologies, unavailability of digital skills for use, lack of resources, to limitations resulting from more restrictive physical conditions (such as vision or hearing problems) and the possible inadequacy of interface design to meet the needs of this population.

The findings regarding the level of meaningful connectivity underscore the exclusion of this group: 61% of individuals aged 60 or older fall into the category of the worst conditions of meaningful connectivity (up to 2 points), a figure well above the national average (33%).

The analysis of the age groups in the study suggests a revision of the hypothesis of overcoming situations of limited Internet access by a generational shift, i.e. the possibility that as the digitally native population grows older, this shift to a fully connected society would take place naturally. As the data show, younger people are not the group with the best indicators

16 Given the limitations of the sample, the results are presented for self-declared white and black or brown individuals.

of meaningful connectivity. Only 16% and 24% of 10 to 15 years old and 16 to 24 years old, respectively, fall into the highest range of meaningful connectivity (between 7 and 9 points).

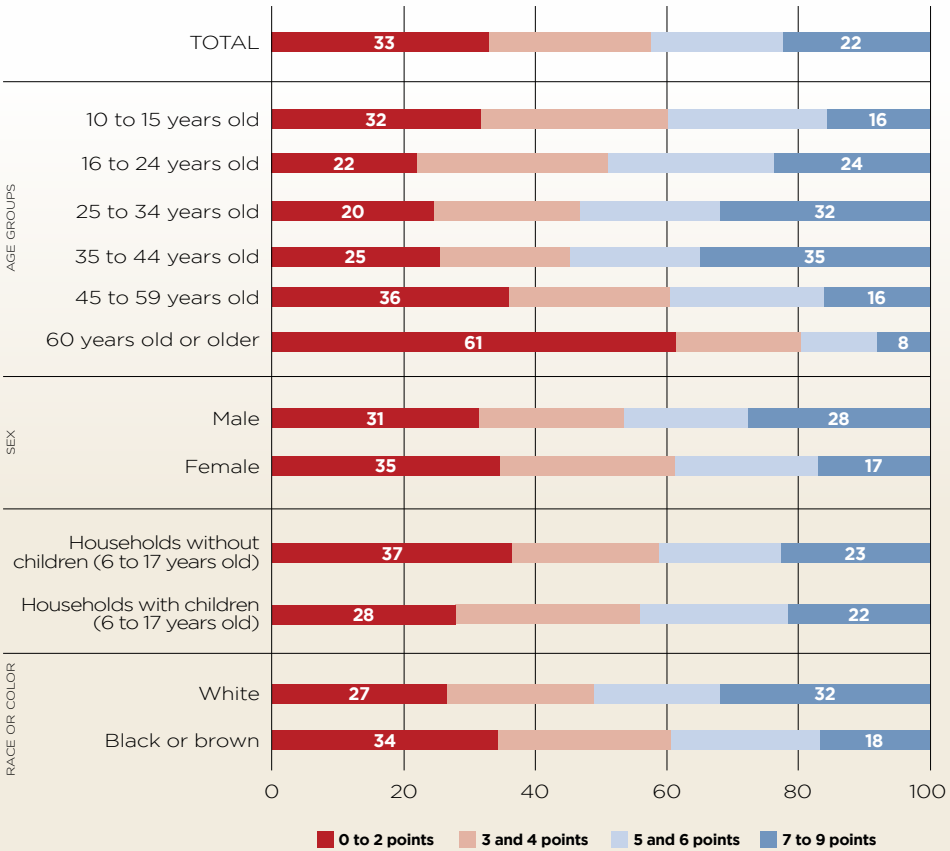
The data shows that the best levels of meaningful connectivity occur precisely within age groups with the highest representation in the labor market (25 to 44 years old). This suggests that the analysis of connectivity should transcend individual attributes, emphasizing the importance of the connectivity environment for achieving an effective harnessing of the network. In this sense, besides reinforcing the greater exclusion scenario among the elderly, the results reveal that a large proportion of young Brazilians have precarious connectivity conditions, which exposes them to numerous disadvantages in their personal and professional development.

Analysis of the results disaggregated by the variable sex of the respondents also reveals an additional layer of overlapping inequalities. The proportion of people in the best performance range for meaningful connectivity (7 to 9 points) is significantly higher among males (28%) compared to females (17%), a difference of 11 percentage points. This discrepancy highlights an additional layer of inequality that demands attention in digital inclusion policies.

When examined individually, some indicators of access to technology may not reveal these inequalities. For instance, the prevalence of Internet users in Brazil shows little difference by sex. According to data from ICT Households 2023 survey (NIC.br, 2023a), 83% of males and 86% of females were Internet users. However, a combined analysis of indicators reveals poorer connectivity conditions for females, emphasizing the importance of gaining a more comprehensive understanding of the population's connectivity. The more precarious connectivity conditions observed among females exacerbates the pre-existing barriers to their productive inclusion, equalization of income, public incidence, and participation in the social, political, and economic life of the country.

CHART 7 - MEANINGFUL CONNECTIVITY LEVELS AND THE SOCIODEMOGRAPHIC DIMENSION IN BRAZIL (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

Finally, the analysis of the data based on the respondents' self-declaration of race or color once again reflects the landscape of exclusion faced by already vulnerable groups. The imbalance existing between whites on the one hand and blacks/browns on the other is remarkable. Among self-declared whites, 27% experience the poorest conditions of meaningful connectivity (score between 0 and 2), while 32% fall into the highest performance group (score between 7 and 9). Among blacks and browns, 34%

are in the lowest range of meaningful connectivity and only 18% are in the highest range: The difference between whites and blacks/browns is therefore 14 percentage points, considering the range related to the best conditions of meaningful connectivity.

Therefore, it is important to implement public policies focused on reducing inequalities in access to and use of technologies for these most vulnerable groups to promote meaningful connectivity for the entire population, enabling the effective utilization of the opportunities facilitated by digital technologies. Overcoming the presented scenario is crucial so that the advancements of digital technologies also become means to overcome pre-existing inequalities rather than being an additional layer for their reproduction and amplification.

