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OMIDYAR NETWORK INDIA

Financing Digital Public Infrastructures

A Playbook for Funders

This is a work of independent research, commissioned by **Omidyar Network India** in 2021-22.

Aapti Institute is a public research institute that works on the intersection of technology and society. It examines the ways in which people interact and negotiate with technology both offline and online.

ACKNOWLEDGEMENTS

In addition to contributions from the wider Aapti team, this report also draws from the expertise of numerous academic and industry experts and practitioners. We are grateful for their input during interviews and rigorous feedback sessions.

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A Playbook for Funders

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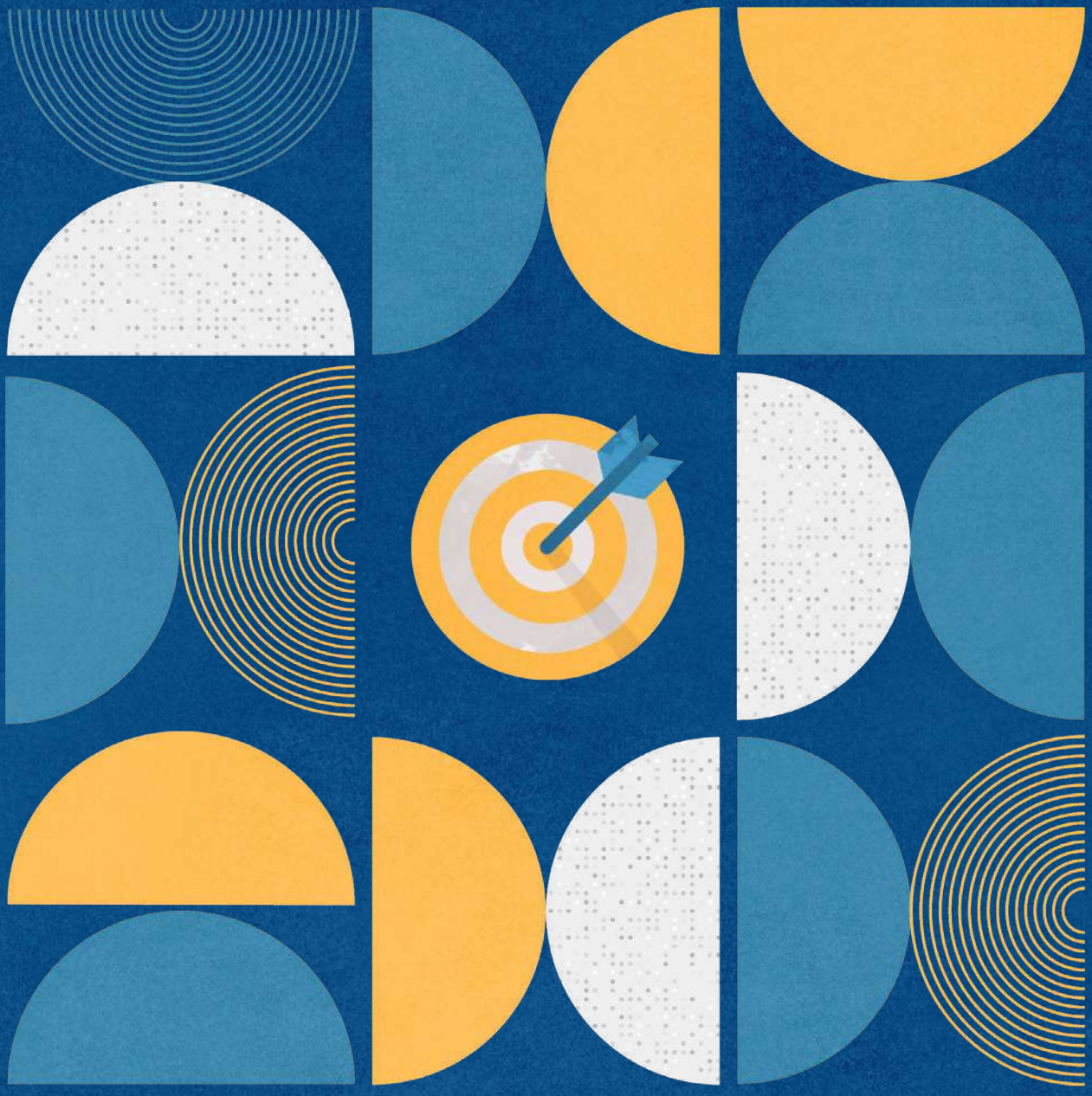
Terminology

Infrastructure (Aapti Interview, 2022)	Refers to a whole-bodied, internally-connected system of assets that can further activities of the public, thus enhancing overall prosperity and development.
Public Good (Elinor and Vincent Ostrom, 1977)	Refers to a type of good that is non-rivalrous (consumption by one does not cause dilution for another) and non-excludable (impossible to exclude anyone from consumption).
Open-source (Red Hat, 2019)	Refers to the open availability of human-readable 'code' that facilitates the operations of any software. Contrasted with "closed source", generally proprietary technologies.
Interoperability (Aapti Interview, 2022)	Refers to the ability of differently-formed software to communicate data and information to one another; indicates the smoothness of translation between two different technological creations.
Core (technology) (Aapti Interview, 2021)	Refers to government-owned, -approved and -financed technologies, containing base data for the entire operation of ABDM. E.g. Health ID, DigiDoctor, Health Facility Registry
Common (technology) (Aapti Interview, 2021)	Refers to technology that might be built and operated by the government or private sources in such a way that it is interoperable. The government ensures privacy and consumer protection. E.g. HCEx, Consent Manager
Reference (technology) (Aapti Interview, 2021)	Refers to technologies that act as "demonstrators" of innovation, simplifying user accessibility, knowledge and control. E.g. mobile applications that show personal health record, longitudinal health record.

Development (technology) (Aapti Interview, 2022)	Refers to the design and build of DPI elements, may be constituted within the “initial” financing priorities.
Deployment (technology) (Aapti Interview, 2022)	Refers to the implementation of DPI elements, generally in the capacity of a pilot or subsequent capacity of a one-time instance.
Maintainence (technology) (Aapti Interview, 2022)	Refers to the long-term regulation and scaling of DPI elements, may be constituted under “operational” financing priorities.

Executive Summary



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Executive Summary

The concept of a 'digital public infrastructure' or DPI is not new, but rather, an act of cohesion-building between existing flows of data, financial activities and identity across digital platforms and technologies. DPIs are imagined as large-scale infrastructural digital inventions aimed at making technological seamlessness a common feature of our dealings with the state, private industry and one another.

They form ecosystems of people and their digital personhoods, based on principles of open-source code software, decentralised creation, customisable user experience, sustainable development, paperless economies and a 'highway' approach to data and digital service delivery. Through their reduction of "inconvenience", human bottlenecks and time spent, DPIs can unlock significant value across all sectors.

Indeed, for India to reap the gains of this digital transition and harness the potential of DPIs, it is critical to understand patterns, flows and instruments for their long-term funding and sustainability. Our endeavour puts together an example-led playbook for financiers, DPI thinkers and governments to understand roles and responsibilities, and the repertoires of instruments for financing.

Examining the Role of Funding in DPIs: Financing as the Focus of Research

Understanding financing can lead to a few key impacts:

1. Unearthing better funding modes;
2. Understanding the hurdles around building large-scale digital projects for economic and social benefit;
3. Gaining an industry perspective of financing goals to target and risks to avoid or take.

In particular, a stakeholder-mapped study of the funding of digital public infrastructures can renew a discussion on public infrastructure financing, while constructing a format for development, deployment and maintenance of such infrastructure.

Funder and Instrument Variation: Unpacking the Four Case Studies

Two key themes of insight emerge from unpacking financing through the lens of four DPI initiatives: Ayushman Bharat Digital Mission (Domestic Health), District Health Information Software 2 (Global Health), Unified Payments Interface (Payments) and Digital Infrastructure for Governance, Impact and Transformation (Urban Governance):

- Funder types vary and have specific incentives and disincentives, and patterns of engagement. These are mapped in the section on The Playbook: Types of Funders, Funding Instruments and Innovative Financing Tools (page 34).
- Types of funders arise in six dominant categories: **public, philanthropic, private, academic, non-profit, bilateral and multilateral.**
- Funding instruments vary, and traditional funding instruments of **budgets, grants** and **equity arrangements**, as well as 'non-financial' **capacity-based contributions, volunteering** and **shared resources** appear across case studies.

Overall, cases suggested that DPI journeys are linked to missions and visions of entities, but also the practical considerations operating at the time of institution. Non-financial instruments (such as volunteering and capacity-based contribution) are used in several instances, and the journey of DPIs without these is difficult to imagine.

A Framework to Govern Financing Approaches

Additionally, interviews suggested that two key paradigms govern financing. The study finds that financing instincts or actions that are in play with respect to DPIs relate to

a. the nature of ***implementation***, that is, the scale and capacity of digitisation, and

b. the nature of ***innovation***, that is, the sophistication and planned disruption of technology.

In other words, implementation and innovation are the pivots upon which different funders tend to make use of opportunity and delegate action. The following is a 2x2 that demonstrates the relationship of funders to these paradigms more elaborately:

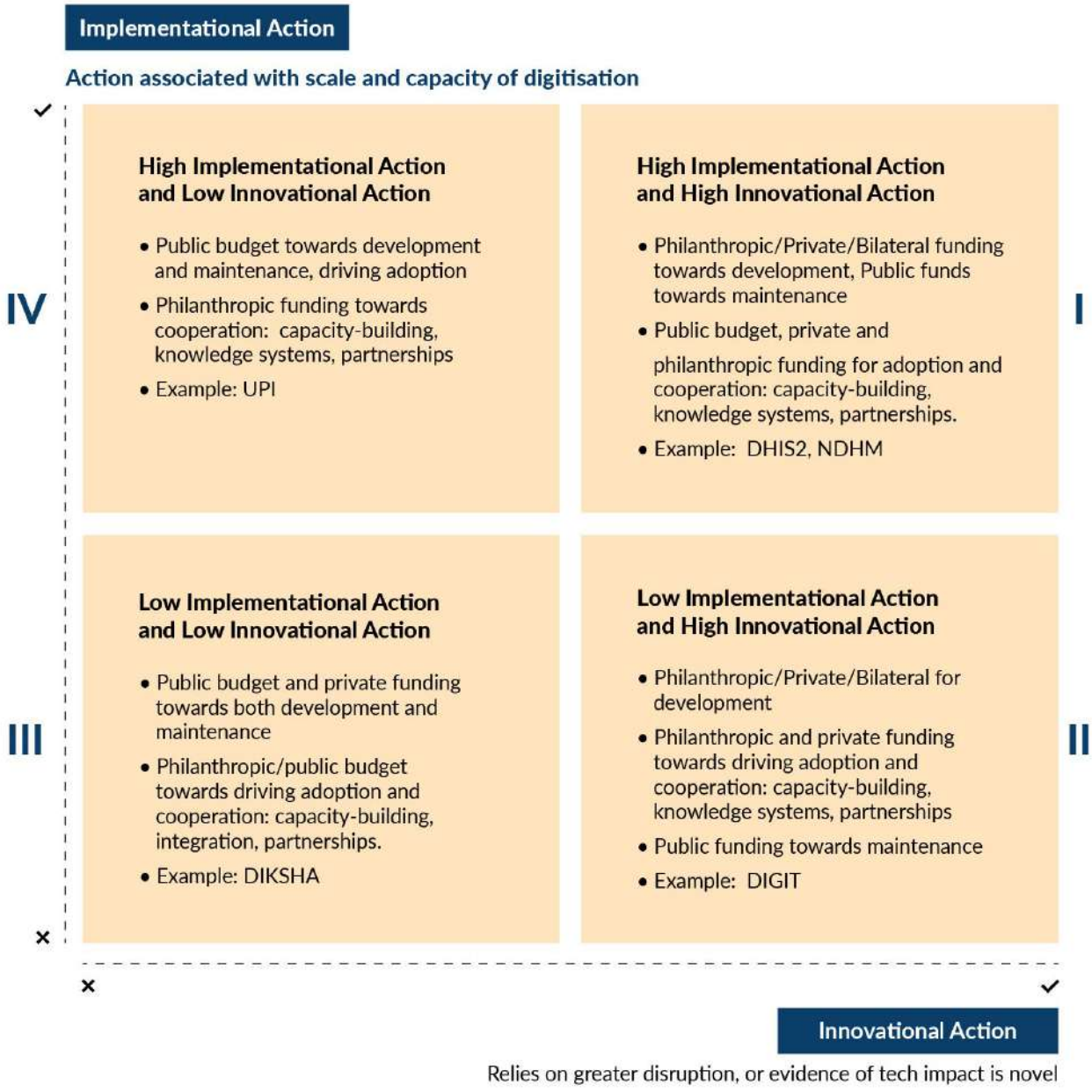


Figure 16. DPI quadrants of financing, subject to interviews and research
[from section on Financing Patterns, Takeaways and Actions]

- The quadrants showcase the four types of financing this study finds DPIs generally represent. For example, DHIS2 is born from the capacity of organisations such as Norad (Norwegian Agency for Development Cooperation) and WHO (World Health Organisation) who fund with an appetite for robust research and data outcomes, social advancement, and risk in creation, as well as the need for implementing for populations from over 70 countries that require localised and specific deployments. This classifies DHIS2 as a DPI that demands high levels of action within innovation and implementation, making it fall in Quadrant 1.
- Additionally, we expand the detail of this 2x2 through a financing playbook, which aims to guide readers through an interactive overview of the study and its key findings. The playbook provides a normative route to financing DPIs, as well as examples of contributions within types of funding instruments.

In general:

- **Public funding** as a more impactful role within high implementation action-related DPIs, whereas **philanthropic** and **private** funding more effectively influence highly innovational action.
- **Academic, non-profit** and other types of funders are noted for their involvement in both implementational and innovational action, as well as more specific contributions of socio-political guidance, public trust-building measures, pure research agendas and others.
- Additionally, all these different funders play different roles in the **development, deployment and maintenance stages** of DPIs.

Beyond the Traditional: A Repertoire of Strategies

- Financing can be viewed as a **responsibility-based task**, where a higher number of contributors being responsible is favourable to robust digital ecosystems.
- Alongside traditional funding mechanisms, there exist more **innovative financing** mechanisms such as **hackathons, partnership-building, incentive-led public funds** and others that have been uncovered through case studies and additional research.

- Financing emerges as a **participatory activity** in open digital ecosystems, and the playbook reflects a decentralised and similarly open system of ideal contributions.

Concluding With Next Steps and Action Areas for DPIs

The study also signals additional actions for DPI funders, such as:

Bolstering of the open-source code software community

- Document the roots and presence of open-source communities in DPI target regions;
- Explore formats of engagement that encourage active participation in DPIs by individual and group OS developers;
- Build governance and support mechanisms around OSS.

Increasing support for sovereign or dedicated infrastructural funds around DPIs

- Establish funding thesis and action plan for dedicated infrastructural or sovereign funds;
- Create tools to sharpen funding avenues and approaches e.g. funder forums for more coordinated financing.

Clarifying of funder roles

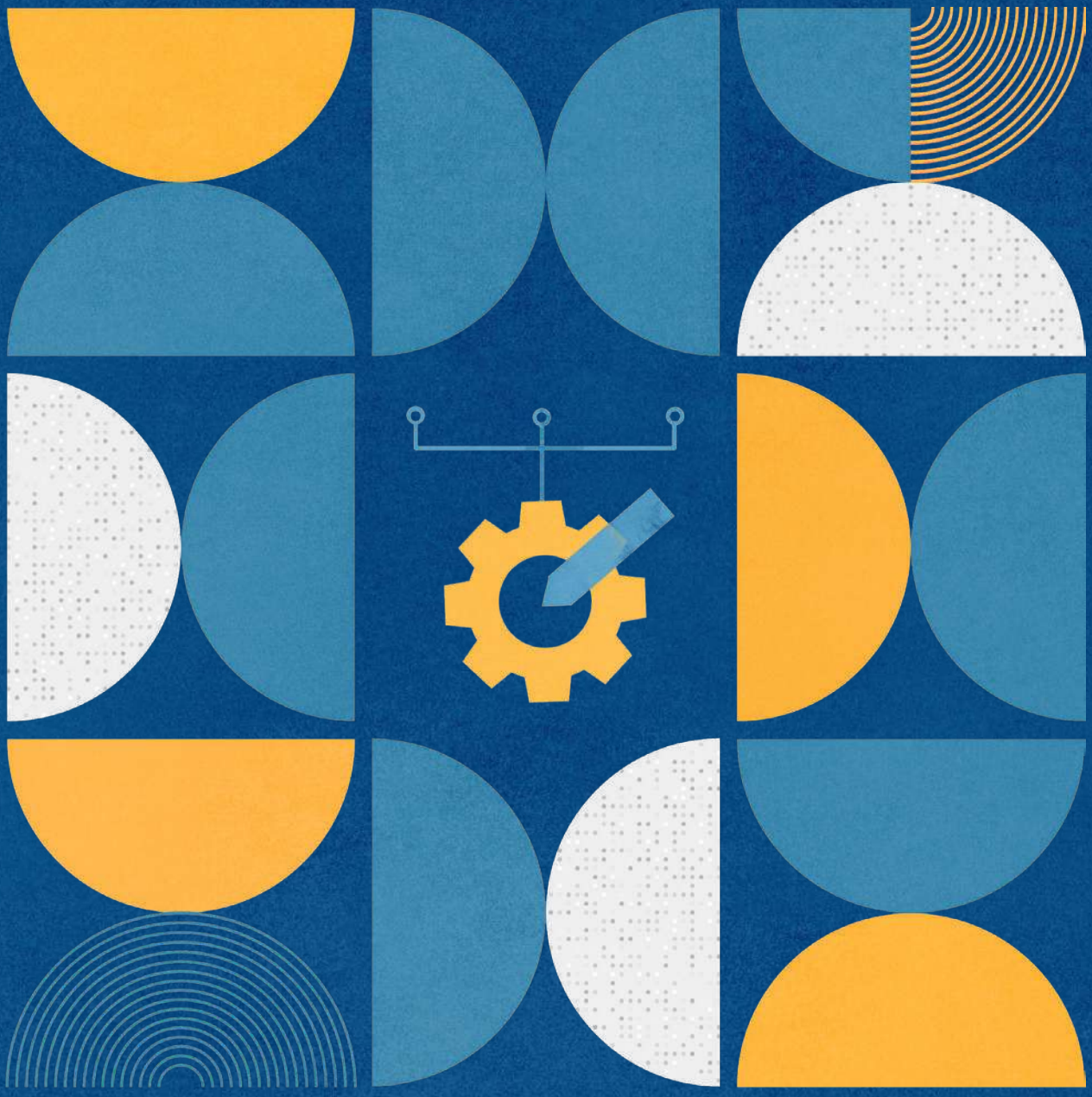
- Make efforts to organise and affirm the theoretical and practical roles that financiers can and must play;
- Socialise thinking on financing partnerships, ideal financing practices and values for DPI creation;
- Gain deeper insight into the specific incentives, inclinations and hesitations faced by digital goods funders.

