Internet Sectoral Overview

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Data collaboratives and data sharing

Data collaboratives: Enabling a healthy data economy through partnerships[1]

By Stefaan G. Verhulst[2]

Introduction

When did our current era begin? One plausible start date is September 9, 2016. That is when the total amount of Internet traffic exceeded one zettabyte — officially inaugurating what some have called the Zettabyte Era (or, alternatively, the Zettabyte Zone).

The scale boggles the mind and is a testament to the rapid datafication of our society. A zettabyte is 10 to the power of 21 bytes — one trillion gigabytes. If the gigabytes in a zettabyte were broken down into meters, then one zettabyte would cover 150,000 times the distance of the Amazon. If a gigabyte were a brick, a zettabyte would be equivalent to 258 Great Walls of China (3,873,000,000 bricks) (Barnett, 2016).

The datafication of virtually every aspect of our private and public lives presents both opportunities and challenges. Among the most important of these challenges is the emerging problem of data asymmetries — the uncomfortable reality presented by scarcity amid a time of unprecedented plenty. Although our society is awash in data, it is increasingly clear that data and its benefits are not equally distributed. Instead, data flows have grafted themselves onto existing, and deeply entrenched, inequalities in our society, in many cases, exacerbating them.

Overcoming data silos is key to addressing these data asymmetries and promoting a healthy data economy. This is equally true of silos that exist within sectors as it is of those among sectors (e.g., between the public and private sectors). Today, there is a critical mismatch between data supply and demand. The data that could be most useful rarely gets applied to the social, economic, cultural, and political problems it could help solve.

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[1] Edited version of the homonymous work published by the Center for the Governance of Change, of the IE University. Available at: https://static.ie.edu/CGC/10_Verhulst_DataCollaboratives_2023.pdf

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Photo: Personal archive

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The case for collaboration: Big Data, datafication, and data asymmetries

This section seeks to make a case for why more — and better — collaboration is necessary to address data asymmetries across society. Beginning with a general overview of the process of datafication, it argues that an era of plenty is, paradoxically, also marked by scarcity, silos, and asymmetries. These challenges are pervasive and may be exacerbating. They draw attention to the urgent need for more sharing through data collaboratives and other mechanisms.

BIG DATA

To understand the Zettabyte Era, it is useful to begin with the concept of Big Data. The term has in recent years gained increasing currency as a way of describing a cross-sectoral phenomenon resulting from widespread digitalization. Typically, it is understood to refer to a quantitative phenomenon — i.e., characterized by the proliferation or abundance of data. However, Big Data extends beyond mere bigness; understanding its related properties can also help us understand the phenomenon of datafication.

Many competing definitions of Big Data exist, but there is widespread agreement that it cannot simply be defined by size or volume.[3] Mike Loukides (2010), for example, argues that the "big" in "Big Data" is a "red herring." He points out that both the public and private sectors have long handled large datasets and argues that "Big Data" must be understood as occurring when the size (or amount) of data itself becomes part of the problem.

DATAFICATION

The process of datafication emerges directly from the phenomenon of Big Data. Datafication can be said to exist on a foundation of Big Data. In this sense, the traits outlined above are critical to the notion of datafication, yet they do not capture the full phenomenon.

Understanding some of the unique drivers and characteristics of datafication can help us better understand some of the resulting asymmetries and, therefore, the need for more sharing.

DRIVERS OF DATAFICATION

The emergence of datafication has been enabled by numerous factors, including changes:

- In the way data is collected, including a proliferation of digital sensors and personal digital devices, resulting in ever-widening streams of "digital exhaust" or "data exhaust" (Neef, 2014; George et al., 2014);
- in the way data is stored, including the rise of cloud computing and (virtually) unlimited memory;

[3] See, for instance, Bradford Cross, "Big Data is less about size, and more about freedom," TechCrunch (2010). Available at: http://techcrunch.com/2010/03/16/big-data-freedom/

- in computation and analytic capacities, driven by advances in computational and data science, and the rise of Artificial Intelligence (AI), machine learning, and new methods of data visualization;
- in the use of and reliance on data and data insights, by businesses and the public sector and the accompanying rise of evidence-based decision-making.

CHARACTERISTICS OF DATAFICATION

The concept of datafication is often discussed primarily as a commercial phenomenon, and its value as such is undeniable. It is important to recognize, however, that the value of datafication extends far beyond what is simply monetizable — which has important ramifications for the era in which we are living. As Mejias and Couldry (2019, p. 3) argue, datafication has also resulted in "the transformation of human life into data through processes of quantification," which, the authors further argue, has "major social consequences [for] disciplines such as political economy, critical data studies, software studies, legal theory, and — more recently — decolonial theory." In this sense, datafication can be understood as a fundamentally social, cultural, and sociological phenomenon.

Three key features of datafication are worth highlighting, as they help us understand how data plenty has led to deeply entrenched asymmetries and why more data sharing is essential:

- Datafication is all-pervasive, which means it permeates and emanates from virtually every aspect of citizens' lives. Sometimes referred to as a process of "life mining" (van Dijck, 2014; Weerkamp & de Rijke, 2012). Datafication emerges from the data trails left behind by citizens' use of social media, sensors, and personal devices like telephones and GPS equipment, as well as various other nodes on the Internet of Things (IoT).
- The resulting "exhaust trails" are, as a result, deeply socially contextualized. Reflecting virtually our entire social lives, they, by extension, contain our social, economic, and political patterns. Datafication therefore effectively involves digitalizing and building a quantifiable map of social exclusion. As Mejias and Couldry (2019, p. 3) argue, many analyses of datafication explain its nature and significance "in terms of its relationship to time, context, and power."
- All of this, in effect, means that our data ecology is today profoundly reflective of our social asymmetries. Like much technology and science in general, data is often normalized and presented as neutral. As scholars have pointed out, however, data results in "nothing less than a new social order, based on continuous tracking, and offering unprecedented new opportunities for social discrimination and behavioral influence" (Couldry & Mejias, 2018, p. 336). Furthermore, data does not simply contain an imprint of existing hierarchies and inequalities: It also perpetuates them. These asymmetries and patterns of exclusion explain the importance of breaking down data silos and increasing data sharing.

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DATA ASYMMETRIES

Much attention has been paid in recent years to the challenges (or negative externalities) associated with datafication (Micheli et al., 2020). The problems commonly highlighted include those related to "dataveillance" (Mai, 2016), the emergence of "surveillance capitalism" (van Dijck, 2014), and data extraction without consent (Sadowski, 2019). In addition, scholars have written about the risks of "data colonialism" (Couldry & Mejias, 2018) and threats to individual autonomy and dignity (Mejias & Couldry, 2019; Krishnamurthy, 2019; Lee et al., 2019; Lu et al., 2019). As noted, however, data asymmetries stand out as among the most critical of externalities.

Data asymmetries often result from data hoarding or the "industrial complex" (Flyverbom et al., 2019, p. 1) that exists behind datafication. They occur whenever there exists a divide or disparity in access to and re-use of data (Dodds, 2017; Organisation for Economic Co-operation and Development [OECD], 2019; World Wide Web Foundation, 2015). The nature of this divide can take many forms, depending on the relationship between data holders, data subjects, and users.

Mejias and Couldry (2019, p. 1) argue that "fundamental to [an understanding of datafication] is the analysis of the intersection of power and knowledge." As we have demonstrated, many of our society's patterns of exclusion and inequalities are therefore refracted through patterns of access in the wider data ecology. If, as scholars like Thomas Piketty (2022) and others have argued, overcoming inequalities is the defining challenge of our era, then inequalities within the data ecology represent a particularly troublesome aspect of that challenge in its ability to enable or otherwise perpetuate other inequalities.

Toward solutions: Data sharing and the potential of data collaboratives

DATA COLLABORATIVES

Despite the clear benefits of data sharing, backed up by a growing body of evidence, too much data remains in silos. There are many reasons for this bottleneck, including a search for competitive advantage, regulatory caution, and general distrust of sharing and data reuse. To an extent, the overarching problem remains a paucity of credible models.