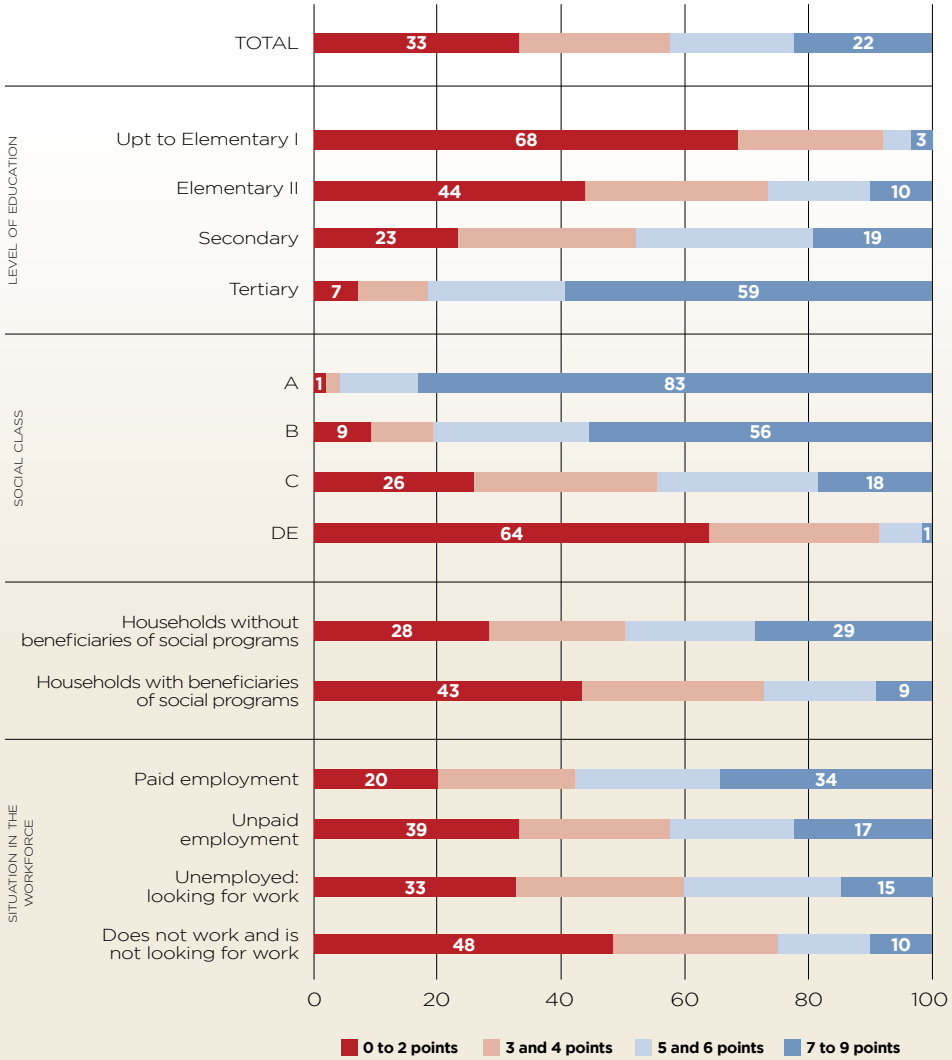
MEANINGFUL CONNECTIVITY AND THE SOCIOECONOMIC DIMENSION

The last section for understanding the different levels of meaningful connectivity in the population deals with the socioeconomic dimension (Chart 8). This section presents the levels of meaningful connectivity based on the following individual characteristics: (a) schooling; (b) socioeconomic class (Brazil Criteria 2020)[17]; (c) residence (or not) in households with beneficiary(ies) of social programs; and (d) presence in the workforce, considering those who: Work for pay, work without pay/volunteer, are unemployed looking for work and those who do not work and is not looking for work (including retirees, discouraged workers, among others).

17 The socioeconomic classification is based on the Brazilian Economic Classification Criteria (CCEB), defined by the Brazilian Association of Research Companies (Abep). For the results published in this publication, the Brazil 2020 Criterion was adopted.

CHART 8 - MEANINGFUL CONNECTIVITY LEVELS AND THE SOCIOECONOMIC DIMENSION IN BRAZIL (2023)

Total population (%)



SOURCE: NIC.BR (2023C).

The data reveal a strong association between years of schooling and meaningful connectivity conditions. As the level of education increases, the proportion of individuals with a score between 0 and 2 decreases, while the proportion with a score between 7 and 9 increases. In this context, the two extreme categories considered in the research stand out. Among those with up to elementary school education, the majority (68%) fall into the worst score range, and only 3% in the best. Conversely, among those with higher education, only 7 % are in the worst score range, while the majority (59%) are in the best.

The association between socioeconomic class and individual conditions of meaningful connectivity is also notable (Chart 8). Once again, there is a direct relationship between situations of greater vulnerability and poorer performance in meaningful connectivity. Among those in class A, the vast majority (83%) are in the best score range, with only 1% in the worst. The situation is reversed among people in the DE classes, where only 1% are in the best score range and the majority (64%) in the worst.

The association between socioeconomic vulnerability and meaningful connectivity conditions is further emphasized by data referring to households with social programs beneficiaries, who are more vulnerable in socioeconomic terms. Among individuals living in such households, 43% have a score between 0 and 2, and only 9% have a score between 7 and 9. Among those who live in households with no social programs beneficiaries, 28% have a score between 0 and 2, and 29% between 7 and 9. It is important to note that these results surpass the averages of the Brazilian population as a whole, with 33% in the worst score range and 22% in the best.

Finally, the results indicate that among individuals with paid work, 20% experience markedly negative conditions of meaningful connectivity (score between 0 and 2), while 34% enjoy positive conditions (score between 7 and 9). In the other three groups considered by the survey, this picture is not replicated. In those groups, the proportion of individuals in the lowest range of meaningful connectivity (score between 0 and 2) exceeds the proportion of individuals in the highest range (score between 7 and 9). Among the non-economically active, those neither working nor looking for a job, the difference is especially

marked, with 48% having a score between 0 and 2, and only 10% between 7 and 9. It is also worth noting the difference between the unemployed (those looking for work) and those with paid work. The difference in the incidence of individuals with the best conditions of meaningful connectivity between these two groups is 19 percentage points. In this context, the data shows the potential impact that the lack of connectivity has on the productive inclusion of the population.

The presented indicators offer a perspective of the challenges encountered on the road to taking advantage of the opportunities for economic development presented by the advent and advancement of digital technologies. The traditional barriers to productive inclusion, income improvement and the practice pursuit of higher-skilled professional activities are exacerbated by the lack of adequate connectivity conditions for the population. Individuals with lower education levels, belonging to the most vulnerable socioeconomic classes, social programs beneficiaries and those outside the workforce or looking for a job are precisely the ones facing the poorest connectivity conditions.

If access to technologies promises new forms of work, alternative activities to increase income, and fundamentally, a universe of possibilities for information access and new educational modalities, precisely those who could benefit most from these possibilities are the ones who are farthest from the minimum conditions necessary for their utilization. For the full exercise of citizenship, reduction of poverty conditions, and creation of opportunities for large segments of the historically excluded population, it is essential to conceive and implement policies and actions focused on reducing inequalities in the Internet access and the quality of connectivity.

MEANINGFUL CONNECTIVITYAND AND THE TYPES OF INTERNET USE

In this section, an analysis is conducted to assess the relationship between the different levels of meaningful connectivity and the types of Internet use and the qualification of individuals for network utilization. In this case, the digital skills of individuals and their online activities were analyzed based on the level of meaningful connectivity. For this section,

the results focus only on the total number of Internet users in Brazil, consisting of 84% of the population.

MEANINGFUL CONNECTIVITY AND DIGITAL SKILLS

Quality access to digital technologies, at a reasonable cost, with suitable devices, in different locations and with an unlimited connection of sufficient speed, is the gateway to capitalize on the opportunities offered by the development of the information society. This use, however, also presupposes the existence of individual skills for using the digital environment, while, conversely, the (good) online experience of individuals also generates and improves their digital skills. In other words, while the conditions for access are essential initial factors for the population to make satisfactory use of the opportunities arising from the use of the Internet, it is equally essential to assess the population's ability to carry out the available activities.

In this section, therefore, the level of meaningful connectivity was analyzed in terms of its possible association with indicators of the population's digital skills, aiming to comprehend the relationship between meaningful connectivity and the effective use of the Internet by the population.

To analyze digital skills, six variables were selected from ICT Households 2023 survey (NIC.br, 2023c), which include activities that Internet users reported having performed in the last three months. These activities, considered as digital skills indicators, address both the adoption of specific tools in the virtual environment and practices aimed at ensuring safe and reliable use of the Internet. They are: (a) having used copy and paste tools to duplicate or move content in a document or message; (b) having attached a file, image or video to instant messages, emails, among others; (c) having installed computer software or apps; (d) having adopted security measures, such as strong passwords or two-step verification, to protect devices and online accounts; (e) having changed privacy settings on device(s), account(s) or application(s) to limit the sharing of personal data, such as name, contact or photo; (f) having verified whether an information found on the Internet was true.

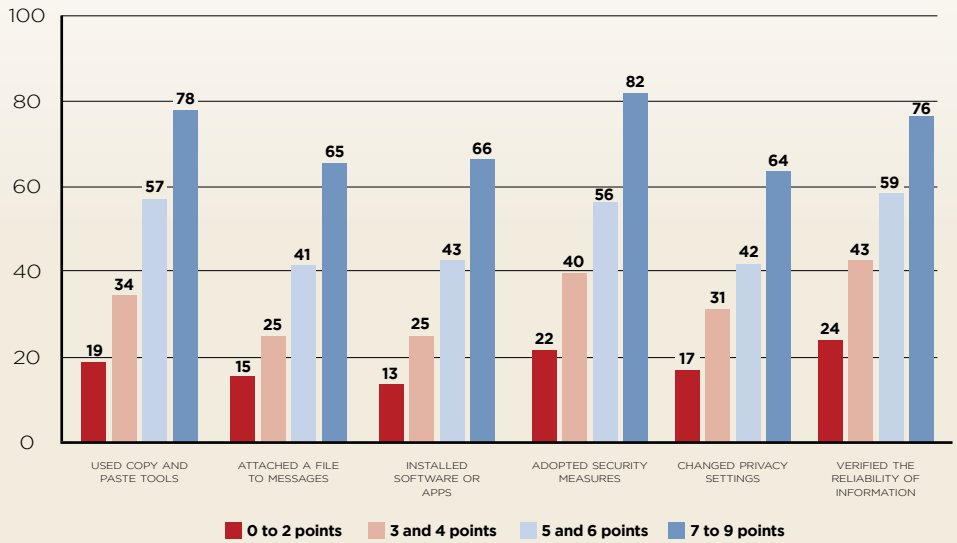
The results reveal a strong association between individual

conditions of meaningful connectivity and the different types of digital skills measured among Internet users. The correspondence is nearly linear between the incidence of the skills and the level of meaningful connectivity observed. In other words, as one advances in the range of meaningful connectivity, the proportion of individuals possessing the analyzed digital skills substantially rises. For instance, the use of copy and paste tools, for example, is done by 19% of individuals with meaningful connectivity between 0 and 2, 34% of those with a score of 3 or 4, 57% of those with 5 or 6 points, and by 78% of those in the highest range of meaningful connectivity (score between 7 and 9). The same trend is observed across the other five activities measured (Chart 9).

