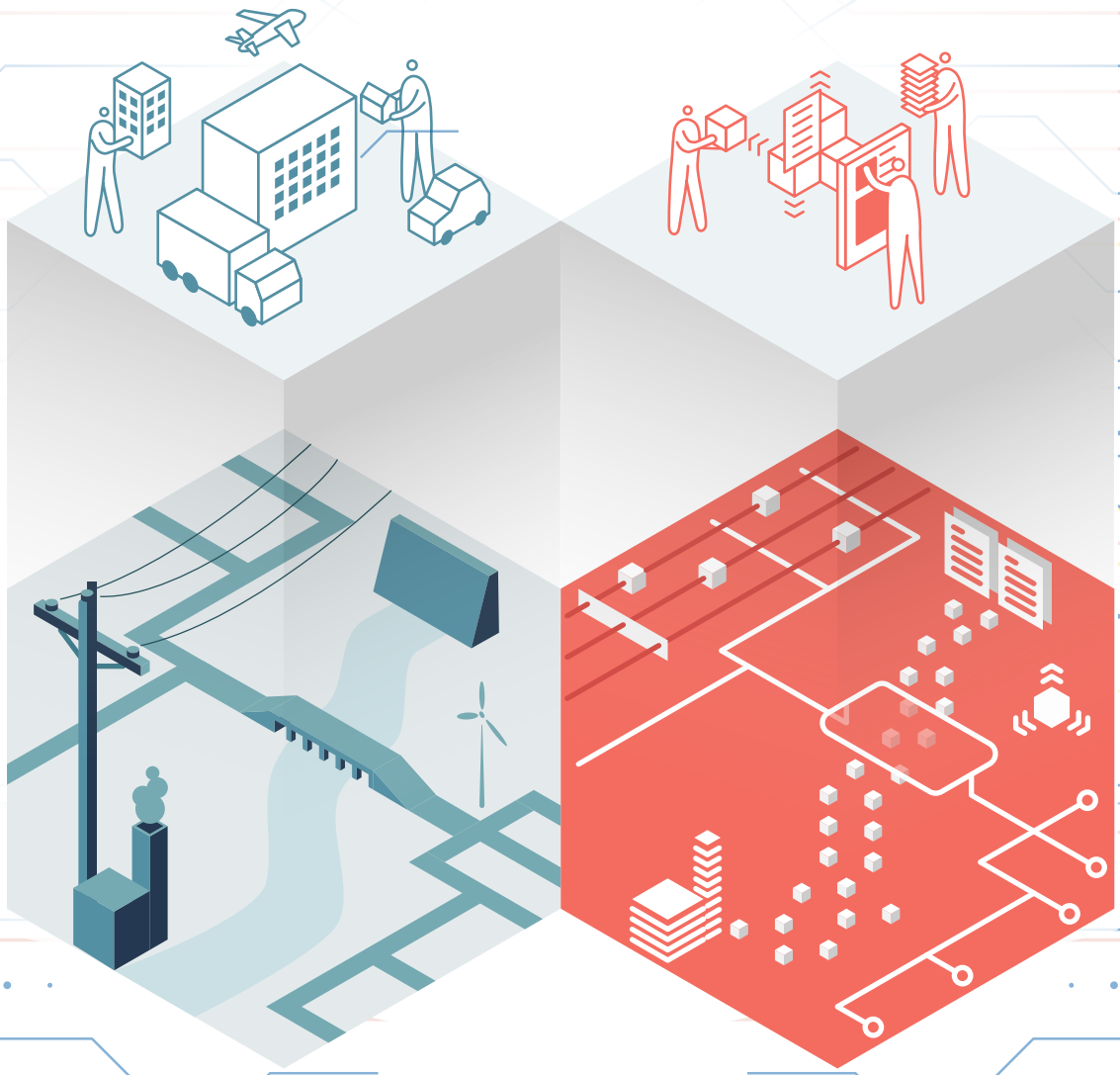
Building India's Digital Highways

The Potential of Open Digital Ecosystems



OMIDYAR NETWORK INDIA | BCG BOSTON CONSULTING GROUP

OMIDYAR NETWORK INDIA

Omidyar Network India invests in bold entrepreneurs who help create a meaningful life for every Indian, especially the hundreds of millions of Indians in low-income and lower-middle-income populations, ranging from the poorest among us to the existing middle class. To drive empowerment and social impact at scale, we work with entrepreneurs in the private, nonprofit and public sectors, who are tackling India's hardest and most chronic problems. We make equity investments in early stage enterprises and provide grants to nonprofits in the areas of Digital Identity, Education, Emerging Tech, Financial Inclusion, Governance & Citizen Engagement, and Property Rights. Omidyar Network India is part of The Omidyar Group, a diverse collection of companies, organizations and initiatives, supported by philanthropists Pam and Pierre Omidyar, founder of eBay.

BCG BOSTON CONSULTING GROUP

Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we help clients with total transformation — inspiring complex change, enabling organizations to grow, building competitive advantage, and driving bottom-line impact.

To succeed, organizations must blend digital and human capabilities. Our diverse, global teams bring deep industry and functional expertise and a range of perspectives to spark change. BCG delivers solutions through leading-edge management consulting along with technology and design, corporate and digital ventures — and business purpose. We work in a uniquely collaborative model across the firm and throughout all levels of the client organization, generating results that allow our clients to thrive.

Contents

Foreword

At Omidyar Network India (ONI), we are committed to supporting 'GoodTech', that is, technology which is both beneficial *and* responsible. **We believe 'Open Digital Ecosystems' (ODEs) have the potential to be the new frontier of 'GoodTech' that can transform societal outcomes for India, but only if they are designed 'responsibly'.**

Globally, the conversations around 'Digital Public Infrastructure', and 'Digital Public Goods' are starting to gain momentum. Developing countries, in particular, have begun to realize the potential to 'leapfrog' towards radical improvements in public service delivery at scale, by building foundational Digital Public Infrastructure, like digital Identity (ID), digital payments and secure data exchanges. Digital Public Goods can then be built on top of this infrastructure, like open software, data, and standards that benefit humankind, across sectors like health, education, finance. India has been a pioneer in building and deploying these at scale. It was one of the first developing countries to have a population scale digital ID initiative, and has built digital payments infrastructure such as Unified Payments Interface (UPI).

At the same time, the growing concentration of data, and hence, power, in 'Big Tech' platforms have set the alarm bells ringing on critical issues like privacy and agency of individuals over their personal data, and the security and sovereignty of data. Similar concerns apply to State-owned digital platforms as well, which in addition to the risks posed by concentration of data, also pose bigger risks combined with the coercive power of the State machinery. Understandably, there is a growing sense of distrust in all types of 'big' digital platforms.

When we began to dive into and confront these issues with people and organizations on both sides of the debate, we soon realized a missing gap. The 'non-tech' layers of these platforms play the most critical role in determining both benefits and harms. While there has been significant deliberation on the design of the technology building blocks of these digital platforms, there hasn't been nearly enough focus on the non-tech dimensions.

For India and other developing countries, to pave a responsible path forward and build digital platforms that truly bring about greater public good, these non-tech dimensions such as the governance of these platforms and the community of both public and private stakeholders that contribute to these would be more critical than the technology itself.

Hence, the focus of this study is on Open Digital Ecosystems, which are defined as *"open and secure digital platforms that enable a community of actors to unlock transformative solutions for society, based on a robust governance framework".*

The objective of this report is three-fold – first, **to a create a common vocabulary and vision** amongst government, technology industry, civil society, and emerging entrepreneurs around ODEs. Second, **to size the impact potential and identify the key risks associated with these ecosystems.** Third, and most importantly, **to offer a set of guiding principles and a practical Toolkit** that provides a starting point towards a 'roadmap' for practitioners, to take this movement forward.

Ever since we set out on this journey with Boston Consulting Group (BCG), the process has been as important as the outcome for this study. All the core ideas presented here have evolved through 100+ consultations with a diverse set of people engaged in the emerging ODE ecosystem globally, including government officials, technology contributors, civil society organizations (CSOs), policy think tanks, philanthropic foundations, impact investors, multilateral organizations, etc. These consultations have included both champions and critics of the approach.

The Ministry of Electronics and Information Technology (MeitY) has been the key government partner on this journey. They are leading the conversation on platformization and ODEs in India, naming these as **National Open Digital Ecosystems (NODEs)** for the Indian context. MeitY's recent whitepaper, to which we have had the privilege of contributing, presents many foundational principles for this agenda, on which this report builds further. Across central and state government departments in India, there is now a growing recognition and commitment towards investing in, and building these NODEs across sectors.

At ONI, we are looking to partner with and support bold entrepreneurs both within the government and non-government practitioners to grow this movement. We hope to do this by investing in catalytic builds of 'responsible' ODEs, supporting research and thought leadership on both benefits and harms of ODEs, as well as facilitating the growth of 'communities of practice' around ODEs.

We hope this study will be a foundational building block towards the development of responsible ODEs in India. We hope to create a movement around responsible ODEs with broad-based ownership within the ecosystem, among government, the philanthropic community, industry, and civil society stakeholders, so that such platforms can be designed to maximize the greater public good, while minimizing harms.

Roopa Kudva
Managing Director
Omidyar Network India

List of Abbreviations

AI: Artificial Intelligence
API: Application Programming Interface
AePS: Aadhaar-enabled Payment System
App: Application
ASF: Apache Software Foundation
BCG: Boston Consulting Group
BHIM: Bharat Interface for Money
CSC: Common Service Centre
CSO: Civil Society Organization
CSR: Corporate Social Responsibility
DBT: Direct Benefit Transfer
DPAI: Data Protection Authority of India
DPG: Digital Public Good
DPI: Digital Public Infrastructure
DSC: Digital Signature Certificate
DTA: Digital Transformation Agency
E2E: End-to-End
eNAM: National Agriculture Market
EPFO: Employees Provident Fund Organization
FAQ: Frequently Asked Question
FMI: Financial Market Infrastructure
G2C: Government-to-Citizen
GDP: Gross Domestic Product
GDPR: General Data Protection Regulation
GDS: Government Digital Service
GeM: Government e-Marketplace
GIS: Geographic Information System
GMV: Gross Merchandise Value
GoI: Government of India
GSTN: Goods and Service Tax Network
HR: Human Resources
ICT: Information and Communications Technology
ID: Identity
IDEA: IndEA Digital Ecosystem for Agriculture
IFC: International Finance Corporation
ILO: International Labor Organization
InDEA: India Enterprise Architecture
IoT: Internet of Things
ISO: International Organization for Standardization
IUDX: India Urban Data Exchange
IVRS: Interactive Voice Response System
KPI: Key Performance Indicator
LGD: Local Government Directory
MeitY: Ministry of Electronics and Information Technology
NeGD: National e-Governance Division
NIC: National Informatics Centre
NODE: National Open Digital Ecosystem
NPCI: National Payments Corporation of India
NSDC: National Skill Development Corporation
NTR: National Transport Register
NULP: National Urban Learning Platform
NUIS: National Urban Innovation Stack
ODE: Open Digital Ecosystem
ONI: Omidyar Network India
OSS: Open Source Software
PbD: Privacy by Design
PDP: Personal Data Protection
PDPC: Personal Data Protection Commission
PII: Personally Identifiable Information
PIN: Personal Identification Number
PLFS: Periodic Labour Force Survey
PMFBY: Pradhan Mantri Fasal Bima Yojna
PMJAY: Pradhan Mantri Jan Arogya Yojana
PMO: Prime Minister's Office
PPP: Public Private Partnership
PSP: Payment Service Provider
RBI: Reserve Bank of India
ReMS: Rashtriya e-Market Services
RIA: Information System Authority
RPS: Retail Payment System
RTI: Right to Information
RTO: Regional Transport Office
SCOPE: Smart Nation Co-creating with People Everywhere
SDG: Sustainable Development Goal
SHF: Small and Marginal Land Holding Farmer
SNDGO: Smart Nation and Digital Government Office
TRAI: Telecom Regulatory Authority of India
UAM: Udyog Aadhaar Memorandum
UI: User Interface
UIDAI: Unique Identification Authority of India
UK: United Kingdom
UP: Unified Payments Interface
USA: United States of America
USAID: United States Agency for International Development
USSD: Unstructured Supplementary Service Data
UX: User Experience

01

INTRODUCTION

Relocating to a new city in India is no easy task. You may need to arrange for accommodation, secure a gas connection, perhaps visit the electricity board, and maybe even register your vehicle at the local Regional Transport Office (RTO). Compounding the hassle is the inconvenience of submitting the same set of documents – identification proof, address proof, etc., to accomplish each of these tasks. While the duplication of effort makes the process onerous, the lack of transparency around the storage and security of personal data can be a cause for concern.

To a certain extent, the digitization of data and services in the late 2000s resolved for some of these issues. However, inefficiencies continue to persist, impacting the delivery and usage of public services. This is primarily attributed to the following three factors:

01 Adoption of a siloed approach to digitization which has led to the fragmentation of data and knowledge across multiple government agencies.

02 Incompatibility among the digital systems which prevents a seamless user experience.

03 Duplication of resources by individuals, private sector entities, and the government due to limited collaboration, resulting in End-to-End (E2E) builds being created each time.

There is, therefore, an imminent need to shift to a new service delivery paradigm that leverages shared technology infrastructure, derives insights from interoperable data systems to bolster user-centricity, and ensures adequate digital security.

Globally, we are seeing an increase in the number of shared and / or open digital platforms that are transforming service delivery. Some key examples include the India Stack and UPI in India, Estonia's digital infrastructure (such as X-tee), and the Singapore Government Design System (reusable digital components that can be brought together to build a number of solutions). A number of sectors in India such as education (with the DIKSHA portal),[1] health (National Digital Health Blueprint [NDHB]),[2] and agriculture are gearing to shift towards a more digital approach as well. **These have the potential to rapidly unlock large-scale economic, societal, and governance value in diverse contexts.**

Digital platforms unlock value by breaking down data silos and creating shared technology infrastructure that enables the formation of multi-stakeholder (public and private) ecosystems. They also encourage private sector participation for the delivery of innovative solutions. However, it is important to recognize that digital dividends co-exist with corresponding risks. These ecosystems may expose users to risks such as privacy violation, data-driven behavioral manipulation, identity theft and fraud, and exclusion from essential public services. In order to maximize the benefits and mitigate the risks, it is imperative to undertake a holistic approach to build, govern, and use technology infrastructure.

[1] DIKSHA, or Digital Infrastructure for Knowledge Sharing, is built on an open source platform, and provides teachers several resources for teacher training, lesson planning, and concept strengthening, along with learning materials for students. Learn more at https://diksha.gov.in/.