In recent years, one model, that gained new valence, has been used with increasing frequency by both public and private sector entities: Data collaboration. Much of our work has focused on the potential of this mechanism. In the remainder of this article, we focus on data collaboratives: Their potential, their challenges, and pathways to implementation.

WHAT ARE DATA COLLABORATIVES?

The term data collaborative refers to an emerging model of collaboration in which participants from different sectors — including private companies,

research institutions, and government agencies — exchange data to help solve public problems. While much commentary is today focused on the glut of available data, in fact, as we have noted, data supply and demand are often poorly matched: Those who most need data, or who could most productively use it, often do not have access to it. Thus, one of the key challenges of our era lies in a persistent failure to reuse data responsibly for the public good. This failure results in tremendous inefficiencies and lost potential. Data collaboratives address these shortcomings by drawing together otherwise siloed data and a dispersed range of expertise, matching supply and demand, and ensuring that relevant institutions and individuals are using and analyzing data in ways that maximize the possibility of new, innovative social solutions.

MODELS FOR DATA COLLABORATIVES

As we move from theory to the practice of data collaboratives, certain patterns are becoming clearer. Data collaboratives are not a uniform phenomenon; especially as they spread around the world and sectors, emerge variations. It is important to consider these patterns and variations in order to better understand what works (and what does not) when it comes to data sharing. In our research, we observe six different types of data collaboratives, each offering their own lessons (and cautions) for the goal of data sharing:

- Public interfaces: Companies provide open access to certain data assets, enabling independent uses of the data by external parties. Current approaches include: Application Programming Interface (API) and data platforms.
- Trusted intermediary: Third-party actors support collaboration between private-sector data providers and data users from the public sector, civil society, or academia. Current approaches include: Data brokerage and third-party analytics projects.
- Data pooling: Companies and other data holders agree to create a unified presentation of datasets as a collection accessible by multiple parties. Current approaches include: Public data pools and private data pools.
- Research and analysis partnerships: Companies engage directly with public-sector partners and share certain proprietary data assets to generate new knowledge with public value. Current approaches include: Data transfers and data fellowships.
- Prizes and challenges: Companies make data available to participants who compete to develop apps, answer problem statements, test hypotheses and premises, or pioneer innovative uses of data for the public interest and to provide business value. Current approaches include: Open innovation challenges and selective innovation challenges.
- Intelligence generation: Companies internally develop data-driven analyses, tools, and other resources, and release those insights to the broader public.

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CHALLENGES OF DATA COLLABORATIVES

Data collaboratives offer a promising model for data sharing and collaboration across sectors. Yet, it is also important to keep in mind that data collaboratives — like any effort at data sharing — also pose certain risks. Based on our research, we identify the following main challenges:

LACK OF AWARENESS AND DATA LITERACY

Both among those who hold data and those who might use it (suppliers and consumers) there often exists a lack of awareness and appreciation regarding the potential of data sharing. This can take the form of a general lack of awareness about the opportunities (and challenges) of data reuse, or it may represent a lack of understanding about a particular opportunity — i.e., a recognition of how a particular dataset can be directed to help solve a particular public challenge.

ABSENCE OF TRUST

The field of data sharing is characterized by a pervasive absence of trust. This is true both among potential sharing partners and also among the public, which remains ambivalent and skeptical about how its data is being (re)used, while such concerns are understandable and often valid, the absence of trust acts as a barrier to the potential of data sharing. It strongly suggests the need for a responsible data sharing framework, something we discuss further below. Such a framework could help build trust, especially if it is made publicly available, includes a fair allocation of liability and dispute resolution mechanisms, and is accompanied by robust steps for monitoring and to ensure accountability.

UNCERTAINTY WITHIN THE PRIVATE SECTOR (UNCLEAR INCENTIVES)

Despite clear evidence for the benefits of data sharing, companies often have concerns and reservations about the reuse of their data. Some of these concerns are no doubt legitimate, but they act as a barrier to unleashing the potential of data for the public good. A (partial) list of concerns include:

- Data leaks and competitors gaining business intelligence about markets and operations;
- penalties and fines by regulators or other lawmakers imposed due to the interpretation of (often unclear) legislation and processes; and
- reputational loss if customers grow suspicious of how their data is being used and recycled.

Addressing these concerns and developing a clearer set of incentives for the private sector, is critical to enabling more data sharing.

LIMITED CAPACITY

The ability to process, analyze, and use data varies widely by organization, a factor that limits sharing and the overall public good potential of data. This lack of capacity can manifest as a lack of technical knowledge (e.g., insufficient data skills), financial resources, or simply as a lack of awareness. Capacity limitations are particularly a problem for poorly funded government agencies, as well as

for smaller private and public sector entities, which may similarly lack adequate technical and financial means to foster a sharing culture.

TRANSACTION COSTS

While open data is often (though not always) made available without charge, it would be incorrect to assert that data sharing is always free of cost. Transaction costs are incurred throughout the data life cycle — while preparing data; de-risking data (e.g., through anonymization); and in coordinating with partners, including through the preparation of legal agreements or other structures, mechanisms, or institutions to permit data sharing and reuse. These costs can inhibit an organization's willingness to share and reuse data (without a fair compensation scheme[4]).

LIMITED COMMUNITY OF PRACTICE AND KNOWLEDGE BASE

Finally, the nascent nature of data sharing poses an additional barrier. Successful initiatives require a community of practice and building upon an established knowledge base (including, for example, case studies and lessons learned). Although the situation is improving as data collaboratives and other mechanisms become more established, we still note an overall absence of a sharing culture to facilitate true collaboration among sectors. Over time, as data-sharing initiatives multiply, we would expect to see the emergence of new bodies, institutions, and bodies of knowledge that could offer a more solid foundation for a community of practice and learning.

Conclusion

In conclusion, data collaboratives offer a promising solution to address data asymmetries in our society, but they require a systematic, sustainable, and responsible approach to be successful. A new science of questions can help identify the most pressing public and private challenges that can be addressed with data sharing. Therefore, data stewards are essential to fostering a culture of responsible sharing within organizations, and clarifying incentives are crucial to operationalizing data collaboration. Additionally, building a social license for data reuse through public engagement, data stewardship, and an enabling regulatory framework is key to establishing trust between all stakeholders involved. Finally, becoming more data-driven is essential to improving our understanding of collaboration, building sustainable initiatives, and achieving accountability for projects. By being smart about incentives and adopting a responsible and sustainable approach, data collaboratives can contribute to a health data economy that benefits society as a whole.

Although the situation is improving as data collaboratives and other mechanisms become more established, we still note an overall absence of a sharing culture to facilitate true collaboration among sectors.

[4] A market-led compensation model may address these concerns best. Such a model should consider all associated costs, such as infrastructure setup and maintenance (e.g., API development), technical and administrative expenses, and more. It should also include provisions for reinvestments and innovation, ensuring that organizations sharing data can enhance their capabilities over time. By adopting such a compensation approach, the sharing of data can be incentivized, leading to improved collaboration and increased accessibility to valuable information.

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Interview I

Data sharing, cybersecurity, and privacy

Photo: Pamela Palma

Katitza Rodriguez
EFF Policy Director for Global Privacy at EFF.

In this interview, Katitza Rodriguez, director of the Electronic Frontier Foundation (EFF), addresses data sharing, cross-border data flows, and the role of privacy and cybersecurity in this context.

Internet Sectoral Overview (I.S.O.)_ What are the opportunities and challenges of cross-border data flows?

Katitza Rodriguez (K.R.)_ From our perspective as users, cross-border data flows enable us to easily connect with family, friends, and colleagues across borders, as well as facilitate civil society and online protest. They allow us to access various types of information and participate in global conversations. Cross-border data flows also play a crucial role in remote work, as an increasing number of people collaborate with colleagues located abroad. Generally, anyone can benefit from online services that may have no local equivalent, and as the way the Internet is designed, a lot of our data traverses international boundaries without significant restrictions.

