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Envisioning **Digital Public Infrastructures** *as Commons*



ABOUT THIS PAPER.

Envisioning Digital Public Infrastructures as Commons

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THE SHARING SHIFT↑

The Sharing Shift is a global effort building the legal, social and technical architecture for sustainable data and knowledge commons in the age of AI.

We study, develop and test open licences, governance models, standards, metadata and code, combining them with social practices and strategic litigation.

Our goal is to give those who share meaningful power over how their contributions are used and their value distributed, creating enforceable boundaries across platforms, institutions and jurisdictions so that the data and knowledge commons can grow without becoming open terrain for extraction.

CIS at CNRS and OKFN are leading it and you can find more information here:

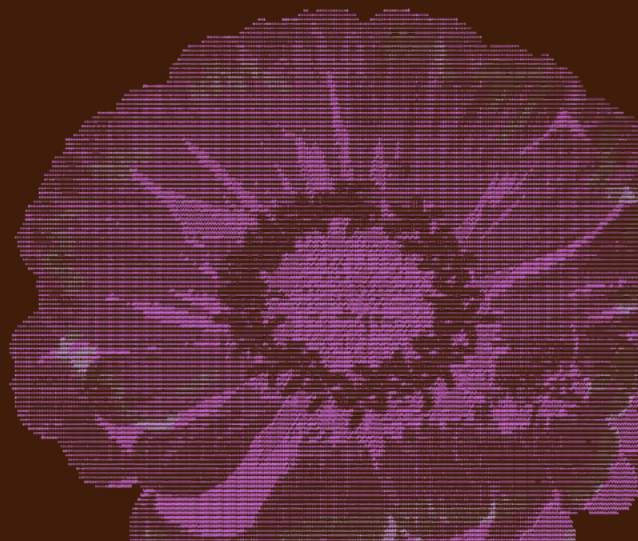
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Since 2023, global consensus around Digital Public Infrastructures (DPIs) for social and economic prosperity as well as national approaches to implementing DPIs have grown. DPIs can be understood as foundational digital infrastructures and a route for digital sovereignty and resilience, with the **potential to realise** all 17 UN Sustainable Development Goals. Commonly-cited examples include national digital systems for identity and payments. But DPIs also encompass open access scientific infrastructures such as SciELO, community networks such as the Zenzelini network in South Africa, and accountability infrastructures for welfare schemes such as Janata Information Systems in India.

The **UN Global Digital Compact** also recognised that digital public goods and digital public infrastructures have the potential to "deliver services at scale and increase social and economic opportunities for all" and to be "key drivers of inclusive digital transformation and innovation". We are now witnessing localisations of DPIs, **coinciding with Global South presidencies of the G20** since 2022 that each valourised the importance of DPIs for interoperability in digital services, compute governance and federated AI commons, and equity and capacity-based approaches to digitisation.

Whether DPIs can help countries realise these promises or not, depends on how DPIs are governed.

At present, governance frameworks for DPIs are developed by a few actors, around a limited conception of DPIs as digital systems for identity, payments and data exchange. We seek to broaden this vision.



A commons-based governance approach to DPIs

In a T20 policy brief published for the Brazil G20 in 2024, we argued that beyond classical models of infrastructure provisioning either by the state, by Big Tech actors, or under public-private partnerships, DPIs should be governed as a commons. By this, we mean DPIs should be comprised of **open technological artefacts and digital public goods**, and DPIs should be governed using i**nstitutional arrangements that ensure development and sustainability of both the technological artefacts and the publics involved, against exclusive profit or value extraction**. Countries should have the freedom to determine what types of digital systems form part of their public tech stack, while commons-based governance entails normative commitments around publicness and an institutional ecology oriented around sovereignty, resilience, inclusivity and sustainability.

The commons has proven to be a resilient alternative to both purely commercial and purely state-dominated provision of public goods and foundational infrastructures, as varied as water, knowledge repositories, and free and open source software. Contrary to erroneous accounts from the mid-20th century on the tragedy of the commons, commons are not intrinsically open to appropriation, leading to depletion. In fact, commons are subject to governance that includes rules to control access and reuse and ensure sustainability, both in terms of stock of resources as well as health of communities. The open movement has successfully provided large-scale public goods for decades as free, libre and open source software are a foundation of the web. The Linux operating system has been supplied through commons-based peer production and is critical to many web servers' infrastructures. Further, a non-code DPI critical to knowledge is Wikipedia which is among the most famous examples of digital commons. DPI projects should be informed by such experiences.