It is noteworthy that, in addition to technical skills, such as installing applications or software and attaching files to messages, skills related to safe and reliable Internet use, including measures for usage security, privacy protection, and information verification, are also strongly associated with the level of meaningful connectivity. Only 19% of individuals in the lowest range of meaningful connectivity report having verified whether information found on the Internet was true, while the incidence is 76% among those with the best conditions of meaningful connectivity (score between 7 and 9).

CHART 9 - MEANINGFUL CONNECTIVITY LEVELS, BY TYPE OF DIGITAL SKILLS IN BRAZIL (2023)

Total Internet users (%)



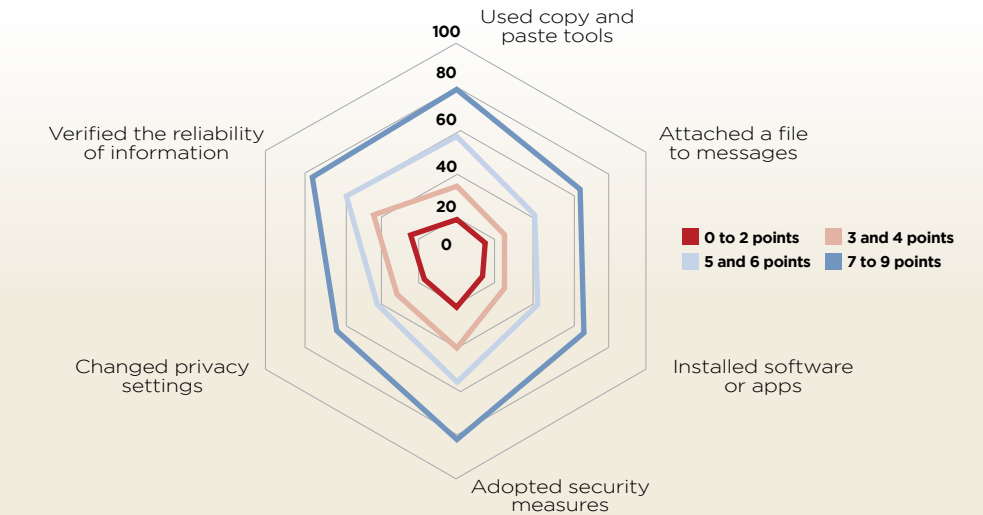
SOURCE: NIC.BR (2023C).

Chart 10 illustrates the gaps between individuals' digital skills, based on the different levels of meaningful connectivity. As the degree of meaningful connectivity increases, the presence of skills for all analyzed items increases almost equivalently.

It is not possible to establish a causality between the level of meaningful connectivity and digital skills for Internet use, i.e. it is not possible to define which factor influences the other. However, the strong association observed reveals that precisely those with poorer connectivity conditions are also the most exposed to risky situations, given that they also have fewer skills to manage their digital environment usage. Furthermore, as discussed in the previous section, meaningful connectivity is strongly dependent on the socioeconomic conditions of the population and, consequently, those individuals who could rely on Internet use to overcome pre-existing vulnerabilities are precisely those who have fewer competencies to do so.

CHART 10 - MEANINGFUL CONNECTIVITY LEVELS, BY TYPE OF DIGITAL SKILLS IN BRAZIL (2023)

Total Internet users (%)



SOURCE: NIC.BR (2023C).

MEANINGFUL CONNECTIVITY AND ONLINE ACTIVITIES

The proposal to adopt the concept of meaningful connectivity as an analytical tool is based on the idea that to take effective advantage of the opportunities offered by Internet use, it is necessary to ensure adequate access conditions. In this sense, once the factors characterizing better or worse connectivity conditions (such as demographic and economic characteristics, for example) have been mapped, it is still necessary to understand the relationship between these connectivity conditions and the different types of activities carried out in the virtual environment. To this end, the analysis presented in this section started from the selection of 14 different activities, grouped into three main types.

The first group encompasses "communication and entertainment" activities, basically associated with individuals' primary sociability and online cultural practices, for which five activities were selected. This group can be understood as the one comprising the most commonplace activities (not

necessarily less important), which relate to individuals' everyday communication practices, as well as leisure and/or entertainment moments in the virtual environment.

The second group, made up of four activities, deals with the use of the Internet to "search for information" of different types. It was analyzed separately, because it deals with activities with more varied frequency, being relatively more dependent on individuals' circumstantial needs, considering the intentionality given by the search effort.

Finally, the third group of indicators center on "transactional activities," involving the exchange of information, goods or services among users, companies, or organizations. In this group, five activities were contemplated. As a distinguishing factor, this group comprises activities characterized by their concrete objective associated with the task performed, such as acquiring specific products or services, gaining qualifications, engaging in professional activities, conducting financial transactions, or securing a particular right.

Table 6 shows the three groups, the activities analyzed in each of them, and the respective questions asked to Internet users that originated the indicators.[18]

18 All the data comes from the ICT Households survey 2023 (NIC.br, 2023c).

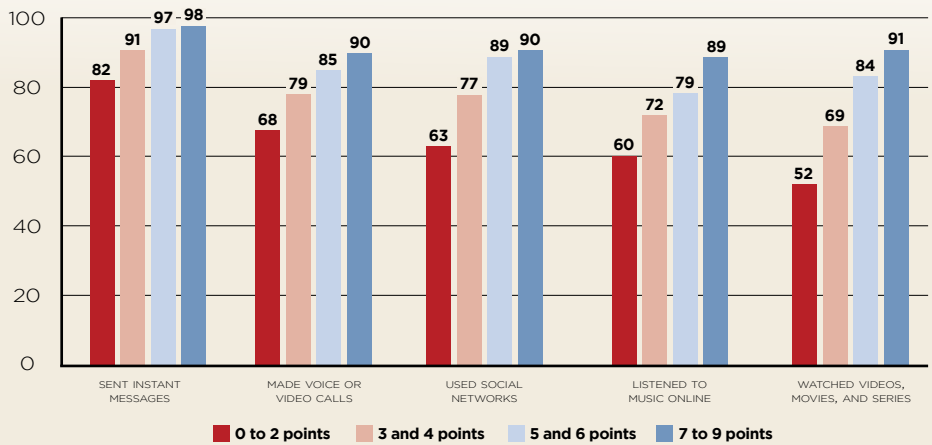
TABLE 6 - GROUPS OF ACTIVITIES CARRIED OUT ON THE INTERNET, DERIVED INDICATORS, AND SOURCE QUESTIONS

GROUPS	INDICATORS	QUESTIONS	
COMMUNICATION AND ENTERTAINMENT	Sent instant messages	Which of the following activities have you done on the Internet in the last 3 months?...	Did you send messages via WhatsApp, Skype or Facebook *chat*?
	Made voice or video calls		Did you have a voice or video call, like on Skype or WhatsApp?
	Used social media		Have you used social networks such as Facebook, Instagram or TikTok?
	Watched videos, movies, series		Have you watched videos, shows, movies or series online, such as on YouTube or Netflix?
	Listening to music *online*		Have you listened to music on the Internet, such as Spotify, Deezer or YouTube?
SEARCH FOR INFORMATION	Searched for health information		Did you look for information related to health or health services?
	Searched for information in virtual encyclopedias		Did you look for information on virtual encyclopedia *sites* like Wikipedia?
	Searched for information on government websites		Did you look for information on government websites?
	Searched for information on products or services		Looking for information on products and services?
TRANSACTIONAL ACTIVITIES	Carried out some type of public service		Have you carried out any public services, for example: issuing documents online, filling in and submitting forms online, or paying fees and taxes *online*?
	Carried out financial activities		Have you made any inquiries, payments, or other financial transactions?
	Carried out work activities		Have you carried out any work activities?
	Studied on his own		Did you study on the Internet on your own?
	Purchased products and/or services	Have you bought or ordered products or services online in the last 12 months, even if you didn't pay online?	

