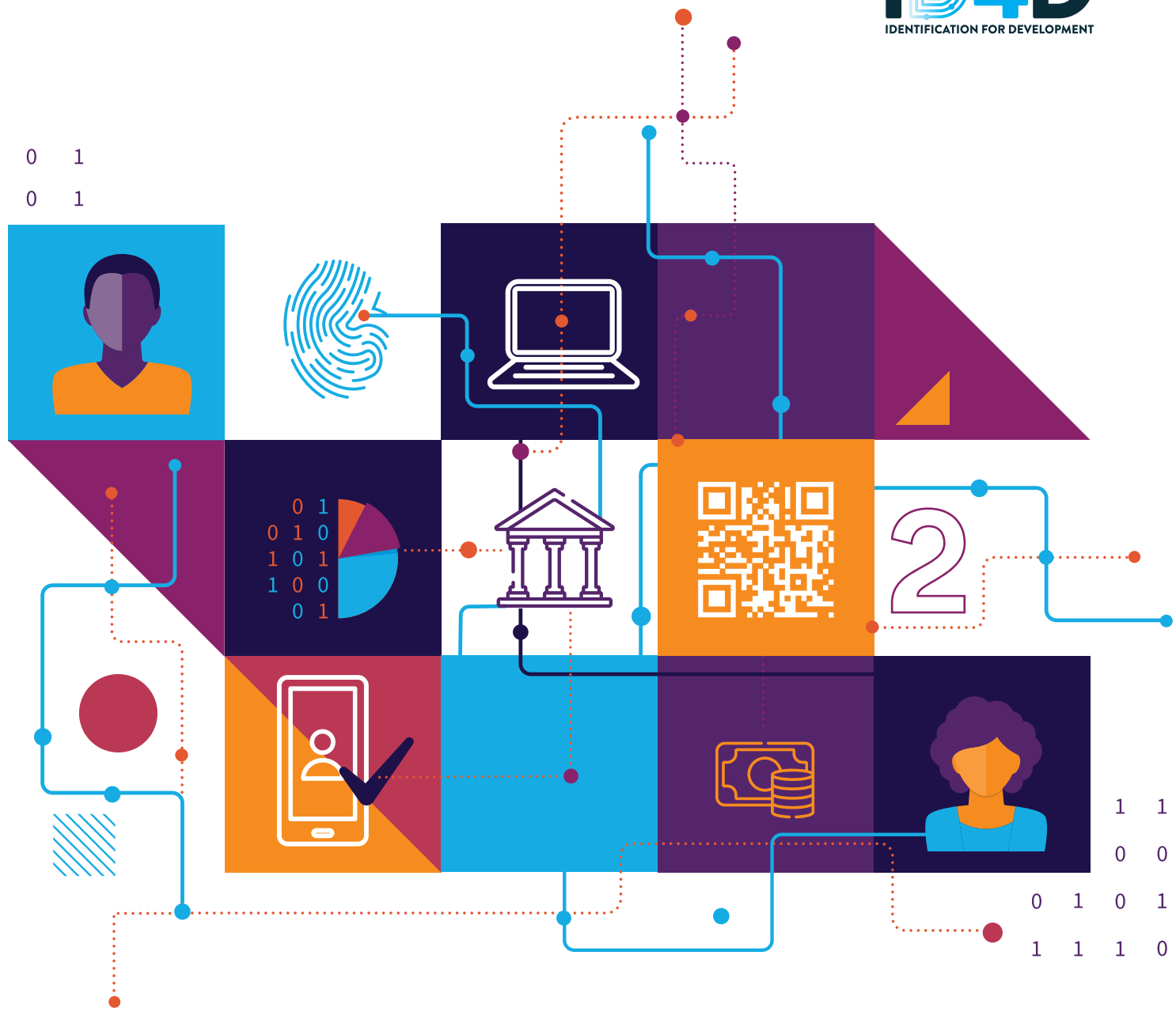


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ID4D GLOBAL DATASET 2021

Volume 2 | Digital Identification Progress & Gaps

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ID4D

GLOBAL DATASET 2021

Volume 2 | Digital Identification Progress & Gaps

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OTHER TITLES IN THE ID4D GLOBAL DATASET 2021 SERIES:

Volume 1: Global ID Coverage Estimates

Volume 3: Trends in Identification for Development

CONTENTS

ABSTRACT	v
ABOUT ID4D	vi
ACKNOWLEDGEMENTS	vii
EXECUTIVE SUMMARY	viii
1. INTRODUCTION	1
Context	1
Purpose	2
Scope and Limitations	2
2. MEASURING DIGITAL ID CAPABILITY	4
Unpacking “Digital ID”	4
Data and Methodology	7
3. RESULTS & DISCUSSION	12
Digital Data	12
Digital Verification	13
Online Digital Identity	14
4. LIMITATIONS	16
5. CONCLUSION	18
REFERENCES	19
APPENDIX 1. COUNTRY DATA TABLE	21

FIGURES

Figure 1. Number of People Without Access to Digital Identification	xii
Figure 2. Evolution of ID Ecosystems	5
Figure 3. Digital Capabilities Across Three Dimensions	7

TABLE

Table 1. Summary of Data Sources by Indicator	8
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ABSTRACT

This paper provides a snapshot of the digital capabilities of government-recognized identification (ID) systems across three dimensions: (i) digitally stored records; (ii) digital verification or authentication for in-person transactions; and (iii) digital authentication for online transactions. This paper and data are part of a three-volume series that began with the 2021 ID4D Global Dataset and seek to contribute to a more precise typology and understanding of global trends in the digitalization of ID systems. This analysis is based on primary data collection from ID authorities (2021-2022), data from the 2021 World Development Report's Global Data Regulation Survey, and desk research.

The paper finds that in more than 90 percent of countries globally, ID systems now rely on digital data; identification systems across at least two-thirds of countries offer at least a basic type of digital identity verification or authentication for in-person transactions; and about 40 percent of countries—primarily high-income ones—have a digital ID ecosystem that enables fully remote, secure authentication for online transactions. When combined with data on the number of people without an official proof of identity, these findings suggest that, in addition to the estimated 850 million people globally who do not have official identification, many more do not have official, digitally verifiable identity credentials or credentials that would allow them to securely transact in online contexts. Our analysis suggests that at least 1.1 billion people do not have a digital record of their identity; 1.25 billion people do not have a digitally verifiable identity; and 3.3 billion people do not have access to a government-recognized digital identity to securely transact online. We hope this data provides a useful starting point for further unpacking ID systems' digital capabilities and how they are used in practice.



ABOUT ID4D

The World Bank Group's Identification for Development (ID4D) Initiative harnesses global and cross-sectoral knowledge, World Bank financing instruments, and partnerships to help countries realize the transformational potential of identification (ID) systems, including civil registration (CR). The aim is to enable all people to exercise their rights and access better services and economic opportunities in line with the Sustainable Development Goals. This is especially important as countries transition to digital economies, digital governments, and digital societies, where inclusive and trusted means of verifying identity are essential to ensure accessibility and data protection.

ID4D operates across the World Bank Group with global practices and units working on digital development, social protection, health, financial inclusion, governance, gender, and data protection, among others. To ensure alignment with international good practices for maximizing development benefits and minimizing risks, ID4D is guided by the 10 *Principles on Identification for Sustainable Development*, which have been jointly developed and endorsed by the World Bank Group and over 30 global and regional organizations (see <http://idprinciples.org>).

ID4D makes this happen through its three pillars of work:

1. Thought leadership, research, and analytics to generate evidence and fill knowledge gaps
2. Global public goods and convening to develop and amplify good practices, foster collaboration across regional and global stakeholders, and support knowledge exchange
3. Country and regional action through financial and technical assistance to realize inclusive and trusted identification and civil registration systems

The work of ID4D is made possible through support from the Bill & Melinda Gates Foundation, the UK Government, The French Government, The Norwegian Agency for Development Cooperation (Norad), and the Omidyar Network.

To find out more about ID4D and access our other publications, visit www.id4d.worldbank.org.

ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The ID4D Global Dataset estimates that as of 2021, 850 million people globally do not have official proof of their identity (Clark, Metz, and Casher 2022)—however, this figure only captures one facet of the global identification challenge. Beyond the coverage of civil registration (CR) and identification (ID) systems, good system design and governance are also critical to ensure that systems can maximize their development impact while minimizing risks. The *Principles on Identification for Sustainable Development* identify several important system characteristics, such as the establishment of a “trusted—unique, secure, and accurate—identity” and creating “a responsive and interoperable platform”, which require a system with robust digital capabilities (World Bank 2022a). Effective digitalization is also critical for enabling people to prove who they are securely, reliably, and conveniently in a multitude of in-person and online settings and to ensure that systems can meet people’s and service provider’s needs in today’s world.

The application of digital technologies in the context of identification is frequently referred to as digital ID—however, the variation in system capability is often obscured by this broad term. Digital ID or digital identity have been used in many ways across countries, institutions, and publications, and there is no universally recognized or accepted definition. This note unpacks this concept by focusing on the outcomes that can be achieved with the digitalization of government-recognized ID: (a) records being stored digitally, rather than on paper (“**digital data**”); (b) digital verification or authentication for in-person transactions (“**digital verification**”), and (c) digital authentication for online transactions (“**online digital identity**”)¹.

This note and data are part of a three-volume series² that began with the 2021 Global ID Coverage Estimates and contribute a more precise typology and measurement of ID system digitalization. The data was collected using three sources: (i) data provided by ID authorities (2021–2022); (ii) data provided by in-country legal experts as part of the 2021 World Development Report’s (WDR) Global Data Regulation Survey; and (iii) desk research. While every effort was made to ensure the accuracy and completeness of the data for this report, ID systems and digital capabilities are rapidly evolving, and this analysis provides only a snapshot as of July 2022.

1 The terms in brackets are the shorthand used in this note to ease readability. For the full definitions, see Section 3.

2 The first volume, “Global ID Coverage Estimates,” uses new data and modeling to estimate the number of globally who do (and do not) have official proof of identity. This second volume, “The Digital Identification Gap,” presents data on the digital maturity and capabilities of the world’s ID systems. The third volume, “Trends in Identification for Development,” enhances that snapshot by exploring many more facets of each country’s ID system.

Digitalization is a two-sided coin. When complemented by policies and practices to ensure inclusivity and trust—as set out in the *Principles on Identification for Sustainable Development*—the digitalization of CR and ID systems can help drive efficiency, transparency, and convenience for users in the public and private sectors. Digitalization can strengthen the security and reliability of identity documents and enable new modes of identity verification and authentication that allow for higher-assurance transactions to be completed quicker and in a more user-friendly way. When digital identification systems are designed as digital public infrastructure—that is, as open resources for the public and private sector to innovate on top of—there is even more scope for benefits to multiply, such as creating new opportunities for digital service delivery and growing the digital economy, including e-commerce and online work (Desai et al. 2023).

