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From India Stack to EuroStack: Reconciling approaches to sovereign digital infrastructure

By Chloe Teevan, Raphael Pouyé and Gautam Kamath

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This paper argues that the EU should expand global discussions around digital infrastructures, presenting a more complete and democratic framework for sovereign digital infrastructure. This would permit the EU to engage with key emerging powers like India and Brazil, offer a holistic vision to govern the technology stack and help shape a wider global conversation about tech sovereignty.

India and a range of international institutions and foundations have championed Digital Public Infrastructures (DPIs) - secure and interoperable digital systems, designed to help societies access essential public or private services. The global discussion about DPIs has built on the success of India's Aadhaar digital ID system, universal payments interface and exchange layer that make up the 'India Stack'. The term DPIs is gaining global traction, with Brazil adopting it while building on existing systems rather than starting from scratch. These experiences offer valuable insights for other countries, but it is vital that different geographies develop DPIs and wider digital infrastructures that respond to their own developmental challenges.

Meanwhile, Europe is engaged in a conversation about competitiveness and tech sovereignty that has crystallised in the discussion on building a 'EuroStack' of sovereign European digital infrastructure, including hardware and software. Alongside a focus on much-needed investments in hard infrastructure and strengthening Europe's governance model, this includes a number of EU-wide DPI initiatives, like the EU digital wallet, and member state innovations that will be crucial for sovereign innovation. To shape the global discussion around tech sovereignty, the EU must partner with others, engaging with their priorities and jointly widening the debate about sovereign digital infrastructure.

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Acronyms

AfCFTA	African Continental Free Trade Area
AI	Artificial intelligence
API	Application programming Interface
AU	African Union
CPF	Cadastro de Pessoas Físicas (Brazilian personal registration number)
DPGs	Digital public goods
DPI(s)	Digital public infrastructure(s)
DTS	Digital transformation strategy
EU	European Union
EUDI Wallet	European digital identity wallet
G20	Group of Twenty (major economies)
GDP	Gross domestic product
ID	Identification document
ID4D	Identification for development
OSPO	Open source program office
PIX	Brazilian instant payments system
SDG	Sustainable development goal
UN	United Nations
UNDP	United Nations Development Programme
UPI	Unified Payments Interface

1. Introduction

A global conversation about Digital Public Infrastructure (DPI) has gathered steam since the 2023 Group of Twenty (G20) Summit in New Delhi. Countries like India and Brazil have implemented and are advocating for different types of DPIs with some success. The Global Digital Compact (GDC) offers the first official recognition of DPI's role in development. Adopted at the September 2024 Summit of the Future, it enshrines "digital public goods and DPI as 'key drivers of inclusive digital transformation and innovation', granted that these are 'built in a safe, inclusive, and interoperable manner". It also recognises that "there are multiple models of digital public infrastructure, and that each society will develop and use shared digital systems according to its specific priorities and needs" (UN 2024a).

DPI was defined at the G20 Summit of August 2023 as "a set of shared digital systems that should be secure and interoperable, and can be built on open standards and specifications to deliver and provide equitable access to public and/or private services at societal scale…" It states that DPI should be governed "by applicable legal frameworks and enabling rules" so as to support specific values such as development and human rights, and recognises that DPI is an 'evolving concept' (G20 2023). While commonly associated with identity, data exchange, and payment systems, a more expansive vision is perhaps more appropriate in a global context. Brazil has recently adopted its own definitions of DPIs (plural) that mirror the G20 definition, while France and Germany are building open-source office solutions, initially for public administration, that could potentially become infrastructural considering the widespread use of such tools. We use DPIs plural in recognition of the multiplicity of approaches and systems emerging across the world.

Yet, the growing discussion about DPIs should also be contextualised within a wider evolving discussion about technology sovereignty and the wider tech stack. Within the European Union (EU), there is growing support for a model of sovereign infrastructure, increasingly referred to as the 'Euro Stack', building on a full technology stack approach - everything from hard infrastructure to software solutions and governance. This approach highlights both industrial policy, as well as democratic values (Bria 2024; Berjon et al. 2025; Teevan and Pouyé 2024). There are certainly overlaps between the European approach and the Indian DPI-focused approach, and both can be seen as efforts to build sovereign systems that respond to local needs, in contrast with the United States (US) - and increasingly Chinese - solutions that dominate global markets. Yet, the EuroStack emphasises the importance of sovereign solutions for hard infrastructure, which might be seen as the missing foundation of the current DPI discussions.

DPIs, like all infrastructure, are not values neutral. Eaves et al. suggest that the "public" in DPIs should not be understood in terms of diverging definitions of public value, but instead in terms of "common good" defined as: "...a philosophical principle that extends beyond the mere attainment of common objectives, foregrounding the common processes and relationships needed to achieve them." This highlights the importance of both outcome and process in reaching an idea of the collective good, and therefore highlights the importance of governance in setting the direction for DPIs (Mazzucato, Eaves and Vasconcellos 2024). Building on this idea of the common good, then it is no surprise that India, the EU and other geographies should develop different approaches to digital infrastructures in order to respond to different interests, values and needs. Yet, given the current geopolitical context, they also have a clear interest in finding common ground.

This paper examines different approaches to DPIs and the technology stack, exploring the development goals they pursue and their approaches to governance. **We argue that DPIs across the world will need to respond to the development needs of distinct geographies, and must be part of a wider discussion about digital infrastructure and technology sovereignty. The EU's commitment to democratic principles, sustainability, digital rights and data protection could also add a distinct contribution to evolving global discussions about DPIs.** This will require the EU and its member states to fully engage with global discussions about DPIs through a comprehensive approach bringing together technology diplomacy and a holistic offer as part of the Global Gateway Initiative and other multilateral engagements. The paper is based on 45 interviews, attendance at several significant events,[1] as well as drawing from the growing literature on DPIs, and on EU policy documents.

In the next section we look at the emergence of DPIs as tech for the Global South, pioneered by India, but now championed by Brazil and a growing number of African governments with support from multilateral organisations and donors. We then explore the European conversation around technology sovereignty, how much the EU and member states have already done in terms of developing DPIs and adjacent technologies, and how the EU is engaging globally around digital infrastructure. Finally, we provide some recommendations for the EU on engaging with DPIs as part of an evolving foreign economic policy, integrating technology diplomacy with a more complete offering under the Global Gateway connectivity strategy.

[1] These notably include the EuroStack event at the European Parliament on 24 September 2024, the Global DPI Summit in Cairo on 1-3 October 2024, a workshop hosted by ECDPM on 14 November 2024, and the Tallinn Digital Summit on 19-20 November 2024 amongst others.

2. India Stack and the emergence of DPI(s) as tech for the Global South

DPIs initially emerged primarily to describe India's public-use technological stack - the groundwork of which was laid in 2009 with the introduction of the Aadhaar digital Identification Document (ID) system, an ambitious project designed to encompass the country's population of nearly 1.5 billion. This initiative evolved into what has become known as the 'India Stack', a set of digital platforms once summarised as "digital identity, data exchanges and financial plumbing" (Eaves 2023). From its inception, India Stack was led by a coalition of experienced managers from private and public-sector enterprises. It involved co-creation and scaling "public digital rails" with banks, fintechs, tech firms, regulators, and developer communities. The National Payments Corporation (NPCI) was initially set up with funding from ten of India's leading banks that then received a 10% stake (Krishnan 2021).