Legitimising non-financially visible instruments such as capacity, expertise, volunteering and shared resources

- Document and acknowledge instances of pro bono support, positive externality and other hidden contributions;
- Understand the value of specific non-quantifiable talent and leadership;
- Push creative thinking around support mechanisms that go beyond traditional financing tools.

SECTION 1

Context



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SECTION 1

Context

In the early months of 2020, just weeks before the COVID-19 pandemic hit, the Ministry for Electronics and Information Technology (MeitY) released a White Paper on its plan to build National Open Digital Ecosystems (NODEs). NODEs constitute a "paradigm shift" in the realm of Gov-Tech, enveloping a nation-wide body of users and developers and unlocking a diversity of digital solutions for India. Stringing together elements of 'governance', 'technology' and 'community', the White Paper stated that increased efficiencies for citizens, reduced costs for businesses, greater accountability of the government and data-driven decision making would be the chief benefits of incorporating NODEs in the new era of digital connection in Indian society.
4 years on, we see that the discourse around DPIs intends to capture these elements in the same way.

The timeliness of MeitY's White Paper cannot be overstated. Having effectively brought about the digitisation of almost every human activity around the world in 2020, COVID-19 continues to emphasise human dependency on digital technologies for communication, work, service delivery, education and various other interactions. From QR code menus in restaurants to digital portals for vaccines, there is a range of innovations that have solidified digital presence.

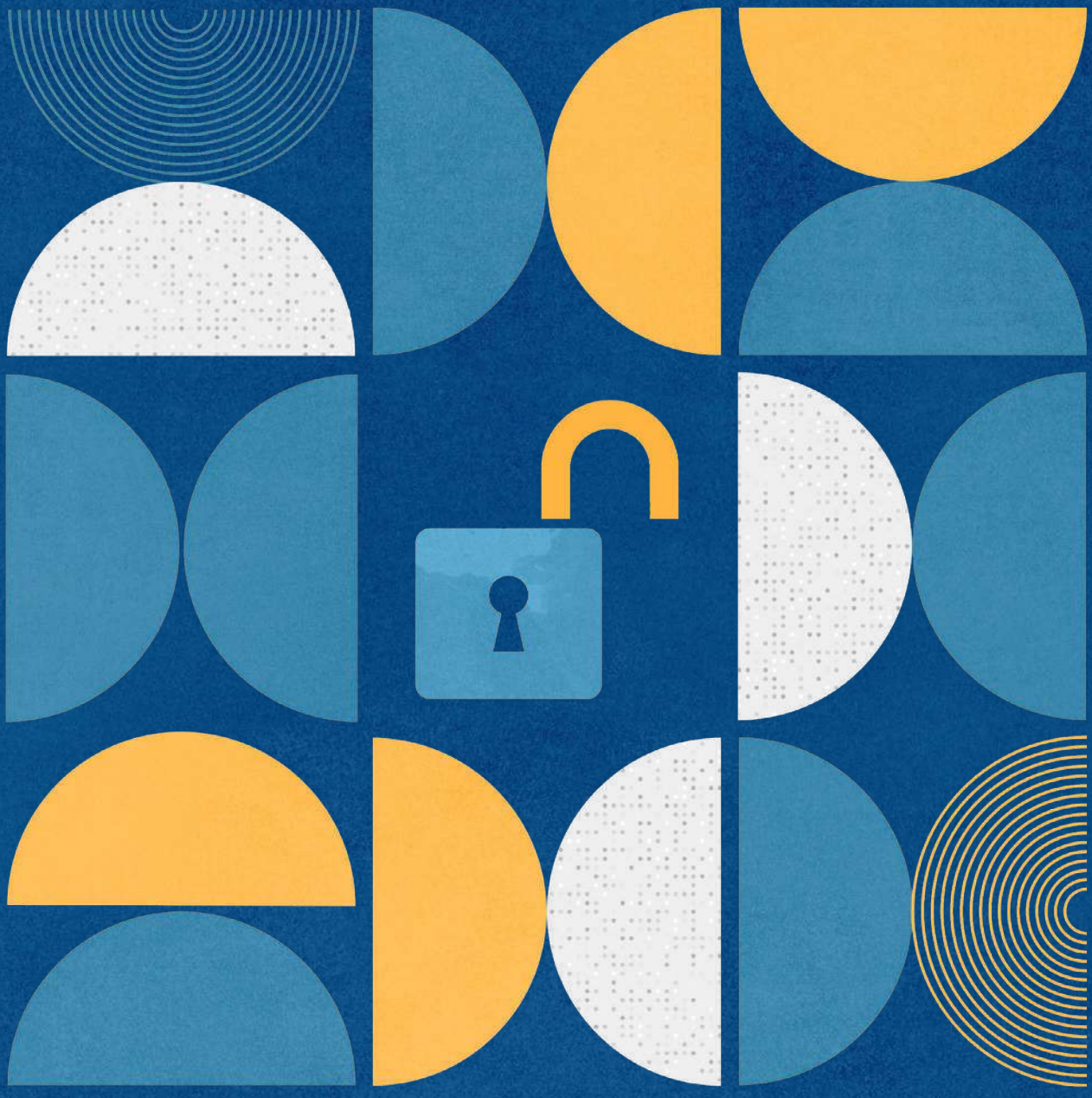
At the same time, these innovations and the data they represent exist in siloed and fragmented ways, as most technologies are designed independently and, thus, incompatibly with one another. Moreover, some technologies perform identical functions, inundating a digital economy with duplication that could have been optimised for a more unified and high quality product with collaboration. Omidyar Network India (ONI) flags these inefficiencies and more through its report on "Building India's Digital Highways" in which it explores the various considerations

that can inform an “open digital ecosystem approach”. One also perceives a push towards ecosystem-isation of digital service delivery in the Union Budget 2022, where emphasis has been placed on the building of a Digital Ecosystem for Skilling and Livelihood (DESH Stack e-portal) and the rolling out of the National Digital Health Ecosystem.

A critical lever of impact within open digital ecosystems like digital public infrastructures is the practice of financing and resource allocation, which poses risks and challenges and involves a variety of stakeholder interests and activities. In this report, we seek to build on the work of ONI, the state and other leaders in the digital goods and infrastructure space through a focus on DPI financing. We explore this crucial element to understand the best outcomes for all actors in financing and the considerations that accord for the rights of all kinds of individuals and communities.

SECTION 2

Introduction to Financing DPI



SECTION 2

Introduction to Financing DPI

The conversation around financing digital public goods (DPGs) and infrastructure (DPI) is led by various entities. Richard Pope stresses an educated approach for funders, where financing is informed by the characteristics of effective digital teams and both short- and long-term needs of the technology and its users. It is important for funders to work together to balance responsibility and think sustainably — this is also reflected in MeitY's White Paper on NODEs, where its principles of design contain the adoption of "suitable financing" that ensures "uninterrupted operations". For instance, ONI's report on DPIs frames a financing mode in terms of "initial" and "operating" costs, where the former is best served by public or philanthropic funding and the latter can be sustained by individual or user fee structures.

The research around financing will shed light on more structured modes for funding DPIs, as well as other knowledge around the supportive mechanisms, logistics, talent and innovation that will come to be important for the creation. These include:

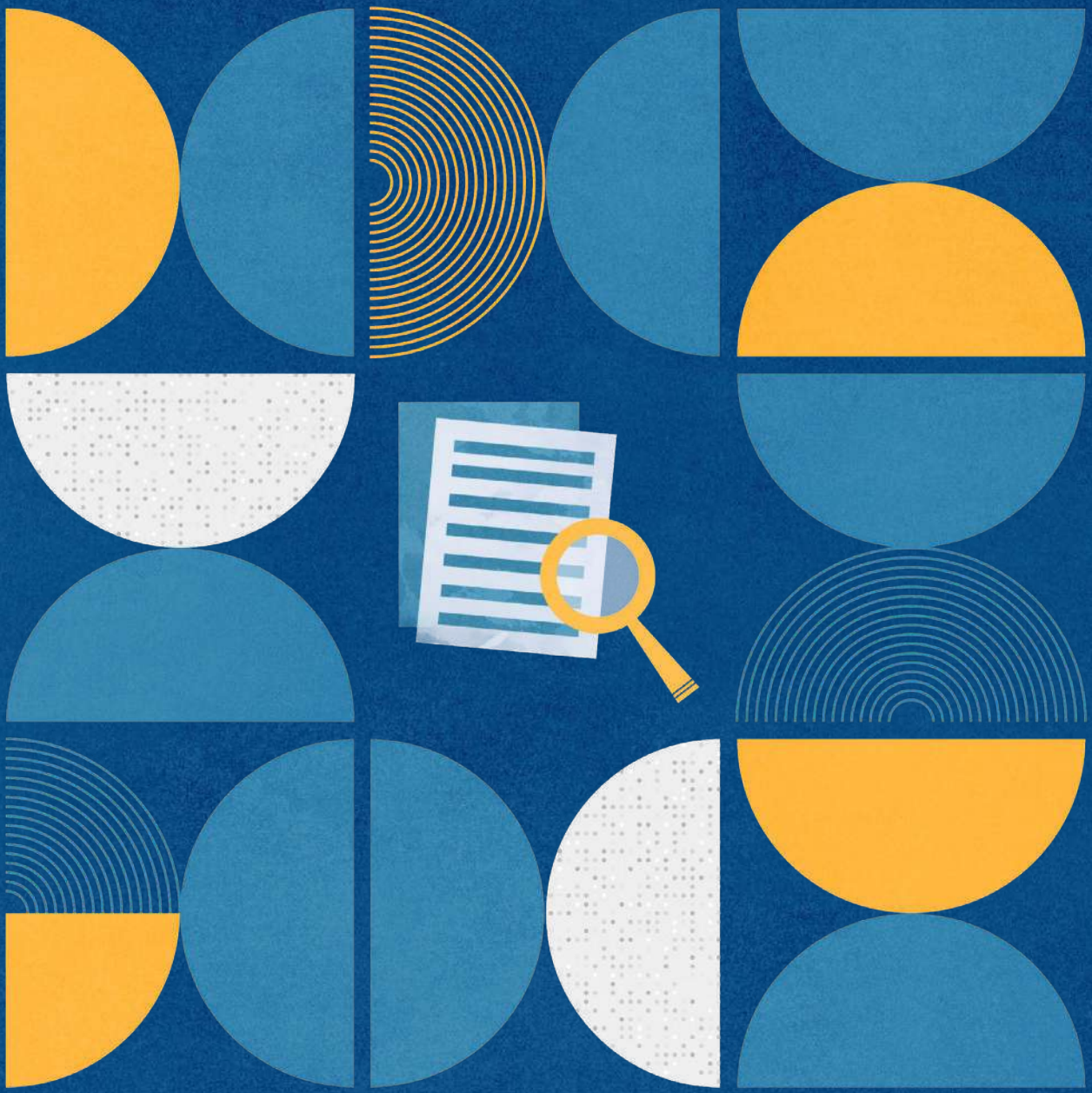
- **Gaps, problems and shortages**: Financing for large-scale digital infrastructural projects may carry its own mix of obstacles, such as inclusion and accessibility for users, efficiency of funded actors and lack of capacity and training, among other less understood issues.
- **Unconventional or invisible support mechanisms**: Forms of contribution may overflow the traditional financing moulds and mechanisms in that some aspects of digital infrastructure success may be hidden in non financially visible actions. This could comprise volunteering, internal capacity, inventive thinking and so on.

- **Non-traditional funders**: While most financial actors and institutions fit neatly in public, private and philanthropic categorisation, there could be pivotal roles played by other actors such as non-profit associations and alliances, academic institutions and individual entities.

Thus, in order to frame a constructive, impact-led picture of financing, through this report we seek to gain a greater understanding of the funding universe as it currently relates to DPIs, how it may be better harnessed and what constitutes actionable financing tools and pathways for their development, deployment and maintenance. In the next section, we appraise the methods of enquiry, overarching methodology, and expected outcomes of our research.

SECTION 3

Method, Methodology & Process



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SECTION 3

Method, Methodology & Process

The previous chapter outlined the stakes that surround financing for digital public goods and infrastructure and the need for building a practical guide for funders and funding institutions. In this chapter, we set out the methodologies and approach adopted for this research. In order to gain insight into current trends in financing and understand the future needs of digital infrastructure creation to build an actionable set of guidelines, we relied on a combination of desk research, expert interviews and peer review engagement.

The research method was anchored around four selected cases, and the aim of the effort was to centre our work on two critical design elements — a case study approach and a playbook approach. While the case studies would provide bottom-up evidence of the trajectories of DPIs in various sectors, the playbook would proffer synthesis to provide guidance on the roles of various funders as well as suggest the best instrument to be applied.

Methodology

This section describes the individual approaches that comprised our research:

A. Expert Interviews and Analysis

Semi-structured interviews to understand practices and opinions around digital transformation and funding: We approached interviewees with a structured set of questions to understand differing perceptions of the various funding norms around digital goods and infrastructure. Based on particular responses and follow-ups, we also built on interviewee-specific insight on other related themes.

B. Desk Research

Reviewing official and perspectival materials: We referred to the digital sources of information produced by the organisation that controls the DPI itself, such as official websites and White Papers. Additionally, we referred to newspaper, digital media sources and research outputs around digital goods and services in Indian and global territories.

C. Peer Review of Preliminary Framework and External Review of Finding

Peer review and response to our study by external advisers: We incorporated a third-party peer review that aimed to understand reviewers' feedback on the frameworks and the action areas. This review was conducted in two steps:

i. Peer review by Richard Pope: As we developed initial insights around financing and rough financing frameworks of instruction, we requested Richard Pope (former Product Manager in the founding team of the UK Government Digital Service) to review them. We sought his input on a number of aspects, such as the form of a financing playbook, roles of financing actors, the needs of digital infrastructure, the ideal custodian of digital financing playbooks, and governance regarding large-scale digital goods and associated human rights. Through his peer review, we were able to perceive certain financing boundaries around our research questions, important points pertaining to the value of open-source projects, barriers and weak points in traditional financing, and research pathways that our study may lead to in the future.

ii. Post-findings review process: Upon finalisation of our financing framework, we discussed our findings with five individuals from the DPI/DPGs research and development space. Their reviews of the research framework put forth a few language- and concept-based contentions; largely, however, the feedback on the thinking and shaping of the framework was found to have broad consensus.

Review pointers and queries included:

- The use of the word ‘innovation’ — does it invite ambiguity?
- The role of philanthropy — is it always ideal for high levels of innovation?
- The factor of political support for DPGs — does this find relevance in our framework?
- The financing of open-source code software — can it be as effective as financing for high-quality proprietary technology?