At the same time, digitalization also introduces new risks, including the potential exclusion of certain vulnerable individuals and groups due to gaps in digital connectivity and skills or technology failures, the potential for data breaches and misuse on an extended scale, excess dependency on or lock-in by vendors, and financially unsustainable investments in high-tech solutions that are not well-suited to local contexts. As systems’ digital capabilities advance, these risks need to be carefully managed (World Bank 2019a).³

THREE DIMENSIONS OF DIGITAL CAPABILITY

Yet despite these potential benefits and challenges—and growing recognition that being able to prove your legal or official identity online is important—there has been no commonly accepted understanding of the terms “digital ID” or “digital identity.” Indeed, such terms have been used to describe systems at varying levels of digitalization, development, and capacity, and to refer both to systems designed for in-person and online use. **As a step forward, the goal of this note is to unpack and measure various types of digitalization globally, to enable a more nuanced discussion about the current gaps and future directions.**

This note therefore examines the digital capabilities of official or “government-recognized” ID systems across three dimensions of digitalization:⁴

- a) **Digital data:** Records are stored in a digital format, rather than in paper records or ledgers.
- b) **Digital verification:** Identities and/or identity information (e.g., name, date of birth, etc.) can be verified or authenticated using digital—rather than manual—means in the context of in-person transactions.⁵

3 See, for example: <https://id4d.worldbank.org/guide/creating-good-id-system-presents-risks-and-challenges-there-are-common-success-factors>

4 For a full definition of these three indicators, see Section 3 below. Note that digital ID or authentication systems used by the private sector but not recognized as official proof of identity (e.g., Facebook, Google, or Apple log-in credentials) are outside the scope of this note.

5 For the purposes of this note, the definition of ‘verification’ and ‘authentication’ follow those laid out in the Glossary of the ID4D Practitioners’ Guide: “Although authentication and verification are related and often used interchangeably, [. . .] they can be distinguished by whether the process involves determining the veracity of particular attributes (verification) or ensuring that a person is the “true” owner of an identity or credential (authentication).” For more details, see: <https://id4d.worldbank.org/guide/glossary>.

- c) **Online digital identity:** Digital credentials provide the ability to securely authenticate identities remotely in order to access online services and transactions.

For the first two dimensions (digital data and digital verification), we examine the digital capabilities of each country's foundational ID system, which is typically the primary system used to provide general proof of identity for a variety of transactions.⁶ For the third dimension (online digital identity), we look *either* at the foundational ID system, or, where relevant at the parallel ecosystems of digital ID providers that some countries have built to provide government-recognized forms of digital identity online. Appendix 1 describes the particular ID systems considered for each country.

MAIN FINDINGS

In recent years, many countries⁷ have embarked on efforts to modernize their ID systems, with the goal of creating a digital platform and issuing credentials that can support a variety of transactions and services. As a result, almost all countries now have foundational ID systems underpinned by digital data (i.e., electronic identity records), and the number that offer digital identity verification or authentication for publicly administered services and programs, banks, and other service providers is rising rapidly, although their availability in low- and lower-middle income countries remains limited. Digital identity solutions that enable secure authentication for online services and transactions are still a rarity in low- and middle-income countries, but are available in more than 80 percent of high-income ones.

- **Digital data:** As of mid-2022, 186 (out of 198)⁸ countries have a foundational ID system where identity records are stored in a digital format. While this is a vast majority, it still leaves around 375 million people who live in countries where identity records are predominantly paper-based, making them difficult or impossible to verify or replace, and particularly susceptible to damage, loss, or fraud.
- **Digital verification (in-person):** Foundational ID systems in at least 132 countries—or about two-thirds of countries globally—support some form of digital identity verification or authentication in the context of in-person services and transactions. However, the functionality, availability, and use of digital verification or authentication services—along with the levels of assurance and data privacy and protection

6 A foundational ID system is an identification system primarily created to manage identity information for the general population and provide credentials that serve as proof of identity for a wide variety of public and private sector transactions and services. Common types of foundational ID systems include civil registries, national ID systems, and population registers (<https://id4d.worldbank.org/guide/glossary>). For the 22 countries without a foundational ID system that issues credentials to adults, we measure the digital capability of the civil registration (CR) system.

7 The term country, as used in this note, does not imply political independence but instead refers to any territory for which authorities report separate social or economic statistics.

8 The ID4D Global Dataset covers 198 countries, excluding some smaller territories and jurisdictions.

safeguards they provide—varies substantially. For instance, ID systems in some countries offer a service that allows service providers to digitally verify whether an ID number is valid and that it matches a certain name or date of birth, but there are no digital means to ascertain whether the person claiming that identity (e.g., by presenting an ID card) is its rightful owner. Our ability to provide more in-depth analysis about the quality, including the ease-of-use, of digital verification and authentication is constrained by the lack of reliable cross-country data.

- **Online digital identity:** In 81 countries (51 of which are high-income), people can obtain at least one government-recognized digital identity credential that allows for remote authentication to access online services and transactions. This leaves over 3.3 billion people (or 2.2 billion people over the age of 15) living in countries without an option to prove their official identity online. This capability gap may limit the deployment or security of government services online, as well as private sector services that require higher levels of identity assurance (e.g., in the banking sector). Even in countries where an online digital identity solution is available, their use varies significantly, from very high uptake in Scandinavian countries and Estonia, to far fewer users per capita in much of Latin America, Central Asia, and some European countries like Germany.

When combined with data on the number of people without any official proof of identity (Clark, Metz, and Casher 2022),⁹ these findings suggest that, in addition to the estimated 850 million people globally who do not have official identification, many more do not have *digitally verifiable* identification.

In addition to the 850 million without any ID, we estimate that at least:

- **1.1 billion people** do not have a digital record of their identity;
- **1.25 billion people** do not have a digitally verifiable identity; and
- **3.3 billion people** do not have access to a government-recognized digital identity to securely transact online.

⁹ See <https://id4d.worldbank.org/global-dataset> for downloadable data.

Figure 1. Number of People Without Access to Digital Identification



DISCUSSION

Investing (wisely) in digital systems and capabilities is necessary to serve people, government, and businesses in a rapidly digitalizing world. Moving from paper-based to digitalized ID systems and enabling secure and user-centric modes of digital identity verification and authentication are important for greater trust, security, efficiency, and convenience in transactions. They can generate savings for both the public and the private sector and reduce the time and effort it takes for ordinary people to access a service or transaction (see World Bank 2018a for a detailed analysis). This note provides insight into the scale of this issue—billions of people around the world (as well as governments and firms) can benefit from improved digitalization of ID systems.

However, not all digital capabilities and digitalization efforts are created equal when it comes to supporting inclusive and effective access to identification and service delivery. Even if a country has systems that allow for digital identity verification or authentication or can issue digital identity credentials for online transactions, this does not necessarily mean that it is “doing better” in terms of providing legal identity for all or promoting

efficient and people-centric service delivery. Indeed, digitalized systems that are poorly implemented may be just as problematic as paper-based systems. Even in the 130+ countries where at least basic digital identity verification or authentication services are available, or the 80 with an online digital identity solution, continued improvements are needed to ensure alignment with good practices for inclusion, data protection, and privacy and to ensure that they maximize convenience while being operationally and financially sustainable.¹⁰ Although assessing the *quality* of digital ID systems is outside the scope of this note and dataset (and presents multiple measurement challenges) it is therefore an important area for future research.

Furthermore, digital identity—whether in-person or online—is not a panacea, and is not necessary or appropriate in all contexts. Exclusion and privacy risks should be carefully examined, along with practical considerations, such as the availability of internet connectivity, electricity, and capacity to operate and maintain associated devices and systems. The latest technology or even a technology that is widely used may not be the best fit in every context. Similarly, the verification or the authentication mechanism that offers the highest level of assurance may not be the most appropriate in all contexts. For instance, biometric-based digital authentication may offer higher levels of assurance and reduce the risk of a fraudulent identity but it can also increase the cost and inconvenience to ID holders and relying parties.

For services where digital identity verification or authentication mechanisms are deployed, it is important that providers consider the requirements and risks carefully, and that appropriate grievance redress and exception handling mechanisms are put in place to ensure that technology failures do not lead to denial of services. Whether in-person or online, digital verification and authentication also require stronger safeguards for personal data protection and privacy, including laws and regulations, independent oversight bodies, and cybersecurity regimes, as well as privacy preserving technologies that make it easier for people to access and correct their data, and to monitor how it is being used by governments and third parties and to hold these actors accountable for misuse.¹¹

Understanding gaps in digital capabilities of ID systems and their impact requires more transparency and concerted monitoring and evaluation efforts. Few identity providers publish detailed information about the digital capabilities of their systems and their use, and even fewer invest in measuring their impact on service delivery and people's lives. Information about core system capabilities, including how it processes and safeguards personal data, should be readily available. Digitalized systems also offer opportunities for measuring the performance of CR and ID services and can help the entities implementing them to track progress toward their goals and respond more rapidly when something is not working well. To achieve this, countries and identity providers should invest in monitoring, evaluation, and learning (MEL) strategies that facilitate effective data collection on the functioning and impact of new capabilities.

¹⁰ For specific recommendations on improving the digital capabilities of ID systems, see the ID4D Practitioners' Guide (World Bank 2019a; <https://id4d.worldbank.org/guide>) and other relevant publications under the 'Tools' and 'Knowledge's section of the ID4D website (<https://id4d.worldbank.org/>).

¹¹ See, for example: World Bank 2018b; Cavoukian 2011.

DIMENSIONS OF DIGITAL ID



INTRODUCTION

CONTEXT

Official identification (ID) systems and credentials are used across the globe to facilitate access to services and transactions. Today, almost all countries have put in place at least one foundational ID system (such as a civil registration system, national ID system, or a population registry) that provides general proof of “legal” or “official” identity through a variety of credentials, such as birth certificates, national ID cards, family books, etc. These systems and credentials play a critical role in establishing trust in transactions between and among people, government, and businesses.

The digital capabilities of ID systems are evolving. When civil registration and ID systems were first introduced in most countries (which in some cases, like Japan or France, was several centuries ago), they were “paper-based.” That is, they relied on manual

record-keeping with individuals’ identity information recorded in ledgers or other types of physical files. In the last 30 years, digital technologies have become widespread in civil registration and ID systems, from the use of computers—and now tablets or mobile phones—for data entry and capture, to the use of sophisticated software and algorithms to de-duplicate identities and manage electronic records, to the issuance of physical credentials with embedded digital features, such as barcodes or chips, or digital credentials, such as mobile IDs.

These changes reflect emerging needs and drive innovation in how people prove who they are and how identity claims are verified. In many places, manual processes that rely on comparing a person with the photo printed on their ID card or a similar document are being replaced by those relying on digital data and automation. Such data may be stored locally, e.g., on an ID card with a barcode or chip that is read using a special device or mobile phone app, or in a digital database that can be queried remotely. Digital identity verification (i.e., validating the accuracy of certain identity credentials or attributes) and authentication (i.e., ensuring that an

individual is the person who they claim to be) can provide a high degree of assurance about a person's identity. This added assurance is important for high-value and high-risk transactions, e.g., when sensitive information or a larger payment is concerned.