At the G20, a more expansive definition of DPI was adopted as mentioned in the introduction, and other countries in the Global South have since embraced the concept, including notably Brazil. Yet, in Presidential Decree Nº 12.069 of June 2024, which lays out Brazil's Digital Government Strategy and establishes a National Digital Government Network, the formal definition of DPIs frames them as an approach to system transformation rather than a set of foundational platforms, unlike India's Stack. Brazil defines DPIs as "cross-application structuring solutions, which adopt network technology standards built for the public interest, follow the principles of universality and interoperability, allow use by various entities in the public and private sectors and can integrate services in physical and digital channels" (Diário Oficial da União 2024).

There are now numerous examples of DPIs' potential to support the state's ability to deliver services and thus support human and social development - an important end in itself. The United Nations Development Program (UNDP) outlines that DPIs can play an important role in a country's development, and can contribute to achieving all 17 of the Sustainable Development Goals (SDGs) (UNDP 2023a). For example, digital identity can facilitate access to a range of services, such as social welfare, safer mobility and more secure wages for women (SDGs 1, 2, 5, 9, 10 and 16). More generally, it has been estimated in 2023: "DPI can increase GDP by an estimated $200 billion to $280 billion by 2030 for the 70 low and middle-income countries…equivalent to a 1–1.4 per cent increase in annual GDP." (UNDP 2023b).

DPIs and the various technologies that undergird and build on them, also potentially form the basis for an innovative economy. The Indian example points to the potential for DPIs to not only achieve human development, but also drive digital innovation. In an African context, DPIs can play a role in achieving national goals related to human development, but interoperable DPIs can also play a key role in achieving economic transformation through continental integration, and spur cross-border innovation ecosystems.

Thus, it is important to appreciate the very different interests and focus of different geographies, and to design DPIs that fit their development goals. **There is much to learn from the incredible development achievements of India Stack, but other geographies will need to build DPIs on strong legal foundations that cater to their own development needs. Further, DPIs need to be tied into wider conversations about digital infrastructure and technology sovereignty.**

Aadhaar and the India Stack as the archetypal model

The development impact of the India Stack has been much lauded and with good reason. It has led to great advances in human development, and fed local innovation. India's Aadhaar is the world's largest eID programme, having issued 1.377 billion unique ID numbers by mid-2023 (Malkani 2024). It was significant in guaranteeing that every Indian would have access to identity, something that was not previously a given in India, like in many developing countries where people do not always have birth certificates.

Aadhaar, in combination with the Pradhan Mantri Jan Dhan Yojana (PMJDY) national financial inclusion mission, is credited with increasing bank account ownership among Indian adults from 35% to 78% between 2011 and 2021 (World Bank Global Findex Database 2021). It is also a gateway to other services, facilitating vehicle registration and access to government welfare schemes, resulting in a large increase in their use. For example, during the COVID-19 lockdown in 2020, almost $10 billion in social assistance was transferred to the poor, including to over 200 million women (Mukherjee and Maruwada 2021). In addition to the better provision of social assistance, Aadhaar also had a cost-cutting effect for the government due to e-authentication and prevented leakages in benefit transfers (Nasscom and Arthur D. Little 2024).

Aadhaar also served as the foundational identity layer for the development of further DPIs, paving the way for the creation of the India Stack. The economic impact of the India Stack has been enormous: It is estimated to have contributed 0.9% to India's Gross domestic product (GDP) in 2022, and this is expected to increase to between 2.9-4.2% of the country's

GDP by 2030 (Nasscom and Arthur D. Little 2024). The implementation of Aadhaar, combined with a rapid expansion of telecom (specifically mobile data) services through low prices across a wide swath of a previously underserved and unconnected population led to a rapid uptake of further services and allowed India to 'leapfrog' the industrial stage of development, straddling a pre-industrial agricultural and rural economy and a world-class services sector.

India's DPI success story offers a potent counter-narrative to the experience faced by "many countries [for which] procurements of the digital components needed for their DPI have resulted in costly vendor lock-ins with rigid, long-term contracts for solutions that are not interoperable" resulting in a steep "price paid in terms of lost opportunities and *loss of digital sovereignty."* (Lloyd 2024). India is understandably proud of the manner in which it overturned the traditional e-government approach – involving government ministries and agencies each procuring their own systems - an approach still prevalent across much of the world. India instead started from scratch with an infrastructure thinking, whereby **universal access to ID, payments and data exchange are considered as basic infrastructure for the modern economy,** and provide the basis for both public and private service provision. It "places a strong emphasis on public-private partnerships, notably involving India's non-profit organisation iSPIRIT, which represents the country's software industry." (Sieker 2024). The first chair of the Unique Identification Authority of India (UIDAI) was Nandan Nilekani, cofounder of software company Infosys, while the CEO was veteran civil servant R.S. Sharma (Krishnan 2021).

In India, Aadhaar was developed in a context where many Indians still did not have access to a legal ID, while the creators of the Unified Payments Interface (UPI) sought to cut corruption and tax avoidance. As the India stack and its various use cases for health, education and other sectors have developed, the central concern was to improve access to basic services. However, alongside this developmental concern, Rahul Matthan (2023) argues that India has developed a novel approach to governing its DPI, embedding its values into the protocols underlying India Stack. He argues that in order to avoid centralised platforms and thus a single intermediary, India Stack was built on protocols that mean that actors can engage in a flexible way. This also allows different ways of engaging as there is no single set of rules for how to engage in e-commerce for example. Additionally, Matthan argues that data protection rules are embedded in the very code, marking an original way to approach data protection. Yet critics point to the centralised nature of the Aadhaar digital ID system, pointing to past security failures leading to leakages of personal data (WEF 2019), and the exclusion of some groups (Masiero 2019; Access Now 2021). Efforts have been made to address some of these shortcomings, but many human rights activists are not satisfied.

The scope of India's Digital Public Infrastructure has grown beyond its initial rollout, evolving from a focus on better governance and state functions towards fostering market competition and dynamism (Jain and Srinivasan 2024). The Open Network for Digital Commerce (ONDC), launched in April 2022 by India's Department for Promotion of Industry and Trade, is an open-source digital commerce network that enables buyers, sellers, and service providers—especially Micro, Small and Medium Enterprises—to interact freely across platforms (Indian Ministry of Commerce and Industry 2025). Using open protocols and specifications, it aims to "democratise the country's online market for all buyers and sellers, irrespective of their size" (Cyrill and Bhardwaj 2022) and to provide equal marketplace access to millions of Indian small businesses and unregistered retailers.

India has imbued the concept of DPI with a strong national sovereignty component, leveraging it as an instrument of international influence. At the New Delhi G20 Summit in July 2023, Prime Minister Modi showcased the India Stack, positioning it as "a sovereign, self-owned technology stack" (Christopher 2023). Since then, "more than 50 countries … have asked the World Bank for technical support and funding to build more robust digital-public-infrastructure systems" (Eaves 2023).

The Global Conversation

The Indian approach to developing DPI has inspired international philanthropic organisations and multilateral institutions. India's successful promotion of its model through fora such as the G20, combined with the United Nations' advocacy for Digital Public Goods (DPGs) as SDG accelerators, have swayed many countries of the Global South to begin to pursue their own digital public infrastructure(s). This advocacy has also been supported by the Bill and Melinda Gates Foundation and Nandan Nilekani's foundations, which have funded the emergence of a full ecosystem of think tanks, non-profits, funds, and incubators such as the Centre for DPI, Co-Develop, 50-in-5, EkStep, et cetera.