[2] Ministry of Health and Family Welfare, Government of India. (2019). National Digital Health Blueprint. Retrieved from https://main.mohfw.gov.in/sites/default/files/Final%20Report%20-%20Lite%20Version.pdf.

This report proposes a new paradigm for building and using shared digital platforms – one that adopts a holistic approach and addresses the complexity of stakeholder interactions and the consequent governance needs. **In an effort to recognize that we are evolving towards more complex and collaborative ecosystems, we have termed these 'Open Digital Ecosystems' that are "open and secure digital platforms that enable a community of actors to unlock transformative solutions for society, based on a robust governance framework".**

The ongoing global discourse around digital platforms has precipitated the need to develop a shared understanding of the why, what, and how of building and administering them. This is relevant not just for the government but also for a wide variety of stakeholders such as open source communities, private enterprises, foundations, policy research institutions, and development finance institutions. Several countries such as Estonia, Singapore, Australia, and the United Kingdom (UK) have already adopted this approach to create shared digital infrastructure for the delivery of public (and private) services. There are numerous learnings that can be gleaned from their journey, some of which have been included in this report.

We hope that this report can meaningfully shape the narratives around digital platforms and create a shared global vocabulary and understanding of the open digital ecosystem approach.

1.1 About this Report

Omidyar Network India, in partnership with Boston Consulting Group, has undertaken a study to reimagine digital platforms for the public good, with the aim of building a shared narrative around digital platforms and developing a holistic roadmap to foster their systematic adoption, while safeguarding against harms. This report shares the findings of this study and concludes that we need a new paradigm to shape our thinking around digital platforms. It introduces a new approach, that is, the ODE approach, which lays the foundation for creating shared value for the public by enabling collaboration across a community of stakeholders while being tethered to a strong governance construct.

This study has undertaken a collaborative approach to ensure that multiple perspectives across government bodies, private sector entities, CSOs, developers, and the user community have been considered. It is the product of intensive primary research – four public consultation workshops were conducted with participation from the central and state governments, philanthropic foundations, non-profits, private enterprises, think tanks, academia, start-ups, and research institutions.

More than 100 in-depth one-on-one interviews were conducted through the course of the study, engaging key stakeholders in the government, users and builders of digital public goods, as well as Indian and global experts across backgrounds, including technology development, public policy, entrepreneurship, and digital governance.

This was augmented with extensive secondary research that involved benchmarking digital platform best practices as well as studying the digitization strategies of more than 10 countries, including Australia, Estonia, India, Singapore, the UK, and the United States of America (USA).

This report has especially benefited from a partnership with MeitY, Government of India (GoI). Its development was aided by consultations that MeitY organised with 15+ ministries and states, and the World Bank on ideas relevant to this study. It builds on the thinking presented in the public consultation whitepaper on 'Strategy for National Open Digital Ecosystems (NODEs)' published by MeitY in February 2020, to which the authors of this report have contributed. It aims to address many of the questions posed in the whitepaper and provides recommendations on the path forward. We would like to thank the entire team at MeitY, especially former Additional Secretary, MeitY, Mr Gopalakrishnan (now Additional Secretary, Prime Minister's Office [PMO]) and his team, MyGov, the National e-Governance Division (NeGD), especially Mr Abhishek Singh, and the National Informatics Centre (NIC) team, for their invaluable contribution towards shaping this study. We hope that this work can meaningfully contribute to the growing public discourse on digital platforms and ecosystems.

1.2 Using the Report

This report is intended for use by a broad range of stakeholders.

- For **practitioners** (public and private), it can serve as a toolkit as they embark on their journey to build ODEs. For example, the Principal Secretary of a State can use it to build a State Service Delivery NODE by leveraging the guiding principles and the associated frameworks that have been provided in the report.

- For **policymakers**, it can serve as a guide for establishing the necessary regulatory frameworks and policies that can drive the adoption of the ODE approach while addressing the risks that stem from them. For example, central government bodies can use the report to identify and prioritize key areas where interventions (policies or guidelines) might be required such as risk mitigation or data governance frameworks for ODEs

- For **academia and researchers,** it can serve as a helpful starting point for further investigation of critical questions to strengthen the thinking around the ODE approach. For example, researchers in the field of development finance can expand upon the initial thinking around the funding of ODEs to develop more nuanced models.

- Finally, for **CSOs, philanthropic foundations, multilateral institutions, and end-users,** it can help identify and develop alternate ways to engage with and strengthen existing and future ODEs. For example, civil society groups can share further learnings on last-mile access and participatory governance or borrow from the examples shared in this report to bolster their current practices.

Exhibit 1.1

Outline of the Report

#	Chapter	Purpose
02	**Open Digital Ecosystems**	Showcases how the ODE approach differs from earlier approaches of service delivery by using practical examples.
03	**Impact Potential of ODEs**	Estimates the economic impact, as well as societal and governance benefits which ODEs can unlock across 10 sectors.
04	**Risks Associated with ODEs**	Identifies four key risks associated with ODEs and suggests specific mitigation measures for each.
05	**Guiding Principles for Responsible ODEs**	Defines 15 principles that guide the design and delivery of responsible ODEs, that is, ODEs that maximize benefits and minimize harms, illustrated using real-life applications.
06	**Illustrative National ODEs of the Future**	Provides a preview of how ODEs can be leveraged in multiple domains like Skilling and Jobs (Talent), Agriculture, Micro, Small and Medium Enterprises (MSME) and State Service Delivery.
07	**Funding Models for ODEs**	Presents options for financing both the initial build and recurring operational expenditure, along with innovative financing models.
08	**A National Governance Strategy for ODEs**	Offers three recommendations to support the design of a robust overarching national governance strategy for ODEs for driving their widespread adoption.
09	**Getting Started with ODEs: A Practitioner's Toolkit**	Provides a practical toolkit that public institutions, businesses, non-profits, open source communities, philanthropic foundations, and research institutions can leverage to effectively build and operate successful ODEs.
10	**A Call to Action: Realizing the ODE Vision**	Describes the mindset shifts required to adopt the ODE approach, rooted in collaboration.

02

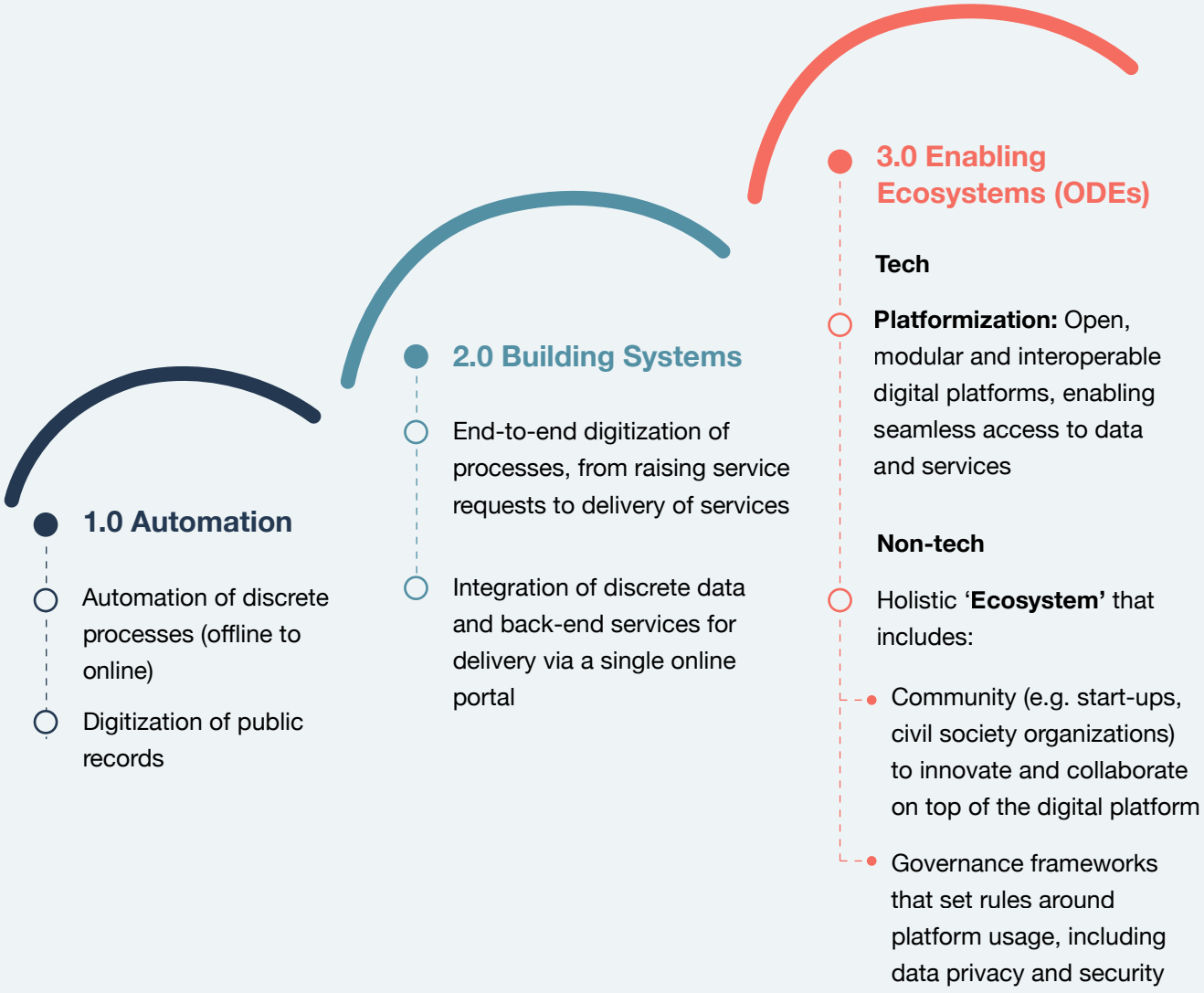
OPEN DIGITAL ECOSYSTEMS

2.1 ODEs: A Paradigm Shift

The ODE approach represents a fundamental change in the way governments can leverage technology for public service delivery (as shown in Exhibit 2.1).

Exhibit 2.1

Evolving Paradigms of Digital Solutions for Public Service Delivery



The "1.0" era represents the earliest use of Information and Communications Technology (ICT) by the government. This involved 'computerization' and partial automation of certain processes, such as raising service requests or viewing the status of an application online. An example of this service delivery model is the birth registration procedure followed in many parts of India. Certain parts of the process such as raising a request for a birth certificate can now be done online through the web portal of the relevant municipality. However, birth registrations are still done offline since they require the physical verification of certain documents.

This was followed by the "2.0" era, which involved the digitization of the E2E processes of numerous services. Certain services (for example, tax payment, delivery of subsidies, etc.) moved to a complete online delivery mode. However, in the absence of a single-window access, individuals still need to visit multiple portals to

complete their journey. For example, the Government e-Marketplace (GeM) is a digital platform, developed for public procurement of common user goods and services (such as office supplies, computers, and other office appliances, transportation and maintenance services). It provides digitized and streamlined E2E services (including publishing bids and auctions, making payments, and managing orders) where buyers (the government agencies and departments) can purchase the products and services offered by registered sellers, based on published criteria. While the platform has created a single portal for all public procurement and delivered a step change in efficiency and transparency, it has only just begun its journey towards full interoperability with other platforms. To facilitate this migration, the extensive use of Application Programming Interfaces (APIs) is being considered which can help facilitate integration between the GeM portal and other government agencies and departments. Further, open APIs can allow third parties to build additional solutions on top or allow the portal to be integrated with other marketplaces.

We are now witnessing the advent of the "3.0" era – a service delivery construct where shared technology infrastructure is leveraged by both the government and private sector entities to unlock new solutions and enhance end-user experience. It breaks the boundaries created by the traditional silos of departments and sectors to provide individuals with seamless access to various services. We refer to this as "platformization" which encompasses a shift in technology, along with a shift in delivery by undertaking a more collaborative and participatory approach. In order to address the complexity of stakeholder interactions and its consequent governance needs, two 'non-tech' dimensions become critical.

- First, a **community** of actors, public and private, need to converge to collaboratively build new solutions and services on top of the digital platform.
- Second, a strong **governance** framework needs to be established to mitigate the risks that could arise from ODEs and ensure fair and equitable outcomes for all actors.

India's Unified Payments Interface (UPI): An Example of an Open Digital Ecosystem

The UPI platform in India is an example of the "3.0" era. It has enabled a seamless payment experience for individuals, businesses, and the government by allowing payment service providers to innovate on top of the existing technology infrastructure to build user-centric applications (apps). As a result of this shared infrastructure, many of these apps (for example, mobile payment apps) can integrate into other systems (like banking systems, payment gateways, etc.), thereby creating a powerful, interoperable, payments ecosystem. Similar efforts are being made in service delivery across education (DIKSHA), healthcare (National Digital Health Blueprint), urban governance (National Urban Innovation Stack), and agriculture.

The ODE approach reflects three major paradigm shifts in the way digital solutions are deployed for service delivery.

- **First, a focus on creating shared technology infrastructure on which public and private sector entities can build a wide range of innovative services for individuals, businesses, and government bodies.** This reflects a shift from monolithic, E2E solutions to open and shared digital platforms that enable multi-stakeholder collaboration towards the delivery of user-centric solutions. For example, the India Stack, a set of open APIs connecting Aadhaar Authentication, eKYC, UPI, eSign, and DigiLocker can be utilized by public agencies, private enterprises, start-ups, and developers to offer a truly digital service delivery experience to users (that is, presenceless, paperless, and cashless) in areas such as accessing financial products and services, disbursing welfare benefits, and health coverage.

- **Second, a focus on enabling interoperability among disparate systems and datasets.** Creating interoperability and allowing data that is fragmented across systems to be exchanged safely can lead to new insights and a better understanding of users' requirements. This will facilitate the creation of new solutions that provide improved access and service quality. For example, India Urban Data Exchange (IUDX) is an open source platform that will enable real-time coordination and exchange of diverse streams of public data to create solutions for smart cities. Anonymized data from government speed sensors and cameras, combined with crowdsourced data from navigation apps and private platforms like delivery and cab-hailing apps, can lead to a number of useful solutions, from emergency response and safety in public spaces to parking optimization.