Whenever we use an online service, we often entrust it with our personal data. This can include everything from the messages we exchange with friends to digital traces we leave behind, like our Internet Protocol (IP) address, which could reveal our location and a history of our interactions and browsing. When a service is hosted in another country, our data is stored under a jurisdiction whose laws might offer stronger or weaker protections than we are accustomed to, and these regulations can differ significantly from those in our home country.

Companies may process the data according to the laws of their own jurisdictions, if such law exists. In some cases, individuals may experience much less opportunities than they would enjoy in their own country to your control or know about how their personal data is used commercially. They can also be exposed to different levels of access by different government agencies, with stronger or weaker legal protections than they would have under their own countries' laws.

Indeed, many types of laws are in play here. Some countries have adopted robust data protection laws that regulate the collection, processing, and transfer of personal data, including regulating the transfer of data to other countries, while others have not. Even countries with comprehensive data protection laws may apply different data transfer standards, or exempt the application of data protection safeguards, to personal data processed by law

"(...) data protection legislation (and industry standards) set minimum technical requirements for information security that must be followed when storing or transferring specific kinds of personal data."

enforcement agencies.
Another key aspect is the legal standard set for police access to personal data in each country. These standards may include some requirements, such as obtaining a prior court order and providing a specific basis for suspecting someone of a crime before such an order is granted, while others may have lower thresholds for accessing data. Some jurisdictions permit service providers to voluntarily identify users to the police, while others say this may only be done through a prior court order if it reveals online anonymity. Similarly, information about users' interactions with others or their locations may be treated in different ways in different countries. Courts have recently been adopting decisions that provide a higher level of protection for subscriber registration data, if it reveals online anonymity and metadata, even though in many countries, subscriber registration data have traditionally been afforded a lower level of protection.
All of this means that people face the risk of encountering gaps in protection when their personal data crosses borders. In an ideal world, their personal data should be protected whenever it flows to another country. We would like to see further steps toward maintaining strong protections everywhere; for example, treaties like the proposed United Nations (UN) cybercrime treaty should include minimum robust privacy and data protection safeguards that all signatories must implement when granting police access.

I.S.O._ What role does cybersecurity play in the context of cross-border data flows?

K.R._ Cybersecurity efforts are vital for understanding and attempting to mitigate the heightened risks to personal data that arise when it is copied to more places, including into more jurisdictions. When this occurs, there are more opportunities for attackers to access it, whether in transit or at rest. We can see this in thousands of major disclosed data breaches, and we assume that there have also been many important data breaches that still remain undiscovered. The attackers could include petty criminals, organized crime, or state intelligence agencies (whether of an involved country or of a third country), intercepting the data while it is being transferred.
Technical methods like encryption aim to reduce these risks, though they cannot eliminate them entirely. Encryption makes it harder for someone monitoring communication links to spy on personal data that passes through them, for example. Similarly, companies can actively try to minimize the amount of data they retain and ensure that personal data is not stored in systems where it is not actively needed. Sometimes data protection legislation (and industry standards) set minimum technical requirements for information security that must be followed when storing or transferring specific kinds of personal data.
Users might have preferences for one jurisdiction over another based on their individual threat models. For example, they might favor their home jurisdiction over a particular foreign jurisdiction, or vice versa. However,

legislation can sometimes aim to restrict that choice (such as with data localization mandates), or data controllers might transfer data unexpectedly, leading to a situation where a copy of their data ends up in a country the user did not anticipate or want. Thus, establishing a robust baseline of data protection standards is crucial to ensure that data protection rights travel with the data and remain protected, regardless of where your data ends up. Encryption where end-users hold the keys, as with end-to-end encryption of private communications, can allow users to manage some of these risks, too. This is particularly useful when online intermediaries transmit or store information on behalf of users without further processing it themselves.

I.S.O._ Which elements might be considered in policies focused on data sharing?

K.R._ "Data sharing" can mean many things to many people, but in our work, it has most often referred to international law enforcement cooperation, and to data-sharing agreements between countries that enable that kind of cooperation. These agreements create procedures for authorities in one country to request data from another country, or to actively share individual or bulk personal data with another country. The requests might sometimes be addressed directly to a company, or more often they are addressed to the other country's authorities, asking for assistance in obtaining the requested data.

Currently, states are negotiating the text of the UN cybercrime treaty, which includes numerous provisions for sharing personal data. As currently drafted, the international cooperation chapter lacks many important safeguards and seems to authorize the direct sharing of highly sensitive personal data. In one place, it can be interpreted as authorizing the sharing of bulk databases, which can contain personal data of entire populations, with no requirement that information sharing be proportionate or include adequate safeguards.

The data protection safeguards included in the current draft are also very weak. These omissions raise alarms, especially as there is no exclusion for sharing "personal data" (including sensitive biometric, traffic, and location data), and there is no requirement that information sharing be proportionate and incorporate proper safeguards.

The draft text of the UN cybercrime treaty should be revised in both the sections addressing privacy and data protection safeguards and the provisions related to law enforcement cooperation. The revision should ensure that data sharing is limited to specific data relevant to a particular criminal investigation and is subject to appropriate privacy and data protection safeguards. Without these revisions, it opens doors to sharing massive databases and Artificial Intelligence (AI) training datasets, putting Human Rights at risk. Biometric data, face, and voice recognition have been abused in some countries against protesters, minorities, journalists, and migrants. The convention should not provide an opportunity to escalate these danger-

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ous patterns beyond borders.

I.S.O._ How can such policies enable collaboration while protecting privacy rights?

K.R._ We continue to think of these questions in the context of the proposed UN cybercrime treaty, which forms a very contemporary example where all of these questions come up. We believe, as pointed out, that the treaty should establish an adequate baseline of protection to ensure that states respond to legal assistance requests in a manner that respects Human Rights.

Oversight and monitoring mechanisms should be built into the treaty to check whether Human Rights safeguards are being followed and provide a way to combat and end any abuses.

In the field of law enforcement, international cooperation should come with mandatory safeguards overseen and enforced by someone other than the police — normally by independent judges. Interfering with privacy rights when cooperating in international investigations should be explicitly prohibited unless subjected to independent authorization concluding that the incursion is likely to yield evidence of a specific crime.

It must also ensure that cooperation is not abused to enable transnational repression, for example when a state requests information about dissidents on the pretext of investigating them for a criminal offense. Requests should only be approved when the underlying investigation relates to behavior considered illegal in both states and when the criminalization of that behavior is compatible with international Human Rights law.

Data processing that is unnecessary, illegitimate, and disproportionate, as defined in international Human Rights law, should also be prohibited, as should any cooperation to prosecute or punish individuals based on race, religion, nationality, or political opinion.

Individuals, regardless of their nationality, should be notified when they have been affected by intrusive investigative measures, as soon as notification can occur without threatening an investigation or prosecution. They should enjoy effective redress mechanisms for any interference with their privacy.

Regrettably, there is no definitive international mechanism for enforcing Human Rights. States should therefore be permitted to carefully and continually scrutinize cross-border access by foreign governments through independent regulators and these regulators should be empowered to correct or even suspend cooperation with any state or agency that fails to adequately safeguard Human Rights.

Article II

Creativity, innovation, and open data: Fostering inclusive growth in Africa

By Kristophina Shilongo[5] and Kaulyaalalwa Peter[6]

Photo: Willem Vrey

Kristophina Shilongo
Senior tech policy fellow at the Mozilla Foundation.

Innovation can have positive impacts on economic growth and development. In the data economy, open data is viewed as an enabler of innovation, often brought about through creative thinking or imagination. If we were to use an equation: Open data + creativity = innovation. It is of course not as clear cut as it may seem, many factors are involved and no one innovation journey is the same (Forgeard & Kaufman, 2016; Frankenhuis & Nettle, 2018; Glor, 1997; Ndemo, 2017).