UN Tech Envoy Amandeep Gill, himself an Indian national, has also championed the DPI approach, together with the concept of digital public goods (DPGs). DPGs are defined as: "open-source software, open standards, open data, open AI systems, and open content collections that adhere to privacy and other applicable laws and best practices, do no harm, and help attain the Sustainable Development Goals (SDGs)" (UN 2020). This concern for avoiding vendor lock-in and giving governments some freedom over public service software infrastructure has coalesced with the Roadmap for Digital Cooperation set in 2020 by the United Nations (UN 2020). In August 2023, UNDP identified DPIs' potential to "turbocharge progress to deliver on the SDGs" (UNDP 2023c). In November of that year, it launched the

50-in-5 Campaign in partnership with the Gates Foundation and others, with the aim to enlist 50 countries by 2028, "helping them design, launch, and scale components of their digital public infrastructure". This approach has mainstreamed the use of DPGs by countries willing to join the DPI bandwagon.

In September 2024, the GDC recognised that "Resilient, safe, inclusive and interoperable digital public infrastructure has the potential to deliver services at scale and increase social and economic opportunities for all" (UN 2024a). This was a resounding victory for India on the world stage. Alongside the GDC, the UN Working Group on DPI - established in the wake of the Indian G20 Presidency - published a Universal DPI Safeguards Framework to "mitigate risks at both the individual and societal level, advance the Sustainable Development Goals and foster trust and equity across all countries." (UN 2024b). This initiative, developed through a multistakeholder process, also aimed to track implementation cases of DPIs and provide insights on how the safeguards could be implemented in practice. Shortly after the adoption of the GDC at the Summit of the Future, the first Global DPI Summit was held in Egypt on 1-3 October 2024.

Yet, some interviewees argued that although technically an open-source solution, ready-to-use tools like MOSIP create technological dependencies that can deprive governments of truly sovereign, locally-tailored solutions. Its critics argue that it is being promoted so successfully that it risks creating a de facto lock-out of alternative solutions. In response, there has been a push from the private sector to respond with a discourse around open standards that ensure interoperability and thereby avoid vendor lock-in. This has led to efforts like the Open Standards Identity APIs (OSIA), led by commercial ID providers, is a set of application programming interfaces (APIs) allowing interoperability between different components of the identity management ecosystem.

At the World Bank, the Identification for Development (ID4D) Initiative predates the emergence of the global discussion about DPIs, yet remains a key initiative therein. It aims to enable access to services and economic opportunities, as well as the expression of rights, by supporting "inclusive and trusted ID systems…to ensure the benefits are realised by all as well as for safeguarding privacy" (ID4D World Bank). It generally aligns with an approach based on interoperable and sovereign identity solutions. For example, ID4Africa emphasises each African nation's ability to maintain technological independence in their digital identity implementations (ID4Africa).

India has aggressively marketed its India Stack as a solution for digital sovereignty, positing that a stack built on open-source systems can be 'sovereign by design' (Burwell and Propp

2022). It has successfully kick-started a global discussion about DPIs. However, India's DPI remains limited to what is essentially an intermediate layer of digital infrastructure that is scalable and interoperable and does not cover the whole technology stack. Can India genuinely claim to offer a sovereign stack, if it for example does not come with native cloud solutions?

Going beyond DPIs in the AI age

In an age of growing protectionism, where major powers are focusing on self-sufficiency in tech industries, it is becoming increasingly dangerous to be overly dependent on a few external actors for key infrastructures. The 2018 US CLOUD Act and 2021 Chinese Data Security Law have both led to concerns that the data of citizens from other nations across the world might be shared with US and Chinese national security services. This concern has taken centre stage with the explosion of Generative AI, and the necessary raw materials needed to achieve 'sovereign AI' - namely, compute capacity through adopting Cloud solutions and building native data centres, along with attracting sufficient technical talent and investment.

In particular, there is growing concern about the global reliance on US hyperscalers, and in recent years, on Chinese vendors for data centres and cloud services. The Snowden revelations and the US CLOUD Act led to a first wave of measures across the world aimed at restricting what data might be shared with US authorities, with Europe taking the lead with sovereignty and governing law requirements in earlier drafts of the EU Cloud Certification Scheme as well as multiple rounds of negotiations around legally acceptable EU-US personal data transfers. Other countries across the world have adopted similar measures, with some taking a more extreme approach based on data localisation (Musoni et al. 2023b). Yet, in recent years and particularly with the return of a less favourable administration in the US, there is a growing sense in Europe and elsewhere that this is not enough and that dependence on the US for cloud services is a major weakness for Europe's sovereignty - undermining its economic security and reducing strategic resilience. Yet, while other blocs may have less financial capacity to address an overreliance on the US and/or China for hardware, there is a growing global conversation emerging about the need to develop sovereign cloud services (for example, Rikap et al. 2024). However, it should be noted that many developing countries have few - if any - data centres, and thus do not have the luxury of being overly fastidious or selective when it comes to offers for investment from Big Tech companies.

India is not a major investor in data centres outside of its borders. The India Stack's missing foundation - cloud-based computing - may soon be patched through strategic partnerships with US hyperscalers or hardware providers.[2] It is worth noting that as countries across the world increasingly express concern for digital sovereignty, hyperscalers are themselves adopting the language of DPIs and digital sovereignty. For example, Google has announced its DPI-in-a-box programme, describing it as a "comprehensive suite for identity storage, management, and access, designed for easy global integration" (Das 2024).

Should partnerships with US hyperscalers be explicitly added to the India Stack, this could constitute a significant geostrategic advantage for India. India may eventually secure political partnerships while establishing its own indigenously developed technology as the standard for DPIs by presenting partner countries with a DPI solution which would be paired with hard/physical or cloud-based infrastructure. As a result, countries which do not have local communities of open-source developers to maintain and adapt these systems risk becoming dependent on the India Stack and any Big Tech infrastructure partners, making it difficult for them to choose alternative solutions in the future.

Still, India's open, multi-stakeholder approach, where the stack provides a framework for collaboration and innovation and when paired with Western investments in hard infrastructure - could serve to challenge China's dominant position in many developing markets under the Digital Silk Road. Although India's ID system Aadhaar has at times been criticised for its handling of personal data and data security (Khera 2018; Cioffi et al. 2022), India's DPI approach remains a much more open approach than China's more restrictive and securitised approach to infrastructure. In September 2024, in an example of India's growing narrative of DPI as a democratic alternative to China's expansion, the Quad (the US, India, Japan, and Australia) released its nonbinding 'Principles for Development and Deployment of Digital Public Infrastructure' (U.S. Department of State 2024).

Brazil's evolving approach

Brazil's encounter with the emerging global DPI discourse during India's G20 presidency in 2023 catalysed this long-term strategic evolution. Using the opportunity provided by the fact that the three Global South champions India, Brazil and South Africa were going to host G20 summits until 2025, Brazil's leadership rebranded its distinctive trajectory of digital transformation as DPIs (*plural*) and led South-South dialogue on digital transformation, a priority that aligned with President Lula's foreign policy vision.

[2] In January 2025, Reliance Industries announced the construction of the world's largest AI data centre with a capacity of three GW powered by NVIDIA GPUs in Jamnagar, Gujarat (Singh 2025).

While supporting India's push to elevate DPI on the global agenda, Brazil developed its own sophisticated approach, culminating in Presidential Decree Nº 12.069 21st of June 2024. The Brazilian approach focuses on transforming its legacy public sector digital systems to be modular, interoperable, and accessible through interoperability principles (called a 'brownfield' approach). It stands in sharp contrast with the Indian one that is based on building foundational layers like digital ID or payment systems, designated as a 'greenfield' one.