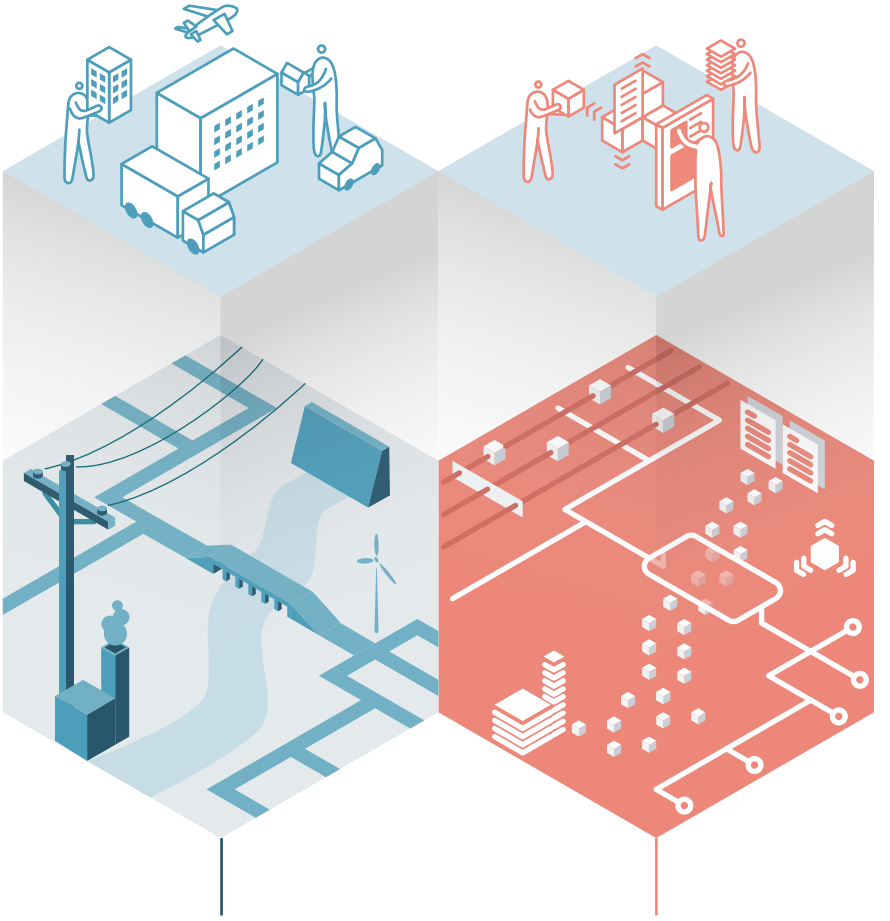
- **Third, a strong emphasis on building in safeguards and incorporating 'Privacy by Design' (PbD) principles within digital platforms to protect the rights of individuals and prevent misuse.** Depending on the type of data flowing in an ODE, significant risks can stem from either inadvertent data breaches or ill-intentioned actors within the system. For example, a registry of digital health records for every individual can be a powerful tool for accessing the right healthcare. However, without stringent measures to protect individual agency over use of these records, they can also be exploited causing harm to the individual. To minimize potential harms, the ODE approach advocates for building responsible ODEs, through design and technical features, as well as through governance and community mechanisms. These imperatives may not have been addressed in the 1.0 or 2.0 eras.

Collectively, these shifts can unlock new public value (through innovation), more efficient service delivery (better access and targeting, cost and time savings for all stakeholders, and greater transparency), and a more user-centric experience (consistent, customized, inclusive, safe, and seamless).

Exhibit 2.2

Open Digital Ecosystems: Public Infrastructure for a Digital World

A good analogy to understand the new ODE paradigm is the physical infrastructure of cities. Building roads, drainage systems, parks, mass transit, that is, the 'commons', is typically done by the government, through public funding and ideally with robust public engagement. If built and governed well, this is the 'platform' over which businesses and individuals can create a vibrant ecosystem of activities and contribute significantly to improved quality of life. **Similarly, the ODE approach suggests that the government should focus on creating the 'digital commons'**; enable interoperability between siloed systems, so that innovators can build solutions on top, by leveraging open source software, open data, open standards, open licenses, and open APIs.



2.2 Defining Open Digital Ecosystems

ODEs are "open and secure digital platforms that enable a community of actors to unlock transformative solutions for society, based on a robust governance framework".

An ODE comprises three layers:

- At the core are **Digital Platforms** (technology infrastructure), anchored by
- A vibrant **Community** of actors who transact and collaborate via the platform and build on top to deliver shared value, and
- A robust **Governance** framework to ensure a level-playing field and fair outcomes for all.

The Digital Platforms represent the 'tech' layer while Community and Governance represent the 'non-tech' layers (as shown in Exhibit 2.3).

2.2.1 Digital Platforms (Technology Infrastructure)

Digital platforms comprise the technology infrastructure that enables the delivery of services and solutions to end-users. Builders (entrepreneurs, businesses, developers, public agencies, etc.) create and leverage digital platforms to develop new and inclusive user-facing solutions. Thus, it is critical that these platforms are built to be 'open' to allow for collaboration across multiple stakeholders.

Digital platforms usually comprise some combination of the following technology components:

- **Data Registries:** These include records of both personal and non-personal information[3] that function as the 'single source of truth' for various stakeholders. This is made possible by ensuring interoperability across various systems. Examples of data registries include Aadhaar (registry of Indian residents), Fixed Asset Registry under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), and Local Government Directory (LGD) codes (directory of local government bodies in India).
- **Core Application Software:** Performs specific business functionalities within a digital platform, for example, consent manager, anonymizer, notification manager, and analytics engine.
- **Open APIs:** APIs are software intermediaries that allow two applications to talk to each other. Open APIs are shared freely and publicly available to developers, for example, eKYC, Aadhaar authentication (India Stack).[4]
- **Standards and Protocols:** The set of rules that define how different data and technology infrastructure interact with each other, for example, the eSign protocol allows users to digitally sign documents, along with plugging the service into applications that require users to digitally sign content.[5] Another example is Beckn, an open protocol, that allows users to seamlessly engage with local commerce players across sectors.[6]

[3] Types of personal and non-personal data have been covered in detail in Chapter 4.
[4] eKYC and Aadhaar Authentication are end-user identity verification services that can be leveraged by public and private entities via APIs. Learn more at https://www.indiastack.org/ekyc/.
[5] For creating electronic signatures, the signatory is required to obtain a Digital Signature Certificate (DSC) from a Certifying Authority (CA) licensed by the Controller of Certifying Authorities. Learn more at http://cca.gov.in/.
[6] Beckn is an open protocol that enables location-aware, local commerce across industries to be discovered and engaged by any beckn-enabled application. Learn more at https://beckn.org/.

Exhibit 2.3

Three Layers of an Open Digital Ecosystem (ODE)

Governance

Laws and rules to govern the ecosystem and accountable institutions that uphold these rules; related to:

Fair and equitable platform access and outcomes

Robust data privacy and security

Sustainable funding model

Digital-ready talent and expertise

Domain-specific policies and standards

Community

Collaborative community who transact via the digital platform to create value for all

1. Builders

Public or private enterprises, and developers, co-creating digital platforms and / or leveraging them to create new solutions

2. End-users

Individuals and entities accessing services and enabling feedback loops

3. Facilitators

Ecosystem participants (e.g. CSOs, academia, philanthropies) involved in governance, financing, research, etc.

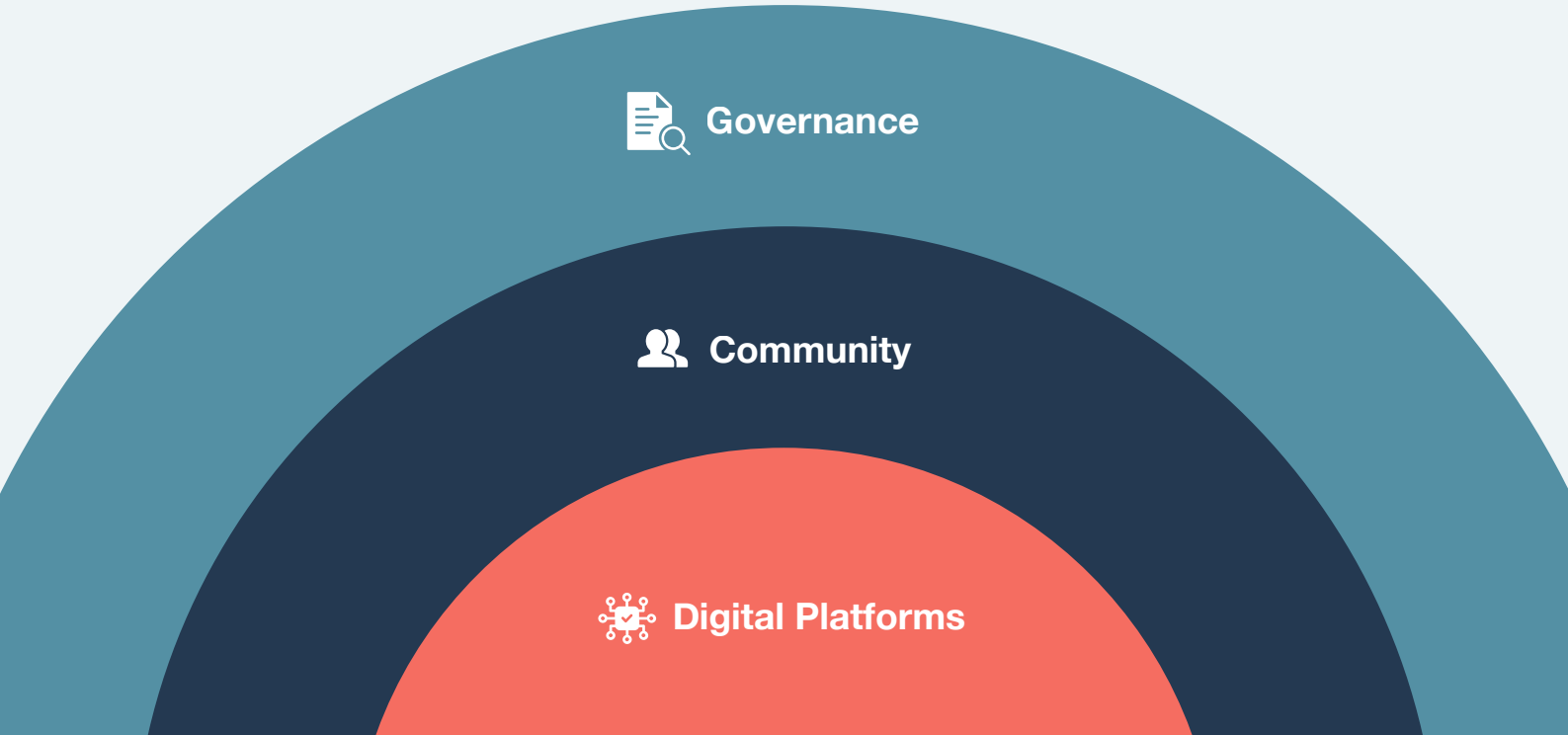
Digital Platforms

Technology infrastructure that facilitates co-creation for the delivery of services to end-users

Technology infrastructure includes data exchanges and registries, ID, open stacks, etc.

End-user solutions may be public goods or proprietary services

Open APIs, standards, and protocols enable interoperability



The various types of open digital platforms are described below.

- **Data Exchanges:** These facilitate the flow of data generated by governments, businesses and individuals across entities, for example, IUDX, Account Aggregators.[7]

- **Open Stacks:** A combination of applications, protocols, software, and / or data registries, for example, Modular Open Source Identity Platform (MOSIP),[8] and National Health Stack (India).[9]

- **End-user solutions** typically comprise a service layer and a user interface built on top of a data exchange or stack; they include solutions like marketplaces, information access portals, or co-creation platforms, for example, Goods and Service Tax Network (GSTN),[10] and GeM.[11]

2.2.2 Community

A vibrant community of partners is the driving force of any ODE. The community primarily comprises **three types of actors:**

01 **Builders:** Public institutions (for example, government departments, public agencies), private enterprises (for example, businesses, start-ups), open source developers, and Managed Service Providers (MSPs) who co-create the digital platforms, their components, and / or leverage them to develop new solutions.

02 **End-users:** Individuals or entities who are consumers of the services delivered via the digital platform. They enable the continuous improvement of these services by participating in their design and providing regular feedback (for example, ratings, surveys, etc.).

03 **Facilitators:** These are entities and experts from multiple fields such as data intelligence, technology, law, and public policy, who are involved in the governance, financing, and research for ODEs, driving adoption and holding the government accountable. CSOs, non-profit groups, foundations, think tanks and academic institutions, etc., can undertake research, and engage with public or private entities and end-users to provide inputs and feedback on the design of the platforms and quality of services delivered, as well as ensure inclusion and the last-mile reach of solutions. Public and private companies may support operations beyond technology development and maintenance, for example, customer support services, data analytics, and user behavior research. Government bodies comprise agencies and committees that drive the ODE vision across sectors and lay down robust governance frameworks at the national level.

[7] Account Aggregator platforms enable the secure sharing of financial data across entities with the individual's consent. Learn more at https://sahamati.org.in/.
[8] MOSIP is an open source software which governments or international organizations can use as a core, to build foundational digital identity systems. Learn more at https://www.mosip.io/.
[9] NITI Aayog, Government of India. (2018, July). National Health Stack Strategy and Approach. NITI Aayog. Retrieved from https://niti.gov.in/writereaddata/files/document_publication/NHS-Strategy-and-Approach-Document-for-consultation.pdf.
[10] This is a centralized platform for individuals and businesses to file indirect taxes, appeals, and grievances. Learn more at https://www.gst.gov.in/.
[11] GeM facilitates online procurement of goods and services required by various government departments and agencies, and aims to enhance transparency, efficiency and speed in public procurement. Learn more at https://gem.gov.in/.

2.2.3 Governance

The openness of the technology infrastructure (including data), as well as the collaborative and multi-stakeholder approach to service delivery necessitates a strong governance framework. In the ODE context, accountability is ensured by both the set of laws and rules that govern the ecosystem, as well as the institutions (government and non-government) that uphold these rules.

Every ODE requires a strong governance framework which should consider the multiple stakeholders and their roles, accountabilities and liabilities. In addition, it should consider risks related to privacy and security, and exclusion, and their mitigation, and the design of different funding models for ODEs that align with their objective of maximizing societal impact. It should aim to empower end-users by safeguarding their rights, ensure institutional accountability for the ODE, enhance transparency, and enable fair and equitable access and outcomes for all stakeholders.

Unpacking the Term 'Open' in Open Digital Ecosystems*

Our thinking on ODEs embraces the word 'open' in the broadest sense possible. At its core is the 'philosophical' idea that ODEs are foundational public goods, in service of society. We unpack this idea at the operational level in the following ways:

- 'Technical' openness refers to making ODEs easily accessible by adhering to a set of open APIs, open standards, and open source code.**
- 'Legal' openness refers to various types of open licenses that allow software, data and other content to be freely used, and shared.
- 'Financial' openness refers to universal access by making ODEs accessible for free or at minimal cost.

Above all, 'open' is a deep cultural attribute which involves engaging with end-users, builders, and facilitators, at all the stages of the ODE lifecycle to enable the creation of a truly multi-stakeholder, participatory ecosystem.

See chapters 5 and 7 for further details.