As transactions and services are moving online, the demand for solutions that enable people to verify their real-world identity without the need for in-person interactions has increased exponentially. In response, many ID systems now provide digital identity credentials and services (such as mobile IDs, digital certificates, etc.) that enable automated and remote authentication for access to government services and entitlements.¹² In some cases, countries have implemented official “digital identity” systems as *part of* existing foundational systems; in others, these systems have been built *on top of* or *in parallel to* foundational systems. Concerns over centralized storage of data have also spurred new models for providing and verifying official (and other) digital identities. This includes “federated” models for digital identification that involve multiple authorized public sector and private sector digital identity providers, as well as “decentralized” models such as verifiable digitally-enabled credentials (World Bank 2022b).

PURPOSE

The primary goal of this note is to unpack and measure various dimensions of ID system digitalization on a global scale. Despite decades of attention to the digitalization of ID systems, and growing recognition of the importance of digital authentication for trusted online transactions, there has been no commonly agreed upon definition of “digital ID” or “digital identity.” Across or within governments, development actors, academia, and civil society, such terms have been used to describe systems at varying levels of digitalization, development, and capacity, and to refer both to systems designed

for in-person and online use. While this note does not solve definitional debates, it helps to unpack and categorize the different types of digital functionalities and capabilities, which we hope will enable a more nuanced discussion about the current gaps and future directions.

SCOPE AND LIMITATIONS

This note provides a global snapshot of the digital capabilities of foundational ID systems, and (where relevant) other systems providing official ID for online transactions. It provides global and economy-level data and insights on the availability of digital record-keeping, digital identity verification and authentication services used in the context of in-person transactions, and government-recognized digital identity solutions that enable authentication in online contexts. It does not cover “non-official” forms of online identity that are used primarily by private companies (e.g., logging-in with Google, Facebook, or Apple ID), nor does it cover various functional ID systems provided by governments for specific purposes (e.g., voter IDs, social security numbers) that may also have digital data storage and/or issue credentials for in-person or online transactions.

Though beyond the scope of this note, it is important to consider this data and analysis in conjunction with the accessibility and trust features of identification ecosystems at the country and global level. On its own, a system with more advanced digital capabilities or a country where such systems operate, does not always imply a *better* system from a development perspective. While the digitalization of records and identity verification and authentication processes can support multiple development outcomes, it may also create or exacerbate risks related to exclusion, data protection, and sustainability. While such risks are inherent in any system that manages personal information, digitization can increase their scale and

¹² For an illustration of the evolution of digital identity credentials, see World Bank 2018c (a case study on Mobile ID in Moldova).

frequency. Consequently, investments in an ID system's digital capabilities should be accompanied by the deployment of appropriate legal, operational, and technical safeguards; where these are missing, greater digitalization may result in suboptimal outcomes.¹³

For this reason, while this note helps to estimate the scale of global digitalization, and remaining gaps, it should *not* be interpreted as implying that any particular digitalized ID system is categorically “better” than another less digitalized ID system.

¹³ For examples of relevant safeguards, see World Bank 2019a (specifically <https://id4d.worldbank.org/guide/assess-risks>); Clark and Daly 2019.

2

MEASURING DIGITAL ID CAPABILITY

UNPACKING “DIGITAL ID”

The evolution of ID ecosystems, and the role that digital capabilities can play across each, is illustrated by Figure 2. Initial efforts and investments typically focus on ensuring that everyone has legally-recognized proof of who they are—which includes providing civil registration from birth, as well as additional credentials for adults. More than 175 countries have established a national ID system, population registry, or other foundational ID system for this purpose, which typically serves as the “authoritative source”¹⁴ of core identity data. Other countries use a combination of

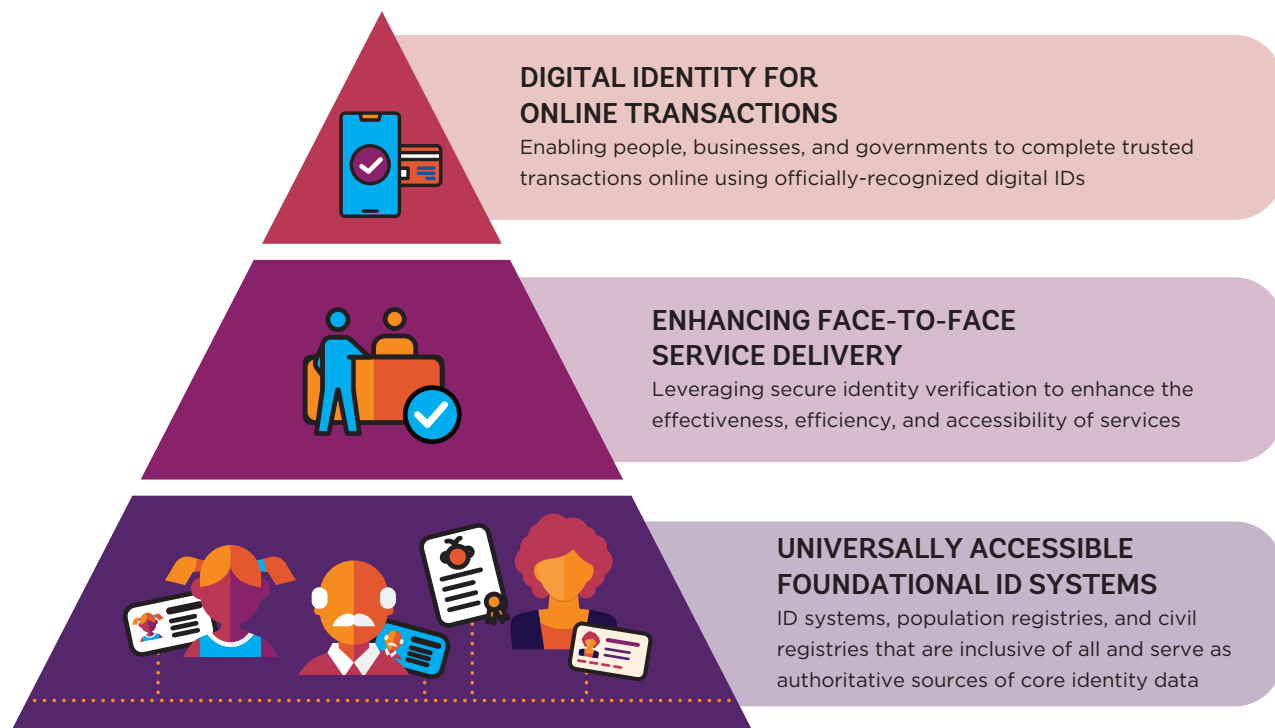
civil registries and functional ID systems (such as those issuing passports, driver licenses, and voter ID cards) to satisfy basic identification needs.

For identity records to be easy to retrieve, query, or quality control, storing information digitally (i.e., in a database) is an important pre-condition. Historically, civil registration and identity records were kept in paper registers or ledgers, oftentimes with only one copy in the locality of registration. Such paper-based records present a number of challenges, including: high risks of loss or damage (e.g., floods, fires, intentional destruction); difficulties verifying whether a record exists and the information it contains; difficulties in replacing a lost or damaged credential;¹⁵ difficulties reliably matching the record

14 An authoritative source of identity information is a repository or system that contains attributes about an individual and is considered to be the primary or most reliable source for this information. In the case that two or more systems have mismatched or have conflicting data, the data within the authoritative data source is considered the most accurate.

15 For example, when records are stored in a physical ledger or file, verifying this record or retrieving a copy that would serve as a basis for a new credential would require someone to know the exact physical location of the ledger or file and typically for that person be physically present at that location.

Figure 2. Evolution of ID Ecosystems



to a real-life person; difficulties keeping a trusted audit trail of when and by whom records were created, altered, or removed; and requiring a large amount of physical space to store. Digital record management and storage—when thoughtfully and responsibly designed and implemented—can address many of these challenges and open the door for more advanced digital capabilities.

Similarly, enabling digital identity verification and authentication for *in-person* transactions can have benefits for streamlining service delivery and reducing certain types of fraud. When people and service providers exclusively rely on physical credentials and manual verification processes, the veracity of the documents and information presented can be difficult to determine. As a result, people often need to carry multiple documents or obtain recently issued or certified copies to prove their identity. Service providers must then spend more time and resources verifying these claims, cross-checking

documents (often manually) and monitoring fraud. Thus, verification and authentication that rely on manual processing often imply added cost and effort for individuals, government, and the private sector. Digital verification of identities or certain attributes can reduce these costs and enhance the convenience and speed for many transactions by providing higher levels of assurance or trust. This has the potential to simplify services and transactions, making them faster and easier (e.g., by reducing the number of physical documents to be presented) and decrease the cost of onboarding for people, government, and businesses.

A further milestone in the digital evolution is the ability to prove one’s official identity *remotely*, in the context of online transactions. This is usually enabled by two processes. The first is binding a person to a (digital) credential after verifying their legal or official identity. The second is the availability of a digital authentication mechanism, usually involving multiple authentication factors, that allows the person

to authenticate their identity securely and remotely each time they transact. Such forms of digital ID enable people to complete transactions over the Internet that require some form of government-recognized identification (e.g., applying for social assistance, registering a business, or opening a bank account). Completing these transactions from the comfort of home, without having to visit any office in-person or provide physical documents, can generate significant savings for users and service providers, and make new types of service delivery possible (e.g., for people with limited mobility, or living in remote areas).

Importantly, official forms of digital identity for online services need not be provided through a single system or by a single—or public—entity. For instance, in countries like Canada, Denmark, Sweden, and Uruguay, high-assurance digital identity credentials and associated digital authentication services are provided by multiple government-certified entities, including ones in private sector. Digital verification or authentication services for in-person transactions may also rely on multiple data sources and may not be provided by the same entity responsible for the foundational ID system.

To provide a snapshot of the digital capabilities of ID systems across countries, this note attempts to categorize countries' foundational and other government-recognized ID systems along these three dimensions, specifically:

1. **Digital data:** Records are stored in a digital format, rather than in paper records or ledgers.
2. **Digital verification and/or authentication for in-person transactions (“digital verification”):** Identities and/or identity information (e.g., name, date of birth, etc.) can be verified or authenticated using digital—rather than manual—means in the context of in-person transactions.
3. **Digital authentication for online transactions (“online digital identity”):** Digital credentials provide the ability to securely authenticate identities remotely and to access online services and transactions.

