

The DPI Approach: Infrastructuring Indian vision of Development

Bidisha Chaudhuri and Nafis A. Hasan
University of Amsterdam

Note for the readers:

This paper is our first attempt to document the observations and interactions we had so far as part of our project on Digital Public Infrastructures that traces its origin in Bangalore and its spread into other Global South context through specific configuration of policy, institutions and technology. The policy part is still not yet formulated in our ideation and we hope to develop this more as we have more interaction in the field. In this draft we tried to focus on elaborating the organizational and material network of DPIs as we encountered through many interviews with experts, mainly those who build and implement DPIs (except for a couple of researchers). The draft you are reading is still an idea of a paper and not yet fully developed as a paper as we only document our findings in a more descriptive manner. Therefore, we would be grateful for your feedback and suggestions on how to develop this into a full-fledged paper with a analytical argument. Thank you in advance!

Introduction

Digital Public Infrastructures or DPIs has become the newest technological export from India that is being globally recognised and efforts are being made to replicate its “success” in other countries of the global south (Sharma and Saran, 2023). This global standing of India leading in technologies of governance comes in close succession of its implementation of population-level digital biometric identity database. In fact, DPIs are an expanded and more ambitious version of “India Stack” which received the rebranding with a global vision of replicating Indian’s success with creating a national foundational ID stack. While DPIs, such as Aadhaar, UPI (unified payments Interface) become ubiquitous in India’s development trajectory, in this paper, we explore the role of DPI in the political rhetoric of branding India as a software infrastructure power, especially in the Global South. To do this, we first explore the network of people and organizations that drive the DPI approach and then connect the material affordances of DPIs underpinning its infrastructural rhetoric.

India’s role in the production and dissemination of DPI is justified on multiple grounds, as the pre-eminent outsourcer of software (Dinesh Sharma 2015) and as a prime mover of public infrastructure at scale with the experience of *Aadhaar* (Chaudhuri 2022). Proponents of the project have themselves framed DPIs as a response to the dependence of governments in the global South on Big Tech corporations. For example, in the Global Digital Public Infrastructure Summit, 12-13 June, 2023, R S Sharma a former member of the UIDAI, the government agency that produced and regulated Aadhaar, and a present Chairman, Geo-Spatial Data Promotion and Development Committee said “the transition from a platform-centric approach to a network-centric approach is fostering democracy and reducing monopoly of platforms such as Meta.” (21, 2023). Another staunch believer of Big Tech’s

role in establishing ‘neo-colonial’ relations with the global South through appropriation and management of data, is Parminder Singh, an independent technology policy expert and also a member of *G20’s Think20 Task Force on Digital Public Infrastructure*. For instance, in a podcast on democratizing data, Singh is critical of big tech companies holding on to data, which he said “stymies the growth of an open data economy”. Many others in policy circles of India believe DPIs to be a good alternative to this penchant of holding on to data by technology companies.

A desire for curtailing big tech from dominating the datafication of the global South is also to be found in corporate India’s response to what they see as the phenomenon of foreign capital being “dumped” on to Indian markets in order to usurp Indian companies, infrastructures and their clients. A ‘capital dumping’ argument was first made by the owners of Indian internet companies, Flipkart and Ola against their equivalent foreign competitors, accusing the latter of diminishing their businesses in India ([SSIU 2016](#)). The owners of these companies as well as venture capitalists funding these entrepreneurs called for the intervention of the Indian government in preventing the unchecked growth of foreign companies in India. Sharad Sharma, the co-founder of iSPIRIT Foundation, the producer of multiple Digital Public Goods, also put his weight behind the ‘capital dumping’ argument ([Goswami 2016](#)).