*We acknowledge the valuable contribution of Societal Platform in advancing the thinking on 'open' in the context of ODEs.
**Ministry of Electronics and Information Technology (MeitY) has released two policies on the use of open APIs and Open Source Software (OSS) to encourage interoperability.

Exhibit 2.4

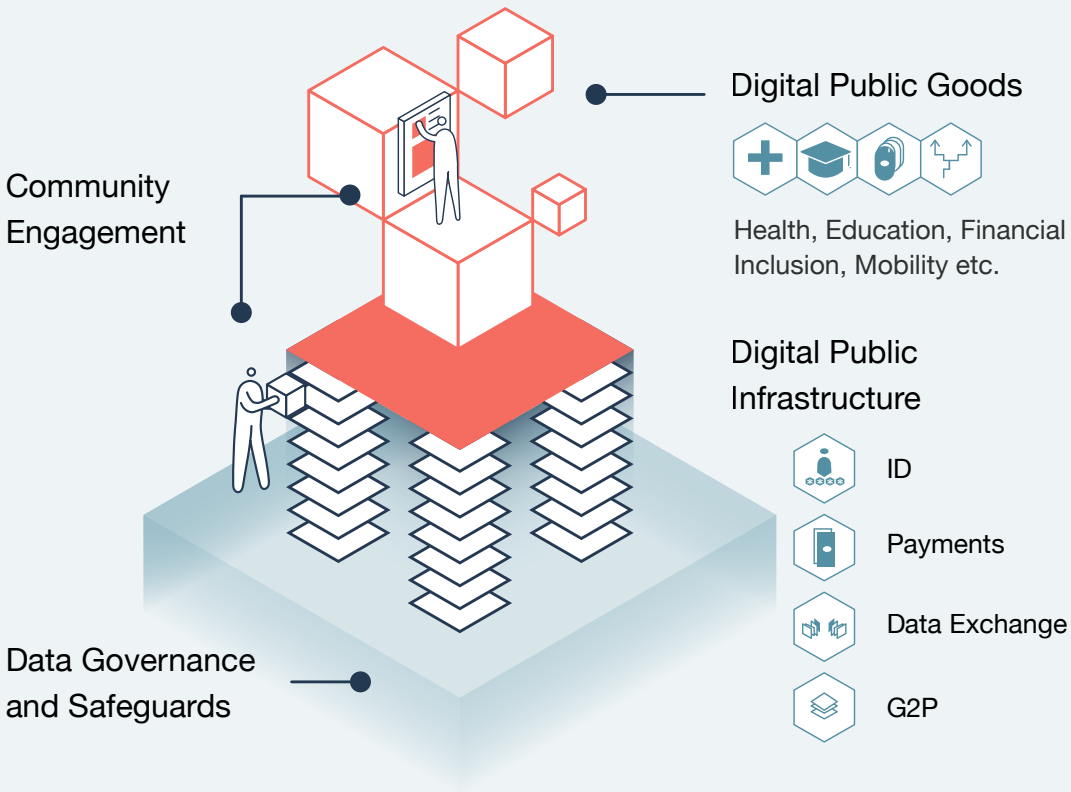
How Open Digital Ecosystems relate to the concepts of 'Digital Public Infrastructure' and 'Digital Public Goods'

There are two terms used to describe the 'tech' layer or the digital platforms layer of Open Digital Ecosystems (ODEs), which have recently become part of the global discourse.

The first is **'Digital Public Infrastructure (DPI)'**. DPIs are the open source foundational technology infrastructure for nations, like Identity, Payments, Secure Data Exchange, and Data Registries that contain information on individuals, households and businesses in the economy. Examples of DPIs are India Stack, MOSIP, Mojaloop, and X-Road.

The second is **'Digital Public Goods' (DPGs)**. Open source solutions in sectors that are critical for public welfare such as health, education, mobility, and financial inclusion need regulations that allow them to be 'public goods' i.e. non-excludable (no individual can be excluded from using it) and non-rivalrous (use by one individual does not reduce its availability to others). DPGs may be complete end-user solutions or may refer to open standards and protocols that can be used to build end-user solutions. Examples of DPGs include the FHIR standard for health data exchange, the Beckn protocol for mobility and local commerce, Open Street Maps, Open Data Kit, and Wikipedia.

ODEs are an evolution of the DPI and DPG concepts with regard to the comprehensive thinking that needs to go into building public infrastructure. ODEs go beyond the 'tech' and give equal prominence to the 'non-tech layers' i.e. governance and community, which are critical if these platforms are to work for the ordinary citizen.



2.3 Guiding Principles for Responsible ODEs

In the above sections, we have described the composition of the layers that make up an ODE. For these layers to come together and maximize the potential impact of ODEs, while minimizing the risks, we have laid out **15 guiding principles, five for each of the three ODE layers** (as shown in Exhibit 2.5). These principles will guide the build of these layers, with the aim to achieve the following outcomes.

- **For Digital Platforms:** Develop reusable, scalable and interoperable technology infrastructure to enable efficient, collaborative, and innovative solutions.
- **For Community:** Foster a vibrant group of builders, end-users, and facilitators who co-create platforms and new solutions, drive accountability, and ensure continuous feedback loops.
- **For Governance:** Enable robust mechanisms – rules and institutions – to ensure transparency, sustainable operations, and fair value sharing for all stakeholders.

These principles, along with examples of where ODEs have been deployed, are detailed in Chapter 5.[12]

Exhibit 2.5

Guiding Principles for Responsible ODEs

Open and secure **DIGITAL PLATFORMS** that enable a **COMMUNITY** of actors to unlock transformative solutions for society based on a robust **GOVERNANCE** framework

DIGITAL PLATFORMS

1. Be open and interoperable
2. Make unbundled, extensible and federated
3. Be scalable
4. Ensure privacy and security
5. Develop minimally and iteratively

GOVERNANCE

11. Define accountable institutions
12. Establish and align with robust rules of engagement
13. Create transparent data governance
14. Ensure the right capabilities
15. Adopt a sustainable funding model

COMMUNITY

6. Ensure universal access
7. Drive participatory design and end-user engagement
8. Cultivate a network of innovators
9. Be analytics-driven for continuous user focus
10. Enable responsive grievance redressal

[12] A version of these principles was first put forth in Ministry of Electronics and Information Technology, Government of India. (2020). Strategy for National Open Digital Ecosystems. MeitY. Retrieved from https://static.mygov.in/rest/s3fs-public/mygov_158219311451553221.pdf.

A Transition to ODEs has begun in India

Many public and private institutions in India are in the process of building ODEs in various sectors such as health, urban governance, and agriculture. However, the journey towards building ODEs across the public service delivery spectrum has only just started. A few examples of digital platforms that exhibit a large number of ODE characteristics and are gradually evolving into full-fledged ODEs have been illustrated in Exhibit 2.6.

Exhibit 2.6
Digital Platforms with ODE Characteristics

NODE	Accountable Institution	Description	Current Status
India Stack Operate Phase	UIDAI, NPCI, MeitY[1]	Enables the government and businesses to deliver presenceless (Aadhaar Authentication), paperless (eKYC, eSign, DigiLocker) and cashless (UPI) services	• High adoption across government, businesses and individuals • ~850 million eKYC transactions and 10.82 billion Aadhar Authentications between July 2019 to May 2020 • ~1.3 billion UPI transactions monthly (INR ~2.2 trillion value)
DIKSHA Operate Phase	MHRD and NCTE[2]	**Knowledge-sharing** platform for teachers to access, create and share course-related content and **teacher training** modules, and for students to access **learning material**	• Roll-out initiated in all states and UTs, with **high adoption in a few**, e.g. Tamil Nadu and Maharashtra • In the process of **enhancing content** on platform, adding features like data-driven content planning

National Urban Innovation Stack (NUIS) Operate Phase	MoHUA and NIUA[3]	Enables urban transformation through a set of cloud-based services e.g. traffic management, grievance redressal	• Pune Smart City to use IUDX for the first pilot urban data exchange. • National Urban Learning Platform (NULP), built on NUIS, to be launched in 2 cities (pilot, 2019) • Citizen-Centric Smart Governance adopted across several municipalities.
National Health Stack (NHS) Design / Build Phase	MoHFW[4]	Driving universal health coverage through a set of building blocks such as health registries (individual, doctors, etc.) and health information exchange, e.g. health insurance	• **National Digital Health Blueprint** (NDHB) published (2019) for public comments, incl. implementation plan for NHS • The National Digital Health Mission, announced in August 2020, will provide a Unique Health ID to every citizen and create a single database
IndEA Digital Ecosystem for Agriculture (IDEA) Design / Build Phase	MoAFW[5]	Data exchange of **farm and farmer related data**, i.e. soil, weather, land records to provide farmers with **seamless access** to government benefits, customized information, input and output **marketplace** and formal-sector **credit**	• **Task force set up under MoAFW** to build the **IDEA 'green print'** (similar to NDHB)

Note:

1. Unique identity Authority of India, National Payments Corporation of India, and Ministry of Electronics and Information and Technology
2. Ministry of Human Resource Development, and National Council for Teacher Education
3. Ministry of Housing and Urban Affairs, and National Institute of Urban Affairs
4. Ministry of Health and Family Welfare
5. Ministry of Agriculture and Farmers' Welfare

Source: NPCI statistics; Aadhaar dashboard; Ministry of Electronics and Information Technology, Government of India. (2020). Strategy for National Open Digital Ecosystems; Ministry of Health and Family Welfare. (2019). National Digital Health Blueprint.

2.4 Role of the Government

The ODE approach calls for the government to play new roles; not just that of a traditional service provider, but also an enabler and a regulator. These three potential roles have been further explored below.

01 **Government as a Service Provider:** This is the traditional role of government – to deliver public services to individuals and businesses. The government's role as a service provider is especially important in the delivery of essential services, such as entitlements, registration of birth, marriage or death, and filing of tax returns. While the government usually assumes the sole responsibility for providing access to essential services, in the 3.0 era, it can also partner with private players to enhance delivery by building user-facing applications on top of privately built open platforms. For example, the DIKSHA platform has been built by leveraging an open source platform, Sunbird.[13]

02 **Government as an Enabler:** In this role, the government is responsible for building technology infrastructure that public and private bodies can leverage to build innovative user-facing solutions. This role arises from the need for collaboration between public and private sector actors to unlock innovation for societal impact, with each party undertaking those tasks that are best suited to their own capabilities.

For example, in the case of IUDX, government departments provide other public and private actors access to multiple types of city data (demographic, geographic, Internet of Things [IoT] data derived from sensors, etc.). Private players (start-ups, businesses, etc.) can leverage the data sets to develop innovative user-facing solutions around women's safety, smart mobility, etc. This would not have been possible in the 1.0 and 2.0 paradigms for two reasons. First, data remained siloed within the confines of the respective departments in the city and second, due to limited collaboration between public and private sectors, the onus to develop all end-user solutions would have fallen on the government.

03 **Government as a Regulator:** In this role, the government is responsible for establishing and enforcing a robust governance framework or 'rules of the road' across all ODEs (whether public or private sector-owned). The frameworks should include rules related to openness, interoperability, data monetization and sharing, data privacy and security, etc. The primary objective of establishing these rules is to avoid risks around exclusion, unfair value capture, and violation of individual privacy as well as to provide mechanisms for grievance redressal and legal recourse. While all ODEs require some form of governance, the role of the government as a regulator becomes critical in the case of ODEs handling personal data or for ODEs that are built and / or operated by the private sector.

For example, in the case of the payments ecosystem, India has seen the entry of several non-bank actors who have leveraged UPI to build services on top. Given the changing landscape, the Reserve Bank of India (RBI) has updated its policy framework for the oversight of Financial Market Infrastructures (FMIs) such as the National Payments Corporation of India (NPCI) and Retail Payment Systems (RPSs) such as Bharat Bill Payment System, operating in India. Through the framework, the RBI aims to promote efficiency, safety, and security in the operation of FMIs and RPSs, including limiting systemic risks, and fostering transparency and financial stability.[14]

[13] Sunbird is an open source, modular platform for learning management. Learn more at https://www.sunbird.org/.
[14] Reserve Bank of India. (2020, June). Oversight Framework for Financial Market Infrastructures (FMIs) and Retail Payment Systems (RPSs). Reserve Bank of India. Retrieved July 28, 2020, from https://www.rbi.org.in/scripts/Bs_viewcontent.aspx?Id=3864.

While the role of the government may evolve in the 3.0 era, it is important to note that the ODE approach does not absolve the government of its core responsibility, that is, to provide public services to individuals. On the contrary, it can equip the government with new tools to enhance service delivery and can empower individuals by enabling better access to their entitlements without discrimination or discretion at the point of delivery. For example, by leveraging shared technology infrastructure such as digital ID (that is, Aadhaar) and payments platforms (for example, Aadhaar-enabled Payment System [AePS]), the Indian government has been able to transfer subsidies worth approximately USD 144 billion (INR 11 lakh crore) to people between 2013 and 2019. The improved targeting and reduced leakages, via the Direct Benefit Transfer (DBT) mechanism, have resulted in savings worth USD 15 billion (INR one lakh crore).[15]

Exhibit 2.7

Role of the Government in the ODE Approach

Government as a Service Provider	Government as an Enabler	Government as a Regulator
The traditional role of the government is to deliver services to both individuals and businesses, including essential services such as entitlements. The ODE approach enhances service delivery through the use of shared, interoperable digital platforms and enables partnerships with the private sector where required.	The government is responsible for building technology infrastructure that public and private bodies can leverage to develop innovative user-facing solutions. These platforms can include data exchanges or open stacks on which end-user solutions can be built.	The government is responsible for establishing and enforcing a robust governance and regulatory framework across all ODEs (whether public or private sector ODEs). The framework should ideally include rules related to technology openness, interoperability, data collection, storage and sharing, and individual privacy and security.

[15] As accessed on June 30, 2020, from https://dbtbharat.gov.in/. This is a cumulative figure upto between March 2013 and December 2019.

03

IMPACT POTENTIAL OF ODES

India has set itself an ambitious goal of becoming a USD five trillion economy by the year 2025.[16] Further, we have committed to achieving the Sustainable Development Goal (SDG) targets by 2030. ODEs can play a critical role in achieving these goals by building new solutions for service delivery, at population scale and lower cost. **In order to achieve these targets, we need to create new models for the government and private sector to engage with end-users, deliver personalized services, and bridge the prevailing delivery gaps.**

3.1 Benefits of the ODE Approach

As discussed in Chapter 2, an ODE reflects three fundamental shifts in how digital solutions are deployed for service delivery – building shared technology infrastructure, enabling interoperability among disparate data systems, and providing safeguards to protect the rights of individuals. This enables ODEs to generate a host of benefits for all ecosystem stakeholders for two reasons.