Why does the relationship between innovation, open data, and creativity matter for Africa? Scholars at the intersections of science, technology, and innovation who are interested in the localization of technology in Africa argue that the dominant approaches adopted in data and digital policies privilege innovation informed by Big Science and Big Data from formal institutions. They warn that this approach neglects innovations that could emerge from incorporating indigenous knowledge, as well as learning practices and experiences of Africans. Thereby, missing the opportunity to develop public policies that utilize the full benefits of open data (Mavhunga, 2017). If technologies reflect the values and world outlook of a people and are an indication of what they care about and the problems they deem worth solving, we posit that allowing Africans the freedom to explore and play with data will introduce new ways of solving the most pressing socio-economic challenges on the continent (Mhlambi, 2020).

Owing to the global data revolution in which data is viewed as a central element of the economy, the link between innovation and open data is often established in African policy documents. The aspirations to leverage science, technology, and innovations to meet socio-economic goals and objectives are outlined in several of the African Union's (AU) flagship projects under *Agenda 2063:*

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[6] AI and Human-computer interaction (HCI) researcher, she is currently pursuing a master's degree in Computer Science with a specialization in Software Development at the Namibia University of Science and Technology. As research consultant, her work revolves around participatory design and the preservation of indigenous knowledge. With a passion for bridging technology and culture, she strives to contribute meaningfully to the intersection of the field of HCI. Her commitment to excellence is evident in both her academic pursuits and her active role in cutting-edge research projects.

Photo: Personal archive

Kaulyaalalwa Peter
Research consultant.

The Africa we want, which boldly asserts that: "The creativity, energy, and innovation of Africa's youth shall be the driving force behind the continent's political, social, cultural, and economic transformation" (African Union Commission, 2015, p. 9). The Science, Technology, and Innovation Strategy for Africa 2024 (STISA-2024), as well as the Digital Transformation Strategy for Africa (DTS), outline similar aspirations for the digital economy (African Union Commission, 2020a, 2020b). In the STISA-2024 (African Union, 2020, p. 23), wealth creation is set as a priority for African countries, with prospects it will be engendered by investment in the continent's human resources and digital infrastructure. Similarly, in the DTS digital innovation and entrepreneurship are identified as one of the foundational pillars that will drive digital transformation in critical sectors such as government, health, and agriculture. Recommendations are made to member countries to promote open data policies which will enable new local business models inspired by the creative ideas of Africans and embedded in their lived realities. The role of data as a public good in the digital economy is emphasized in the AU Data Policy Framework (African Union Commission, 2022, p. ix), which outlines a common vision, strategic priorities, and provides key recommendations to guide African countries in the development of their national data systems. In this sense, open data is recommended as a critical infrastructure to propel innovation and entrepreneurship:

> [P]romote interoperability, data sharing, and responsiveness to data demand through the setting of open data standards in data creation conform to the general principles of anonymity, privacy, security, and any sector-specific data considerations to facilitate non-personal data and certain categories of personal data are accessible to African researchers, innovators and entrepreneurs. (African Union Commission, 2022, p. ix)

The AU policy documents are guidelines for member countries, which decide the principles and recommendations that are best suited to the country's socio-economic conditions and technological capabilities. This article identifies and discusses the areas where policy could enable a conducive environment for innovations, emphasizing the creative ideas of Africans, and sets precedence by allowing Africans to develop data-driven solutions on issues they care about and consider important.

We begin with an exposition that relates innovation to creativity in the African context, followed by a brief overview of the state of open data and its challenges in Africa. This will provide the backdrop against which we advocate for policies and practices that could foster creativity and innovation, and consequently a sustainable data ecosystem. The discussion that ensues offers strategies to optimize open data, these are: (a) Equitable participation, (b) diversification of data capabilities, (c) optimizing data sharing and collaboration, and (d) developing a regulatory environment for creative experimentation.

Supporting a creative society to innovate

Creativity and innovation are often used interchangeably, and not to anyone's fault, as they are assumed to exist in tandem. Although they exist, the distinction lies in the fact that creativity is the expression of new ideas and innovation involves capitalizing on the idea by putting it into effect. The creative ideas we have are influenced by our experiences of the world, our core beliefs, and how we perceive ourselves. Not all creative ideas become innovations: The ones that inspire successful innovations are mostly original and judged as useful by other people (Yusuf, 2009). Concerned with the trajectory of innovation in Africa, Daniels (2017) argues that the model of innovation which is widely envisioned in policies, practices, and education in African countries is informed by creative ideas from "Western countries." These narratives define innovations in terms of Research and Development (R&D), they are mostly technology-based and derived from educated ideas from a specific discipline. This is not to say the Western narrative should be discarded; our interpretation of the point Daniels (2017) is making is that the ideas that inform innovations should be expanded to include the local context.

The African continent has one of the largest so-called informal economies in the world, accounting for 81% of jobs in Africa (Guven & Karlen, 2020). Many of these jobs address local needs by either providing products or services or involve setting up a household innovation, as is the case in Ghana and South Africa (Avenyo, 2018; De Jong et al., 2023). These businesses or innovations are not based on the formalized R&D or skills developed through formal education. The ideas meet local needs, address issues affecting their communities, and take advantage of local resources such as household appliances or awareness of cultural norms.

What types of data-driven solutions, services, or products could Africans come up with if the narratives about what inspires innovation were expanded to reflect their realities? While policy measures may not directly influence creativity, they can either exclude or push certain ideas to the margin, labeling them as informal or unconventional and therefore not worthy of support.

The mentioned propositions are not flawless; poor and systematically excluded people have been victims of creative theft and extractive practices (Bulstrode & Warmington, 2023; Meyer & Naicker, 2023). Therefore, protective measures should be set in place to make sure that the creative ideas emanating from this expanded narrative of innovation equitably benefit those who come up with them.

(...) the model of innovation which is widely envisioned in policies, practices, and education in African countries is informed by creative ideas from "Western countries."

The objective of opening up databases is so that people or entities with different contexts and expertise are able to access and use the data for their own purposes.

Open data in Africa

Morocco was the first African country to launch an open data initiative, as recently as 2011 (Mutuku & Tinto, 2019). As more countries recognize the value of data (or open data to be more specific), they have rolled out similar initiatives in the hope of creating more job opportunities through entrepreneurship or to improve public services.

What is *open* data? In light of the conversation above and the ensuing arguments below, this extended definition from The State of Open Data adequately reflects open data in many African countries:

> [D]ata that is accessible, machine-readable, and free of licensing restrictions on reuse. However, we apply the definition heuristically rather than legalistically. This recognizes, for example, that in some countries and contexts, the lack of a fully "open license" is less of a barrier to reuse in practice than in others, or that, at times, data may not be provided in machine-readable formats at source but has been easily converted for reuse by intermediaries. (Davies et al., 2019, p. 8)

The objective of opening up databases is so that people or entities with different contexts and expertise are able to access and use the data for their own purposes. There are a significant number of data-driven innovations that confront some of the biggest challenges on the continent such as financial exclusion, food scarcity, and stressed health systems. A popular example is Kenya's inclusive banking system, M-pesa, the platform was launched by telecommunications company SafariCom (Beck et al., 2014). The system has allowed millions of Kenyans who are not banked or do not live in close proximity to banking services or infrastructure to make financial transactions or trade. Perhaps M-pesa's most impactful achievement is that it connected the so-called informal sector to the formal sector: Small businesses are able to transact with larger entities without the need for a registered bank account.

There are two reasons why we decided to highlight M-pesa. First, it responded to a unique set of metrics that required a contextual understanding of the financial and information and information and communication technology (ICT) sectors in Kenya: (a) Mobile phone use, (b) financial exclusion, and (c) financial activity. Many Kenyans use feature mobile phones, they are unbanked and lucrative trading between businesses from the informal sector (who are mostly unbanked) and the more traditional businesses (Hinz, 2014; Ndung'u, 2018).