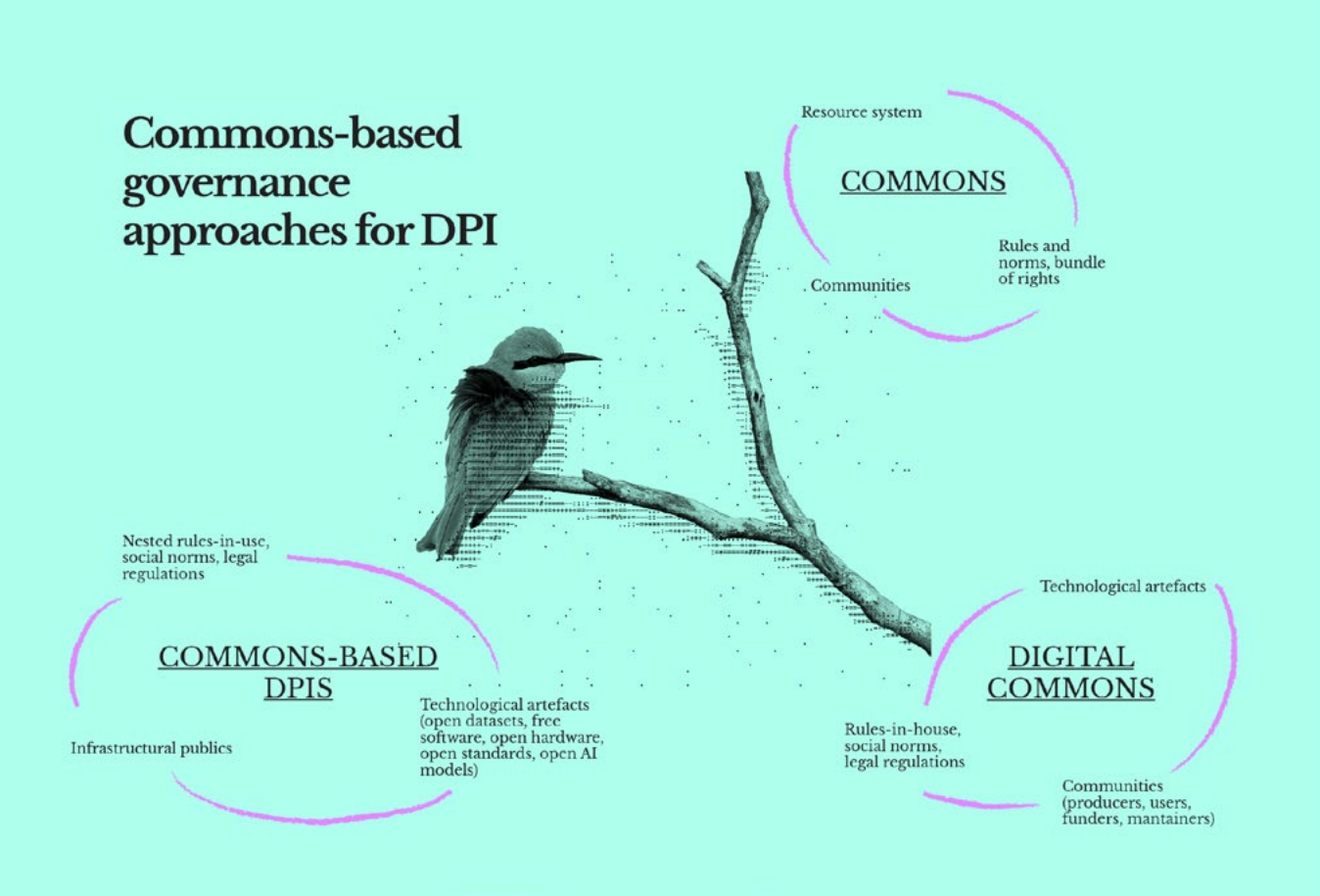


Figure 1: Authors' representation of commons-based governance approaches for DPI

Commons are crucial to ensure DPIs are truly "public". DPIs that systematically exclude certain publics engage in public-washing, and are not democratic. This encompasses the expertise driving DPI localisations, accountability frameworks for new public-private collaborations in DPI projects, and participative plurality in the governance of DPIs.

The legitimacy of DPIs can be ensured only if all affected publics have *voice with weight* related to the design, implementation and regulation of DPIs. To do so, there is a need for a new institutional ecology for DPIs, that accounts for the existing centres of power in DPIs, and empower all affected publics to participate in DPIs. Such institutional ecology should be centered on participative plurality, financial and environmental sustainability, and global cooperation for knowledge and infrastructure sharing while preserving the sovereign freedom of countries to experiment with their public tech stacks based on local context. The commons can serve as this institutional model. Empirical research from natural resource commons (such as forests and pastures) and digital commons offer crucial guidance on how to do so.

