

2021

Annual Report Cetic.br



United Nations
Educational, Scientific and
Cultural Organization

cetic.br

Regional Center for Studies on the
Development of the Information
Society under the auspices of UNESCO

nic.br

Brazilian Network
Information Center

egi.br

Brazilian Internet
Steering Committee

About CGI.br

The Brazilian Internet Steering Committee (CGI.br) was created with the purpose of coordinating and integrating all Internet service initiatives in Brazil, as well as promoting technical quality, innovation, and the dissemination of Internet services.

About NIC.br

The Brazilian Network Information Center (NIC.br) was created to implement the decisions and projects of the Brazilian Internet Steering Committee.

About Cetic.br

The Regional Center for Studies on the Development of the Information Society (Cetic.br) is the NIC.br department responsible for the production of indicators and statistics on the availability and use of the Internet in Brazil. In 2012, Cetic.br|NIC.br was approved as a UNESCO Category 2 Center with the mission of monitoring the development of knowledge and information societies in Latin America and the Portuguese-speaking countries in Africa.

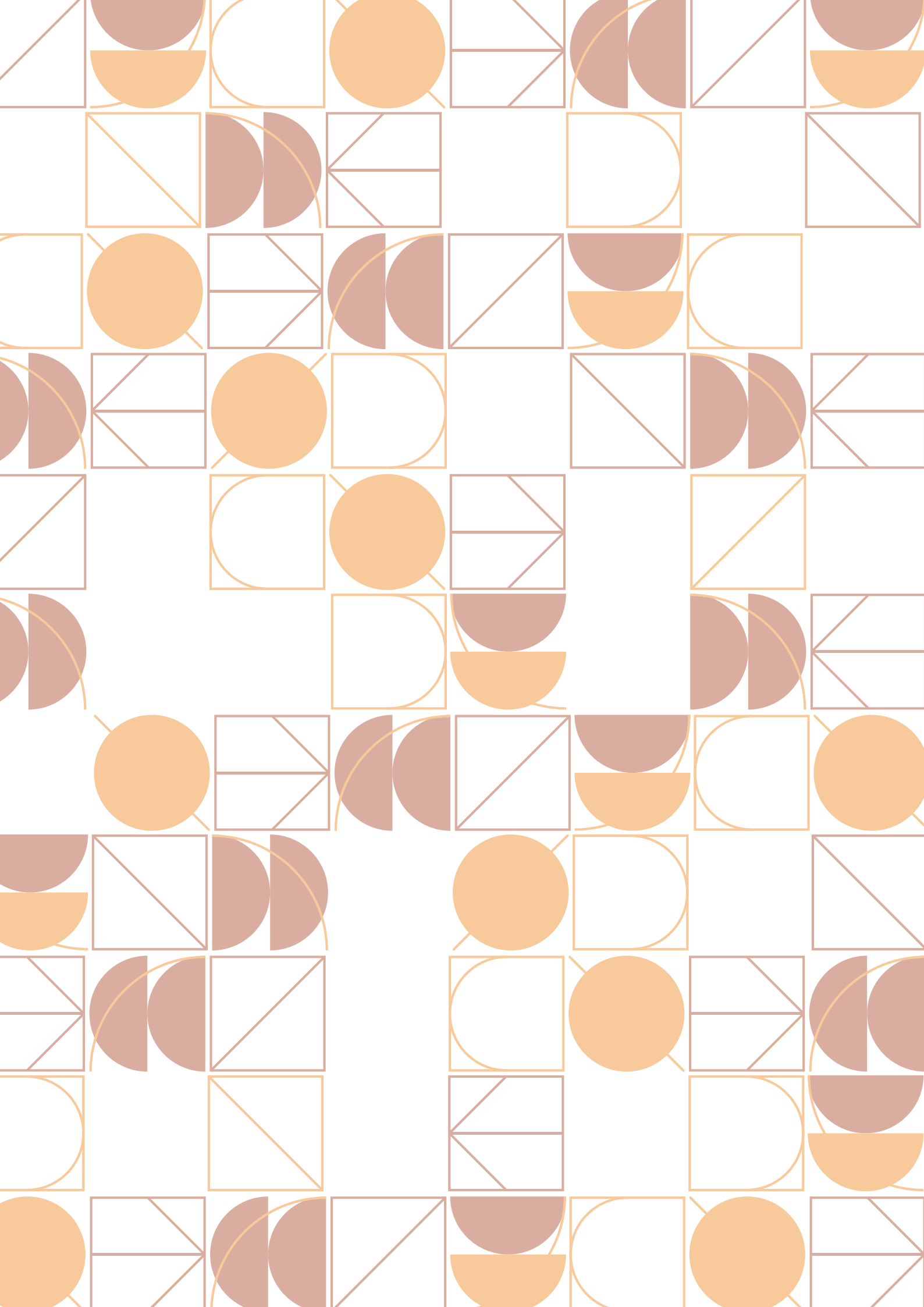


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Message from the CEO

I am pleased to present the 2021 annual report of the Regional Center for Studies on the Development of the Information Society of the Brazilian Network Information Center (Cetic.br|NIC.br).

Cetic.br|NIC.br has operated under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) since 2012. Its mission is to monitor the development of knowledge and information societies in Latin America and Portuguese-speaking countries in Africa. Thanks to its solid work over the years, Cetic.br|NIC.br has become a reference in the production and analysis of quality data on digital transformation and inclusion.

More recently, the COVID-19 pandemic has increased interest in digital technologies, because many activities moved online due to social distancing measures. We witnessed a remarkable increase in digitalization, which heightened opportunities for digital inclusion and changed the digital landscape, causing significant transformations in how individuals, governments, and organizations use the Internet. As online services and transactions became increasingly critical to our daily activities, producing relevant, timely, robust data for understanding the adoption of digital technologies became even more important.

In this context, the surveys and studies conducted by Cetic.br|NIC.br provided critical information on the use of electronic public services, e-commerce, telemedicine, telework, and remote learning, among others. Our data revealed relevant disparities in access to and use of the Internet, indicating limited reaping of potential benefits among more vulnerable segments of the population. In this regard, sound data production offered strategic input for policymaking and academic research.

It should also be noted that the interruption of non-essential in-person activities posed

important challenges to data production. Nonetheless, Cetic.br|NIC.br quickly adopted innovative strategies. It continued to produce and provide quality data that policymakers and a wide range of data users could rely on. Cetic.br|NIC.br also strove to explore new frontiers in data production and survey methodologies, including measuring the impacts of new disruptive digital technologies such as robotics, Artificial Intelligence, and the Internet of Things.

The long-term cooperation between Cetic.br|NIC.br and UNESCO was fundamental to expanding and strengthening capacity-building initiatives in 2021. It also allows us to disseminate quality ICT indicators that contribute to Internet development through inclusive and meaningful connectivity and pursue actions that contribute to the UN Sustainable Development Goals (SDGs). All these initiatives, as well as the data production processes through nationwide surveys on access to and use of information and communication technologies (ICT), are fully funded by resources derived from Brazil's Internet domain name registry, i.e., the country code top-level domain (ccTLD) .br operated by NIC.br. The .br domain has become one of the largest in the world, reaching more than 4.8 million domain registrations.

On November 17, 2021, ties between Cetic.br|NIC.br and UNESCO were renewed thanks to the signing of a new agreement, further strengthening and reaffirming our commitment to building and monitoring knowledge and information societies in Latin America and Portuguese-speaking countries in Africa.

Demi Getschko – CEO
Brazilian Network Information
Center (NIC.br)

2021 Highlights

During 2021, Cetic.br|NIC.br conducted several initiatives and projects, including data collection and analysis through stand-alone ICT surveys as well as webinars, public debates, capacity-building activities, and international cooperation with countries in the region. The major achievements and relevant outcomes of all these projects have counted on the support of strategic partners, particularly data producers engaged in the discussion of strategies to continue data collection activities during the COVID-19 pandemic in the region. The Center has also promoted relevant dialogues with key stakeholders about digital transformation and the impacts of the pandemic.

Although the adoption of digital technologies by individuals, government, and organizations has greatly increased in the past year, the persistence of digital inequalities reduces opportunities to cope with the health crisis among more vulnerable segments of the population. In Brazil, the impact of the pandemic on digitally excluded citizens has been enormous, revealing that public policies are not yet bridging socioeconomic and digital gaps. Therefore, universal and meaningful connectivity¹ to the Internet is still at the center of the policy agenda in the country.

Evidence collected among other Latin American and in Lusophone-African countries indicates that there are still significant proportions of their populations that are not yet participating in and benefiting from the digital transformation. Across the region, access to information and communication technologies (ICT) is not evenly distributed, and persistent socioeconomic disparities affect the reach of the digital transformation.

The current digital landscape has shown how digital technologies can be leveraged to build better, more inclusive knowledge societies. Having access to the Internet is essential for all citizens to fully exercise their rights in the online environment. Because of that, it is critical to have statistical data to measure the impacts of the digital transformation on socioeconomic and sustainable development.

“Following another pandemic year, 2021 was challenging for data production. The continuity of the COVID-19 pandemic for two consecutive years has increased digitalization in society at both the organizational and individual levels. It has accelerated even more online interactions between individuals and organizations, advancing the creation of digitally enabled services by government, enterprises, education and health institutions, etc. The Internet and digital technologies have been vital in helping to maintain continuity of daily activities and have helped to mitigate the impacts of the pandemic. In this context, measurement initiatives undertaken by Cetic.br|NIC.br have proven to be essential for monitoring the socioeconomic impacts of digital transformation. Additionally, the partnership between Cetic.br|NIC.br and UNESCO has supported initiatives for capacity-building, dissemination of methodologies for measuring Internet development, and promotion of debates on digital inclusion, digital skills, and media information literacy.”

Alexandre Barbosa - Head
of Cetic.br|NIC.br

¹ According to the Alliance for Affordable Internet (A4AI), *Meaningful Connectivity* means that a set of minimum thresholds must be met across four dimensions that matter most to users: regular Internet use; appropriate devices; enough data: unlimited broadband connection; and fast connections. More information at: <https://a4ai.org/meaningful-connectivity/>

In view of its mission as a UNESCO Category 2 Centre, Cetic.br|NIC.br has been collaborating with Latin American countries and Portuguese-speaking countries in Africa in the dissemination of sound methodologies to produce relevant, comparable, and quality statistical data for decision-making. This includes: capacity-building programs; production of policy briefs; and promotion of debate about digital inclusion.

In 2021, Cetic.br|NIC.br continued to promote capacity-building programs, workshops and public debates focused on policymaking with data user communities in Brazil, Latin America, and Portuguese-speaking Africa. These programs covered theoretical and practical survey methodology concepts, including data collection and data analysis techniques, and reached more than 398 participants. Two relevant programs were: the 11th edition of the NIC.br Annual Workshop on Survey Methodology; and the 7th edition of the Summer School on the Challenges of Transformation and Digital Innovation in Latin America. In addition, the “Tech for Good” MOOC had 1,489 participants. Our public debates, available online, had 8,598 views.

The Center also organized 10 workshops to promote exchange of experiences between national statistical institutes and international organizations around methodological innovations in the production of relevant ICT statistics for the Agenda for Sustainable Development.

The Center launched 18 new publications and published around 350 indicators collected in the pre-pandemic period. Cetic.br|NIC.br

also created the ICT Panel COVID-19, presenting 92 indicators designed to monitor Internet use during the COVID-19 outbreak. Big Data sources and web scraping algorithms were also among the innovative strategies implemented in partnership with international organizations. The publications were:

- Six national surveys on access to and use of ICTs;
- Four special editions of the COVID-19 ICT Panel;
- Regional eLAC Report: Data and facts about the digital transformation (“Datos y hechos sobre la transformación digital”);
- Regional Mercosur Report: Mercosur in the face of technological changes and digital transformation: Elements for analysis;
- Two sectoral studies: one on cybersecurity and digital risk management in enterprises, and another on educational and digital technologies in times of COVID-19; and
- Four editions of the Internet Sectoral Overview Report: “Connecting the unconnected in times of crisis;” “Beyond connectivity: Internet for all;” “Infodemic: Disinformation and media literacy in the context of COVID-19;” and “Privacy and data protection during the pandemic.”

² This event is co-organized by the Regional Center for Studies on the Development of the Information Society (Cetic.br|NIC.br), and the National School of Statistical Sciences (ENCE) of the Brazilian Institute of Geography and Statistics (IBGE).

³ This event is co-organized by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), the Development Bank of Latin America (CAF), the Regional Center for Studies on the Development of the Information Society (Cetic.br|NIC.br), and the Internet & Jurisdiction Policy Network (I&JPN).

2021 Facts & Figures

559

Field interviewers involved
in data collection

36

Field coordination
supervisors

18

Publication of ICT surveys,
NIC.br Sectoral Studies &
Internet Sectoral Overview

27,537

Interviews carried
out in all of the
Cetic.br|NIC.br surveys

350

Indicators published

316

External experts involved in ICT
survey projects

8

Expert meetings
(multistakeholder groups)

1,966

Media appearances

7

New cooperation agreements
signed in 2021

22

Cooperation agreements
in force

8,598 views

Webinars and public debates
organized by Cetic.br

1,489 participants

MOOC "Tech for Good: The
Role of ICT in Achieving the
SDGs" (edX Platform)

398
participants

Capacity-building and workshops on
research methodologies⁴

⁴ Participants enrolled in one or more of the following capacity-building workshops: "NIC.br Annual Workshop on Survey Methodology", "Summer School on the Challenges of Transformation and Digital Innovation in Latin America", and the Online Course - "Introduction to the Use of Surveys for Public Policy Impact Evaluations in Costa Rica".

Publications

The production of high-quality statistical data to monitor access, use and appropriation of ICT is a central activity developed by Cetic.br|NIC.br. The Center carries out a set of four annual ICT survey projects - related to households, education, health, and children - in addition to surveys with other periodicity - enterprises, e-government, culture, non-profit organizations, Internet service providers, and Internet public access centers. These projects cover critical areas for monitoring the development of information and knowledge societies, while also generating relevant data for monitoring the sustainable development goals and targets defined by the United Nations (UN) in its 2030 Agenda for Sustainable Development.

Publications index

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ICT in Health

Carried out since 2013, the overall goal of the ICT in Health survey is to understand the stage of ICT adoption in Brazilian healthcare facilities and their appropriation by healthcare professionals (physicians and nurses).

In its eighth edition, the survey presented data in the context of the COVID-19 pandemic, a time when the healthcare system and professionals faced an increase in the demand for care. Therefore, the survey carried out interviews with facility managers only.

A new module on the adoption and use of new technologies by healthcare facilities was included, covering indicators on the use of cloud services, blockchain, Big Data analysis, robotics and Artificial Intelligence. This is key to understanding how these tools can contribute to improving clinical, governance, and strategic processes in healthcare planning, enabling better reach of digital health and its monitoring.

Articles Published in ICT in Health 2021

Digital health: Monitoring the impact of the COVID-19 pandemic on care in Australian general practice

Andrew Georgiou, Julie Li, Rae-Anne Hardie, Chisato Imai, Nasir Wabe, Zhaoli Dai, Gorkem Sezgin, Judith Thomas & Guilherme Saffi Franco

Use of information and communication technologies in health care: Telehealth in 2021

Shira H. Fischer & Li Zhou

The importance of primary care records in low- and middle-income settings for care, resource management and disease surveillance: A review

Hamish Fraser, Taiwo Adedeji & Paul Amendola

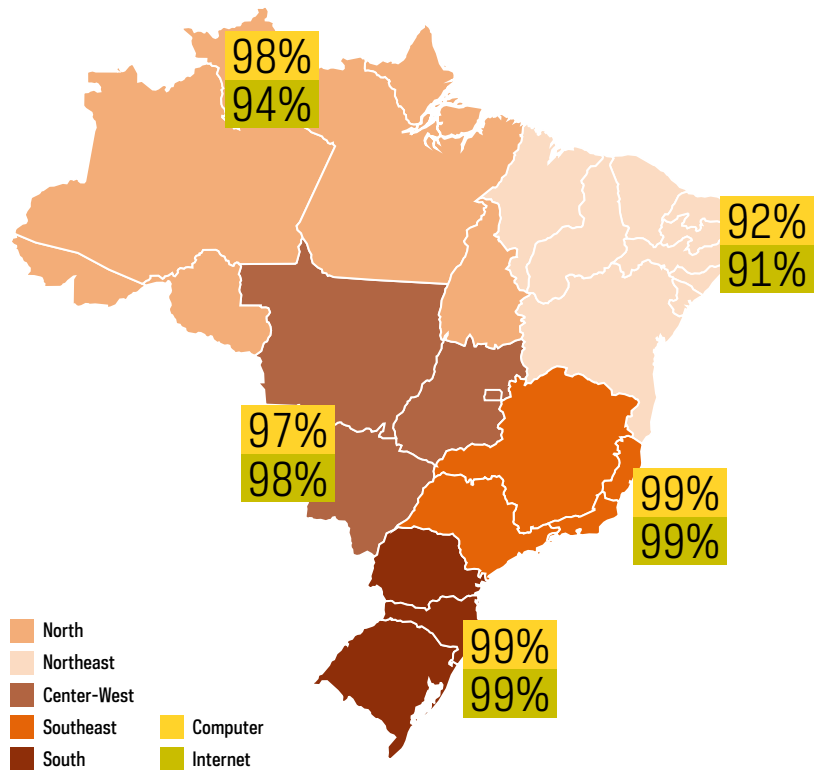
Digital strategy as an organizer of equitable access to health services

Sabrina Dalbosco Gadenz, Stephan Sperling, Beatriz de Faria Leão & Maria Kersanach

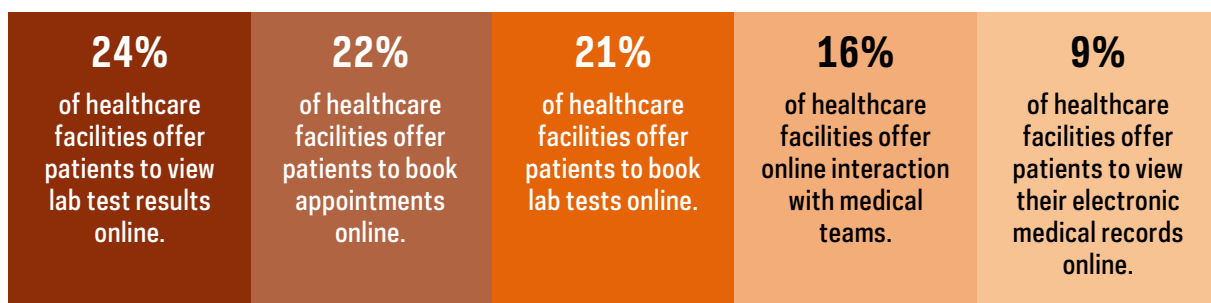
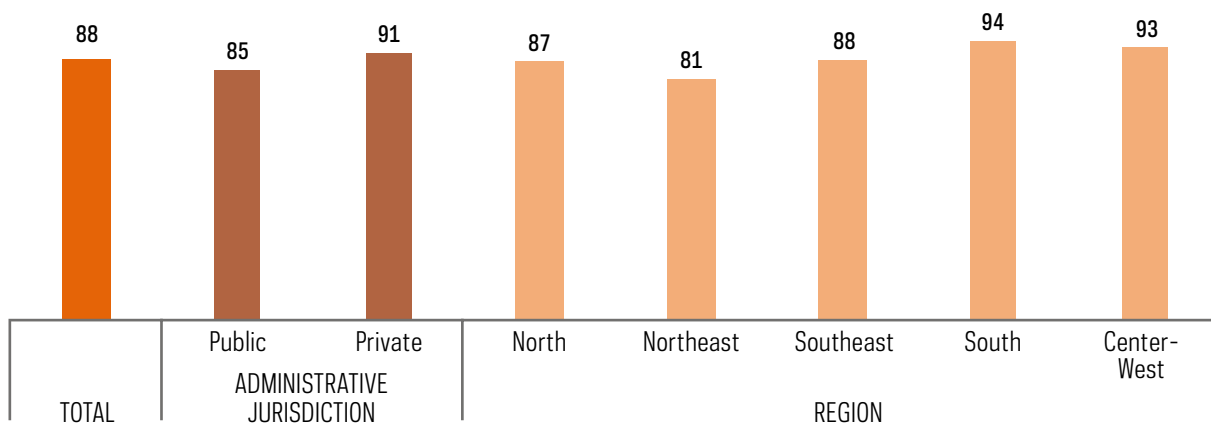
USE OF COMPUTERS AND THE INTERNET IN HEALTHCARE FACILITIES IN THE LAST 12 MONTHS

In recent years, there has been an increase in the use of computers and Internet access in Brazilian healthcare facilities. The facilities that presented lower percentages of access to basic ICT infrastructure were still public facilities, of which 6% did not have access to computers and the Internet (about 3,000).

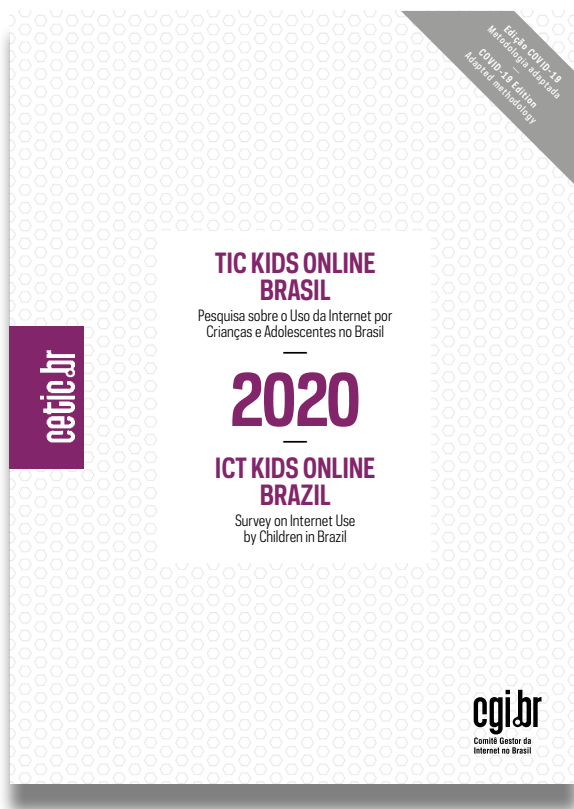
Telehealth in primary healthcare units: 31% offered remote patient monitoring and 14% offered teleconsultations.



HEALTHCARE FACILITIES BY AVAILABILITY OF AN ELECTRONIC SYSTEM TO RECORD PATIENT INFORMATION (%)



Source: CGI.br. (2021). ICT in Health 2021 (COVID-19 edition - adapted methodology).



