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# Digital Public Infrastructure: A Practical Approach for Africa

Diana Sang, Jane Munga, Nanjira Sambuli



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Carnegie Endowment for International Peace  
Publications Department  
1779 Massachusetts Avenue NW  
Washington, DC 20036  
P: + 1 202 483 7600  
F: + 1 202 483 1840  
[CarnegieEndowment.org](http://CarnegieEndowment.org)

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## Introduction

Digital public infrastructure (DPI)—broadly defined as the rails on which digital products and services are built to enable access to a range of “essential society-wide functions” services—has been gaining prominence as a digital development concept and tool.<sup>1</sup> DPI is generally understood to meet three fundamental needs: identification, payments, and data exchange.<sup>2</sup> In addition to the technology rails it is built upon, DPI also encompasses governance through regulations embedded into the design and accommodates the participation of both the private and public sectors in building digital systems and applications.<sup>3</sup> To be useful to all of society, DPI systems are interoperable, modular, and built on open standards. This helps make them a favorable approach for driving digitalization, fostering inclusion, and spurring innovation. All these features differentiate DPI systems from other information and communication technology systems (see box 1).

The DPI approach has registered impact in early adopter countries, such as India and Singapore, leading to calls for global deployment of DPI to advance digital development.<sup>4</sup> India’s efforts, through its G20 presidency, have drawn international attention to the concept and the policies that would advance it. As a result, the G20, the United States (in a joint declaration with India),<sup>5</sup> the United Nations, and the World Bank have all publicly recognized the potential of DPI. The United Nations notes that “[DPI] can help countries achieve their national priorities and accelerate the Sustainable Development Goals.”<sup>6</sup>

### Box 1: The DPI Approach

The **DPI approach** is characterized by three concepts:

- 1. Common design philosophy** that emphasizes *interoperability* (to facilitate seamlessness between disparate components and systems), *extensibility* (modular building blocks that can be easily extended and modified), *protocol-based systems* (rather than platform-based systems to facilitate diversity of innovation within the system), and *data federation* (rather than data consolidation in centralized repositories).<sup>7</sup>
- 2. Robust governance** that directs DPI to be people-centric, that is, to safeguard users' rights to privacy and autonomy. The concept introduces a *techno-legal approach*, wherein regulators supervise the protocols underpinning DPI ecosystems to influence policy outcomes, and *obligations in code*, where compliance is automatically embedded in the system design.
- 3. Market/private sector participation**, with key strategies of facilitating *private sector involvement* in the proliferation of DPI, a *competitive market* that allows businesses of all sizes to participate, and *incentives alignment* to avoid market capture by powerful players.

DPI has the potential to support Africa's digital transformation, including continental-level ambitions such as the Digital Transformation Strategy for Africa (2020–2030) and the African Continental Free Trade Area (AfCFTA).<sup>8</sup> However, for this to happen, there are crucial baselines for DPI that must be considered on the continent, including situating DPI within existing governance and digital systems. This raises important questions such as the following: How widespread is digital infrastructure and connectivity? How available is the necessary technical know-how? How does DPI relate to existing systems? What investments are needed? And, importantly, how does DPI line up with the existing policies and governance of the different African digital economies?

It is also essential to examine how the DPI concept can facilitate the continent's digital transformation agenda and the operationalization of the African Union (AU) single market agenda within AfCFTA. In addition, what is the opportunity for Africa's hundreds of millions of young people? Can DPI offer much needed jobs for Africa's youth or help develop localized society-wide innovations that harness Africa's youth potential?

This paper highlights these nuances and analyzes the DPI concept and its offer for Africa. It provides policy recommendations for effective deployment in African countries, emphasizing that successful and sustainable uptake will depend on the level of cohesion with local



digital ecosystems. Policymakers, analysts, stakeholders, and potential partner agencies must evaluate how local conditions are suited to make DPI advance or divert digital transformation. Even as DPI is popularized globally, the basic tenets of digital transformation and the subtleties of Africa cannot be ignored. For instance, Africa has the world's largest digital divide, with less than 40 percent of the population using the internet because of prohibitive costs and lacking digital skills, among other factors.<sup>9</sup> It is also important that existing digital solutions are integrated into DPI implementation. Solutions such as Mauritius's and Uganda's data integration and exchange platform and Kenya's M-PESA mobile money application need to be considered in DPI implementation conversations.<sup>10</sup> Even though their design architectures may vary from DPI specifications, these existing systems are important because they are already entrenched in countries' digitalization trajectories and have sunk costs. Furthermore, attention should be given to the novelty of DPI as a concept. Success stories in other ecosystems have fueled the emergence of DPI, yet its definitions and frameworks are relatively new. Consequently, DPI as an instrument for Africa's digital transformation must be approached with careful consideration and prudence.

This paper is structured into three sections. First, it examines the foundational pillars of DPI—digital identification, digital payments, and data exchange—and then analyzes each pillar in the context of Africa's realities. The second section analyzes three conditions essential for the success of DPI in Africa: placing DPI discourse within current digital frameworks, emphasizing the need for robust infrastructure, and developing localized solutions that leverage the potential of Africa's youth. The paper concludes with recommendations aimed at ensuring the success of DPI in African nations.