Case Study Selection: Why Health, Payments and Governance Matter

In order to gain a layered perspective of funding, we appraised differing sectors such as healthcare, governance and payments. The following case studies (with factors that bolstered their selection cited), were picked from these sectors:

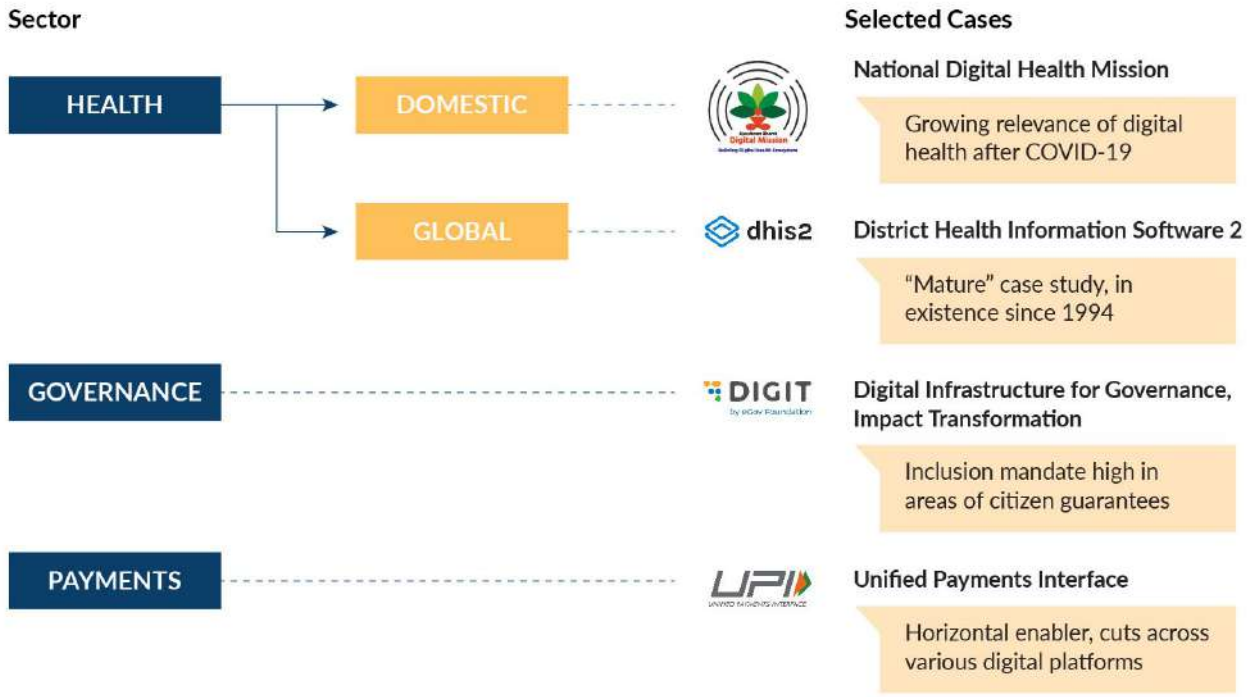


Figure 1. Structural value of sectors, proposed case studies and relevance

Through in-depth appraisal of these cases, we seek to understand the comparative ecosystems of funders, the responsibility each bears for the DPI, accepted norms of funding, and aspirations around their future importance.

NHA—ABDM

Led by the National Health Authority, the **Ayushman Bharat Digital Mission** (ABDM) is the Indian state's scheme for the digitisation of healthcare services, which includes health facility data, individual citizen data and insurance claims portals, among other information.

Key aspects:

- Announced in August 2020.
- Aims for "hassle-free method of accessing and sharing your health records digitally."
- Seeks to contain open standards of creation (open-source, open API), interoperability, and "Privacy by Design."

While the policy documents and proposals around the NHA and ABDM emerged as early as 2018, it is in the context of COVID-19 that digital healthcare services and digital public infrastructure become crucial for populations to avail of safe and convenient access. Given the population size that ABDM seeks to cover and its commitment to doing so through open standards of creation, it matches the criteria as a DPI for assessment.

NPCI—UPI

Incubated under the National Payments Corporation of India (NPCI), the **Unified Payments Interface** (UPI) is a supportive digital infrastructure capable of bearing various applications (e.g. Google Pay, PhonePe) that facilitate peer-to-peer transactions as well as transactions related to goods and services. It involves five entities on its digital platform: the payer, the receiver, their respective banks and the NPCI.

Key aspects:

- Launched in 2016.
- "Powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood."

- Removes the hassles of paper currency and streamlines the payment process.
- Government and private sponsors.

UPI has been supported innovationally and financially by the banking ecosystem in India, which has considerably more experience in digitisation than several other sectors of the economy. This, coupled with the highly configurable and widespread nature of the DPI, makes UPI a formidable case study in population scale infrastructure.

eGovernments Foundation—DIGIT

Created by eGovernments Foundation, a non-profit funded by Nandan Nilekani, Omidyar Network India and other philanthropies, **the Digital Infrastructure for Governance, Impact and Transformation** (DIGIT) aims to digitise "interactions", such as tax filing, utility installations and the like, between citizens and state bodies.

Key aspects:

- Began development in 2016.
- Aims to "catalyse urban development for greater good."
- Partners with city administrators, civil society, state governments and private developers — generates many funding relationships.
- For providing open-source, configurable solutions for quicker implementation, accountability, transparency.

DIGIT represents an experiment in partnering philanthropic funding with non-profit organisations, while roping in state capacity but not necessarily financing. Additionally, the involvement and support of private actors makes the infrastructure a greatly representative ecosystem of actors. It thus informs our research in terms of the ideal combinations and partnerships between various types of funders, especially in services that are crucial to public functioning such as urban governance.

HISP—DHIS2

Spearheaded by the Health Information Systems Programme at the University of Oslo (UiO), the **District Health Information Software** (DHIS2) is now supported by a variety of global donors such as PEPFAR (US President's Emergency Plan for AIDS Relief), The Global Fund to Fight AIDS, Tuberculosis and Malaria, and the Norwegian Agency for Development Cooperation (Norad). It is the UiO's digital infrastructure and presents a set of tools that enable a health management system, making health data configurable for a variety of services such as immunisation, COVID-19 surveillance, and even for agricultural and educational use.

Key aspects:

- Launched in the mid-1990s; piloted in South Africa and then implemented in different countries.
- "Free, open-source, fully customizable platform for collecting, analyzing, visualizing, and sharing aggregate and individual data."
- 73+ countries covered by DHIS2 operations.
- Funded by various global philanthropies and organisations, covers health, education, and other developmental domains.

Developed in the 1990s, DHIS2 is considered a mature open-source platform and ecosystem. Spanning decades of sector growth and population cover, it may hold important lessons around long-term financing, key issues with sustaining international digital ecosystems and insights into the roles of bilateral and multilateral funders.

Playbook Approach

The Universe of Funding

A crucial part of funding is recognising the multi-player feature of connection. Taking a wide view of ecosystem contributors means focusing both on those who fund operationally, and those who contribute in non-fundable ways. It is then important to understand where each of these entities best serves the interests of open digital ecosystems, and also where they may cause harm through their involvement. Finally, a study of these actors can also lay bare their particular forms of contribution, be these regularised infusion of funds or innovative mechanisms to target specific outcomes.

Figure 2. Components of the goods and infrastructures funding universe

The Basics of a Playbook

With a clearer picture of the funding ecosystem, it is necessary to explore approaches that fit capabilities and account for specific limitations harmoniously. These capabilities could relate to:

- Innovating at the developmental stage;
- Deploying in a sustainable format;
- Fostering partnerships and trustworthy environments for other entities;
- Maintaining feedback loops for refinement purposes;
- Overall governing of the ecosystem to ensure cohesion and best practices.

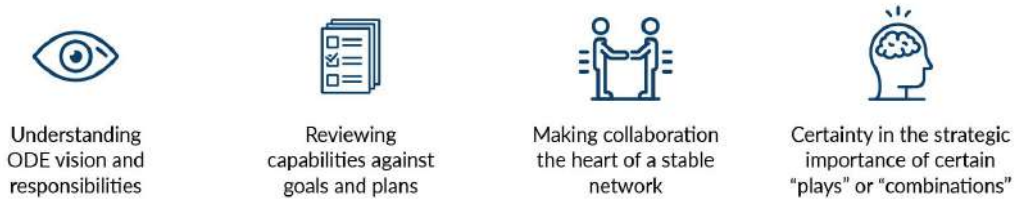


Figure 3. Components of a 'playbook'

A Financing Playbook

Transforming the study into a playbook structure yields:

- An infrastructural funding ethos that guides funders to a common goal;
- A partnership-led approach that guards against lapses in coordination;

- A map of the entire landscape of players, envisioning their funding capabilities through a clear view of ecosystem needs, funder needs and funding blind spots;
- A decentralised assortment of innovative financing mechanisms and modes that can formalise the digital infrastructure financing patterns that currently exist.

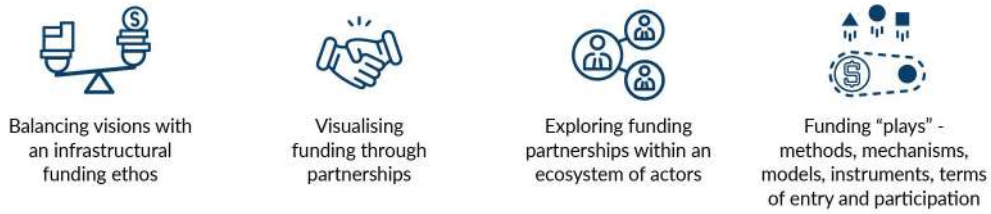


Figure 4. Possible results from combining a playbook approach with a funding universe for DPIs

A playbook approach allows us to produce results in terms of who must be involved and in what manner when it comes to effective development, deployment and maintenance of digital public infrastructure.

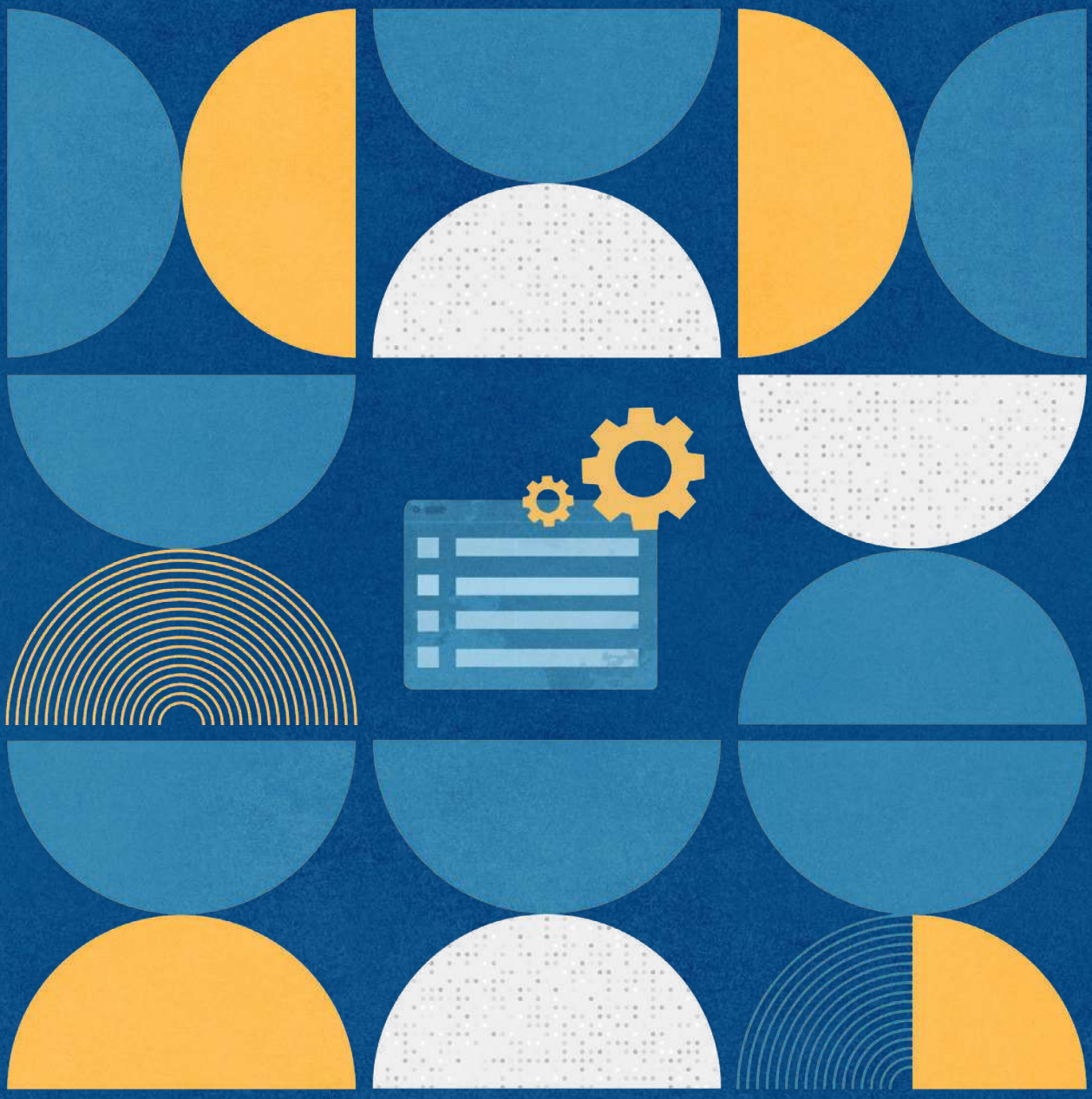
The end results of our enquiries were aimed at fulfilling two functions:

1. Revealing a comparative view of funding with existing or suggested forms, and hence providing descriptive knowledge around the qualitative and quantitative universe of digital financing and its possible trajectories.
2. Providing prescriptive knowledge in the form of a playbook; presenting research in an actionable format primarily for the use of a funding entity (public, private or philanthropic); revealing innovative financing mechanisms and "plays" for different actors.

This section covers the methods and methodologies associated with the study. The next section delineates our attempt to apply them to the specific case studies and to derive financing information alongside a juxtaposition of insights gathered from interviews and desk research.

SECTION 4

Case Studies



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Case Studies

This section outlines findings from the selected case studies. It reveals the visions of the digital infrastructures, the associated technologies, the available financing information and the different ways in which financing institutions contribute to the digital ecosystem. As we uncover information around these four cases, we are able to find commonality of public visions, similar interpretations of digital openness, and largely parallel aims of universality. Funding, however, takes on different and specific forms across the case studies; in particular, the financing ecosystems around these digital infrastructures contain unique combinations of financially "visible" and financially "invisible" or non-visible types of contribution.

I. Ayushman Bharat Digital Mission (Domestic Health)

About the DPI

The ABDM is the Indian government's innovation for creating digital highways for collection, use and transfer of health and healthcare-related data between stakeholders of a "national digital health ecosystem." This includes patients, healthcare providers, the state and various other entities such as developmental NGOs, associations and private health-tech companies.

Financing Actors

Led by the National Health Authority (NHA), a state-affiliated non-profit, the digital infrastructure seeks to achieve "universal

health coverage." The **NHA** derives its funds from the Union Budget, and is supported in its activities by **philanthropic** entities in knowledge creation and dissemination, by **civil society organisations** in bridging access and integrating citizens, and by **private** actors in creating and streamlining technologies associated with the ABDM.

Technology and Platform

The ABDM is to be made functional through five components:

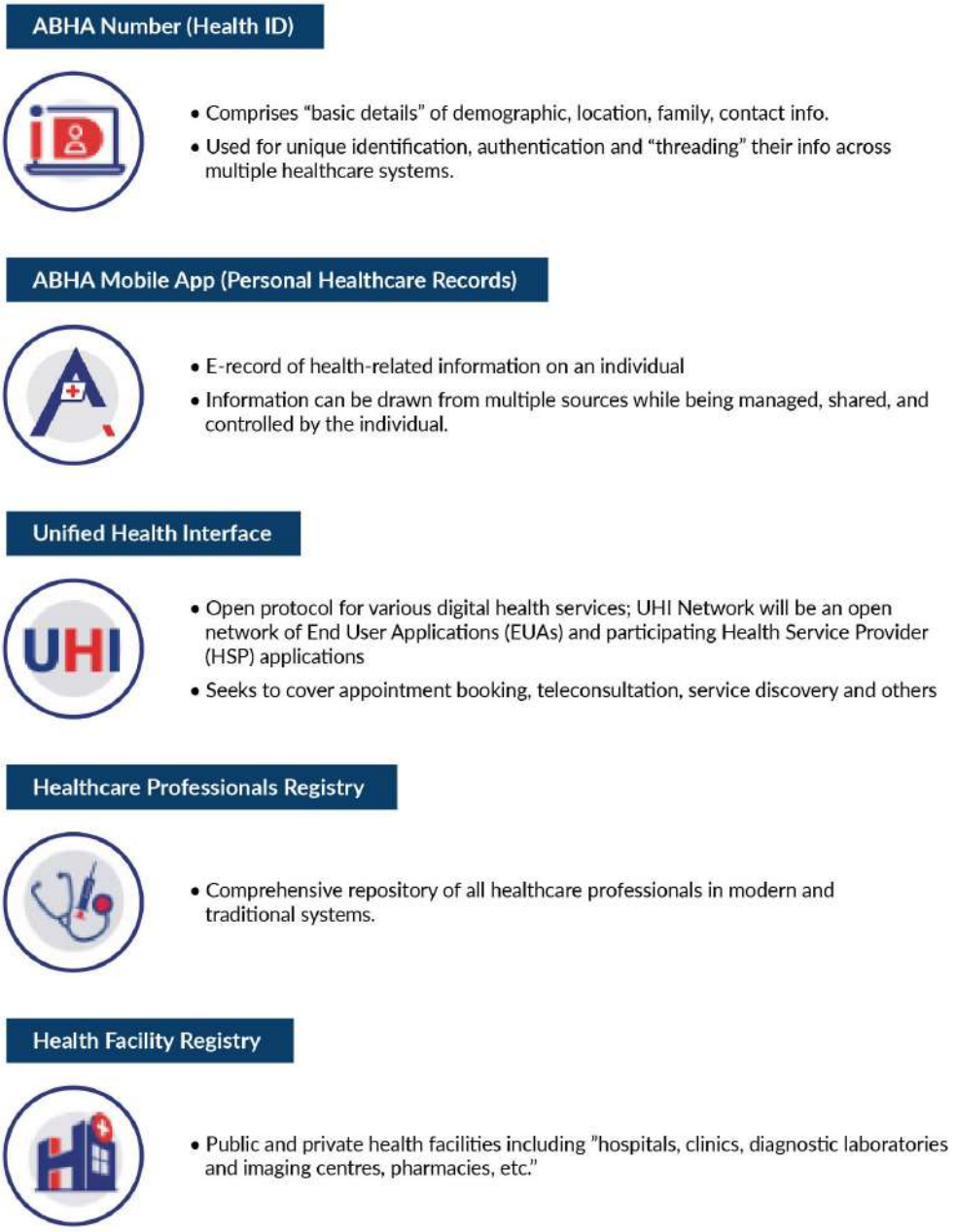


Figure 5. Components of the ABDM

Financing Information

Funding is envisioned as follows:

a. Support-based funding: The ABDM strategy document designates public funds as the base source of financing. It also names "support" expectations, such as Data Contribution and Integration, Leadership and Legislation, Implementation, Training and Capacity-Building, and Technological Creation.