SOURCE: NIC.BR (2023C).

CHART 11 - MEANINGFUL CONNECTIVITY LEVELS, BY COMMUNICATION AND ENTERTAINMENT ACTIVITIES CARRIED OUT ON THE INTERNET IN THE LAST 3 MONTHS (2023)

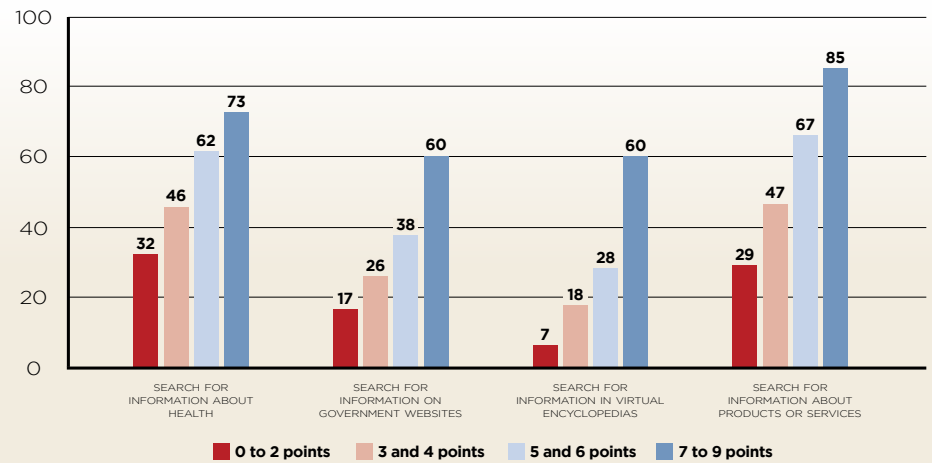
Total Internet users (%)



SOURCE: NIC.BR (2023C).

CHART 12 - MEANINGFUL CONNECTIVITY LEVELS, BY SEARCH FOR INFORMATION ACTIVITIES CARRIED OUT ON THE INTERNET IN THE LAST 3 MONTHS (2023)

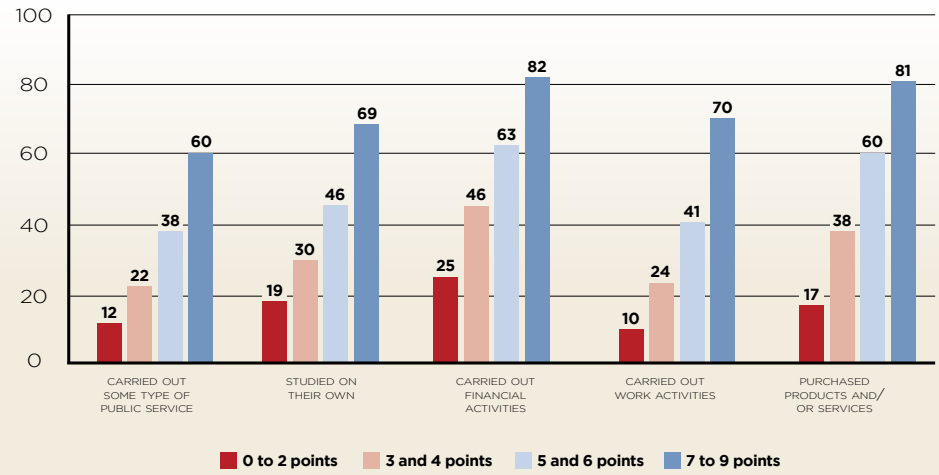
Total Internet users (%)



SOURCE: NIC.BR (2023C).

CHART 13 - MEANINGFUL CONNECTIVITY LEVELS, BY TRANSACTIONAL ACTIVITIES CARRIED OUT ON THE INTERNET IN THE LAST 3 MONTHS (2023)

Total Internet users (%)



SOURCE: NIC.BR (2023C).

When analyzing online activities performed by Internet users across different levels of meaningful connectivity, the relationship between better connectivity conditions and a higher incidence of performing activities in the virtual environment becomes clear. Across the three groups, which include 14 different activities, this relationship is evident, albeit to varying degrees, which is an important point to note.

For "communication and entertainment" activities, there is a significant difference in the use of the network according to the degree of connectivity, especially among those with the worst connectivity conditions. The group of Internet users with scores between 0 and 2 does engages in these activities to a lesser extent. However, the discrepancies between the groups in the other ranges are not as significant. For instance, "sending or receiving instant messages" is an activity carried out by 82% of Internet users with meaningful connectivity between 0 and 2, 91% of those with a score of 3 or 4, 97% of those with a score of 5 or 6, 98 % of those with a score of 7 or more. In entertainment activities, such as "watching movies,

videos or series," the differences between the meaningful connectivity ranges are more pronounced, suggesting possible limitations imposed by bandwidth or data package constraints. Furthermore, while more than 90% of Internet users with a score between 7 and 9 engage in this type of activity, only half (52%) of those with a score between 0 and 2 do.

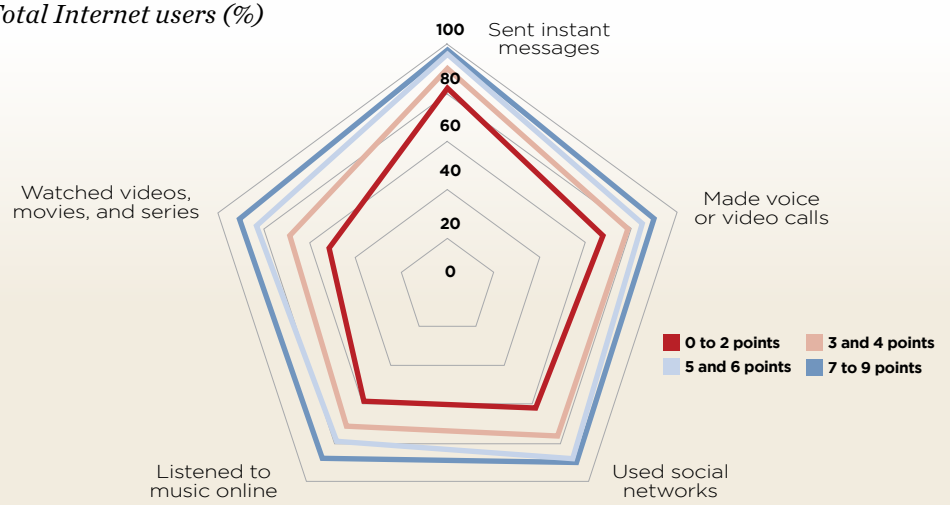
Although differences are observed among the activities assessed in the "communication and entertainment" group, the disparities observed between the meaningful connectivity ranges are smaller in this group. Despite being fundamental activities for everyday life, considering the centrality that new technologies have assumed in individuals' sociability and communication forms, qualified and meaningful uses of the virtual environment cannot be limited to this type of activity.

When analyzing the relation between online activities and levels of meaningful connectivity within the other two groups of activities presented, the differences between the ranges are quite significant. "Search for information" of various kinds is an activity carried out by more than two thirds of Internet users only among those with the best conditions of meaningful connectivity (score between 7 and 9 points). Searching for information on government websites, for instance, is an activity carried out by only 17% of those with a score between 0 and 2, 26% of those with a score of 3 or 4; 38% of those with a score 5 or 6 and 60% of those with the best conditions (score between 7 and 9).

In the category of "transactional activities," the bottlenecks observed at different levels of meaningful connectivity are even greater. Engaging in work-related activities on the Internet is practiced by 70% of those with the best conditions of meaningful connectivity (score between 7 and 9), 41% with a score between 5 or 6, 24% with a score of 3 or 4 and only 10% with the lowest level of meaningful connectivity (score between 0 and 2). A nearly identical linear relationship is observed in the other transactional activities.