ICT Kids Online Brazil

The goal of the ICT Kids Online Brazil survey is to understand how the population 9 to 17 years old uses the Internet and how they deal with risks and opportunities related to its use. It is fully aligned with the methodological framework of the European network EU Kids Online.

Considering the need to collect sensitive data from children, and the complexity of migrating the project to other non-face-to-face forms of collection, the ICT Kids Online survey was not carried out in 2020. Alternatively, in order to fulfill its mission of providing updated data to underpin policymaking, it presented unprecedented data on ICT access, use, and appropriation by children, based on databases from other studies conducted by Cetic.br|NIC.br.

Since the 2015 edition, the micro databases and documentation of the ICT Kids Online Brazil survey have been available for download on Cetic.br|NIC.br's website.

Articles Published in ICT Kids Online Brazil 2020

Government digital services and children: Challenges to the digital transformation

Zoë Pelter, Jasmina Byrne, Morten Meyerhoff
Nielsen & Mercy E. Makpor

Updating the "screen time" debate: Does it still make sense to be so concerned?

Daniel Tornaim Spritzer, Ivelise Fortim,
Fabiana Vasconcelos & Evelise Carvalho

Data protection of children and digital education: Challenges and perspectives

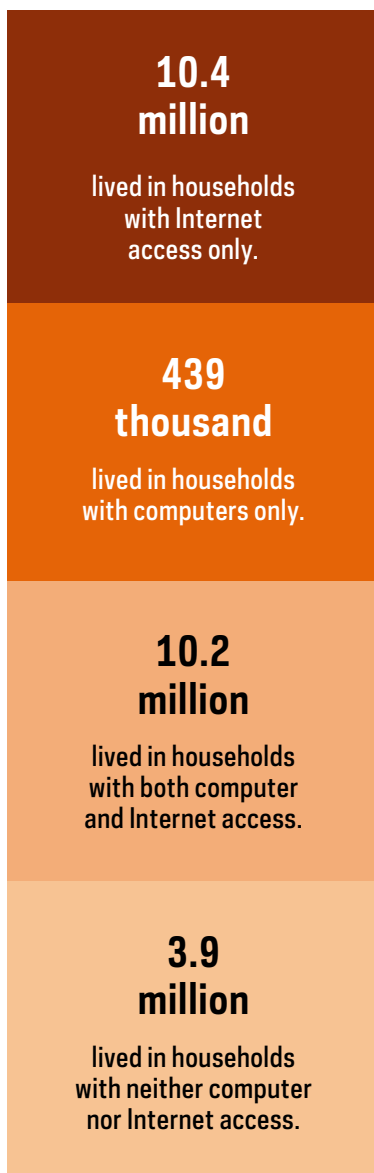
João Francisco de Aguiar Coelho &
Maria Mello

Mental health and social isolation in the pandemic: The impact and use of technology by children

Karen Scavacini & Deborah Noal

92%

of children 10 to 17 years old lived in households with Internet access in 2020. The proportion was lower among individuals in classes DE (82%).



CHILDREN WHO LIVED IN HOUSEHOLDS WITH ICT DEVICES



98%

Mobile phone
Urban area: 99%
Rural area: 92%



24%

Game console
Urban area: 27%
Rural area: 12%



97%

Television
Urban area: 97%
Rural area: 94%



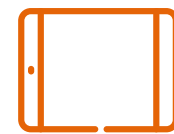
19%

Desktop computer
Urban area: 21%
Rural area: 7%



26%

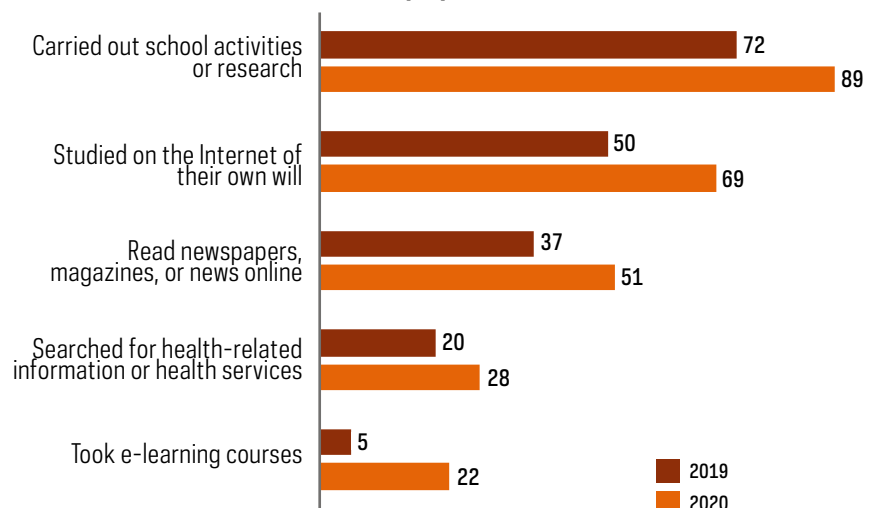
Laptop
Urban area: 29%
Rural area: 10%



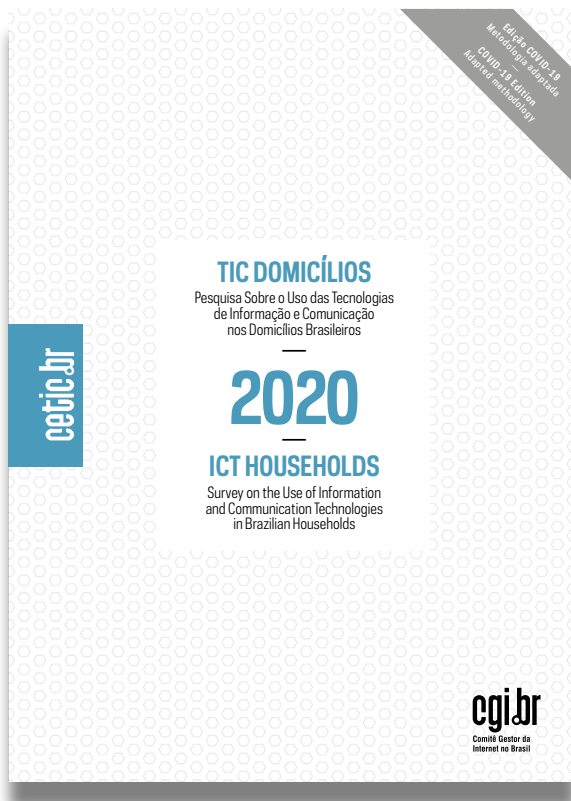
16%

Tablet
Urban area: 18%
Rural area: 6%

EDUCATION AND LOOKING UP INFORMATION-ACTIVITIES CARRIED OUT ONLINE BY CHILDREN 10 TO 17 YEARS OLD THAT ARE INTERNET USERS (%)



Source: CGI.br. (2021). ICT Kids Online Brazil 2020 (COVID-19 edition - adapted methodology).



ICT Households

Carried out annually since 2005, the ICT Households survey aims to measure ICT use in Brazilian households, individual access to computers and the Internet, and activities developed online, among other indicators.

For this edition, interviews were conducted with 5,590 households and 4,129 individuals throughout Brazil. Using a methodology adapted to the COVID-19 period, the data was collected through telephone interviews, complemented by face-to-face interviews, between October 2020 and May 2021.

Since the 2015 edition, all of the ICT Households micro databases and documentation have been available for download on Cetic.br|NIC.br's website.

Articles Published in ICT Households 2020

Brazil in the pandemic: Lack of quality connection and increasing inequalities

Bia Barbosa

Support - not training - gets the digitally excluded online: A case study in the UK during the COVID-19 pandemic

Leela Damodaran, Wendy Olfhert & Jatinder Sandhu

Racial inequalities, education, and digital divide in Brazil: An overview of Internet access by students during the COVID-19 pandemic

Caio Jardim Sousa & Anna Carolina Venturini

Pandemic: Cultural habits and the reopening of in-person activities

Jader André de Souza Rosa

Privacy, data, and the pandemic: Balancing anti-contagion measures and the Brazilian General Data Protection Law

Luã Cruz, Camila Leite Contri & Larissa Rosa

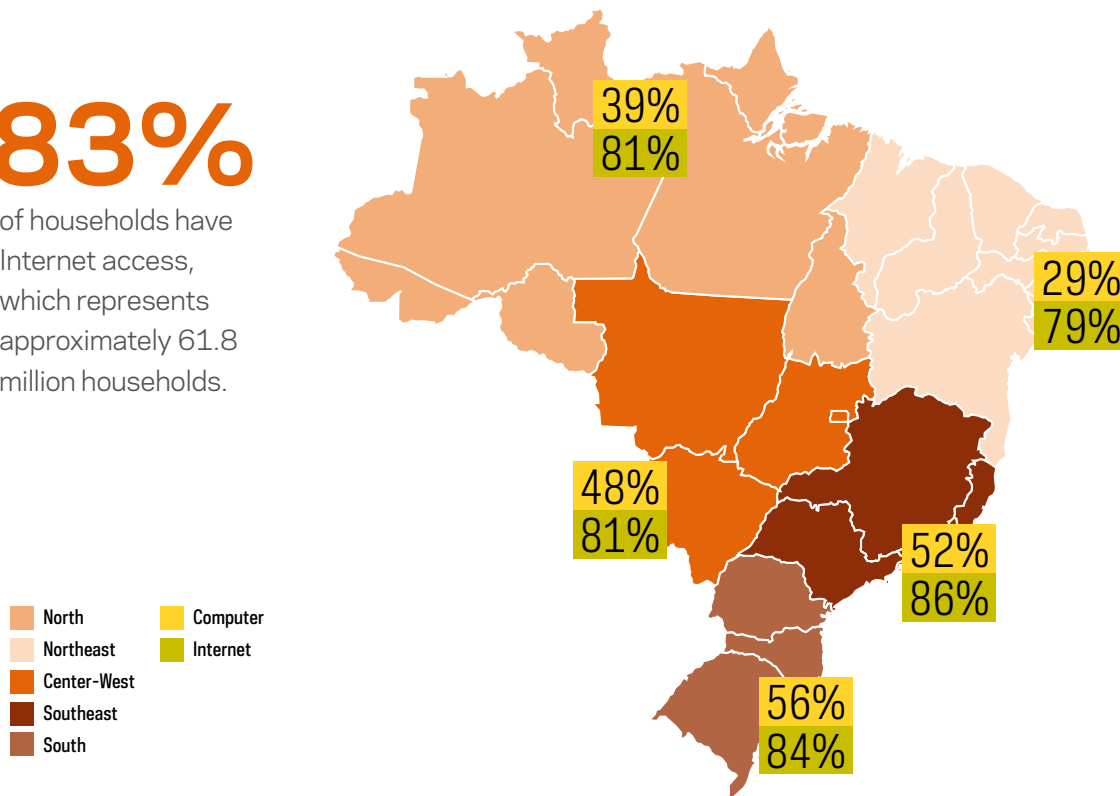
Was Brazil's Internet infrastructure prepared for the pandemic?

Elisa Bettega

HOUSEHOLDS WITH COMPUTERS AND INTERNET ACCESS

83%

of households have Internet access, which represents approximately 61.8 million households.



DIGITAL INEQUALITY: BEYOND ACCESS

152 million

Internet users
(81% of population)



70%
Rural

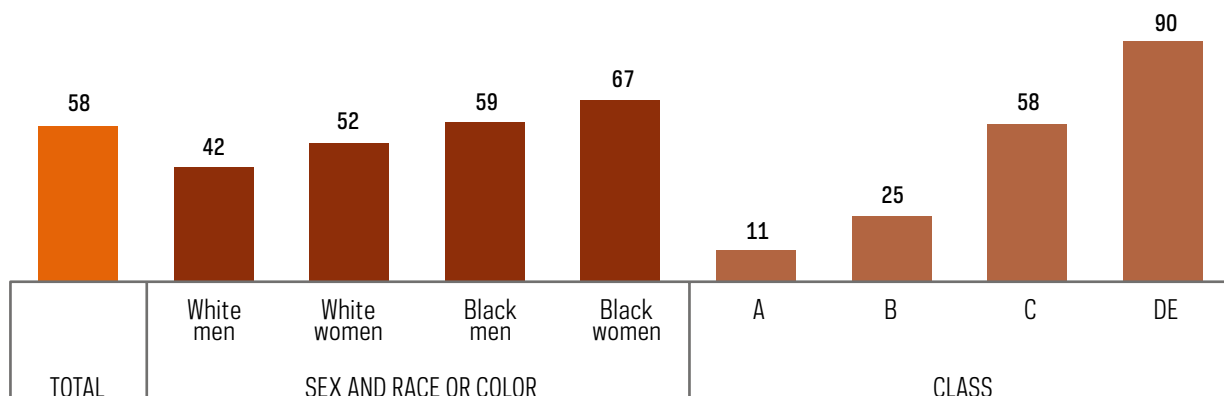


50%
60+ years old



67%
Classes DE

INTERNET USERS WHO USED MOBILE PHONES EXCLUSIVELY (%)



Source: CGI.br. (2021). ICT Households 2020 (COVID-19 edition - adapted methodology).



ICT in Education

Carried out annually since 2010, the ICT in Education survey aims to investigate ICT access, use and appropriation in Brazilian public and private primary and secondary schools located in urban and rural areas.

For its 11th edition, interviews were carried out with 3,678 managers of operating public schools (municipal, state, and federal) and private schools that offered regular Primary and Secondary Education.

A specific dimension on the COVID-19 pandemic was included, which made it possible to analyze the role of digital technologies in this disruptive period for education.

Articles Published in ICT in Education 2020

The digital transformation of education: Connecting schools, empowering learners

Ana Sepúlveda

The Plan Ceibal in pandemic times: Guaranteeing pedagogical continuity in Uruguay

María Florencia Ripani

Remote teaching during the pandemic: Challenges and potentials according to teachers

Marina Ferraz, Vanderson Berbat, Lia Glaz & Pedro Sarvat

Digital technologies, public school, and literacies: Research in pandemic times

Eliane Fernandes Azzari, Juliana Doretto, Petrilson Alan Pinheiro, Tarcísio Torres Silva & Walkyria Monte Mór

Knowledge dissemination: The experience of the nPeriferias group on social networks

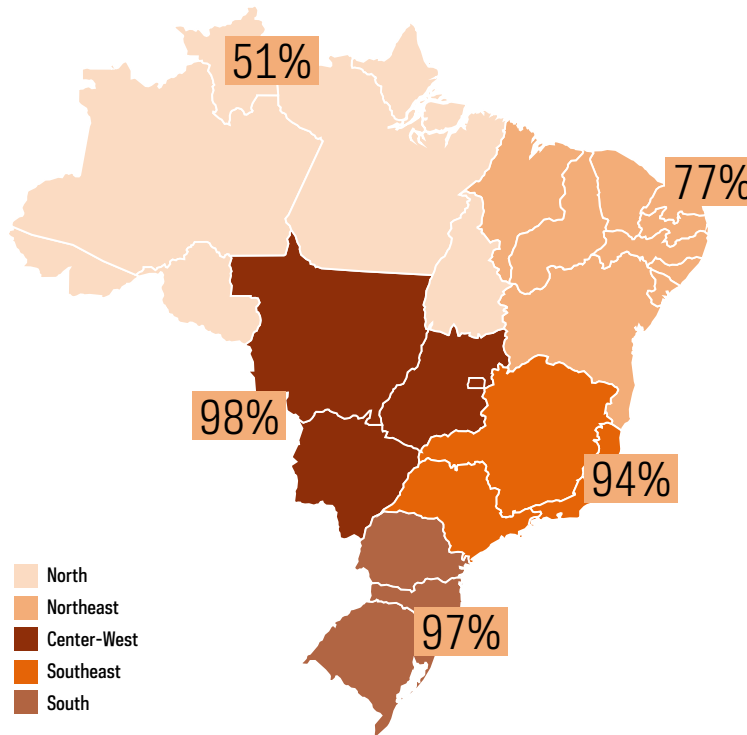
Gislene Aparecida dos Santos, Camila Tavares de Moura Brasil Matos, Julia Inoscencia Oliveira dos Santos, Juliane Cintra de Oliveira & Rafael Marques Geraldo

82 % OF BASIC EDUCATION SCHOOLS HAVE INTERNET ACCESS



51%

of schools made available Internet access for students in the classroom.



EMERGENCY REMOTE EDUCATION IN BRAZIL

93%

of public school managers reported that the lack of devices and Internet access in students' households was one of the main challenges to continuing educational activities during the COVID-19 pandemic.

Main remote education strategies adopted by public schools



93%

Scheduling a day and time to pick up printed activities and pedagogical materials at school



59%

Conducting distance learning classes with students through videoconferencing platforms



90%

Groups in applications or social networks to communicate with students and parents and legal guardians



55%

Sending activities and materials to students by e-mail



74%

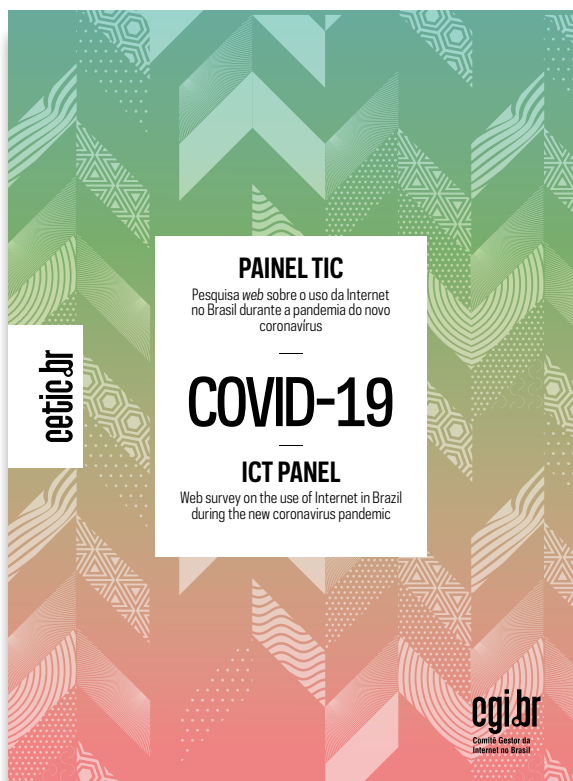
Recording video lessons and making them available to students



53%

Using virtual platforms and educational digital resources

Source: CGI.br. (2021). ICT in Education 2020 (COVID-19 edition - adapted methodology).



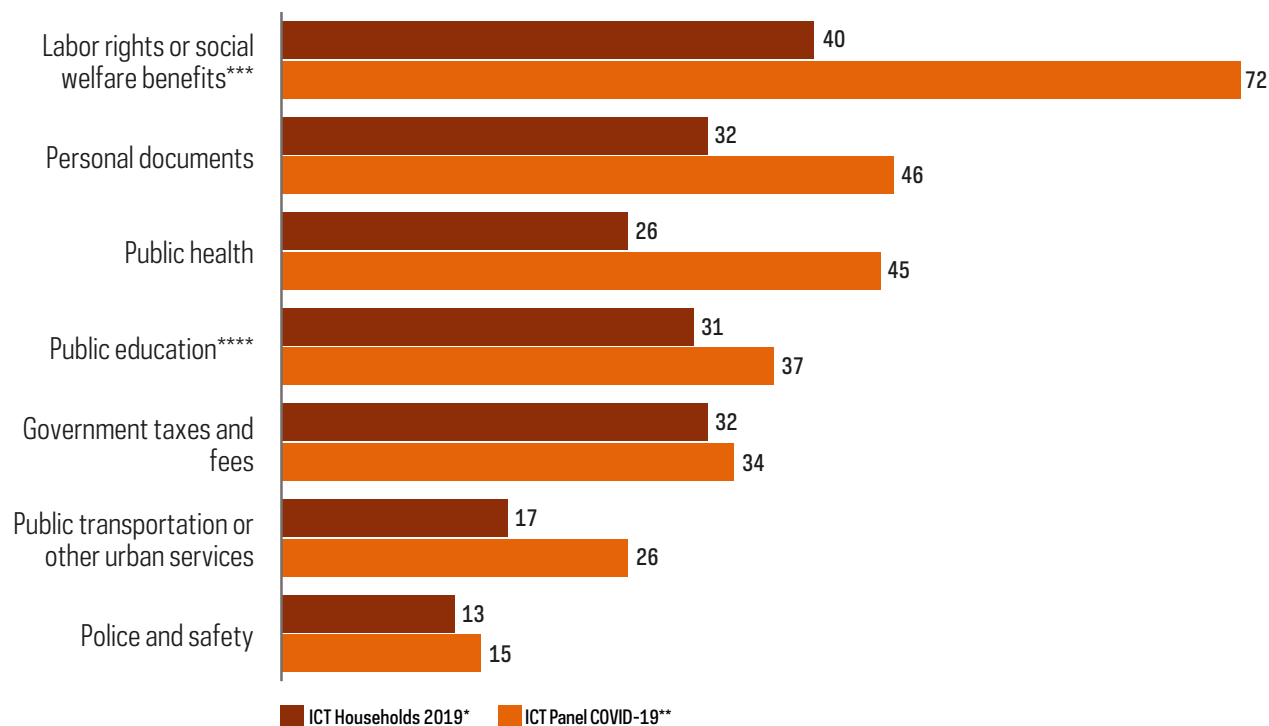
ICT Panel COVID-19

The ICT Panel COVID-19 – Online survey with Internet users in Brazil investigates activities carried out online during the pandemic, collecting indicators validated by the ICT Households survey as its framework, in addition to custom-designed thematic modules covering topics such as telehealth, remote education, culture, e-commerce, e-government, telework, etc.

In 2021, we launched a publication compiling the first three editions of the survey, carried out in the second half of 2020. It is available in Portuguese and English.

INTERNET USERS BY TYPE OF INFORMATION REGARDING PUBLIC SERVICES SOUGHT OR USED IN THE LAST 12 MONTHS

INTERNET USERS 16 YEARS OLD OR OLDER (%)



* Reprocessed database with population cut-off sample.