- **First, openness and interoperability in the sharing of data and other technology infrastructure can create new economic and societal value.** For instance, a data exchange enables a comprehensive view of the challenges at hand, thereby spurring innovation and allowing the creation of more customized solutions. This can potentially increase individuals' access to and choice of services, and drive population scale inclusion. For example, linking different agriculture datasets like soil health, weather forecasting, and crop details can enable timely and customized farm advisory services on sowing, maintenance, and harvest. These advisory services can help improve productivity and farmer incomes. This can also present new business opportunities for agri-tech startups servicing farmers and increase transparency and trust in the ecosystem.

- **Second, ODEs can deliver significant cost and time savings to all ecosystem stakeholders through better targeting and more efficient processes and procedures.** For individuals, this can stem from access to more seamless, user-centric services. For example, individuals who apply for a skilling program can also seamlessly apply for a bank loan through data sharing and consent mechanisms. Following a combined process instead of separately applying for the program and then for the loan would avoid the duplication of paperwork and save resources. Further, government and private sector entities can realize additional cost and times savings by reusing shared technology building blocks rather than recreating them for every new build.

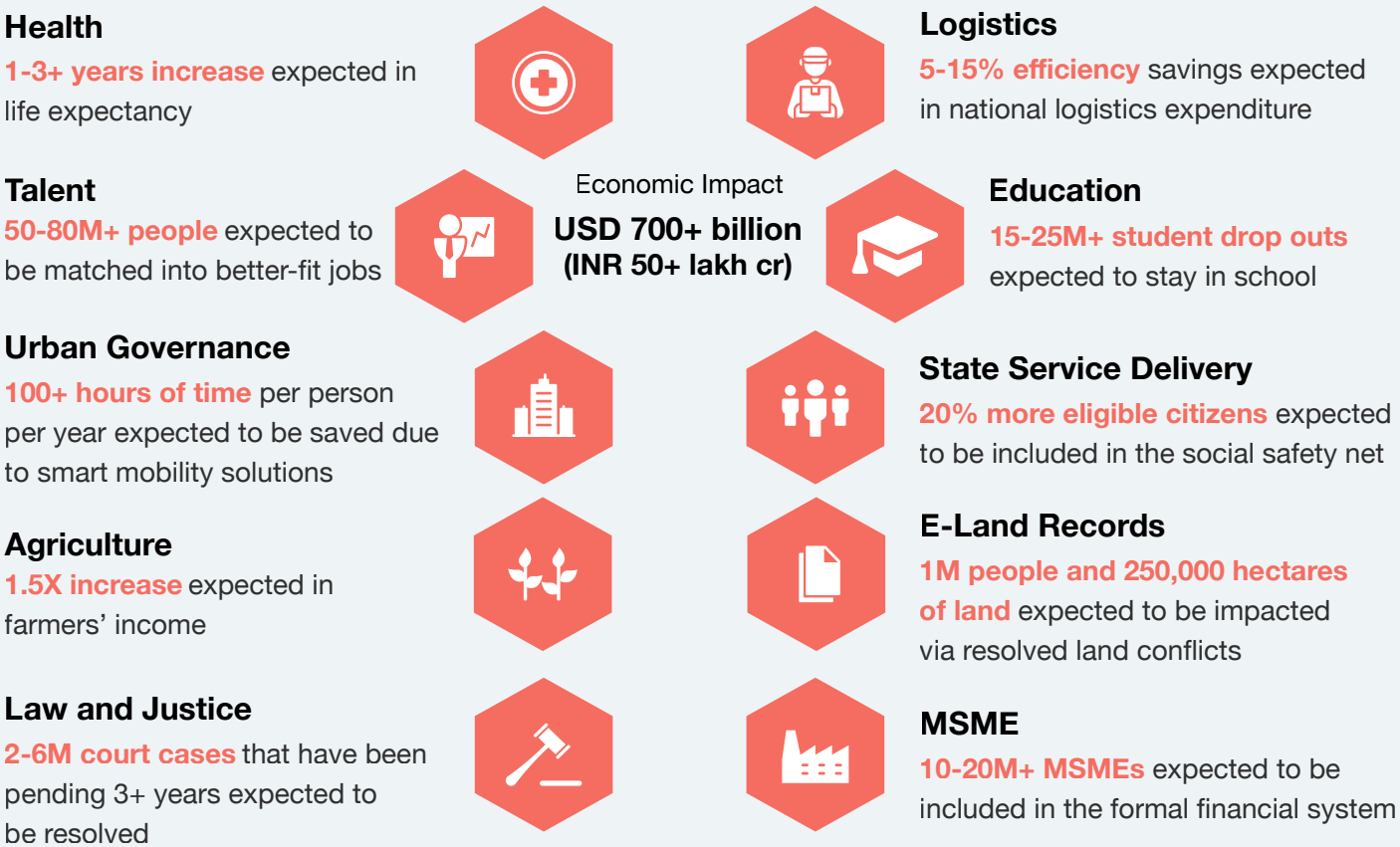
3.2 Quantifying the Impact Potential of NODEs

ODEs hold the potential to create disruptive impact across a wide range of sectors. This report presents an initial list of 10 National ODEs in sectors like agriculture, health, logistics, and real estate, and their potential economic impact as well as the societal and governance benefits such as increase in farmer income, life expectancy, and resolution of land conflicts (as shown in Exhibit 3.1).

[16] Department of Economic Affairs, Ministry of Finance, Government of India. (2020). Economic Survey 2019-20: Volume I. Retrieved from https://www.indiabudget.gov.in/economicsurvey/doc/echapter.pdf.

Exhibit 3.1

Economic, Societal, and Governance Impact Potential of NODEs



Note: USD 700+ billion is the total economic impact potential of these 10 NODEs. Additionally, each NODE will generate a number of societal and governance impacts, a few of which have been showcased in this exhibit.

Source: ONI and BCG analysis

As illustrated in Exhibit 3.1, NODEs hold tremendous potential to unlock significant economic, societal, and governance value.

- **Economic impact: By 2030, 10 high potential NODEs in sectors like health, jobs and skilling, agriculture, justice, logistics, etc., can collectively create new value of USD 500+ billion (INR 35+ lakh crore) – equivalent to 5.5% of India's GDP, and in addition, generate USD 200+ billion (INR 15+ lakh crore) in savings to the country.**[17] It is important to note that the benefit estimated is from the one-time impact of adoption; post successful adoption of the NODE, recurring benefits from continued usage are likely. For example, in the case of the MSME NODE, we have considered a one-year reduction in the interest payment due to increased access to institutional credit. However, the cascading and perhaps perpetual impact of cheaper and easily accessible financing options has not been considered. Therefore, the actual benefits could potentially be much larger.

[17] USD 700+ billion is the one-time impact achieved based on benchmark adoption rates in the year 2030. Since adoption is assumed to be modelled on a curve between 2020 and 2030, the benefits will start accruing sooner than 2030. Further, there will also be recurring benefits post adoption which have not been considered in this estimation. Therefore, the impact is likely to be greater than what is estimated above. India's GDP in 2030 is projected to be USD 8.6 trillion, assuming a business as usual scenario, i.e. without accounting for incremental GDP from ODEs. The estimated USD 500+ billion in new value creation is, therefore, equivalent to about 5.5 percent of GDP in 2030. For a detailed understanding of the methodology please look at the Appendix and the Microsite. Source for GDP projection https://www.oxfordeconomics.com/.

- **Societal impact: The impact of NODEs extends beyond positive stimulus to GDP to enabling significant improvements in the quality of life of the individual.** For example, in addition to the tangible benefits, the Talent NODE can further lead to enhanced job satisfaction due to better job matching. A few key societal benefits that can be achieved by adopting the NODE approach across major sectors have been highlighted below.

  - **Health NODE:** Enhanced access to healthcare and health insurance coverage can **increase life expectancy by one to three years.**
  - **Education NODE:** Improved access to e-learning or remote education opportunities can **improve the education level of 15 to 25 million student drop outs, who will be expected to stay in school** (approximately 20-30 percent of students who drop-out after the 8th / 10th standard).[18]
  - **Talent NODE:** An interoperable platform that brings together information about employment opportunities, job-seekers, and their skills can **potentially match 50 to 80 million people with better-fit jobs** (approximately 10-20 percent of non-casual labor force).[19]
  - **MSME NODE:** Improved access to institutional credit can result in the **inclusion of 10 to 20 million MSMEs in the formal financial system** (approximately 40-50 percent of MSMEs with unmet credit needs).[20]
  - **E-land Records NODE:** Digitization of land records can enable the verification of all land transactions. This can help **resolve land conflicts associated with one million individuals and 250,000 hectares of land** (approximately 10 percent of the land in India is presently under conflict).[21]

- **Governance impact: NODEs such as Urban Governance, State Service Delivery, and Law and Justice can also lead to enhanced governance by strengthening accountability, compliance, efficiency, and transparency.** By augmenting transparency and accountability in service delivery, NODEs can help reduce leakages and improve the quality of delivery.

  - **Urban Governance NODE:** Solutions like smart mobility, enabled through the NODE can enable gains such as reduced commute time, improved public safety, and enhanced productivity, resulting in savings of **over 100 hours per person, annually** for inhabitants of smart cities.
  - **State Service Delivery NODE:** Interoperable and secure state service delivery platforms can result in **20 percent more eligible citizens are expected to be included in the social safety net** by breaking down data silos and through better targeting and leakage reduction.
  - **Law and Justice NODE:** Productivity gains arising from digital interventions in the conduct of court hearings, listing of matters to be heard, filing of cases, precedent tracking, and online dispute resolution, can potentially lead to the **resolution of two to six million court cases** that have been pending for over three years (approximately 20-40 percent of total pending cases).[22]

Further details on these NODEs are provided in Exhibit 3.2. These have been conceptualized based on an analysis of the existing approaches to service delivery, including challenges faced by individuals, public and private entities, the maturity level of current data and technology systems, as well as opportunity areas for disruption across these sectors.

---

[18] National Institute of Educational Planning and Administration and Department of School Education and Literacy, Ministry of Human Resource Development, Government of India. (2018). U-DISE Flash Statistics on School Education. National Institute of Educational Planning and Administration. Retrieved from http://udise.in/Downloads/Publications/Documents/Flash_Statistics_on_School_Education-2016-17.pdf.

[19] Ministry of Statistics and Programme Implementation, Government of India. (2019). Periodic Labour Force Survey.

[20] Omidyar Network and the Boston Consulting Group. (2018). Credit Disrupted: Digital MSME Lending in India.

[21] Land Conflict Watch. Retrieved December 2019, from https://www.landconflictwatch.org/.

[22] National Judicial Data Grid. Retrieved December 2019, from https://njdg.ecourts.gov.in/njdgnew/?p=main/pend_dashboard.

Exhibit 3.2

The Current Status and Potential Benefits of 10 NODEs

NODE	Digital Platform and NODE Services	Potential Benefits for Stakeholders	Current Efforts[23]
Agri NODE	Data exchange platform that integrates and shares data on the farmer (ID, land holdings, financial history, etc.), the farm (plot type, soil type, irrigation, etc.), crops (crop sown, acreage, historic yield, etc.), weather, commodities' pricing, etc. Services that can be built on top include a marketplace for inputs and outputs, logistics, warehousing and farm services, financial services – credit and insurance, and advisory services.	• Access to cheaper formal credit • Better pricing for inputs and outputs • Increased productivity • Improved targeting of subsidies	Task force set up to develop the IndEA Digital Ecosystem for Agriculture (IDEA) 'green print'
Healthcare NODE	Platform comprising aggregated health records of individuals with supporting applications exchanging required data across healthcare and insurance providers, etc. Services that can be built on top include insurance coverage and claims platform, telemedicine applications, and seamless referral applications across facilities.	• Improved healthcare access and outcomes • Reduced out-of-pocket expenses with better insurance coverage • Operational efficiency • Better planning and healthcare system readiness	National Digital Health Blueprint released. The National Digital Health Mission, announced in August 2020, will provide a Unique Health ID to every citizen and create a single database
MSME NODE	Unique digital ID platform for MSMEs (similar to Aadhaar for individuals) to enable integration of data such as financial and transaction history across multiple sources and seamless access to services. Services that can be built on top include access to financial products (credit), labor matching, and a sales marketplace.	• Inclusion in the formal financial system • Access to cheaper formal credit • Enhanced access to resources and customers	CHAMPIONS portal launched by the Ministry of MSME as a one-stop shop for MSMEs, bringing together limited use cases such as list of government services and grievance redressal[24]

[23] While some of the efforts are currently more reflective of the 1.0, 2.0 paradigms, these can gradually evolve into the 3.0 paradigm or ODEs.
[24] Ministry of Micro, Small and Medium Enterprises. (2020, June 1). PM Modi launches CHAMPIONS: Technology Platform to Empower MSMEs. Press Information Bureau. Retrieved June 17, 2020, from https://pib.gov.in/PressReleasePage.aspx?PRID=1628317.

Talent NODE (Skilling and Labor)	Interoperable talent marketplace offering aggregated jobs data and skilling courses, provider accreditation and ratings, verification of personal employment, and skilling history, etc. Services that can be built on top include job search services, skilling and financing services, and career counselling services.	• Better fit between jobs and job seekers and higher average income (through improved matching) • Increased labor force participation • Seamless skills upgradation • Increased trust in the ecosystem due to lower information asymmetry	Multiple disparate public and private sector portals exist (for example, National Career Service Portal, Skill India Portal)
Education NODE	Digital learning management system for students with customizable local-language content, assessment tools and other e-learning resources, access to remote education / tutoring services, etc. Services that can be built on top include personalized adaptive learning solutions and teacher training resources.	• Better access to education opportunities • Improved learning outcomes with personalized training • Reduction in dropouts due to easy access and lower cost	DIKSHA platform launched
Law and Justice NODE	Automated platform to monitor and track legal matters with in-built Artificial Intelligence (AI) / Machine Learning (ML) capabilities to enable out-of-court dispute resolution, faster case resolution, performance and resource management for judges, precedent tracking, and automated research processes to increase efficiency. Services that can be built on top include a case load management portal that can be linked to a judgements' library and tools to facilitate and support online dispute resolution.	• Faster dispute resolution and lower pendency • Increased transparency due to E2E tracking	National E-Courts launched; currently in the 2nd phase of implementation[25]

[25] Ministry of Law and Justice. (2019, January 24). eCourts Services through Common Service Centres. Press Information Bureau. Retrieved June 17, 2020, from https://pib.gov.in/PressReleasePage.aspx?PRID=1561302.

