Task Force 2:
Our Common Digital Future: Affordable, Accessible and Inclusive Digital Public Infrastructure

UNPACKING DIGITAL PUBLIC INFRASTRUCTURE: NAVIGATING CONCEPTUAL AMBIGUITIES

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Abstract

Digital public infrastructure (DPI) has garnered widespread attention from policymakers, industry officials, and civil society. DPIs, combined with digital public goods (DPGs),[1] have forced policymakers to consider how digital technologies can be used to address complex societal challenges. Indeed, DPIs can be deployed by state and non-state actors for a variety of uses. While there is plenty of enthusiasm regarding DPIs, there is still a degree of conceptual nascency, evident in the attempts to objectively define DPIs and DPGs, and delineate their features.[2,3,4] This policy brief seeks to (a) critically summarise the assortment of definitions that exist around DPIs, (b) articulate practical implications that such conceptual ambivalence may give rise to, and (c) propose a corresponding set of recommendations to the G20.

The Challenge

1

The dominant rhetoric around DPI remains uncritical

Digital technologies have proliferated over the last two decades, fundamentally changing how society works. Their use has been ubiquitous, having been deployed for a wide range of functions central to our socioeconomic lives. Within this paradigm of digitalisation, a distinct conversation pertaining to the "infrastructural"[a,5] quality of digital technologies has emerged.

The focus has been on the potential of emergent population-scale digital technologies that can be leveraged for a variety of use cases, spanning both public and private spheres of service/product delivery. Such technologies have been clubbed under the term 'digital public infrastructure' (DPI) which, in turn, has been defined using a variety of approaches (see Table 1). Loosely defined as "digital solutions that enable basic functions essential for public and private service delivery,"[6] DPIs have come to dominate policy parlance within the international development community-and are frequently referred to as one of the key levers for achieving Sustainable Development Goals (SDGs).[7,8]

While there is a substantial amount of advocacy-oriented information around the use of DPI to address a diverse spread of issues including climate change and gender empowerment,[9] little has been written about DPI's conceptual foundations, its etymological origins, and/or the defining set of features that set it apart from other forms of digital technologies. This might be due to two reasons. First, the literature on DPI is nascent and a variety of thematic currents remain unexplored. Second, the discourse has been led by policymakers (governments, international organisations) rather than academia, focusing more on practice than on conceptual investigations. Nonetheless, most of the attempts to define DPI have, by and large, involved the use of value-laden concepts. We have labelled such definitions as 'normative', in that they

a While the term 'infrastructure' has been defined differently across contexts, we view it through three basic characteristics. These include (i) scale, (ii) enablement of "downstream uses" that foster a variety of economic and social activities, and (iii) tendency for their provision to be concentrated in a few actors coupled with their centrality to various downstream uses.

either uncritically assert DPI's potential benefits (focus on output) or offer a set of desirable standards that DPI must exhibit to achieve the said benefits (focus on governance mechanisms).

Such normative definitions serve the important purpose of vision-building since they lay out features of an ideal prototype of DPI. In some cases, such definitions also serve as short-term goals for governments in the process of building and/or deploying DPI. Several countries borrow the normative framing of DPI and use it to visualise features of technological interventions they seek to deploy. However, such definitions of DPI only focus on 'what *should* be' and are, therefore, not without ideological undercurrents. It is important to acknowledge that the norms they put forth are not necessarily universal—raising questions about whose vision counts and which voices are being excluded from framings or imaginations of DPI.

There is a second group of definitions that has also dominated conversations around DPI– inductive definitions. These definitions rely on a collection of examples or functionalities for which large-scale digital technologies have been used as the primary input. While such definitions provide a preview of the various applications of DPI, they unfortunately lack the desired objectivity due to an inherent bias in the way the examples are chosen. Inductive definitions rely on a set of cherry-picked functionalities for which implementation of all-encompassing digital technologies is either already underway or has supposedly been effective in select contexts. Three examples that are cited frequently are biometric identification systems, payments, and social registries. Such a choice also signals an underlying assumption that the 'success stories' cited are transplantable to other sectors (which may be very different from the sectors pioneering DPI's application) and that a similar approach will achieve favourable outcomes when scaled up. Like normative definitions, inductive definitions also sidestep conceptual questions around DPI, latently endorsing the use of digital technologies for their stated functionalities and ultimately end up contributing to the ongoing rhetoric.