## Understanding DPI Foundational Pillars and the DPI Approach

DPI has been popularized by several actors; however, India's approach stands out for the critical role the country has played in elevating the concept into a global technology policy agenda. India's DPI journey dates back to 2009 with the launch of Aadhaar, a digital identity system that provides people with a unique twelve-digit identity number.<sup>11</sup> The identity system fulfilled the first pillar of DPI and set the stage for unlocking digital payments, the second pillar. With Aadhaar, financial players such as banks and telecom companies could authenticate identities instantly and cheaply thanks to the system's electronic know-your-customer (e-KYC) service. The establishment of the Unified Payments Interface (UPI) in 2016 introduced a simple, secure, and interoperable payment system. These innovations combined resulted in financial inclusion, evidenced by a leap from 25 percent of Indians in the formal banking sector in 2008 to over 80 percent in 2023.<sup>12</sup> Aadhaar's benefits also included cash transfers during the pandemic—similar to Togo's Novissi, a contactless mobile-based cash transfer system.<sup>13</sup> India's two layers of digital identification and payments benefitted from a

third layer, data exchange, through a mechanism called Data Empowerment and Protection Architecture (DEPA), which facilitates consent-based sharing of personal data without compromising users' right to privacy.<sup>14</sup>

India's DPI has attracted international recognition, interest, and opportunities for collaboration and rapid deployment.<sup>15</sup> Most notably, the Modular Open-Source Identity Platform (MOSIP), an Aadhaar-informed open-source platform for building national foundational identity systems, is being deployed across the globe.<sup>16</sup> And recently, Daas, a DPI prepackaged solution, has emerged for global deployment.<sup>17</sup> Other DPI systems have also emerged, such as Singapore's Government Tech Stack (SGTS)<sup>18</sup> and Estonia's X-Road.<sup>19</sup> In addition, GovStack is an open-source community that develops global standards for DPI.<sup>20</sup>

On the advocacy front, the Digital Public Goods (DPG) Charter is a global campaign that seeks to stimulate action and commitment to advance access to digital public goods that help countries build their foundational DPI.<sup>21</sup> In Africa, the DPG Charter has endorsements from the governments of Rwanda and Togo, while Ethiopia, Lesotho, Malawi, Togo, Sierra Leone, Senegal and Zambia have signed on to the 50-in-5 campaign's commitment to "sharing learnings, best practices, and technologies that can ultimately reduce costs, build local capacity, maximize impact, and help radically shorten the implementation journeys for digital public infrastructure."<sup>22</sup>

## Foundational DPI and the State of Play in Africa

In many African countries, digital systems already exist that can be classified under the three foundational pillars of DPI. There are case studies in almost all African countries on digital ID systems, digital payments, and data exchange, outlined below. The existence of these systems raises key questions: What can DPI add or more effectively offer with respect to innovation, investments, policy, and governance in African digital economies? How can the DPI concept support the continent's stated digital transformation agenda? What and how can Africa contribute to the global development of DPI? The following analysis of the three DPI pillars assists in answering these questions.

### Digital ID Systems in Africa

Some of the existing digital ID systems in Africa are DPI compatible and others do not have interoperability features. Nevertheless, their existence requires they interact with DPI

implementation. How this is managed will be critical for successful implementation of digital ID within the DPI stack. The World Bank defines a digital identification system as “an identification system that uses digital technology throughout the identity lifecycle, including data capture, validation, storage, and transfer; credential management; and identity verification and authentication.”<sup>23</sup> There are two main types of ID systems upon which digital IDs are developed: foundational and functional. Foundational IDs (civil registers) are typically issued by government agencies or other trusted organizations and used to establish an individual or juridical person’s identity and include state issued IDs. Functional (transactional) IDs, on the other hand, are used to authenticate a person’s identity during transactions. Examples of functional (transactional) IDs include bank-related identifier systems such as Nigeria’s bank verification number, email addresses, and mobile phone numbers. Digital formats can be applied in both foundational and functional IDs.<sup>24</sup>

Approximately 85 percent of African countries have national ID systems with digital capabilities, and over 70 percent collect biometric data for authentication purposes.<sup>25</sup> However, close to half a billion African citizens do not have a foundational ID. Globally, an estimated 850 million people lack access to official identification.<sup>26</sup> The AU Interoperability Framework for Digital ID sets out a vision for systems that enable African citizens to access public and private services securely and with ease, on demand and regardless of their location.<sup>27</sup> It aims to bolster trust, foster inclusivity, and establish interoperability among AU member states’ foundational ID systems through a common standard for digital ID interoperability. The framework also seeks to empower African citizens to maintain control of their personal data, especially through selectively disclosing attributes necessary for any particular transaction. The framework further recognizes the importance of identifying oneself online and offline by obtaining an interoperable, digital credential for legal identity (IDC-ID) that takes the form of a verifiable claim. This advances free movement of Africans, continental unity, exchange of goods and services, sustained growth, and fast-tracked economic integration, in line with the aspirations of Agenda 2063—the continent’s development blueprint. The framework awaits adoption by member states to drive the development of the enabling legislative framework, its implementation, and scale-up, each proposed as a different, subsequent phase.