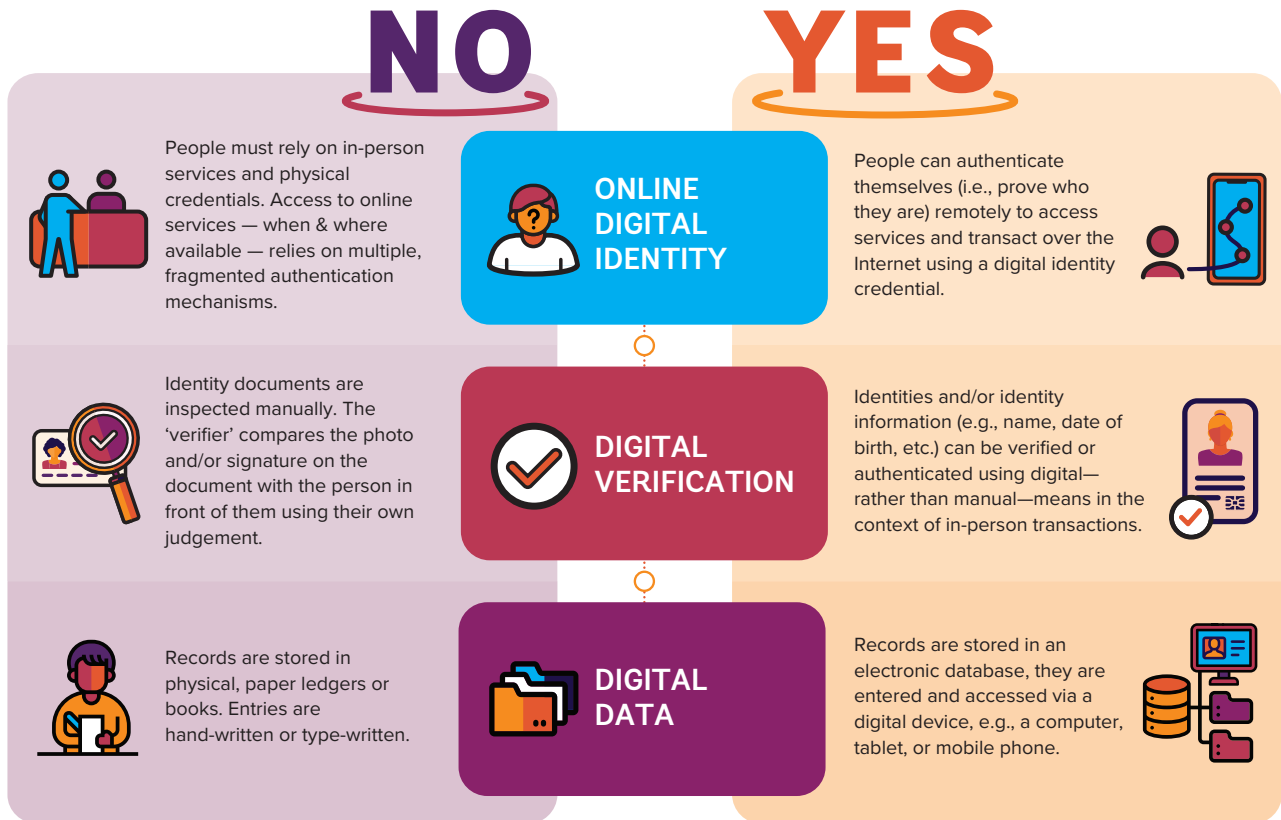
For easier readability, we use the following shorthand terms for the three dimensions of digital capability throughout this note:

- (1) **“digital data”**,
- (2) **“digital verification”** and
- (3) **“online digital identity”**.

Measuring and distinguishing between these categories is a challenging exercise, and we offer the following clarifications and caveats:

- **These dimensions do not necessarily imply a required sequence.** Having digital data is typically a pre-requisite for digital verification and authentication services. However, having digital verification or authentication enabled for *in-person* services is not necessarily a pre-requisite for digital identity solutions for *online* services.
- **Multiple systems and architectures may be represented in these measurements.** Although the mechanisms to enable authentication for in-person and online contexts can be similar, they serve very different functionalities/outcomes in terms of service delivery. Furthermore, the systems that provide digital authentication for online services (dimension 3) are increasingly different from those providing traditional forms of identity credentials and authentication for in-person transactions (dimensions 1 and 2).
- **Additional data is needed to further parse “digital verification” for in-person transactions.** While available data makes it possible to distinguish systems that provide digital authentication in online contexts, more detailed information is required to reliably differentiate between countries with only basic digital verification capabilities

Figure 3. Digital Capabilities Across Three Dimensions



vs. those that offer true digital authentication for in-person transactions. It is hoped that with improving data availability, more granular analysis will become possible in the coming years.

across 80 countries; and (iii) desk research relying on official sources, such as government websites, press releases, reports from UN agencies, and other development partners.

DATA AND METHODOLOGY

To determine a system’s digital capabilities along the three dimensions described above, data collection relied on three sources: (i) data provided by ID authorities in response to questionnaires, as part of the ID4D Global Dataset data collection (2021–2022) (ID Authority Questionnaire, or “IDAQ”); (ii) the 2021 World Development Report (WDR) Global Data Regulation Survey (World Bank 2021), which fielded a questionnaire to in-country legal experts

Data collection for this note ended in July 2022; changes to ID systems and credentials that were enacted after July 2022 are thus outside the scope of this analysis. Identity ecosystems and digital capabilities are rapidly evolving, and this analysis therefore provides only a snapshot. Furthermore, while we believe this is the most comprehensive set of data measuring digital ID on a global scale, obtaining accurate data for all countries can also be challenging as many countries do not make information on digital capabilities public. We therefore welcome submissions about updates and corrections.¹⁶

¹⁶ Please send relevant information to id4d@worldbank.org with the subject line “ID4D Global Dataset - Digital Indicators.”

Table 1. Summary of Data Sources by Indicator

Indicators	System(s) Evaluated	Data Sources
1. Digital data	Foundational: national ID system or similar (or for 22 countries where no such system exists, civil registry)	IDAQ, desk research
2. Digital verification	Foundational: national ID system or similar (or for 22 countries where no such system exists, civil registry); for 28 out of 198 economies, there is no data available	IDAQ, desk research
3. Online digital identity	Foundational and/or other government-recognized systems, if applicable	IDAQ, World Development Report (WDR), desk research

Note: "IDAQ" is the ID4D ID Authority Questionnaire.

Indicator 1: Digital Data

Storing records in a digital format (i.e., in a database), rather than using an analog, paper-based system (i.e., ledgers or books), is an important first step in digitalization. The digital data indicator was coded as "Yes" if the country's established ID system uses electronic storage for new records as of mid-2022. For countries where the implementation of a digitalized system/database for identity records was in the pilot stage or otherwise not yet fully operationalized as of mid-2022, the indicator was coded as "No." Where ID and civil registration systems are separate, this indicator codes the ID system only. Thus, for countries where ID records are stored in a digital format, but civil registration records are still paper based (e.g., in Cameroon), the digital database indicator is coded as "Yes."¹⁷ This is the same approach taken in previous versions of the ID4D Global Dataset that included a "digitized ID system" indicator (for example, World Bank 2018d).

Many (but not all) countries that have transitioned to digital records are also in the process of digitizing their past civil registration and ID records. For example, Namibia digitized 4.5 million birth records from the 1980s to 2012 to enable easier record retrieval and identity verification (Centre of Excellence for

CRVS Systems n.d.). Information on the exact share of digitized records (and their quality) can be very difficult to obtain and is often not closely tracked by ID agencies themselves; as a result, it was not possible to differentiate systematically between countries on a global scale based on the *proportion* of digitized records. Therefore, the digital data indicator is coded as a "Yes" for some countries where newly collected data is stored digitally, but where some portion of older records may still be stored in paper ledgers or similar analog formats.

Indicator 2: Digital Verification

Digital identity verification and authentication encompass the use of a wide range of electronic processes and credentials to validate certain identity attributes and to check whether a person is who they say they are. Although authentication and verification are related and often used interchangeably, they can be distinguished by whether the process involves checking the veracity of certain attributes (verification) or ensuring that a person is the "true" owner of an identity or credential (authentication). Traditionally, verification and authentication processes have involved the visual inspection of credentials (commonly ID cards) to determine that they are

¹⁷ For additional details on the status of digitization for civil registration systems globally, see, for instance: the Centre of Excellence for CRVS systems: <https://crvssystemscountry-profiles.org/>; UNICEF: <https://data.unicef.org/crvs/>; UNESCAP/Get in the picture: <https://getinthepicture.org/countries>. <https://www.unicef.org/esa/reports/review-civil-registration-and-vital-statistics-innovations-eastern-and-southern-africa>; UNESCAP/Get in the picture: <https://getinthepicture.org/countries>.

genuine and assess whether the person or their physical signature resembles the photo or signature displayed on the credential. Digital verification and authentication processes can use either: (i) information stored in a digital format locally, such as on a card or token held by the individual; or (ii) information stored and accessible in a digital format remotely, such as in a database. Common examples of digital verification involve scanning a barcode or chip or querying a database to obtain or verify identity data (e.g., name or date of birth). Common examples of digital authentication include providing a credential (such as an ID card or number) in combination with a PIN, one-time password (OTP), biometric (such as fingerprint, face, or iris), or other authentication factor(s) to ensure that this person is who they claim to be.¹⁸

Given data limitations and the diversity of verification and authentication mechanisms and modalities, a broad-based approach was adopted for coding the “digital verification” indicator. Unfortunately, a lack of publicly available data on the specifications and use of foundational ID systems makes it difficult to capture the nuanced spectrum of digital verification and authentication capability. As a result, we have coded this indicator broadly as a “Yes” when there is at least one public and/or private service provider that can use the ID system to verify and/or authenticate a person’s information or identity digitally. Therefore, this indicator should be interpreted as a *lower bound* for the availability and use of digital identity for in-person transactions within a country.

Among the systems that fulfil the basic criterion for this category, there is a wide variation in terms of the levels of automation and assurance that the digital verification and authentication mechanisms offer. Some systems still require a considerable amount of human input and/or discretion while for others the process is fully automated. For example,

being able to verify that an ID number is associated with a certain name and date of birth can help confirm that the identity exists, and that the identity credential issued is a genuine one. However, the service provider stills need to manually assess whether the person presenting the ID is its true owner, or an identity thief. Conversely, using digital authentication mechanisms (e.g., via a PIN + OTP or biometric) provides higher assurance that the person is who they claim to be in cases where this is required.

Countries and systems also differ in terms of how many and what type of service providers (for example, public vs. private sector, specific sectors, and so on) can digitally verify or authenticate their users. In some countries, such as Indonesia, Moldova, and Peru, more than 1,000 service providers have access to digital verification or authentication services. In others, access and use is limited to a handful of providers.

More information is needed to validate the extent to which digital verification or authentication services are performing in line with needs and expectations, and with sufficient oversight and safeguards in place. There is very limited data available across countries that would allow us to measure how well and how consistently digital verification and authentication services are able to meet relying parties’ and peoples’ needs. There are also differences across systems with respect to the volume of data shared and the oversight or direct control people will have over the identity verification or authentication process. Although ID agencies in some countries like India, Nigeria, and Peru provide detailed documentation online about the identity verification and authentication processes in use, similar documentation is missing for a majority of countries.

¹⁸ For additional discussion on the types and reliability of digital verification and authentication mechanisms, see World Bank (2019a), specifically: <https://id4d.worldbank.org/guide/credentials-authentication>; for specific details on the use of biometrics for authentication, see Dunstone (2020).

Indicator 3: Online Digital Identity

Enabling people to prove their identity in a secure and trusted manner remotely, in the context of online transactions, is increasingly relevant for service delivery, public administration, and economic opportunities in the digital age. Having an “official” (online) digital identity¹⁹—one that is government-recognized and able to provide a high level of assurance that the person transacting is who they claim to be—is, of course, not necessary for all online transactions. However, its role is critical for unlocking convenient, online access to transactions that require higher levels of trust, e.g., applying for social assistance, registering a business, applying for a loan, etc. Credentials to underpin such an “official” digital identity and enable remote authentication can take many forms, including ID cards with a chip and mobile IDs containing a cryptographically protected digital certificate in a secure element, combined with the use of PINs, passwords, and biometrics to offer multi-factor authentication. Their purpose is to enable people to securely access services and transact over the Internet, the same way as they would in-person.