E-Land Records NODE	Platform comprising aggregated digital land records to enable the monitoring and tracking of land transactions and real estate development project history. Services that can be built on top include connecting government applications with the land and revenue departments, real-estate marketplaces, financing applications, applications that can provide information on property ownership, registration status, and tax compliance history, etc.	• Reduced land conflicts • Increased real estate transactions • Improved infrastructure planning • Improved credit or insurance underwriting	Digital Land Records Modernization Programme launched
Connected Logistics NODE	Platform integrating public multi-modal commodity movement data, logistics demand data, transportation and warehousing capacity and utilization information, etc. Services that can be built on top include logistics e-marketplace, capacity forecasting and planning, route planning, trade analytics, and warehouse financing.	• Increased efficiency • Reduced overall costs due to improved utilization (demand and supply matching) • Improved logistics infrastructure planning	National Logistics Information Portal and Port Community system is currently being implemented
Urban Governance NODE	Platform aggregating urban data such as transportation, water, electricity, public safety, grievances, crime, air quality, etc. Services that can be built on top include multi-modal public transportation access, women's safety solutions, grievance redressal, clean energy, and solid waste management.	• Improved efficiency of city services • Reduced fraud and corruption • Improved grievance redressals	National Urban Innovation Stack (NUIS) Concept Note published

State Service Delivery NODE	State-based platform enabling federated access to data from multiple schemes, individuals' personal details, household income, and eligibility data. Services that can be built on top include online services and social protection benefits disbursal from the government to individuals, analytics services for government planning, etc.	• Reduced leakages via better targeting of benefits • Increased trust since individuals get an unhindered view of their benefits • Accurate planning of schemes through better analytics	State initiatives are currently underway in Telangana, MP, Odisha, AP, Haryana, Rajasthan (to name a few); ServicePlus platform released by MeitY (can be customized by the states for service delivery)

04

RISKS ASSOCIATED WITH ODES

As ODEs represent a fundamental shift away from traditional models of ICT-enabled delivery, they can potentially give rise to a set of new risks. These need to be tackled proactively by establishing and implementing the right safeguards and mitigation measures.

Four primary risks and their key drivers have been identified (as shown in Exhibit 4.1) in the context of ODEs. The following risks are specifically related to the construct and functioning of ODEs.

- **Data Centralization** risk, which arises due to aggregation of personal data from multiple sources into a single database, increasing the chance of its misuse or replicating errors due to its poor quality.
- **Builder Adoption** risk, which arises when the builder community (such as open source developers and start-ups) is unable or unwilling to leverage the technology infrastructure to build new and innovative solutions on top due to poor quality of the digital platform, lack of awareness, lack of trust, and / or weak incentives.

Exhibit 4.1

Key Risks Associated with ODEs

ODE-Specific Risks

Data Centralization Risk

- Creation of a single point of failure
- Reliance on poor quality data as a 'single source of truth'
- Inadequate privacy and security safeguards to protect sensitive personal data

Builder Adoption Risk

- Limited awareness of the availability, usage and impact potential of the digital platform
- Poor quality of the digital platform (including data)
- Lack of incentives or funding to build new solutions on top of the digital platform

Other Digital Platform Risks

Exclusion Risk

- Lack of access to technology infrastructure or poor digital literacy
- Non-inclusion of the informal sector
- Disintermediation of the public sector by private players

Operational Management Risk

- Lack of expertise in procurement and contracting
- Lack of required talent or skills for digital development and management
- Paucity of sustainable funding options

Two additional risks, while not unique to ODEs, need to be highlighted as their mitigation is critical to the successful implementation of ODEs.

- **Exclusion** risk, which arises due to technological or socio-economic barriers (such as limited digital literacy and internet services), preventing certain segments of the population from accessing services.
- **Operational Management** risk associated with government ICT builds which arises due to challenges with procurement and contracting, talent management, and funding.

In this chapter, we outline key drivers for each of these risks, discuss their relevance in the context of ODEs, and assess their impact. Additionally, risk mitigation measures across all the three ODE layers, that is, Digital Platforms, Community, and Governance, have also been suggested. These measures have been further elaborated in Chapters 5, 7, and 8.

4.1 Data Centralization Risk

One of the ways in which ODEs create shared value is by breaking down data silos and creating a 'single source of truth' for all relevant stakeholders. For example, the MSME NODE is a platform that can link each MSME's unique digital ID to information that is stored in multiple organizations. This can include utilities bill payment data, GST filing data, fixed asset registries, etc. A comprehensive profile can provide MSMEs with better access to financial and other services in a more efficient manner. **However, the aggregation of personal, and often sensitive data (for example, biometrics, financial, health, etc.), can generate a few critical risks that need to be managed appropriately.**

- **Increased potential for misuse of personal data by public or private sector actors:** There are two ways in which data centralization can increase the potential for misuse of individual data. First, consolidation of data into a centralized registry can increase its vulnerability to cyber-attacks by creating a single point of failure. Second, interoperability across multiple data registries, without appropriate safeguards, can allow entities to access information in a manner that can be misused, potentially for unauthorized profiling, surveillance, and behavioral manipulation, putting an individual's privacy and wellbeing at risk. For example, the e-health record of an expecting mother can enable any doctor to understand her medical history, helping her to access lifesaving maternal healthcare. However, enabling access to this sensitive personal data in combination with other registries such as an employment or insurance database may expose her to discrimination, and result in adverse consequences like job loss or higher insurance premiums.
- **Increased cost of reliance on incomplete or incorrect (poor quality) data:** As data registries become interoperable, the ODE approach creates a 'single source of truth' with stakeholders using the same underlying instance of the data for service delivery. If this data is incomplete or incorrect, then the decisions that are tethered to it could be biased or incorrect as well. For example, there has always been a risk that incorrect data may lead to the exclusion of certain individuals from accessing social benefits. However, in the past, each state or central department created its own (often physical) registry and, therefore the risk of consistent exclusion across all of them was lower. As we move in the direction of creating a single 'social registry' of individuals that can be leveraged by multiple departments, any errors in the records in the underlying registry could result in wrongful exclusion of certain individuals from receiving government services or benefits from all departments that use the registry.

Mitigating Data Centralization Risk

Digital Platform Design (Refer Section 5.1)

- Incorporate PbD principles and appropriate security measures into the platform design, for example, E2E data encryption, purpose specification, data minimization, electronic consent and authorization frameworks, etc.
- Adopt a federated architecture when building data registries to avoid consolidation of the data into a centralized database, with clear standards on privacy. This allows data to be stored across multiple databases rather than creating a single point of failure.

Community Engagement Processes (Refer Section 5.2)

- Run initiatives such as penetration testing or bug bounty programs to identify and address security vulnerabilities in the platform.
- Establish responsive (and legally backed and enforceable) grievance redressal mechanisms at the ODE and national level.
- Define the accountable entity, processes, and recourse measures to flag data-privacy and security related concerns, etc.

Governing Rules and Institutions (Refer Section 5.3 and Chapter 8)

- Set up a NODE Council with committees on 'Technology and Data' and 'Risk and Ethics', to:
  - Develop trusted frameworks on data collection, sharing, and usage.
  - Publish a 'Code of Ethics': Standards on ethical design and delivery of solutions (including personal and community data usage, data sharing, and monetization).
- Outline and publish data governance policies and standards to incorporate transparency, accountability, and fairness.
- Establish mechanisms (touch-points, processes, etc.) for users to exercise their ability to correct, complete, and update misleading, incorrect, and out-of-date personal data to ensure data quality.
- Conduct a risk-benefit analysis to ensure proportionate use of individual data (that is, societal benefit from data vs. risk exposure to individuals).

Not all ODEs are the Same: Significant Variation in Degree of Risk

ODEs vary considerably by the type of data underpinning the platform, the number and types of stakeholders (public sector, private entities, individuals) that interact with it, the frequency at which data is collected, and the policies around data usage and retention. All these variables play a key role in determining the level of risk and potential harm to individual privacy and security posed by the ODE.

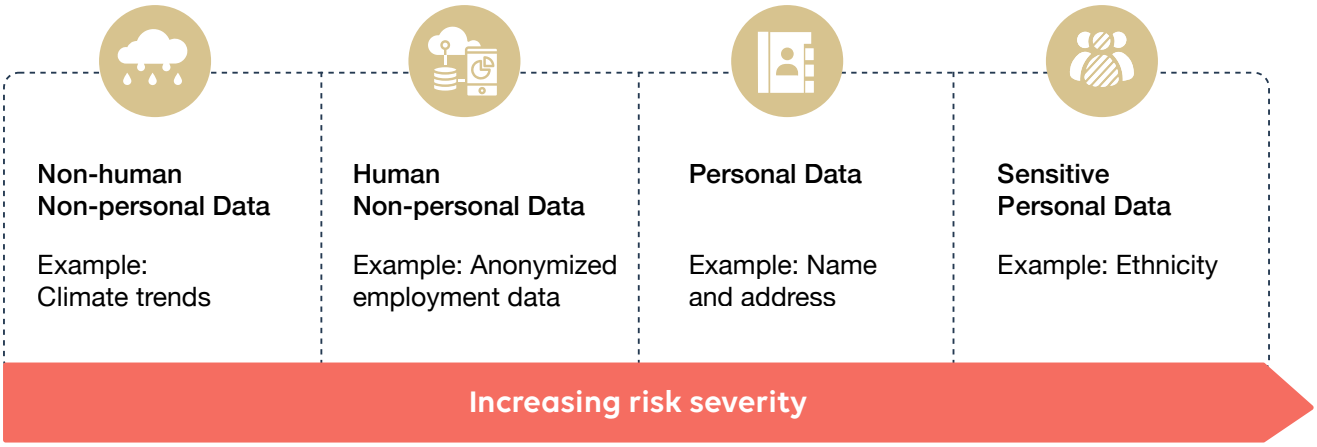
As a first step, we have classified the different types of data and ranked them according to the degree of risk posed by each.[26, 27, 28]

- **Personal Data or Personally Identifiable Information (PII):** Comprises data that can be used to identify a specific individual directly or indirectly through mapping; includes name, surname, address, phone number, location, Internet Protocol (IP) address, etc.
  - **Sensitive Personal Data:** Comprises personal data that needs to be guarded with additional security and privacy measures owing to the enhanced reputational, social, legal, and financial risks posed by its misuse; includes biometric data, genetic data, health identifiers, religious or political beliefs, etc.
- **Human Non-Personal Data:** This can take two forms:
  - Data that is related to individuals but has been anonymized (pseudonymized or de-identified) for use and thus, cannot be used to directly identify any specific individual, for example, e-commerce shopping trends, seasonal disease trends, etc. However, the risk of re-identification persists due to the cross-linking of this data with other datasets.[29]
  - Aggregated data at the level of administrative units, for example, villages, municipalities, districts, etc., that does not contain an individual's details. While this reduces the risk of individual privacy violation, it still retains the risk of community-level harms (for example, religion-based, caste-based or political targeting).
- **Non-Human Non-Personal Data:** Comprises data that has no relation to human beings and is usually available in the public domain, for example, weather patterns, soil quality data, etc.

26 Personal Data Protection (PDP) Bill 2019 (India).
27 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ L 119, 4.5.2016, p. 1).
28 The Ministry of Electronics and Information Technology. (2020). Report by the Committee of Experts on Non-Personal Data Governance Framework. Retrieved from https://static.mygov.in/rest/s3fs-public/mygov_159453381955063671.pdf.
29 Re-identification of personal data that has been de-identified, without the consent of the data processor, has been stated as a punishable offense in the PDP Bill, India (2019).

Exhibit 4.2

Risk Severity of Different Types of Data



Since most ODEs usually use or store some combination of the above types of data, the risks posed by each ODE depends on its unique context. For example, a State Service Delivery ODE comprises a social registry that will typically enable data interoperability across multiple schemes, including individual contact details, household income (personal data), biometrics, and financial account details (sensitive personal data). The collection, usage, and handling of personal data of millions of individuals makes the ODE highly at risk of individual privacy violations. On the other hand, a National Disaster Management or Public Spending ODE usually aggregates data belonging to the non-human non-personal category, majority of which is already in the public domain (for example, historical data on weather disasters, geographic hotspots information, public sector spending on central or state programs and schemes) and hence, poses low risk to individual privacy and security. The risks and the potential cost of data misuse can be mitigated through a set of digital platform design choices and by establishing a robust governance framework. These principles are further discussed in Chapter 5.

4.2 Builder Adoption Risk

The success of the ODE approach depends on its adoption by builders, end-users, and facilitators. Given the collaborative, building blocks approach, value creation will only be possible if the builder community leverages the shared technology infrastructure to build new and innovative solutions on top or contributes to the building of new digital platforms. Further, it is imperative that all ecosystem collaborators comply with the standards and protocols of the ODE.

For example, the IUDX platform aims to open public data (for example, traffic patterns, street lighting and sensors, land use, crime, etc.), to innovators to build new solutions in the context of urban governance such as smart mobility, women's safety, etc. **The platform, thus, provides innovators with a core technology infrastructure, along with the necessary technical specifications but does not necessarily create end-user solutions.** The successof this platform and its impact on urban lives, therefore, relies on its adoption by innovators who can take advantage of the infrastructure to build services on top of it.

There are several factors that lead to the lack of adoption by the builder community community which have been listed below.

- **Lack of Awareness:** Builders are often not aware of the existence of the digital platforms or are unable to envisage the potential value that can be generated by building solutions on top of them.
- **Poor Quality of Digital Platforms:** Open data platforms sometimes contain compromised datasets or datasets in non-usable formats. This can impact the quality of the platform and make it challenging for the builders to leverage it.
- **Lack of Incentives or Funding:** Paucity of funds or incentives can prevent builders from leveraging the technology infrastructure to create new solutions. This is especially true for start-ups and entrepreneurs, who comprise a large proportion of the builder community.

Beyond builder adoption risk, ODEs can face the risk of a lack of end-user engagement with the platform. Hence, it is also important for ODEs to undertake proactive measures to gain traction among the end-users of the platform to achieve the desired socio-economic impact. This is further discussed in Section 5.2.

Mitigating Builder Adoption Risk

Digital Platform Design (Refer Section 5.1)

- Use and / or build open standards, licenses, databases, APIs etc., to facilitate interoperability.
- Build reference user-facing applications on top of the ODE to demonstrate its use and encourage builders to create relevant solutions, for example, Bharat Interface for Money (BHIM) was built on top of UPI.

Community Engagement Processes (Refer Section 5.2)

- Facilitate participatory design of ODEs, including co-creation and feedback loops via public consultations, workshops, forums, etc., to enhance platform builder-centricity.
- Organize hackathons and incentive-based challenges to encourage the creation of digital platforms or innovative solutions on top of the platform.
- Provide ongoing support (Frequently Asked Questions [FAQs], guidelines, usage documentation, user service desk, etc.), to facilitate the effective use of platforms.
- Define and monitor Key Performance Indicators (KPIs) related to user adoption, for example, number of solutions built on top, ODE adoption rates, etc., and identify steps to be undertaken to enhance builder-centricity and performance.
- Nurture a vibrant open source developer community that can contribute to building the technology infrastructure as well as create user-facing services and solutions on top.