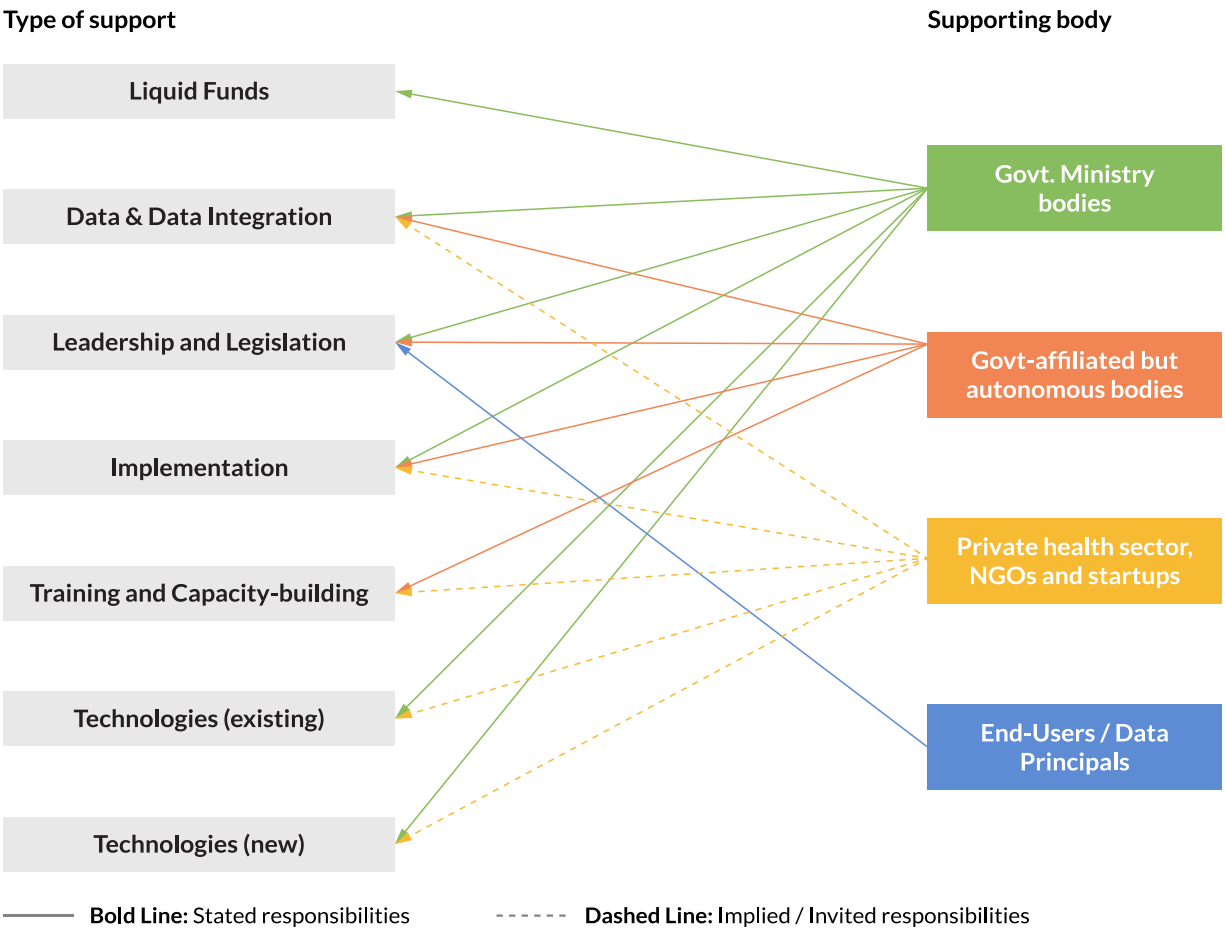


Figure 6. Support expectations mapped to supporting entity in ABDM

These responsibilities or support expectations are divided between four identifiable entities, which are presumed to direct resources such as funding towards fulfilling these expectations. These include ministry bodies like the MoHFW (Ministry of Health and Family Welfare) and the Ministry of Finance, government-affiliated but autonomous bodies like the NHA and NITI Aayog, private sector facilities, NGOs and startups, and end-users or "data principals".

b. Core-Common-Reference funding: To divide creation and deployment responsibilities, ABDM technologies are to be determined as either Core (government-owned, -approved and -financed building blocks), Common (built and operated by the government as well as private entities in a way so that it is interoperable) or Reference technologies ("demonstrators" of innovation, simplifying user accessibility, knowledge and control).

Financial and Non-Financial Break-up

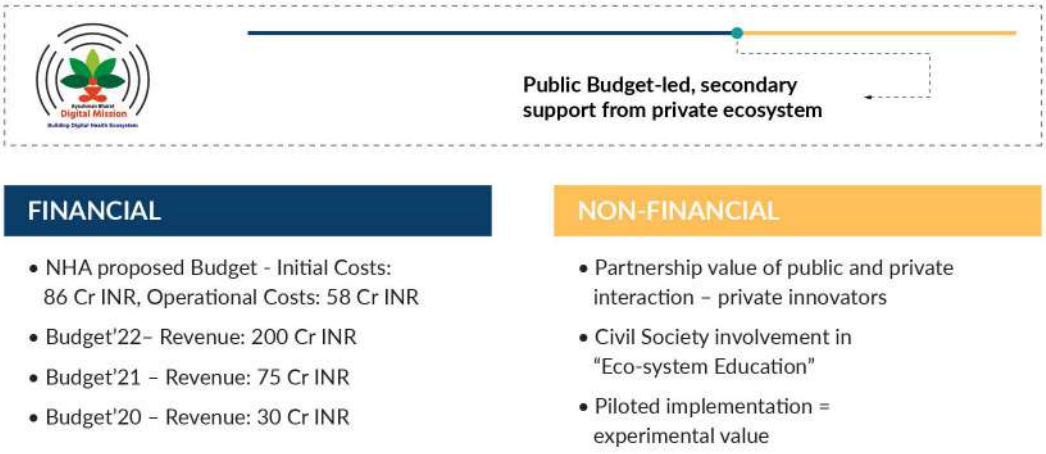


Figure 7. Division of financial and non-financial forms of contribution to the ABDM

Takeaways

- ABDM is still in a nascent stage of development; possible disruptions to traditional range from less paperwork and fewer health risks to greater convenience and more seamless healthcare data flows.
- Respondents noted that "one-time" intervention tends to exist where the state funds innovation as an act of kick-starting an ecosystem, expecting autonomous digital agents and developers to start using it. The result is often that participation remains far too unsubstantial, leaving behind a "single government instance" with no scope for transcendence into public infrastructure.
- Thus, it becomes apparent that it is crucial to balance state

interests and expectations with clear relationships with private actors to ensure that digital infrastructures like ABDM do not become stalled innovations. Further, it is important that the state identifies where it need not intervene, and instead allow the private sector to flow in its investment.

II. District Health Information System 2 (Global Health)

About the DPI

DHIS2 was created in 1994 by researchers at the Health Information Systems Programme (HISP) at the University of Oslo (UiO). Considered "the world's largest health information management system", the software is designed to collect, analyse, visualise and share aggregate and individual data. It now also serves functions in education and agriculture. Sri Lanka has notably used the platform for COVID-19 surveillance, and other countries participating in DHIS2 too have been able to report their data to the large community of nations (Zhao, 2022).

Financing Actors

DHIS2 received initial support from HISP, an **academic programme** housed within UiO. It continues to receive logistical support from the HISP and its different branches in deploying countries (e.g. HISP Uganda, HISP Tanzania). DHIS2 is continually funded by **developmental** and global **philanthropic** entities. **Private global technology developers** have granted DHIS2 licences for its technological operation

Technology and Platform

DHIS2 provides "generic [tools] rather than a pre-configured database application", which makes the system highly interoperable and personalisable. The technology focuses on the ability of data to transform, flow, fit and configure for persons at each level of data collection. Health-related data becomes precise, personal, validated and verified.

Figure 8. Features of DHIS2 technology

For administrating bodies and for community health purposes, the interface of DHIS2 allows easy visualisation:

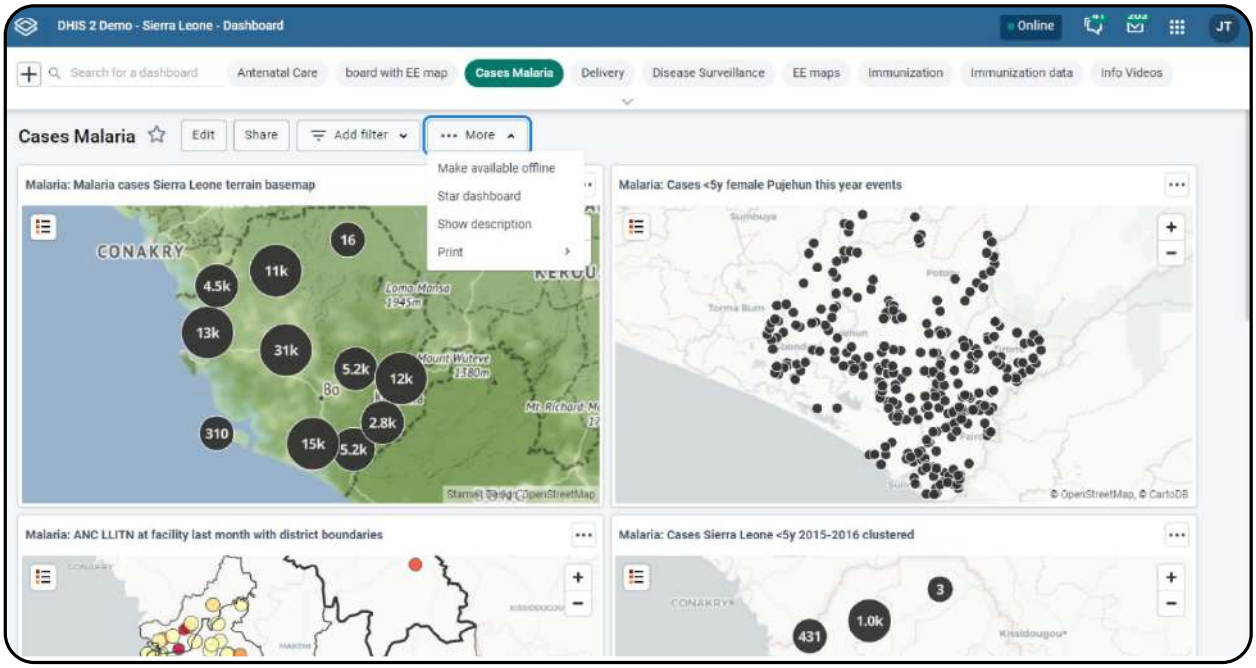


Figure 9. DHIS2 dashboard for Sierra Leone

Financing Information

DHIS2 receives diversified support through:

a. Philanthropic and developmental funding: DHIS2 operations are funded by multilateral entities such as UNICEF

(United Nations Children's Fund), GAVI (Global Alliance for Vaccines and Immunisation), The Global Fund and WHO, bilateral entities such as PEPFAR, Norad and the CDC (Centers for Disease Control and Prevention), and philanthropic entities such as the Bill and Melinda Gates Foundation. In 2022, these entities together support HISP in UiO through an endowment of over $23 million.

b. Technological and creation support: DHIS2 has been granted licences by Browsterstack, YourKit and Netlify, who are 'software sponsors'; additionally, the programme is the culmination of the University of Oslo's HISP Centre's "20-year longitudinal participatory action research project that has its origins in the Scandinavian tradition of workplace democracy and South African anti-apartheid activism", lending academic effort and socio-political credence to its ongoing mission of technological collaboration.

Financial and Non-Financial Break-up

Figure 10. Division of financial and non-financial forms of contribution to the DHIS2

Takeaways

- Donor money can bring "transaction costs, oversight, and projectised financing" — this leads to overly-specific outcomes, bureaucratic stagnation and staggered communication between giving and receiving entities, vested interests that

may compromise long-term goals and unsustainable timeframes for financial infusions.Fragmented investments are poorly handled by national-provincial governments — often they struggle to combine different sources of funding, or compromise one source to patch up for another. Additionally, funds may be directed towards what are considered more pressing national interests by the state.

- These funds also tend to carry or emerge from research interests and specific data collection purposes, leading to technology being created with heavy emphasis on data. Thus, monitoring and accountability become overly funded (and guided) by international funding entities, leading to core and implementing responsibilities also being overly donor involved. This has repercussions for the national-provincial ability to prioritise the infrastructural growth of digital ecosystems and platforms.
- Financing by sector, it is noted, often disincentivises a long-term investment in national-provincial progress, as it ignores the interconnectedness associated with that sector and other sectors. For example, health-related outcomes may be found to be highly correlated with gender disparities, but funding does not always account for specific targeting of such interconnections.
- Given the wide ecosystem of global funders, it is necessary to create terms of engagement that prioritise “client-oriented” funding, not “donor-oriented” funding. Funder forums and regular intellectual exercises can enable funding interests to align, avert overlap and avoid compromise of infrastructural growth of the receiving entities.
- Some funders like Norad additionally carry a non-political, non-coercive reputation due to Norway’s involvement, a reciprocal learning focus, pro bono action and teamwork infrastructure. Another suggestion was to explore subsidisation models with infrastructures in wealthier countries, where the use and maintenance of health infrastructure is easier for the state and conducive to citizen contribution.
- Experimenting with how such infrastructures can then be “cross subsidised” for use in other nations may also entail a coming together of different country entities and different financing institutions.

About the DPI

UPI seeks to "[power] multiple bank accounts into a single mobile application", making banking processes portable, seamless and unified. It aims to enhance "financial inclusion", a new power of citizens to "participate and transact in the digital economy" [India Stack], and the integration of India with futuristic mindsets and environmentally-conscious (paperless) technology.

Financing Actors

UPI is developed by the National Payments Corporation of India, an allied non profit of banks operating in India and the RBI (Reserve Bank of India). UPI also benefits from the individual leadership of 'Technology Advisers', and individuals like Nandan Nilekani as an 'Adviser of Innovations and Public Policy.' Additionally, private players are the chief innovators atop the infrastructure.

Technology and Platform

The UPI technology connects all actors in a transaction flow, demonstrating the success of a "5-party mode" over the traditional "2-party mode", signalling significant disruption in innovation.