Meanwhile, the Modular Open-Source Identity Platform (MOSIP)—which enables national foundational IDs to be built on open source, modular architecture and is inspired by India’s Aadhaar—is gaining traction on the continent.<sup>28</sup> Nine out of the eleven MOSIP-implementing countries are in Africa, as illustrated below.<sup>29</sup>

**Table 1. Snapshot of DPI-Enabled Digital ID Systems in Africa**

Country	Overview	ID Platform
<b>Burkina Faso</b>	Agence Nationale De Promotion Des Technologies De L'information Et De La Communication (ANPTIC) is rolling out a digital ID project for foundational and verification services.	Modular Open-Source Identity Platform (MOSIP), <a href="#">2022</a>
<b>Ethiopia</b>	The country's digital identification program called Fayda means "value" in Amharic. The system collects biometric and demographic data. Citizens are provided a digital ID either in electronic or printed format and verifiable offline using an authorized verifier application on a smartphone.	MOSIP, <a href="#">2021</a>
<b>Guinea</b>	Guinea's digital ID was launched as part of the West Africa Unique Identification for Regional Integration and Inclusion (WURI), a project to build foundational identity systems in the Economic Community of West African States (ECOWAS). It is a foundational digital identity system with biometrics.	MOSIP, <a href="#">2020</a>
<b>Madagascar</b>	Ministere Du Developpement Numerique, De La Transformation Digitale, Des Postes Et Des Telecommunications De Madagascar is developing a unique ID system with authentication capabilities to facilitate access to public services and is upgrading the foundational national ID to a digital infrastructure.	MOSIP, <a href="#">2022</a>
<b>Morocco</b>	The Morocco Directorate of National Security maintains an identification and authentication service that relies on a national e-ID card.	MOSIP, <a href="#">2022</a>
<b>Niger</b>	Niger's digital ID was launched as part of WURI. It is a digital identification system that includes unique identification numbers linked to biometric data.	MOSIP, <a href="#">2022</a>
<b>Sierra Leone</b>	The National Civil Registration Authority is modernizing the country's national digital ID system to a multipurpose biometric identification card and identity verification system.	MOSIP, <a href="#">2023</a>
<b>Togo</b>	The Togolese Agency for Identification, ANID-TOGO, is building a national biometric e-ID system based on iris, face, and fingerprint recognition technology. Togo's digital ID is part of WURI.	MOSIP, <a href="#">2021</a>
<b>Uganda</b>	"Ndaga Muntu" means "identity card" in Luganda. The MOSIP-based system is administered primarily by the National Identification and Registration Authority.	MOSIP, <a href="#">2023</a>

Source: Developed by the authors and adapted from [UNECA's "Africa Digital Identity Landscape 2022"](#) and [ECPDM's "Digital ID Systems in Africa: Challenges, Risks and Opportunities."](#)

Most African governments have explored digital identification frameworks and measures to ensure that every African is digitally identified, albeit this has not been fully implemented across the continent. Most have established national identity systems that are being ramped for digitization—with some using DPI enabled systems—to improve public services and e-services. Ubiquitous identification of Africans must be achieved through building interoperable, secure digital systems

Implementation must be articulated within existing digitization efforts and adhere to national and continental governance frameworks. The AU Digital Transformation Strategy for Africa (2020–2030) notes that a digital ID system is a crosscutting theme and proposes the AU Interoperability Framework for Digital ID.<sup>30</sup> The framework emphasizes the role that foundational digital IDs play in underpinning broader digital stacks, “with digital payment and trusted data sharing platforms to create opportunities for innovation and a wide range of presence-less, paperless and cashless transactions across the continent”—an invocation of the DPI approach and technology principles.<sup>31</sup> While individual nations and regional economic blocs are at varied stages in achieving ubiquity and inclusiveness of and in instant digital payments, DPI technology stacks—or an African stack similar to the India or Singapore Stack—can be instrumental in driving interoperability within and across country systems. This would be especially valuable for the AfCFTA digital commerce visions, particularly the vision for PAPSS.

## Digital Payments

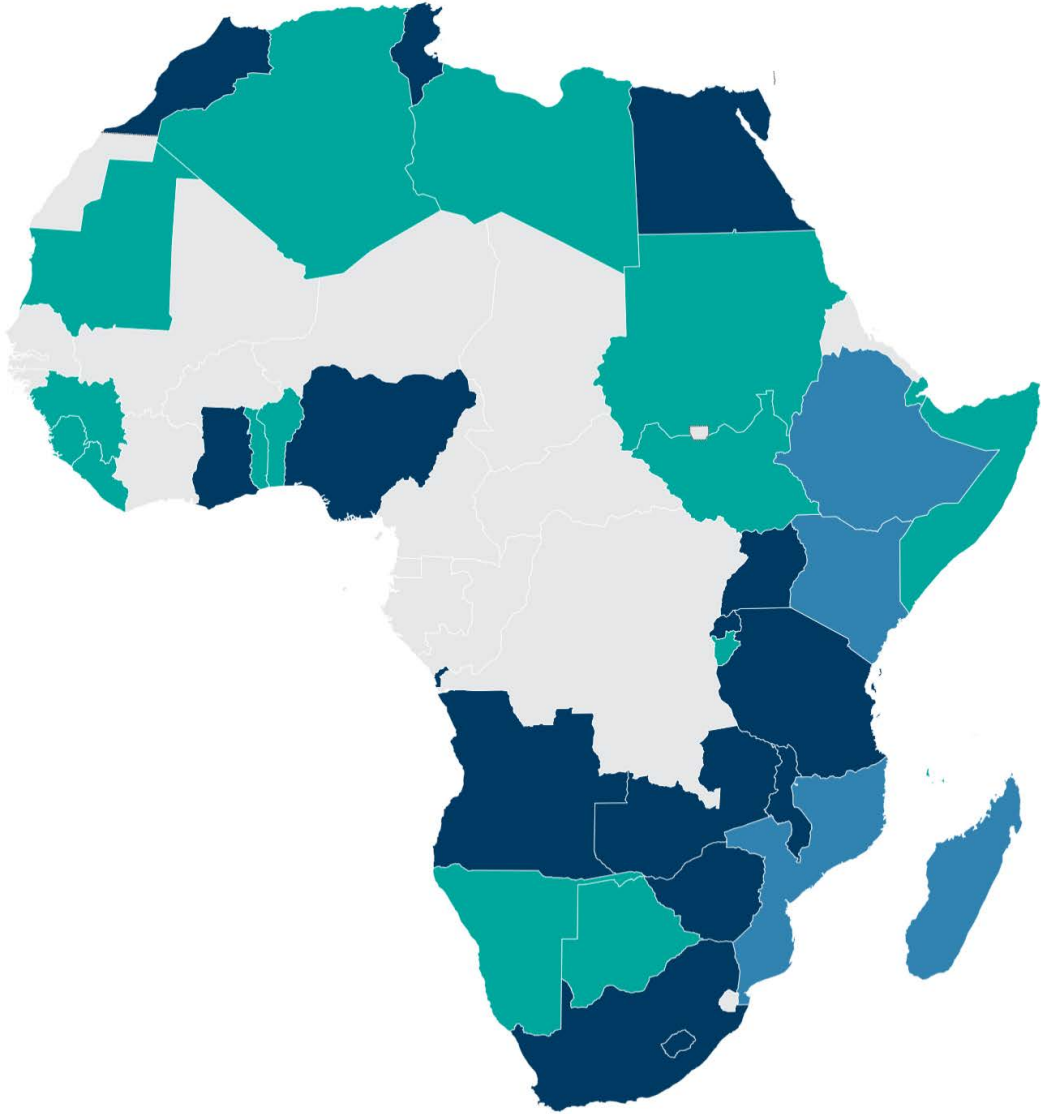
DPI-enabled digital payments are envisioned to be low-cost and frictionless. The Centre of Digital Public Infrastructure (CDPI) argues that a DPI approach to payments “creates inclusion, innovation, and an unprecedented scale of access that allows for diverse user experiences” across a range of devices.<sup>32</sup> The DPI approach to digital payments posits that systems operate on a common network—serving public agencies, private organizations, and individuals—to prevent siloed transactions by sector and undue influence of dominant payments providers such as banks and telecoms.<sup>33</sup> Interoperability across service providers is a core feature for DPI-oriented digital payments.<sup>34</sup>