Governing Rules and Institutions (Refer Section 5.3 and Chapter 8)

- Ensure transparent data governance, that is, clear publication of data sources, ownership, policies for data collection, etc., to ensure good data quality and integrity.
- Define and use common standards that are published by government agencies.

4.3 Exclusion Risk

Exclusion from basic services, such as education, health, and financial services affects the livelihoods and standards of living of individuals and can compound the deprivations of the traditionally underserved segments of the population. For these individuals, beyond the adverse impact on their well-being, inability to access essential services can undermine their trust in the government, thereby damaging the social contract.

Exclusion risks manifest themselves in the two forms discussed below. It is important to note, however, that digital exclusion is not just contained to ODEs and can arise across a range of technology enabled services.

- **Digital Exclusion is primarily driven by the lack of access to good quality technology infrastructure that is, internet connectivity, smartphones, etc., and due to limited digital literacy among rural and marginalized communities.** As of March 2019, while internet penetration in the urban Indian population was approximately 51 percent, it was a meagre 27 percent in rural India.[30] **Another aspect of digital exclusion is the risk of not accounting for the large informal sector when migrating to digital platforms.** For example, the informal sector accounts for approximately 93 percent[31] of the employed population in in India. In the case of the Talent NODE, this population could face a high risk of exclusion since these individuals are often not included in official employment databases such as Employees' Provident Fund Organisation (EPFO). Similarly, ODEs related to smart cities and urban planning might fail to consider the informal settlements in urban cities that roughly comprise 24 percent of the urban population in India.[32]

- **Disintermediation of the Public Sector by Private Entities:** The ODE approach promotes minimalism and collaboration among public and private sector players for public service delivery, so that each stakeholder can leverage its unique skills. This can result in a change in the role of the government from service provider to data creator, custodian or supplier of technology infrastructure. This, in turn, can open up avenues for private entities to function as service providers by building on top of publicly available technology infrastructure and increasing choice and competition for users. However, it can also result in the exclusion of certain segments that may not be profitable for the private sector to serve. Thus, disintermediation can preclude certain sections of the society from accessing key services. This can be effectively addressed by establishing relevant regulatory frameworks or providing a default public provision option for essential public services.

30 IAMAI and Nielsen. (2019). India Internet. Retrieved from https://cms.iamai.in/Content/ResearchPapers/d3654bcc-002f-4fc7-ab39-e1fbeb00005d.pdf.
31 Department of Economic Affairs, Ministry of Finance, Government of India. (2019). Economic Survey 2018-19. Ministry of Finance.
32 Population living in slums (percentage of urban population) - India. (n.d.). World Bank Open Data. Retrieved June 5, 2020, from https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=IN.

Mitigating Exclusion Risk

Digital Platform Design (Refer Section 5.1)

- Design user-friendly (including disability-friendly), vernacular interfaces, that is, User Interface / User Experience (UI / UX) for ease of access.
- Enable omni-channel access (mobile, web, Interactive Voice Response System [IVRS], etc.), including offline channels to accommodate all levels of technological know-how.
- Design a default public sector provision option for the delivery of essential services (for example, BHIM for mobile payments).

Community Engagement Processes (Refer Section 5.2)

- Provide last-mile access and engagement for rural and marginalized groups, via both online and offline channels, for example, Common Service Centres (CSCs) to facilitate last-mile reach of services.
- Facilitate participatory design and ensure feedback loops through public consultations, beta-testing user groups, etc.

Governing Rules and Institutions (Refer Section 5.3 and Chapter 8)

- Establish a NODE Council with a committee on 'Risk and Ethics' to:
  - Publish a 'Code of Ethics': Standards on ethical design and delivery of solutions (including digital and socio-economic inclusion).
- Adopt a sustainable funding model that is mindful of intended user propensity to pay as well as price elasticity of demand, to ensure universal access.
- Incentivize private entities that build end-user facing apps to serve the non-profitable segments of the society as well.
- Encourage participatory governance via end-user collectives and CSOs that monitor social impact KPIs, for example, social audits.
- Release source code to enable entities to check for exclusionary biases in algorithms.

4.4 Operational Management Risk

Digital government solutions have traditionally been fraught with operational challenges, especially those related to third party procurement and contracting, on-boarding technology talent and required capabilities, and financing. These challenges can give rise to certain risks that can pose a serious threat to the effective launch and functioning of an ODE. Operational management risks are primarily driven by the following factors.

- **Lack of Relevant Expertise:** Many institutions or government bodies lack the relevant expertise required to build holistic digital solutions. Creating and managing an ODE would require expertise in (i) shaping multi-vendor technology contracts involving digital platform development, maintenance, hosting etc., (ii) drafting terms and conditions and service-level agreements that foster long-term benefits for all parties, (iii) building flexibility into the arrangement to manage for future changes, and (iv) framing requirements that take into account immediate as well as future needs. The Singapore government's digital transformation agency, GovTech, has introduced several innovative procurement processes to cater to the needs of digital builds. An example of such an initiative is 'Spiral Contracting',[33] which comprises multi-stage contracts. In this case, the project advances to subsequent phases only on the success of the preceding phase. Another example is 'Dynamic Contracting' (for bulk tenders),[34] that allows for the addition of either new requirements or new vendors (suppliers), at any point in the contract.

- **Inadequate Talent Management:** Several government organizations are unable to identify talent with the relevant technology and marketing skills (for example, chief technology officers, product managers, data scientists, data privacy experts, and consumer research analysts). Additionally, uncompetitive compensation packages and stringent rules challenge the public sector's ability to recruit the relevant talent from the open market. For example, GSTN's recruitment strategy has focused on hiring the right talent from the open market (not just from within government) given the complexity of the Information Technology (IT) infrastructure and the expertise required to build it. In order to achieve this, GSTN designed a competitive recruitment process which included benchmarking against private sector skills, offering attractive compensation, and engaging a specialized consultancy to implement a rigorous screening process.

- **Paucity of Financing Options:** Across several departments, public sector budgets typically allocate a small proportion of the total funds to digitization or technology interventions. Building technology infrastructure, much like physical infrastructure, requires a significant share of expenditure to be earmarked for this purpose. Additionally, unless governance and funding models can be identified to enable a reasonable return, private sector interest in financing ODEs is likely to be low. Guidelines on how ODEs can plan for a long-term sustainable funding model and how the public sector can effectively allocate funds for new builds, have been detailed in Chapter 7.

[33] Government of Singapore. (2009). Budget Highlights Financial Year 2009: Keeping Jobs, Building for the Future. Retrieved from https://www.mof.gov.sg/Newsroom/Press-Releases/Keeping-Jobs-Building-for-the-Future.

[34] GovTech Singapore. (2019, June). 3 New Ways to Partner with GovTech. Government Technology Agency. Retrieved June 1, 2020, from https://www.tech.gov.sg/media/technews/3-new-ways-to-partner-with-govtech.

Mitigating Operational Management Risk

Community Engagement Processes (Refer Section 5.2)

- Create mechanisms to enable improvements in the platform's performance or rectify bottlenecks in operations, for example, through bug bounty programs to identify errors in the code or by appointing expert advisory groups.
- Enable responsive grievance redressal processes to address operational challenges.

Governing Rules and Institutions (Refer Section 5.3 and Chapter 8)

- Ensure the right capabilities and expertise by instituting processes and practices to attract and retain the relevant talent.
- Adopt a sustainable funding model that not only supports the build and operations of the platform, but also ensures long-term planning and appropriate allocation of public funds for new ODEs.

While the above sections have demonstrated a number of ways in which potential risks associated with ODEs can be mitigated, it is also crucial to adopt practices that can enable the early identification of risks and their potential negative consequences. One such approach is known as Consequence Scanning.[35] It is a continuous process and should be conducted at every key milestone of the ODE lifecycle, that is, plan, design, build, and operate. It enables ODEs to anticipate and address potential threats by envisaging the risk mitigation measures for all identifiable risks in the planning and design phase and incorporating appropriate measures (outlined in the above sections) during the initial build itself.

Consequence Scanning is a process in an iterative development cycle that allows builders to consider the potential consequences and risks associated with a product and provides them with the opportunity to mitigate or address potential harms before they take place. It does so through the following three key questions.

01 What are the intended and unintended consequences of this product or feature?

02 What are the positive consequences we want to focus on?

03 What are the consequences we want to mitigate?

[35] Doteveryone. (n.d.). Consequence Scanning – An Agile Practice for Responsible Innovators. doteveryone | think tank championing responsible tech for a fairer future. Retrieved June 5, 2020, from https://www.doteveryone.org.uk/project/consequence-scanning/.

The process operates across two phases – Ideation and Action – and recommends including the core team developing the product, along with user researchers, and technology and business specialists in order to glean different perspectives.

For example, data from a healthcare ODE can potentially allow insurance agencies to analyze disease burdens and hospitalization rates across geographies. While leading to potential benefits (such as developing more personalized insurance offerings), such insights can also fuel malpractices (such as poor coverage of locally prevalent diseases). Consequence Scanning, in such situations, will allow builders to establish appropriate frameworks to mitigate the potential risks.

Learn more at: https://www.doteveryone.org.uk/project/consequence-scanning/

05

GUIDING PRINCIPLES FOR RESPONSIBLE ODES

Given the impact potential alongside the possible risks of ODEs, it is imperative to ensure the correct design and delivery of ODEs, and establish appropriate safeguards. In this chapter, we propose a set of guiding principles for 'responsible' ODEs, designed with the aim of maximizing benefits and minimizing potential harms.

These guiding principles (as shown in Exhibit 5.1) address both the 'tech' (Digital Platforms) and 'non-tech' (Community and Governance) layers of ODEs. Each principle is illustrated with an example to help readers understand and apply them in different contexts.

These principles have been developed after an extensive benchmarking of existing resources such as the Gemini Principles by the Centre for Digital Built Britain, Societal Platform Design Principles, the US Government's Digital Strategy, and Singapore's Digital Government Blueprint.[36] Further, on the Microsite, four case studies demonstrating the application of many of these guiding principles have been provided, along with an Interactive Toolkit for successful implementation.

Exhibit 5.1

15 Guiding Principles for Responsible ODEs

Layer	Guiding Principle	Description
Digital Platforms	1. Be open and interoperable	Use and / or build open source codes, standards, licenses, databases, APIs, etc., so that different digital platforms and their components can talk to each other.
	2. Make unbundled, extensible, and federated	Incorporate a modular or 'building blocks' architecture. Design such that each block (i) has minimal functionality allowing it to be used in different contexts, (ii) is extensible so that it can be combined with other blocks and repurposed in diverse contexts, and (iii) represents an autonomous data source which is interconnected with other sources rather than creating a single database covering all variables.
	3. Be scalable	Use elastic and flexible design to enable the platform to easily accommodate any unexpected increases in demand and / or to meet expansion requirements, without the need to change existing systems.
	4. Ensure privacy and security	Adopt a PbD approach that embeds key technology and security features within the core design of the solution to ensure individual privacy and data protection.
	5. Develop minimally and iteratively	Build incrementally to develop Minimum Viable Products (MVPs) to which additional features can be added in response to new use cases and as our understanding of user behavior gradually evolves.

[36] For additional information on these resources, and other resources considered, please refer to the Further Readings section of the report and the Toolkit.

Community	6. Ensure universal access	Encourage the build of ODEs that minimize or overcome barriers to access (economic, technical, or social) to ensure inclusion, empowerment of end-users, last-mile access, and user rights, irrespective of their backgrounds.
	7. Drive participatory design and end-user engagement	Encourage the participation of all community actors throughout the ODE value chain, that is, plan, design, build, and operate, to facilitate and promote a culture of openness and collaboration, enable the development of user-centric solutions, and facilitate widespread and sustained adoption of the digital platform.
	8. Cultivate a network of innovators	Proactively engage with innovators to spur the development of new solutions on top of the digital platform.
	9. Be analytics-driven for continuous user-focus	Leverage the data generated by the digital platform to acquire insights around user profiles and engagement, adoption barriers, and platform performance. Analyze user data to improve user-centricity, support robust policy-making, and incentivize the design of new solutions.
	10. Enable responsive grievance redressal	Define accessible and transparent mechanisms (offline and online) for grievance redressal, that is, user touch-points, processes, and responsible entities with a strong focus on actions for resolution.
Governance	11. Define accountable institutions	Ensure a designated institution for the ODE and create the right legal and organizational structure, operating processes, etc., in line with its objectives. Promote multi-stakeholder governance involving key stakeholders, including government bodies, private actors, and individuals to enhance transparency.
	12. Establish and align with robust rules of engagement	Define clear rules around the responsibilities, rights, and liabilities of all actors in the ecosystem (government bodies, private sector participants, individuals), in adherence with domain-specific laws and rules and other overarching national policies and frameworks.
	13. Create transparent data governance	Outline clear standards and policies on data ownership, collection and contribution, consumption, and sharing, especially with respect to sensitive personal data. Ensure that these are easily understood and readily available to all users. Establish a set of mechanisms to monitor and drive adherence.
	14. Ensure the right capabilities	Nurture partnerships and establish Human Resource (HR) policies and practices to attract and retain the relevant talent required to successfully build and operate the digital platform.
	15. Adopt a sustainable funding model	Develop a sustainable long-term funding model which is aligned with the overall goals of the platform, to ensure uninterrupted operations and continuous user-focused enhancements.

5.1 Digital Platform Design Principles for Responsible ODEs

The principles for designing digital platforms focus on ensuring that the technology infrastructure is open, reusable, scalable, and promotes interoperability for efficient and innovative service delivery.

Principle 1

Be open and interoperable: Use and / or build open source codes, standards, licenses, databases, APIs, etc., so that different digital platforms and their components can talk to each other.

Digital platforms should be designed using open source rather than proprietary software to enable the developer community to modify or enhance existing codes and create new solutions on top. This facilitates transparency and prevents vendor lock-in. However, openness in technology is not limited to source code. It also includes open APIs, licenses, and standards which facilitate interoperability, data sharing, collaboration, and the creation of interlinked data systems.[37]

Interoperability between platforms is critical as it will help ODEs provide users with an E2E experience by facilitating the aggregation of information across multiple registries and enabling the developer community to build new and improved solutions on top. Being open and interoperable has three key advantages.

01 Enable platforms to interact with each other to achieve efficiency in design and operations.

02 Deliver more user-centric services.

03 Guard against potential monopolies, thereby promoting competitive behavior and availability of choice for individuals.