The “online digital identity” indicator considers three criteria. To be coded as a “Yes”, systems providing online digital identity credentials and associated digital authentication solutions needed to have: (i) strong “binding” between the digital credentials and the real-life identity holder; (ii) the operationalization and active use of the system; and (iii) the ability of the credential to support remote digital authentication across multiple platforms or services.

In terms of binding the digital identity to the real-life person, for a “Yes” coding, we looked for **evidence of a rigorous initial onboarding (i.e., identity**

proofing) process and the **availability of robust subsequent authentication** to ensure that the digital identity is being presented by the same individual to whom it was issued.²⁰ A more rigorous onboarding would typically involve the capture of an individual’s biographic and/or biometric data, checking the validity of the existing ID, and verifying that the individual claiming a digital identity is the same as the individual originally issued with the document. Systems where the binding between the real-life user and the online-use digital identity credential was more limited, e.g., those that relied on self-declared identity information or solely on a combination of the ID number and an OTP sent to a phone number associated with that ID, were not counted in this category.

In terms of operationalization and use, a “Yes” coding also required evidence that **digital identity credentials are not only being issued but are in active use** at least by some members of the general population (e.g., not limited to staff within a given agency or Ministry) to access at least one service or transaction online. Systems in a pilot phase as of mid-2022 were categorized as “No.” Finally, a “Yes” coding also required that the **digital identity credential can be used (at least by design) by multiple different platforms or services**, as this is one of the primary requirements for catalyzing innovation in digital service delivery. For instance, if a country has a system that offers a digital identity credential for e-filing taxes that can be used only on the tax authority’s website—even if the “binding” and “use” criteria above are satisfied—it would not be categorized as offering an online digital identity.

Beyond these three criteria, there is a lot of variation in how (online) digital identities are provided and used, but these dynamics are outside

19 The term “digital identity” has been used to convey a number of different meanings, and we note a multitude of uses and definitions even across recent ID4D and World Bank publications. The [NIST Digital Identity Guidelines](#) (SP 800-63-3) define digital identity as “the unique representation of a subject engaged in an online transaction”, while recognizing that “a single definition is widely debated internationally” (Grassi, Garcia and Fenton 2017).

20 Ideally, we would be able to measure the actual levels of identity and authentication assurance provided by the digital ID system, however that is not possible at scale due to a lack of comparable technical information across countries, with the exception of countries participating in digital ID federations with clear and public frameworks for evaluation (e.g., Europe’s eIDAS). Hopefully, better and more transparent data will be available in the future.

the scope of this note. As noted earlier, an “official” digital identity for online transactions need not be provided through a single system or by a single, public entity. More recently, models involving multiple identity providers—including both public and private sector entities—have emerged for the provision of government-recognized online digital IDs. Such federated digital ID ecosystems have been implemented at the national level in multiple countries in Europe—for example, Norway, Denmark, Belgium, France, the United Kingdom, and Estonia—and in others such as Australia and Uruguay (for

more details, see World Bank 2022b). In addition, systems and countries differ in terms of the types of services that can be accessed using digital identities. Some systems—such as those in Australia, Cyprus, Georgia, Ireland, Japan, and Mongolia—limit use to the public sector, while other are available both to public and private sector service providers offering secure transactions and services online. For each country, we coded the primary system used for online digital identity, whether this is a federation, or a single provider that also issues foundational identity credentials.

3

RESULTS & DISCUSSION

Looking at ID (eco)systems globally, a picture of rapid and continuous digitization emerges. The use of digital storage for identity records is nearly ubiquitous, and the number of countries with systems that allow for digital verification for in-person transactions is also growing rapidly. Increasingly, verification and authentication services provided by foundational ID systems are becoming available for private sector entities such as banks and mobile network operators, to strengthen customer onboarding. The development and use of government-recognized online digital identity solutions—at times involving a mix of public sector and private sector identity providers—are becoming prevalent in high-income countries, with middle-income countries also increasingly following suit. Unsurprisingly, in low- and lower-middle income countries where internet connectivity and availability of smart devices is more limited, investments in online digital identity solutions remain nascent.

A summary of key results is provided in the sections that follow.

DIGITAL DATA

- **In more than 90% of countries (186 out of 198) globally, ID systems now store data digitally.** Of the 177 countries with a national ID system, 170 store identity records in a digital format and out of the 21 countries without a national ID system, 16 have civil registries where data is stored in an electronic format. This marks an important first step in the durability, verifiability, and portability of records. At the same time, there are large differences between countries in the level of digital data collection (versus re-typing data from paper application forms), how and whether this data is used digitally, and the degree of security and data protection safeguards these systems provide. Although outside the scope of this paper, other sources and practical experience indicate that digitalization of civil registration system data lags much further behind (APAI CRVS 2019, UNECA 2017).
- **Conversely, in around 12 countries, identity records are still stored primarily in physical,**

paper files or books. This includes countries such as the DRC, Madagascar, and Niger and certain Pacific Islands including Palau and Samoa. This means that **approximately 375 million people globally live in countries where the primary identity records remain paper-based and thus difficult or impossible to verify or retrieve.** When combined with the global estimates of 850 million people without an official proof of identity, these findings suggest that there **are at least 1.1 billion people in total who do not have a digital record of their identity.**²¹

Trends point to a rapid decline in the number of countries and number of people relying on paper-based systems. Many countries that were primarily reliant on paper-based identity records as of mid-2022—including Ethiopia and Madagascar—are in the process of introducing digitized ID systems. Thus, the number of people relying on non-digitized systems and records for identity management is expected to decline rapidly in the coming years.



At least 1.1 billion people globally do not have a digital record of their identity.

DIGITAL VERIFICATION

- **ID systems in at least 132 countries²²—around two-thirds of the world—offer at least a basic type of digital identity verification or authentication for in-person transactions.** Of the 177 countries with a national ID or similar foundational ID system, 123 offer some digital verification capability (with 25 “unknowns”). Of the 21 countries

without a national ID or similar system, 9 have civil registration systems that offer such capabilities. This implies that a large majority of countries have recognized the importance of not only providing proof of legal identity to their population, but of providing the ability to more securely verify and authenticate identity when required for transactions. However, while digital verification is available in almost all high-income countries and most upper-middle income countries, this capability does not exist in at least a third of low- and lower-income countries (and potentially up to half, considering countries with missing data).

- **Around 635 million people live in countries where identities cannot be verified or authenticated through digital means, and 270 million more live in countries where the availability of such services is unknown.** For these people—and many more in countries where the accessibility and use of such services is uneven—the ability to securely verify a person’s legal identity is limited. Of the 170 countries with data on digital verification, there are 26 countries where identity records are stored in a digital database, but with no digital verification enabled. Together with the 12 countries with no or very limited digital records, this indicates that the verifiability of identities is severely constrained in at least 38 countries, and potentially as many as 60 (if also considering countries with missing data). Furthermore, by combining the digital verification indicator with the estimated number of adults without an ID in these countries, we find that at least **1.25 billion people likely do not have the means of securely verifying or authenticating their identity.**²³

21 This is calculated by adding the number of people without any ID to the (lower-bound) number of people who have an ID, but one that is issued based on non-electronic (i.e., paper-based) records. Specifically, the 850 million people without an ID globally are added to the 216 million (out of the 375 million total population) who have an ID and reside in the 12 countries without digital identity records. The true total is likely to be higher as some people in countries that have recently transitioned to digital record-keeping may still hold IDs that are solely underpinned by paper records.

22 Data on digital verification is available for 170 out 198 countries, with 28 unknowns.

23 If countries where the status of digital verification or authentication for in-person transactions is ‘unknown’ were added to this figure, it would be closer to 1.5 billion.



At least 1.25 billion people likely do not have the means of securely verifying or authenticating their identity.

- **At the same time, even where digital verification capabilities are available, they may not be widely used to support effective service delivery.** Based on the broad categorization of “digital verification” used for this note (see Section 2 above), a “Yes” coding does not necessarily mean that a system’s digital verification or authentication feature is widely accessible to or used by service providers, nor that it is able to provide a high level of assurance, nor that it is otherwise deployed in a way that meets people’s needs or fully protects their data. Modes of digital verification and authentication and good practices in their deployment—e.g., measures to maximize functionality, convenience, data privacy, and user control—continue to evolve, and continued investment and reform may be needed even in countries where such capabilities already exist to some degree.
- **Conversely, there are around 117 countries without a government-recognized system that provides online digital identity.** This means at least 3.3 billion people globally—or 2.2 billion adults—live in countries with greater barriers to digital economy and digital government, and without the added convenience and opportunities of being able to access services and transactions that require higher levels of identity assurance remotely, online. Of these 2.2 billion adults, 1.1 billion are already Internet users,²⁵ suggesting a large untapped potential for the introduction of digital identity solutions to facilitate the growth of secure online services.
- **Even in countries where systems to provide online digital identity are available, their use varies considerably.** In Estonia, where digital ID and online authentication have been in use for two decades, 98 percent of the population is believed to use their credentials regularly to access more than 5,000 services online (Oyetunde 2022; Enterprise Estonia n.d.). Launched in 2018, France’s “FranceConnect” digital identity solution counted 40 million users—about 70 percent of the adult population—and facilitated access to over 1,400 services online by 2022 (République française n.d.). Singapore’s Singpass counts more than 4.5 million users, or about 97 percent of the adult population (World Bank 2022c). In Brazil, more than 150 million people have registered with gov.br, including 45 million

ONLINE DIGITAL IDENTITY

- **81 countries have a digital identity (eco)system that enables fully remote authentication for online transactions.** This includes 74 countries with a national ID system and 7 countries without one.²⁴ Most countries with online digital identity solutions—51 out of the 81—are high-income countries and another 20 are upper-middle income countries. From a regional perspective, online digital identity solutions are most prevalent in Europe, the Middle East, Latin America, and East Asia. During the COVID-19 pandemic, the demand

²⁴ In countries without foundational ID systems that provide authoritative sources of identity information, digital identity solutions may rely on a variety of identity documents and records for identity proofing and onboarding (e.g., birth certificates, passports, and driver’s licenses), assuming these are widely held and trusted.

²⁵ Calculated based on the share of Internet users in the countries without a digital identity solution for online service access, using the latest (2021/2022) data from the World Development Indicators database (<https://data.worldbank.org/indicator/IT.NET.USER.ZS>).

high-assurance 'gold' accounts that allow for secure access to the widest online services and transactions. In contrast, while most German ID cards can facilitate remote authentication for online service access, only 7 percent of the population is using this function (Price Waterhouse Coopers 2021).



An estimated 3.3 billion people—or 2.2 billion adults—do not have access to a government-recognized digital identity and the number of those who have not effectively used one is even greater.