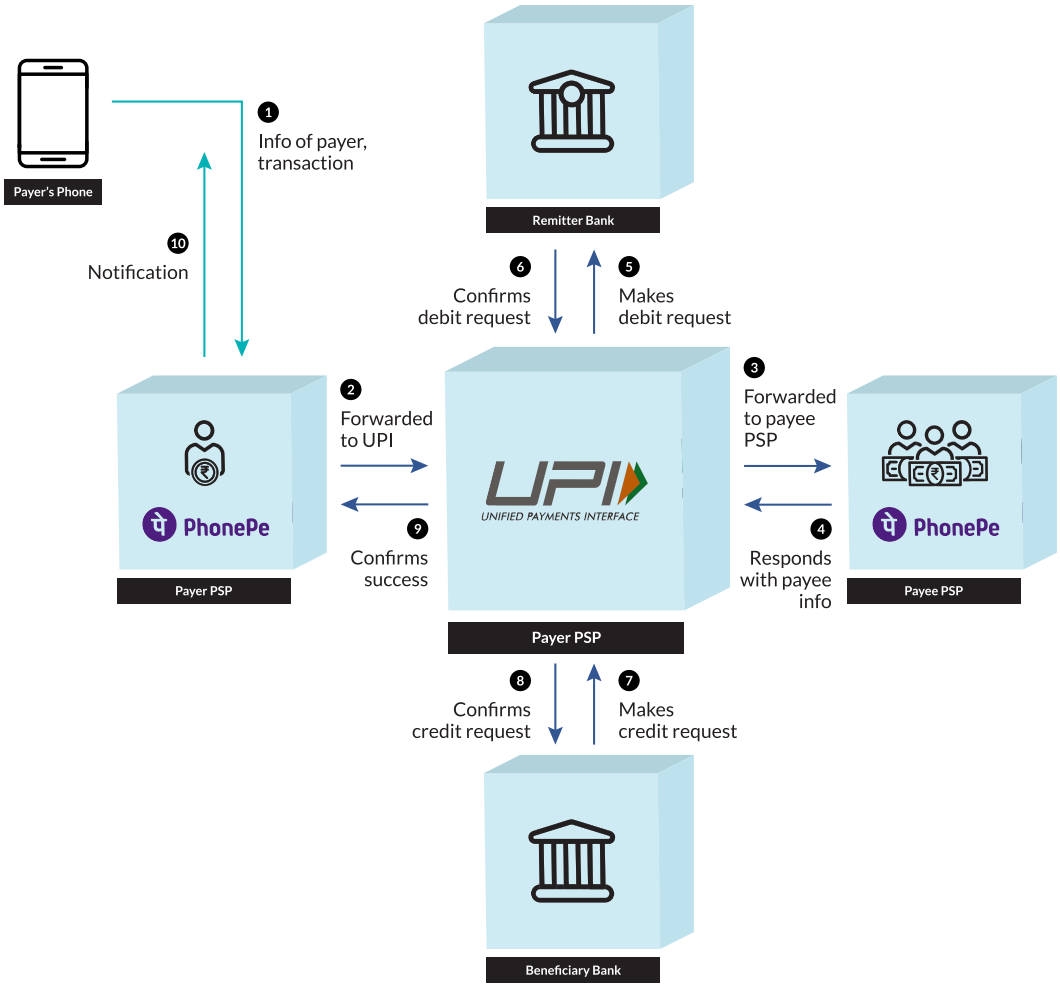


Figure 11. Visual representation of UPI's technology (inspired by DICE's representation)

Financing Information

a. Creation, shareholding and maintenance: The NPCI is an alliance of the Reserve Bank of India and the Indian Bank Alliance, making banks the primary shareholders in its activities. It is solely responsible for ownership, regulation, approval of ecosystem players, security, audits and data retrieval. Specifically, shareholding is carried out by 66 banks from national banks, foreign banks, private sector banks and Indian multinational banks.

b. Leadership and advisory support: The success of UPI may be partly due to the advisory capacity contributed by leaders in the technological industry like Nandan Nilekani, and individuals in the academic space such as N.L. Sharda, and experienced officials in the digital banking space such as R.B. Barman.

c. State development, deployment and legitimation:
The state has contributed to UPI in three ways:

i. Development of reference applications: The state has created the BHIM (Bharat Interface for Money) app on the UPI infrastructure, centring the goals of a cashless and green economy.

ii. Deployment and adoption: The state has announced measures such as the PIDF (Payments Infrastructure Development Fund) to incentivise the integration of point of sale infrastructure (physical and digital) in Tier-3 to Tier 6 towns in India. Another move is the government's incentivising of UPI payments by paying a percentage of transaction costs to facilitating banks for each use of UPI. (Shetty, 2021)

iii. Legitimation by use: The state provides UPI with a degree of legitimation by integrating it with its own technologies, such as the ABDM. Legitimation may serve to increase citizen trust in UPI.

Financial and Non-Financial Break-up

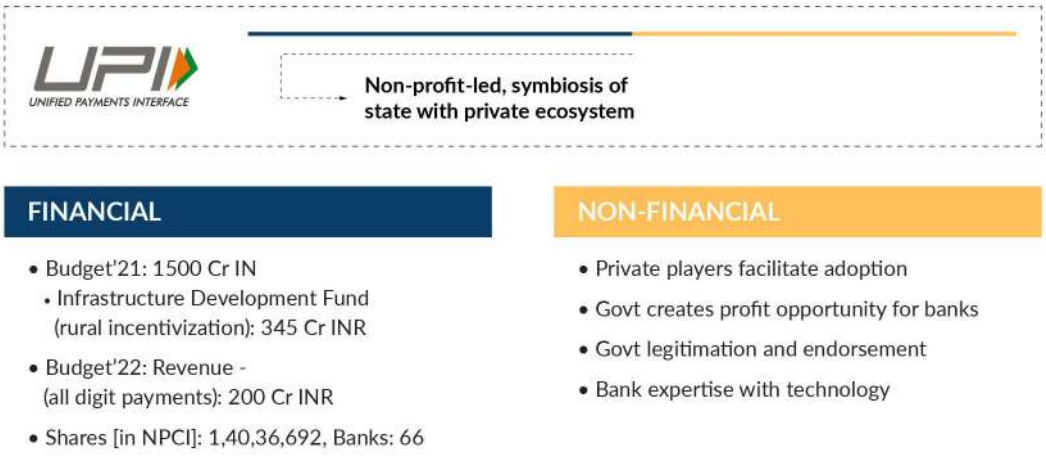


Figure 12. Division of financial and non-financial forms of contribution to the UPI

Takeaways

- The combination of different banks at the shareholder level signals a wide ecosystem of interests. Further, with nationalised banks making up over half the total shareholding, there is scope to enable a public goods approach around UPI.

- Banks have also been at the forefront of digitalisation for decades, equipping the sector with experience. It is additionally believed that due to the secondary role played by the government, design thinking and innovation are less staggered and more freely explored by non-profit organisations like NPCI and private technology developers.
- Additionally, the growing community of private fin-tech innovators in India is ready to experiment with UPI's technology, offering a wide range of digital platforms upon the infrastructure such as Google Pay, PhonePe, BharatPe and so on.
- To conclude, UPI as a DPI is well supported by independence in creation, healthy risk-friendly leadership, strong state support and decades of private experience.

IV. Digital Infrastructure for Governance, Impact and Transformation (Urban Governance)

DIGIT by eGov Foundation

About the DPI

First developed in 2016, the Digital Infrastructure for Governance, Impact and Transformation (DIGIT) aims to "catalyse urban development for greater good", wherein it monitors and researches the interactions that are most relevant for urban governance, and builds digital infrastructure around those interactions.

Financing Actors

The **non-profit** entity behind its creation, eGovernments Foundation, pledges to partner with city administrators in their efforts to "leverage technology for better service delivery and enhanced productivity". The organisation receives a diverse range of financially visible and non-financially visible support from partners in domestic and international **philanthropies**, the Indian **government, the private** sector, and the **non-profit** and **research** sectors.

Technology and Platform

Under the categories of 'Revenue', 'Citizen', 'Administration' and 'Expenditure', DIGIT innovations cover various interactions between citizens and the state. With its focus on interactions, DIGIT technology strongly emphasises the resolving of blockages, delays and inefficiencies that tend to plague the relationship between actors of the state and citizens. This may include long wait times to avail of a public service, such as a simple water connection. Other hindrances such as repetitive identification protocols and high maintenance costs of paperwork also contribute to the overall inefficiency of government processes for public service delivery.

Figure 13. Features of urban governance covered by DIGIT's technology

DIGIT Urban Stack

DIGIT's Urban Stack forms the basis of its infrastructure, carrying reference applications, open APIs, and structured dashboards in order to enable entities from all sectors — private, public, philanthropic, non-profit — to operationalise it for their own purposes. In staying with its "public good" classification, DIGIT's stack is open to all interested parties without a fee or barrier.

It also emphasises its feature of a "level playing field", inviting innovators and collaborators with its open standards of creation and integration and encouragement of "locally-developed solutions". DIGIT also integrates a "mobile first" approach in order to accommodate the primary use of mobiles by citizens.

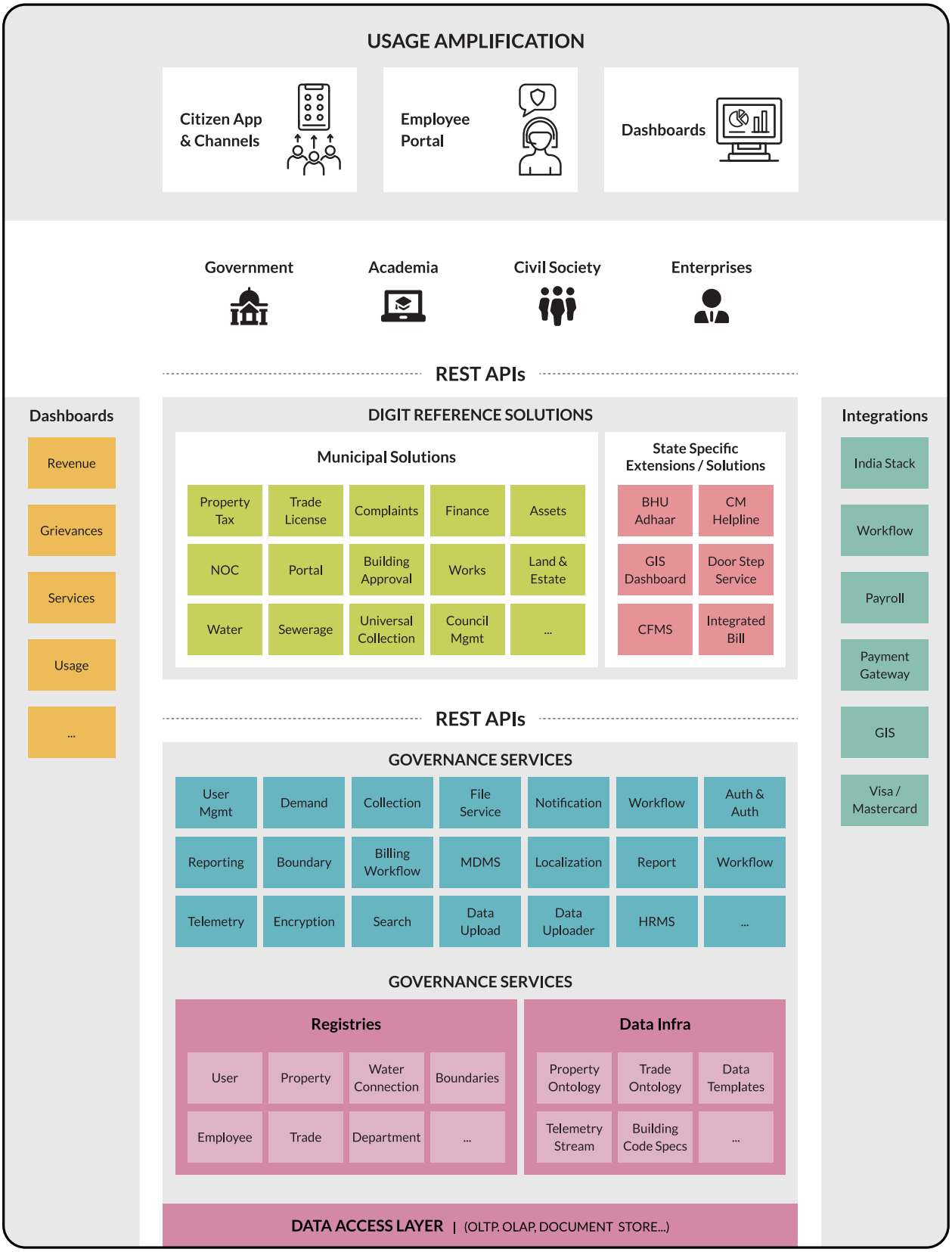


Figure 14. Digit Urban Stack Architecture

a. Philanthropic funding: While the creation of DIGIT is guided by a non profit, the funding that supports eGovernments Foundation is largely philanthropic; benefactors include Tata Trusts, Omidyar Network India, the Bill and Melinda Gates Foundation, and Nandan Nilekani.

b. Partnership value creation: Additionally, eGovernments Foundation's work is advanced by its highly collaborative attitude towards other institutions. Through what it calls its innovation ecosystem, eGovernments seeks to "foster the creation and development of ideas and [distribute] the ability to resolve societal challenges collaborating with platform, policy and civil society actors". It achieves this through its 'Samaaj-Sarkaar-Bazaar' network, wherein it matches what DIGIT requires with what eGovernments can offer to different sectors and organisations. Many of these partnerships are created through non-financial MoUs.

i. 'Samaaj' or Society: Partnerships with civil society organisations such as Janaagraha help to understand citizen access to municipal service, improvements to civic work and greater efficiency. Further, academic partners such as Aapti Institute, Centre for Policy Research and Ideas42 serve to build on the "knowledge & perspectives on equity, access, digital exclusion, and civic participation". eGovernments Foundation leverages these partnerships for greater understanding of policy environments to create solutions based on the research outcomes.

ii. 'Sarkaar' or Government: There are also partnerships with state entities such as Ministry of Housing and Urban Affairs, National Institute of Urban Affairs, the governments of Odisha, Andhra Pradesh, Uttarakhand, Puducherry, and Uttar Pradesh for "program design, policy and process change, and capacity of state implementers for adoption and sustainability". eGovernments Foundation collaborates with the central and state governments to "evangelize public digital platforms, establish national standards, and design policies and programs to accelerate the adoption of open digital platforms".

iii. 'Bazaar' or Market/Industry: eGovernments plays a "convening role", bringing in commercial entities and non-profits to collaborate and build greater solutions on the DIGIT platform. Through "solution workshops", implementation "playbooks", training, certification and in-market participation, eGovernments supports the 'Bazaar' component of its innovation ecosystem. It also names 'Technology Partners' such as Bharat Electronics, Ernst & Young, Pricewaterhouse Coopers and SRIT (an e-governance and ICT Systems).

Financial and Non-Financial Break-up

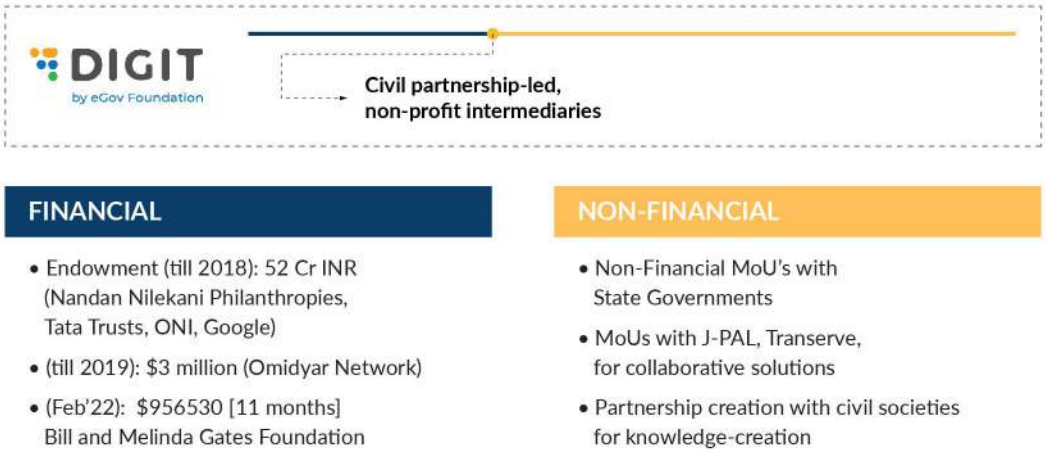


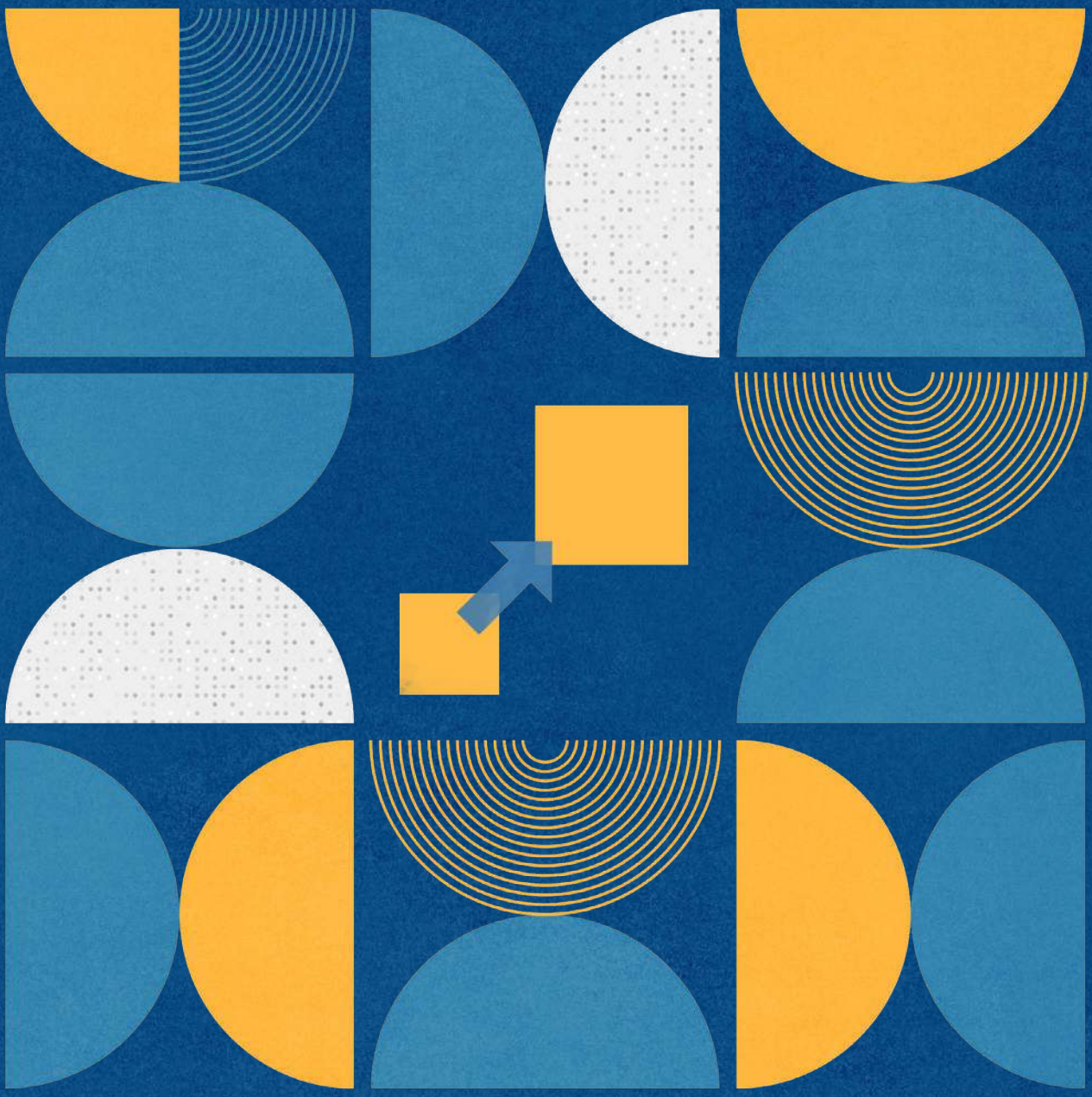
Figure 15. Division of financial and non-financial forms of contribution to the DIGIT

Takeaways

- A philanthropically-backed non-profit like eGovernments Foundation is trusted and talented in brokering partnerships, in making sure that even the commercial sector can be enveloped into the digital ecosystem for a service like governance, and in "internally changing the mindset of policymakers" to accept its activities and guidance. The strength and vision of public funding serve better to tackle the scaling up and maintenance stage of digital infrastructure. Public funding must also strive to improve internal state capacity and integration, so as to eventually eliminate some of its dependency on non-public actors.
- According to respondents, true innovation in digital goods and infrastructure lies in "pockets of well-meaning people", and individuals with "altruistic impacts but high talent in the technological sector." They also noted that such entities were rare, as were entities like eGovernments Foundation. Thus, there is a need to incubate a hybridity of talent and social mindsets in digital innovation.