Brazil built its digital foundations in the 1960s and 1970s through state-owned enterprises providing digital services at federal and state levels, creating a comprehensive ecosystem of federal and state-level digital service providers. The country legally committed to systematically integrating its digital public services in 2004 with the adoption of formal interoperability standards for government services. It passed a law in 2020 that established that "software developed by, or for government organisations, should use open source licences" (Presidência da República et al. 2020). In March 2021, Law nº 14.129, known as the 'Digital Government Law', elevated this agenda from federal to national level, meaning that from then on, it encompassed and coordinated digital transformation efforts across all levels of government (federal, state, and municipal).

Brazil designates a variety of DPIs, whilst India defines one DPI, in other words one stack. Indeed, Brazil's experience with social payments through the Bolsa Familia programme established in 2003 further illustrates its hybrid, variegated and iterative approach to DPIs. Twenty years before India's push for financial inclusion through digital infrastructure, Brazil had established a comprehensive system for digital social payments, leveraging existing state-owned enterprises to distribute debit cards to millions of Brazilians. Similarly, unlike India's creation of Aadhaar, Brazil built upon its existing CPF ("cadastro de pessoas físicas") number system, gradually enhancing it to achieve universal coverage.

Brazil's digital payments system, PIX demonstrates how DPI can emerge through different institutional paths. While PIX meets DPI principles of interoperability and public interest, it was developed by the Central Bank of Brazil in 2020 with a focus on financial system efficiency rather than explicit DPI goals. Pix is an instant payment system that supports faster and less costly transactions between individual and business accounts. The platform is used for around $300 billion transactions per month and is also used by the government's social assistance programme, to deliver financial support to its citizens. Today, around 70% of Brazil's population and 79% of its businesses are registered with Pix (Bandura et al. 2024). This 'unintentional DPI' shows how robust public infrastructure can emerge from various institutional motivations, provided it adheres to principles of universality and interoperability.

Brazil's distinctive model for governing DPI is also characterised by its focus on multi-stakeholder engagement and federal-state coordination. Unlike India's centralised approach, Brazil's governance model emerged from a complex interplay between federal orchestration and state autonomy. The federal government provides interoperability standards and shared services while respecting state-level implementation choices. This model, which parallels the EU's eIDAS framework, has led to successful adoption of federal government portals by 16 of Brazil's 27 states while allowing others to maintain compatible local solutions. The Gov.BR network exemplifies this hybrid model, balancing public infrastructure with private sector innovation. Brazil's 'brownfield' approach to DPI governance suggests that achieving the common good through digital infrastructure can consist of carefully orchestrating the evolution of existing systems toward greater openness and interoperability while maintaining strong multi-stakeholder governance and preserving local autonomy. However, it is worth noting that Brazil is still in the process of building its own overarching architecture.

The Brazilian interpretation of DPIs as a variety of collaborative, transformative processes is emerging as an alternative model for Global South countries with established digital systems. It demonstrates how DPI principles can modernise existing systems. This alternative approach to implementing DPI - neither pure greenfield development nor simple system integration - offers valuable lessons for nations seeking to transform legacy systems while preserving existing investments. Brazil's distinctive contribution to the global DPI discourse is the possibility of achieving DPI objectives through careful modularisation and enhancement of existing systems, guided by principles of interoperability and universal access, rather than necessarily building new infrastructure from the ground up.

Africa finding its role in the DPI discussion

African governments have their own strategies and priorities for digital transformation at the national, regional and continental levels. Basic connectivity remains a key priority for many of them and is ultimately a necessary prerequisite for the roll-out of DPIs. Given how new the concept is, few governments mention DPI(s) explicitly in their strategies. South Africa's Minister of Communications and Technology, Solly Malatsi, recently included DPI as one of the focus areas in a speech on a new infrastructure roadmap (Republic of South Africa 2024). Many other countries prioritise digital ID, digital payments and wider digital government services. Continental organisations, such as Smart Africa, have also embraced the concept and see the various components of DPI as useful for their goal of building an African digital single market.

They also lay out a wider vision in terms of the development objectives. For example, the African Union (AU) Digital Transformation Strategy (DTS) (AU 2020) lays out a vision for how digital technologies can play a role in achieving Africa's wider development goals in line with Agenda 2063 (AU 2013). Both the DTS and Agenda 2063 aim for human development and for the economic integration and transformation of the continent. Any conversation around digital infrastructure, including DPI, in Africa will need to encompass both of these objectives, helping governments to deliver better services, but also supporting a more fundamental transformation of the continent through initiatives such as the African Continental Free Trade Area (AfCFTA).

African countries have already begun to experiment with the rollout of systems that might be termed DPI at the national level, and there are a number of interesting experiences already. In Togo for example, digital payment systems were a lifeline during the COVID-19 pandemic, facilitating the rapid provision of direct financial assistance by the government. Togo's digital welfare programme, Novissi, allowed the government to provide direct financial assistance to up to 500,000 informal workers whose livelihoods had been affected by the pandemic (Webster et al. 2023). Yet despite some promising initiatives, the continent still has some way to go to achieve its digital transformation, including in the area of DPIs. In 2021, an estimated 470 million people in sub-Saharan Africa did not have any ID, making up over half of the global population without ID (WB 2021). Boosting ID coverage in Africa will be part of the puzzle for achieving greater financial inclusion as well as better social assistance provision.

Yet, Africa also aspires to wider economic transformation, including by means of deeper integration via the AfCFTA. For this, DPI could play a transformational role in allowing for quicker implementation. As ECDPM's previous work has explored, cross-border payments and interoperable digital IDs can help to deliver seamless cross-border trade in both goods and services (Domingo and Teevan 2022; Musoni et al. 2023a). Cross-border data flows will be the basis of the digital trade protocol of the AfCFTA, and the bedrock for building meaningful data sets to drive innovation in the data economy and to build Artificial Intelligence (AI) that caters to African needs (Musoni et al. 2024). However, in Africa as elsewhere, there is a deep concern in many African countries about where citizens' data is held, and thus also growing interest around sovereign data centres (Musoni 2023b).

ECDPM's research on digital ID in Africa also points to the many challenges that will need to be overcome in the process of rolling out DPI. For instance, while digital ID can play an important role in both facilitating access to foundational ID for citizens and in facilitating access to finance, trade and other services, African countries also face numerous challenges

in guaranteeing inclusion and governance. This points to the importance of updating identity laws and establishing robust data governance frameworks such as data protection and cybersecurity laws. Kenya's experience with digital ID implementation highlights the critical importance of data protection and public consultation, as demonstrated by the 2021 court order suspending Huduma ID cards pending a Data Protection Impact Assessment. The government's new plan to replace Huduma Namba with an UPI aims to integrate digital ID with government services through the e-citizen platform, including vital registration and access to tax, social security, and health insurance services. Namibia provides an interesting model of an approach that builds interoperability and integration of all e-government systems from an early stage. Namibia's digital ID system, while still in its early stages, is advancing rapidly due to strong political support. Estonia - itself recognised as a global leader in building e-government from scratch - has helped implement the 'NAM-X' interoperability solution, enabling secure data exchange between public institutions. This progress was further demonstrated in 2021 with the launch of the 'New Look' ID card, a secure digital identification system designed to facilitate access to services (Musoni et al. 2023a).