LIMITATIONS

These results and analysis are subject to some limitations related to the completeness and accuracy of the data and the association between digital system capabilities and development outcomes. These include:

- **Data on digital system capabilities are not always readily available or easy to validate.** Few identity providers make detailed information about the digital capabilities of their system and/or their use publicly available. As a result, this note is only able to capture the broad strokes of digital capabilities with potential relevance for development outcomes. There are many other aspects of digitalized identity ecosystems that matter for inclusion, trust, and the ability to support service delivery across sectors. This includes their degree of interoperability with service providers, ease of use, data security and privacy features, financial and operational sustainability, and more, each of which are difficult to measure systematically across countries. Even among the three technical dimensions this note seeks to capture, it can be difficult to obtain reliable and timely data.
- **A certain capability may exist from a design perspective, but not be used in practice.** For instance, a system may issue an ID card with a chip that could be used for in-person digital authentication (e.g., via a PIN or biometric), but in practice service providers may not have the necessary software or hardware to utilize the information stored in the chip. In such a case, the in-person digital authentication capability would not exist in a meaningful way. Similarly, a smart card can technically be used to support digital authentication to access services online, but in practice there may be no card readers or online services available to take advantage of this technology. Despite our best efforts, discerning whether and how the availability of certain digital technologies translate into true digital capabilities can be difficult. As a result, the digital capability categorizations for certain countries may not be fully accurate.
- **ID systems and digital capabilities are rapidly evolving, and this note provides only a snapshot.** Digitalization is dynamic, with countries regularly launching new systems and features. Thus, any attempt at measuring technical capabilities

(as in this note) is likely to become rapidly outdated. In some cases, a reversal in digitalization may happen as well. For instance, certain systems or features may be discontinued with insufficient use or (particularly in the case of vendor-dependent systems) certain system functionalities may be lost when a contract with a specific provider ends. ID4D intends to periodically update this data to capture the evolution of digital capabilities and, if possible, to provide data on additional aspects of digitalization.

- **Advances in digital ID capabilities do not necessarily translate into improved services or livelihoods.** While digitalization can unlock many benefits for people, government, and businesses, digital identity management and

data sharing can also increase certain risks and harms relative to analog processing, such as data breaches due to cyberattacks, online fraud, digital surveillance—although they may reduce others (Clark and Daly 2019). Such risks need to be mitigated through appropriate legal and institutional frameworks, privacy-enhancing technologies, and appropriate information security measures. In addition, digitalization can also increase exclusion risks for certain individuals and population groups. These risks should also be actively addressed, including by working to ensure the accessibility of ID systems, engaging the public in system design to foster a culture of trust and reduce information asymmetries, and implementing appropriate grievance redress mechanisms and other safeguards (World Bank 2019a).²⁶

26 See specifically: <https://id4d.worldbank.org/guide/pillar-1-inclusion>.

5

CONCLUSION

For ID systems to facilitate inclusive service delivery and secure transactions across sectors, including as part of a country’s digital public infrastructure, responsible investments in and improvements of digital capabilities are critical. The use of digital technologies in foundational ID systems is now almost ubiquitous and the availability of digital verification and authentication for in-person transactions has expanded rapidly over the last decade. With an estimated 5.4 billion people using the internet (ITU 2023) and ever more services and transactions moving online, the number of countries with systems that offer online digital identity is also rising rapidly. An important trend in this space is the emergence of decentralized or federated models, with multiple identity providers offering people greater choice and driving innovation.

Tracking this evolution at the country and global levels is important for assessing the ability of ID systems to serve development goals in a digital age, and whether digital safeguards are keeping pace with evolving risks. This note and data collection effort are one piece of the puzzle, and ID4D intends to continue updating and improving this work over time. For example, additional research is needed to fully understand whether these verification and authentication mechanisms can meet people’s and service providers’ needs in a manner that is people-centric, secure, and privacy-preserving.

Digitalization is not a panacea, but it is the new reality. Continued data collection and analysis about how ID systems integrate digital technologies, the digital capabilities they enable, and their impact on people’s access to services, economic opportunities, and rights will be important to guide decision-making and investments. Strengthening countries’ own monitoring and evaluation capabilities and promoting a culture of transparency and accountability is one important step towards this goal. It is only through unpacking and measuring “digital identity” that we can ensure that billions are not left behind.

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APPENDIX 1. COUNTRY DATA TABLE

Table A1. ID System Digital Capabilities, by Economy

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/ Credential (may be part of, or separate from, the foundational ID system)
Afghanistan	Tazkira	Yes	No	No	—
Albania	National ID System/Electronic Identity Card	Yes	Yes	No	—
Algeria	National Population Register (RNP)/Biometric, Electronic National Identity Card (CNIBE)	Yes	Unknown	No	—
Andorra	Administrative Identification Number (NIA)	Yes	Yes	Yes	Electronic certificate: https://www.signaturaelectronica.ad/certificats-individuals
Angola	Civil and Criminal Identification Integrated Management Platform (PGIBI)/Integrated ID	Yes	No	No	—
Antigua and Barbuda	Civil Registry (no national ID or similar)	Yes	Unknown	No	—
Argentina	National Registry of Persons System/National Identity Document (DNI)	Yes	Yes	Yes	SID—Digital Identification System: https://www.argentina.gob.ar/interior/renaper/sid-sistema-de-identidad-digital
Armenia	National ID System/ID Card	Yes	Yes	Yes	eID online authentication: https://www.ekeng.am/en/eid_auth
Australia	Civil Registry (no national ID or similar)	Yes	Yes	Yes	Trusted Digital Identity Framework (www.digitalidentity.gov.au), including MyGovID: https://www.mygovid.gov.au/
Austria	Central Civil Status Register (ZPR)	Yes	Yes	Yes	The Citizen Card: https://www.bmdw.gv.at/Themen/Digitalisierung/Digitalisierung/Oesterreich/Die-Buergerkarte.html
Azerbaijan	National ID System/ID Card	Yes	Yes	Yes	Asan Imza: https://asanimza.az/en/
Bahamas, The	Civil Registry (no national ID or similar)	Yes	Yes	Yes	My Gateway SSO: https://services.mygateway.gov.bs/

Foundational ID System/Credential		Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/ Credential (may be part of, or separate from, the foundational ID system)
Bahrain	Civil Registration System (CRS)/Bahrain ID Card	Yes	Yes	Yes	ekey SSO service: https://www.ekey.bh/
Bangladesh	Voter Registration List/National Identity Card (NIC)	Yes	Yes	No	—
Barbados	National Identity Management System ²⁷ /National Identification Card	No	No	No	—
Belarus	National Automated System/Passport	Yes	Unknown	No	—
Belgium	Population Registry/Belgian Electronic Identity Card (Eid)	Yes	Yes	Yes	eID (https://eid.belgium.be/); Itsme (https://www.itsme-id.com/)
Belize	Civil Registry (no national ID)	Yes	Unknown	No	—
Benin	Physical Persons National Register (RNPP)/National Identity Card	Yes	Yes	No	—
Bhutan	Bhutan Civil Registration System/Citizenship Identity Card (CID)	Yes	Unknown	Yes	Bhutan Digital Identity Service: https://sso.dit.gov.bt/
Bolivia	Unique Identification Registration System/National ID	Yes	Yes	Yes	Ciudadania Digital: https://www.agetic.gob.bo/registro-eh-ciudadania-digital/
Bosnia and Herzegovina	MKR Register/Identity Card	Yes	Unknown	No	—
Botswana	National ID System/National Identity Card (Omang)	Yes	Yes	No	—
Brazil	Natural Persons Register (CPF)	Yes	Yes	Yes	Conta gov.br: https://www.gov.br/governodigital/pt-br/conta-gov-br
Brunei Darussalam	Central Registry/Smart Identity Card	Yes	Yes	Yes	e-Darussalam account: https://www.gov.bn/SitePages/Digital%20Identity.aspx
Bulgaria	Unified System for Civil Registration and Administrative Services of the Population/Identity Card	Yes	Yes	No	—
Burkina Faso	National Identification System/Burkinabe National Identity Card (CNIB)	Yes	No	No	—
Burundi	National Identification Register/National Identity Card	No	No	No	—
Cabo Verde	National Civil Identification and Authentication System (SNIAC)/National Identification Card (CNI)	Yes	Yes	Yes	Electronic identity card: https://sniac.cv/mw/
Cambodia	Khmer National Identity Card	Yes	No	No	—
Cameroon	National Identity Card (CNI)	Yes	No	No	—
Canada	Civil Registry/Passport (no national ID)	Yes	Yes	Yes	Pan Canadian Trust Framework (federated digital ID): https://diacc.ca/

²⁷ Barbados passed a Bill establishing a National Identity Management System in February 2021 and launched a new ID card in mid-2022. As of end-2021, the system was not yet fully operationalized and thus the indicators for digital capabilities were coded as 'No' reflecting the capabilities of the previous identity system.

Foundational ID System/Credential		Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/Credential (may be part of, or separate from, the foundational ID system)
Economy		Yes	No	No	—
Central African Republic	National ID System/National Identity Card (CNI)	Yes	No	No	—
Chad	National Biometric Population Register (RNBP) & Integrated Population and Secured Titles Management System (SIGPTS)/National Identity Card	Yes	Yes	No	—
Chile	National ID System/ID Card	Yes	Yes	Yes	ClaveÚnica: https://claveunica.gob.cl/
China	National Citizen Identity Information Center (NCIIC)/Resident Identity Card	Yes	Yes	Yes	National Government Service Platform SSO: https://login.gjz.wfw.gov.cn/tacs-uc/naturalMan/register
Colombia	Civil Registry Information System (SIRC)/Citizenship Card	Yes	Yes	Yes	Cedula digital: https://wapp.registraduria.gov.co/identificacion/cedula-digital/#inicio
Comoros	National Identity Card	Yes	Unknown	No	—
Congo, Dem. Rep.	Civil Registry (no national ID)	No	No	No	—
Congo, Rep.	The National File/Biometric National Identity Card	Yes	No	No	—
Costa Rica	Civil Registry System/Citizenship Card	Yes	Yes	No	—
Côte d'Ivoire	National Register of Natural Persons (RNPP)/National Identity Card	Yes	Yes	No	—
Croatia	National ID System/Identity Card	Yes	Yes	Yes	eID: https://www.eid.hr/ ; Certiilia mobile app
Cuba	Unique National Identity System (SUIN)/Identity Card	Yes	Unknown	No	—
Cyprus	Population Registry/Identity Card	Yes	Unknown	Yes	CY Login: https://cge.cyprus.gov.cy/cyloginregistration/register ;
Czech Republic	National ID System/Identity Card	Yes	Yes	Yes	NIA ID: https://info.identitaobcana.cz/ups/
Denmark	Civil Registration System (CPR)/Health Insurance Card (card, mobile app)	Yes	Yes	Yes	NemID: https://www.nemid.nu/dk-da/
Djibouti	National Register of Natural Persons/National Identity Card	Yes	Yes	No	—
Dominica	Civil Registry (no national ID)	Yes	Yes	No	—
Dominican Republic	Certificate Administration System/identity and electoral card (CIE)	Yes	Yes	No	—
Ecuador	System for the Issuance of Identity Documents and Electronic Passports (SEDI)/Unified Registration and Identification System (SUR)/Identity Card	Yes	Yes	No	—
Egypt, Arab Rep.	National Citizen Database/National ID Card	Yes	Yes	No	—
El Salvador	Systems of the National Registry of Natural Persons/Unique Identity Document (DUI)	Yes	Yes	No	—
Equatorial Guinea	National ID System/National Identity Document (DNI)	Yes	Yes	No	—