The second reason allows us to highlight some of the open data challenges in many African countries namely, the limited availability of data in critical sectors and extractive practices by big technology companies. For example, the agricultural sector in most African countries lacks basic data to measure the economic activities of smallholder farmers or productivity, as well as measures of productive land and the crop capacities required for sustainable farming (Kalibata & Mohamedou, 2019). On the other hand, the private sector and big technology companies disproportionately benefit from Africans' data. Big Techs

own most of the cloud computing infrastructure required to store data, they then use this to their advantage by offering "free" digital services in exchange for digital data (Ngila, 2022).

The main source of open data in Africa is from government and government agencies. The private sector often claims proprietary rights to the data it collects, which limits its use by small players. Notwithstanding, the private sector often exploits open government data for profit by offering products and services that solve African problems (Mutuku & Tinto, 2019; Ngila, 2022). In this sense, there are several intricacies about the open data ecosystem in Africa, which we will not discuss in this article. Our discussion below primarily focuses on open government data. We explore the ways in which public policy can engender data-driven innovations that emphasize African creativity, in addition to the traditional R&D or Science and Technology (S&T)-centric approaches.

Engendering a creative data economy

We reiterate that we have not come across evidence of public policies with a direct effect on the creative ideas generated. However, there is evidence that the implementation of certain policies can lead to systematic exclusion. Due to South Africa's history of racial discrimination, for example, present-day policies can systematically exclude black people from working in historically white academic institutions. In this sense, the study we cite here found that systematically reforming education and science policies is more likely to mitigate racial discrimination in academia without worsening the problem (Cowan et al., 2023).

Our approach here is similar to the aforementioned study because we discuss policy areas that can increase the likelihood of creative ideas progressing into a data-driven innovation with real-life positive implications.

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EQUITABLE PARTICIPATION

Two of the biggest challenges limiting African countries' ability to fully utilize data are incoherent sector policies and accessibility to data critical for the success of the data economy; particularly how they put a limit on the number of people who can participate or who see themselves as participants within this economy.

Policy reformation is needed to increase the participation of all human resources and essentially the pool of creative ideas. These policies, such as education policies should aim to diversify the so-called "digital skills" by promoting qualitative methods in addition to quantitative methods already prioritized. The AU data and digital policy documents referred to in the introduction of this article have a strong S&T focus. This seems to neglect other disciplines that can be valuable in promoting creativity and inevitably advancing the process of innovation in the data economy, such as art, languages, or music in the humanities, vocational training, and less popular branches of social sciences (which are not anthropology, sociology, psychology, or economics). Scholars argue that a multidisciplinary understanding of science, technology, and innovation

Languages indigenous to Africa are paid less attention resulting in millions of Africans being unable to participate in the data economy. How many ideas are left unexpressed because connections to them cannot be made in an English-speaking world?

not only leads to creative solutions but can also increase the pool of creative ideas and, inevitably, the number of ideas that advance to the innovation stage (Mavhunga, 2017). The objectives of data or digital policies that aim to encourage innovation and entrepreneurship should focus on increasing the number of expertise or disciplines that see themselves as critical to finding data-driven solutions, even if they are addressing a problem that may not be in the realm of their discipline.

The DTS recommends a multidisciplinary approach to the critical data economy by distinguishing traditional digital skills from digital complementary skills:

> Review education curricula according to current needs and trends in the digital society, economy, and labor market, with a focus on Innovation, Science, Technology, Engineering, Art, and Math (iSTEAM) and a combination of digital, 21st century, and e-business skills, across all areas of learning Digital Complementary Skills. (African Union Commission, 2020a, p. 23)

Although the STISA-2024 (African Union Commission, 2020b, p. 23) alludes to empowering the continent's human resources with "the necessary skills" and that "greater emphasis must be placed on innovation and on appropriate adaptation of technology and existing research results." The call to "promote creativity and innovative technologies" is limited to mostly traditional Science, Technology, and Innovation subjects such as computer science, ICT, or business. Additionally, this attempt at multidisciplinary skills development is not reflected in the AU Data Policy Framework, the latest of the three documents adopted in 2022 (African Union Commission, 2022, p. 23). Recommendations for the development of coherent policies that can enhance data value, such as competition and taxation, omit education. Although data skills such as Big Data Analytics, AI, or quantum computing provide a quantitative analysis of data or a problem but lack the qualitative or interdisciplinary perspectives captured through historical, sociological, or even artistic understanding of narratives that shape the society or people whose data is being analyzed or to whom a certain innovation is directed at. There is no one path to innovation and, therefore, policymakers should make sure that Africans can equitably participate regardless of their skills or interests.

The second challenge is the linguistic accessibility of data or to datasets. The number of languages spoken in Africa is estimated to be more than 1,500 (Daniels, 2017), however the data and the discourse about data are skewed towards anglophone languages, with some concern about the inclusion of francophone or lusophone languages. Languages indigenous to Africa are paid less attention resulting in millions of Africans being unable to participate in the data economy. How many ideas are left unexpressed because connections to them cannot be made in an English-speaking world? Notwithstanding, organizations such as Masakhane are addressing these accessibility challenges from a grassroots level by building high-quality text and speech datasets for low-resourced languages in East Africa, such as Luganda, Runyankore-Rukiga, Acholi, Swahili, and a subset of Luhya Languages. These datasets are also intended to be open and can be used in several Natural Language Processing (NLP)-based

applications such as spell checking and correction, and machine translation (Masakhane, n.d.). Many African societies have a culture of orality and, using the Mozilla Common Voice platform, Masakhane is also crowdsourcing voice contributions which could possibly translate oral knowledge into written form if needed. Policymakers should, therefore, not only prioritize open government data but also support the development of language datasets to enhance accessibility and enable equitable participation of Africans.

DIVERSIFICATION OF DATA CAPABILITIES

We have established that increased participation leads to a higher chance of innovative outcomes, so it is important to discuss the data skills needed to create value from it. Part of idea generation and creativity is the freedom to experiment and playful exploration. Current data practices limit the participation of African communities to data collectors or as simply as data subjects, which is neither equitable nor covers the assortment of skills required to proceed from idea to implementation. The #DataValues Manifesto captures this well under the third principle which states: "Everyone, everywhere must gain confidence to engage with and use data. Wide-spread data confidence is a building block of a fair data future" (The Data Values Projects, n.d.).

Many African countries have either introduced (or are in the process of introducing) mandatory basic coding classes at the school level and institutions of higher education — a step that is welcomed. Data capabilities development, however, should not exclude those who are not enrolled in the education system. Collaborations between institutions such as governments should empower communities to have a say in data design and collection in a manner that allows their needs, priorities, or experiences to be captured in data (The Data Values Projects, n.d.). This means data and digital policies should expand data capabilities to include skills that allow people to annotate data in a manner that reflects their interests and empowers them to use methodologies beyond the traditional S&T dominant approaches.

Subsequently, the diversifying data capabilities will not only allow people to confidently engage with data but will also contribute to idea generation when they can playfully engage with it, for instance, as a problem-solving tool.

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OPTIMIZING DATA SHARING AND DATA COLLABORATION

An expanded pool of participants, with increased confidence in their ability to engage with data and diverse capabilities has the potential to inspire further creativity. However, the impact of this creative collaboration may be exacerbated if two or more parties combine their different capacities for data generation, processing, and analysis to create an innovation the individual parties would not create alone (Klievink et al., 2018). These collaborations are referred to as "data collaborations." The most important technical requirements for data collaboration such as interoperability are adequately covered in both the AU Data Policy Framework and the DTS; especially specific to government data (African Union Commission, 2020a, 2022). However, data collaborations also require a trust relationship and, where possible, investment incentives; especially open

(...) attempts at maintaining a power equilibrium and just outcomes should begin with governments developing accountability mechanisms to guide data collaborations with partners.

government data pertaining to non-private sector partners (although private sector partners are not excluded). We noted that the African governments' role should not be limited to collaborators: It can also act as facilitators between collaborators who can solve certain problems with the use of open government data (Klievink et al., 2018).