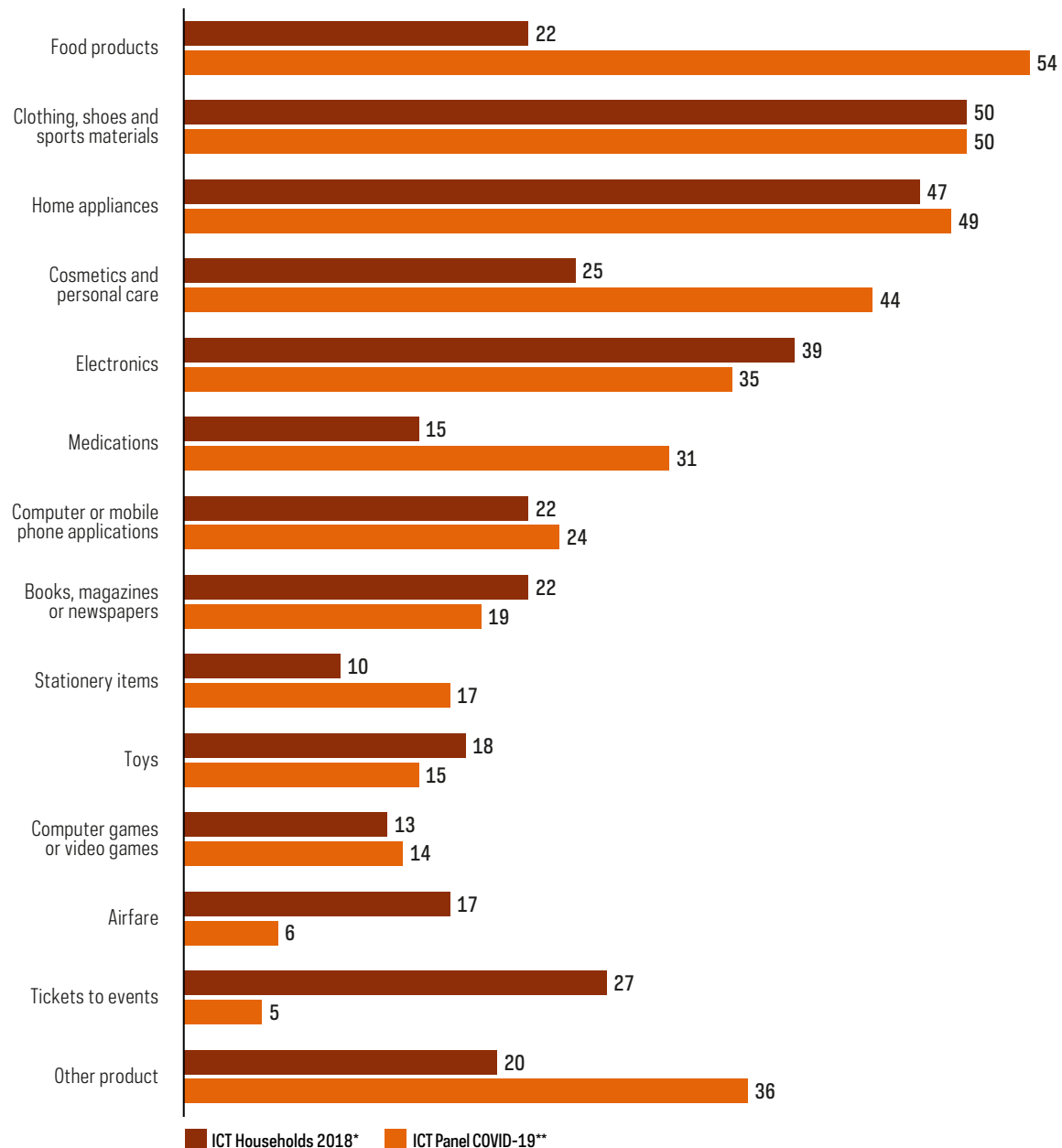
** For this indicator, the reference period adopted by the ICT Households survey was 12 months. Because the ICT Panel COVID-19 is a survey about Internet use during the pandemic, the reference period was “since the beginning of the pandemic”.

*** In the ICT Panel COVID-19, emergency aid was added as one of the examples of public services in the area of labor rights or social welfare benefits.

**** In the ICT Panel COVID-19, remote learning was added as one of the examples of public services in the area of public education.

TYPES OF PRODUCT PURCHASED ONLINE

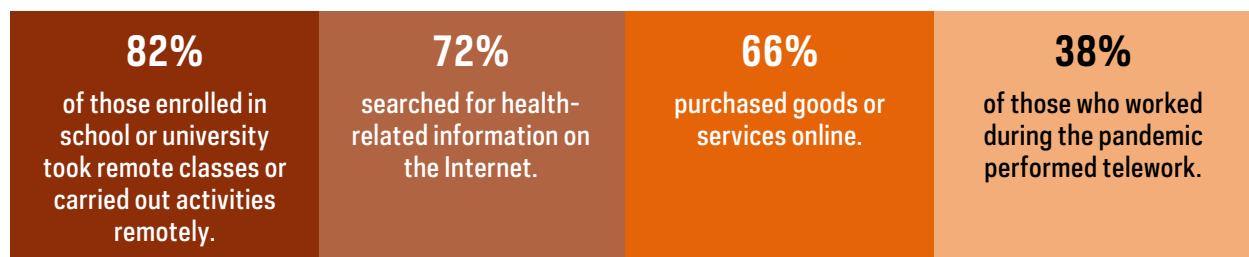
INTERNET USERS 16 YEARS OR OLDER WHO PURCHASED GOODS OR SERVICES ONLINE (%)



* Reprocessed database with population cut-off sample.

** For this indicator, the reference period adopted by the ICT Households survey was 12 months. Because the ICT Panel COVID-19 is a survey about Internet use during the pandemic, the reference period was three months.

AMONG INTERNET USERS 16 YEARS-OLD OR OLDER...



Source: CGI.br. (2021). Web survey on the use of Internet in Brazil during the new coronavirus pandemic: ICT Panel COVID-19.



ICT in Culture

The ICT in Culture survey investigates the presence of ICT infrastructure and the use of these technologies in Brazilian cultural facilities, focusing on internal management, public relations, and collection digitization. It also presents information about IT management in these institutions and the perceptions of the contributions and challenges of computer and Internet use in cultural facilities, including archives, heritage sites, libraries, cinemas, museums, culture points and theaters.

In its third edition, the survey interviewed 2,193 managers responsible for the cultural facilities. It covered the period when the first cases of COVID-19 in Brazil emerged and the health crisis was established, leading to the suspension of in-person activities and the closure of cultural facilities due to social distancing measures.

Articles Published in ICT in Culture 2020:

The role of the Internet in supporting the cultural production chain during the COVID-19 pandemic in Brazil

Flavia Tebaldi Henriques de Queiroz

The social networks of Brazilian museums: Mapping of and behavior in museum field events in May 2020

Rose Moreira de Miranda

Digitization, preservation and access: The experience of the Brasiliana Mindlin Library/ USP in the digital field

Carlos Zeron, Alexandre Moreli, João Cardoso, Patrícia Zendron & Fernanda Menezes Balbi

The production of cultural statistics by the Brazilian Institute of Geography and Statistics

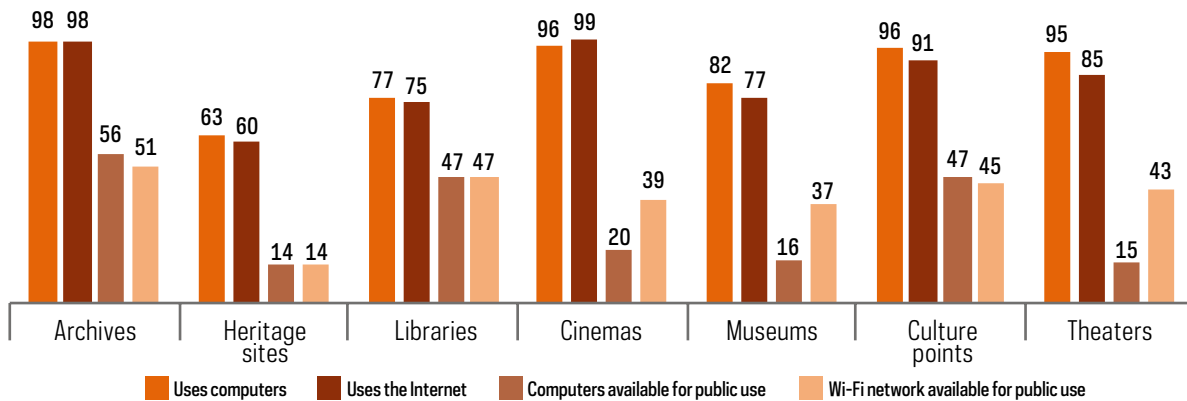
Leonardo Athias

Pathways to a national policy for cultural data and information in times of Big Data

José Carlos Vaz & Matheus de Lima

COMPUTER AND INTERNET USE AND AVAILABILITY TO THE PUBLIC IN CULTURAL FACILITIES

Total number of cultural facilities (%)



ONLINE ACTIVITIES CARRIED OUT AND SERVICES OFFERED ON THE INTERNET



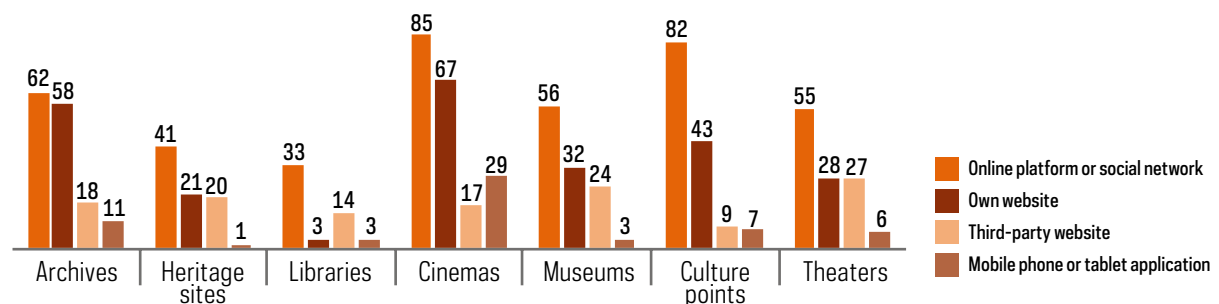
About half of archives, libraries, and culture points had infrastructure that allowed the population to access digital technologies.

Offering services, information, and assistance to the public online was widespread, but activities more focused on offering access to remote services directly through ICT remained underexplored.

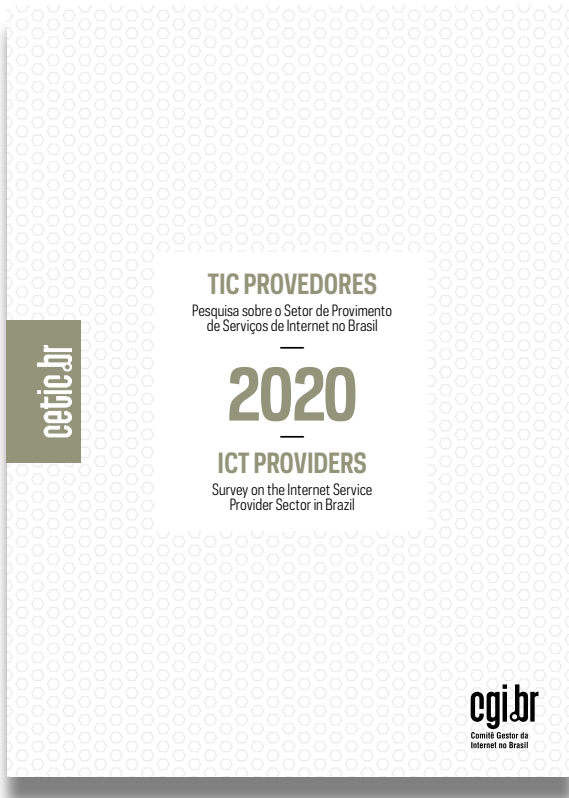
Cultural facilities continued to be more present on the Internet through online platforms or social networks. Publicizing cultural programming and posting pictures of activities carried out were quite widespread.

CULTURAL FACILITIES BY INTERNET PRESENCE

Total number of cultural facilities (%)



Source: CGI.br. (2021). ICT in Culture 2020.



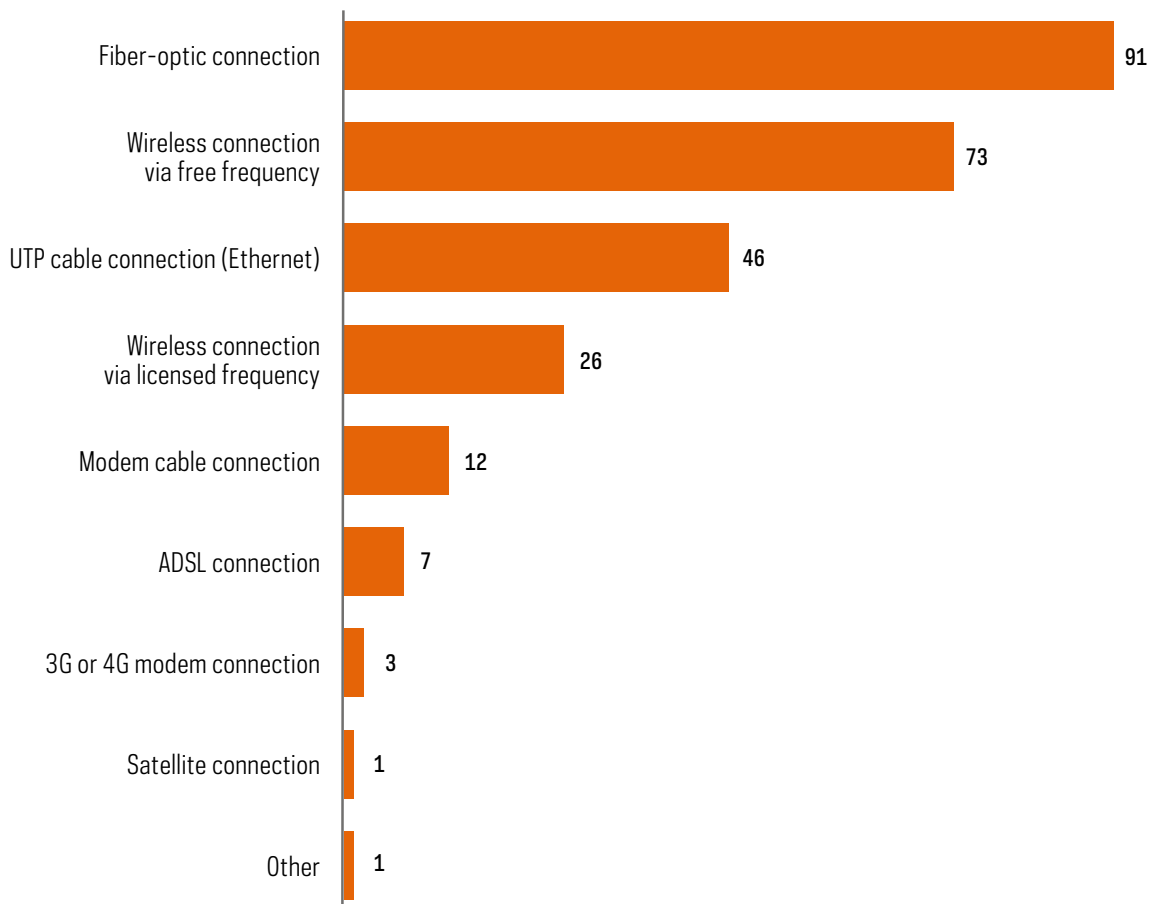
ICT Providers

Carried out since 2011, the goal of the ICT Providers survey is to carry out a census of Internet service providers (ISPs) to construct a National Register of Providers that maps out the context of the Internet access provision market in the country.

In its fourth edition, data was collected between June 2020 and January 2021, with a total of 2,315 enterprises interviewed across Brazil. The survey provided details on the main characteristics of the enterprises that make up the ISP market and identified the sector’s needs and potentials.

An estimated **12,826** ISP enterprises are operating in the country.

MAIN TECHNOLOGIES OFFERED BY ISP ENTERPRISES TO CUSTOMERS (%)



Most Brazilian ISP enterprises (61%) began providing Internet services in the last ten years, between 2011 and 2020.

Fiber optic was the most common connection technology offered by providers with declared connection records.

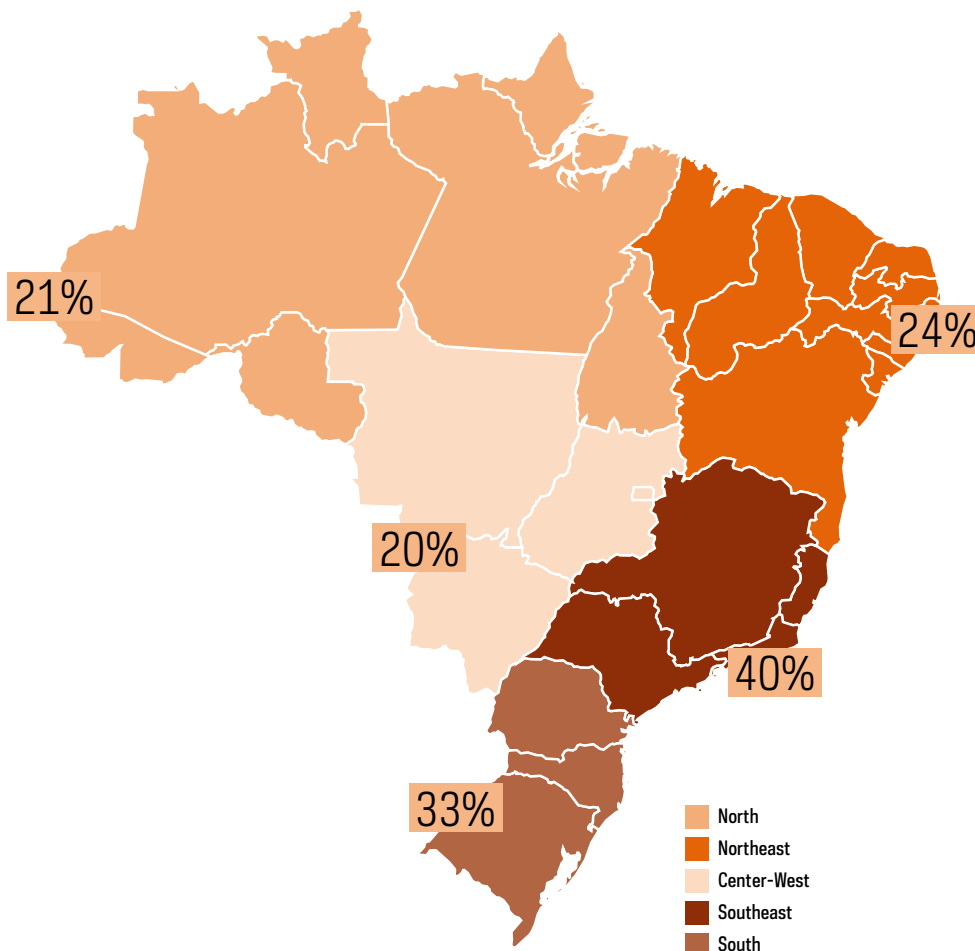
Considering regional differences, UTP cable connection was offered by 73% of providers in the Northeast, a much higher proportion than the other regions.

PARTICIPATION IN INTERNET EXCHANGE POINTS

Of the total number of providers, 2,442 (30%) participated in Internet exchange points (IX or IX.br), with higher proportions in the Southeast and South than in the Northeast, North and Center-West. Among enterprises with declared connection records, the increase in the number of providers that participated in Internet exchange initiatives was 47% in comparison with 2017.

Approximately **2,242** ISP are present in any IXP or IX.br.

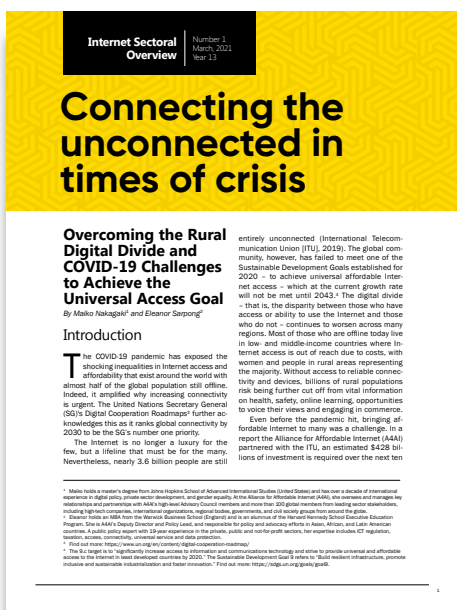
About **3,102** ISP deliver IPv6 to their customers.



Internet Sectoral Overview

The Internet Sectoral Overview (ISO) is a quarterly publication produced by Cetic.br|NIC.br that addresses different themes related to access to and use of digital technologies in various sectors of society. Available in Portuguese and English, the articles, interviews and infographics featured in the ISO explore current debates on digital inclusion and also draw on data and findings that derive from the research conducted by Cetic.br|NIC.br.

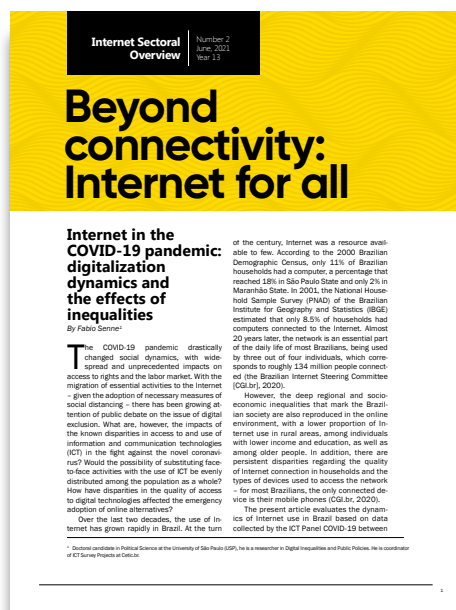
In 2021, the ISO addressed the overarching theme “Technologies and inequalities: digital gaps in times of pandemic.” Four editions were published in 2021 on the following topics.