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/Credential (may be part of, or separate from, the foundational ID system)
Eritrea	National ID Card	Yes	Unknown	No	—
Estonia	e-Identity System	Yes	Yes	Yes	Digi-ID, Mobil-ID: https://e-estonia.com/solutions/e-identity
Eswatini	National Population Register/National ID Card	Yes	Yes	No	—
Ethiopia	Kebele ID System/Kebele ID Card	No	No	No	—
Fiji	Civil Registry (no national ID)	Yes	No	No	—
Finland	Finnish Population Information System/Identity Card	Yes	Yes	Yes	Identity Card/Federated digital ID: https://www.suomi.fi/instructions-and-support/identification/
France	Secure Electronic Titles File (Fichier TES)/National Identity Card (CNI)	Yes	Yes	Yes	France Connect: https://franceconnect.gouv.fr/
Gabon	National ID System/National Identity Card	Yes	Yes	No	—
Gambia, The	Gambian National ID Card	Yes	Unknown	No	—
Georgia	Civil Registry/Electronic ID Card	Yes	Yes	Yes	Electronic ID card: https://my.gov.ge/en-us/account/login
Germany	Personal Identity Document	Yes	Yes	Yes	Electronic ID card: https://www.personalausweisportal.de/Webs/PA/DE/buergerinnen-und-buerger/online-ausweisen/online-ausweisen-node.html
Ghana	National Identification System (NIS)/GhanaCard	Yes	Yes	No	—
Greece	Integrated Information System of National Population (OPSED)/Identity Card	Yes	No	No	—
Grenada	Voter Registry/Voter ID Card	Yes	Unknown	No	—
Guatemala	Person Identification System/Personal Identification Document (DPI)	Yes	Yes	No	—
Guinea	National ID Card	Yes	No	No	—
Guinea-Bissau	Biometric Identity Card	Yes	Unknown	No	—
Guyana	National Register/Guyana Identification Card	Yes	No	No	—
Haiti	National Identification Register/Unique National Identity Card (CINU)	Yes	Unknown	No	—
Honduras	National Identification System (SIN)/National Identification Document	Yes	Yes	No	—
Hong Kong SAR, China	Hong Kong Identity Card (HKID)	Yes	Yes	Yes	iAM Smart: https://www.iamsmart.gov.hk/en/
Hungary	Register of citizens' personal- and address data/Personal Identification Document	Yes	Yes	Yes	Electronic ID card & mobile app: https://eszemelyi.hu/

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/Credential (may be part of, or separate from, the foundational ID system)
Iceland	Population Register/ID Card	Yes	Yes	Yes	Electronic ID card: https://island.is/en/electronic-id ; and IceKey: https://island.is/en/icekey
India	Aadhaar System/Number	Yes	Yes	Yes	MeriPehchaan SSO service (https://meripehchaan.gov.in)
Indonesia	Population Administration Information System (SIAK)/Electronic Citizen Identity Card (e-KTP)	Yes	Yes	No	No
Iran, Islamic Rep.	Iranian ID System/National Identity Card	Yes	Unknown	Yes	Electronic ID card
Iraq	The Iraqi National ID Card (INID) System/Iraqi National Identity Card (INID)	Yes	Unknown	No	—
Ireland	Civil Registry/Personal Public Service (PPS) number (no national ID)	Yes	Yes	Yes	MyGovID: https://www.mygovid.ie/
Israel	Israeli Identity Card	Yes	Yes	Yes	Government Identification System - various credentials (biometric ID card, GovID app)
Italy	National Register of the Resident Population (ANPR)/Electronic Identity Card (CIE)	Yes	Yes	Yes	"Entra con CIE" authentication application; CieID mobile app
Jamaica	Civil Registry (no national ID)	Yes	Unknown	No	—
Japan	Social Security and Tax Number System ("My Number System")/Individual Number Card ("My Number Card")	Yes	Yes	Yes	My Number: https://myna.go.jp/ ; My Number Card
Jordan	Smart Civil Status Card	Yes	Yes	Yes	Sanad app: https://sanad.jo/
Kazakhstan	National Register of Identification Numbers/ID Card	Yes	Yes	Yes	Electronic ID card (or login/password): https://egov.kz/cms/kk
Kenya	National Integrated Identity Management System (NIIMS)/ID Card	Yes	Yes	No	—
Kiribati	National ID	Yes	No	No	—
Korea, Dem. People's Rep.	Resident Register/Citizen Card/Pyongyang City Resident Card	Yes	Unknown	No	—
Korea, Rep.	Resident Registration System (RRS)/Resident Registration Card (RRC)	Yes	Yes	Yes	National Public Key Infrastructure Authentication Certificate; Internet PIN (I-PIN), and Mobile Network Operator (MNO) IDs
Kosovo	Civil Status Registration System (CSRS), ID and Passport System (IPS)/ID Card	Yes	Yes	Yes	Electronic ID card (& other methods); see: https://www.rks-gov.net/Security
Kuwait	Kuwait ID System/Kuwait Civil ID	Yes	Yes	Yes	PACI mobile ID/ eID card: https://hawtyti.paci.gov.kw/
Kyrgyz Republic	Unified State Register of the Population of Kyrgyzstan/eID card	Yes	Yes	Yes	Electronic identity card: https://portal.srs.kg/ru/faq#eid_chno_neobhodimo
Lao PDR	National ID	Yes	No	No	—

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/Credential (may be part of, or separate from, the foundational ID system)
Latvia	Register of Natural Persons/Identity Card (eID)	Yes	Yes	Yes	eID card, mobile app, various identity providers: https://latvija.lv/en/dzivesituacijas/tiesibu-aizsardziba/elektroniskais-paraksts#show4
Lebanon	National ID System/ID Card (bitaaqat al hawiya)	Yes	No	No	—
Lesotho	National Identity Register/National Identity Card	Yes	Yes	No	—
Liberia	National Identification Registry (NIR)/National ID Card	Yes	No	No	—
Libya	Personal Card	Yes	Unknown	No	—
Liechtenstein	National ID System/Identity Card	Yes	Yes	Yes	“eID.li” mobile app https://www.serviceportal.li/de/privatpersonen/ausweise-und-rechtliche-hinweise/identitaetsausweise_digitale-identitaet_
Lithuania	Residents Register/Identity Card	Yes	Yes	Yes	Electronic ID Card: https://www.nsc.vrm.lt/default.htm
Luxembourg	National Registry of Natural Persons (RNPP)/Identity Card	Yes	Yes	Yes	Electronic ID Card; GouvID mobile app: https://guichet.public.lu/fr/myguichet.html
Macao SAR, China	Macao SAR Resident Identity Card	Yes	Yes	Yes	Macao Public Services One Account portal (https://www.publicservice.gov.mo/)
Madagascar	National identification system/National Identity Card (CIN)	No	No	No	—
Malawi	National Registration and Identification System (NRIS)/National Identity Card (NIC)	Yes	Yes	No	—
Malaysia	National Registration Identity Card (NRIC)	Yes	Yes	No	—
Maldives	Population Registry/National Identity Card	Yes	Yes	Yes	eFaas: https://efaas.egov.mv/
Mali	Population Database of the Civil Status Administrative Census (RAVEC)/NINA Card	Yes	Yes	No	—
Malta	National Identity Management System (NIDMS)/E-ID Card	Yes	Yes	Yes	Electronic ID card: https://eid.gov.mt/auth/Account/Login
Marshall Islands	Civil Registry (no national ID)	Yes	No	No	—
Mauritania	National Population Registry (RNP)/Identification Card	Yes	Yes	No	—
Mauritius	Mauritius National Identity Scheme (MNIS)/Mauritius National ID Card	Yes	Yes	Yes	MauPass (https://maupass.govmu.org/LandingPage)
Mexico	The Federal Registry of Voters/Voting Card	Yes	Yes	No	—
Micronesia, Fed. Sts.	Civil Registry (no national ID)	Yes	No	No	—

Economy		Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/ Credential (may be part of, or separate from, the foundational ID system)
Moldova	State Register of Population (RSP)/Identity Card	Yes	Yes	Yes	Yes	M-Pass (https://mpass.gov.md/); M-eID mobile ID app
Monaco	National ID System/Monegasque Identity Card	Yes	Yes	Yes	Yes	mConnect mobile app & digital ID: https://mconnect.gouv.mc/en
Mongolia	Civil State Registration/Citizen Identity Card	Yes	Yes	Yes	Yes	E-Mongolia: https://e-mongolia.mn/home
Montenegro	Register of Montenegrin Citizens/Identity Card	Yes	Yes	Yes	Yes	Electronic ID card
Morocco	National Digital Identity System/National Electronic Identity Card (CNIE)	Yes	Yes	Yes	Yes	Electronic ID card/Mon identite numerique app
Mozambique	Identity Card (BI)	Yes	No	No	No	—
Myanmar	Citizen Scrutiny Card (Naing Ngan Thar Sitsityay Card)	No	No	No	No	—
Namibia	Electronic National Population Registration System (eNPRS)/National Identification Card (NID)	Yes	Yes	Yes	No	—
Nauru	National ID	Yes	No	No	No	—
Nepal	National Identity Card System	Yes	Yes	Yes	No	—
Netherlands	Personal Records Database (BRP)/Dutch Identity Card	Yes	Yes	Yes	Yes	DigiD (https://www.digid.nl/)
New Zealand	Civil Registry/Driver Licence (no national ID)	Yes	Yes	Yes	Yes	RealMe (https://www.realme.govt.nz/)
Nicaragua	Identity Card	Yes	Yes	Yes	No	—
Niger	National ID System/National Identity Card	No	No	No	No	—
Nigeria	National Identity Management System (NIMS)/NIIN slip, National Electronic Identity Card (e-ID card)	Yes	Yes	Yes	No	—
North Macedonia	National ID System/ ID Card	Yes	Yes	Yes	Yes	eID app: https://eid.com.mk/
Norway	National Population Register/National ID Card	Yes	Yes	Yes	Yes	MiID, BankID, Buypass ID, Commfides, and BankID: https://www.norge.no/en/electronic-id
Oman	Omani ID Card	Yes	Yes	Yes	Yes	Tam
Pakistan	National Identification System/National Identity Card (NIC)	Yes	Yes	Yes	No	—
Palau	Civil Registry (no national ID)	No	No	No	No	—
Panama	Identification System/Personal Identity Document	Yes	Yes	Yes	Yes	MiCedulaID: https://micedulad.com/account/user-identity-verification
Papua New Guinea	National Identity Register System/National Identity Document (NID)	Yes	No	No	No	—