CHART 14 - MEANINGFUL CONNECTIVITY LEVELS, BY COMMUNICATION AND ENTERTAINMENT ACTIVITIES CARRIED OUT ON THE INTERNET IN THE LAST 3 MONTHS (2023)

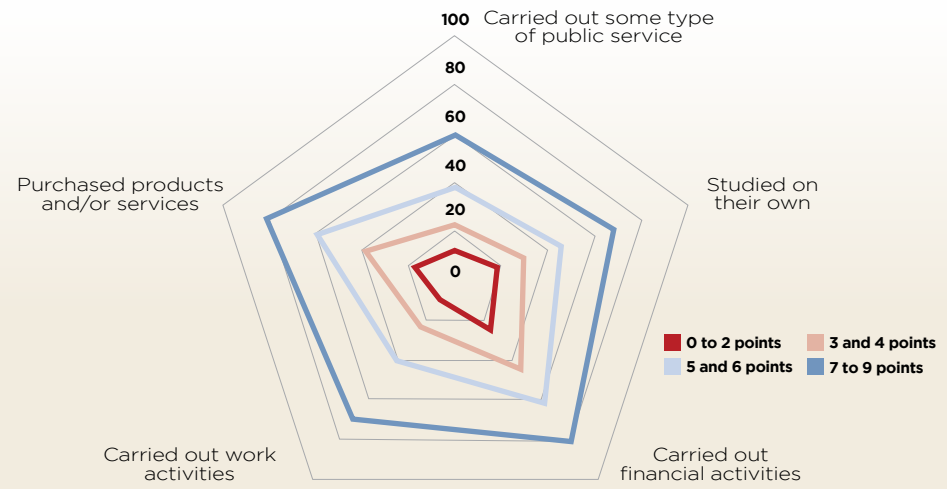
Total Internet users (%)



SOURCE: NIC.BR (2023C).

CHART 15 - MEANINGFUL CONNECTIVITY LEVELS, BY TRANSACTIONAL ACTIVITIES CARRIED OUT ON THE INTERNET IN THE LAST 3 MONTHS (2023)

Total Internet users (%)



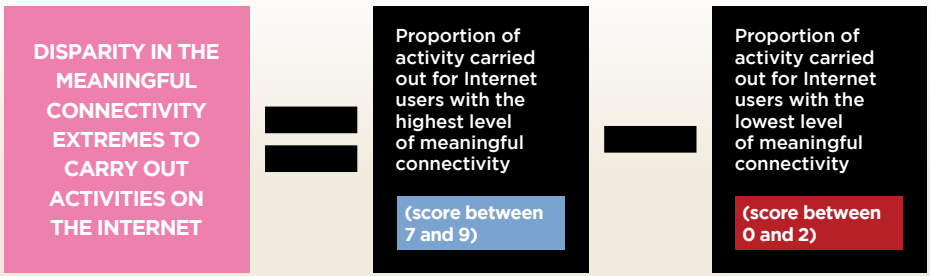
SOURCE: NIC.BR (2023C)

Charts 14 and 15 compare the "communication and entertainment" group of activities, those most frequently carried out by the general population, with "transactional activities." The distances observed between the lines representing each meaningful connectivity range reveal that the level of connectivity has a greater association with activities with higher potential benefits for social and economic development and for ensuring individuals' rights. In this context, the importance of understanding digital inclusion in a broader way is reinforced and not just by whether you have access to the Internet.

The conditions of access and the related infrastructure, such as adequate bandwidth quality, diverse devices, and affordable prices, are key to effectively realizing the vision of a society where opportunities in the digital age are accessible on equal terms and meaningful connectivity is guaranteed. The different uses of the Internet, underscored by great inequalities, reintroduces barriers for overcoming situations of vulnerability that could have been partially mitigated with the emergence of technologies. Furthermore, these inequalities make already vulnerable groups even more excluded from the economy that is becoming more intense with the development of the information society.

The disparities in Internet use, depending on connectivity conditions, become evident when comparing the groups at the opposite ends of the meaningful connectivity spectrum. In this study, an alternative way of interpreting the observed disparity in meaningful connectivity on Internet use was proposed: As shown in Figure 4, the difference, in percentage points, between the prevalence of each of the 14 activities analyzed among those with the highest (score between 7 and 9) and lowest (score between 0 and 2) meaningful connectivity levels was calculated.

FIGURE 4 - CALCULATION OF DIFFERENCES IN PERFORMING INTERNET ACTIVITIES BY EXTREMES OF MEANINGFUL CONNECTIVITY

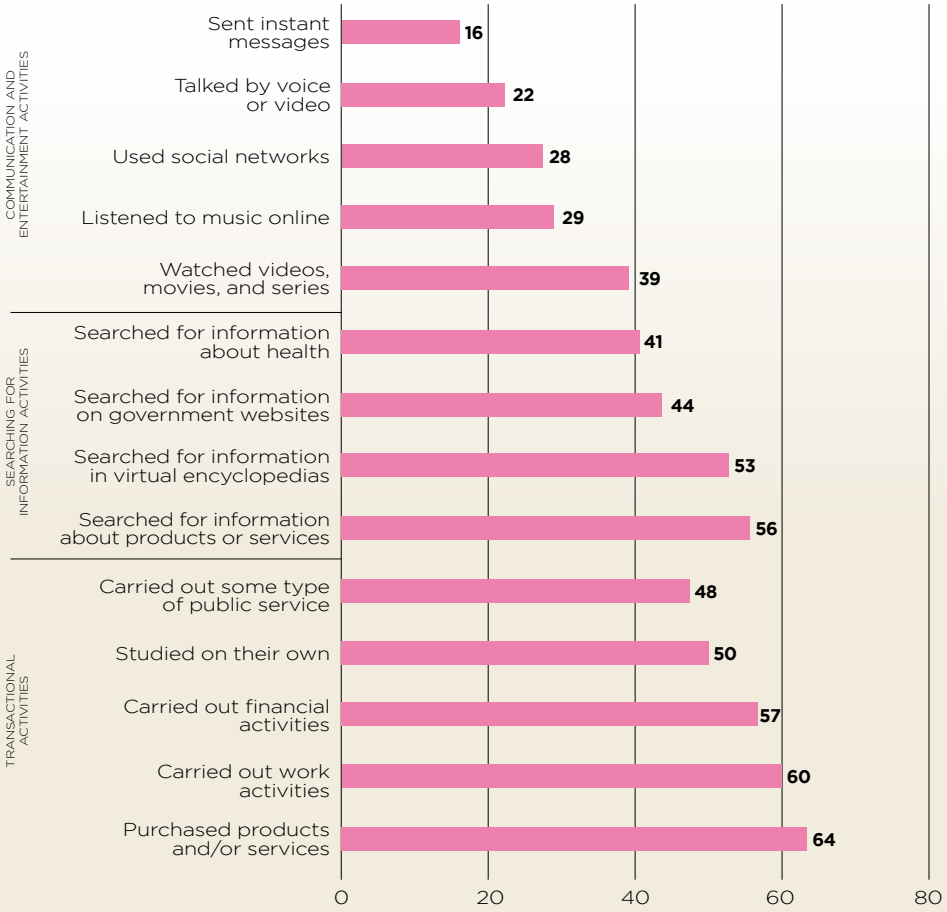


SOURCE: PREPARED BY THE AUTHOR.

Chart 16 illustrates that, in all cases, there are very unequal levels utilization of activities available in the virtual environment, based on the individuals' level of meaningful connectivity. These bottlenecks in utilization become even more pronounced when observing activities with more tangible benefits for Internet users. While the differences between the groups with the worst and best conditions for meaningful connectivity range from 16 to 39 percentage points for "communication and entertainment" activities, the differences range from 41 to 56 percentage points for "search for information" activities. Among "transactional" activities, the minimum difference observed for these is 48 percentage points, reaching 64 percentage points for "purchasing products and/or services over the Internet."

CHART 16 - DISPARITY BETWEEN THOSE WITH THE LOWEST AND HIGHEST LEVELS OF MEANINGFUL CONNECTIVITY, BY GROUP AND TYPE OF ACTIVITIES CARRIED OUT ON THE INTERNET (2023)

Total Internet users (%)



SOURCE: NIC.BR (2023C).

Internet users with unequal opportunities, varying degrees of utilization, and varied levels of restrictions for digital environment use. These are possible findings based on the results presented so far. Brazil has been historically marked by situations of inequality that persist and exacerbate as society advances and becomes more complex. Addressing

these challenges, characterized by overlapping situations of disadvantage built up by historical contexts with high vulnerability, insecurity, and little effective guarantee of rights, is an arduous task but crucial to building a country with more social justice and a higher quality of life. The advent of technology has brought new possibilities for creating disruptive situations, capable of possibly minimizing some of the lack of opportunities for development for a significant portion of the population. Therefore, to take advantage of these opportunities, it is essential to reduce inequalities in terms of qualified access to digital technologies, as well as their potential use.