Year 13 - N. 1: Connecting the unconnected in times of crisis

COLLABORATORS:

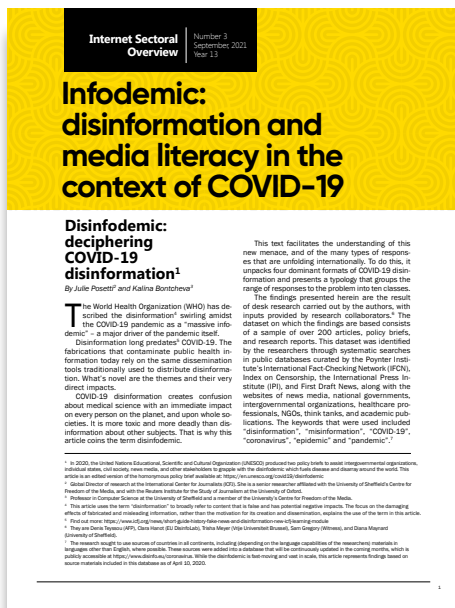
- **Article I** - Overcoming the Rural Digital Divide and COVID-19 Challenges to Achieve the Universal Access Goal, by Maiko Nakagaki and Eleanor Sarpong (A4AI).
- **Interview I** - Patricio Poblete (NIC Chile).
- **Article II** - Challenges to connectivity in Latin America: traditional policies and the emergence of community networks, by Carlos Baca, Luca Belli, Erick Huerta and Karla Velasco.
- **Interview II** - Oona Caldeira Brant Monteiro de Castro (Instituto Nupef).
- **Domain Report** - Domain registration dynamics in Brazil and around the world.
- **Answers to your questions** - Rural connectivity in Brazil.



Year 13 - N. 2: Beyond connectivity: Internet for all

COLLABORATORS:

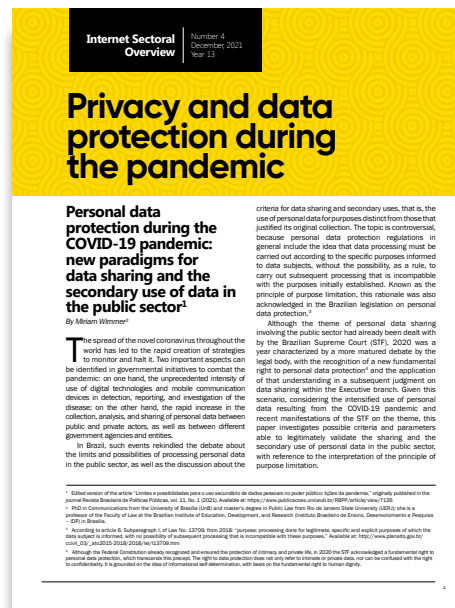
- **Article I** - Internet in the COVID-19 pandemic: digitalization dynamics and the effects of inequalities, by Fabio Senne (Cetic.br|NIC.br).
- **Interview I** - Ana María Rodríguez Pulgarín (Web Foundation/A4AI).
- **Article II** - Harnessing the potential of information and communication technologies for persons with disabilities in Latin America and the Caribbean: challenges and opportunities, by Heidi Ullmann, Francis Jones, Robert Williams and Deirdre Williams (ECLAC).
- **Interview II** - Dorothy Gordon (IFAP).
- **Domain Report** - Domain registration dynamics in Brazil and around the world.
- **Answers to your questions** - Use of ICT in the COVID-19 pandemic.



Year 13 - N. 3 - Infodemic: Disinformation and media literacy in the context of COVID-19

COLLABORATORS:

- **Article I** – Disinfodemic: deciphering COVID-19 disinformation, by Julie Posetti (ICFJ) and Kalina Bontcheva (University of Sheffield).
- **Interview I** – Disinformation and data journalism, Natália Mazotte (Insper).
- **Article II** – Media literacy and citizen empowerment: an approach to countering disinformation, Debora Albu (ITS).
- **Interview II** – Fact-checking and media literacy for countering disinformation, Gilberto Scofield Jr. (Agência Lupa).
- **Domain Report** – Domain registration dynamics in Brazil and around the world.
- **Answers to your questions** – How does information circulate on the Internet?



Year 13 - N. 4: Privacy and data protection during the pandemic

COLLABORATORS:

- **Article I** – Personal data protection during the COVID-19 pandemic: new paradigms for data sharing and the secondary use of data in the public sector, by Miriam Wimmer (IDP).
- **Interview I** – Bertrand de la Chapelle (Internet & Jurisdiction Policy Network).
- **Article II** – Between urgency and surveillance: an analysis on the use of technologies during the COVID-19 pandemic in Latin America, by Jamila Venturini (Derechos Digitales).
- **Interview II** – Nina da Hora (CTS/FGV).
- **Domain Report** – Domain registration dynamics in Brazil and around the world.
- **Answers to your questions** – Applications and personal data during the pandemic: What is the opinion of the Brazilian population?

NIC.br Sectoral Studies

The NIC.br Sectoral Studies publication series launched in 2016 addresses a variety of emerging themes that explore the interface between ICT and society.

In 2021, two editions were published: the first discussed issues related to digital security and risk management in enterprises; the second edition delved into the challenges concerning education and digital technologies in times of COVID-19. Although both editions were published in Portuguese in 2021, English versions will also be launched in 2022.

Digital Security

The book *Digital security: An analysis of risk management in Brazilian enterprises* was published by Cetic.br|NIC.br and co-organized by the Brazilian National Computer Emergency Response Team (CERT.br) as an edition of the NIC.br Sectoral Studies. A webinar entitled “Digital security in enterprises in a context of increasing digitalization,” conducted in May by Cetic.br|NIC.br, marked the launch of the publication. The book explores different aspects of digital security risk management, especially in small and medium enterprises (SMEs), and presents new qualitative data collected by Cetic.br|NIC.br. The publication is made up of the following chapters, which are authored by experts from different national and international organizations:

Presentation

Demi Getschko (NIC.br).

Prologue

Laurent Bernat (OECD).

Chapter 1 - The new cybersecurity agenda: Economic and social challenges to a secure Internet

Johannes M. Bauer (MSU) and William H. Dutton (University of Oxford).

Chapter 2 - Cyber risk management for small and medium enterprises

Éireann Leverett (University of Cambridge).



Chapter 3 - Where to invest to reduce risk: A depiction based on reported security incidents, on data from sensors and external sources, compiled by CERT.br

Cristine Hoepers (CERT.br|NIC.br).

Chapter 4 - Digital security and risk management: An analysis of Brazilian enterprises

Stefania L. Cantoni, Leonardo M. Lins, and Tatiana Jereissati (Cetic.br|NIC.br).

Conclusion - Regional context of cybersecurity

Georgina Núñez and Jorge Alejandro Patiño (ECLAC).

Education and Digital Technologies

In 2021, Cetic.br|NIC.br also published the book *Education and digital technologies: Challenges and strategies for the continuity of learning in times of COVID-19*, another edition of the NIC.br Sectoral Studies. Launched in November at the webinar “Digital inclusion and post-pandemic challenges,” this publication highlights the relevance of conducting research and producing data on the effects of the pandemic in learning and education. Given the role of digital technologies for promoting learning continuity in the context of the health crisis, it is crucial to produce timely and robust data for understanding the challenges of digital exclusion for remote education. The publication is made up of the following chapters:

Presentation

Demi Getschko (NIC.br).

Prologue

Rafael de Almeida Evangelista (CGI.br).

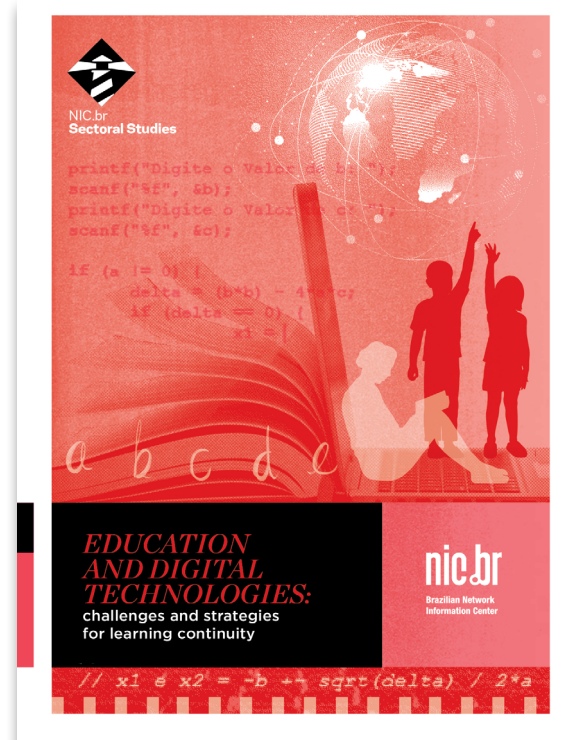
Chapter 1 - Emergency distance learning: From emergency responses to more open, inclusive, and quality education systems
Valtencir M. Mendes (UNESCO).

Chapter 2 - Exploring the deployment, perceived effectiveness, and monitoring of remote learning

Maria Barron Rodriguez, Cristobal Cobo, Alberto Muñoz-Najar, and Iñaki Sánchez Ciarrusta (World Bank).

Chapter 3 - Education innovation challenges in Uruguay during the COVID-19 pandemic

María Florencia Ripani (Fundación Ceibal).



Chapter 4 - The continuity of education during the COVID-19 pandemic: The use of ICT in Brazilian public schools

Javiera F. Medina Macaya and Tatiana Jereissati (Cetic.br|NIC.br).

Chapter 5 - The platformization of education in times of pandemic

Nelson De Luca Pretto (UFBA), Tel Amiel (UnB), Maria Helena Silveira Bonilla (UFBA), and Andrea Lapa (UFSC).

Conclusions - Moving forward: Education for the most marginalized post-COVID-19

Tim Unwin (UNESCO Chair in ICT for Development), Azra Naseem (Aga Khan University), Alicja Pawluczuk (Digital Beez), Mohamed Shareef (Ministry of Environment, Climate Change, and Technology of the Republic of Maldives), Paul Spiesberger (International NGO Safety Organization - INSO), Paul West and Christopher Yoo (University of Pennsylvania).

Gender Dynamics in the Use of Digital Technologies: A Study With Children and Adolescents in the City of São Paulo



In April, the Brazilian Center of Analysis and Planning (CEBRAP) and Cetic.br|NIC.br released a publication that explores gender differences related to access to and use of the Internet by children and adolescents.

The book draws on the findings of qualitative research conducted by Cetic.br|NIC.br on differences and inequalities in access to and use of information and communication technologies (ICT) by youngsters. In addition, it investigates how the online experiences of girls and boys can be influenced by gender issues, impacting uptake of opportunities, perceptions of privacy, self-presentation, and forms of expression, among other aspects.

The publication is made up of the following chapters:

Foreword

Gloria Bonder (UNESCO Regional Chair, Women, Science and Technology in Latin America, FLACSO-Argentina).

Part I - Research design

Tatiana Jereissati, Javiera F. M. Macaya, Stefania Lapolla Cantoni (Cetic.br|NIC.br), and Monica Barbovschi (University of Oslo).

Results

Tatiana Jereissati, Javiera F. M. Macaya, and Stefania Lapolla Cantoni (Cetic.br|NIC.br).

Part II - Article 1 - Interfacing gender, race, and class in ICT use experiences among children and adolescents

Márcia Lima and Silvia Aguião (CEBRAP).

Article 2 - Sexuality, gender and Internet: Aspects of ICT use in the constitution of networks of sociability and production of self among youths

Silvia Aguião (CEBRAP).

Article 3 - Children and adolescents in Buenos Aires: An analysis of access, use and incidence of ICT and social networks from a gender perspective

Sebastián Benítez Larghi and Blas Fernández (FLACSO-Argentina).

Final remarks

Reflections and ways forward

Sonia Jorge (Alliance for Affordable Internet [A4AI]).

Public policy recommendations

Tatiana Jereissati, Javiera F. M. Macaya, and Stefania Lapolla Cantoni (Cetic.br|NIC.br).

Policy Paper

Artificial Intelligence and Culture: Opportunities and Challenges for the Global South

In April, Cetic.br|NIC.br released a policy paper that discusses the impacts of AI on the cultural sector in the Global South. The publication was launched at the Open Forum on Sciences in Latin America and the Caribbean – CILAC Forum, organized by the UNESCO Regional Bureau for Science in Latin America and the Caribbean in Montevideo. This regional hub for debating science, technology and innovation addressed Artificial Intelligence (AI) as one of its core themes in its 2021 edition, which fostered constructive and informative conversations with relevant stakeholders around the topic.

The policy paper was authored by Lucia Santaella (Full professor at the Pontifical Catholic University of São Paulo – PUC-SP and researcher at the National Council for Scientific and Technological Development – CNPq), under the technical and editorial coordination of Cetic.br|NIC.br and in partnership with the UNESCO Regional Bureau for Science in Latin America and the Caribbean in Montevideo.

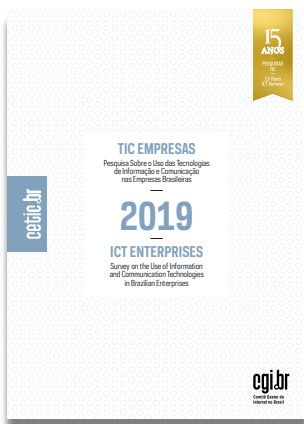
In addition to mapping AI application trends in different stages of the cultural cycle in distinct domains, the publication presented opportunities and benefits brought about by such technologies. It also addressed challenges related to the overconcentration of data monitored by AI in large digital platforms. Finally, it discussed possible implications for the Global South from the perspective of Latin America and the Caribbean countries, given the digital and creative divides that tend to deepen



with the use of AI in culture. The conclusions led to recommendations regarding possible strategies for public policies and raising awareness among civil society and the public and private sectors.

The policy paper is available in Portuguese and Spanish. In 2022, it will also be published in English as part of the NIC.br Sectoral Study on Culture and Artificial Intelligence, which is currently being developed by Cetic.br|NIC.br. This upcoming publication will also feature a qualitative study that aims to investigate the use of AI in the cultural sector and its implications for the protection and promotion of the diversity of cultural expressions in Brazil. It will be carried out through in-depth semi-structured interviews with artists and cultural agents, digital platforms and cultural institutions.

Other ICT Survey Projects



ICT Enterprises

Conducted since 2005, the ICT Enterprises survey measures the adoption of information and communication technologies in enterprises with 10 or more employed persons. Its objective is to investigate access to infrastructure, as well as use and appropriation by the private sector of new technologies, mapping their perceptions of associated benefits.



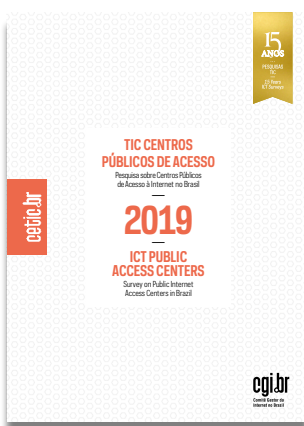
ICT Electronic Government

Conducted every two years since 2013, the ICT Electronic Government survey investigates the supply of e-government services in Brazil. The use of ICT in the public sector can increase access to public services, making governments more transparent, in addition to enabling citizen participation. With the aim of analyzing this scenario, interviews are conducted with ICT managers and people responsible for the digital content of governmental organizations at the three levels of government (federal, state and local), in the executive, legislative and judicial branches, and in the public prosecutor's office.



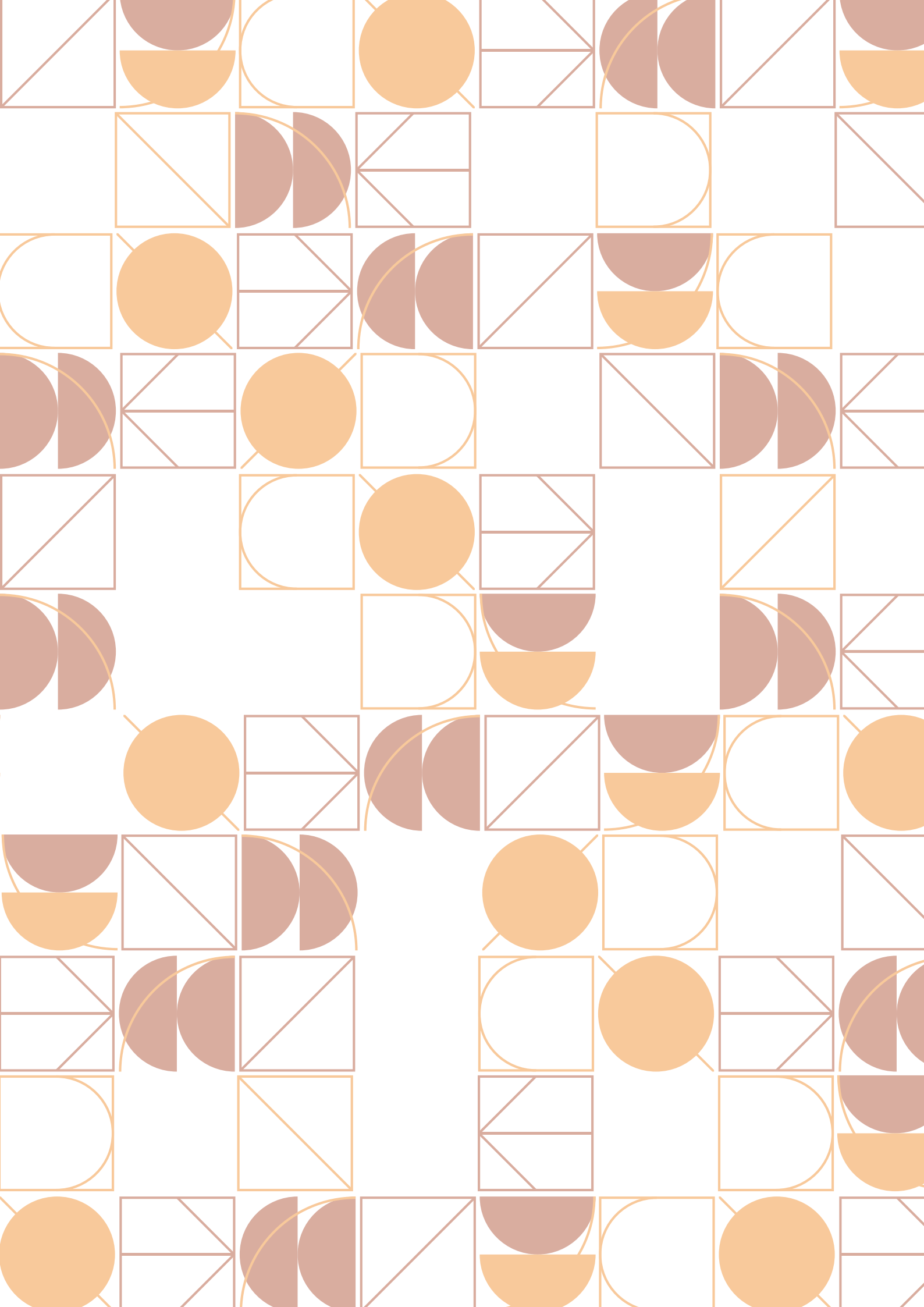
ICT Nonprofit Organizations

Conducted since 2012, the ICT Nonprofit Organizations survey investigates access to, and use and appropriation of, information and communication technologies by organizations such as NGOs, associations, foundations and religious organizations in Brazil, in addition to mapping out characteristics and accumulated ICT skills in these facilities.



ICT Public Access Centers

The ICT Public Access centers survey presents a mapping of information on the provision of Internet access by public access centers in Brazil supported by the federal government, particularly telecenters, in view of the importance of these sites in fighting digital exclusion and reducing inequalities related to technology adoption and use in Brazil.



Public Debates: Advancing Information and Knowledge Societies

Cetic.br|NIC.br sponsors widespread public debates and technical meetings with key stakeholders from the government, academia, the private sector, and international and civil society organizations to discuss the socioeconomic and cultural implications of digital technologies in society and the development of information and knowledge societies. Debates are based on an interdisciplinary approach to discussing the multifaceted aspects related to access to, and use and appropriation of technologies by different segments of society.

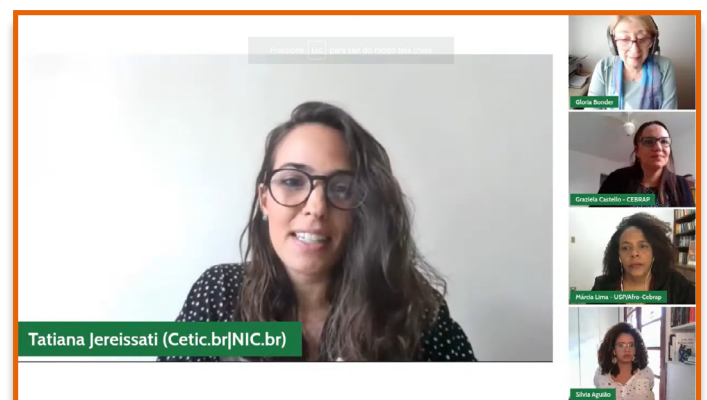
During 2021, the Center held public events that marked the launch of new publications and also served as a forum for discussing relevant themes, encouraging informed public debate on digital technologies and society. Among several public debates organized by the Center throughout the year, several focused on relevant findings from the national ICT surveys conducted by Cetic.br|NIC.br. Public debates are one of the transparency mechanisms that legitimize its work on data production. Below are some of the main events that took place in 2021.

Webinar “Gender Dynamics in the Use of Digital Technologies – A Study with Children and Adolescents in the City of São Paulo”

April 2021 – Online

The Brazilian Center of Analysis and Planning (CEBRAP), with the support of the Regional Center for Studies on the Development of the Information Society (Cetic.br|NIC.br), released the publication “Gender dynamics in the use of digital technologies: A study with children and adolescents in the city of São Paulo.” The publication was based on qualitative research conducted by Cetic.br|NIC.br that explored differences and inequalities in access to and use of digital technologies by the young population.

The event was carried out in April, during the week of the Girls in ICT Day (established by



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the International Telecommunication Union - ITU), in the presence of invited national and international speakers that authored the book chapters. The webinar recordings are available in Portuguese and can be accessed on NIC.br's YouTube channel.⁵

Speakers: Graziela Castello (CEBRAP), Gloria Bonder (UNESCO Regional Chair, Women, Science and Technology in Latin America, FLACSO-Argentina), Tatiana Jereissati (Cetic.br|NIC.br), Marcia Lima (CEBRAP), and Silvia Aguião (CEBRAP).

Artificial Intelligence at the Open Science Forum for Latin America and the Caribbean (Foro CILAC 2021)

April 2021 - Online



© MCTI/Leonardo Marques

The 2021 edition of the Open Science Forum for Latin America and the Caribbean⁶ (Foro CILAC 2021) promoted discussions on the following core themes: inclusive science; Artificial Intelligence; open science; and opportunities and challenges related to the digital economy.