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/Credential (may be part of, or separate from, the foundational ID system)
Paraguay	Identity Card	Yes	Unknown	Yes	Identidad Electrónica https://www.paraguay.gov.py/identidad-electronica/informacion ;
Peru	Unique Registry of Identification of Natural Persons (RUIPN)/National Identity Document (DNI)	Yes	Yes	Yes	DNI electrónico: https://dnielectronico.pe/
Philippines	Philippine Identification System (PhilSys)/Philippine Identification Card (PhilID)	Yes	Yes	No	—
Poland	Register of Identity Cards (RDO)/Identity Card	Yes	Yes	Yes	Electronic ID card/Profil zaufany (PZ)/“trusted profile” login credential: https://www.gov.pl/web/gov/zaloz-profil-zaufany
Portugal	Civil ID System/Citizen Card (CC)	Yes	Yes	Yes	Electronic ID card/mobile ID: https://eportugal.gov.pt/entrar-Autenticacao.gov : https://www.autenticacao.gov.pt/
Qatar	Qatari ID Card (QID)	Yes	Yes	Yes	Electronic ID card: https://hukoomi.gov.qa/en/
Romania	National Register of Persons (RNEP)/Electronic Identity Card	Yes	Yes	No	—
Russian Federation	Automated System “Russian Passport”/Internal Passport	Yes	Yes	No	—
Rwanda	National Population Register (NPR)/National Identity Card (NID)	Yes	Yes	No	—
Samoa	Civil Registry (no national ID)	No	No	No	—
San Marino	National ID System/Identity Card	Yes	Yes	No	—
São Tomé and Príncipe	Civil Identification System/Identity Card (BI)	Yes	No	No	—
Saudi Arabia	Automated Central System (ACS)/Saudi National ID Card	Yes	Yes	Yes	Absher platform: https://www.absher.sa/portal/landing.html
Senegal	National Identification System/Biometric Identity Card (CEDEAO)	Yes	Yes	No	—
Serbia	National ID System/ Biometric ID Card	Yes	Yes	Yes	Electronic ID Card: https://eid.gov.rs
Seychelles	National Population Database (NPD)/National Identity Card	Yes	Yes	No	—
Sierra Leone	National Civil Registration System (NCRS)/National Identity Card	Yes	Yes	No	—
Singapore	National Register/National Registration Identity Card (NRIC)	Yes	Yes	Yes	SingPass digital ID: https://www.singpass.gov.sg/home/ui/login
Slovak Republic	REGOB/Identity Card	Yes	Yes	Yes	Electronic ID card/mobile app: https://www.slovensko.sk/en/start-now
Slovenia	Central Population Register (CRP)/Identity Card	Yes	Yes	No	—

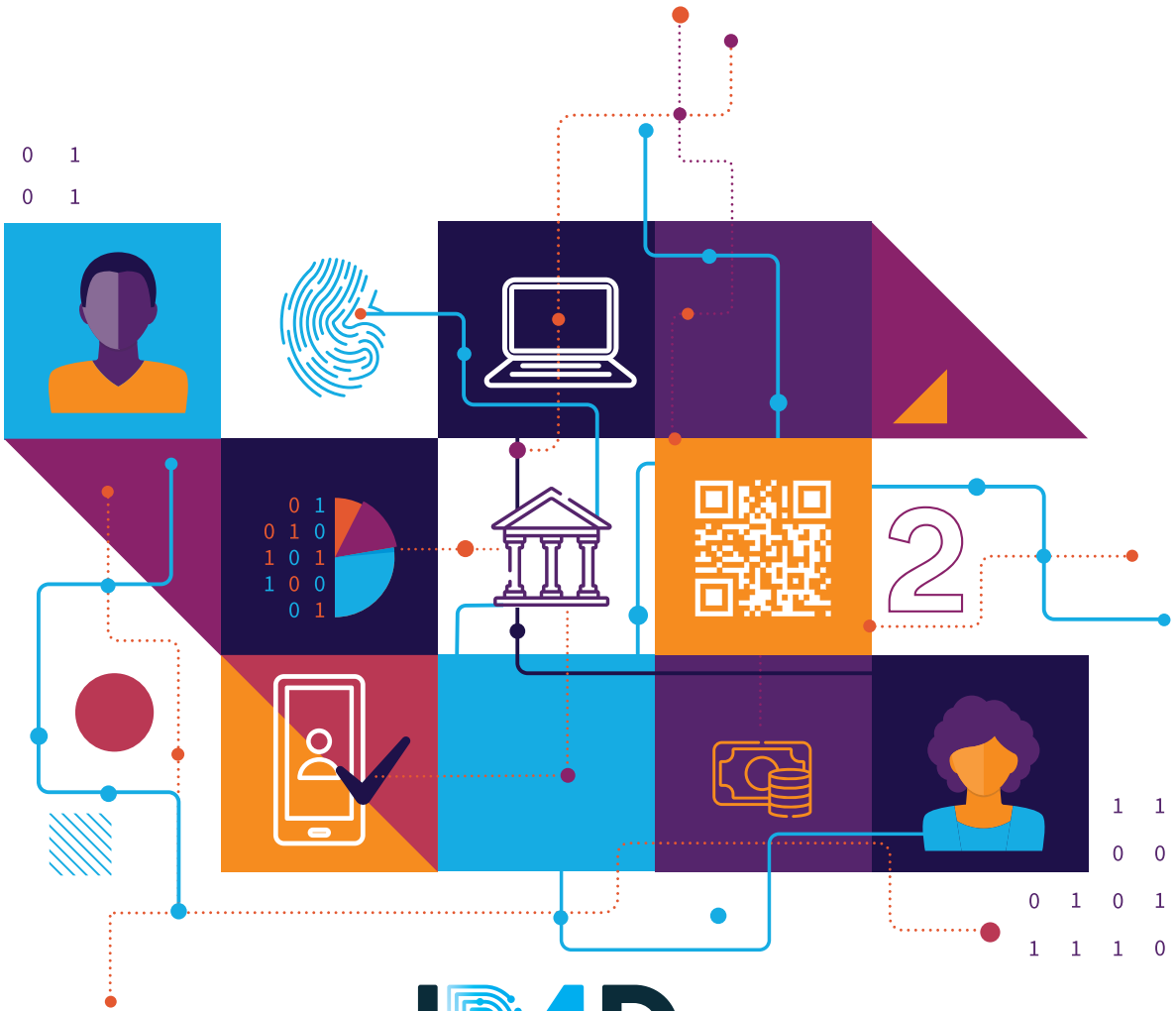
Foundational ID System/Credential		Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/ Credential (may be part of, or separate from, the foundational ID system)
Solomon Islands	Civil Registry (no national ID)	Yes	No	No	—
Somalia	Civil Registry (no national ID)	No	No	No	—
South Africa	National Population Register (NPR)/Smart ID Card, Green ID book	Yes	Yes	No	—
South Sudan	National ID System/National Identity Card	Yes	No	No	—
Spain	National Identity Document (DNI)	Yes	Yes	Yes	Electronic ID card
Sri Lanka	National Persons Registry/National Identity Card (NIC)	Yes	Yes	No	—
St. Kitts and Nevis	National Registration System/National Identification Card	Yes	Unknown	No	—
St. Lucia	Voter Registration System/National Identification Card	Yes	Unknown	No	—
St. Vincent and the Grenadines	Voter Registration/National Identification Card	Yes	Unknown	No	—
Sudan	National Civil Register (NCR)/National ID	Yes	Yes	No	—
Suriname	Population Register/Identity Card	Yes	Yes	No	—
Sweden	Population Register/National Tax Board's ID Card	Yes	Yes	Yes	Bank ID, Freja eID
Switzerland	Identity Card	Yes	Unknown	Yes	SwissID: https://www.swissid.ch/en/
Syrian Arab Republic	Civil Registry/Identity Card	Yes	Unknown	No	—
Taiwan, China	Household Registration/National Identification Card	Yes	Yes	No	—
Tajikistan	ID/Passport Database/National ID Card	Yes	No	No	—
Tanzania	National ID Database/Identity Card	Yes	Yes	No	—
Thailand	Population Identification Number System/Thai Citizen Identification (CID) ("SmartCard")	Yes	Yes	No	—
Timor-Leste	National Identity Card	Yes	No	No	—
Togo	DGDN Database/National Identity Card	Yes	Yes	No	—
Tonga	National Identity Card	Yes	No	No	—
Trinidad and Tobago	National Identification Card	Yes	Unknown	Yes	TTConnectID: https://www.ird.gov.tt/etax/ttconnect
Tunisia	National ID System/National ID Card	Yes	Yes	No	—
Türkiye	Central Population Management System (MERNIS)/Republic of Turkey Identity Card (TCKK)	Yes	Yes	Yes	Electronic ID Card, mobile ID, other credentials: https://giris.turkiye.gov.tr/giris/gir
Turkmenistan	Database of passportization and registration of the population/ National passport	Yes	Unknown	No	—
Tuvalu	Civil Registry (no national ID)	No	No	No	—

Economy	Foundational ID System/Credential	Digital Data	Digital Verification	Online Digital Identity	Online Digital Identity System/ Credential
Uganda	National Identification Register/National ID Card	Yes	Yes	No	—
Ukraine	Unified State Demographic Register/Passport	Yes	Yes	Yes	Diia digital ID: https://diia.gov.ua/
United Arab Emirates	Emirates ID System/UAE ID Card (“Emirates ID”)	Yes	Yes	Yes	UAE Pass app: https://selfcare.uaepass.ae
United Kingdom	Civil Registry (no national ID)	Yes	Yes	No ²⁸	—
United States	Civil Registry (no national ID)	Yes	Yes	Yes	Login.gov
Uruguay	Civic Identification/Identity Card	Yes	Yes	Yes	Electronic ID card, Abitab mobile app, other credentials: https://mi.iduruguay.gub.uy/
Uzbekistan	Unified Population Register/ID Card	Yes	Yes	Yes	Electronic ID card, One ID (https://id.gov.uz), other credentials
Vanuatu	Register VIZ Database/Vanuatu National ID Card (VNIC)	Yes	Yes	No	—
Venezuela, RB	National Identification System/Identity Card	Yes	Unknown	No	—
Vietnam	Citizenship ID Card Issuance and Management System (IDCIM)/ Citizen ID Card (CCCCD)	Yes	Yes	No	—
West Bank and Gaza	Palestinian Population Registry/West Bank and Gaza Strip ID	Yes	Yes	No	—
Yemen, Rep.	Identity Card	Yes	Unknown	No	—
Zambia	National ID System	No	No	No	—
Zimbabwe	Zimbabwe Population Registration System (ZPRS)	Yes	Yes	No	—
Notes	Indicator definitions:				
	Digital data: Records are stored in a digital format, rather than in paper records or ledgers.				
	Digital verification: Identities and/or identity information (e.g., name, date of birth, etc.) can be verified or authenticated using digital—rather than manual—means in the context of in-person transactions.				
	Online digital identity: Digital credentials provide the ability to securely authenticate identities remotely, to access online services and transactions				

28 At the time of data collection, the UK’s [GOV.UK](https://gov.uk) Verify program, which had previously facilitated online digital authentication was being closed down. A new system, called [GOV.UK](https://gov.uk) One Login is currently in beta mode.



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ID4D

IDENTIFICATION FOR DEVELOPMENT