Crucially, a commons-based approach recognises that the use of open technological artefacts alone cannot ensure democratic DPIs. These deliberately-designed technical components that promote openness need to be combined with clear governance frameworks. The Digital Public Goods Standard offers an example of such an approach.

Nine governance principles for governing DPIs as commons

DPI efforts are gathering steam worldwide, such as the Eurostack in the European Union; sectoral expansions of Indiastack in India to agriculture, education, health and e-commerce; and the Climatestack in Brazil. The World Bank - a key global actor behind the roll-out of digital identity and digital payments systems in various countries - has also institutionalised a specific track for investments and support for DPIs.

Amidst this accelerated expansion of DPIs, it is important that policymakers, builders and funders prioritise commons-based governance of DPIs. To do so, **we articulate nine commons-based governance principles. These principles offer a clear path for a democratic, public digital ecosystem with the tools to promptly address harms, with the potential to increase innovation and collaboration, with the strength to enforce its rules locally, and with the ability to go beyond borders respecting other norms.**

NINE PRINCIPLES FOR DEMOCRATIC, SOVEREIGN, RESILIENT, SUSTAINABLE, AND INTEROPERABLE DPIS

1. DPIs must comprise of open technological systems
2. DPIs must centre community data sovereignty and personal data protection
3. DPI technologies must interoperate with each other and the technologies used by the public
4. DPI efforts must entail alignment with local technological, linguistic, cultural and regulatory contexts
5. DPI governance must be transparent and accountable
6. DPIs must be publicly governed
7. DPIs must be aligned with human rights
8. DPIs must be sustainable
9. DPIs must be federated

Figure 2: The 9 governance principles

Nine Principles for democratic, sovereign, resilient, sustainable, and interoperable DPIs

1. **DPIs must *comprise of open technological systems***

The technological systems in DPIs - notably software, application programming interfaces (APIs), AI model weights, standards and protocols - must be open.

2. **DPIs must *centre community data sovereignty and personal data protection***

DPIs must proactively ensure that communities are sovereign over their data, and personal data is protected. It is important to create safe and sustainable ecosystems for data sharing, where open datasets can interoperate with other forms of data sharing, through a semi-commons approach while ensuring necessary protection for personal data.

3. **DPI technologies must *interoperate with each other and the technologies used by the public***

All technical standards used in DPIs should be open and accessible, royalty-free, and maintained by open standards bodies. Where there are existing open standards, then governments should reject efforts to create competing standards that hinder interoperability and distributed innovation.

4. **DPI efforts must *entail alignment with local technological, linguistic, cultural and regulatory contexts***

DPIs must be aligned with the local contexts in which they are implemented, to reduce uptake frictions as also to ensure long-term sustainability.

5. **DPI governance must *be transparent and accountable***

There must be clear transparency and accountability for DPI providers and for public administrations as users of DPIs, to protect fundamental rights as well as ensure sustainability. This is also necessary for DPIs to achieve Sustainable Development Goals, such as social and financial inclusion.

6. **DPIs must *be publicly governed***

DPIs must be governed by processes and bodies that include public institutions, civil society and community participation,and give each of these stakeholders voice with agency.

7. **DPIs must *be aligned with human rights***

DPIs must be developed, constructed and maintained to respect, protect, promote and fulfil fundamental human rights.

8. **DPIs must *be sustainable***

DPIs must be developed, constructed and maintained in an environmentally and economically sustainable way.

9. **DPIs must *be federated***

DPIs must be developed and implemented in a federated way so that they are immediately ready for network scalability. Through global cooperation, including south-south cooperation, DPIs can be scaled without creating clones of certain models/approaches to DPIs. Such cooperation can ensure that beyond their first deployment, DPIs can grow not as isolated but as networked efforts.

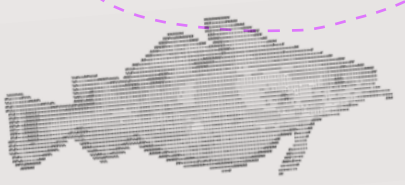




Figure 3: Tabular representation of principles for commons-based DPIs

Fundamentally, these nine governance principles highlight the need to focus on technical design of DPIs as well as on protection of fundamental rights, community sovereignty and planetary futures. Values of participative plurality and sustainability can be deliberately coded into the design of technological artefacts, but must also be ensured and protected through external interventions in regulation, standard-setting and policymaking.