In this context, four editions of the Internet Sectoral Overview published by Cetic.br|NIC.br in 2020, which addressed Artificial Intelligence from different perspectives, were made available at the relevant documents repository of Foro CILAC. The following publications were translated into Spanish by the UNESCO Regional Bureau for Science in Latin America and the Caribbean in Montevideo:

Year 12 - N. 1 - Artificial Intelligence: Fairness, justice and consequences

Year 12 - N. 2 - Use of Artificial Intelligence in health

Year 12 - N. 3 - Artificial Intelligence, education and childhood

Year 12 - N. 4 - Artificial Intelligence and work

Additionally, the Center of Study and Research in Network Technology and Operations (Ceptro.br|NIC.br) and Cetic.br|NIC.br co-organized a Thematic Session at the CILAC Open Forum, entitled "Artificial Intelligence for SDGs." The session was conducted with the participation of representatives of Ceptro.br|NIC.br, Cetic.br|NIC.br, the United Nations Children's Fund (UNICEF) and the Brazilian Ministry of Science, Technology and Innovation (MCTI). Three different experiences related to uses of AI for achieving the Sustainable Development Goals (SDGs) were presented, addressing issues concerning connectivity in Brazilian public schools, digital inequalities from a gender perspective, and the use of technologies for identifying schools in remote areas.

⁵ https://youtu.be/4_s_PNSsgU0

⁶ <https://youtu.be/3y0vMSPRmDM>

Webinar: Digital Security in Enterprises in a Context of Increasing Digitalization

May 2021 – Online

The COVID-19 pandemic highlighted the relevance of digital technologies for enterprises, which saw the Internet as an essential infrastructure to support their operations and counter the restrictions imposed by social distancing. As digitalization advances, digital security becomes an increasingly important matter for companies.

In this regard, in May, the Regional Center for Studies on the Development of the Information Society (Cetic.br) and the Brazilian National Computer Emergency Response Team (CERT.br), departments of the Brazilian Network Information Center (NIC.br), conducted the webinar “Digital security in enterprises in a context of increasing digitalization.” The event featured the launch of the Sectoral Study publication *Digital security: An analysis of risk management in Brazilian enterprises* and gathered the authors of the chapters to discuss risk management and digital security. The event debated issues such as incident measurement and consequences, risk management strategies,



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ecosystems, and cooperation for a more secure digital environment.

The webinar recordings are available in Portuguese, English, and Spanish and can be accessed at NIC.br’s YouTube channel.⁷

Speakers: Demi Getschko (NIC.br), Alexandre Barbosa (Cetic.br|NIC.br), Cristine Hoepers (CERT.br|NIC.br), Éireann Leverett (University of Cambridge), Alejandro Patiño (ECLAC), Johannes M. Bauer (MSU), Laurent Bernat (OECD), Leonardo Melo Lins (Cetic.br|NIC.br) and Tatiana Jereissati (Cetic.br|NIC.br).

Webinar: Cultural Digitalization and the Pandemic // Launch of 2020 Edition of the ICT in Culture Survey

June 2021 - Online

On June, Cetic.br|NIC.br launched the publication of the ICT in Culture 2020 survey during the webinar “Cultural digitalization and the pandemic: Institutions and audiences on the Internet.” At that time, indicators from the 3rd edition of the ICT in Culture survey were released and results of the ICT Panel COVID-19 were also presented. After the presentation

of new data about the use of ICT in Brazilian cultural facilities and the use of the Internet in Brazil to access cultural activities during the new coronavirus pandemic, experts debated the challenges to digital transformation, the role of digital technologies in cultural facilities, and the barriers and opportunities to accessing cultural activities in the context of the COVID-19

⁷ https://youtu.be/a9_SrRjra7k

pandemic. The debate was moderated by Andrea Nogueira (CPF Sesc). The following members of the private and non-profit sectors and academia also participated in the webinar:

Speakers: Alexandre Barbosa (Cetic.br|NIC.br); Bel Santos Mayer (Brazilian Institute of Community Studies and Support [IBEAC]/LiteraSampa); Demi Getschko (NIC.br); Isaura Botelho (Consultant and researcher on cultural policies); Jader Rosa (Itaú Cultural); Marcio Nobre Migon (CGI.br); Luciana Lima (Cetic.br|NIC.br); and Marielza Oliveira (UNESCO).



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More than 1,600 people watched the live webinar on the NIC.br channel on YouTube.⁸

Webinar: Live Intrarede // Launch of 2020 Edition of the ICT Providers Survey

July 2021 - Online



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The ICT Providers 2020 launch event took place on July, during the Live Intrarede promoted by Ceptro.br|NIC.br, and was broadcast on the NIC.br YouTube channel. The general theme of the event was “Internet Pioneers.” Representatives of the first Internet service providers in

the country shared the challenges of the early days of providing Internet access in Brazil and how they see the future of the sector. The results of the ICT Providers survey were discussed after the pioneers’ presentations, offering a current overview of companies in the sector.⁹

⁸ <https://youtu.be/h2b6NSsIKk8>

⁹ <https://www.youtube.com/watch?v=ixrRheOPT7U>

Webinar: Digital Inclusion and Post-Pandemic Challenges // Launch of 2020 Edition of the ICT Households, ICT in Education, and ICT Kids Online Brazil Surveys and Sectoral Study

November 2021 - Online



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Digital technologies, in particular the Internet and mobile devices, have come to play a central role during the COVID-19 pandemic. Digital technologies have enabled continuity of business activities through telework and e-commerce, the online provision of public services, the continuation of educational activities through remote teaching, and telehealth in the health area.

Digital inequalities, however, have restricted opportunities for the appropriation of online opportunities. Challenges regarding equitable and quality Internet access and limited availability of digital devices in households are among the aspects that restrict “meaningful connectivity.”

The ICT surveys and sectoral studies conducted by CGI.br, through Cetic.br|NIC.br, constitute a repository of information for understanding the scenario of adoption and use of information and communication

technologies (ICT) during the health crisis. The webinar “Digital inclusion and post-pandemic challenges” was held on November 25 to discuss this evidence, in light of the challenges for public policies in the post-pandemic future.¹⁰

This occasion also marked the launch of the publications for the ICT Households 2020, ICT Education 2020, and ICT Kids Online Brazil 2020 surveys, as well as the Sectoral Study “Education and digital technologies: Challenges and strategies for the continuity of learning in times of COVID-19”.

Panelists:

Carlos Eduardo Torre Freire (Fundação Seade); Flavia Lefèvre (Intervozes); João Marcelo Borges (FGV/DGPE).

Moderator: Marta Avancini (Association of Education Journalists [JEDUCA]).

¹⁰ <https://www.youtube.com/watch?v=SaPi3AFYYsk>

Webinar: ICT in Health 2021: Digital Technologies and Perspectives for Health Systems in Brazil // Launch of 2021 Edition of the ICT in Health Survey

November 2021 - Online



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Cetic.br|NIC.br launched the eighth edition of the ICT in Health 2021 survey on November 24, as part of the activities of an event that included the 10th Brazilian Congress of Telemedicine and Telehealth, the XVIII Brazilian Congress of Health Informatics (CBIS 2021), and the National Education and Research Network (RNP) Forum. The panel “ICT in Health 2021: Digital technologies and perspectives for health systems in Brazil” featured the presentation of the main results on the adoption and use of ICT in Brazilian healthcare facilities. It also featured the participation and comments of experts in digital health, especially telehealth and data protection. The bilingual publication

of the ICT in Health 2021 survey was also launched. It contains articles on the use of ICT during the COVID-19 pandemic, analysis of the results, and the methodology of the survey. The panel was composed of the following members:

Speakers:

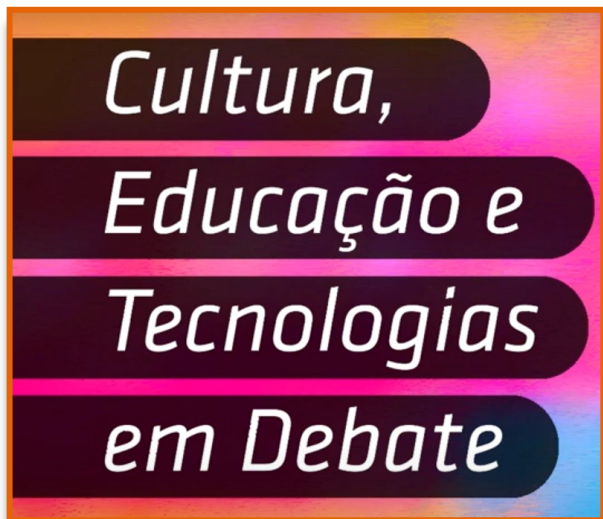
Alexandre Barbosa (Cetic.br|NIC.br);
Fabio Senne (Cetic.br|NIC.br); Luciana Portilho (Cetic.br|NIC.br); Dr. Ana Estela Haddad (University of São Paulo [USP]); Dr. Analuza Bolivar Dallari (USP).

Moderator:

Dr. Heimar de Fátima Marin (Scientific coordinator of the ICT in Health survey)

Debate Series on Culture, Education and Technology

May-October 2021 – Online



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A series of webinars were organized by PUC-SP, the Brazilian Social Service of Commerce – Sesc, and Cetic.br|NIC.br. The webinars focused on the discussion of critical questions in contemporary society, particularly those related to the role of technology in the education and culture fields. While technology has a transforming potential in peoples' lives, it also creates new social, political, and economic challenges.

The webinars explored both the potentialities and challenges of technology in the education and culture fields, reinforced by the COVID-19 pandemic. They discussed relevant topics such as the implications of technology for access to information; knowledge, science, research, memory, and cultural expressions; the role of technology in democratization and access to education; the development of new skills for emancipatory, safe, and critical use of technologies; and social and democratic practices in the use of technologies to create

and diffuse cultural and educational content. All the webinars gave centrality to social inequalities, including policies that seek to tackle them, increase opportunities, and promote inclusion and diversity.

The debates were moderated by the journalist Paulo Markun and included the participation of the following specialists and activists:

May 25 - The necessary changes through culture, education, and digital technologies in the context revealed by the pandemic – Preto Zezé (Central Única das Favelas)

June 29 - Social, racial and gender segregation for more equal access to culture, education, and technologies – Silvana Bahia (Olabi)

July 27 - Technologies as a right for children's and young people's cultural and educational appropriation and participation in a hyperconnected society – Ricardo Henriques (Unibanco Institute)

August 31 - Digital platforms, cultural practices, and distance education in a flawed democracy – Nelson Pretto (Federal University of Bahia [UFBA])

September 29 - Ethical and social impacts of Artificial Intelligence in education and culture – Dora Kaufman (PUC-SP)

October 26 - Platform capitalism in the face of public policies for culture, education, and technologies – Fernanda Bruno (Federal University of Rio de Janeiro [UFRJ])

Webinars: Digital Technologies: Innovation, Productivity and Labor Markets in Mercosur // Publication “Mercosur in the Face of Technological Change and Digital Transformation: Elements for Analysis

October 2021 - Online

WEBINAR
TECNOLOGÍAS DIGITALES: INNOVACIÓN,
PRODUCTIVIDAD Y TRABAJO EN EL MERCOSUR
6 Y 7 DE OCTUBRE DE 2021, 10 HORAS (GMT-3)
YOUTUBE.COM/NICBRVIDEOS

ORGANIZACIÓN:

MINISTERIO DE RELACIONES EXTERIORES | PÁTRIA AMADA BRASIL GOBIERNO DE BRASIL | 30 MERCOSUL | PRESIDENCIA PRO TEMPORALE BRASIL 2021

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In 2021, during the Brazilian *Pro Tempore* presidency of Mercosur (Southern Common Market), Cetic.br|NIC.br, with the support of ECLAC, organized two international webinars, gathering representatives from regional governments, academia, civil society, and international organizations to discuss the development of the digital economy in the regional market. Divided into two axes, the event aimed to increase the visibility of the topic, facilitate exchange, and promote evidence-based reflections on digital transformation in Mercosur countries, coordinating these regional discussions in Latin America. The meetings discussed conceptual aspects, reflections and regional experiences, and

the measurement and production of data on the subject.

Cetic.br also coordinated the publication “El Mercosur frente al cambio tecnológico y la transformación digital: elementos para el análisis” (“Mercosur in the face of technological change and digital transformation: Elements for analysis”, in free translation). This publication gathers articles by renowned researchers and members of international organizations, presenting evidence-based reflections and policy recommendations, as well as mapping strategic indicators that identify the main advances and challenges facing the Mercosur, contributing to achieving the Mercosur Digital Agenda.

Webinar 1: Scenarios for the digital transformation: Artificial Intelligence and new technologies for innovation, productivity and work

October 2021 – Online

The objective of this seminar¹¹ was to share analyses, conceptualizations, and evidence-based reflections on the digital transformation of the Southern Common Market (Mercosur) that may enable foreseeing future scenarios, understanding the role of digital technologies in them, and projecting feasible development paths for the region.

Opening:

Luciana Mancini (MRE)

Panelists:

Bernardo Díaz de Astarloa (University of Buenos Aires); Davor Orlic (IRCAI); Jorge Arbache (CAF); Lucas Tadeu Melo Câmara (C4IR); Mariana Ferreira (Ministry of Productive Development - Argentina); Sebastián Rovira (ECLAC - Brazil)

Moderation:

Daniel Cavalcanti (Ministry of Communications)

Webinar 2: Data production for measuring the digital economy: Evidence-based public policies

October 2021 – Online

The objective of this webinar¹² was to promote regional exchange and learning focused on innovative methodologies for measuring the digital economy, mainly those involving alternative data sources. Additionally, it sought to facilitate experience and strategic information sharing among the countries in the region, applicable to measuring access to, and use and appropriation of, digital technologies in the Mercosur.

Panelists:

Jose Luis Cervera (DEVSTAT - Spain); Leonardo Lins (Cetic.br|NIC.br); Romina Da Re (MITIC - Paraguay); Scarlett Fondeur Gil (United Nations Conference on Trade and Development [UNCTAD]); Valeria Jordán (ECLAC - Brazil); Susana Dornel (AGESIC - Uruguay)

Moderation:

Alexandre Barbosa (Cetic.br|NIC.br)

¹¹ <https://youtu.be/21GhwrYOUN4>

¹² <https://youtu.be/Xfn513u3ta8>

IGF 2021 // “Artificial Intelligence and the rule of law in the digital ecosystem”

December 2021 – Online



© UN Internet Governance Forum - IGF 2021

In 2021, Cetic.br|NIC.br contributed to the production of the MOOC “AI and the Rule of Law,” developed by UNESCO, The Future Society, the National Judicial College, and the Institute of Electrical and Electronics Engineers (IEEE). This introductory course engages judicial operators in a global and timely discussion around AI’s application to and impact on the rule of law. Cetic.br and NIC.br contributed with two items of learning material (videos), and will be in charge of the moderation of a module.

Linked to the former online course, Cetic.br and UNESCO co-organized “Artificial Intelligence and the rule of law in the digital ecosystem,” an open forum¹³ session at the Internet Governance Forum 2021, which took place on December 7, 2021. The overall goal was to discuss

emerging issues at the intersection of AI and the rule of law and reflect on challenges and the good practices that need to be adopted for ethical use of AI in judicial systems, from a human rights perspective. The panel discussion was followed by the launch of the aforementioned MOOC.

Opening:

Prateek Sibal (UNESCO); Ana Laura Martinez (Cetic.br|NIC.br)

Panelists:

Nicolas Mialhe (The Future Society); Isabela Ferrari (Brazilian Supreme Court of Justice); Benes Aldana (National Judicial College - USA)

Moderation:

Vanessa Dreier (UNESCO)

¹³ https://www.youtube.com/watch?v=Qj7Y_AS4Clk

Capacity-Building and Awareness-Raising

Cetic.br|NIC.br's capacity-building programs aim to bring together the main stakeholders involved in the production, analysis and use of ICT indicators in public policies, academia, and sectoral market analysis. These programs are directed toward data producers and users, such as national statistical institutes, ministries, regulatory agencies, international organizations, and academic institutions.

In addition to disseminating technical knowledge about survey methodology, they are a forum for promoting debates about the importance of ICT statistics for evidence-based policymaking and for discussing new measurement possibilities, while highlighting

the potential of ICT for development. In addition to regular capacity-building and awareness-raising activities about the importance of ICT statistics, in 2021, the Center continued to offer its massive open online course (MOOC) about ICT and sustainable development. This pioneering initiative sought to promote awareness and capacity-building about the role of ICT in implementing and measuring the UN 2030 Agenda for Sustainable Development and the Sustainable Development Goals. Offered in an open and free format, the course engaged multiple stakeholders related to the intersection between ICT and sustainable development during a 10-week discussion.

MOOC // "Tech for Good: The Role of ICT in Achieving the SDGs"

This program, offered in a massive open online course (MOOC) format through the edX Platform, is a joint initiative by Cetic.br|NIC.br, UNESCO, and the SDG Academy. Set up as a self-paced course, it provides students with a set of 10 modules that address ICT as a critical component for achieving the SDGs. The course brings together thought leaders and changemakers from all regions of the world in fields related to ICT and sustainable development. It addresses the role of ICT in achieving the SDGs in five important areas: i) how digital technologies are empowering billions of people around the world by providing access to education, healthcare, banking, and government services; ii) how ICT is being used to inform smarter, evidence-based policies to improve people's lives in fundamental ways; iii) how these technologies

can be used for measuring and monitoring the achievement of the SDGs; iv) new challenges that technology can introduce, such as privacy, data management, risks to cybersecurity, e-waste, and the widening of social divides; and v) ways in which stakeholders are coming together to answer big questions about what our future will look like in a hyper-digitized world.

In its latest edition, the course received 1,489 enrollments, which included learners from the United States, India, Brazil, Indonesia, and Nigeria, among other countries. Since its launch in 2018, more than 8,000 learners from diverse backgrounds have enrolled in the course, reaffirming the relevance of continued discussions around the role of technologies for achieving the SDGs.

Course modules:

- **Module 1:** Welcome to the Digital Age
- **Module 2:** Technology for Governments and Citizens
- **Module 3:** ICT Infrastructure
- **Module 4:** ICT Innovations in Health
- **Module 5:** Learning in Knowledge Societies
- **Module 6:** Promoting Financial Inclusion
- **Module 7:** Measurement and Metrics for ICT and the SDGs

- **Module 8:** Artificial Intelligence for Development
- **Module 9:** Concerns for our Digital Future
- **Module 10:** The Way Forward

Languages: Videos in English; transcriptions in English, Spanish, Portuguese and Russian.

Registration and more information:

<https://sdgacademy.org/course/tech-for-good/>

MOOC // “AI and the Rule of Law”

In the face of rapid advancements regarding the use of AI in judicial systems, UNESCO and The Future Society, with the support of Cetic.br|NIC.br, the National Judicial College, and IEEE, developed a massive open online course (MOOC) to promote capacity-building on this topic. This course builds on the UNESCO Judges’ Initiative, which has trained over 23,000 judicial operators since 2014. In addition, it was made possible by contributions from the UNESCO Multi-Donor Programme on Freedom of Expression and Safety of Journalists (MDP) and the Open Society Foundations.

This introductory course on AI and the rule of law is structured around six modules, unpacking the opportunities and risks of the increasing adoption of AI technologies across justice systems and AI’s impact on the administration of justice, particularly concerning human rights and AI ethics and governance issues.

The target audience is judicial operators, including judges, prosecutors, public lawyers, and other stakeholders working for judiciary branches, prosecution services worldwide, and

sectors including legal technology companies. Other relevant audience groups include policymakers, academics, social workers, and civil society representatives.

Course modules:

- **Module 1:** Why Digital Transformation and AI Matter for Justice Systems
- **Module 2:** AI Adoption across Justice Systems
- **Module 3:** The Rise of Online Courts
- **Module 4:** Algorithmic Bias and Its Implications for Judicial Decision Making
- **Module 5:** Safeguarding Human Rights in the Age of AI
- **Module 6:** AI Ethics & Governance Concerning Judicial Operators

Languages: English, French, Spanish, Russian, Chinese, Arabic and Portuguese.

Registration and more information:

<https://www.judges.org/ai-rol>

Course commencement is planned for March 2022.

11th NIC.br Annual Workshop on Survey Methodology

October 2021 – Online

The 11th edition of the NIC.br Annual Workshop on Survey Methodology took place in an online format in October in partnership with the National School of Statistical Sciences (ENCE) of the Brazilian Institute of Geography and Statistics (IBGE).

The event featured 2 short courses for guests and 3 days of webinars on emerging topics for data production and ICT research. More than 290 people participated in this year's edition, which was open to the public with simultaneous translations in English and Portuguese.

Short course I: Tutorial on methods and tools for analyzing microdata from ICT research by Cetic.br¹⁴

Speakers: Isabela Coelho (Cetic.br|NIC.br) and Mayra Pizzot (Cetic.br|NIC.br)

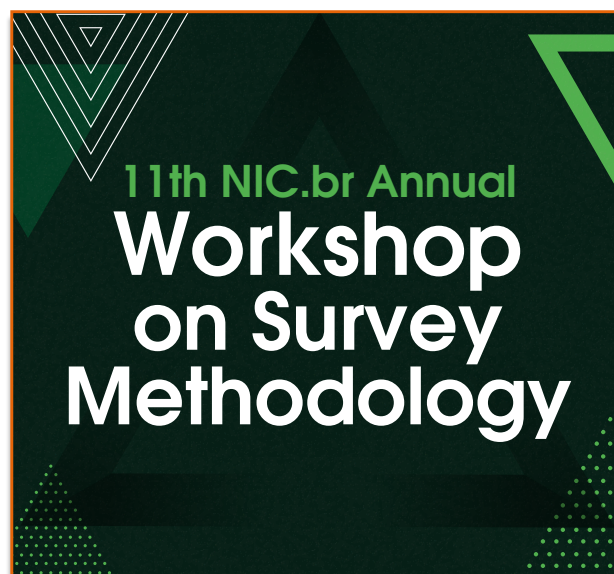
Moderation: Professor Pedro Silva (ENCE/IBGE)

Webinar I: Innovation in data collection and dissemination to estimate ICT indicators and price indices¹⁵

Opening: Demi Getschko (NIC.br) and Maysa Magalhães (ENCE/IBGE)

Speakers: Marcelo Pitta (Cetic.br|NIC.br) and Vladimir Miranda (IBGE)

Moderation: Professor Denise Britz (ENCE/IBGE)



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Webinar II: Big Data and Official Statistics¹⁶

Speakers: Marco Puts (CBS Netherlands) and Piet Daas (CBS Netherlands)

Moderation: Professor Pedro Silva (ENCE/IBGE)

Webinar III: International AI Projects: OECD, UNESCO, IRCAI and C4IR¹⁷

Speakers: Cédric Wachholz and Prateek Sibal (UNESCO); Davor Orlic, Matej Posinković and Matej Kovačič (IRCAI); Lucas Câmara, Clara Langevin and Rafael Fassio (C4IR Brazil); and Alistair Nolan (OECD).