We foreground this discussion by acknowledging the exploitative data practices African communities and people have been subjected to. Historical and present-day research practices have led to the exploitation of less-resourced partners and the extraction of their data for the benefit of those more powerful and/or resourced (Abebe et al., 2021; Couldry & Mejias, 2019). It is no surprise when communities are reluctant to partner with external parties, including their governments, because, on too many occasions, the benefits derived from collaborations are not equitably distributed. In some African countries, governments may have to put in more effort to gain and maintain the trust of communities. Therefore, attempts at maintaining a power equilibrium and just outcomes should begin with governments developing accountability mechanisms to guide data collaborations with partners.

The DTS and AU Data Policy Framework both mention accountability as a key principle for the data economy. Accountability requires governments to be transparent about their intentions to collaborate, as well as relay details about how data is processed and used within the collaboration and beyond (Klievink et al., 2018). In this regard, regulatory measures should be set in place to ensure aggrieved parties can seek legal recourse or conflicts can be resolved through an arbitration process.

Investment incentives from the government may optimize these data-sharing efforts and data collaborations. There are other ways in which governments can incentivize data collaborations and data-sharing practices; however, we want to focus on R&D expenditure, which is often related to increments in innovation. But as Raghupathi and Raghupathi (2017) point out, research about R&D expenditure's effects on innovation and inevitably economic growth is inconsistent. They cite a study by Park which analyzed data from 18 manufacturing industries and found a positive relationship between the number of patents with productivity and R&D expenditure (Park, 2003, as cited in Raghupathi & Raghupathi, 2017); however, a larger sample size by the same authors indicated that an increase in R&D expenditure and patents did not guarantee productivity. Therefore, R&D expenditures do not always have a positive effect on idea generation and ideas that proceed to the implementation stage do not always guarantee economic outputs. This evidence, although not conclusive, led us to the following inference: Governments are more likely to yield better returns on investments if R&D expenditures are complemented by a conducive business ecosystem, which promotes the innovations' success based on data. Some of these are mentioned in our discussion: Investing in activities that can foster an entrepreneurial culture, such as a network of collaborators, data processors, business owners, and entrepreneurs; investing in data as infrastructure, investments in diverse data capabilities; and, among others, a regulatory environment which supports innovation. These are all measures that can be affected by policy.

CREATING A REGULATORY ENVIRONMENT FOR CREATIVE EXPERIMENTATION

Lastly, we expand on the importance of advancing a regulatory environment, which advances national security and protects the Human Rights of data subjects or those at the receiving end of data-driven innovations. At the same time, the environment should encourage creative experimentation under controlled conditions, such as regulatory sandboxes.

Several institutions such as the United Nations (UN), the Regional Economic Communities in Africa, Civil Society Organizations (CSO), and even the AU (in the Data Policy Framework and DTS) make convincing arguments for a Human Rights approach to data governance and the governance of technologies that may emerge from data. There is, however, a divergence between more powerful and established data controllers, such as Big Techs, and the larger CSO community on the appropriate approach to innovation. The former advocates for self-regulation, where those who have innovated products or services make the rules, and a permissionless approach to innovation, which grants them the power to experiment with and test out new innovations without any restraints (Gobble, 2015). Others call for a precautionary approach where the lack of evidence of harm or violation cannot be taken to assume the lack of harm (Kuziemski, 2018). This is based on historical practices which have seen companies not adhering to the rules they set themselves:

> Without enforceable penalties or a regulatory watchdog to hold these companies accountable, the promise of AI safety becomes nothing more than a handshake agreement, and one that is highly likely to be broken when enforced only by tech companies interested in profits, not people. (Griffin, 2023, para. 5)

Tech companies also highlight the importance of robust cybersecurity and cybercrime legislation to protect national security. Notwithstanding, much is still to be done in these areas. The creative ideas of a few should not create hostile conditions for the majority, particularly if governments are to categorize open government data as public infrastructure.

Lastly, we want to draw attention to the fact that the data economy and the larger advanced technology ecosystem are nascent, governments will not always set the best rules, and compliance checklists cannot always anticipate all the potential socio-economic and environmental implications of certain innovations. So, regulatory sandboxes can be useful instruments to test out the rules and standards and have an opportunity to observe societal implications in a controlled environment.

Tech companies also highlight the importance of robust cybersecurity and cybercrime legislation to protect national security. Notwithstanding, much is still to be done in these areas.

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Interview II

Photo: Personal archive

Paulo Renâ
Ph.D. candidate in Law, State, and Constitution at the University of Brasilia.

Data, digital technologies, and the information society

Paulo Renâ is a Ph.D. candidate in Law, State, and Constitution at the University of Brasilia (UnB). In this interview, he discusses the data ecosystem topic with a view to data collaboration and sharing, the datafication of marginalized individuals' lives, and the challenges posed by new digital technologies for the protection of Human Rights.

Internet Sectoral Overview (I.S.O.)_ What aspects should be considered to promote data ecosystems that encourage sharing while guaranteeing data security?

Paulo Renâ (P.R.)_ The processing of digital data, including sharing such data, is an inherent process to the dynamics of the information society. It is therefore important to bear in mind that the Brazilian General Data Protection Law (LGPD) does not advocate for a ban on data processing. Instead, it aims to establish minimum conditions precisely so that an ecosystem can be set up in Brazil that harmonizes security requirements with the various personal data processing operations.

This complexity should be expressed in a balanced culture, supported by feasible rules and appropriate systems. To this end, when sharing personal data, whether between individuals or legal entities under public or private law, it is crucial to respect the foundations, principles, and objectives outlined in the LGPD, and the administrative and technological measures carefully dedicated by each agent to preventing incidents in the processing activities must be fully promoted. Despite being a common and routine situation, the relationship between different processing agents can never be considered an excuse to relax legal requirements for the protection of personal data.

Data sharing must therefore guarantee the exercise of all rights by data subjects; have passive and active publicity; be limited to the minimum amount of data necessary to meet the purpose, with a strict lifecycle management policy, from collection to deletion; observe the limits of free and informed consent; value anonymization and pseudonymization; establish and follow governance structures, with access control mechanisms; adopt robust cybersecurity measures, following standards and complying with compliance protocols; rely on the assumption of responsibility by the parties involved, both preventive and reactive; value the assessment of their impacts on privacy in order to identify and mitigate potential risks; subject themselves to

regular audits and monitoring in the light of security policies; and ensure that the people involved are educated about the value of best security and protection practices.
This is a complex and challenging task, but it is feasible and absolutely crucial to guarantee fair and beneficial processing of personal data.

I.S.O._ How does the debate on the increasing datafication of individuals' lives address the implications for marginalized groups? How can we move forward so that these groups are not left behind?