FINAL REMARKS

This study proposes a method for measuring the population's level of meaningful connectivity, by constructing a scale derived from data processing from the ICT Households survey, a longitudinal probabilistic household survey on access and use of ICT in Brazil. The proposed levels of analysis appear as a first exercise in gauging the population's connectivity conditions from a comprehensive analytical lens. This is an attempt to deepen the effective meaning of digital inclusion beyond, for example, mere usage or non-usage of the Internet, or access or non-access to the web.

Based on the concept of meaningful connectivity, which presupposes that Internet access should enable satisfactory, secure usage and the possibility of capitalize on network, the levels of meaningful connectivity presented are the result of combining nine indicators across four dimensions: (a) affordability, which deals with connectivity costs; (b) access to equipment, encompassing the possession of suitable devices for intended uses; (c) quality of the connections available; and (d) connectivity environment, considering Internet usage frequency and locations.

The results observed for the different levels of connectivity reveal a very challenging scenario concerning meaningful connectivity among the Brazilian population. With scores ranging from 0 to 9, the levels of meaningful connectivity are categorized into four ranges. In 2023, only 22% of Brazilians aged 10 or older fall within the highest score range (between

7 and 9 points). The largest observed group exhibits the worst performance (up to 2 points), representing one-third (33%) of the Brazilian population. Nonetheless, a retrospective analysis of selected indicators reveals a trend of progressive improvement in the country. In 2017, 48% of the population belonged to the group with the lowest levels of meaningful connectivity and only 10% were in the highest-performing range.

Despite promising progress in indicators over the last few years, the inequalities of the current scenario in Brazil regarding meaningful connectivity among the population reveal that situations of digital exclusion are markedly reproductive of pre-existing social and economic exclusion in the country. Residents of rural areas, small municipalities, populations from the North and Northeast regions, women, self-identified black or brown people, from socioeconomic classes C and DE, with low levels of education and outside the labor market are those with the lowest score*s* for meaningful connectivity.

Furthermore, the study revealed a direct association between an individual's level of meaningful connectivity (measured using the proposed scale) and their digital skills. Higher meaningful connectivity score*s* are associated with better technical skills to deal with the technologies. Moreover, higher meaningful connectivity scores are also more frequent associated with skills aimed at using the Internet in a secure and reliable manner, measured by activities carried out to improve browsing safety, privacy protection and the verification of information accessed in the virtual environment. Consequently, those with the most fragile access conditions are precisely those with the fewest skills needed to mitigate the risks associated with the Internet usage.

Finally, to leverage the opportunities in the virtual world is also more effective when individuals have higher levels of meaningful connectivity. While the effect of the level of meaningful connectivity for primary sociability or entertainment activities (such as sending instant messages, using social networks, and watching online videos) is observed, it is not as pronounced as in more complex activities with greater potential for individual empowerment, such as searching for information on rights and/or services, and activities of

a transactional nature, such as financial transactions and using digital government services.

Based on this study on the meaningful connectivity of the Brazilian population, there is a need to revise public policy strategies for digital inclusion, also taking into account the identified and quantified dimensions. Public policies focused on reducing inequalities in access must be accompanied by investments in digital infrastructure strategies to reduce the costs of individual devices and democratization of Internet access locations. Inclusion initiatives should target vulnerable groups, promoting digital literacy. In this sense, partnerships between the public and private sectors and civil society organizations are essential to develop educational resources and critical digital skills. At the same time, it is imperative to continue monitoring the progress of meaningful connectivity over time in order to adapt policies and interventions as necessary to ensure that all population have the opportunity to enjoy the benefits of the digital age.

The measurement of meaningful connectivity levels presented in this study is an initial proposal, which is open to continuous improvement in the face of rapid technological change. Like any proposal for measuring a current phenomenon, it will have to undergo revisions and updates to reflect new realities in the future. Despite this, its conception and the analyses resulting from the conceptual and analytical frameworks used represent an important step in understanding the progress and challenges related to the population's connectivity. They make it not only possible to assess the current state, but also to identify critical areas where interventions are needed and to monitor the impact of policies over time.

It is hoped that this study, in addition to offering valuable clues about the existing gaps, will also guide the formulation and evaluation of policies and initiatives aimed at ensuring that all segments of society can fully enjoy the benefits provided by the digital age, with continued progress towards truly inclusive and meaningful connectivity. Recognizing connectivity as a right is an essential milestone in the society digital transformation. Ensuring that everyone, regardless of socioeconomic background or geographical location, has

access to a meaningful connectivity to Internet is not just a step forward, but an imperative for digital inclusion that goes beyond mere access. This principle is the foundation for building a connected society, in which the opportunities generated by the digital age are distributed fairly, fostering progress and innovation in all spheres of human and social life.

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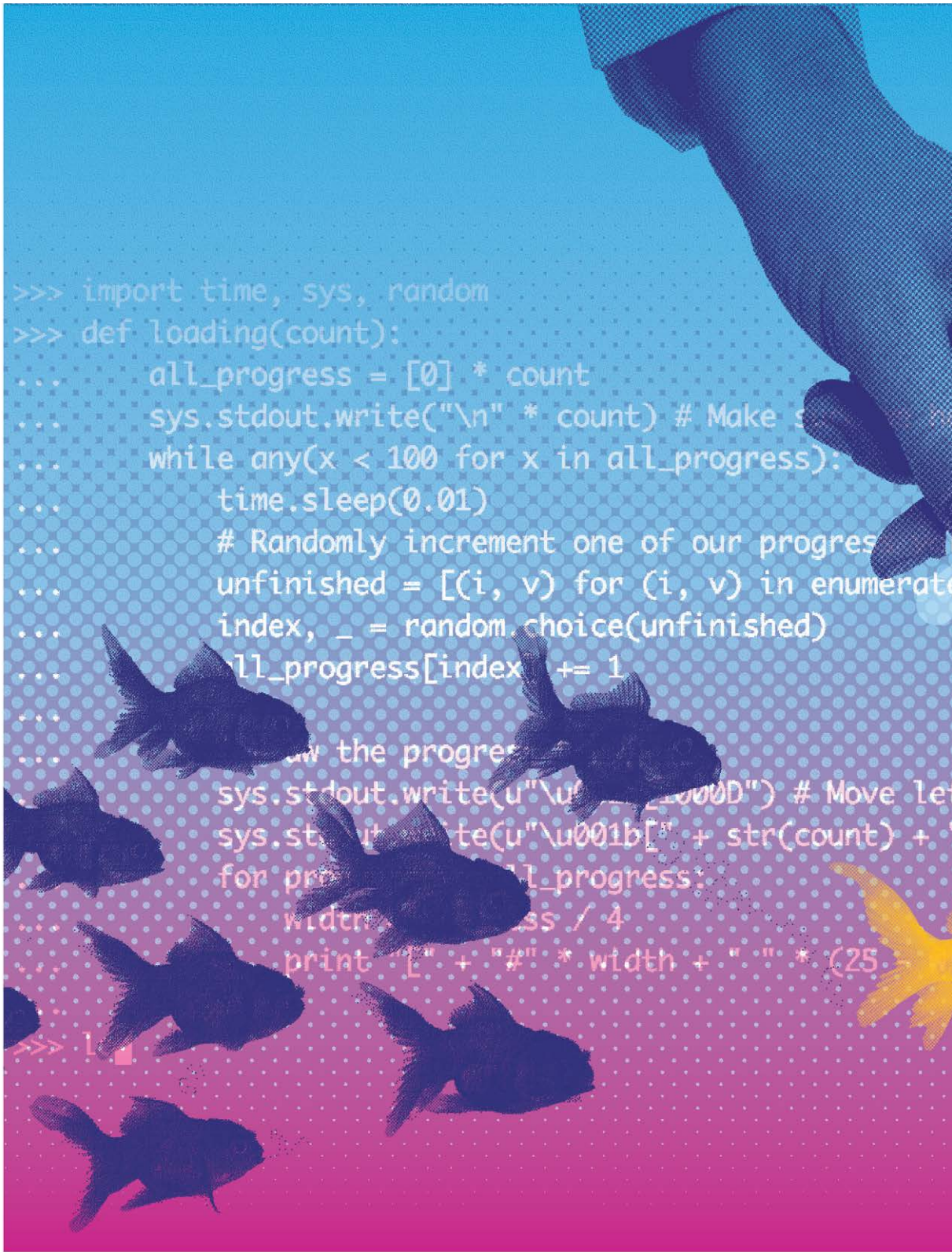
FINAL CONSIDERATIONS

Regional experiences in meaningful connectivity

Fernando Rojas[1]

1 Fernando Rojas has more than 20 years' experience in the telecommunications sector, working in the Division of Productive and Business Development of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) as a specialist in telecommunications infrastructure and the digital economy. He is also responsible for the Regional Broadband Observatory (ORBA) and is part of the technical secretariat of the eLAC process, a regional platform for political dialogue on information and communication technologies (ICT), created in 2005.