Moderation: Tatiana Jereissati (Cetic.br|NIC.br)

Short course II: Linking records - integration of databases for the production of statistics¹⁸

Speaker: Andrea Diniz (ENCE/IBGE)

Moderation: Professor Denise Britz (ENCE/IBGE)

¹⁴ <https://www.youtube.com/watch?v=7d1bhqtrPGk>

¹⁵ <https://www.youtube.com/watch?v=4zyvTvQmBss>

¹⁶ <https://www.youtube.com/watch?v=IJJTF4iJK>

¹⁷ <https://www.youtube.com/watch?v=xrtPjtHQwFO>

¹⁸ <https://www.youtube.com/watch?v=Yzlc2SHm9oE>

Summer School on the Challenges of Digital Transformation and Innovation in Latin America

November 2021 – Online

The seventh edition of the Summer School was co-organized by ECLAC, CAF, Cetic.br|NIC.br, and I&JPN. The capacity-building program aims to engage policymakers and ICT experts in a multistakeholder and cross-sectoral debate on the challenges of digital transformation and innovation in Latin America and other regions.

More than 80 people from 16 countries participated in the Summer School. The webinars were held in Spanish, Portuguese and English on November 16, 23 and 30 by more than 10 international experts.

Webinar I - Infrastructure & Connectivity

Session 1: Perspectives and Enablers for 5G and its Impact on Digital Inclusion and Innovation

Speaker: Lucas Gallitto (GSMA)

Moderator: Fernando Rojas (ECLAC)

Session 2: COVID-19 and Broadband Connectivity Gaps among Disadvantaged, Vulnerable, and Low-Income Socioeconomic Groups and Populations in Remote and Rural areas

Speaker: Fernando Rojas (ECLAC)

Moderator: Fabio Senne (Cetic.br|NIC.br)

Webinar II - Digital Transformation & Measurement

Session 3: Digital Transformation of Production Processes and Assets to Accelerate Economic Recovery: the impact of disruptive digital technologies such as Big Data, IoT, robotization, and Artificial Intelligence on development

Speakers: Agustin Diaz-Pines (European Commission); Juan Jung (Telecom Advisory Services|Universidad Pontificia Comillas ICAI-ICADE)

Moderator: Eduardo Chomali (CAF)



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Session 4: Trends in Regulation and Management of Competition in Digital Service Markets

Speakers: Ana Beatriz Rodrigues de Souza (Anatel - Brazil); Georgina Nunez (ECLAC)

Moderator: Fernando Rojas (ECLAC)

Session 5: Measuring the Adoption of Disruptive Digital Technologies by Government, Industry, and Citizens: Innovative Methods for Statistical Data Production

Speaker: Ronald Jansen (UNSD)

Moderator: Alexandre Barbosa (Cetic.br|NIC.br)

Webinar III - Data Governance & Personal Data Protection

Session 6: Innovative Data Governance Frameworks and Artificial Intelligence

Speaker: Lorryne Porciuncula (I&JPN); Beatriz Botero Arcila (Sciences Po)

Moderator: Martin Hullin (I&JPN)

Session 7: Trust, Privacy and Safety Online

Speaker: Christian Reimsbach-Kounatze (OECD)

Moderator: Carolina Rossini (I&JPN)

In addition, the School had 10 group sessions in which participants presented and discussed topics such as legal and regulatory barriers faced by refugees and migrants in accessing connectivity and financial services, conversion of community banks to fintechs, the connectivity landscape during the pandemic, Peru's digital transformation process, the aesthetic normalization of gender in Artificial Intelligence algorithms, and access to a quality Internet, among other topics. The presentations and reading materials of this edition will be available for consultation on the event website¹⁹.

¹⁹ <https://cetic.br/pt/evento/escola-verao-transformacao-digital/>

Workshop - “Introduction to the Use of Surveys for Public Policy Impact Evaluations”

July 2021 – Online

Through an initiative for technical cooperation towards the countries of the region, Cetic.br|NIC.br has organized this virtual course, that was designed on demand to cover introductory aspects of impact evaluation applicable to Costa Rica’s Telecommunications Superintendency (SUTEL) programs, projects and regulatory initiatives. Taught by Pedro Luis do Nascimento, Professor and Former Secretary of the International Statistics Association, the course counted on the participation of 20 middle managers and senior officials from SUTEL, as well as Cetic.br|NIC.br’s team of researchers, which facilitated the exchange of experiences and reflections about the topic.

The course contents and materials can be tailored to reach new interested public institutions and national teams, and is an asset for further promoting evidence-based policymaking in the region.

Additional Contributions

Cetic.br|NIC.br has also contributed with teaching materials for the following MOOCs:

- MOOC “Artificial Intelligence in Latin America and the Caribbean: so that no one is left behind” in which Cetic.br|NIC.br has provided a video entitled “Digital Inequalities in Latin America today”. The course was organized by UNESCO Office in Montevideo.
- MOOC “Opportunities and challenges for SMEs in the cross-border e-commerce”²⁰ in which Cetic.br|NIC.br has provided a video entitled “Digital Safety and Risk Management”. The course was organized by ECLAC in collaboration with the digital agenda for Latin America and the Caribbean (eLAC2022) and UNCTAD.

“When it comes to capacity building on survey methodology to produce ICT-related statistics, Cetic.br|NIC.br has been doing exemplary work. The National School of Statistical Sciences (ENCE) of the Brazilian Institute of Geography and Statistics (IBGE) has been partnering with the Center to deliver workshops and capacity-building activities aimed at bringing together stakeholders from the data production ecosystem, including policymakers, researchers and representatives from public, private and international organizations to debate data production and use. By regularly carrying out ICT surveys to produce public statistics, Cetic.br|NIC.br has accumulated solid experience and has contributed substantially towards better use of ICT-related statistics for policy design, monitoring and research. In addition to disseminating knowledge about survey methodology, the Center has also become an important voice in international fora discussing the development of methods and indicators to measure the socioeconomic implications of digital technologies in society.”

Professor Pedro Luis do Nascimento Silva

The National School of Statistical Sciences (ENCE)

²⁰ For more information on this MOOC please visit:
<https://www.cepal.org/es/cursos/opportunidades-retos-mipymes-commerce-transfronterizo>

Methodological Support on Data Measurement for Strategic Partners

In 2021, Cetic.br|NIC.br continued to work alongside strategic partners in the area of ICT-related statistics production, data provisioning and sharing, data analysis, and capacity-building on survey methodologies and innovative methods of data collection. Based on a multi-stakeholder approach, Cetic.br|NIC.br works in close cooperation with partners from relevant areas of government (regulators, national statistical offices, various ministries), academia, research institutes, and international organizations to develop an ICT measurement ecosystem that allows for the production of

sound and updated data for policymaking and research. Cetic.br|NIC.br also provides technical support and capacity-building programs to decision-makers and data producers in Latin America and Portuguese-speaking countries in Africa. Cetic.br|NIC.br is also an active player in the international arena. In recent years the Center has been cooperating with some national statistical offices in Latin America and with ECLAC, UNESCO, ITU, and OECD in the area of measurement, indicators, and survey methodologies.

UNESCO Internet Universality Indicators



The UNESCO Internet Universality Indicators were designed to enable stakeholders to assess Internet development at the country level and offer policy improvement recommendations, all in accordance with UNESCO's ROAM-X principles: R - Human Rights; O - Openness; A - Accessibility to All, and M - Multistakeholder Participation. Brazil was the first country to complete an assessment based on the ROAM-X indicators. Cetic.br|NIC.br prepared the national assessment report, which was launched at a UNESCO-led event in 2019.

Throughout 2021, Cetic.br|NIC.br participated in numerous virtual meetings to disseminate the results of the Brazilian report and support implementation in other countries. Among the main events were:

- IGF Dynamic Coalition presentation on UNESCO Internet Universality Indicators. EuroDIG 2021. June 2021.
- Expert meeting on UNESCO Internet Universality framework. IAMCR conference 2021. July 2021.
- IGF Event #21 Advancing Internet Universality ROAM principles and Indicators for the Internet United. December 2021.
- IGF 2021 - DC-IUI: UNESCO's call to all stakeholders to support ROAM and the DC. December 2021.
- In the process of implementing the indicators, technical meetings were held with several countries. In 2021, Cetic.br|NIC.br's team also contributed to reviews in other Latin American countries, such as Argentina, Uruguay and Paraguay.

Working Group on Measuring E-Commerce and the Digital Economy

Cetic.br|NIC.br has been part of a working group led by UNCTAD, which aims to promote cooperation on measuring electronic commerce and the digital economy. The event took place on May 3 and 4, and participants from several countries presented the advances and challenges of measuring the digital economy, with special concern about the dissemination of good practices, comparability, and support for developing countries. Cetic.br|NIC.br presented

its Big Data projects in the panel "The use of non-survey sources of data to supplement the traditional measurement of e-commerce and the digital economy."

More information about the event can be found on UNCTAD's website: <https://unctad.org/meeting/working-group-measuring-e-commerce-and-digital-economy-second-meeting>.

Webinar: First Regional Seminar on Social Development // Education in Latin America and the Caribbean: The Prolonged Crisis as One Restructuring Opportunity

October 2021 - Online

As part of the First Regional Seminar on Social Development, organized by ECLAC, Cetic.br|NIC.br participated in the panel "Skills and competences in a changing environment" that took place on October 14. The event²¹ aimed to contribute to strengthening the capacities of the countries of Latin America and the Caribbean in the development of educational policies that allow transformation of education systems so that they are equitable and inclusive, and

contribute to the commitment collectively assumed in the UN 2030 Agenda for Sustainable Development.

Moderation: Daniela Trucco (ECLAC)

Keynote: María Luisa Marinho (ECLAC) and Tamara Díaz (Organization of Ibero-American States [OEI]), Cristóbal Cobo (Banco Mundial), Fabio Senne (Cetic.br|NIC.br, Brazil), Cora Steinberg (UNICEF), Ana Gúezmes (ECLAC)

²¹ <https://www.youtube.com/watch?v=D6ewOWam18>

Debating the Challenges of ICT Measurement In International Forums: Sharing Experiences with Data Production

Cetic.br|NIC.br is dedicated to the systematic production of indicators and statistics about ICT access and use in Brazil in various sectors of society. With more than 15 years of experience, the Center adopts the methodological recommendations established by international organizations that work with the measurement and analysis of ICT statistics, enabling the comparison of its indicators with those of other

countries. Cetic.br|NIC.br also contributes to the development of these recommendations and actively participates in discussions about the indicators. In 2021, the Center participated in discussions held in various national and international forums dedicated to ICT methodologies and indicators, which focused on their review and definition. Some of those events are highlighted below.

Working Party on ICT Indicators for Measurement and Analysis of the Digital Economy (WPMMADE), OECD

October 2021 – Online

Since 2011, Cetic.br|NIC.br has been an active participant in the OECD Working Party on Measurement and Analysis of the Digital Economy (MADE). The goal of this working party is to share countries' experiences with measuring the digital economy, including tools and methodologies to produce relevant data for public policymaking. Participants in MADE are OECD member countries and invited experts. It is also a forum for debate about the socioeconomic impacts of new disruptive technologies on the

digital economy and their contribution to economic growth and well-being.

In 2021, WP-MADE meetings were virtual and included topics such as: measuring the trustworthiness of online environments; data governance; and ICT measurement during the COVID-19 pandemic. The group also discussed the implementation of studies on Artificial Intelligence and the Internet of Things (IoT) among enterprises, both with the support of Cetic.br|NIC.br in collecting data across Brazilian companies.

Expert Group on ICT Household Indicators (EGH) and Expert Group on Telecom / ICT Indicators (EGTI), ITU

The mission of both the Expert Group on ICT Household Indicators (EGH) and the Expert Group on Telecommunication/ ICT Indicators (EGTI), which are led by ITU, is to bring together representatives from various countries to discuss ICT indicators to measure ICT supply and demand, based on the methodological framework developed by ITU. The expert groups share experiences through an online forum²² and meet in person once a year (which also happened online in 2021, due to the pandemic).

The EGH and EGTI group meetings are open to ITU members, targeting experts from ministries, regulatory agencies, and national statistical offices. The 9th EGH meeting occurred back-to-back with the 12th EGTI meeting, with the participation of 136 professionals from 57 countries, as well as

ITU Development Sector members, other UN agencies, and regional organizations.

The objective of the meeting was to examine the contributions sent by members concerning the topics covered during the current working period, with the intent to finalize the items under discussion. The topics discussed included measuring mobile money (jointly with EGTI), child online protection, and e-waste indicators in household surveys.

The discussions focused on ways forward in advancing measurement and data collection on various topics, including new methodologies for data collection during the COVID-19 pandemic, which included a presentation by Marcelo Pitta on the developments and experiences of Cetic.br|NIC.br with new approaches, combining different data sources and data collection modes, to produce ICT indicators.

Expert Group for the Review of the OECD Recommendation on the Protection of Children Online

As part of the review of the implementation of the 2012 Recommendation of the OECD Council on the Protection of Children Online, a multistakeholder expert group that includes the participation of Cetic.br|NIC.br was established by OECD to guide this work. The first consultation of the expert group was held in Zurich in October 2018. Based on the outcomes of the analytical work and the Zurich consultation, delegates agreed in November 2018 that the Recommendation needed updating. In 2019, OECD organized a second consultation with experts to present and exchange views on relevant national and international developments in previously

identified priority areas, and discuss proposed revisions. In 2020, Cetic.br|NIC.br participated in three virtual expert meetings of the group (February, March and June).

In 2021, there were technical meetings of the expert group in March and July. In November 2021, the “High-Level Launch of the OECD Council Recommendation on Children in the Digital Environment” took place. The launch event brought together high-level policymakers and key decision-makers to discuss the Recommendation and consider how governments can take action to ensure a safe and beneficial digital environment for children.

²² <https://www.itu.int/en/ITU-D/Statistics/Pages/events/egti2021/default.aspx>

Accelerating SDGs through ICT

Contributions to the 2030 Agenda



SDG 4

QUALITY EDUCATION

Cetic.br|NIC.br's contribution to SDG 4 (Ensure inclusive and quality education and promote lifelong learning opportunities for all) ranges from producing ICT and education statistical data, to engaging in the development of international frameworks, to supporting policymakers in designing evidence-based ICT policies.

Cetic.br|NIC.br annually carries out the ICT in Education and ICT Kids Online Brazil national surveys, measuring key indicators of access to and use of ICT and digital skills among students, teachers, directors of studies and school principals. In addition, the ICT Households survey measures digital skills in the general population, following the ITU framework. These sources are capable of informing

progress on Target 4.4 (increase skills for employment, including technical and vocational skills), particularly Indicator 4.4.1 (the proportion of youth and adults with ICT skills).

In 2021, Cetic.br|NIC.br participated in the implementation of relevant projects promoted by UNICEF, ITU, and UNESCO for the advancement of Internet connectivity in schools, as well as for promoting digital education for entire school communities, such as the GIGA Project and the working groups of the Broadband Commission. Cetic.br|NIC.br also collaborated in the preparation of frameworks and guidelines on the matter, including the Global Declaration on Connectivity for Education, launched by UNESCO in December 2021.



SDG 5

GENDER EQUALITY

To measure progress in gender equality in the field of access to and use of ICT by women and girls, all surveys conducted by Cetic.br|NIC.br with individuals and professionals allow for disaggregation by gender. In addition, they offer data users access to a wide set of specific indicators on the subject. The topic is

highlighted, in particular, in the two household surveys conducted annually by the Center: ICT Households and ICT Kids Online Brazil.

Additionally, in 2021, Cetic.br|NIC.br contributed to the debate on gender inequality in the labor market, as part of the book ICT, Internet Governance and Gender

- Trends and Challenges, launched by the Brazilian Internet Steering Committee (CGI.br), as well as by contributing to the chapter “Youth, gender and digital inequalities in Latin America and the Caribbean: Progress and pending debts (in free translation),” which will appear in a publication coordinated by the UNESCO Montevideo Regional Office. The Center also launched the publication “Gender dynamics in the use of digital technologies: A study with children

and adolescents in the city of São Paulo,” in partnership with the UNESCO Montevideo Regional Office.

Cetic.br|NIC.br also adopts gender balance criteria in the integration of panels at events, authors invited to its publications, capacity-building activities, and research teams. Cetic.br|NIC.br’s team is composed of 9 men and 14 women. The composition of the Center’s team of coordinators also presents gender balance.



SDG 9

INDUSTRY, INNOVATION AND INFRASTRUCTURE

Cetic.br|NIC.br has continued its core projects and activities that support relevant action under SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation). The Center’s knowledge production strategies directly contribute to measuring SDG 9 via nationwide surveys measuring ICT adoption in enterprises, households, and by Internet service providers (ISPs). These surveys are critical to understanding both the supply and demand sides for ICT goods and services in Brazil, which are critical for the development of the digital economy. Cetic.br|NIC.br also participates in international working groups discussing definitions, concepts and frameworks for measuring the digital economy, such as those promoted by OECD, ITU and UNCTAD. These international efforts are aimed at fostering the production of comparable data among countries. In particular, Cetic.br|NIC.br’s activities directly contribute to monitoring Target 9.c, which focuses on increasing access to ICT and

providing universal and affordable access to the Internet in least developed countries.

In addition, Cetic.br|NIC.br produces regular publications focusing on the innovative use of technologies and the digital transformation. Capacity-building strategies developed by the Center also contribute to raising awareness among policymakers and key actors about emerging issues such as Artificial Intelligence, innovative data collection methods, and alternative data sources such as Big Data. Among the main activities related to SDG 9 carried out during 2021, two are worth mentioning: i) the 11th NIC.br Annual Workshop on Survey Methodology focused on innovation and trends in ICT data production; and ii) an international project focused on the use of Big Data sources for the production of statistics on the digital economy. In 2021, Cetic.br|NIC.br also supported ongoing projects involving data collection on emerging technologies (such as Artificial Intelligence and the Internet of Things) in enterprises, in partnership with the OECD.



SDG 16

PEACE, JUSTICE AND STRONG INSTITUTIONS

Cetic.br|NIC.br's ICT Electronic Government survey is the contribution to SDG 16 (Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels). This survey is aimed at measuring the digital transformation in the public administration of Brazilian states and cities, providing key inputs to digital government policies. This survey also includes a module on smart cities that allows better understanding of the level of adoption of ICT for local services at the municipal level. Cetic.br|NIC.br is actively engaged in international debates on this topic.

In addition, the Center monitors the transformations in the health and education sectors, measuring advances, barriers, and innovations in embracing digital innovations and ICT solutions, all key elements for advancing SDG 16. The ICT Enterprises

survey provides useful inputs for policies promoting innovative ICT solutions in business.

Another contribution to SDG 16 occurs via a massive open online course (MOOC) on Artificial Intelligence (AI) and the rule of law, which is an introductory course engaging judicial operators in a global and timely discussion around AI's application in and impact on the rule of law. This capacity-building program is structured around six modules. It unpacks the opportunities and risks of the increasing adoption of AI technologies across justice systems and AI's impact on the administration of justice, particularly concerning human rights and AI ethics and governance issues. The course was developed by UNESCO and The Future Society, with the support of Cetic.br|NIC.br, the National Judicial College, and the IEEE SA. It will be launched in March 2022.



SDG 17

PARTNERSHIPS FOR THE GOALS

In addition to collecting around 258 ICT indicators, Cetic.br|NIC.br conducted a new edition of the ICT Panel COVID-19, with 92 indicators designed to monitor Internet use during the COVID-19 outbreak.

The use of alternative data sources was also among the innovative strategies implemented by Cetic.br|NIC.br in partnership with the Brazilian National Statistical Office and international organizations. The Center also published two Sectoral Studies - covering

cybersecurity and ICT in education, focusing on learning strategies during the COVID-19 pandemic - as well as four editions of the Internet Sectoral Overview, dedicated to technologies and inequalities, and focusing on digital divides during COVID-19.

As a laboratory of ideas, Cetic.br|NIC.br engaged in relevant public debates on the digital transformation - 10 webinars organized by the Center and 91 webinars as a guest participant. Throughout the year,

Cetic.br|NIC.br promoted 6 press conferences and held 8 expert meetings, bringing together a network of 316 volunteer experts.

In the field of capacity-building, the main activities were: i) the 11th NIC.br Annual Workshop on Survey Methodology, which highlighted innovation and trends in ICT data production; ii) the “Tech for Good” MOOC; and iii) contributions to the new MOOC “AI and the Rule of Law,” developed in partnership with UNESCO. In addition, technical cooperation with government agencies in Latin America and Portuguese-speaking African countries made it possible to promote evidence-based policy design.

Cetic.br|NIC.br is actively engaged in cooperative initiatives with national and international organizations that play a key role as supporters, conveners and facilitators in the implementation of the 2030 Agenda for Sustainable Development. In 2021, Cetic.br|NIC.br carried out cooperative activities with the following:

- UNESCO Headquarters,
- UNESCO Regional Office for Science in Latin America and the Caribbean,
- UNESCO Field Office Brazil,
- UNESCO Institute for Statistics (UIS),
- UNICEF Headquarters,
- UNICEF Children in Latin America and the Caribbean (LACRO),
- UNICEF Brazil,
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC),
- International Telecommunication Union (ITU),
- World Health Organization (WHO),
- Pan American Health Organization (PAHO),
- UN Conference on Trade and Development (UNCTAD),
- Organization for Economic Co-operation and Development (OECD),
- Inter-American Development Bank (IADB),
- Alliance for the Digitalization of Education in Latin America (ADELA Network),
- Alliance for Affordable Internet (A4AI),
- Centro de Inovação para a Educação Brasileira (CIEB),
- Brazilian government (ministries, regulatory agencies, state and municipal secretariats),
- Academia (national and international),
- Private sector,
- Other civil society organizations (national and international).

Cooperation Networks

In 2021, Cetic.br|NIC.br strengthened its cooperation efforts with government agencies and regional collaboration networks in Latin America and Portuguese-speaking African countries, which made it

possible to promote evidence-based policy design. These efforts, in turn, allow for knowledge exchange, sharing of common frameworks for ICT data collection, and regional comparability.

UN Big Data Regional Hub in Brazil

In 2021 Cetic.br|NIC.br participated as a member of the council and the technical advisory group of the UN Big Data Regional Hub in Brazil²³, working closely with the IBGE, which is a Brazilian NSO and the host of the hub. The hub aims to contribute to advancement in the use of Big Data to improve the production of official statistics, promoting the sharing of knowledge and the development of innovative initiatives in Latin America and the Caribbean. The initiatives planned or already carried out during 2021 were:

- Getting to know what is going on in the Region: Web scraping and surveying NSO.
- Launching the Hub: Activity at the Conference of the Americas.
- Training and fostering the interest of young statisticians in the use of Big Data in official

statistics: organizing a workshops series, "Big Data for Official Statistics".