Although DPI can play an important role in sustainable development, as shown in the case of Aadhaar in India, it is essential that DPI responds to local needs. As with any technology, there is a risk that developing countries become dependent on foreign providers for the creation and maintenance of their DPI, and this can have a negative impact on digital sovereignty. An example of this is the Chinese-driven digital transformation in Africa, which has seen Chinese companies providing whole-package solutions to establish and maintain DPI in African countries. This can be detrimental to digital sovereignty if developing countries become unable to maintain their own systems independently or are unable to switch providers due to a lack of resources and are therefore locked into certain contracts (Arnold 2023). The Smart Africa Trust Alliance, which is experimenting with cross-border approaches to different DPIs, is an interesting example of how Africa can approach building its own digital single market from the bottom up.

A ripe field for further debate

The emergence of distinct approaches to DPI in the Global South demonstrates both the concept's flexibility and its strategic importance for digital sovereignty. While India showed how greenfield development could accelerate development goals, Brazil's 'brownfield' approach reveals how countries can evolve existing systems toward DPI principles. This matters for other countries, especially in Africa, as they choose between custom-made commercial solutions that can integrate interoperable standards, or ready-made solutions that are often open source but will need to be maintained. These concerns extend beyond

developing countries. For example, Japan's Special Commission on Digital Administrative Reform's "Five Digital Principles" include "interoperability" and "infrastructure sharing", along with a commitment to developing "public-private partnerships" (Kono 2023). India and Brazil's experiences provide useful lessons for building autonomous, interoperable – yet sovereign – digital infrastructures. A meaningful multilateral discussion around DPIs could help connect the dots and harmonise its rollout across the world around common, democratic objectives. It could also widen the discussion about DPI so as to place it within the context of a wider discussion about technology sovereignty and the tech stack.

3. The EU, Tech Sovereignty and engaging on DPIs

As we have written elsewhere, the rhetoric of digital sovereignty or technology sovereignty is growing across the world (Musoni et al. 2023; Teevan and Pouyé 2024). Ultimately, this movement has primarily been in response to the outsized impact that US Big Tech has across the world, particularly its access to citizens' data. European governments and regulators have played an active role in contributing to an evolving understanding of digital sovereignty and the EU has become a highly influential regulatory actor, as evidenced by the so-called 'Brussels effect.'

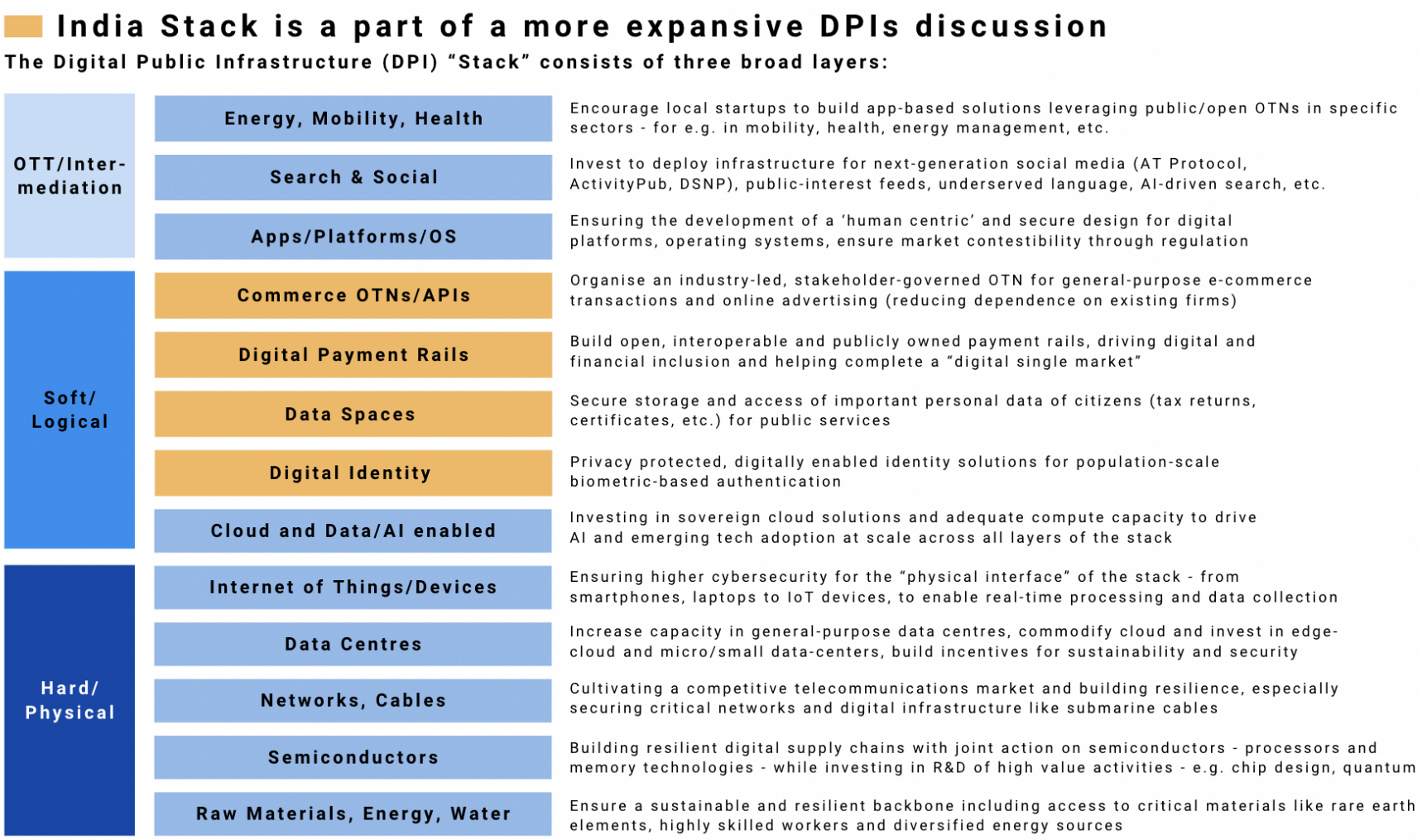
Yet, as noted in the introduction, there is an emerging sense of foreboding that regulation alone is not enough, with a focus on investing in the EU's technological competitiveness as highlighted by the Draghi report (Draghi 2024).[3] There are growing calls for substantial reforms and investments aimed at fostering industrialisation, innovation, and the development of democratic values-based sovereign digital infrastructure (Bria 2024; Berjon et al. 2024). As we argued elsewhere, it will be essential for the EU to build new and stronger technology partnerships if it hopes to make this vision of technology sovereignty a reality (Teevan and Pouyé 2024). Partners will be essential to building secure value chains, securing skilled labour and developing new markets, while only by actively forging alliances will the EU be able to play the ambitious role it hopes in global digital governance. This is particularly true at a time when the EU's Transatlantic ally is threatening trade sanctions, while US big tech companies roll back what few safeguards are in place in order to placate the Trump presidency. Commission President Ursula von der Leyen appeared to acknowledge this at Davos when she stated: "Even in a moment of harsh competition, we need to join forces. And

[3] There is also an increase in awareness of a "Euro stack" - as highlighted by recent initiatives such as the Euro Stack event at the European Parliament on 24 September 2024.