Arguably, digital payments are the most advanced DPI pillar across the continent. Africa leads the globe in mobile money adoption, with almost half of all registered accounts worldwide and over half of monthly active accounts worldwide,<sup>35</sup> but disparities exist across countries and types of services offered. Most digitized payments are primarily driven by private sector innovation and investments in financial technology (fintech), hence they have varied interoperability capabilities to other digital systems.

One metric of digital payments and their progress toward becoming DPI is instant payment systems and their state of inclusiveness.<sup>36</sup> According to the annual State of Instant and Inclusive Payments Systems (SIIPS) reports by advisory firm AfricaNenda, instant payment systems provide a foundational layer of Africa’s DPI; they “process retail transactions digitally in near real-time and are available for use 24 hours a day, 365 days a year, or as close to that as possible. They enable low-value, low-cost push transactions that are irrevocable and based on open-loop and multilateral interoperability arrangements.”<sup>37</sup>

**Figure 1. State of Instant Payment Systems in Africa**

■ Live IPS   ■ Live IPS and IPS in development   ■ IPS in development   ■ No data



Source: AfricaNenda

**Table 2. Categorization of Instant and Inclusive Payment Systems in Africa**

Inclusivity Level	Criteria	Number of Systems in Africa	Countries
<b>Basic Level</b>	<ul style="list-style-type: none"> <li>Has minimum functionality</li> <li>Supports widely used user access channels</li> <li>Supports Person to Person (P2P) and Person to Business (P2B) transactions</li> </ul>	12	Egypt (Meeza Digital), Ethiopia (EthSwitch), Gambia (Gamswitch), Kenya (mobile money), Madagascar (mobile money), Morocco (MarcoPay), Mozambique (SIMO), Nigeria (mobile money and eNaira), South Africa (RTC), Tanzania (Taifa Moja), Uganda (mobile money),
<b>Progressed Level</b>	<ul style="list-style-type: none"> <li>Includes basic functionality</li> <li>Interoperability of all licensed Payment Service Providers (PSPs)</li> <li>Central bank actively involved in governance frameworks</li> </ul>	9	Ghana (GIP and MMI), Malawi (Natswitch), Mauritius (MauCAS), Nigeria (NIP), Tanzania (TIPS), Zambia (NFS), Zimbabwe (ZIPIT), Central African States -CEMAC (GIMACPAY)
<b>Mature Level</b>	<ul style="list-style-type: none"> <li>Includes basic and progressed-level functionality</li> <li>Expanded use-case coverage (such as Government to Person (G2P) and Business to Business (B2B))</li> <li>Transparent, efficient consumer recourse mechanisms and low-cost services</li> </ul>	0	None
<b>Not Ranked</b>	<ul style="list-style-type: none"> <li>Systems fail to support minimum use cases (such as P2P and P2B) or preferred digital channels</li> </ul>	10	Angola (KwiK), Egypt, (IPN), Kenya (PesaLink), Lesotho (LeSwitch), Morocco (Virement Instantané), Rwanda (eKash), South Africa (PayShap), Tunisia (mobile money), SADC (TCIB), WAMZ (Pan African Payments Settlement System (PAPSS))

Source: [The State of Instant and Inclusive Payment Systems \(SIIPS\) in Africa 2024 Report](#).