SECTION 5

Financing Patterns, Takeaways & Actions



SECTION 5

Financing Patterns, Takeaways & Actions

The previous section demonstrated how the selected DPIs were financed. Funder types, financing instruments and opinions on existing financing structures were culled from these deep dives, as well as an understanding of financial and non-financial support. Based on the insights from the section, case studies and the interviews (see Annexures), now we attempt to articulate a few general principles around financing. The current section also acts as a bridge between the empirical findings and the playbook.

First, we explore the general beliefs and capacities that inform action in the financing DPIs. We present the takeaways in terms of ideal funding actions. Based on interviews, peer review and desk research, we identify these actions as implementational or innovational. **Implementational action refers to the active capacity to effect the processes, programmes and policies stipulated by the digital infrastructure. Innovational action refers to the process of evolution around technology, i.e., the level of technological refinement undertaken over time as well as the potential for disrupting other pathways in the sector.**

We suggest a rough terminology of phases that can allow funders to understand the various stages in a DPI. We then map the presence of implementational action and innovational action along the axes of a 2x2, keeping in mind these phases of funding.

Action around Implementation

From the case studies, we see that funders considered the **nature of implementation** at play. For example, DHIS2 was and is well served by developmental and philanthropic entities that seek to bring better health outcomes to underserved parts of the world, raising the profile of inclusive and socio-economic design and impact. We consider this partly a function of implementation, where infrastructural and institutional capacity to drive effect must be further improved. Additionally, with a DPI such as UPI, where the pressure to envelop and impact a large number (i.e. the Indian population) of users for the basic lifeline of payment is high, it is important for the government to step in at stages of implementation.

Action around Innovation

Second, funders appear to be guided strongly by the **effort around the innovation process**, which relates to a) the novelty of introducing technological infrastructure in a particular sector and therefore, patience regarding trial and error, and b) the level to which existing pathways in that sector would be disrupted by innovation, and thus the verified quality of such technology. For instance, ABDM aims to be disruptive in a new sector, in that it aims to replace old practices with entirely new ones—involving factors such as travel time to avail of healthcare, costs incurred for travel, health risks incurred by travel, the plethora of paperwork that surrounds insurance and tests, ease of transferability of health data between healthcare entities, and the relationship between patients and physicians transitioning from physical to digital. The innovational process and appetite for action are major in this case, as in the case of DIGIT, which has been developing and been under innovation for nearly 20 years under eGovernments, and has also aimed to radically overcome the inefficiencies, blockages and delays that often plague crucial urban governance interactions.

Takeaways

Based on the case study material and viewpoints of interviewees, a financing playbook can be made operational by assessing the best pathways for a particular funder, in terms of what they are most able to support and the best use of their funds. This approach also implies that there are areas less ideal for a particular funder to serve, given that others may be more appropriate, and so financing clash is minimised.

After understanding the two types of action that tend to be in play in financing, we arrive at a general picture of the existing scenario and suggest the following actions by funders:

Low action in innovation can be supported by **public funding** due to decreased volatility of achievement, whereas **high action in innovation** may be developed and supported by **philanthropic** and experienced **private** entities.

Low action in implementation can be met with **private or philanthropic** funding, whereas **high action in implementation** can be supported by **public funding**, due to higher stakes in achieving success for a greater population or in the case of under-equipped experience.

Adoption must be driven and subsidised to the greatest extent; the role of the state becomes important in deploying for differential local impact.

Maintenance and regulation must be carried out by entities with legal or social mandates for these tasks; the role of the private sector must be restrained.

Phases of Funding

Based on the above takeaways and on previously modelled divisions and cycles of funding (such as the lifecycle mode), we identify three key phases or tasks for DPI funding that encompass all likely human and technological needs and capacities that financiers and contributors may consider:

a. Development and Deployment: Responsibility in this phase relates to the design, creation, testing, and instantiation of digital technologies. It may be dominantly

dedicated to one entity, such as the state in the case of ABDM, or it may be collaboratively determined, such as in the case of DHIS2 or DIGIT and their philanthropic funders.

b. Adoption and Cooperation: Responsibility in this phase relates to the integration of citizens/test users, human capacity building, training and bridging of technology between different entities, such as the funding and receiving entity, or between like-minded organisations for enhanced knowledge networks and societal outcomes. For instance, it may apply to incentivising private actors to encourage more citizens to use infrastructure such as in the case of UPI, or perhaps the drive towards non-financial MoUs carried by eGovernments to partner with state entities as well as non-profits such as J-PAL.

c. Maintenance and Regulation: Responsibility in this phase relates to long term operational needs, governance and standard-setting, grievance redressal and ownership associated with the digital technologies. This could be centralised, such as in the case of ABDM and state ownership, or could be understood as more decentralised as in the case of UPI, with non-profit ownership and governance, and with private, public and multinational stakeholdership.

Putting it Together in a 2x2: The DPI Financing Playbook

Having consolidated the main vocabulary around funding actions, funding actors and phases of funding responsibility, we now attempt to map them into a 2x2 framework, assigning existing as well as ideal quadrants of operation.

DPI Quadrants of Financing

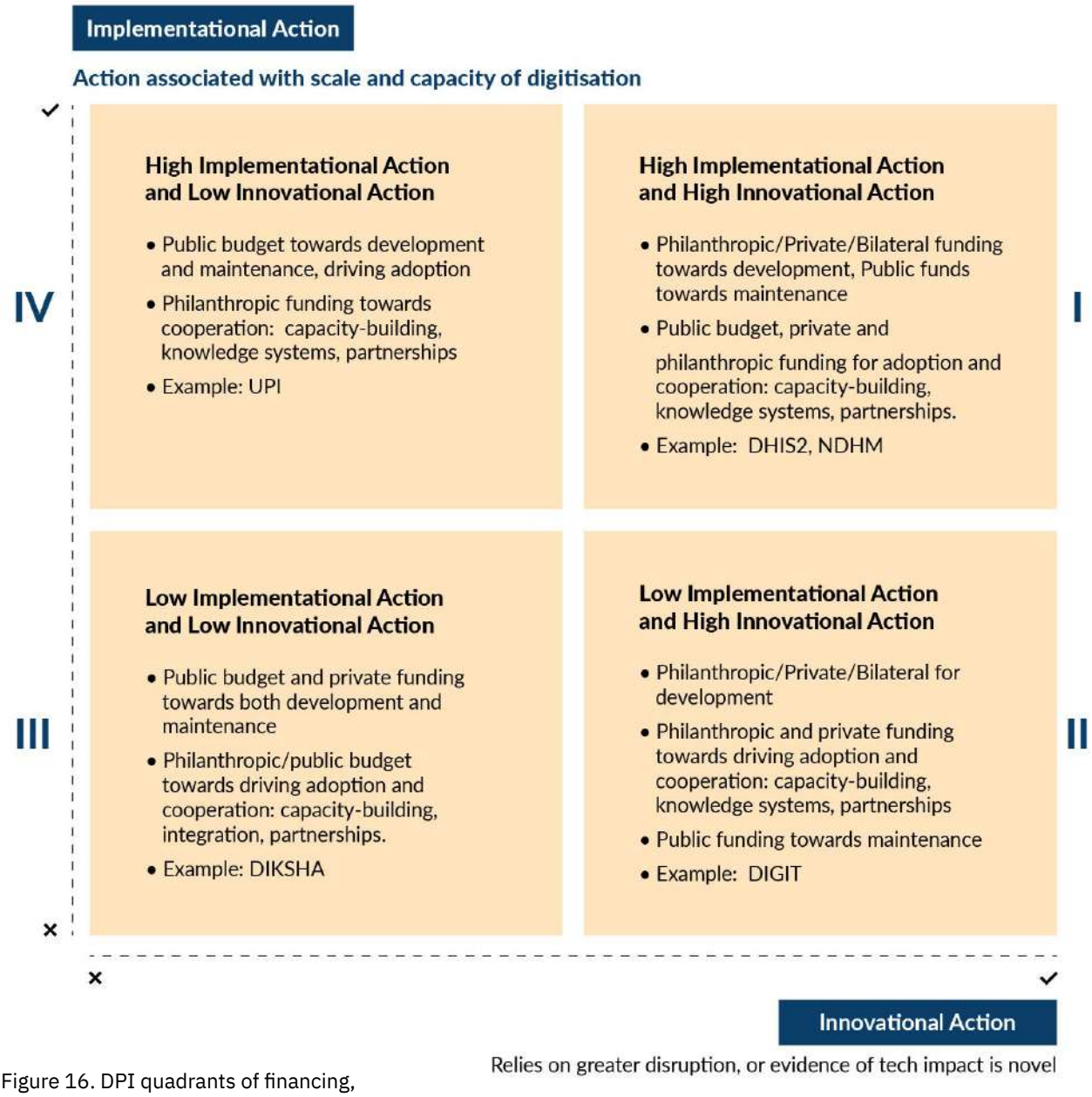


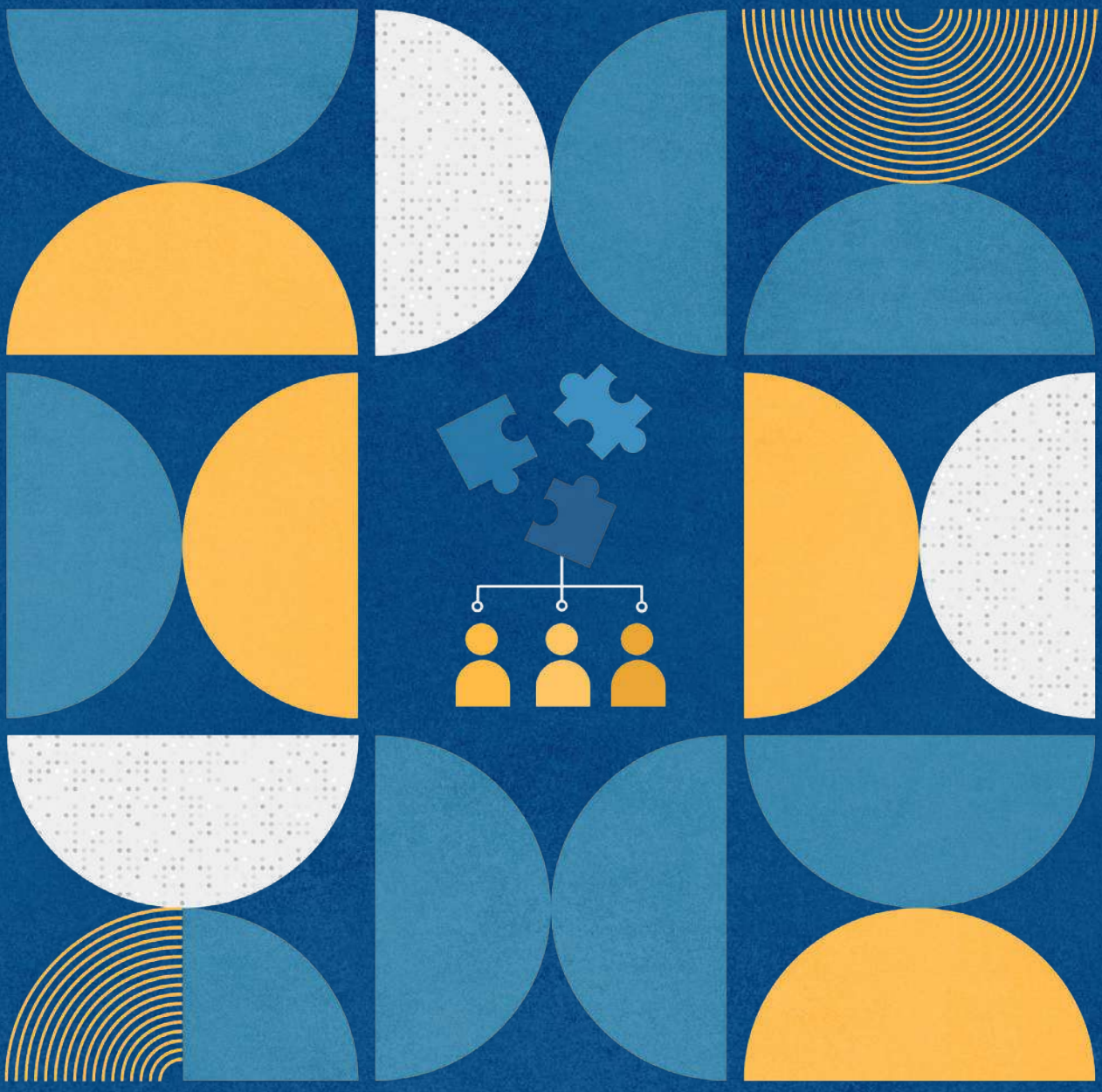
Figure 16. DPI quadrants of financing, subject to interviews and research

In this section, we distil action areas for financiers, as well as understand how those actions together determine the role that financiers may play in digital public infrastructures. Implementational action and innovational action serve as parameters of operation, where private, philanthropic and public funders may all have particular approaches to sectors and DPIs. In the following section, we seek to explore an instructive manifestation of these actions in funding through a playbook.

SECTION 6

The Playbook

Types of Funders, Funding Instruments & Innovative Financing Tools



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The Playbook

Types of Funders, Funding Instruments & Innovative Financing Tools

The preceding section presented a final determination of parameters around funding digital public infrastructures: innovational action and implementational action. In order to visualise pathways based on this determination, we now present a playbook through which funders may identify their position and priorities and match them with the funding needs of infrastructures, based on examples and suggestions.

This section begins with a broad categorisation of funder types as well as funding types, following which the playbook is set out. It then proffers innovative financing mechanisms that embody decentralised and impactful financing outcomes, which can form a part of the repertoire for various institutions.

Funder Types

Our case studies signal a wider variety of actors than the public-private philanthropic categorisation would allow taking note of. Academic institutes, science-based non-profits and knowledge-disseminating arms of the government play active roles in contributing to DPIs. While funding is chiefly understood as flowing from the public, private and philanthropic treasuries, even if they flow into these other entities it is important to consider the invisible or non quantifiable involvement that they bring to digital ecosystems; for example, DHIS2 may be philanthropically funded but bears research interests and the socio-political impetus of academics at UiO that continue to shape the technology. This particular type of involvement is difficult to replicate or, at least,

finance purely through funds. Hence, we attempt to include them in the financing actors bracket so as to visibilise and call attention to the (often invisible) roles that non-profits, academic institutes and organisations play.

Thus, the financing ecosystem broadly encompasses:

a. Public: Governments, at national or local level. Actors that are authorised by law and government schemes to be accountable around financing to citizens.

b. Private: Technological and non-technological entities that exist outside of public funding but carry out commercial and private activities.

c. Philanthropic: Organisations that generally serve as charities or to finance social and welfare goals. These can be domestic or international.

d. Bilateral and Multilateral: Bilateral agencies emerge in one country and finance projects in another country for social and economic progress. Multilateral institutions involve three or more countries that come together to finance and collaborate on issues of global development or priority.

e. Non-profit: An organisation that is not a business, and seeks to contribute/operate in the space of collective and/or social well-being.

f. Academic: An organisation or group (generally research-oriented) that is authorised by an official academic body, such as a university.

Funding Instruments

Our case studies and literature review reveal evidence of diverse funding: financial and non-financial. The former refers to a system of budgets, funds, grants and endowments; essentially, it is the quantitative value of contribution that is made publicly available. The latter refers to systems of partnerships, donated capacities, pro bono arrangements and indirect incentivisation. It is necessary to identify both types of funding in a particular sector to understand not just what is to be funded, but what cannot be simply achieved through funding. As some respondents noted, funding cannot replace vision, citizen trust and political will, as well as various other components that appear invisible to

the ecosystem. Accounting for various funding types is then crucial to unearth a qualitative approach alongside a quantitative understanding.