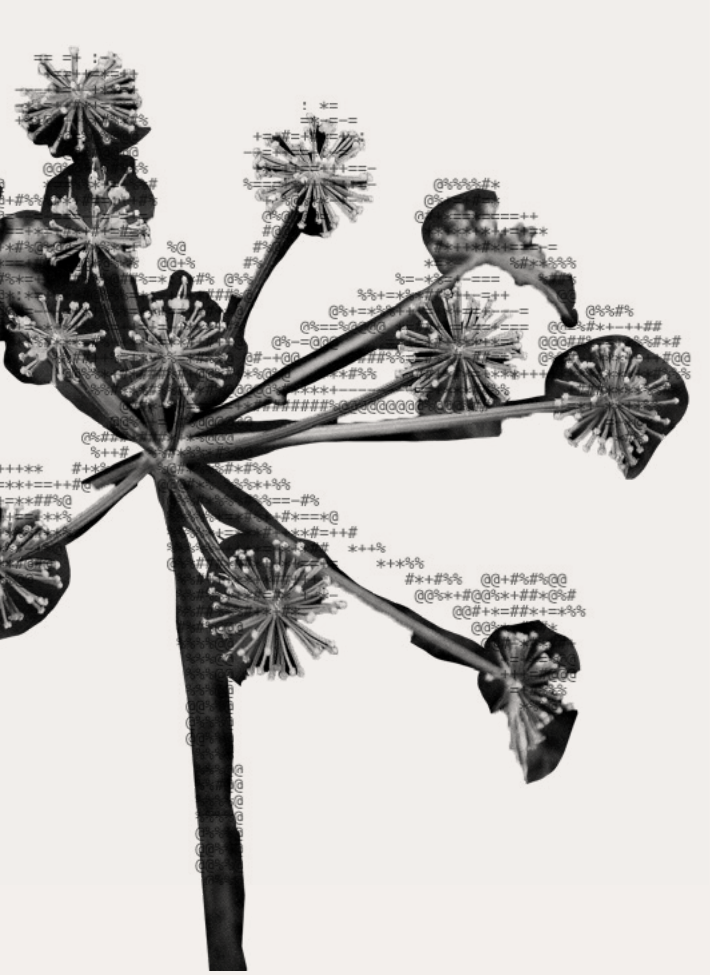
Through these principles, countries can build and support DPIs that are truly **public interest technologies**. One of the areas where, in fact, digital resources are mature and institutionalised as commons both in their governance and their infrastructure is open knowledge, where open access publishing infrastructure are built around the idea of knowledge as a public good.

There are various examples of commons-based DPIs from around the world. Brazil in particular offers many case-studies - **MapBiomas**, an open environmental data consortium; **Scielo**, a federated, public interest, open access networked scientific publishing platform, and, **Pix**, a real-time payments system with open standards run by the Brazilian Central Bank. Other examples of DPIs include community networks such as the **Zenzeleni network** in South Africa, accountability infrastructures for welfare schemes such as Janata Information Systems in India, and an **ecosystem of open datasets and open source tools** for AI development in India. Each of these represent different modes of commons-based DPI - with Pix featuring a more active role for public bodies such as the Brazilian Central Bank, the Zenzelini network represents more bottom-up innovation, while SciELO and the DPIs from India represent forms of co-creation. At their core, each of them guarantee participative plurality, sustainability and sovereignty.

Crucially, commons-based governance of DPI does not entail a recession of the state into the background, but rather requires the state to adopt a multi-faceted role beyond simply a regulator or a consumer of technologies. In the case of Pix for example, the infrastructure is owned by the Central Bank of Brazil, but is operated as a public good, with full transparency and (increasing) participation. A multistakeholder governance mechanism known as the Pix Forum - which includes one consumer protection group, the technical community, the financial technology community, as well as the traditional banks and financial institutions - develops Pix's rules, reviews its functioning and standards and decides on new functionalities, allowing innovation at the edges and inclusion at the peripheries, resulting in tangible social and economic value. The Janata Management Systems in India as another example, reveal how public administrations can co-create accountability frameworks for DPIs by working with affected publics. This includes a mix of pre-digital and non-digital strategies such as citizen assemblies, combined with carefully designed online information portals on welfare distributions.

These examples of commons-based DPI illustrate different public-commons partnerships that emerge to ensure DPIs have impact and do not cause harm, echoing the Global Digital Compact as well which recognised that there can be different models for DPI but there should be “a set of safeguards for inclusive, responsible, safe, secure and user-centred [DPIs]” (Global Digital Compact, 2024, p17(c)). Political factors will complicate this endeavour, but it is important to maintain space for experimentation with different public-commons arrangements for DPIs.

A commons-based governance approach for DPIs offers a vehicle for every stakeholder to take an active and responsible role in shaping the digital architectures serving the public, with a model already tested in practice and at scale.





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