Following this line, DPI being described as decolonial response to the claims of Big Tech’s neocolonial penchant for government data connects to a decolonization frame being increasingly applied to the study of data across the world (Coudrey and Mejias, 2021). The ‘capital dumping’ argument is a reflection of the more serious claim of datafication having “deleterious consequences for people and communities on the ground” leading to the “epistemicide of the global South” (Milan and Trere 2019). DPI advocates in India’s tech hub of Bangalore and policy hub of New Delhi explicitly assuring African governments that Indian made infrastructure will ensure data sovereignty, that is independent and sovereign control of data by the governments of these countries after they have been datafied by Indian engineers, is explicitly framed in response to the criticism that the “data extractivist” mechanisms of agents of the global North (both governments and corporations) are being challenged within critical data scholarship. DPI promoters are conscious about the legacies of dependency that aid and infrastructure from the global North has created in the south (Adams 2021) and are therefore stressing independence from the temporary and necessary dependence on Indian tech work in African countries. Yet, Adams (2021), in posing whether AI can be at all decolonized is asking a more fundamental question, vis-a-vis the colonial hierarchies of “intelligence” on which the production and dissemination of data technologies, on one hand, and their framing of data subjects, on the other is based. Thus even as DPI promoters are aware of the legacy of colonialism and neo-colonial dependencies ushered in by Big Tech’s drive to capture data, what is left unstated is the kind of futures brought forth by the datafication of nations via DPIs and the reshaped value of people and relations that this new world would inadvertently solidify.

The DPI approach is not just about building technology according to its proponents. It is a combi of policy, people/networks and technology. So this paper unravels what the components of these policies are.

Policy

This section is not covered in this first draft of the paper. In this section we would cover, what kind policy demands are made in specific contexts while deploying DPIs. We explore what kind of topics that these policy discourses touch upon, for example local invocation ecosystem, domain/context expertise, design principle of co-creation, data ownership and son.

People/Networks -.

“Bangalore, once admired as a city of gardens and a retirement paradise, over the last two decades, has famously earned its place as a premier global hub of software development and IT services. Equally revered have been its more internal experiments with digital technologies to improve citizens’ experience of public life, in a domain collectively known as “citizen services” (Bussell, 2012, p. 226).” For example, a digitized database of agricultural land records, “Bhoomi, imagined in Bangalore in the late 1990s by Rajeev Chawla, a charismatic engineer-turned-bureaucrat, is a paradigmatic example of this IT-inflected gaze on problems concerning states’ ethical responsibility toward their citizens.” Bhoomi, funded by the World Bank was also showcased around the world as a great example of technology for land administrations (reference). The model of a World Bank emissary encouraging a state bureaucrat to develop a technology that is circulated to other states in the world is now replaced by another set of people and networks. Central to this new configuration is the presence of the Indian technologist and entrepreneurs who with their established expertise in the corporate sectors come with solutions for the problems, not only of governance in India but potentially for other governments in the global South.

The key technologist in the DPI story is Nandan Nilekani, formerly known as the Co-founder and Chairman of Infosys technologies, Founding Chairman of the UIDAI that gave Aadhaar to India and Co-founder of EKStep Foundation, a non-profit for improvement of India’s national education through digital means. However, Nilekani’s role as consultant and financial support extends into many other organizations in Bangalore and beyond, connected with the proliferation of DPI, as mentioned below. Prior to these roles, Nilekani has been a long-term advocate of reforms in urban governance, starting with founding the Bangalore Action Task Force in the 2000s in which he pledged \$300,000 for five years for the improvement of the city (https://en.wikipedia.org/wiki/Bangalore_Agenda_Task_Force; <https://www.jstor.org/stable/4417426?seq=1>), to being an advisory member to India’s most significant urban reform project called JNNURM in 2004-05 (<https://archivepmo.nic.in/drmanmohansingh/press-details.php?nodeid=414>); then to Agenda for Bengaluru Infrastructure and Development in 2009 and B-Pac with Ashwin Mahesh (check and check). In 2014, Nilekani even stood for parliamentary elections but lost. After which he stayed away from electoral politics but remained an influential figure in promoting DPIs in India and beyond. His influence is reliant upon, a) actual experimentation with design

and deployment of DPGs/DPIs through various not-for profit organizations and start-ups he is part of and b) mobilising a wide network of organizations that would research, build, implement and fund these initiatives, c) influencing push for DPIs at the highest level of policy making in India and making it a part of India's software diplomacy abroad.