Europe will keep seeking cooperation – not only with our long-time like-minded friends, but with any country we share interests with. Our message to the world is simple: if there are mutual benefits in sight, we are ready to engage with you." (EC 2025)

The EU has begun to develop both its digital diplomacy and its digital cooperation strategy, but thus far these are not sufficiently developed or integrated with the domestic competitiveness discussion. Within that context, it is essential for the EU to engage with leading economies across the Global South on a number of different issues, including notably around questions of technology sovereignty and digital infrastructures. While India has promoted DPI globally as a path to digital sovereignty, it currently covers only the middle layer of digital infrastructure, focusing on scalability and interoperability. This leaves gaps in the full technology stack and does not address key challenges like reducing dependencies, securing critical infrastructure (including raw materials, undersea cables, semiconductors, and skilled talent), or improving sustainability.

Figure 1: DPIs within a broader discussion around technological sovereignty.



Source: Gautam Kamath for ECDPM, adapted from Eurostack: A Pitch Paper (Berjon et. al. 2025)

There is an opportunity for the EU to partner with countries like India, Brazil and the 2025 South African G20 Presidency to develop a comprehensive approach that combines open digital infrastructure with interoperable rules founded on shared democratic values. **The EU's commitment to democratic principles, sustainability, digital rights and data protection could add a distinct contribution to evolving global discussions about DPIs. At the same time, the EU should continue to push the boundaries of this conversation, highlighting the ultimate goal of greater sovereignty across the tech stack, and building geopolitical capital through strategic partnerships.**

Positioning Europe in the existing Global DPI Discussion

The EU and member states have not actively engaged in shaping global discussions about DPI to date, and yet they are developing their own DPIs, and have potentially the most advanced governance mechanisms to ensure safe and inclusive DPIs. This gives the Europeans a meaningful avenue to engage in global DPI discussions. As Schoemaker writes: "A user-focused, rights-based, and decentralised approach to digital infrastructure would be distinctly European and reflect European values, contributing to the DPI marketplace, which is currently dominated by India, Brazil, and others. Actively promoting and sharing this vision for a digital future would complement existing efforts, such as the widespread adoption of GDPR, and ensure wider alignment of European values, standards, and systems" (Schoemaker 2024).

The EU's approach to digital regulation and emerging technologies is distinctly shaped by its emphasis on democratic oversight and the protection of individual rights, as exemplified by the European Declaration on Digital Rights and Principles. The conversation around democratic governance of DPI, and technology more broadly, is by no means a European one alone, but Europeans are very active in it. The EU's digital rulebook is the most comprehensive effort globally to protect citizens and to regulate the platform economy and the EU also has advanced consumer protection regulations. While the EU's digital regulations do not necessarily create the level-playing field that many policymakers hoped for, it does provide a relatively complete backdrop for the rollout of DPIs. This is especially true since a key prerequisite for the successful rollout of DPIs is to have an effective, fit-for-purpose legal framework. It is important to note that the success of the India Stack is underpinned by legislative and institutional initiatives like a new authority (the UIDAI) being set up, the Central Bank (RBI) being designated as responsible for payment systems (in 2007), the Aadhar Act (2016) defining the legal framework for digital ID, and the upcoming Data Privacy bill (DPDA) set to complete the enabling legal framework.

At the same time, without explicitly using the terminology of DPIs, the EU has created the necessary legislative and regulatory frameworks to allow for interoperable DPIs across the entire 27-country bloc. Indeed, the EU has a long history with open standards as it moves towards building its digital single market by attempting to weave together the digital services of 27 member states. For example, the European Interoperability Framework (EIF) is a set of recommendations that specify how administrations, businesses, and citizens communicate with each other within the EU and across Member State borders. It aims to improve the delivery of European public services in an interoperable manner, making digital government services available to EU citizens across the Union. Similarly, the new European Digital Identity (EUDI) Wallet, based on a decentralised model, moves away from identity provided by one central authority towards a model of interoperable, portable identity based on open standards. "Decentralised digital identity is not just a response to the requirements and opportunities of our time, but a proactive strategy to shape the next level digital backbone, enabling trust and cooperation in an increasingly interconnected world" (Stöcker 2023). The wallet should allow users to control their data, whilst allowing them to request, store and share personal documents, as well as electronically sign or seal documents. Four large pilot projects are currently underway that will test the digital wallet's potential across a wide range of use cases (EC N.d.-b). Meanwhile, the European data strategy aims to develop a continent-wide approach to data sharing so as to spur innovation across economic sectors, based on a strong regulatory framework and data spaces across 14 sectors/domains (EC N.d.-c). The European digital industry has called for the simplification of rules associated with data sharing in order to actually operationalise the data strategy (for example, Digital Europe 2024).

The EU's regulatory strength also means that it has the potential to shape the governance of DPIs. The EU has introduced pioneering regulation on Artificial Intelligence (the EU AI Act), online media and content (Digital Services Act), and fair market competition for digital platforms (Digital Markets Act). Following the first 'Brussels Effect' wave of the General Data Protection Regulation (GDPR), these new digital laws are also being emulated by various countries. For instance, Brazil's Draft Bill Regulating Digital Platforms (2022) adopts an approach that mirrors the EU DMA by establishing an ex-ante regulatory regime for a subset of companies. The Chinese Model AI Legislation takes a risk-based approach similar to the EU's AI Act while simplifying the grading through a 'negative list' of cases where further approvals are mandated. This approach is also adopted by the G7 Hiroshima Process, where a voluntary code of practice for advanced AI companies includes risk-based measures (OECD 2023).

On the industrial policy front, new initiatives also mirror growing political concerns shared by many partners. For instance, the EU Chips Act was introduced to bolster sovereign access to semiconductors, while the EU Critical Raw Materials Act aims to secure necessary critical minerals for the twin green and digital transition. Countries like the US, India and Japan have launched focused legislative initiatives to revitalise domestic semiconductor manufacturing following the EU Chips Act. Recent incidents of sabotage of submarine cables in the Baltic Sea and the Taiwan Straits have demonstrated the need for concerted action, not just at the soft/intermediation layers, but also further down the technology stack, at the 'hard/physical' infrastructure layer, which includes chips, critical raw materials, cables, telecom networks, data centres, et cetera.

European Open Source and impact on DPIs

Europe has been at the heart of open source and 'hacker' culture since Linus Torvalds uploaded version 1 of Linux from the University of Helsinki's FTP server to the public internet in 1991. The EU and its member states have cemented this rich tradition at the institutional level through the establishment of Open Source Program Offices (OSPOs) to lead open-source development for the public sector, and to promote the reuse and upkeep of successful solutions. Open source software constitutes 76% of all software code and may contribute €65–€95 billion of the EU's GDP (Krewer 2025). Many open-source components are essential to building DPIs, and indeed some might be considered as new and innovative DPIs. Open source technologies - and the associated debate about Digital Commons - are also playing a key role in the ongoing discussions about tech sovereignty in Europe.

The concept of 'digital commons' has been important to the European debate, and highlights this link between openness, democracy and sovereignty. The concept: "encompasses a diverse range of systems and solutions that are collaboratively owned, developed, and maintained by communities rather than single entities. These commons operate on principles of peer collaboration rather than hierarchical control or market pricing." (Krewer 2025) The French Presidency of the Council of the EU in 2022 spearheaded a European Initiative for Digital Commons in 2022, defining the concept as: "non-rivalrous and non-exclusive digital resources defined by shared production, maintenance and governance" (France Diplomacy 2022). This initiative highlighted the importance of digital commons for European digital sovereignty and pushed for a strategic European approach (Digital Assembly 2022).