Below is an aggregation of funding instruments:

Figure 17. Financially and non-financially visible instruments

The Playbook

The final step in bringing the actions of funding to the fore is visualising their place in the trajectory of a potential funder. What is one's funding priority, where is one's funding priority and what could be the funding requirement?

Below is a financing playbook based on the lessons of the case studies and resulting principles; the quadrants refer us back to the 2x2 in the previous section, where one of whose quadrants applies to any funder. After a determination of that, we delineate an area of funding, that is, the required areas of attention in a DPI. Based on one's funder type, funder categories highlight where one is best suited to contribute, after which one sees a suggested avenue for funding. Finally, one notes a visual representation of the financial and non-financial division of instruments that is optimal and/or suggested by our respondents and study.

Guide to Playbook

Step 1 Evaluate the financing actions relevant to your particular contribution.

Step 2 Locate your quadrant of financing and discover your ideal role in development and deployment, adoption and cooperation and/or maintenance and regulation.

Step 3 View the financially visible and non-financially visible instrument that the framework observes as ideal.

Step 4 Review the innovative mechanisms that may apply to your financing actions.

Innovative Financing Mechanisms

Listed ahead are some mechanisms and instruments derived directly from the case studies as well as additional desk research. Beyond a system of budgets and grants, and systems of sharing resources and lending capacity, these mechanisms allow us to think of real manifestations of funding types, who practises them and how they target specific outcomes.

MECHANISM	DESCRIPTION	PROS & CONS	EXAMPLE	FUNDERS
Incentivisation fund	Fund for specific outcomes, e.g. for greater use by rural communities, disadvantaged	*Can incentivize actors from different sectors to take up welfare actions* *Limited instances*	*Payments Infrastructure Development Fund (PIDF)*	
Research-based fee structure	Funds through consent-driven access to collected data, etc.	*Financing in controlled manner, autonomy to data holder* *Costs can be disincentivising*	*e-Estonia's model for data solicitation*	
Status-centric funding	Funds in exchange for a specific non-financial stake, e.g. being a Tech partner	*May yield more holistic funder engagement and direct involvement* *Funder vested interests may complicate vision*	*Mojaloop, MOSIP, Mifos X*	
Social Impact/ Digital Penetration Bonds	Funds for supporting ODE activities, such as greater broadband access, last mile connectivity	*Can incentivize actors from different sectors to take up welfare actions* *Limited instances*	*ADB's Bond Framework for "Light Up Africa"*	
Tactical govt. subsidisation	Govt subsidies for private sector engagement to innovate	*Allows state to pull innovators, signal support, increase return on public spend* *May not yield desired outcomes*	*Govt. subsidy to banks for participant integration in UPI*	
Independent funding and solutions from citizenry	Hackathons, Challenges, Quadratic funding etc to harness public interest and create opportunities for individuals to contribute	*Builds civilian awareness, opportunity and involvement* *Unstable structure of creation, no guarantees of success*	*Atal New India Challenge, Pomelo Grant for Youth Edu. in Tech*	
Ecosystem Education	Partnerships with CSOs, knowledge-builders, digital evangelism	*Encourages adoption, knowledge-building* *Difficult to estimate impact*	*Philanthropic participation in ABDM*	
Value creation through partnerships	Strong societal network, greater integration of interests and mindsets, wider learning exchanges	*Strong foundation for communication, translates ideas between different entities* *Difficult to achieve*	*Samaaj-Sarkar-Bazaar in DIGIT*	
State legitimation	Increases trust of civilians in digital alternatives to public services	*Allows digital project to carry state backing, elevates trust* *Can have opposite effect, can be coercive*	*Health becomes publicly-supported service in NDHM*	
Open-sourcing as a type of self-financing	Innovations fed back; removal of proprietary barriers around use of digital technologies	*Encourages open innovation, allows a broader understanding of contribution to ODEs* *Low demand for OSS structures*	*Open-sourcing in all collaborations and new products in DIGIT*	

- **We outline a repertoire of funding mechanisms and their advantages and disadvantages**
- **Specific funders are best suited to wield each instrument**

Ideal Funder - Legend

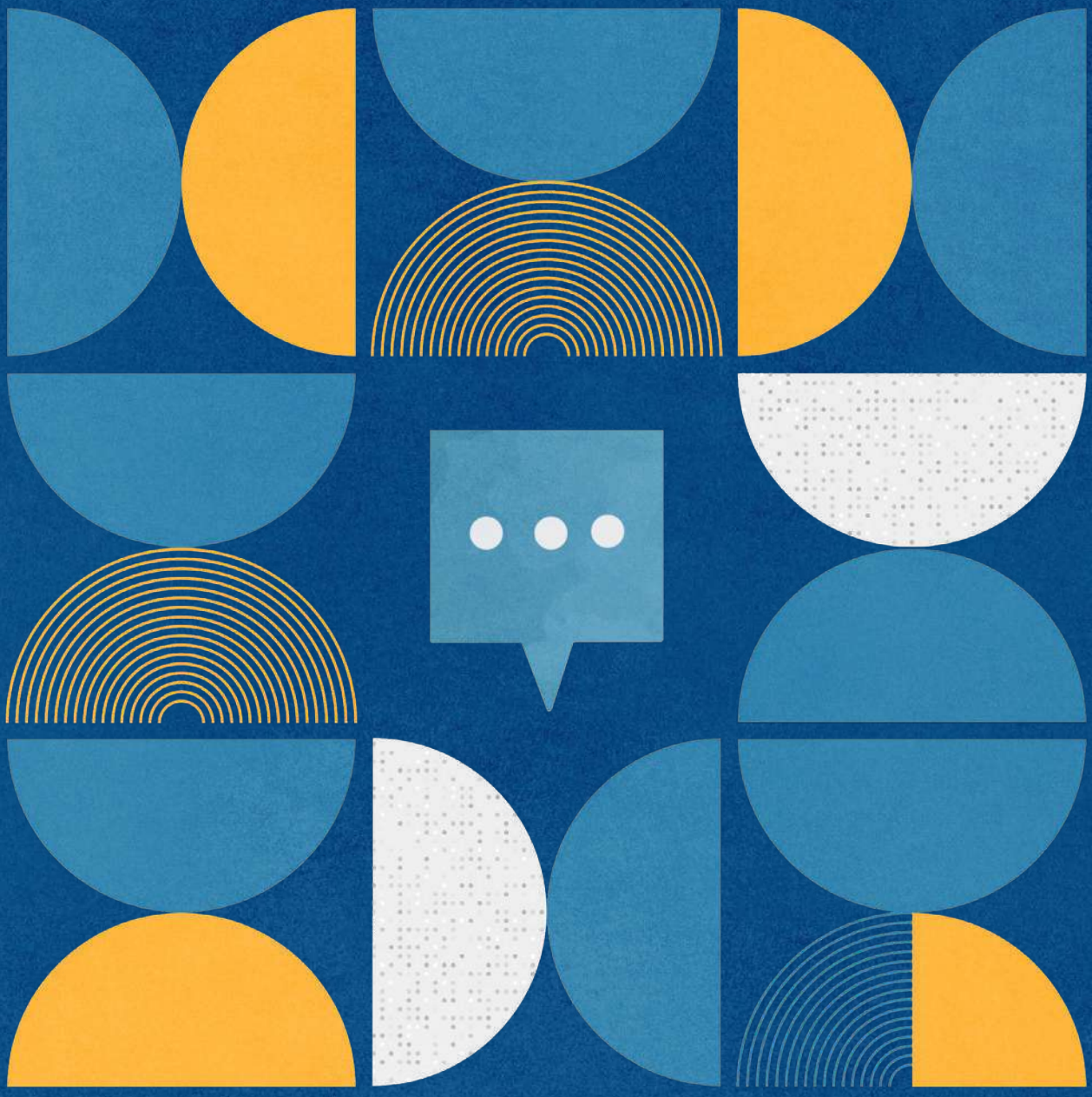
Public *Private* *Other*

Philanthropic *Non-profit*

Figure 18. Financially and non-financially visible instruments

SECTION 7

Conclusion



SECTION 7

Conclusion

In this study, we have explored the financing practices that currently surround large-scale digital infrastructures and goods in the sectors of health, payments and governance, and attempted to cull the gaps and shortages as well as the effective instruments and invisible successes. We have identified the capacities and associated strengths and weaknesses of particular funders and financing institutions. We have also gathered information around considerations of actors in their funding decisions, and typified implementational and innovational actions that can be associated with these decisions.

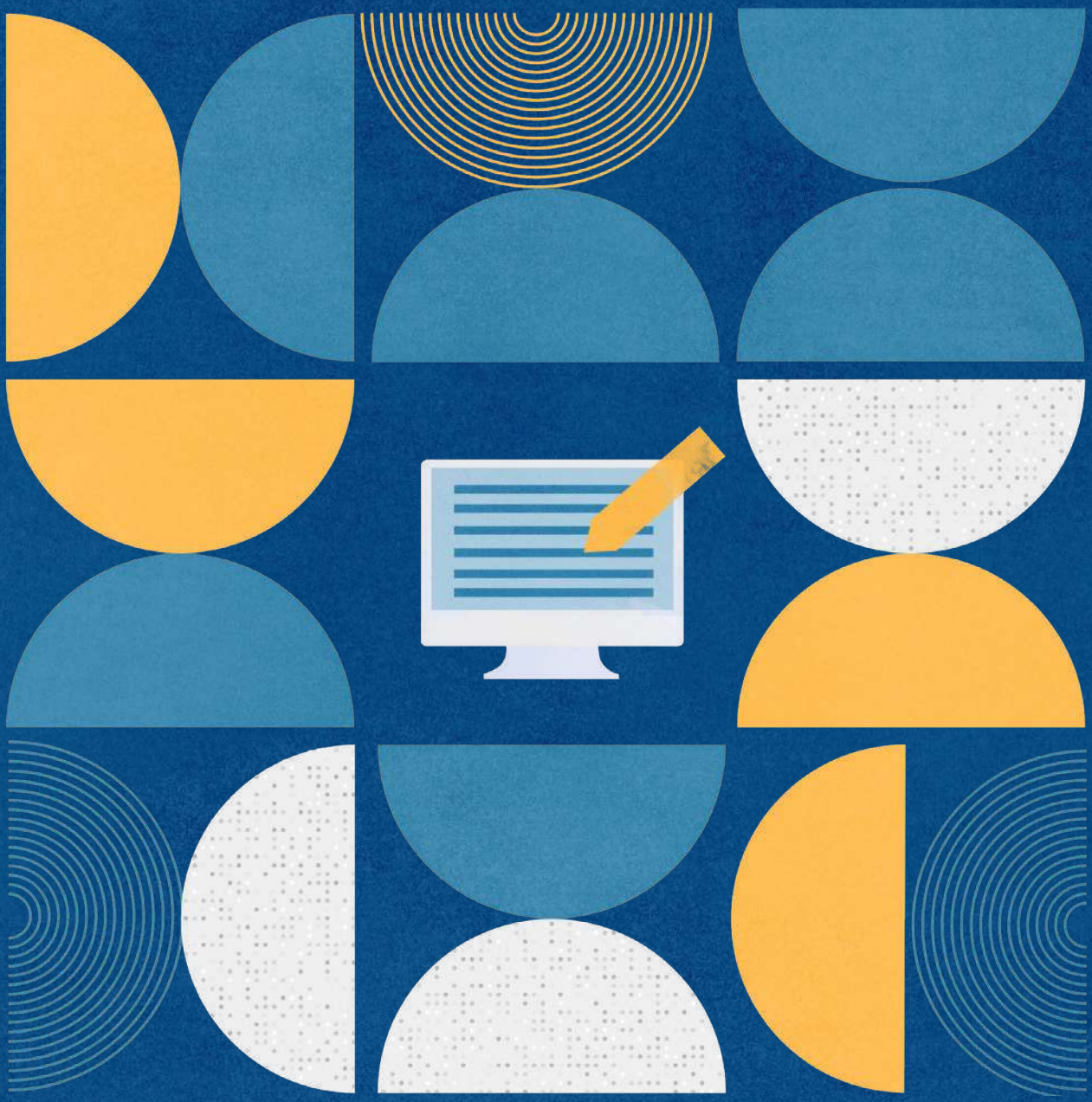
Through our research, we have posited these actions in the form of a playbook that aims to instruct future financiers, DPI builders and researchers on the ideal financing pathways that fit the DPI approach.

Within this framework, we have also designated two crucial typologies in the financing of digital goods and infrastructure: funder types and funding instruments. Funder types identified through our work include public, private, philanthropic, bilateral and multilateral, non-profit and academic institutions. Funding instruments can encompass financially visible forms such as grants, budgets, equity and debt arrangements and non-financially visible forms such as capacity, volunteering and shared resources. In the playbook, we have identified where these instruments appear to be implemented and by whom in the four case studies: ABDM, DHIS2, UPI and DIGIT.

Through further desk research, we have also uncovered a list of financing instruments that we term ‘innovative financing mechanisms’, which provide a bouquet of financing options for funders in the digital goods and infrastructure space. We have further analysed the ideal funder type that is able to utilise each of these instruments.

Based on the conclusion of our research, we recommend four primary action areas to bolster the DPI approach, in order to ensure more successful and sustainable financing. These include greater clarity around funder roles, the establishment of a sovereign or government-led fund for DPIs, the engineering of support for open-source software communities in areas of deployment, and the legitimation of invisible or non-quantifiable financing instruments and actors.

Financing Playbook



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Financing Playbook

Playbook Guide

About the Playbook

This playbook is aimed at providing governments, funders and DPI ecosystem players a view into financing. The playbok shows ideal funder types and funding instruments.

Please note that the evaluations are subjective.

Using the Playbook

- **Page 60** shows how to place financing contexts into quadrants.
- **Page 61** shows the quadrants.
- **Page 62** shows the financing playbook.

It provides guidance on who should fund (which entity type) and what instrument may be best suited.

We break down implementation and innovational action:

Implementation Action

1. Is the implementation intended for population-scale ie. the entire target population?

Yes	ODE entire population. Eg. ID and payments projects
No	ODE serves small use case for a limited population. Eg ODE for sericulture in one state

2. Are step-change actions required to enable human and technical capacity to support implementation?

Yes	Limited institutional and technical capacity at any level
No	Adequate or easily accessible technical capacity

Answer Matrix

Any yes	High	Q1 or Q4
All no	Low	Q2 or Q3

Innovational Action

1. Is there a novelty in introducing technology in this sector?

Yes	The technology entirely new and unimagined in the space
No	Existing technology can be leveraged and extensions suffice in this domain

2. Is there a high potential for disruption of existing methods and pathways?

Yes	The technology is an entirely new way of doing things
No	Existing methods are digitised or largely so, and this is an addition of a new dimension