>>> import time, sys, random
>>> def loading(count):
... all_progress = [0] * count
... sys.stdout.write("\n" * count) # Make
... while any(x < 100 for x in all_progress):
... time.sleep(0.01)
... # Randomly increment one of our progres
... unfinished = [(i, v) for (i, v) in enumerat
... index, _ = random.choice(unfinished)
... ll_progress[index] += 1
... aw the progre
... sys.st out.write(u"\u 0000D") # Move le
... sys.st te(u"\u001b[" + str(count) +
... for pr l_progress:
... width ss / 4
... print "[" + "#" * width + " " * (25
>>> l

As mentioned throughout this publication, meaningful connectivity is a broad concept that considers the massification of broadband Internet services and access devices, as well as the development of digital skills for their use. In this sense, having meaningful connectivity is the main conditioning factor for accessing the various benefits of digital technologies.

Regarding access to broadband Internet services, the information available on the penetration of these services in Latin American and Caribbean countries shows a challenging picture. Over the last decade, the region has made great efforts to universalize access to these services, achieving significant progress in this area. However, there are still significant gaps in access to connectivity, marginalizing an important portion of the population from the benefits of digital services.

Between 2010 and 2021, the region grew, on average, by more than 10 times in terms of mobile broadband penetration, an increase much higher than that observed in North America and Europe.[2] A very different situation is observed in the case of fixed broadband, where the region grew by just over two times, remaining well below Asia Pacific, Europe, and North America.

In 2021, the average penetration of fixed broadband in households in Latin America and the Caribbean was close to 62%, which, as mentioned, puts the region well below other regions such as North America and Europe, which have penetration levels close to 100% and 90%, respectively. In the case of mobile broadband, the differences are also significant, with penetration reaching 78% of the region's population, compared to 105%, and close to 150% in Europe and North America. This compares with 105% and close to 150% in Europe and North America, respectively, although with very different situations depending on the country considered.

Although there has been significant progress in terms of connectivity in the region, there is still a significant percentage

2 The data presented in this text is based on indicators from the Digital Development Observatory (ODD) of the United Nations Economic Commission for Latin America and the Caribbean (ECLAC). The non-reprocessed data is available at: https://desarrollodigital.cepal.org/es/indicadores

of households and individuals in the region who, depending on their age, geographical location, and economic status, have limited or no access to the Internet.

In this context, it is important to mention that although there is high broadband coverage in the region, particularly mobile broadband, there is also a high demand gap (understood as the difference between the availability of the service and its actual contracting), largely explained by low-income levels.

Connectivity gaps are associated with different supply and demand factors. Among the former, those related to service coverage stand out, while the latter are more associated with the accessibility of the service and the necessary terminals, as well as digital skills. Demand factors are linked to people's income level, area of residence, education level, gender, and age, among others. In this sense, a detailed analysis of the gaps is very relevant, as it allows the adoption of actions to be taken to massify access. In Latin America and the Caribbean, the digital divide by family income level differs widely, in some cases reaching more than 50 percentage points between the highest and lowest-income households.

The place of residence is another relevant dimension that explains the connectivity gaps, as there are significant differences in access between urban and rural households. In this respect, the situation is very heterogeneous among the countries of the region. In urban areas, some countries have a penetration rate of more than 80%, while in other countries it reaches less than 40%; similarly, the difference in penetration between urban and rural areas ranges from more than 50% to less than 10%.

The connectivity gap reflects the exclusion of important segments of the population, especially the most vulnerable ones. This situation not only limits access to the potential benefits of digitalization, but also restricts access to some basic services, such as information, education, and health, among others. For this reason and since income will continue to be one of the main limiting factors for Internet access, it is important to consider different alternatives to finance the bridging of this type of gap, such as the application of demand subsidies.

Another element that must be considered when referring to meaningful connectivity is the quality of the Internet

connection since this will determine the services and applications that can be accessed. This quality, in turn, depends on the technologies used to access the Internet.

Fixed broadband, provided through fiber optic connections, allows high connection speeds with low latency,[3] which would make this technology the best option for home connectivity. However, its deployment costs limit the geographical scope and the speed of network expansion, orienting connectivity massification solutions towards fifth-generation (5G) mobile networks, which allow the implementation of fixed wireless access (FWA) connections, providing high connection speeds with faster deployment and lower costs. Similarly, the evolution of satellite access is creating an option for competitive connectivity, especially for remote areas that are difficult to access or have low population density.

Among the countries in the region, the fixed broadband landscape is heterogeneous. Brazil, Chile, Colombia, Panama, and Uruguay stand out for having high average download speeds (over 100 megabits per second [Mbps]) and low latency. These countries exceed the world average, reaching values even comparable to some advanced economies, such as Japan, the Republic of Korea, and the United States. Chile stands out in this group with an average effective download speed of close to 280 Mbps.

In the case of mobile broadband, although there is greater homogeneity between these countries in terms of average speeds and latencies, they are clearly behind more advanced countries, such as the United countries such as the United States and the Republic of Korea. In Latin America and the Caribbean, it is important to note that the most widely used modality to access broadband is mobile technology, so the quality of this service could have a greater impact.

In this context, ECLAC proposed the allocation of a basic digital basket that would allow lower-income segments of the population to have access to meaningful connectivity and thus be able to take advantage of the benefits derived from the use of digital technologies.

3 Latency is the sum of time delays in a computer data network. The delay is produced by the delay in the propagation and transmission of data packets within the network.

This basket, in its integral form, comprises a fixed broadband plan, a mobile broadband plan, and access devices (smartphone, tablet, and laptop) to facilitate the connectivity for various members of a household. In this regard, the current context has shown that the optimal engagement in activities like tele-education or teleworking requires the use of terminal equipment such as computers or tablets, since smartphones may have limitations for the execution of these activities, and it should also be considered that several members of a household may be simultaneously utilizing digital services, so more than one device and adequate connection speeds will be required.

As for the development and reinforcement of basic digital skills, which is another component of meaningful connectivity, content could be distributed (for example, through applications preloaded on the devices) with information on how to properly use the access terminals, on health, education and entrepreneurship issues, as well as information on how to carry out online procedures, in addition to basic aspects related to security and privacy in the handling of personal data. This component would have a zero or marginal cost, since this type of content is already available free of charge from various public and private sector sources.

In this regard, it is important to mention that the basic digital basket is a modular tool that has the flexibility to adapt to different needs and policy objectives since not all countries have the same characteristics in terms of connectivity gaps. For example, in the case of countries with very high mobile broadband coverage and penetration, the basket could be adjusted to only provide fixed broadband and the corresponding access devices, with a consequent reduction in the cost of the basket.

The cost of allocating the basic digital basket will depend on the target population; for example, if the objective is to reach lower-income households that have no connection, the cost will depend on the number of households without connection times the unit cost of the basket.

In the case of mobile broadband, there is greater homogeneity among countries in terms of average speeds and latencies. However, they are clearly lagging behind more advanced countries such as the United States and the Republic of Korea. In

Latin America, it is important to mention that the most widely used modality for broadband access is mobile technology, so the quality of this service could have a greater impact.

Among the countries in the region, the fixed broadband scenario is heterogeneous. Brazil, Chile, Colombia, Panama, and Uruguay stand out for having high average download speeds (over 100 Mbps) and low latency. These countries outperform the global average, even reaching figures comparable to some advanced economies, such as Japan, the Republic of Korea, and the United States. In this group, Chile stands out with an effective average download speed of around 280 Mbps.

In the case of mobile broadband, there is greater homogeneity between countries in terms of average speeds and latencies. They are, however, clearly behind more advanced countries such as the United States and the Republic of Korea. In Latin America, it is important to mention that the most widely used modality for accessing broadband is mobile technology, so the quality of this service could have a greater impact.

In this context, ECLAC has proposed the allocation of a basic digital basket to enable low-income segments of the population to access meaningful connectivity and thus enjoy the benefits derived from the use of digital technologies. This basket, in its comprehensive form, is made up of a fixed broadband plan, a mobile broadband plan, and access devices (smartphone, tablet, and laptop) that allow connectivity for the different members of the household. In this sense, the current context has shown that the best development of activities such as distance education or teleworking requires the use of terminal equipment such as computers or tablets, since smartphones can present limitations for the development of these activities. It should also be borne in mind that there may be several members of a household who simultaneously use digital services, so more than one device is needed, as well as adequate connection speeds.