Table 1: DPI definitions

Definitions	Approach(es)[b]
"DPI are society-wide, digital capabilities that are essential to participation in society and markets as a citizen, entrepreneur, and consumer in a digital era. Because it is essential, DPI should be guaranteed by public institutions to be 1) inclusive, 2) foundational, 3) interoperable, and 4) publicly accountable, as it is deployed in countries around the world."[10]	Normative (Governance)
"DPI refers to digital solutions that enable basic functions essential for public and private service delivery, i.e., collaboration, commerce, and governance. Think about our existing shared public infrastructure such as roads and education, but online: that's DPI in a nutshell."[11]	Sum-of-its-parts[c]
"DPI refers to platforms such as identification (ID), payment and data exchange systems that help countries deliver vital services to their people."[12]	Inductive
"DPI comprises foundational population-scale technology systems on which the digital economy operates, such as identity systems, payment systems, data exchanges, and social registries."[13]	Sum-of-its-parts + Inductive
"DPI refers to systems that allow data to flow seamlessly while accomplishing basic, but widely useful functions at a societal scale. DPI systems build on internet access and mobile connectivity to allow people to access public services, do business, and collaborate effortlessly with each other."[14]	Normative (Output)

Variegation in arguments

Two overlapping clusters of arguments have emerged in favour of DPI. The first one mostly revolves around DPI's potential to limit the growing market power of private technology corporations over digital infrastructure vital to people's lives.[15,16] The argument has primarily originated from policy discourse in high-income/developed countries where a lot of the digital infrastructure has been developed by the private sector[17] and where socio-economic development is not a first-order priority. In this cluster, the phrase DPI has been interchangeably used with other related concepts- these analogous concepts mostly relate to the governance of digital infrastructure for public interest and have emerged

b Authors' typological framework.

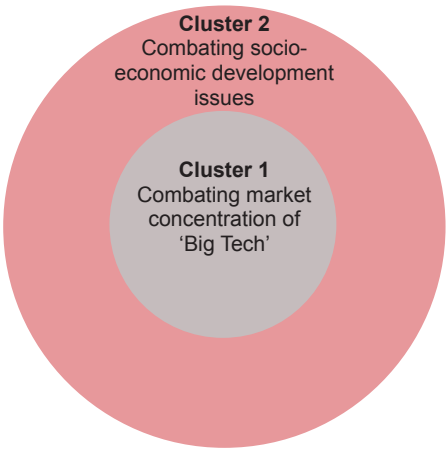
c These definitions synthesise the connotations of the words, 'digital', 'public', and 'infrastructure' (see footnote 2) to arrive at a conceptual understanding of DPI.

in the literature (mostly from the US and the EU[d]) under terms such as "digital commons"[e,18] and "public digital infrastructure".[19]

The second cluster of arguments is markedly different from the first one in that it exhibits a much more aggressive form of fusion between development goals and large-scale digital technologies. DPI is expressly defined through its ability to facilitate the achievement of socio-economic and developmental policy objectives through enhanced public and private service delivery.[20,21,22] Unsurprisingly, this cluster of arguments has primarily originated from low-and-middle income countries, including India.

An important thing to note here is that in the case of India, arguments in favour of DPI span both clusters, especially in certain critical sectors such as e-commerce and payments.[23] The Indian narrative seeks to actively encourage and engage homegrown tech-evangelists to either co-develop DPI (as in the case of Aadhaar) and/or innovate using government-built DPI. The rhetoric in India shows that this approach is being adopted in sectors dominated by foreign technology companies, with DPI envisaged as the key lever for lowering market entry barriers for private domestic firms.[24]

Figure 1: Argumentation clusters



d Two notable exceptions are Norway and Estonia.

e Commons are goods that depict a high subtractability of use and where it is highly difficult to exclude potential beneficiaries. Digital commons are a subset of the commons, where the resources are data, information, culture, and knowledge which are created and/or maintained online.

The two clusters highlight conceptual tensions within the DPI discourse with a certain degree of disjointedness in their treatment of private actors. While a few arguments call for exercising caution vis-à-vis the involvement of private actors in infrastructural services and goods provision, other arguments, especially in India, embrace their intensifying role in the same.

Although it is completely justifiable for proponents of DPI to have multi-faceted motivations, it is important to resolve possible paradoxes in the discourse. While certain regulatory frameworks/ broad guidelines do exist for private actors' participation in public service delivery (this may vary from sector to sector), performance monitoring constraints faced by governments may result in suboptimal outcomes. Private sector involvement, in and of itself, may not organically result in a set of desired socio-economic objectives—it may, in fact, even result in a dilution of accountability and transparency mechanisms.[25,26] These risks signify that countries implementing DPI in the second cluster may run into the very issues that DPI is being deployed to combat in the first cluster. While claims are being made that these risks will be precluded through use of open-source software, it is important to acknowledge that their success depends on the larger institutional context. DPGs, in and of themselves, may not guarantee the realisation of faultless service delivery.[27]

Policy implications of the uncritical discourse around DPI

Leapfrogging questions around applicability: While conversations around the potential of DPI across sectors are exciting and not without credibility, fundamental questions around the applicability and suitability of the DPI approach (given the specific sectoral context) have become somewhat muted, often because of the sheer expanse of potential benefits that DPIs promise. Additionally, given that these conversations are taking place at the international tier, sector-agnosticism is coupled with a reduction in focus on local and hyper-local contexts. Instead of a one-size-fits-all approach, comprehensive, jurisdiction-specific assessments need to be conducted before the deployment of such large-scale technologies. These assessments could span questions related to technical capacities, legal and rule-enforcement traditions, implementation

prowess, merits of competing non-DPI alternatives, and financing, among many others.