We were able to trace this network of DPIs by interacting with one such organization in Bangalore that has been building gov-techs for various urban administrative units across India for many years. More recently, with financial and advisory support from the Bill and Melinda Gates Foundation it has ventured into the DPI space that was built in house and was being deployed across three countries in Africa. This ties-in with the long-term Gates Foundation agenda of improving the delivery of health services in Africa through the use of quantified data and other tracking mechanisms. As per our interlocuter based in one of the receiving countries, the Indian organization brings in the base digital platform (which they called a DPG) and product engineers who work with experts (mostly labelled as domain experts) in the implementing department to understand the context of the governance and envision the scope of solution. They together co-create the different software modules on top of the base platform which are then piloted in the "field" and iteratively improved based on the "field experience". One successful pilot opens the door for not only scaling up that very solution but also for collaborations with other domains/departments in the country where new solutions can be experimented with the same base platform.

DPI ecosystem consists not only of Bangalore's technologists, but also of academics and researchers at the International Institute of Information Technology. Here, two centers: Center for Digital Public Infrastructures (CDPI) and Center for Open Societal Systems (COSS) play a key role in developing a network of connections. CDPIs is a very new entity, set up in March 2023 and its focus, according to our interlocuters, is to consult and "steer" governments outside India (in Africa and Latin America) to adopt DPIs and provide them with know-how on digital best practices. Many of CDPI's members were formerly part of India Stack. Our interlocuter at CDPI stressed upon the fact that they don't go to countries, but rather government agencies come to them although events like India hosting the G20 summit in 2024 and showcasing DPIs helped popularize CDPI's work to governments outside India. CDPI works with "counterpart agencies" in these countries at the national level. Our interlocuter mentioned working with the Ministry of IT, Ministry of Finance and Ministry of Health as examples of government agencies they work with. To showcase the kind of consultation CDPI provides, they gave us the example of working with Zambia:

Zambia had been wanting to build the national ID system for decades now. And there are a bunch of projects that have worked, not worked, failed, whatever. And so you had multiple parallel ID systems existing in the country. But the thing was none of those ID systems were reusable by citizens, which meant it was just like a smart card, it was a chip, it was something, but you couldn't use that ID for anything. And so when they came to us saying we need to fix our ID system, one of the things we told them was you don't have to build another ID system from scratch. Use an ID system you already have, like your voter registration card or something like that. Add in an EKYC, an e-authentication layer on top of that, so that your

voter ID can now be used as an identifier to say, open a bank account to get social benefit payments, to get whatever XYZ features. So that design pivot of being like, we don't need a new ID, but on your existing ID, we layer capabilities that make the ID reusable was, I think, one of the examples of a country we worked with.

COSS is another institution, referred to as “system” by one of its key members, also housed in the IIITB, whose function is to “instantiate” DPIs for other countries. Where CDPI steers the governments towards the right approach for digital adoption, COSS takes specific examples to governments.

DPI's Materialities: Building a Protocol Infrastructure

DPIs marks a shift from traditional consultant driven software services export that dominated much of India's intervention into building IT systems elsewhere. This shift is drawn out of an understanding that developing IT systems by itself does not allow for large-scale implementations and requires more institutional, regulatory, policy and governance change. The ability to make a software system operational in a specific context through all these holistic changes was both a social as well as technical challenge. Socially, IT companies and their experts coming from India (and elsewhere) did not have either a clear understanding of the local context or the authority to make or demand any concomitant changes for their software solutions more conducive in the local contexts. Technically, the software products and its implementations were sold as a single unit which could not be effective without making the institutional and policy changes. As one of our interlocutors commented:

in the past, we used to build the products and implement them ourselves. And all of this was very tightly coupled...