Concerning the development and reinforcement of basic digital skills, which is another component of meaningful connectivity, content could be distributed (for example, through pre-loaded applications on devices) with information on how to use access terminals correctly, on health, education and entrepreneurship issues, as well as information

on how to carry out basic procedures related to security and the processing of personal data. The content could be distributed (for example, through pre-loaded applications on devices) with information on how to use access terminals correctly, on health, education, and entrepreneurship issues, as well as information on how to carry out online procedures, in addition to basic aspects related to security and privacy in the processing of personal data. This component would have zero or marginal cost, since this type of content is already available for free from various sources, both in the public and private sectors.

In this regard, it is important to mention that the basic digital basket is a modular tool that has the flexibility to adapt to different needs and political objectives since not all countries have the same characteristics in terms of connectivity gaps. For example, in the case of countries with very high mobile broadband coverage and penetration, the basket could be adjusted to provide only fixed broadband and the corresponding access devices, with a consequent reduction in the cost of the basket.

The cost of allocating the basic digital basket will depend on the target population; for example, if the aim is to reach low-income households that are not connected, the cost will depend on the number of unconnected households multiplied by the unit cost of the basket.

In this regard, the relative cost of the integral basic digital basket was estimated for five countries in the region as a reference:

TABLE 1 - RELATIVE COST OF THE BASIC DIGITAL BASKET IN RELATION TO THE AVERAGE MONTHLY INCOME OF HOUSEHOLDS IN THE LOWEST INCOME QUINTILES (Q1), BY COUNTRY

COUNTRY	RELATIVE COST
Peru	43.6%
Mexico	23.0%
Ecuador	21.5%
Chile	12.5%
Uruguay	8.6%

SOURCE: PREPARED BY THE AUTHOR BASED ON DATA FROM ECLAC'S ODD (HTTPS://DESARROLLODIGITAL.CEPAL.ORG/ES/HOME).

The costs shown in the table are referential, as the figures were estimated based on public information from operators and providers regarding broadband services and devices. However, these figures can change in the case of wholesale purchases or in the case of agreements with suppliers to reduce prices. On the other hand, as also mentioned, the components of the basket can be adjusted to the specific context, and this can also reduce the cost of the basket.

Considering this, it is also relevant for the implementation of the basic digital basket to consider the participation and collaboration of the sector to obtain cost reductions for Basket components and foster access to pre-existing content in relation to the development of basic digital skills.

It is worth noting that several countries in the region are formulating strategies and implementing measures to develop meaningful connectivity. To illustrate some of these initiatives, the experiences of the Dominican Republic and Chile in this regard are described below.

In the case of the Dominican Republic, the project Connecting the disconnected (*Conectar a los no conectados*) (Instituto Dominicano de las Telecomunicaciones [Indotel], n.d.) was implemented, consisting of the components "Demand subsidy" (*Subsídio a la demanda*) and "Social appropriation and skills development" (*Apropiación social y desarrollo de habilidades*).

The "Demand subsidy" component consists of providing women heads of households with a Social Digital Basket (*Canasta Digital Social*), consisting of an Internet access service and an access device, for a period of 24 months. The Social Digital Basket consists of a partial subsidy for broadband Internet service and an access device, designed to train the beneficiaries in the use of digital technologies.

The "Social appropriation and digital skills development" component consisted of implementing a training program. The objective was to develop skills among women heads of household, who were beneficiaries of the "Demand subsidy" component. This initiative aimed to facilitate the process of appropriation and effective use of the digital technologies received under the project, according to their needs and those of their communities, in terms of productive vocation, cultural and/or social values.

The general objectives of the components are:

- Contribute to the autonomy and independence of women heads of households in poverty, by using the Internet and digital technologies, so that they can attain their social and economic development, well-being, and care for themselves and their families. This involves ensuring that the beneficiaries have an affordable quality broadband service and the possession of a device that allows them to access the Internet as needed in their daily activities.
- Promote the proficient use and appropriation of basic digital technologies among the population benefiting from the Social Digital Basket (of the "Demand subsidy" component). This is achieved through the design and implementation of a gender-sensitive training program to be taught by a selected group of facilitators in charge of bringing knowledge to women beneficiaries.

In the context of Chile, as part of the Digital transformation strategy, Chile Digital 2035 (*Estategia de transformación digital, Chile Digital 2035*) (CEPAL, 2023), a Meaningful Connectivity Plan (*Plan de Conectividad Significativa*) is under development. The proposal for this plan identifies several priority themes:

- Close the gaps, prioritizing connectivity in households where high impact is achieved to reduce their vulnerability.
- Programs that enhance digital skills development to capture the benefits of digital infrastructure.
- Promoting instances of collaboration among different stakeholders of the digital ecosystem.

On the other hand, the following considerations must be acknowledged:

- The coverage of Internet services to the entire population will have no impact if there are no means for individuals to connect or if there is no interest or knowledge about the benefits and possibilities offered by connectivity. The difference between coverage and the significant penetration levels of these services is identified as the demand gap in Internet services.

- Meaningful connectivity translates into users being able to access the Internet at a quality that suits their needs and requires the possibility of contracting the service, having the appropriate devices for use and a sufficient level of digital skills for effective use.
- Affordability is determined by the impact of service prices and device costs on household income levels. For low-income households, particularly, this impact is very high, thus limiting the levels of services contracting.
- The difficulty of affording an Internet plan is a reality in many households, despite the constant reduction in service tariffs. Spending on a basic digital basket (which enables meaningful connectivity) is equivalent to more than 12% of the average monthly income of households in the lowest income quintile, while spending on water and electricity for these households is 2.7% and 3.7% respectively.
- The same difficulty goes for the suitability of devices for activities that need to be carried out online. For instance, a smartphone is not enough for households with multiple children to study online.
- It is important to be able to identify households where the main reason for not using the service is economic and those where there is a lack of interest due to perceived as unnecessary or useless; in such cases, a different approach is needed to encourage adoption, digital skills training and access to connectivity and/or devices, which is crucial for elderly people, for example.

There is a consensus that the "Demand subsidy" represent the most relevant tool, regardless of the areas analyzed (urban, rural, and end regions). However, the following considerations must be taken into account during its implementation:

- The subsidy should be targeted according to the degree of vulnerability of the households.
- The target group to be reached, such as female-headed households, must be clearly determined.
- The subsidy should be accompanied by actions to develop digital skills.

The recommendation is to prioritize subsidies for households headed by women and those with school-age minors.

The "Demand subsidy" complements the current "Supply subsidy for connectivity" (*Subsidio a la oferta de conectividad*), which remains essential for reaching areas of lower commercial interest that private agents alone cannot serve and which, in the future, may be needed for the introduction of new technologies and/or enhancing the supply of other enabling infrastructures.[4]

Another initiative related to the advancement of meaningful connectivity is being developed within the framework of the Regional Digital Agenda (eLAC2024).[5] In this regard, a working group on meaningful connectivity has been established, the purpose is to create a space for technical debate on the design of meaningful connectivity policies in Latin America and the Caribbean and to develop a conceptual framework for measuring meaningful connectivity, as well as compilation of practices that promote it both in the countries of the region and globally.

In this sense, in order to achieve the stated objective, the working group will undertake the following activities: Develop a conceptual framework and definition of meaningful connectivity and its components; propose an indicator for measuring meaningful connectivity, allowing regional comparisons; measure meaningful connectivity using the indicator mentioned in the previous point, for selected countries within the region; develop a compendium of practices that promote meaningful connectivity in Latin America and the Caribbean.

For all the above reasons, we can say that meaningful connectivity is becoming increasingly relevant within the region and should be considered one of the main pillars in the digitalization processes. However, there are still several challenges in this regard, including:

- Define the concept of meaningful connectivity in a

4 The aforementioned plan proposal is under analysis and has not yet been officially presented.
5 More information available at: https://www.cepal.org/es/proyectos/agenda-digital-america-latina-caribe-elac2024#

clearer and more standardized way.

- Generate statistical information and indicators to estimate the levels of meaningful connectivity in the region's countries.
- Develop recommendations, policies, and actions aimed at its massification, particularly among the most vulnerable segments of the population.
- Strengthen regional collaboration and coordination to implement joint initiatives in this area and thus achieve a harmonized development and eliminate gaps among countries.

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