In a 2024 assessment of thirty-one instant payment systems across the continent, none had attained a mature level of inclusivity. However, nine systems demonstrated growth by meeting criteria of the “progressed” level.<sup>38</sup> These systems, such as Ghana’s GHIPSS Instant Pay (GIP) and Mobile Money Interoperability (MMI) and Tanzania’s Instant Payment System (TIPS), showcased advanced interoperability and governance, setting an example for how central bank involvement and collaborative frameworks can drive inclusivity. Twelve systems

were classified at the “basic” level, meeting foundational requirements for functionality and use-case support. These systems, including Nigeria’s eNaira and Tanzania’s Taifa Moja, provided essential P2P and P2B transaction capabilities but struggled to expand their offerings beyond these basic use cases.<sup>39</sup> On the other end of the spectrum, ten systems were not ranked because of their inability to meet even minimum criteria for inclusivity. Systems like Angola’s KwiK and Kenya’s PesaLink highlighted challenges such as lack of interoperability and insufficient support for preferred channels. Regional platforms like Transactions Cleared on an Immediate Basis (TCIB) for the Southern African Development Community (SADC) and Pan-African Payment and Settlement System (PAPSS) for the West African Monetary Zone (WAMZ) also fell short of expectations, reflecting the complexity of harmonizing diverse national payment systems under a unified framework. These findings emphasize the need for a coordinated effort among governments, financial institutions, and technology providers to improve instant payment system functionality and inclusivity at both national and regional levels. It must be highlighted that there was some progress from 2023, when twelve instant payment systems were not ranked, fifteen were at the basic level, and only five were at the progressed level.<sup>40</sup>

India’s DPI approach to digital payments is influencing some countries’ payments infrastructure. Namibia, for instance, is tapping into the UPI technology and expertise to develop real time peer-to-peer and merchant payments, in line with the nation’s plans to achieve full interoperability of payments systems and modernize its financial sector.<sup>41</sup> Ghana has signed on to operationalize UPI within the country’s payment and settlements systems to facilitate faster money transfers between Ghana and India.<sup>42</sup> Such initiatives can help expand Africa’s digital payments ecosystems to ensure interoperability within national and continental payment systems.

While individual nations and regional economic blocs are at varied stages in achieving ubiquity and inclusiveness of and in instant digital payments, DPI technology stacks—such as inclusive instant payment systems—will be instrumental in driving interoperability across country systems and in the AfCFTA digital commerce visions, particularly the vision for a PAPSS.

## Data Exchange

The third DPI pillar, data exchange, is still nascent in Africa. At its core, data exchange entails the sharing of data among authorized entities and ensuring that data conforms to well defined standards, upholds data protection and privacy, and abides by pertinent data sharing regulations. In DPI systems, personal data is exchanged by consent managers who serve as data fiduciaries. Consent managers enable data principals to provide, withdraw, evaluate, and manage their consent to the use of data via an accessible, transparent, and interoperable platform. This framework is useful for services such as credit checks, insurance, and cash transfers, and African countries have begun to build out national data exchange systems to take advantage of these services, especially for financial services.<sup>43</sup>



In Ghana, the rapid evolution of the fintech ecosystem has been pivotal in promoting the widespread adoption of digital payments and has thus provided a sectoral opportunity for developing data exchange mechanisms. The Ghana Interbank Payment and Settlement Systems Limited (GhIPSS), established by the Bank of Ghana (the central bank) in 2007, laid the foundational framework for all financial data exchange in the country, thus creating data protection protocols and compliance with international data exchange standards.<sup>44</sup> The infrastructure of GhIPSS has become the backbone for data exchange in the financial sector, extensively utilized by all banks, savings and loans companies, mobile network operators, and third-party payment providers in Ghana. This infrastructure underpins the fintech ecosystem, allowing these entities to build their products and services on a settlement platform that facilitates seamless cross-institutional payments and data flows.

GhIPSS aligns well with DPI principles with its strong interoperability base, ensuring seamless integration across various payment systems, which supports broader financial inclusion goals. Governed by the Bank of Ghana, it ensures that the infrastructure serves public good and adapts to increased demand, showcasing scalability. However, GhIPSS is not integrated into a cohesive, government-wide data exchange platform, revealing an area for potential growth and synergy. Through GhIPSS, Ghana could develop a broad national system to facilitate seamless data exchange across all government sectors. Building on GhIPSS's robust technological and governance frameworks, the government could expand these successes beyond the financial sector to include a broader range of government services. By leveraging existing capabilities in interoperability, such as application programming interface (API) management, identity access management, and secure transaction protocols, this initiative could transform public sector efficiency and accessibility. It could also strengthen the establishment of an inclusive model that is tailored to the unique needs of Ghana, fostering widespread acceptance and utility. This approach could not only leverage a system that has been in place for over seventeen years but could also ensure that it is deeply embedded in the local context and well-aligned with the preferences, expectations, and practices of its users.

In 2016, Uganda launched its national data exchange platform, UGHub. The open-source platform designed for data and systems integration was developed and rolled out by the National Information Technology Authority-Uganda. Its core objective has been to facilitate the seamless sharing of data across government systems in a rational, secure, efficient, and sustainable manner, thereby enhancing service delivery to citizens.<sup>45</sup> Initiated with a modest participation of just twelve government ministries, departments, and agencies, UGHub has since witnessed exponential growth. Over 130 entities, encompassing both government agencies and private sector organizations—predominantly banks and financial institutions—have integrated with UGHub. There are currently sixty-two government agencies and seventy-three private entities, reflecting a broad-based adoption across sectors.