P.R._ The ongoing and pervasive possibility of transforming all aspects of individual life into digital data is related to marginalized social groups, as the processing of this large volume of personal data has the potential to magnify and exacerbate inequalities and discriminations. Respecting democracy and the rich diversity of society requires an approach that will ensure these groups are not left behind.
Firstly, considering that automated data processing tends to mirror existing reality, combating social biases requires acknowledging their existence and intentionally adopting a stance to oppose them head-on. For instance, by demanding transparency, systems can be required to anticipate their duty to be fair and not incur algorithmic discrimination.
Another approach is to prioritize informed consent as a means of providing information and respecting freedom, but without assuming that individual decisions are sufficient to resolve any collective issues that go beyond the personal scope of exercising freedom. Therefore, data controllers must also have a duty to always act with good faith, demonstrating corporate responsibility and ethical conduct in the processing of personal data, particularly for individuals whose hypo sufficiency may lead them to immediate choices or overlook the totality of the effects on their lives.
Therefore, policies, plans, and strategies for effective digital inclusion must be disseminated to promote access, availability, and technological empowerment. In this context, the most diverse marginalized communities should receive education, capacity building, and training tailored to their heterogeneous needs, so that they are able to critically understand and deal with possible datafication issues. This scenario could further promote diversity in technology, ensuring greater representation in the research and development of innovations, with inclusion and equity being issues considered from the inception of projects. From a public policy perspective, the State must establish legal norms and regulations that guarantee the practical protection of individual, collective, and diffuse rights, specifically preventing exploitation by enterprises or public authorities. This involves, in the current Brazilian context, strengthening the National Data Protection Authority (ANPD) and, for the Judicial Branch, raising awareness about the significance of this autonomous constitutional right, both in the substance of decisions and in the management of data relevant to processes administration.

"The ongoing and pervasive possibility of transforming all aspects of individual life into digital data is related to marginalized social groups, as the processing of this large volume of personal data has the potential to magnify and exacerbate inequalities and discriminations."

"Only democratic, open, and participatory collaboration between governments, civil society, enterprises, and technical and academic experts can provide sufficient input to develop plans, standards, and legal norms that adequately address all the aspects involved in the challenges of Internet governance."

I.S.O._ What opportunities and challenges do new digital technologies place for the protection of Human Rights? How can multistakeholder collaboration contribute to this scenario?

P.R._ In the context of the information society, it is possible to say that the changes resulting from the widespread adoption of new digital information and communication technologies (ICT) have brought two legal issues that have played central roles since the emergence of the rule of law. Firstly, the reaffirmation of Human Rights in digital environments and, secondly, the equilibrium of powers. This dual problem is the foundation of an ideological concept called Digital Constitutionalism, encompassing not only technological concerns but also philosophical, cultural, geopolitical, military, scientific, and economic ones. From bitcoin taxation to the right to be forgotten, e-commerce, Artificial Intelligence (AI), cryptography, information disorder, and the electoral system: All over the world, there is an incessant mosaic of new questions that revisit old problems and demand new approaches to adapting legal rules to the digital context, in three emerging categories of normative countermeasures: (a) Recognizing the expanded possibility of exercising existing rights; (b) protecting existing rights against new threats; (c) creating new rights or new protections for situations not yet regulated; moreover, beyond the "classic" dimensions like ordinary national law, constitutional law, and charters of rights, there are also regional and international normative productions, in the dispute resolution mechanisms of transnational organizations such as the Internet Corporation for Assigned Names and Numbers (ICANN) and in the terms of use of digital platforms.
Thus, for the information society to be able to provide answers to both of these questions, especially concerning the Internet, a multisectoral approach becomes imperative in order to deal with the complexity of the elements at play. From the identification of themes, through planning to effective action and monitoring, public policies demand commitment, financial investments, research, and development capacity, as well as the production of goods and services. Only democratic, open, and participatory collaboration between governments, civil society, enterprises, and technical and academic experts can provide sufficient input to develop plans, standards, and legal norms that adequately address all the aspects involved in the challenges of Internet governance. Hence, this broad and ongoing cooperation of forces and interests can pave the way for practical decisions aligned with the demands of Digital Constitutionalism.

Domain Report

Domain registration dynamics in Brazil and around the world

The Regional Center for Studies on the Development of the Information Society (Cetic.br), department of the Brazilian Network Information Center (NIC.br), carries out monthly monitoring of the number of country code Top-Level Domains (ccTLD) registered in countries that are part of the Organisation for Economic Co-operation and Development (OECD) and the G20.[7] Considering members from both blocs, the 20 nations with the highest activity sum more than 91.57 million registrations. In November 2023, domains registered under .de (Germany) reached 17.65 million, followed by the United Kingdom (.uk), China (.cn), and Netherlands (.nl), with 9.40 million, 7.97 million and 6.30 million registrations, respectively. Brazil had 5.25 million registrations under .br, occupying 6th place on the list, as shown in Table 1.[8]

[7] Group composed by the 19 largest economies in the world and the European Union. More information available at: https://g20.org/

[8] The table presents the number of ccTLD domains according to the indicated sources. The figures correspond to the record published by each country, considering members from the OECD and G20. For countries that do not provide official statistics supplied by the domain name registration authority, the figures were obtained from: https://research.domaintools.com/statistics/tld-counts. It is important to note that there are variations among the date of reference, although the most up-to-date data for each country is compiled. The comparative analysis for domain name performance should also consider the different management models for ccTLD registration. In addition, when observing rankings, it is important to consider the diversity of existing business models.

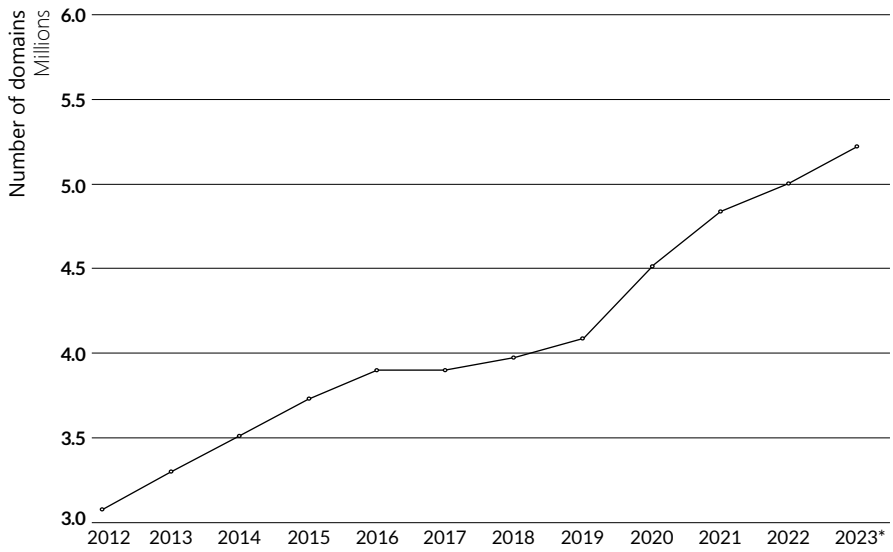
Table 1 – TOTAL REGISTRATION OF DOMAIN NAMES AMONG OECD AND G20 COUNTRIES

Position	Country	Number of domains	Date of reference	Source (website)
1	Germany (.de)	17,658,995	01/12/2023	https://www.denic.de
2	United Kingdom (.uk)	9,408,517	31/10/2023	https://www.nominet.uk/news/reports-statistics/uk-register--statistics-2023/
3	China (.cn)	7,972,073	01/12/2023	https://research.domaintools.com/statistics/tld-counts/
4	Netherlands (.nl)	6,306,574	01/12/2023	https://stats.sidnlabs.nl/en/registration.html
5	Russia (.ru)	5,366,922	01/12/2023	https://cctld.ru
6	**Brazil (.br)**	**5,252,464**	**30/11/2023**	**https://registro.br/dominio/estatisticas/**
7	Australia (.au)	4,230,422	01/12/2023	https://www.auda.org.au/
8	France (.fr)	4,126,796	29/11/2023	https://www.afnic.fr/en/observatory-and-resources/statistics/
9	European Union (.eu)	3,668,198	01/12/2023	https://research.domaintools.com/statistics/tld-counts/
10	Italy (.it)	3,506,689	01/12/2023	http://nic.it
11	Canada (.ca)	3,380,950	01/12/2023	https://www.cira.ca
12	Colombia (.co)	3,329,819	01/12/2023	https://research.domaintools.com/statistics/tld-counts/
13	India (.in)	2,947,072	01/12/2023	https://research.domaintools.com/statistics/tld-counts/
14	Switzerland (.ch)	2,563,083	15/11/2023	https://www.nic.ch/statistics/domains/
15	Poland (.pl)	2,545,417	01/12/2023	https://www.dns.pl/en/
16	Spain (.es)	2,097,049	29/11/2023	https://www.dominios.es/dominios/en
17	United States (.us)	1,950,475	01/12/2023	https://research.domaintools.com/statistics/tld-counts/
18	Portugal (.pt)	1,771,971	01/12/2023	https://www.dns.pt/en/statistics/
19	Japan (.jp)	1,754,320	01/12/2023	https://jprs.co.jp/en/stat/
20	Belgium (.be)	1,737,747	01/12/2023	https://www.dnsbelgium.be/en

Collection date: December 1, 2023.