Practically, the EU and member states have begun to set up institutions to support the open source ecosystem and to build open source software. This links to sovereignty by creating real choices for the European public sector, for instance by building new office software that represents a viable alternative for public administrations across Europe. Indeed Germany's OSPO, ZenDis, sees digital sovereignty as creating real choice. It launched a sovereign workplace called OpenDesk, while France's OSPO has been investing in a set of office solutions called 'La Suite.' Together, the two recently launched a European initiative with a view to building cross-border cooperation around solutions (République Françcaise 2024). Given the infrastructural nature that office software plays in all public administration and businesses, such a solution could potentially be an important addition to the core DPIs.

A network of existing European solutions

These institutions build on fertile soil. A wide range of DPIs have been developed by the member states and their institutions. As already touched on, the EU is now building interoperability amongst the host of DPI solutions that have been developed or are being developed by EU member states. These solutions range from Estonia's much-publicised X-Road exchange layer to the Netherlands' Ideal payments, developed by the country's banking sector and representing over 70% of payments in 2023 (Cutler 2023).

Yet, the EU should not stop short at existing DPIs. Not only are EU countries building new office software, but the EU and its member states might also be able to build new solutions vital for dealing with the consequences of climate change. A notable example is France's GéoCommuns, led by the National Geographic Institute (IGN). This initiative reinvents IGN as a provider of freely accessible, fully digital geographic public infrastructure. It makes it a hub for collaboration between public, private, research, and civil society sectors, enabling geographic data sharing and crowdsourced cartography, with a focus on sustainability goals and climate policy needs. When paired with the EU's powerful earth-observation data from the Copernicus programme, such mapping solutions could prove vital in planning for the future.

In future, the EU will also of course build interoperability with future member states, including notably Ukraine. Yet, given Ukraine's impressive development of its own DPIs, these could already be championed by the EU institutions and members to further Ukraine's soft power reach. DIIA, a state digital application launched in April 2020 now enables 20 million citizens - including many citizens currently abroad or on the frontline - access to essential documents

and government services (Ingram and Vora 2024). For more examples of DPI implementations across the EU-27, please see Table 1 below:

Table 1: Examples of DPI implementations across the EU-27

Name of solution	Type of solution	EU / Member state	Description
EU-wide initiatives			
EUDI Wallet	Digital ID Wallet	EU	The EUDI Wallet is a digital identity application launching across the EU by 2026, allowing citizens to store and share official documents like IDs and licenses for accessing services, while controlling their personal data.
European Interoperability Framework	Data exchange	EU	The European Interoperability Framework (EIF) is a set of recommendations that specify how administrations, businesses, and citizens communicate with each other within the EU and across member state borders. It aims to improve the delivery of European public services in an interoperable manner.
EU sectoral data spaces	Data exchange - for example, for health	EU	European Data Spaces are part of the EU's strategy to create a single market for data, enabling secure and efficient data sharing across 14 sectors including health, energy, finance, and manufacturing. The spaces feature open participation, privacy-preserving infrastructure, fair access rules, and compliance with EU regulations, aiming to boost innovation while ensuring data sovereignty.
Digital Euro	Legislation	EU	The Digital Euro is a proposed central bank digital currency (CBDC) being developed as a digital form of the euro. It would complement cash and existing payment methods, featuring high privacy standards, holding limits, and both online and offline capabilities. The preparation phase began in November 2023, with final issuance pending legislative approval. Note this is counter to recent US efforts that do not endorse CBDCs.
Selected EU Member state DPIs of note			
X-Road	Data exchange	Estonia	X-Road creates a link between public and private sector information systems, as well as within government (between departments). X-Road is interoperable while also protecting data from third parties.
NemKonto	Digital payments	Denmark	NemKonto is a mandatory Danish bank account system where citizens and businesses register their accounts with the

			government. It's linked to the national ID system - MitID - and automatically updates across public services, enabling seamless government payments.
iDEAL	Instant payments	Netherlands	iDEAL is the country's most popular e-payments system, and in 2023 it was sold to the European Payments Initiative to become the base for a pan-European payments system.
GéoCommuns	Maps	France	The géocommuns are collaboratively produced geographic resources, offering a public-interest alternative to big tech mapping platforms as part of the French National Institute of Geographic and Forest Information's strategy.
La Suite	Open-source digital workplace platform	France	'La Suite numérique' is a collaborative digital ecosystem launched in 2024 by the French Government, providing secure and sovereign tools to enhance public sector employees' remote work capabilities.
Open Desk	Open-source digital workplace platform	Germany	OpenDesk is an open-source digital workplace platform launched in 2024 by ZenDiS (the German Centre for Digital Sovereignty) that provides collaboration tools for German public administration.

Europe's existing global engagement on digital infrastructures

The EU and its member states have stepped up their engagement around investing in digital infrastructures in recent years. This has been most notable with the announcement of the Global Gateway Strategy in 2021 but has also been evident in statements and engagements at multilateral fora. The EU and key member states played an active role in negotiating the GDC, and the EU, Germany, France and Italy are members of the G20. At the 2023 Delhi Summit, Ursula von der Leyen acknowledged India's "remarkable success in rolling out its Digital Public Infrastructures" (EC 2023). Meanwhile, at a January 2024 meeting in New Delhi, President Macron of France and Prime Minister Modi of India recognised convergence around their approach to digital technologies and called for: "sustained collaboration in building Digital Public Infrastructure (DPI)" (Embassy of France to India 2024). Similarly in October 2024, Germany and India agreed to: "share experience and expertise in digital public infrastructure (DPI)" at the India-Germany Intergovernmental Consultations (7th IGC) (PM India 2024). As the EU sets out to strengthen its partnership with India and restart trade talks (Gijs 2025), bilateral discussions around DPI are likely to feature strongly.

The EU Global Gateway (GG) is a global connectivity strategy that aims to foster public and private investments in hard and soft infrastructure in partner countries. The GG constitutes the third pillar of an emerging economic foreign policy according to the political guidelines for the EC, 2024-2029 (von der Leyen 2024). Particularly under the new Commission, there is a

strong focus on reconciling European geopolitical aims, the EU's growing concern for its own economic competitiveness and a commitment to the achievement of the SDGs. The initiative aligns with the EU's adherence to the idea of 'open strategic autonomy,' which brings together concern for European economic security, with a continued commitment to economic openness and international cooperation (CoEU 2021). The GG also incorporates sustainability and security criteria and stresses the aim of furthering European values.

The GG's digital pillar initially emphasised hard infrastructure development, focusing on submarine and terrestrial fibre-optic networks, secure space-based communication systems, and cloud infrastructure, with particular attention to underserved regions and sustainability. Through specialised digital economy agreements with partners like Colombia, Kenya, Nigeria, and the Philippines, and through a series of regional Team Europe Initiatives bringing together EU and member state engagement, the GGextends beyond physical infrastructure to wider packages of investments. The digital pillar emphasises alignment with EU standards across network security, cybersecurity, interoperability, and internet governance. Additionally, it promotes core digital principles including personal data protection, ethical AI development, and fair and open digital markets, creating a comprehensive ecosystem that reflects European values and technical standards (EC 2021). Yet, while the EU supports DPIs through various initiatives, it is not yet a highly influential player in this space. This might be tied to the EU's lack of a comprehensive vision and discourse around its own domestic DPIs, together with the lack of a joined-up diplomatic approach by the EU and its member states.