Data exchange is a foundation for building digital systems at scale in Africa, and there is an urgent imperative to develop systems that facilitate movement of data between national institutions and across borders. These platforms require innovation and design that meets

local needs, as demonstrated in Uganda and Ghana. There is no one-size-fits-all solution. It is imperative for African countries to forge their own paths, factoring in contextual uniqueness, while also drawing from other countries' and regions' practices where appropriate. By recognizing variances, countries can choose elements that align with their operational needs, policy and legal structures, and institutional frameworks rather than adopting an imported plug-and-play model.

Efficient data exchange in Africa is also key to realizing Africa's vision of a single digital market through the AfCFTA. The AU developed the AU Data Policy Framework, which underscores the need for a shared direction on data exchange among African countries as it facilitates seamless cross-border data flows that are considered essential for regional integration and economic growth.<sup>46</sup> The framework calls upon member states to develop "a high-level and strategic policy perspective that is strongly rooted in the local context." Additionally, the AU's Convention on Cybersecurity and Personal Data Protection (Malabo Convention) also presents AU member states an opportunity to streamline their data protection regimes to harmonize data governance.<sup>47</sup> It is imperative for countries without data protection laws to establish these legislations. In addition, the proposed protocol on digital trade provides annexes on data sharing and data exchange.<sup>48</sup> The operationalization of an African data exchange framework will be key in unlocking the economic and social potential of data, even as it pertains to DPI. The DPI agenda therefore has an opportunity to contribute to the development of this pillar in the continent.

## DPI in African Countries: Preconditions for Success

DPI's foundational systems and attendant principles have the potential to support Africa's ongoing digital transformation, and evidence is already emerging across the continent. However, DPI is an emergent concept, entails a new approach in the continent, and borrows from success stories in other ecosystems, where its definitions and frameworks are also relatively new.<sup>49</sup> Therefore, the proposed DPI-ization of Africa's digital transformation should be approached with caution and aptitude. Implementers of DPI will have to contend with ongoing initiatives—within the three fundamental pillars—and not assume tabula rasa. Consideration must also be made for the local political economies into which the systems and concepts are being introduced; the infrastructure realities that support the resulting systems; and the localized capacity necessary to maintain the resulting systems. In addition, consideration of the existence of legacy systems that may already function in alignment with a DPI approach is imperative. As Chief Architect of the India Stack Pramod Varma has noted, in defining DPI for impact, one has to determine what is a necessary condition without which failure is guaranteed.<sup>50</sup> The following preconditions for DPI success in Africa must be amplified, even if they are considered givens in the DPI typology.<sup>51</sup>

## Situating DPI Discourse Within Existing Digital Systems and Governance Structures

Presently, most DPI narratives contend for DPI implementation with proposals for new DPI solutions including prepackaged DPI applications for global adoption, yet most African countries have digital systems—in all three pillars—that are operational. DPI initiatives such as the One Future Alliance (under India’s G20 presidency) have emerged to build capacity and provide technical assistance and adequate funding to support DPI rollout in developing countries. And initiatives such as 50-in-5, a country-led advocacy campaign, aim to have fifty countries fully develop and deploy DPI in a safe and inclusive manner by 2028. Within this wave, DPI has become a prepackaged solution to help countries accelerate their digital transformation journey.<sup>52</sup> Though a noble initiative, it creates the impression that new systems are needed, with little narrative effort presently to speak to existing systems’ prospects to embody DPI principles.

An urgent question to address is whether countries with relatively established systems that already operate “like roads”—a popular analogy describing this newly favored approach to digital development—can be classified as DPI.<sup>53</sup> And what would it take for existing systems to fit the DPI script, so as to inform more efficient policy action. Where do widely adopted systems like Kenya’s M-PESA fit within the DPI narrative? Would countries with ubiquitous mobile money systems need entirely new payments systems to fit the DPI bill? If not, what can the DPI approach and tech architecture offer this widely adopted and functional system such that it can serve Africans even better? These are non-trivial questions for DPI proponents to address as the push for DPI in Africa’s digital transformation gains momentum. Policymakers and DPI stakeholders, such as development partners, must reframe DPI’s prepackaged approach to consider existing digital infrastructures in African countries. This will be fundamental to raising awareness and gaining political buy-in for DPI in prospective implementing countries. An approach that does not consider current digital successes will most likely run into political and administrative headwinds given the cost of DPI systems and limited budgets.

Additionally, the political economy of DPI will be buttressed by the regulatory environment of respective African countries. Governance is regarded as central to the DPI approach. And in a continent with over fifty countries, DPI deployment will vary depending on national legislation and continental frameworks. Focusing on governance therefore becomes imperative in domesticating DPI. The DPI model must anchor technology interventions alongside governance conversations. Questions such as how national governance frameworks interplay with the DPI approach will need to be addressed. In many African countries, digital ID, digital payments, and data exchange are distributed across various ministries. It will be essential to have a convening platform that brings different stakeholders together. For example, in Brazil’s national instant payment system Pix, the Central Bank of Brazil convened the Pix Forum. This forum ensures representation of multiple stakeholders, including national associations representing end users and providers of IT and financial services, in the rollout

of a national payments infrastructure and permanent advisory committee.<sup>54</sup> This inclusive governance model ensures that local capacity is built and local interests are considered, facilitating a more effective and sustainable implementation process.

Related to this is the political buy-in, especially of institutions that could be disrupted by the introduction of DPI. Mid- to low-level personnel in government ministries, departments, and agencies are often overlooked in discourses introducing new concepts and approaches to digitalization, yet these individuals' buy-in can fast-track or jeopardize implementation success. Thus, awareness efforts should be tailored to engage with personnel in the mid- and low-level ranks of key implementing public institutions to complement the engagement with ministerial- and presidential-level representations of countries' public sectors. They should also incorporate ways of formally and informally interacting with private sector technologists, as well as civil society and academia involved in or concerned with DPI implementation to foster multi-stakeholder collaboration and engagement. In this way, political and technical DPI champions can be fostered toward minimizing friction or resistance to the resulting DPI interventions.