DPIs were offered as a solution to make software systems more customisable to local contexts while making the software systems the infrastructural base for which institutions, laws, policies and peoples were to be mobilized. We call this an infrastructural turn in the digitalisation of public services and this turn was prompted and pioneered by the Bangalore innovation complex and supported by a wider network of multilateral development agencies and philanthropic foundations.

Debunking what constitutes a DPI approach implies that we understand the actual material components of this infrastructural term. While on policy documents published by international organizations and state institutes, DPI appeared to be a concerted concept, on the ground it came to be experienced as a slippery trope that everyone should be aware of without exactly being sure of its meaning. We also traded on this slippery path to make sense of what people actually meant when they talked of DPIs, what is it constituted of.

Given the emerging nature of the term and confusion surrounding it, most policy documents also made efforts to clarify the terms used in association with DPIs, some even came up with a glossary of terms. Across these documents, DPIs are built on architectural principles of openness, interoperability and scalability. From a point of view of software infrastructures, these principles rely on specific material configuration of software and can be found in many

software platforms provided by private companies such as Amazon and Google or even by community owned Open Web Platforms. However, what sets DPIs apart from a simple platformized approach to software, is that it invokes open source software and its interoperability across platforms to be deployed, governed and circulated as a consolidated and well-regulated approach to national level problem solving. So, the journey from a software to becoming an infrastructure requires a more complex web of things, people and relations. As one of our interlocutors suggested: “as long as it is just a few codes available on GitHub, it is not yet a DPI, it is just a DPG”. Hence, the open source software, which can be considered a public good, is a necessary but not a sufficient condition for becoming a DPI. Many of our expert interlocutors who work to design and develop DPIs compare it as a service or solution to societal problems rather than a software system. In short, an open source software code needs to be interoperable across various different platforms.

In early years of building DPIs, the interoperability was sought through open APIs that allowed programmatic access to even privately owned software interfaces. By this way different privately or publicly owned platforms could be accessed and integrated through a shared infrastructural ecosystem. However, such an interoperability meant that privately owned platforms that had bigger market share controlled the infrastructural space. Instead, the focus was now building open standards and protocols which could allow any entities (private or public, big or small) to build interfaces based on local needs and integrate them into the infrastructure by following these protocols. In more simple terms, instead of defining system specifications, the focus was now on defining the rules/paths of building the system so that different software systems, built with varied specifications, context and requirement in mind could still be integrated and collectively shared. This protocol based interoperability also facilitated modularity and flexibility in software system development not just in terms of what would go into the system but also in terms of who can build these systems. And the diversity of solutions and people involved within this infrastructural complex were unified through protocols and a common design philosophy

(<https://carnegieendowment.org/research/2023/05/what-is-the-dpi-approach?lang=en>) which we would discuss above under the policy section. For example, Digital Public Good Alliance as an international body (as mentioned by one of our interlocutors) was one such international organizations which provides a concerted framework of policies that govern the review process of Digital Public Good (DPG) applications (<https://github.com/DPGAlliance/dpg-resources/blob/main/docs/dpg-review-policy.md>) which are openly available on Github as a open source resources. A bigger takeaway here is that “the “rules” are not only shareable but completely transparent and in the control of any end user”

(<https://knightcolumbia.org/content/protocols-not-platforms-a-technological-approach-to-free-speech>). Hence, the protocol based interoperable systems where not only the software codes but its rules are also openly available for any users makes it an attractive proposition for governments in the Global South who have not only struggled to make exported software solutions more locally conducive but also to retain control over the software solutions themselves. As one of our interlocutors from Mozambique explained, DPIs are different as they allow for “cocreation” of solutions with expertise of software developers, product managers and more importantly of domain experts in a specific context. This meant that the

government could employ any number of local partners, be it public, private or civil society organizations, in co-creating software solutions for a specific sector while retaining the control of core principles and rules by which these platforms will be governed. This material affordance of modularity and interoperability with a social affordance of co-creation facilitated quick scale up of DPIs.

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