The most significant European addition to the global DPI discussion to date is undoubtedly the GovStack Initiative, which aims to support governments in diagnosing their own needs and choosing solutions that cater to those needs. GovStack was launched in 2020 by a German/Estonian-led consortium, together with the International Telecommunication Union (ITU) and the Digital Impact Alliance (DIAL). In 2023, it deployed its 'Digital Building Block Specifications' which provide partner governments with "technical specifications guidance on nine key technology building blocks, to create cost-effective and vendor-agnostic solutions to reach people…from identification cards to vehicle registration, e-waste, digital payments and many more" (GovStack 2023). Although Govstack states that it is technology-neutral, it shows a clear commitment to certain principles, including interoperability, modularity and tailored solutions.

The EU and its member states are also supporting the rollout of DPIs in other ways. Team Europe's Action on Data Governance in Africa integrates a focus on building data centres, together with support to the AU and its members in implementing the AU Data Policy

Framework with its strong focus on cross-border data sharing within Africa, and in developing use cases. The initiative's design, bringing together hard infrastructure with regulatory support and efforts to support meaningful data sharing demonstrates a holistic approach that might be adopted in the EU's overarching approach to DPIs. Another Team Europe Initiative (also under the umbrella of the GG), called 'Safe Digital Boost for Africa' (SDBA) is implemented in partnership with several regional economic communities in Africa, including the East Africa Community (EAC) and Economic Community of West African States (ECOWAS). It aims to support e-commerce, e-payments, cybersecurity and e-government with technical assistance, using the GovStack specifications framework. The EU has also launched the Collaboration for the Horn of Africa Initiative on Digital Government and Cybersecurity.

The EU's DG INTPA is also supporting the Open Source Ecosystem Enabler (OSEE), a project launched in February 2024 by the International Telecommunication Union (ITU) and UNDP which aims to enhance the capacity of its target countries to adopt open source for digital government services and to put in place and maintain their own OSPOs. The selection of the participating countries is underway: candidates must be from low to middle-income countries with an existing open-source ecosystem, as well as a 'strong commitment to leverage open-source technologies for public services', with at least one existing digital public service. They must propose a suitable, well-connected institutional host for an OSPO, as well as a 'willingness to share their experience and learn from others'. The project runs for a 3.5-year period, beginning with two pilot countries and allowing for expansion to additional countries.

These EU-funded projects resonate with the larger GG goal of supporting: "strengthening connections between Europe and the world and helping partner countries address the digital divide…" (EC N.d.-a), while building capacity among its operators in government and civil society. In particular, the EU approach supports a version of DPI-enabled digital sovereignty that preserves democracy and human rights. Yet, the EU still lacks a meaningful vision and diplomatic strategy around DPIs. If the EU hopes to play a role in shaping the global conversation around DPIs and to be able to negotiate a meaningful digital partnership with India, it will be vital for the EU and its member states to have a joined-up approach to DPIs as an important element of the wider tech stack.

4. Towards a more expansive global conversation on Digital Infrastructure

Given the current geopolitical uncertainties, it is paramount for Europe and for many of its global partners to do more to pursue technology sovereignty by securing their digital infrastructures, diversifying supply chains and identifying their critical niches in the technology stack. With the emergence of a more comprehensive discussion about digital infrastructures within Europe, the EU has the opportunity to develop a foreign and economic security policy around emerging technologies that bring together technology diplomacy and trade, along with international cooperation and investments. The EU's GG represents a significant effort to play a global role in digital development and has the potential to promote a vision of digital sovereignty that combines Europe's own established regulatory approach with its emerging focus on greater control of digital infrastructures. As part of this strategy, the EU needs to develop a diplomatic and cooperation strategy for engaging in - and expanding - the debate around DPIs. This will both enable the EU to contribute to the debate about governing DPIs, but also to expand the global conversation around tech sovereignty and the tech stack.

The EU should focus on developing a coherent strategy for developing sovereignty and 'open strategic autonomy' across the technological stack. Europe needs to focus on building a 'EuroStack' that includes both DPIs and much more, imagining a more expansive version of the principles and interventions necessary at all parts of the tech stack (including the OTT/intermediation, the soft/logical and the hard/physical layers). This has become even more urgent given the explosion of new technologies like generative AI, and the need for the infrastructure underpinning it - including cloud services, semiconductors, data centres and submarine cables. In other words, a more coordinated, expansive and strategic policy response is needed that goes beyond existing approaches to DPIs.

The EU can and should participate in developing a meaningful offer on DPIs, together with its member states. This should be complemented by a narrative and diplomatic effort to promote its own model of DPIs, in concert with like-minded countries. As we have shown in this paper, the EU brings together a long history of open standards, with a strong governance model and an evolving approach to developing digital commons and open source technologies. The EC has developed a number of strategies and frameworks to develop cross-border DPIs, including most notably the EUDI Wallet and potentially continent-wide data spaces. The EUDI Wallet will be central to developing an EU DPI offer. It is already available on GitHub and promoted as a model for others such as Smart Africa Trust Alliance.

Yet, these projects should be publicised much more widely. Member states also have interesting examples of DPIs to offer, such as Estonia's X-Road, Netherlands' iDeal for payments, France's GéoCommuns and the Franco-German Sovereign workplace initiative.

The EU and its member states should continue to invest in a flourishing open source ecosystem that is essential to developing new DPIs and that can give meaning to the concept of digital commons. As we explored in this paper, the evolving ecosystem brings together government services like the OSPOs, Germany's Sovereign Tech Agency, initiatives like the Next Generation Internet (NGI) and a flourishing civil society. The EU and member states should continue to invest in this ecosystem but also begin to develop a more strategic approach to open source technologies and their governance. For example, a new EU Open Source strategy could demonstrate the important role that open source technologies play as components in DPIs, but also in many commercial and industrial usages, such as deploying AI. This should be paired with an expansion of funding for this ecosystem and the maintenance of essential open-source technologies. The EU should also encourage strong governance mechanisms for important open-source technologies that have a public use (public code), potentially by supporting the creation of a public product organisation to govern and maintain these technologies by making this a requirement of larger grants.

The EU should engage more wholeheartedly in global conversations about DPIs and their governance, actively engaging in global conversations at the UN and G20, making sure it is represented at standards bodies relating to DPIs, as well as at some of the specialised fora that have begun to develop such as the Digital Public Goods Alliance and the Global DPI Summit. The EU and its member states must be actively involved in shaping future discussions about DPIs, including conversations at the multilateral level about their expansion and governance, as well as more technical discussions related to standards. Given its own experiences, the EU is in a strong position to champion open standards and to push back against new forms of vendor lock-in.

The EU can learn from others and should find ways of developing meaningful cooperation around DPIs with India, Brazil and other like-minded partners, including both learning from and sharing experiences. As the EU steps up engagement with India with a view to negotiating a free trade agreement and elevating its strategic partnership, it is clear that DPIs are one avenue for more sustained engagement and cooperation: both within India and Europe, as well as at the global level. In the coming months, ECDPM hopes to explore how India and the EU might further cooperate around DPI. As we have shown in this paper, Brazil has also developed a sophisticated governance approach and shares a lot in common with the EU in terms of the way it is attempting to build on and develop interoperability between

existing systems. This could be the basis for further bilateral dialogue and cooperation but would require new avenues for EU-Brazil cooperation.

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ecdpm

HEAD OFFICE
SIÈGE
Onze Lieve Vrouweplein 21
6211 HE Maastricht
The Netherlands *Pays Bas*
Tel +31 (0)433 502 900

BRUSSELS OFFICE
BUREAU DE BRUXELLES
Avenue des Arts 44, 1040
Brussels *Bruxelles*
Belgium *Belgique*
Tel +32 (0)2 882 50 08

info@ecdpm.org
www.ecdpm.org
KvK 41077447