Answer Matrix

Any yes	High	Q1 or Q2
All no	Low	Q3 or Q4

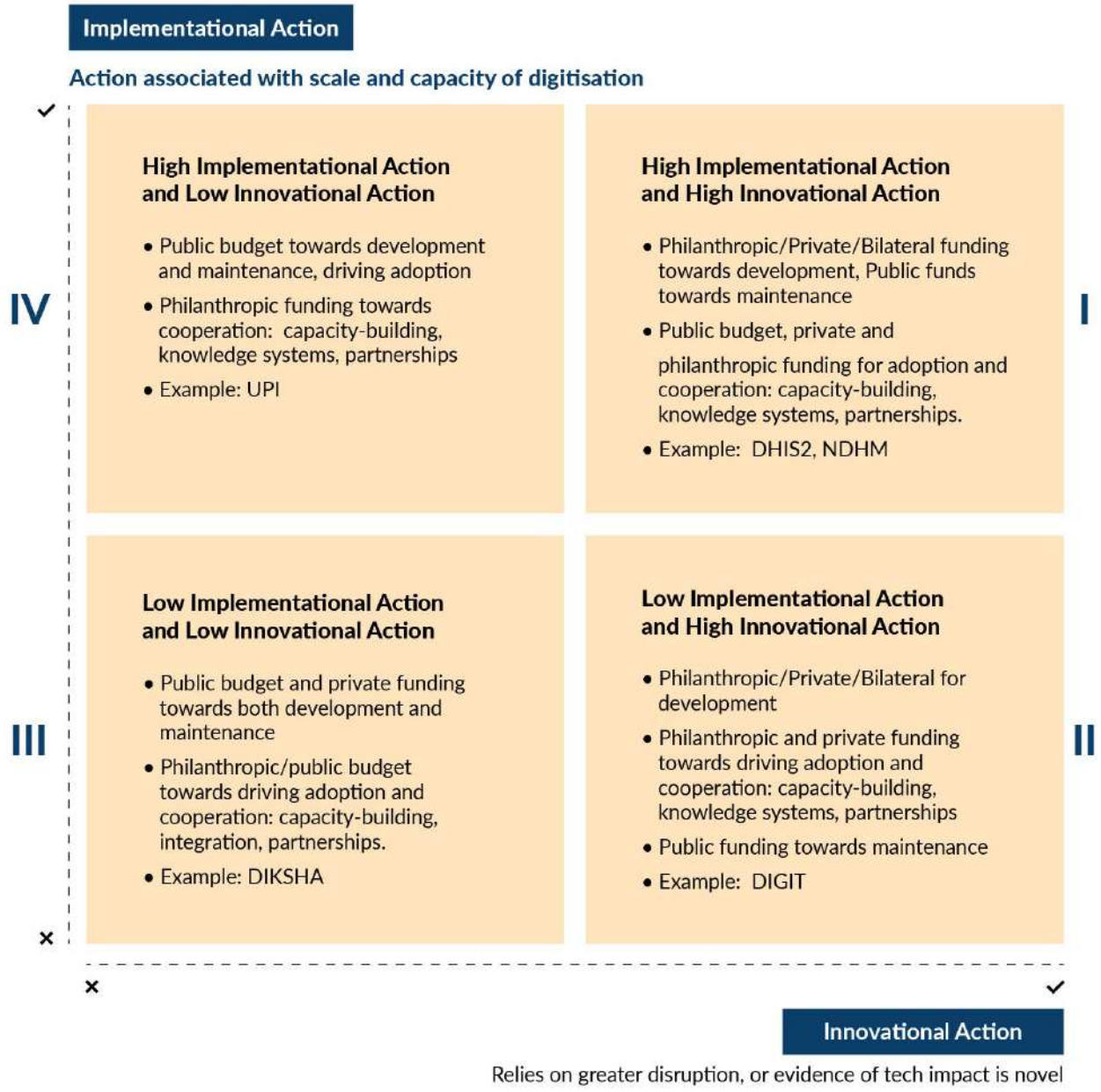
And map our studied cases here

Implementation Action

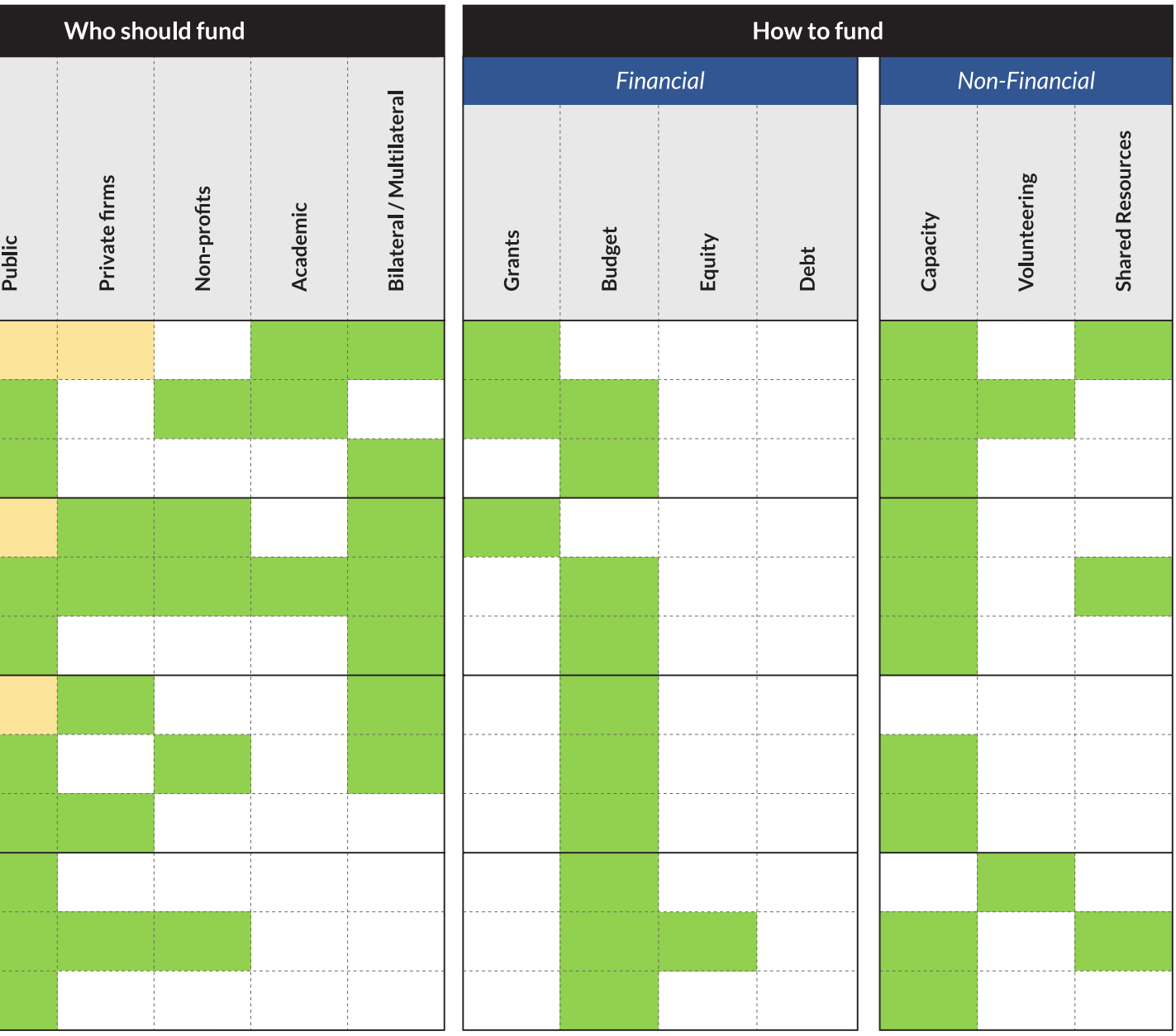
	ABDM	UPI	DIGIT	DHIS2
Population-scale?				
Need for enhancing capacity?				

Innovational Action

	ABDM	UPI	DIGIT	DHIS2
Novelty in sector?				
High aims and potential for disruption?				


Implementational Action
Action associated with scale and capacity of digitisation
✓
IV
I
III
II
×
×
✓
High Implementational Action and Low Innovational Action
• Public budget towards development and maintenance, driving adoption
• Philanthropic funding towards cooperation: capacity-building, knowledge systems, partnerships
• Example: UPI
High Implementational Action and High Innovational Action
• Philanthropic/Private/Bilateral funding towards development, Public funds towards maintenance
• Public budget, private and philanthropic funding for adoption and cooperation: capacity-building, knowledge systems, partnerships.
• Example: DHIS2, NDHM
Low Implementational Action and Low Innovational Action
• Public budget and private funding towards both development and maintenance
• Philanthropic/public budget towards driving adoption and cooperation: capacity-building, integration, partnerships.
• Example: DIKSHA
Low Implementational Action and High Innovational Action
• Philanthropic/Private/Bilateral for development
• Philanthropic and private funding towards driving adoption and cooperation: capacity-building, knowledge systems, partnerships
• Public funding towards maintenance
• Example: DIGIT
Innovational Action
Relies on greater disruption, or evidence of tech impact is novel

	Description	Studied Case	Stage of ODE Area of Funding	Philanthropy
Quadrant I	High Implementational, High Innovational Action	ABDM, DHIS2	Development & Deployment	
			Adoption & Cooperation	
			Maintenance & Regulation	
Quadrant II	Low Implementational, High Innovational Action	DIGIT	Development & Deployment	
			Adoption & Cooperation	
			Maintenance & Regulation	
Quadrant III	Low Implementational, Low Innovational Action	*No case study applicable*	Development & Deployment	
			Adoption & Cooperation	
			Maintenance & Regulation	
Quadrant IV	High Implementational, Low Innovational Action	UPI	Development & Deployment	
			Adoption & Cooperation	
			Maintenance & Regulation	

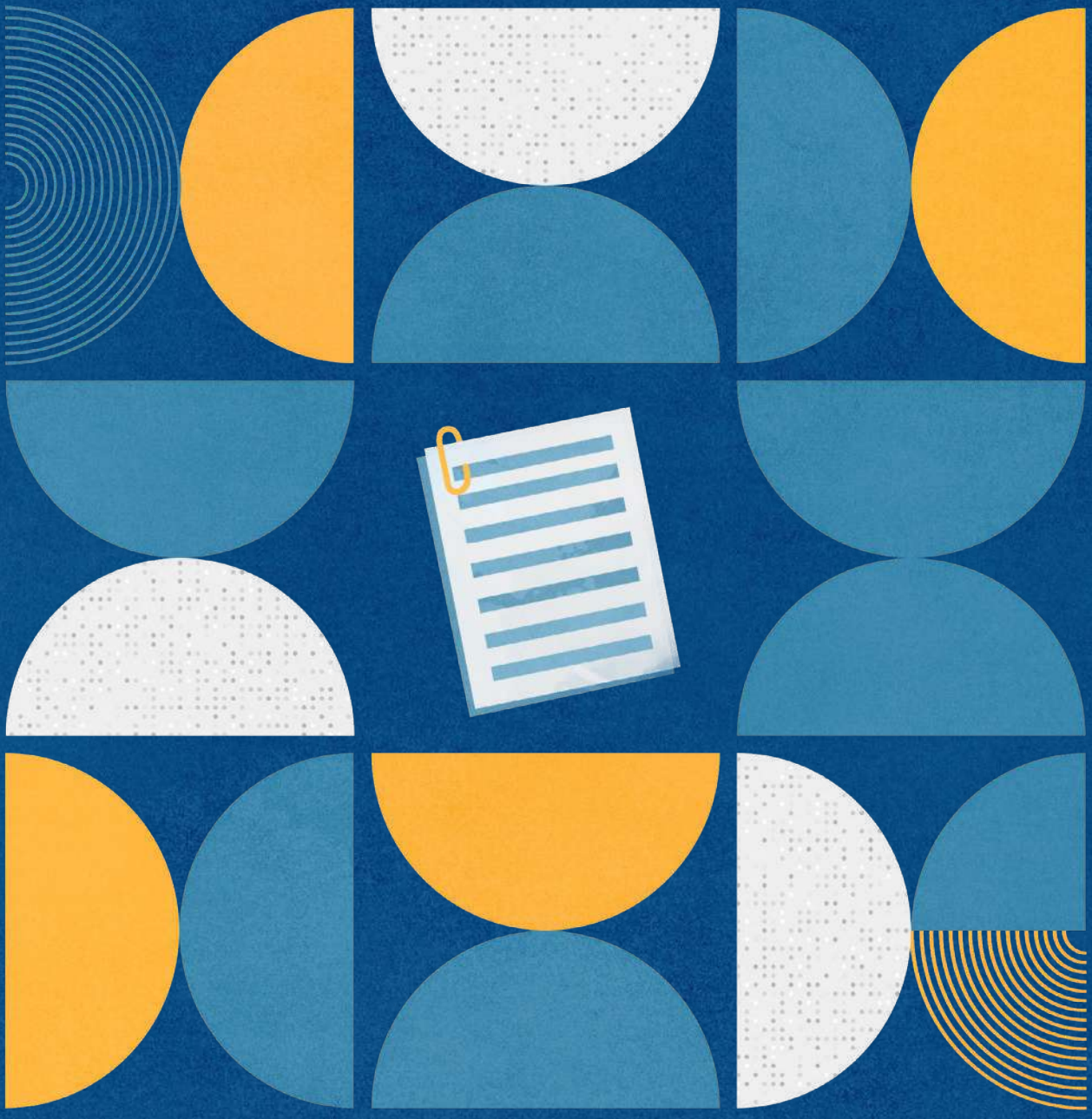


Key:

First or high preference

Second or lower preference (better application of funds or risks attached)

Annexures



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Annexures

I. References

- **DHIS2**
  The world's largest health information management system — developed through global collaboration led by UiO.
  Retrieved from https://dhis2.org/

- **Edison Alliance & World Economic Forum (2021, September)**
  Guidebook to Digital Inclusion Bond Financing [White paper].
  Retrieved from https://www3.weforum.org/docs/WEF_Guideboo_to_Digital_ Inclusion_Bond_Financing.pdf

- **eGovernments Foundation**
  About eGov Foundation.
  Retrieved from https://egov.org.in/about-us/

- **Financing the Digital Public Goods Ecosystem (2021, March 17). [web log].**
  Retrieved from https://digitalpublicgoods.net/blog/financing-the-digital-public goods-ecosystem/

- **Government of India, Ministry of Electronics and Information Technology (2020)**
  Strategy for National Open Digital Ecosystems (NODEs).
  Retrieved from https://static.mygov.in/rest/s3fs-public/mygov_158219311451553221.pdf

- **Government of India**
  Atal Innovation Mission.
  Retrieved from https://aim.gov.in/atal-new-india-challenge.php

- **Norad**
  How Norway works with Global Health.
  Retrieved from https://www.norad.no/en/front/thematic-areas/global-health/ how-norway-works-with-global-health

- **Khera, R. (2019). Aadhaar Failures: A Tragedy of Errors**
  Economic and Political Weekly, 54(14).
  Retrieved from https://www.epw.in/engage/article/aadhaar-failures-food-services-welfare

- **Licorish, E. (2021, May 5)**
  Gitcoin's Owocki explains how quadratic funding can help developers quit their 9-5s and work on web3 full-time. Chainlink Today.
  Retrieved from https://chainlinktoday.com/gitcoins-owocki-explains-how quadratic-funding-can-help-developers-quit-their-9-5s-and-work-on-web3-full time/

- **Miller, K., & Schaik, T. van. Waterfall vs. agile [web log].**
  Retrieved from https://www.pluralsight.com/blog/software-development/waterfall-vs-agile

- **Mojaloop**
  Mojaloop foundation - open source software for payment interoperability.
  Retrieved from https://mojaloop.io/

- **MOSIP**
  An open source platform on which national foundational ids are built.
  Retrieved from https://www.mosip.io/

- **Natarajan, S. (2020, September 9)**
  Digital access, democratic rights. Deccan Herald.
  Retrieved from https://www.deccanherald.com/opinion/panorama/digital access-democratic-rights-884730.html

- **National Health Authority, Government of India**
  Ayushman Bharat Digital Mission.
  Retrieved from https://abdm.gov.in/

- **National Payments Corporation of India**
  NPCI Official Website.
  Retrieved from https://www.npci.org.in/

- **Omidyar Network India & Boston Consulting Group (2020)**
  Building India's Digital Highways:
  The Potential of Open Digital Ecosystems.
  Retrieved from https://opendigitalecosystems.net/pdf/DPI-Report.pdf

- **Omidyar Network India. (2020, February 27)**
  EGov signs MOU with Transerve.
  Retrieved from https://www.omidyarnetwork.in/news/egov-signs-mou-with-transerve

- **Pope, R. (2021, May)**
  A series of essays about digital public goods — collaboratively maintained digital infrastructure that aims to serve as building blocks for modern digital societies. Exploring Digital Public Goods.
  Retrieved from https://digitalpublicgoods.xyz/

- **Reserve Bank of India. (2021, November 16)**
  Payments Infrastructure Development Fund (PIDF) – Status Update. Press Release.
  Retrieved from https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay. aspx?prid=52571

- **Shetty, M. (2021, December 20)**
  Govt funds to boost usage of RuPay, UPI.
  Retrieved from https://timesofindia.indiatimes.com/business/india-business/ govt-funds-to-boost-usage-of-rupay-upi/articleshow/88379205.cms

- **Siddarth, D., & Weyl, E. G. (2021, June 2)**
  The case for the digital commons.
  Retrieved from https://www.weforum.org/agenda/2021/06/the-case-for-the digital-commons/

- **Sukumar, A. M. (2021, February 5)**
  Standards and Digital Public Goods. iSpirt.
  Retrieved from https://research.ispirt.in/articles/Standards-and-Digital-Public Goods

- **The Abdul Latif Jameel Poverty Action Lab (J-PAL). (2021, October 26)**
  EGov foundation partners with J-PAL South Asia to improve government service delivery in India through effective use of technology and data.
  Retrieved from https://www.povertyactionlab.org/updates/egov-foundation partners-j-pal-south-asia-improve-government-service-delivery-india-through

- **Zhao, J. (2022, January 13)**
  Data Agility: A fashionable term, or a game changer for Global Health? The Global Fund.
  Retrieved from https://www.theglobalfund.org/en/blog/2022-01-13-data agility-a-fashionable-term-or-a-game-changer-for-global-health/

- **DHIS2. (2023, November 30)**
  HISP Centre receives £14.5 million from Wellcome for Climate & Health.
  Retrieved from https://dhis2.org/wellcome-grant-climate-health/

- **Agarwal, A. (2023, February 1)**
  Budget 2023: Govt bumps allocation for National Digital Health Mission by 70%.
  Retrieved from https://www.cnbctv18.com/healthcare/health-budget-2023-ayushman-bharat-digital-mission-allocation-nirmala-sitharaman-15816441.htm

II. Interviewees

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Rahul Matthan
Trilegal

Kiran Anandampillai

Ajay Nair
Swasth App

Abhishek Jain
Swasth App

Ajay Shah
NIPFP

Venkatesh Hariharan
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Hiren Doshi
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Sharad Sharma
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Liv Marte Kristiansen Nordhaug
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Austen Peter Davis
Norad

Kevin O'Neil
Rockefeller Foundation

Keyzom Ngodup
UNDP

Thampy Koshy
ONDC

Richard Pope
PT2 Works

David Eaves
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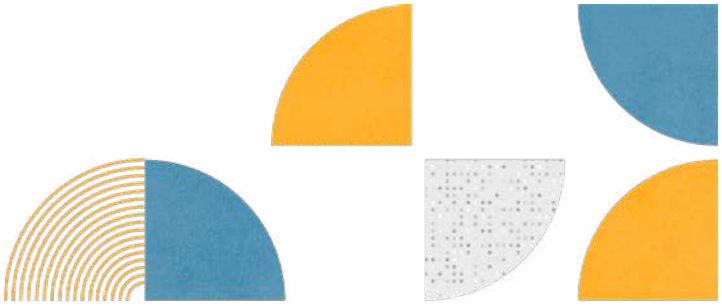

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