Chart 1 shows the performance of .br since 2012.

Chart 1 – TOTAL NUMBER OF DOMAIN REGISTRATIONS FOR .BR – 2012 to 2023*



* Collection date: November 30, 2023.
Source: Registro.br
Retrieved from: https://registro.br/dominio/estatisticas

In November 2023, the five generic Top-Level Domains (gTLD) totaled more than 189.07 million registrations. With 158.33 million registrations, .com ranked first, as shown in Table 2.

Table 2 – TOTAL NUMBER OF DOMAINS AMONG MAIN gTLD

Position	gTLD	Number of domains
1	**.com**	158,334,047
2	**.net**	12,945,357
3	**.org**	10,792,209
4	**.info**	3,679,658
5	**.xyz**	3,325,994

Collection date: December 1, 2023.
Source: DomainTools.com
Retrieved from: research.domaintools.com/statistics/tld-counts

Internet Markers in Brazil

Number of
Domains .br
over 15 years

Year	Domains .br
2009	1,934,935
2014	3,530,463
2019	4,112,223
2023	5,252,464

Date of reference:
November 30 of each year.

Source: Registro.br

Special edition:

Internet Sectoral Overview in a decade and a half

This edition wraps up the 15th year of the Internet Sectoral Overview (ISO), a quarterly publication organized by the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of the Brazilian Network Information Center (NIC.br).

Over these years, the Internet in Brazil has made significant progress, multiplying the agendas on the role of technologies for the development of our society. Here we retrieve some of the indicators that reflect the changes that have taken place in the country and present a summary of the main contents published in the 43 editions of ISO.

We would like to emphasize the multisectoral nature of the publication, highlighting the valuable collaboration of representatives of the scientific and technological community, the third sector, the government, enterprises, and international organizations, who have contributed with interviews or articles, to whom we extend our deep gratitude.

Table 1 - THE INTERNET IN BRAZIL IN 15 YEARS[9]

	2009 ISO year 1	2023 ISO year 15
Households with Internet access *Total number of households*	24%	84%
Internet users[10] *Total population*	39%	84%
Individuals who own mobile phones *Total population*	59%	88%
Individuals who used e-government services in the last 12 months *Total population 16 years old or older*	27%	63%
Individuals who purchased products and services on the Internet in the last 12 months *Total population*	9%	42%

[9] The indicators are derived from the 2009 and 2023 editions of the ICT Households survey.

[10] A "user" is defined as someone who has been using the Internet for less than three months at the time of the interview, as defined by the International Telecommunications Union (ITU).

The ISO in 15 years

Since its first edition, ISO has published institutional content, such as the "Domain Report," which periodically publishes the total number of country code Top-Level Domain (ccTLD) registrations, including .br, and "Answer to your questions," which summarizes curiosities and information about the Internet and digital technologies.

In addition, throughout its 43 editions, ISO has published 51 interviews, 41 original articles, and 14 republished articles, featuring content produced by 143 authors connected to around 80 institutions. Considering the first author of the 106 published articles, 6% are from the corporate sector; 10% from the government sector; 18% from international organizations; 19% from the third sector; 27% from the scientific and technological community; and 20% from various NIC.br departments, demonstrating the institution's commitment to understanding the effects of digital transformation on different segments of society. It is also worth noting that just over half (57%) of the first authors are Brazilian. The remainder (43%) are foreigners from 23 different countries. In this group of 24 countries, 12 are from the Global North and 12 from the Global South, with six of them being from Latin America, five from Africa, and one from Asia.

A brief analysis of the topics discussed at the ISO reveals the changes and still-present agendas on the impact of digital technologies on society during this period. At the beginning of the 2010s, the editions covered the need to present the general characteristics and functioning of the Internet in Brazil. The potential of LAN gaming centers for digital inclusion, the advent of social networks, the characteristics of the Web in Brazil, and the infrastructure for Internet provision in the country were some of the topics published in the early years of ISO.

In the second half of the 2010s, the universalization of Internet access by the population continued to be explored, combining analyses of the opportunities and challenges for the digitalization of different economic and social sectors. In addition, topics such as smart cities, citizen participation in the digital age (e-participation), e-waste, and Big Data for development were also presented. In recent years, the inequalities associated with information and communication technologies (ICT) during the COVID-19 pandemic, Artificial Intelligence (AI), privacy and personal data protection, governance, and the data economy have all been addressed. Many of them should still generate good debates for the ISO in the future.

While broad and diverse, the set of authors and content has a common trait: A cross-cutting concern with the opportunities and challenges posed by digital technologies, in order to promote debates for an increasingly better Internet in Brazil.

PRIVACY AND PERSONAL DATA PROTECTION IN THE GOVERNMENT

With the passing of the Brazilian General Data Protection Law (LGPD), Brazilian government organizations at different levels have had to adapt and implement actions to comply with it. In 2021, 28% of local governments and 59% of federal and state government organizations stated they had an area or person responsible for procedures and policies for the collection, storage, or use of personal data or the implementation of the LGPD.[11] The results below show two actions implemented by local governments and federal and state government organizations.

ACTIONS RELATED TO THE LGPD IMPLEMENTED BY LOCAL GOVERNMENTS AND FEDERAL AND STATE GOVERNMENT ORGANIZATIONS (2021)

Total number of local governments and federal and state government organizations

	Local governments[12]	Federal and state government organizations[13]			
		Executive Branch	Legislative Branch	Judiciary Branch	Public Prosecutor's Office
Appointed the Data Protection Officer (DPO)	14%	34%	40%	81%	73%
Made online customer service channels available for citizens to send messages regarding the use of their personal data	31%	33%	43%	75%	45%

[11] Data from the ICT Electronic Government 2021 survey by Cetic.br|NIC.br. Available at: https://cetic.br/en/pesquisa/governo-eletronico/

[12] Other actions related to the LGPD in local governments collected by the ICT Electronic Government 2021 are available at: https://cetic.br/en/tics/governo/2021/prefeituras-regiao-porte/G3/

[13] Other actions related to the LGPD in federal and state government organizations collected by the ICT Electronic Government 2021 are available at: https://cetic.br/en/tics/governo/2021/orgaos/G3/

/Credits

TEXT

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ABOUT CETIC.br

The Regional Center for Studies on the Development of the Information Society – Cetic.br (https://www.cetic.br/en/), a department of NIC.br, is responsible for producing studies and statistics on the access and use of the Internet in Brazil, disseminating analyzes and periodic information on the Internet development in the country. Cetic.br acts under the auspices of UNESCO.

ABOUT NIC.br

The Brazilian Network Information Center – NIC.br (http://www.nic.br/about-nic-br/) is a non-profit civil Entity in charge of operating the .br domain, distributing IP numbers, and registering Autonomous Systems in the country. It conducts initiatives and projects that bring benefits to the Internet infrastructure in Brazil.

ABOUT CGI.br

The Brazilian Internet Steering Committee – CGI.br (https://cgi.br/about/), responsible for establishing strategic guidelines related to the use and development of the Internet in Brazil, coordinates and integrates all Internet service initiatives in the country, promoting technical quality, innovation, and dissemination of the services offered.

*The ideas and opinions expressed in the texts of this publication are those of the respective authors and do not necessarily reflect those of NIC.br and CGI.br.

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