Subversion of empiricism: One consequence of the nascency of the DPI literature is the limited amount of empirical evidence available. However, even when present, it has not significantly changed the larger rhetoric. This is evident in the case of digital identification. The widespread use of Aadhaar for delivery of social protection benefits in India has been justified by its potential to reduce "leakages" in the delivery pipeline, despite various concerns related to its exclusionary bias. Studies have repeatedly pointed out that Aadhaar-based biometric authentication by itself has not significantly changed either leakage or the value of in-kind goods received by households on average, however, it has led to an increase in transaction costs and exclusion errors.[28,29] Within the broad impacts that digital IDs can have, there is little research on how they can improve the implementation of welfare programs, how these systems and linked programs affect citizens, and what unintended consequences may result from governments/third-party providers having access to IDs and their associated technology (Parekh, 2020). This trend of subverting empiricism seems to be a result of the uncritical nature of the DPI discourse, wherein all the actors involved treat DPI as a foregone conclusion rather than a policy option that requires deeper deliberation.

Sidestepping questions around risks: Issues of technological determinism, excessive datafication, limited data security and privacy, abundant surveillance, and unequal digital access are all challenges that must be addressed as DPI get entrenched further into the fabric of modern governance. Research has indicated data privacy and security concerns associated with India's Aadhaar system;[30,31,32,33] large Aadhaar datasets have been leaked several times since the system's introduction.[34] Comparable concerns around the Unified Payments Interface (UPI) have also been documented.[35,36,37,38] Statements from governments have indicated that adequate technological and regulatory oversight mechanisms will be implemented as part of DPI to ensure that these challenges are mitigated, and citizens' rights are protected. However, as the Aadhaar and UPI examples demonstrate, operationalising such commitments is challenging.

Shifting the responsibility onto private actors: The involvement of private actors is an integral component of the DPI approach. While private sector involvement in public service delivery has historically taken place in the form of private-public partnerships, the DPI approach looks to empower private actors to drive technological innovations, which in turn may pose risks for which regulatory instruments/ engagement models are yet to be designed. Furthermore, such a move could result in a gradual shifting of the role of the State from one of primarily service delivery provision to service delivery facilitation. While inclusion of private actors is not necessarily undesirable, it is important for implementing governments to institute risk-mitigating mechanisms.

The G20's Role

2

The G20 comprises of the world's largest economies, playing a pivotal role in shaping the global discourse around international economic issues. In the last one year, DPI has quickly moved to the top of the priority list of policy areas for high- and low-and-middle income countries alike. It has been identified as an important lever for achieving SDGs, frequently being referred to as the 'digital rails' of the 21st century. Given the global attention being directed towards DPIs and the increasing number of digital development programmes being launched across countries, an international forum such as the G20 is well placed to shape the nascent discourse around DPI. Firstly, the G20 Secretariat can assume the role of a convener for multistakeholder working groups that can help bring practice and theory together. Such working groups can engage deeply with the conceptual questions around DPI and produce operational definitions for implementing governments. Given the mix of member states within the G20, it is also the ideal discussion forum for resolving paradoxes between the two argumentation clusters described earlier. Secondly, the G20 can also facilitate knowledge-sharing between member state on issues relevant to the debate around DPI. This could include dialogues around best practices related to data protection and data security, especially given the different maturity levels of legal frameworks that are found across member nations.

Recommendations to the G20

3

As an intergovernmental forum, the G20 is primed to spearhead collaborative efforts to sharpen the discourse around DPI. Such efforts should go above and beyond popularising the concept of DPI and should ideally include incubation of diverse stakeholder groups that critically assess the benefits of DPI. The G20 can assist in shaping the DPI discourse by:

- **Coordinating efforts related to consensus building around DPI's features and phraseology.** The G20 wields the ability to facilitate dialogue between a myriad of influential private and public actors, thereby serving as an ideal forum to deliberate on and produce a common understanding and vision of DPI.

- **Initiating the development of assessment frameworks that can guide applicability and suitability tests prior to DPI implementation**. The endorsement of modularity associated with DPI risks their implementation for sectors and situations where their use may either prove unnecessary or pose challenges. The development of assessment frameworks citing the considerations of multiple stakeholders would aid policy makers better contextualise the need and applicability of DPI within their regions.

- **Encouraging member countries to direct funding towards longitudinal studies that assess the impact of various kinds of DPI.** At present, much of the research and evidence on DPI has focused on the scale of onboarding, as in the case of UPI in India. While this is undoubtedly an essential metric for success, the G20 must utilise its influence to encourage member states to critically appraise *whether and how* the deployment of DPI has tangibly impacted citizens. Such assessments could include discussions around inaccessibility, exclusion, rights violation, and search costs.

- **Issuing guidelines tomember countries regarding DPI implementation- conditions related to public consultation, parliamentary debates, and rights-based frameworks.** Many of the rights and access-based challenges

associated with the integration of technology into service delivery have been well documented. The G20 member states have the opportunity to collaboratively address these problems by deliberating on and creating rights-based guidelines on DPI implementation.

Attribution: Aarushi Gupta and Aman Nair, "Unpacking Digital Public Infrastructure: Navigating Conceptual Ambiguities," *T20 Policy Brief*, July 2023.

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