- Fostering the use of Big Data for official statistics among youth: Participating in lectures and training.
- Supporting research on the use of Big Data and data science: Research on Web scraping (CPI/social media/industries).
- Reviewing methods and practices on Big Data for official statistics: Literature review (academic feature).
- Organizing and hosting seminars and conferences: Portraying what is going on in the Region in using Big Data for official statistics.
- Organizing a series of conferences on relevant issues.

ICT in Health

Cooperation with the Inter-American Development Bank (IADB)

In addition to monitoring the transformations in the health sector, and measuring advances, barriers, and innovations in embracing digital innovations and ICT solutions, Cetic.br|NIC.br offers technical cooperation on these matters. In the framework of the Memorandum of

Understanding signed in 2020 with IADB, the Center undertook technical assistance to the ministries of health of Colombia and Argentina for the design of the first wave of their ICT and Health nationally representative surveys. These projects are still taking place in 2022.

²³ <https://hub.ibge.gov.br/index.htm>

Cooperation with the World Health Organization - Regional Office for Europe

In 2021, Cetic.br|NIC.br was commissioned to coordinate the project “Measuring digital health: Mapping the available frameworks and national surveys worldwide,” in partnership with the Regional Office for Europe of the World Health

Organization (WHO)²⁴. The objective of this project is to map the available frameworks and instruments to measure digital health globally, allowing for the development of future recommendations on the implementation of internationally comparable indicators.

ICT in Education

Knowledge-sharing with African Countries of Portuguese Official Language (PALOP)

Cooperation with Latin American countries has greatly expanded in recent years, as well as with Portuguese-speaking African countries, particularly with actors in the education and innovation ecosystems of these countries, with the exchange of experiences, methodologies, and reciprocal participation in webinars and panels.

Cetic.br|NIC.br supported the translation into Spanish of UNESCO’s recent publication “AI and Education: Guidance for policy-makers,” which is also available in English, Chinese, Arabic and French, and will support its dissemination among policymakers and educational researchers and practitioners in the Latin American and Caribbean region.

ICT and Children

Youth and Gender

In 2021, Cetic.br|NIC.br contributed to the debate on gender inequality in the labor market by developing the chapter “*Juventud, género y brechas digitales en América Latina y el Caribe: avances y deudas pendientes*”²⁵ (Youth, gender and digital inequalities in Latin America and the Caribbean: Progress and pending debts, in free translation), which will appear in the publication *Género*

y juventudes en un entorno desigual: Realidades y perspectivas para América Latina y el Caribe (Gender and youth in an unequal context: Realities and prospects for Latin America and the Caribbean, in free translation), coordinated by the UNESCO Montevideo Regional Office, the Latin American Council of Social Sciences (CLACSO), and El Colegio de México.

Kids Online Networks

Cetic.br|NIC.br participated in the working group meeting of the Kids Online Latin America Network, along with ECLAC officials and UNICEF representatives from the Dominican Republic, and academic researchers from Uruguay, Chile and Costa Rica. The meeting

took place in February 2021 and sought to strengthen methodological experience sharing and advocacy initiatives in the region.

New lines of technical cooperation are available to countries interested in implementing the Kids Online survey.

²⁴ <https://www.euro.who.int/en>

²⁵ https://repositorio.cepal.org/bitstream/handle/11362/39695/S1500718_es.pdf

ICT and Government

ICEGOV 2021

On October 7, a roundtable session organized by Cetic.br|NIC.br, “Digital inclusion, inequalities, and government initiatives during the COVID-19 pandemic in Latin America,”²⁶ took place with the participation of five international experts. The panel debated the implications of the COVID-19 pandemic for digital inclusion and access to public services and social policies in Latin American

countries, particularly for social policies such as education and health.

Speakers included Alejandro Patiño (ECLAC); Professor Lorena Barberia (USP); Professor Maria Alexandra Cunha (FGV); Pablo Orifice (IDB); and Manuella Maia (Cetic.br|NIC.br). Alexandre Barbosa (Cetic.br|NIC.br), was responsible for moderating the roundtable session.

²⁶ <https://youtu.be/yXqVK3-ekaQ>

Dialogue with Stakeholders

ICT as a key cross-cutting technology that impacts multiple sectors requires the involvement of multiple and diverse stakeholders in the development of information and knowledge societies. Dialogue among these stakeholders can be established in many ways: cooperation agreements between institutions; sharing microdata bases; participation in forums and discussion groups; and meetings to present the indicators produced by the Center. In 2021, there were 22 ongoing cooperation agreements with government and international organizations, which, in addition to consolidating long-term cooperation and strengthening the Center's relationships with these organizations, allow the establishment of joint activities, and the sharing of experiences, data and methodologies among institutions. Next, find important actions carried out by the Center in 2021 that allowed for closer ties with multiple and diverse stakeholders throughout the year, reinforcing its commitment to the dissemination of information and knowledge.

Policy Dimension: Digital Economy

In 2021, Cetic.br|NIC.br engaged in pilot international research projects developed by OECD.

One example is the project "Measuring the Internet of Things: Case studies in IIoT." The objective of the project is to gain richer understanding of the uses of the Industrial Internet of Things (IIoT) in the manufacturing sector in Brazil and Germany. The study investigates the main IIoT functions used, and their related impact(s).

Another project is the "OECD-BCG-INSEAD International Survey of Artificial Intelligence in Enterprises." The objective of the study is to support the design and implementation of a new and exploratory survey of Artificial Intelligence (AI) in enterprises. The aim of the survey is to explore why medium and large companies in the manufacturing and ICT sectors "do and do not use AI, as well as the policy and institutional conditions needed to increase the use of AI" (OECD, 2021).

Digital Government

In 2021, Cetic.br|NIC.br was an institutional partner of the Local Online Service Index (LOSI) Pilot Project in Brazil. The study evaluated the availability of digital government services from Brazilian municipalities with more than 500,000 inhabitants. It was carried out by the Center of Studies in Public Administration and Government of FGV. The project was also supported by the following partner international organizations: United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV), and United Nations Department of Economic and Social Affairs (UNDESA).

ICT in Education

In 2021, the Giga Project, led by ITU, UNICEF, and the Broadband Commission Working Group on School Connectivity, with the support of UNESCO, played an even more relevant role in the education area due to the increased demand for connectivity in schools and for the dissemination of access to the

Internet among students and teachers during the COVID-19 pandemic. Cetic.br|NIC.br actively participated in the working groups on the implementation of education policies mediated by technologies conducted by these two projects, contributing with data on the use of these resources in Brazilian education systems, and also with theoretical and methodological knowledge about evaluation and monitoring of policies. Cetic.br|NIC.br also collaborated in the preparation of guiding documents on the subject, such as the Global Declaration on Connectivity for Education, launched by UNESCO in December 2021.

During 2021, Cetic.br|NIC.br also supported UNESCO in projects with Brazil as the object of case studies on assessment of the impact of educational policies, such as the E9 Partnership project. Cetic.br|NIC.br also contributed to national working groups on connectivity policies in schools, such as the Interinstitutional Group on Connectivity in Education (Gice), led by The Innovation Center for Brazilian Education (CIEB) and NIC.br.

ICT in Health

In 2020, the Technical Committee (CT) in Digital Health of the National Education and Research Network (RNP) was launched. It aims to be a forum to study the future of applications, products and services, and aspirations in digital health in several areas of research, development and innovation. Cetic.br was invited to participate in this CT and has contributed more directly, coordinating the group "Accelerating human resources training for digital health practice." In 2021, Cetic.br|NIC.br participated in the development of the report *Vision of the future of digital health*, which presented the main challenges and trends for digital health in Brazil.

Cetic.br|NIC.br participated in the workshop on the Digital Maturity Index (IMDS) organized by the Digital Health Strategy Management Committee of the Ministry of Health. Cetic.br has contributed to the methodology that will be developed to calculate this index and its amplitude, using the experience and indicators of the ICT in Health survey.

Cetic.br|NIC.br established a partnership with the Brazilian Company of Hospital Services (EBSERH), which is responsible for the administration of some of the university hospitals in Brazil that are included in the survey sample. The results were presented at the Digital Health Congress in the panel organized by EBSERH.

Cetic.br|NIC.br signed a cooperation agreement with the National Council of Municipal Health Secretaries (Conasems) that aims to expand the dissemination of the results of the ICT in Health survey with municipalities and guarantee a representative of the agency as a specialist collaborating in the Cetic.br|NIC.br's expert group meetings for the survey consultations, and other contributions.

Measurement and Data Production for Policymaking

In 2021, Cetic.br|NIC.br implemented actions established by an agreement with the Seade Foundation - the statistics agency of the government of the State of São Paulo - to share information, improve research methodologies based on technological innovations, and develop joint research and analysis. In 2021 the agency published technical notes on access to and use of the Internet in healthcare facilities²⁷ and the share of ICT in the regional accounts²⁸.

²⁷ <https://sptic.seade.gov.br/wp-content/uploads/sites/16/2021/09/SPTIC-setembro-2021-contas-regionais-cadeia-produtiva.pdf>
<https://sptic.seade.gov.br/wp-content/uploads/sites/16/2021/03/SPTIC-marco-2021-uso-tecnologias-informacao-comunicacao-estabelecimentos-saude.pdf>

²⁸ <https://sptic.seade.gov.br/wp-content/uploads/sites/16/2021/09/SPTIC-setembro-2021-contas-regionais-cadeia-produtiva.pdf>

COVID-19 Pandemic

As the COVID-19 spread in Brazil, Cetic.br|NIC.br joined the efforts of the Solidary Research Network, formed by researchers from different scientific fields (humanities as well as exact and biological sciences) in Brazil and overseas to help improve standards, calibrate the focus, and improve the quality of federal, state and municipal government policies that seek to respond the COVID-19 crisis, with the aim of helping to save lives. The network²⁹ aims to improve the debate and the work of public administrators, authorities, congressional representatives, journalists, the academic community, businesspersons, and those who are interested in debating the directives and concrete actions that impact the lives of the population. In 2021 the network launched 12 technical notes and participated in several webinars.

Multi-Participative Process: Contributions from Different Sectors of Society

In 2021, Cetic.br|NIC.br engaged in several activities organized by major private sector companies, which are increasingly relevant stakeholders in discussions about the socioeconomic and cultural implications of ICT.

Cetic.br|NIC.br participated in a cycle of meetings of the “Well-Being and Technology Project”, promoted by Facebook, Instagram, Google and YouTube. The meetings brought together national and international experts in the areas of technology, well-being, and childhood to share research and actions aimed at the safety of children online.

The round tables addressed the following topics:

- Sexual exploitation of children and adolescents on the Internet in times of pandemic. June 16
- Well-being and technology: Regulatory discussions for children. June 29.
- Well-being and technology: Mental health and suicide prevention. September 30.

²⁹ <https://redespesquisasolidaria.org/en/>

Producing Knowledge about ICT

The production and sharing of knowledge about themes related to information and knowledge societies are the most important lines of action of Cetic.br|NIC.br. In 2021, the Center actively participated in several academic discussion forums, including presenting survey results and data analyses, debating methodological challenges, promoting thematic discussions, and proposing discussion panels with important stakeholders. Relevant events in which the Center participated in 2021 to present and share what Cetic.br|NIC.br is producing are listed below.

Culture and Technologies

- 11th International Conference on Cultural Policy Research - ICCPR. March 2021.
- II International Congress on Digital Humanities. UNIRIO, Instituto Urca, UFBA ABHD. April 2021.
- Seminar: XVII Enecult - Multidisciplinary Studies in Culture Meeting. UFBA. September 2021.
- CILAC Colloquium: "Artificial Intelligence and Culture - New Challenges for Latin America and the Caribbean." September 2021.

Education and Children

- Presentation of Cetic.br|NIC.br ICT in Education survey to the Basic Education Secretariat of the Brazilian Ministry of Education (MEC). Brasília. January 2021.
- Webinar: "It's official - children's rights apply in the digital world!" 5 Rights Foundation. March 2021.

- Workshop WSIS Forum 2021. Session "Children and the digital transformation of public services: The state of affairs." São Paulo (São Paulo State, Brazil) April 2021.
- Presentation about Cetic.br|NIC.br ICT surveys on Safer Internet Day. NIC.br. February 2021.
- Roundtable on the Manifesto, "The Case of Better Governance of Children's Data: A Manifesto." UNICEF. February 2021.
- 1st International Online Congress on Contemporary Education. Panels: "Gender digital inequalities in the labor market" and "Reflections and provocations on hybrid education in public Basic Education in Brazil." COIEC. July 2021.
- Workshop: "Protection of Children and Adolescents in a Digital Environment". IAMCR, ITS Rio and Instituto Alana. July 2021.
- [FIB11] "Peer education and digital citizenship: Strategies for remote teaching with children and adolescents." NIC.br. July 2021.
- Expert group meeting: "Kids Online Network Colombia team". August 2021.
- Public hearing by the Chamber of Deputies to debate the use of ICT in university education. Brazilian Chamber of Federal Deputies. August 2021.
- Child well-being framework consultations. Workshop: "Responsible innovation with technology and ethics for children and adolescents." Sydney University, UNICEF, LEGO Group and Cetic.br|NIC.br. September 2021.

- VIII Education Symposium - V International Meeting on Public Policies in Education. Panel: "Education, digital technologies and inequalities." UNESP and Uni-FACEF. September 2021.
- Estadão Education Summit. Panel: "Technology: The turn to the main ally of education." Estadão. September 2021.
- VII Web Curriculum - Public policies, digital education and welcoming diversity. Panel: "Public policies, digital education and welcoming diversity." PUC São Paulo. September 2021.
- Webinar: "Future challenges of education in Brazil in the post-pandemic period." FGV. October 2021.
- Seminar: "Education in Latin America and the Caribbean: The prolonged crisis as an opportunity for restructuring." ECLAC. October 2021.
- Co-creation workshops: "Educational digital transformation in Latin America and the Caribbean." CIEB, IDB and Omar Dengo Foundation. October 2021.
- 56th Annual Meeting of the Brazilian Dental Education Association. Panel: "Internet governance in Brazil and hybrid learning." ABENO. October 2021.
- Live Data Privacy Brazil: Education and Technology. Panel: "Education and technology: Possibilities and limits of data use." October 2021.
- Workshop: "Training educators in digital human rights." FGV São Paulo and NIC.br. November 2021.
- Workshop: "Educational policy dialogue: Digital policies in education in Latin America: A comparative regional study". IIPÉ-UNESCO. November 2021.
- Cycle of Webinars of the Ministry of Education of Cape Verde. Panel: "Gamification in practice: The art of motivating students." November 2021.
- Event: 6th Symposium on Children and Adolescents on the Internet. Panel: "Platformization of education". FGV Direito SP, Instituto Alana and SaferNet Brasil. São Paulo. November 2021.
- UNICEF Global Forum on AI for Children. Panel: "Ensure inclusion of and for children." UNICEF. December 2021.
- UNESCO AI in Education Conference. Webinar: "AI and education: Guidance for policymakers." December 2021.
- VII WebCurrículo: "Networks, territories and diversities." Opening table and panel: "Networks, Artificial Intelligence and platformization." PUC São Paulo. November 2021.
- The 2nd International Congress on Education and the Teaching Profession. Panel: "The impacts of digitalization of teaching and learning processes on the teaching profession and on the pedagogical practices of teachers in public and private schools." University of Brasília (UnB) and Center for Interuniversity Research on Teacher Education and the Teaching Profession (CRIFPE). December 2021.

E-Government

- CONIP Public Management 2021. Session: "Digital citizenship: the new Brazilian digital government law". São Paulo June 2021.
- 26th World Congress of Political Science (IPSA). Panel: "Global practices for smart cities and public policy." July 2021.
- Workshop: "Access to digital government services in Brazil." IdeaGov, São Paulo State Government. July 2021.
- 1st Virtual Week GIGAPP. Session: "IV Industrial Revolution: Initiatives and challenges in the use of digital tools in Latin American public administrations." São Paulo September 2021.
- Webinar: "Challenges faced by smart cities in Brazil." FGV. October 2021.

- WebMedia 2021. Panel: "Open data: Highlighting the importance of accessibility indicators and open data on the Brazilian governmental Web." November 2021.
- IGF 2021. Open Forum #10: "AI and the rule of law in the digital ecosystem." December 2021.

Health and Technologies

- Presentation of Cetic.br|NIC.br ICT in Health survey. Cooperation of Denmark and Brazilian Ministry of Health. January 2021.
- Seminar: "ICT in Health survey 2019: methodology and results" Universidade do Porto/CINTESIS. February 2021.
- Planetary Health Annual Meeting and Festival. Panels: "Digital technologies and access to equitable healthcare: Available data and the future of telehealth adoption in Brazil" and "Digital inclusion and the response to COVID-19: New evidence and policy issues." April 2021.
- VIII Regional School of Computing Applied to Health. Panel: "What is the role of technology in planetary health." August 2021.
- 10th Brazilian Congress of Telemedicine and Telehealth. Panel: "Computerization of university hospitals of the EBSEH." CBIS. November 2021.
- II National Forum on Health Data. Panel: "Partnerships that strengthen the Digital Health Strategy for Brazil." November 2021.

Households and Digital Inclusion

- Working group meeting on "Mobile phone data." UN Global Working Group on Big Data. February 2021.
- Presentation on the paper "Gendering the digital divide: The use of electronic government services and implications for the digital gender gap." FGV. April 2021.

- SDG 16 Conference. Session: "Digital governance in a post-pandemic world." UNDESA. April 2021.
- CILAC Forum 2021. Panel: "Ethics and AI." April 2021.
- Webinar: "Contemporary digital divide." FGV CEAPG. June 2021.
- WTR PoP-RN Network Technologies Workshop. Presentation: "Digital divide, telework and remote teaching." August 2021.
- WTR PoP-RO Network Technologies Workshop. Presentation: "Digital divide, telework and remote teaching". August 2021.
- Seminar EnANPAD: "Smart cities and communities." October 2021.
- Brazil Internet Governance School (EGI). Presentation: "Overview of digital inclusion in Brazil." November 2021.
- Expert meeting for the Digital Agenda Group (GAD) Mercosul. November 2021.

Productivity and the Digital Economy

- G20 Working group on Measuring the Digital Economy. February 2021.
- Webinar debate: "Digital and financial divide." FGV. May 2021.
- Webinar Valin Week: "Tech food edition." June 2021.
- Working group meetings on measuring AI in companies. OECD. April, October and November 2021.
- CPRLATAM Conference, in coordination with Congreso Latinoamericano de Transformación Digital (CLTD2021). Presentation: "Pago contra entrega: comercio electrónico B2C de pequeñas empresas en Brasil (Payment on delivery: B2C e-commerce of small businesses in Brazil)." October 2021.

- Participation in the USP program “Dialogues # 48 – 5G technology and the implications for society.” USP. October 2021.
- International Seminar on Artificial Intelligence: “Are workers afraid to be replaced by Artificial Intelligence? A comparative multilevel analysis between Brazil and 30 European countries.” USP. December 2021.
- Webinar: “11th Week of Internet Infrastructure in Brazil.” NIC.br. December 2021.
- GF WS #86: A Toolkit to Measure and Shape an Inclusive Digital Economy. December 2021.
- Online event: “Machine Learning from a statistical perspective.” European Master in Official Statistics. May 2021.
- Online event: “What will be the new normal for statistical training?” World Data Forum. May 2021.
- Webinar: “Planning and implementing household surveys under COVID-19.” ENCE. May 2021.
- Online event: “Meeting of women in statistics and data science.” UFRJ. May 2021.
- Online lecture: “Presentation of statistical methods in scientific research.” UFPR. May 2021.

Survey Statistics and Methodological Events

- Online event: “Positioning household surveys for the next decade.” UN Stats. February 2021.
- Online event: “New techniques and technologies for statistics (NTTS).” European Commission. March 2021.
- Online event: “Data validation in national and international context: Where are we, and where are we going?” European Master in Official Statistics - EMOS. March 2021.
- Online event: “Governance innovation for cross-border data flows.” Internet & Jurisdiction Policy Network and METI. April 2021.
- Online event: “Use of innovative data sources to measure SDG progress on the environment.” UN World Data Forum webinar. April 2021.
- ITU working group on Mobile Phone Data. April 2021.
- Online event: “Cognitive interviewing for testing surveys.” European Commission on Official Statistics. April 2021.
- Online event: “UNICEF data collection webinar series - social media polling with Faruk Kreuter.” UNICEF. April 2021.
- Online event: “The 2021 joint program in survey methodology distinguished lecture by Professor Rod Little.” University of Maryland. April 2021.
- Online event: “Innovations in measuring hard-to-count populations.” UN Stats. June 2021.
- Online event: “Poverty mapping using small area estimation.” Joint ECLAC-IS GHS webinars. July 2021.
- Online event: “Conference in memory of Fred Smith and Chris Skinner.” IASS. July 2021.
- Webinar: “Weighting a non-probability web sample survey carried out during the pandemic.” ISI World Statistics Congress 2021. July 2021.
- Online event: “Building a sample frame of SMEs using patent, search engine, and website data.” International Association of Survey Statisticians Webinar. September 2021.
- Presentation: “Measurement of digital development.” ITU. September 2021.
- Presentation: “Training in research planning and questionnaires.” USP. September 2021.
- Presentation: “Models in rescue action: Model-based methods for inference with non-probabilistic sample data.” XVII Escola de Morelos de Regressão 2021. ENCE. November 2021.
- Webinar: “Collaborative geoinformation initiatives in Latin America.” UN Big Data Regional Hub in Brazil, IBGE, Cetic.br|NIC.br, INEGI Mexico and UFPR Brasil. December 2021.

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Ribeiro, M. M., Macaya, J. F. M., & Coelho, I. B. (2021). Capacidades estatais em tecnologias de informação e comunicação dos municípios brasileiros. In E. J. Grin, D. J. Demarco & F. L. Abrucio (Eds.), *Capacidades estatais municipais: O universo desconhecido do federalismo brasileiro* (pp. 248-286). Editora da UFRGS/CEGOV.

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About Cetic.br

The Regional Center for Studies on the Development of the Information Society

Cetic.br|NIC.br was created in 2005 with the mission of producing data on access to information and communication technologies (ICT) and their use and appropriation in Brazilian society. The data collected is used in the design and monitoring of public policies that contribute to the development of the Internet, supporting digital transformation.