## The Infrastructure Imperative

As there is foundational DPI, so too is foundational infrastructure that needs to be in place for DPI to deliver on its stated goals. Internet connectivity and energy are two prime examples with respect to Africa. As Nigeria's minister for communications, innovation, and digital economy notes in his vision for DPI in the country, DPI includes both physical technology such as broadband networks and digital platforms and capabilities such as identity systems and payment rails.<sup>55</sup> DPI systems, like any other applications, will require connectivity to provide value, and connectivity infrastructure is a critical component that must be addressed. Meanwhile, the International Telecommunication Union estimates that only 37 percent of Africans were online in 2023.<sup>56</sup> Africa has a digital divide with an estimated 900 million people who are not online, attributed to a myriad of reasons such as affordability, the rural-urban divide, and the gender divide. Already, DPI implementation has begun with significant investments going toward digital ID, digital payment, and data exchange systems, yet some countries such as Burundi, Central African Republic, and South Sudan still have internet penetration rates below 20 percent.<sup>57</sup> These low levels of connectivity will inevitably hamper the widespread adoption and effectiveness of digital solutions.

There is also a need for energy to power digital infrastructure such as data centers and telecommunications towers. And with the growth of Africa's digital economy and artificial intelligence (AI)-based solutions, the demand for energy is expected to grow.<sup>58</sup> This growing demand will add to an already pressing situation, as many Africans (43 percent in 2022) lack access to electricity.<sup>59</sup> Mobile network companies across the continent are already grappling with a range of energy-related challenges. These include power outages, limited access to the grid, soaring energy costs, and the complexities of procuring and integrating renewable energy.<sup>60</sup> To support the digital connectivity infrastructure of a continent that prioritizes

mobile technology, the calculation of energy infrastructure becomes crucial. With over 240,000 telecom tower sites, ensuring reliable power supply is of utmost importance.<sup>61</sup> Many of these sites are resorting to alternative energy sources, mostly diesel generators, an expensive and emissions-heavy option.<sup>62</sup> Without dependable and affordable energy and internet connectivity, Africa's digital transformation will falter. In South Africa for instance, experts have warned that power disruptions could worsen the digital divide, especially for rural and poor communities.<sup>63</sup> DPI proponents must take these imperatives into account. In addition, energy provisions should be climate friendly to ensure that DPI maximizes all opportunities to support the Sustainable Development Goals.<sup>64</sup>

## Localized Solutions that Harness Africa's Youthful Population

DPI offers the continent an opportunity to grow local innovations by utilizing the continent's innovative talent. The United Nations reports that Africa possesses the youngest population globally, with more than 70 percent of its inhabitants under thirty years old. This demographic is expected to increase as the continent's population grows from 1.4 billion now to an estimated 2.5 billion by 2050.<sup>65</sup> Africa's youth bulge offers a tremendous resource that should be leveraged to develop scalable solutions for the continent's people. In this regard, DPI presents an opportunity for developing localized innovations, such as a continental African stack—a digital infrastructure that will use API to provide access to a common African framework for digital ID, digital finances, and data exchange available to businesses and government to build new services—that will harness youth talent at the forefront of Africa's digital transformation. Africa's youth provide DPI with human resources, and they are already shaping the digital landscape with innovative solutions evident in tech startups across the continent. Young people have the potential to spearhead the development of localized DPI solutions, provided that they are given the necessary resources and tools. By investing in local talent and building localized DPI innovations, Africa can reduce its dependency on external technologies and foster long-term, sustainable growth, providing much needed economic benefits for the continent's youth.

The development of an African stack will also provide a solution that ensures an interoperable digital ID, digital payment, and data exchange system and complements AfCFTA. Maintaining digital sovereignty is also essential for African countries as the rollout of DPI progresses in the context of digital transformation. This can only be achieved by developing solutions that are locally owned and utilize local capacity.

One benefit of DPI is bypassing proprietary vendor lock-in, often considered a disadvantage for low- and middle-income countries. However, DPI necessarily demands that the local ecosystem have certain technical and policy capacities to maintain or oversee the maintenance of the resulting systems. It is widely assumed that African public sectors lack capacity, more so in relation to digital technologies. Yet, nuance is key to effective and progressive capacity building and development interventions. Therefore, mapping existing skills and capacities, especially within the public sector systems that DPI is envisioned to bolster, must

be conducted in each implementing country and institution. This way, capacity investments—including technical assistance, development grants, and philanthropic support—can be streamlined to establish a sound capacity baseline to avoid the risk of creating new digital dependencies on outside expertise and external funding, thus jeopardizing the purported benefits of the DPI approach.

## Conclusion: Priorities to Anchor Success of DPI in Africa

Africa is ripe with potential to generate global DPI exemplars—as long as the infrastructure and governance, regulatory, and capacity nuances are factored into its deployment. Arguably, DPI's greatest potential in Africa is in realizing the continent's aspirations for digital development and transformation, driven by both public and private sector innovation. However, the broader context and environment in which DPI is designed and deployed must be considered equally to the DPI foundational pillars. DPI enablers such as connectivity, energy, and skills demand equal investments to ensure DPI adoption at scale and maximize the impact of DPI systems. Already, DPI implementation has begun with significant investments going toward digital ID, digital payment, and data exchange systems. In this section, we offer five policy recommendations derived from the three DPI pillars and the necessary preconditions for success.