In 2012, Cetic.br|NIC.br became a UNESCO Category 2 Centre, the first of its kind dedicated to the development of information and knowledge societies. The Center reports to the Communication and Information (CI) Sector, one of five areas covered by UNESCO. It contributes to the Organization's strategic objectives, strengthening its efforts to monitor the building of information and knowledge societies. Cetic.br|NIC.br cooperates with countries in Latin America and Portuguese-speaking countries in Africa.

“In recent years, we have been witnessing the deep impacts provoked by the adoption of information and communication technologies (ICT) in our lives and how they can be powerful enablers for human rights and empowerment. Producing data on these transformations is essential for designing effective public policies for building information and knowledge societies. In this regard, Cetic.br|NIC.br has been working collaboratively with UNESCO for over a decade to extend its activities to Latin America and Portuguese-speaking countries in Africa, strengthening the importance of ICT evidence-based policymaking in these regions. This longstanding collaboration with UNESCO reinforces the Center's key role in producing evidence and knowledge on ICT which have notably contributed for the consolidation of more inclusive societies.”

Ambassador Santiago Irazabal Mourão

President of the 41st General Conference of UNESCO
Permanent Delegate of Brazil to UNESCO

Mission

Cetic.br|NIC.br's mission is to “contribute to building inclusive knowledge societies through information and communication technologies” in Latin America and Portuguese-speaking countries in Africa. The Center, which is responsible for the periodic production of indicators and statistics on the availability of ICT in Brazil, also conducts training programs in research methodologies in the regions in which it operates.

Source: Cetic.br, 2021 - <https://www.cetic.br/en/sobre/>

“Cetic.br|NIC.br has greatly contributed to the development of indicators, and to the collection and analysis of data that enables policymakers to foster the opportunities and mitigate the risks that digitalization brings. Beyond its expert role in statistical data production, the Center has been a major partner in building capacities of UNESCO Member States, including reflections on the impact of emerging technologies such as Artificial Intelligence. The Center has made important contributions to the development of the Internet Universality Indicators and to Massive Open Online Courses (MOOCs) on The Role of ICTs in achieving the Sustainable Development Goals and on Artificial Intelligence and the Rule of Law, which have served Member States globally.”

Tawfik Jelassi

UNESCO Assistant Director-General for Communication and Information

Main Lines of Action

Cetic.br|NIC.br strives to contribute to discussions about the role of ICT data for public policies. It creates opportunities for key stakeholders to share their findings on the intersection between society and digital technologies and implications for the building of information and knowledge societies.



ICT statistical data production center & Knowledge center

Cetic.br|NIC.br aims to produce data through quantitative and qualitative research on ICT and to disseminate information and knowledge, including survey methodologies, indicators, data analyses, and ICT publications that contribute to the building of inclusive information and knowledge societies.



Capacity-building on survey methodology for the production and use of ICT statistics

This line of action focuses on survey methodology capacity-building programs for the production of ICT-related statistics and indicators. These programs aim to improve the availability and quality of ICT statistics and foster the production of internationally comparable data on access to and use of digital technologies. This line of action is also intended to raise awareness about the role of data in evidence-based policymaking for developing information and knowledge societies.



Laboratory of ideas and methodological innovation

Cetic.br|NIC.br also serves as a multistakeholder platform for sharing experience on survey methodologies. It encourages debate among key stakeholders about the challenges inherent in measuring ICT and about emerging issues related to knowledge societies. Cetic.br|NIC.br promotes public debate, lectures, and discussion panels among renowned experts from government, academia, international organizations, and civil society, with a view to exploring the socioeconomic implications of ICT. The Laboratory of Ideas guarantees transparency and legitimizes the Center's work.



Culture and Ethics on the Internet

The social dimension of the Internet has drawn attention to topics such as culture and ethics. The Center not only produces data on ethics and the Internet, privacy, and online safety, it also engages in workshops and the production of guidelines to raise awareness about these issues among parents, educators, and users in general. The ICT in Culture survey also reinforces the Center's commitment to studying the intersection between the Internet and culture.

Cetic.br's Vision of the ICT Statistical Data Production Ecosystem

Digital technologies are transforming societies by spurring profound social and economic changes. New disruptive technologies such as AI, robotics, the Internet of Things, cloud computing, biotechnology, and other technologies create new challenges in terms of measuring their adoption and use, but at the same time, they offer numerous new alternative data sources that can be used in the data production process. In particular, Big Data from administrative sources in government and the private sector can be an effective instrument for statistical systems. Countries are under increasing pressure to produce high-quality data in a timely manner to monitor national digital transformation policies and progress toward the Sustainable Development Goals (SDGs). Enormous amounts of data that are available at ever-increasing rates, new data sources, and institutional arrangements have reshaped the production of ICT data and statistics. Big Data, along with traditional sources such as administrative and survey data, has emerged as a promising paradigm, shedding light on private data sources and adding complexity to the ICT data ecosystem.

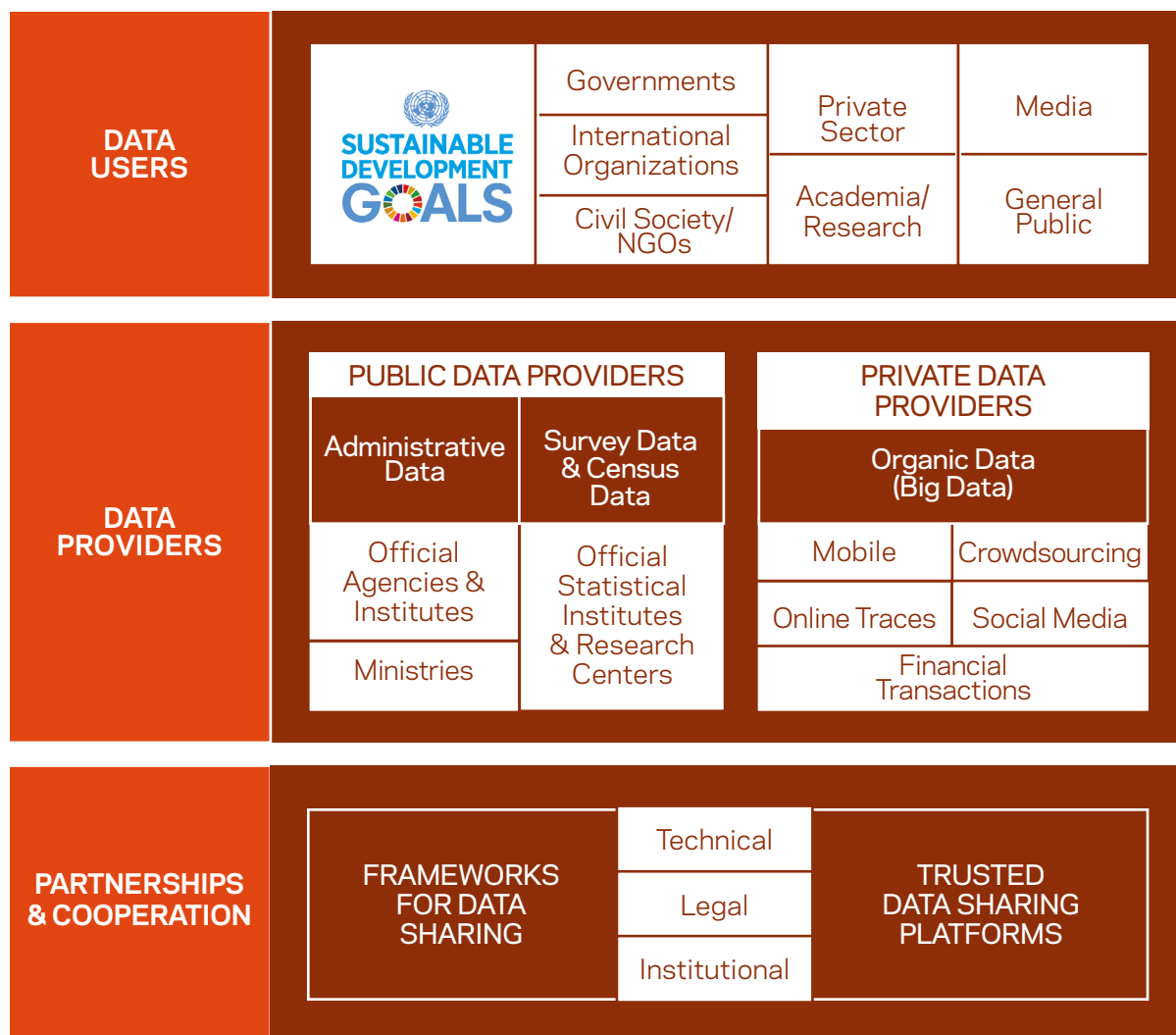
A wide range of data providers must collaborate to produce relevant data for monitoring progress towards the SDGs. And traditional national statistical agencies may not be able to provide timely, reliable, and well-disaggregated data that meet policy design and monitoring needs. Cetic.br|NIC.br has developed a new layered model for ICT data production (see Figure 1) that brings new data providers and data sharing opportunities to the existing ecosystem.

“*In the digitized world, data are continuously generated through smart phones, smart cards, satellites or mobile apps. These new data sources represent a clear opportunity to the statistical community, and the data community in a broader sense, to innovate and provide better insights with high-frequency and very granular information that previously would not have been possible. In this context we have established the United Nations Global Platform with regional hubs all over the world working together to educate, collaborate, and develop and test new methods and applications using a variety of data sources. Cetic.br|NIC.br cooperates with the Regional Hub in Brazil, participates both in its Advisory Group and Technical Board and plays an important role in this new data ecosystem, especially through promoting and sharing of knowledge on innovative methodologies for ICT statistics production.*”

Ronald Jansen

Assistant Director | Chief, Data Innovation and Capacity Branch
United Nations Statistics Division (UNSD)

FIGURE 1: STATISTICAL DATA PRODUCTION ECOSYSTEM



Source: Cetic.br (2021)

The top layer consists of data users and their specific needs. Statistical data is useful to all stakeholders (governments & policymakers, international organizations, civil society organizations, the private sector, academia, the media, and the general public) and will contribute to the design of new policies and products, conveying messages for raising awareness, and producing studies and academic research.

The middle layer consists of traditional national statistical systems and administrative data from governments (Public Data Providers) and a wide range of new private-sector data sources (Private Data Providers).

The bottom layer represents new data-sharing opportunities through partnerships supported by trusted data platforms and agreements. These platforms aim to mitigate challenges faced by data producers who are using privately owned data sets, enabling secure use in a trustworthy manner in compliance with personal data protection regulations. The trusted data collaboratives concept was adopted by the United Nations Statistical Division (UNSD) in 2017, at the 4th International Conference on Big Data for Official Statistics.³⁰ It addresses the use of Big Data and its integration with other sources, such as administrative data,

³⁰ This conference took place in Bogota, Colombia, in November 2017. (<https://unstats.un.org/unsd/bigdata/conferences/2017/default.asp>)

geospatial data, and traditional survey and census data.

The diversity of relevant stakeholders from the public and private sectors, who have great potential for production of ICT data and statistics, will require the development of appropriate technical, legal, and institutional frameworks. Public and private data providers will need to conduct technical and commercial negotiations to enable data sharing.

Interacting directly with various data users, Cetic.br|NIC.br plays a key role in the new ecosystem and in identifying new ICT data needs. The Center also has close ties with national statistical offices and other data-

producing institutions in Latin America and Portuguese-speaking countries.

In Brazil, Cetic.br|NIC.br works in close collaboration with the National Telecommunications Agency (Anatel), a national regulatory agency; IBGE; ENCE; and MCTI; and other relevant ministries in areas such as education, health, and culture. Besides cooperating with different levels of government, Cetic.br|NIC.br also works with academia, international organizations, and civil society organizations, and is able to produce sound, up-to-date data for policymaking and research.

Data Production Process at Cetic.br|NIC.br An End-to-End Quality Approach

Cetic.br|NIC.br's data production process is based on best practices outlined by national centers of excellence and international statistical quality assurance frameworks. The Center has developed an end-to-end quality approach that includes every phase of the process, from planning to dissemination and evaluation. These processes are aligned with processes at levels 1 and 2 as defined by the *Generic Statistical Business Process Model - GSBPM 5.1* (UNCE, 2019)³¹ and follow the recommendations of the *United Nations National Quality Assurance Frameworks Manual for Official Statistics* (UNDESA, 2019)³². The GSBPM is a sound and robust framework that defines a set of well-defined processes to help statistical organizations produce quality statistics. It provides harmonized terminology, process quality assessment, and improvement. This set of processes includes specification of needs,

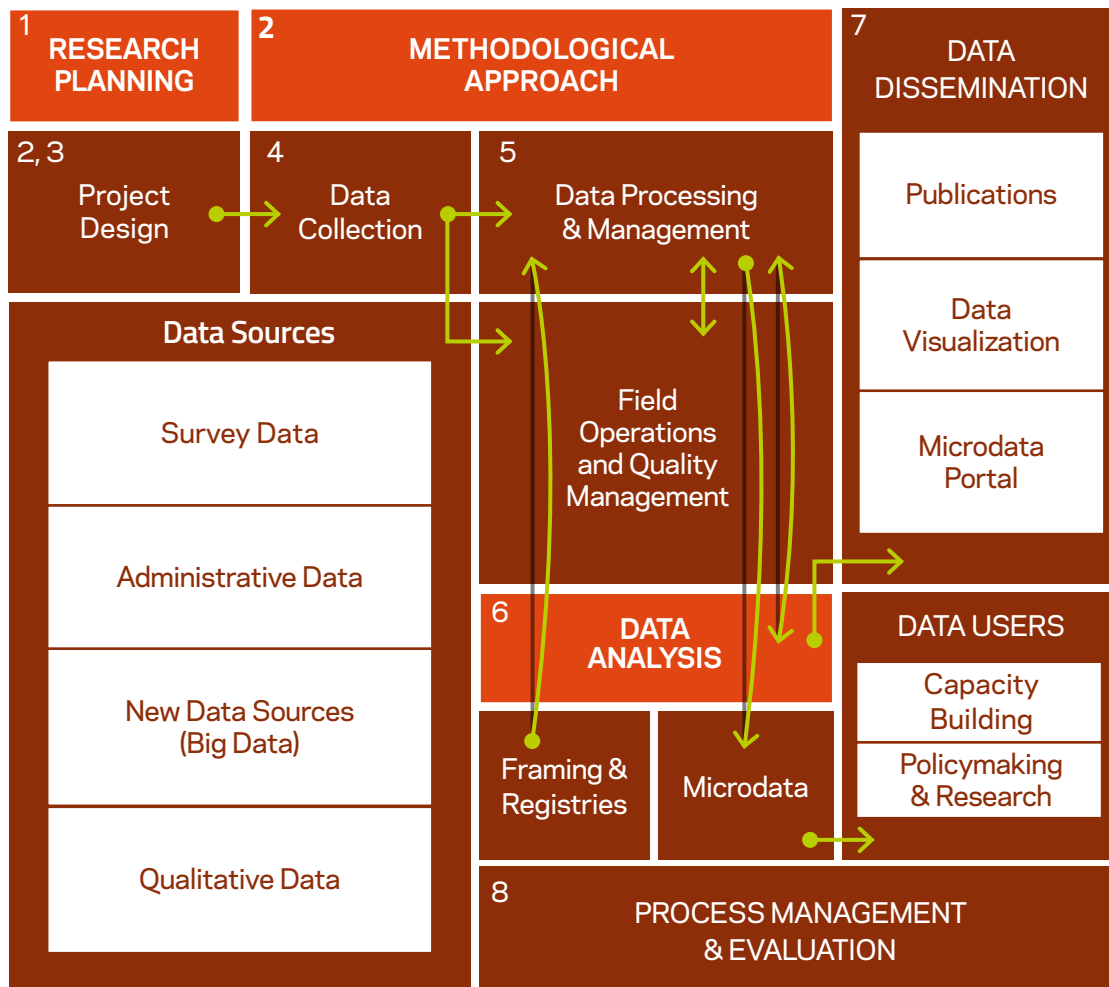
design, building, data collection, processing, analysis, dissemination of products, and evaluation. Cetic.br|NIC.br is a world-renowned reference for ICT data production. Its work is supported by a multistakeholder group of experts whose invaluable contributions during the planning and data analysis stages provide legitimacy and enhance transparency.

Data production macro phases are summarized in Figure 2. Cetic.br|NIC.br has optimized resources and fostered innovation, strengthening links between data users and producers. The process involves an approach that engages stakeholders from various sectors throughout the critical phases. Experts participate in the planning phase, defining methodological approaches and indicators, and in the data analysis phase of the data production process. Methodological rigor and transparency are positively correlated with quality data production.

³¹ For more information on the *Generic Statistical Business Process Model - GSBPM 5.1*, see <https://statswiki.unece.org/display/GSBPM/GSBPM+v5.1>

³² For more information on the *United Nations National Quality Assurance Frameworks Manual for Official Statistics*, see <https://unstats.un.org/unsd/methodology/dataquality/>

FIGURE 2: **CETIC.BR'S DATA PRODUCTION PROCESS**



NOTES:

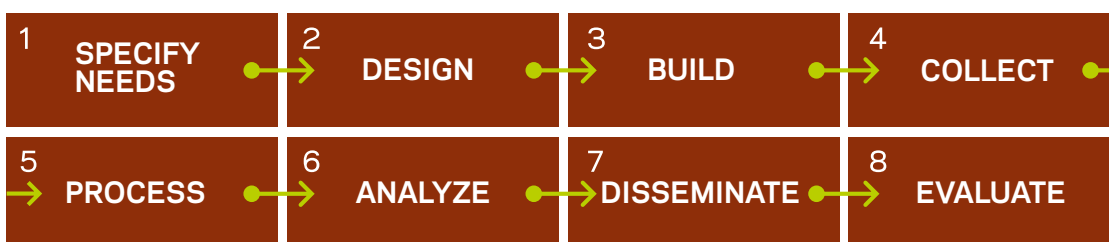
A) ■ 1, 2, 6 Multistakeholder engagement:

These processes rely on multistakeholder groups made up of experts from government, international organizations, academia and research institutes, private sector and civil society organizations.

B) ■ 3, 4, 5, 7, 8 GSBPM phases:

Processes aligned to levels 1 and 2 of the GSBPM Version 5.1 (Please see Note C).

C) Level 1 of the GSBPM as defined by United Nations Economic Commission for Europe - UNECE (Version 5.1, January 2019).*



Source: Cetic.br (2021)

Source: <https://statswiki.unece.org/display/GSBPM/GSBPM+v5.1>

Cetic.br|NIC.br’s methodological approach spans all phases of every research and survey project, from planning to data analysis and sharing. It guides decisions about quantitative and qualitative methodological strategies, framing, sample design and selection, data collection tools, questionnaire design and testing, and field control.

A summary of data types and collection strategies is shown in Table 1. The probability sample design and selection for all quantitative survey projects rely on data sources from official registries that represent the populations of interest. The Center also collects data through non-probability sample surveys weighted considering innovative methods, such as pseudo-weighting.

Cetic.br|NIC.br’s surveys are designed to guarantee uniform data collection and an

understanding of concepts across interviewers, interviewees, and field supervisors. Guidelines, content, and methodological definitions are crucial to the training of field staff. Research teams monitor each data collection step. Quality control guides every action, ensuring accurate results.

Alternative data sources such as Big Data and administrative data are increasingly being used to complement traditional survey data in the production of public statistics. Unstructured data such as data extracted by web scraping tools is also being incorporated in the process. Cetic.br|NIC.br also increasingly uses case studies, focus groups, and in-depth interviews for qualitative studies of how digital technologies impact society.

TABLE 1: METHODOLOGICAL APPROACH & DATA COLLECTION STRATEGIES

APPROACH	QUANTITATIVE		QUALITATIVE
	STRUCTURED <i>(Designed Data)</i>	UNSTRUCTURED <i>(Organic Data)</i>	
TYPE OF DATA	Probabilistic and non-probabilistic survey data	Big Data Sensor & transaction data Web data	Convenience sample <i>(qualitative data)</i>
DATA COLLECTION STRATEGIES	Structured interview* Secondary data use <i>(data sharing agreements)</i>	Data analytics tools Web scraping	Cognitive interviews Focus groups In-depth interviews Case studies

*TYPES OF INTERVIEWS BEING CARRIED OUT BY CETIC.BR:

CAPI: Computer-assisted personal interviewing;
CATI: Computer-assisted telephone interviewing;

CASI: Computer-assisted self-interviewing;
CAWI: Computer-assisted Web interviewing.

Source: Cetic.br (2021)

Data dissemination and capacity-building programs are two important elements of Cetic.br|NIC.br’s data production process. Cetic.br|NIC.br regularly publishes reports on the ICT survey projects, offers a data visualization portal, and provides microdata to policymakers and researchers. Cetic.br|NIC.br also offers

capacity-building programs on quantitative and qualitative methodologies used for the production of ICT-related statistics. These programs address theoretical and practical concepts, stimulating debate among researchers, policymakers, and representatives from the private sector, civil society, and international organizations.

Structure and Functions

As shown in Figure 3, Cetic.br|NIC.br’s structure includes four areas: ICT survey project management; quantitative methods; qualitative methods and sectoral studies; and process and quality management.

Under this structure, Cetic.br|NIC.br publishes periodic demand-side ICT data

based on stand-alone surveys (households, businesses, e-government, schools, healthcare facilities, cultural institutions, and non-profit organizations) and sectoral studies on ICT and the Internet. It also looks at supply-side indicators, such as through a nationwide survey on Internet service providers (ISPs).

FIGURE 3: **STRUCTURE AND FUNCTIONS**

ICT SURVEY PROJECT MANAGEMENT	QUANTITATIVE METHODS	QUALITATIVE METHODS & SECTORAL STUDIES	PROCESS & QUALITY MANAGEMENT
<ul style="list-style-type: none"> ▶ National ICT Surveys (10 thematic areas) ▶ Methodological Guidelines for Statistical Production 	<ul style="list-style-type: none"> ▶ Sample Design & Selection ▶ Data Processing ▶ Data Visualization ▶ New Methods & Big Data 	<ul style="list-style-type: none"> ▶ NIC.br Sectoral Studies ▶ Internet Sectoral Overview ▶ Ad Hoc Qualitative Research 	<ul style="list-style-type: none"> ▶ Process Management ▶ Continuous Improvement & Quality Management ▶ Workshops & Events
PUBLICATION & DISSEMINATION STRATEGIES			
LABORATORY OF METHODOLOGICAL INNOVATION			
INTERNATIONAL COOPERATION NETWORKS			

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