### African Policymakers Must Develop DPI National Guidelines and Governance Frameworks

A policy that guides coordination mechanisms for DPI implementation is imperative. Policy guidelines must address the integration of DPI with current digital systems and outline the necessary governance frameworks for data sharing and system integration. Most African countries have digital ecosystems, but lack requisite structures and policy direction for the coordination and integration of digital ID, digital payment, and data exchange systems. Lack of a national framework to support DPI adoption could hinder progress. It is therefore crucial for countries to put in place national plans to drive the DPI agenda. These plans must align with continental frameworks, such as the AU's Interoperability Framework for Digital ID, Convention on Cybersecurity and Personal Data Protection, and Data Policy Framework, to help streamline data protection laws for continental integration. Africa's diversity will be reflected in the various DPI solutions that develop. However, a coherent policy ecosystem will support successful implementation, thereby accelerating inclusive digital transformation.

## **DPI Implementation Must Integrate New and Existing Digital Systems Both Nationally and Regionally**

African countries must endeavor to develop integrated digital systems for digital IDs, digital finance, and data exchange, anchored in their DPI policy. This integration should be for both new and existing systems. In addition, governments must fast-track integration into existing initiatives such as PAPSS. Accelerating integration of their national payments systems into PAPSS will advance cross-border financial transactions on the continent and help achieve instant, inclusive, and interoperable digital payment systems. The development and advancement of PAPSS itself could lean on DPI tech principles and the DPI approach to maximize its potential. Additionally, African policymakers should fast-track the development of data exchange systems that allow for cross-border data movement. DPI innovations and solutions must be localized.

In countries with existing digital systems, proponents of DPI, such as development partners and intergovernmental organizations, must consider local contexts and situate DPI solutions within existing digital solutions, especially those already serving identification, payment, and data exchange functions—even though they may not fully align with the DPI way. Presently, DPI discourse overlooks existing successful solutions in Africa while advocating for new approaches. Showcasing how existing solutions can evolve through DPI to deliver solutions at scale and build an Africa stack will advance buy-in from policymakers and local stakeholders.

## **DPI Implementers Must Seek to Grow Localized Solutions That Harness Youth Talent**

DPI can play a pivotal role in shaping Africa's future. The continent holds immense untapped potential for technology and innovation and untapped, immersive, youthful, and innovative talent. A key tenet of DPI is to unlock the power of market innovation and entrepreneurship to address societal challenges and advance productivity gains.<sup>66</sup> DPI solutions on the continent should therefore aim to harness technology to address local issues through innovative approaches that help establish tech entrepreneurship that can provide much needed income opportunities for Africa's youth. Establishing a connection between DPI and the potential it holds for Africa's innovative and talented youth will be essential. Solutions that provide economic opportunities for youth must be prioritized. DPI can facilitate the expansion of Africa's technology ecosystem by providing localized solutions and a digital architecture that enables others to develop solutions at scale. This architecture creates opportunities for others—especially the digitally empowered youth with pathways to develop new innovations increasing market driven solutions such as e-commerce platforms. An African stack enabled by a common digital ID, digital payment and data exchange framework will be pivotal in developing DPI to scale with localized solutions.

## **Policymakers Must Ensure DPI Implementation Mitigates the Digital and Energy Divides**

Inclusivity is crucial to the success of DPI. Implementation in Africa must therefore accommodate the infrastructure imperative—digital connectivity and energy—to guarantee success of DPI-driven digital transformation.

## **Policymakers and DPI Stakeholders Must Build Technical Know-How**

Investing in developing young people's skills will ensure they can become active participants in DPI in Africa. The DPI concept relies on unique technical skills—for example, DPI architecture design, data engineering, network security—that need to be developed for the resultant infrastructure. This also means that local technical capacity, especially in the public sectors, is imperative. Skills and capacity building must be factored into DPI advocacy, planning, and investments.

DPI has excited technologists and development practitioners with regards to advancing digital development in Africa, and for good reason. DPI holds the potential to bring productivity and inclusion gains through digital solutions. However, to translate this potential to practice, implementers must employ strategies that factor in the peculiarities of African countries digital ecosystems, including existing digital systems. Consequently, DPI in African countries must be approached from a nuanced perspective. Investments in DPI should not be hasty in their support of new systems; rather, they should first consider what systems exist, examine why they work or don't, and make evidence-based suggestions for improvements or upgrades through DPI. Failure to do so could lead to inefficiencies or abandoning of systems in a bid to secure DPI resources, leading to disruptions of already existing rails. Additionally, DPI provides the continent with the opportunity to expand the African innovation ecosystem by leveraging youth talent. Significantly, DPI will require coherent policy action to function as a tool for digital transformation. The policy recommendations presented in this paper can contribute to the success of the DPI across individual nations and the continent as DPI efforts are piloted, socialized, and entrenched in the continent's diverse digital ecosystems. Nevertheless, the ultimate responsibility for ensuring the effectiveness of DPI, with its potentially wide-ranging societal benefits for the continent, will fall on African policymakers and stakeholders.



## About the Authors

**Diana Sang** is the Africa Director for Digital Impact Alliance

**Jane Munga** is a fellow in the Africa Program focusing on technology policy. Her career has focused on policymaking with an emphasis on the potential of digital technologies for digital development.

**Nanjira Sambuli** is a researcher, policy analyst and strategist studying the unfolding, gendered impacts of digitalization/ICT adoption on governance, diplomacy, media, entrepreneurship, and culture, especially in Africa.

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