It is important to note that appropriate guidelines and processes are necessary in order to promote open technologies. To encourage interoperability and stakeholder participation, MeitY has released two policies, one on the use of Open APIs[38] and the other on the use of Open Source Software (OSS)[39] as the preferred option for all GoI e-governance applications and systems. Going forward, digital platforms can adhere to these policies, along with additional global best practices highlighted in the Toolkit (see Chapter 9 and the Microsite).

Example 1

IUDX, an initiative of Ministry of Housing and Urban Affairs (MoHUA), is a part of the Smart Cities Mission.[40] The platform enables secure access and sharing of data housed under different government departments in a city (for example, demographic, geographical, IoT data derived from sensors, property records, etc.). This is achieved by facilitating interoperability across disparate systems through the use of open standards and APIs, allowing them to 'talk to one another'.

[37] Schlagwein, D., Conboy, K., Feller, J. et al. "Openness" with and without Information Technology: A Framework and a Brief History. J Inf Technol 32, 297–305 (2017). Retrieved from https://doi.org/10.1057/s41265-017-0049-3.

[38] Ministry of Communications & Information Technology, Government of India. (2015, May 19). Policy on Open Application Programming Interfaces (APIs) for Government of India. Retrieved from https://meity.gov.in/writereaddata/files/Open_APIs_19May2015.pdf.

[39] Ministry of Electronics and Information Technology, Government of India. (2014, March 1). Policy on Adoption of Open Source Software for Government of India. Retrieved from https://meity.gov.in/writereaddata/files/policy_on_adoption_of_oss.pdf.

[40] Learn more at https://www.iudx.org.in/.

Data, which was previously sitting in silos, can now be collectively accessed by different public and private players (start-ups, businesses, etc.). These players can leverage this data to develop innovative user-facing solutions related to smart mobility, waste management, traffic management etc., for the urban population. For example, a public safety application can be built to alert users to the relative safety of a particular neighborhood or provide suggestions for safer walking or driving routes based on a combination of crime data, Geographic Information System (GIS) data, streetlight data, and traffic information housed within different departments.[41]

The UK Government has developed open digital infrastructure, Gov.UK Notify, Pay, and Verify, that can be leveraged by all public agencies. These platforms enable agencies to send messages to individuals, accept online payments, and verify an individual's identity, respectively. By building these as open and interoperable, all government agencies can integrate them into their existing solutions rather than rebuilding them from scratch each time. As a result, the government can offer a consistent user experience across all services and save considerable time and cost. Taking it a step further, the UK's Government Digital Service (GDS) has also made the source code of the above digital infrastructure open, allowing Australia's Digital Transformation Agency (DTA) to leverage the code to build its own Government-to-Citizen (G2C) messaging service.[42]

Principle 2

Make unbundled, extensible, and federated: Incorporate a modular or 'building blocks' architecture. Design such that each block (i) has minimal functionality allowing it to be used in different contexts, (ii) is extensible so that it can be combined with other blocks and repurposed in diverse contexts, and (iii) represents an autonomous data source which is interconnected with other sources rather than creating a single database covering all variables.

This 'building blocks' approach is very similar to the Lego blocks with which children play. Each Lego block looks and feels different and thus, has a specific purpose. However, every distinct block can be assembled with other blocks to build different end-products such as a house, car, tree, etc.

Modularity, combined with extensibility, ensures that while each building block of the platform serves its own unique purpose, it can be combined with other building blocks to be repurposed for the creation of new digital platforms and solutions. This precludes the need to reinvent the wheel for every separate build, thereby conserving valuable resources. For example, a common government platform design (to bring together stakeholders across a sector) can have multiple blocks – one can undertake the search function, while another can provide the functionality to filter. This basic model can be repurposed for any sector such as agriculture or talent. In the Agri NODE, these functions can be used to scan through government agriculture schemes, filtered by location. On the other hand, the Talent NODE can use these functions to allow users to search for training providers based on a specific skill or course, filtered by rating.

Finally, adopting a federated architecture to connect the databases can increase security and reliability. Instead of consolidating all required data into a single registry, it is better to retain data within their existing data registries and issue calls to access the data, as per requirement. **This ensures regular access to real-time data and avoids dependency on a single, centralized database. It also ensures the ability to retain federated data ownership and apply the necessary safeguards on data sharing and exchange, such as access control.**

[41] Ministry of Housing and Urban Affairs, Government of India. (2019). National Urban Innovation Stack: Strategy & Approach. NIUA. Retrieved from https://smartnet.niua.org/sites/default/files/resources/national_urban_innovation_stack_web_version.pdf.
[42] Learn more at https://notify.gov.au/.

Adopting an unbundled (building blocks) and federated construct for the digital platform also enhances platform resiliency, owing to the distributed nature of the infrastructure. Vulnerabilities are spread out across a network of databases and digital building blocks, instead of being concentrated in a singular consolidated database and enterprise architecture (for example, a single point of failure). This equips the platform to adapt to unexpected changes without significant disruptions.

Example 2

The NUIS is being developed to provide foundational building blocks that can be repurposed for a host of digital urban initiatives across India. The stack is envisioned as a collection of data registries, cloud-based services such as location, payments, authentication, and authorization, etc., and applications such as analytics, data visualization tools, etc. These can be accessed using open APIs (compatible with global standards) to build various urban solutions and services. For example, the IUDX digital platform can leverage the NUIS stack components such as authentication, search, and entity management services. **These core services can also be utilized to build solutions like smart urban governance platforms as well as smart procurement platforms for local government bodies.**[43]

X-tee, Estonia's data exchange platform based on X-Road (which is open source), enables the exchange of data amongst different government departments, private entities, and individuals. The platform forms the backbone of the **federated model of data ownership and storage** adopted by Estonia. Different government bodies and private sector entities create and maintain their own separate databases that best suit their needs. However, the data exchange platform allows them to securely share data (for example, population register, health register, financial information, etc.) with each other. The decentralized model enables higher security since each database incorporates security measures to ensure the quality and privacy of data that is flowing through X-Road.[44]

Principle 3

Be scalable: Use elastic and flexible design to enable the platform to easily accommodate any unexpected increase in demand and / or to meet expansion requirements without changing existing systems.

ODEs will operate at population scale, which in the case of India would translate to millions of households, businesses, and individuals. However, the platform may start with fewer users and use cases and scale-up subsequently. **Incorporating flexible and scalable architecture ensures uninterrupted operations as well as sustainability of the offered services.** Hence, digital platforms should incorporate horizontally scalable architecture that is flexible enough to easily adapt to a large number of users and data records. This keeps a control on the initial technology investment while the platform is being tested and prevents poor performance due to server overload.

[43] Ministry of Housing and Urban Affairs, Government of India. (2019). National Urban Innovation Stack: Strategy & Approach. NIUA. Retrieved from https://smartnet.niua.org/sites/default/files/resources/national_urban_innovation_stack_web_version.pdf.
[44] X-road®. (2019, November 7). e-Estonia. Retrieved from https://e-estonia.com/solutions/interoperability-services/x-road/.

Example 3

The GSTN platform has facilitated an increase in indirect tax compliance and is thus, likely to see a steady increase in the number of tax payers (users). As reported by GSTN, the scale of users has already risen from approximately 6.5 million to 12 million (approximately 65 lakh to 1.2 crore) from July 2017 to February 2019. The platform incorporated a horizontally scalable architecture for all software components due to the uncertainty in the number of users. **This ensured that it could increase user capacity at any time simply by augmenting the hardware, without the need for any changes to the application.** Since then, this flexible and scalable architectural choice has helped the GSTN platform smoothly handle large increases in the number of users each year.[45]

Principle 4

Ensure privacy and security: Adopt a PbD approach that embeds key technology and security features within the core design of the solution to ensure individual privacy and data protection.

As discussed in Chapter 4, digital platforms that do not have the right security and privacy safeguards in place can be susceptible to a host of risks such as violation of individual privacy and cyber-attacks. This can increase the potential for misuse of personal data and affect its quality and usability. Thus, the mitigation of these risks becomes paramount. It is important to proactively envisage and implement privacy and security-related features and frameworks in the core design of the ODE.

The PbD approach embeds privacy within the design and operation of a digital platform. This includes both technological and policy choices made about the operations and governance of the platform to ensure secure and fair use of personal data.[46] These include:

- **Purpose Specification:** Refers to clear communication of the purpose for which personal information is collected or used.
- **Data Minimization:** Refers to minimum collection and use of personally identifiable information and only for a specified purpose.
- **Use, Disclosure and Retention Limitation:** Refers to the use of data only for the purpose(s) specified to the individual and storage of personal data for only as long as required.
- **Consent:** Refers to provision of full agency to users over how their data is accessed and shared, with the choice to revoke consent at any desired point in time.

These principles can be put into practice by deploying a number of globally recognized technology checklists and frameworks. For example, the Electronic Consent Framework[47] published by MeitY can be deployed to implement user consent. Similarly, to ensure information security, data encryption, digital signatures, multi-factor authentication, and authorization frameworks can be used.

[45] GSTN. (n.d.). GSTN - Goods and Services Tax Network. Retrieved from https://www.gstn.org.in/about-us.
[46] A list of seven core Privacy by Design Principles and 11 connected fair information practices were developed by Dr. Anne Cavoukian. Please refer to the Further Readings section for related resources.
[47] Ministry of Electronics & Information Technology, Government of India. Electronic Consent Framework Technology Specifications: Version 1.1. Retrieved from http://dla.gov.in/sites/default/files/pdf/MeitY-Consent-Tech-Framework%20v1.1.pdf.

Data Governance: Adopting Privacy by Design

'Privacy by Design' is an approach where privacy principles are incorporated into the design and operation of the platform. PbD includes both technological and policy choices made about the operation and governance of the platform. Looking at the lifecycle of the platform, from design to data collection, storage, processing and data sharing, PbD principles would need to be incorporated at each stage.

Exhibit 5.2

Framework for Good Social Protection ODEs

Pre-Operationalizing		
Inclusion Provide for accessible, auditable alternatives if e-authentication fails	**Efficiency** Build using open-source, modular, scalable, re-usable software components	**Transparency** Institutional home must be covered under Right to Information (RTI) Act Use or create open source code that can be peer reviewed
Privacy Conduct privacy impact assessment before any registry is deployed	**Security** Adhere to International Organization for Standardization (ISO) data protection standards	**Governance** Pass laws through legislature that lay down purpose, governance, redressal – unless covered under existing laws Registry run by an accountable government institution.
Data Sourcing		
Inclusion Enable new enrollments through registry; and not in silos	**Efficiency** Enable near-real-time collection of data through online workflow driven processes	**Transparency** Create and widely publish documentation on objectives, processes, etc.
Privacy Seek opt-out consent from individuals; threshold for opt-in Follow collection limitation – collect what is necessary	**Security** Set minimum privacy and security standards for contributing databases Use tokenization i.e, unique ID for each database	**Governance** Conduct data validation / ground truthing of data collected through random sampling

Storage and Processing		
Inclusion Provide all modern data principal rights – access, rectification, erasure, portability, etc.	**Efficiency** Enable access to decision-support data dashboards for appropriate level of decision makers	**Transparency** Data access notification for data principals Ensure notifications are simply worded in all official languages
Privacy Use federated architecture – aggregated / anonymized data in central hub; rest of the data should be in silos Follow purpose limitation – use for what individual has consented to	**Security** Encrypt all data at rest and during transmission Data breach notification to both regulator and data principals	**Governance** Autonomous advisory board with technical and governance experts to suggest standards of anonymization, purpose limitation, etc.

Data Sharing		
Inclusion Ensure both online and offline grievance redressal mechanisms	**Efficiency** Ensure interoperability and data portability across platforms Enable government and non-government innovators to build on top through open APIs	**Transparency** Provide and publicize helpline numbers Create publicly-available grievance redressal dashboard
Privacy Create personal data stores through API-based system Follow storage limitation – delete what is not necessary	**Security** Machine-readable policies that stick to data Department-to-department data sharing based on auditable electronic queries	**Governance** Conduct data audits every year and present, as part of anual report, to legislature Generate periodic data audit reports for individuals

Note: We would like to thank the Centre for Internet and Society for guiding our thinking on data privacy.

Example 4

The Estonian Government has incorporated PbD principles into its e-Estonia ecosystem to safeguard individuals from unauthorized access and misuse of their data. Estonia's Health Information System is underpinned by an Electronic Health Records platform which functions as a nationwide database, interoperable across different healthcare providers using the secure data exchange layer X-tee. Both the Health Information System and the Digital Prescription Centre are governed by separate laws, that is, the Health Services Organization Act[48] and the Medicinal Products Act,[49] respectively. **These provide individuals the right to prohibit access to their records.** Authorized individuals can be granted explicit permission to review medical records or collect medicines from pharmacies.[50] **Further, only the minimal data that is required to deliver the service can be shared with the requesting system (purpose specification and collection limitation).** Only registered and authenticated entities are allowed to exchange data via X-Road, with all data being encrypted in transit. In addition to encryption of the health data, security and privacy are ensured as individuals can access their data via the e-Patient portal by using their digital ID which is secured using multi-factor authentication (digital certificates and Personal Identification Number [PIN]).

Principle 5

Develop minimally and iteratively: Build incrementally to develop Minimum Viable Products (MVPs)[51] to which additional features can be added in response to new use cases and as our understanding of user behavior gradually evolves.

Base case builds ensure that valuable resources are not spent on developing additional features that might become obsolete at launch or are simply unable to address user requirements. Iterative development of platforms is key to ensuring timely releases, user-centricity, and favorable user engagement rates.

Example 5

An iterative development process was adopted by the City of Philadelphia, USA, for the redesign of its main service delivery platform, phila.gov. The platform enables digital delivery of local government services to both individuals and businesses. In order to ensure accessibility and effectiveness, the platform chose to adopt a user-centric approach for its redesign. This approach was characterized by a few key elements including i) always start with user needs, ii) test assumptions, iii) develop iteratively, and iv) keep it simple.[52] **The platform was built live and frequently tested with the users.** This was instrumental in

[48] Learn more at https://www.riigiteataja.ee/en/eli/505032015002/consolide.
[49] Learn more at https://www.riigiteataja.ee/en/eli/ee/503062019001/consolide.
[50] Priisalu, J., & Ottis, R. (2017). Personal control of privacy and data: Estonian experience. Health and technology, 7(4), 441–451. Retrieved from https://doi.org/10.1007/s12553-017-0195-1.
[51] MVP is a product development technique in which a base product is designed with just enough features for early users. Further customization is completed after user-testing and feedback.
[52] Code for America. (2015, October). Aaron Ogle – The Strategy is Delivery: Practices of 21st Century Government [Video]. YouTube. Retrieved from https://www.youtube.com/watch?v=NgPXf0PZ8EM&index=19&list=PL65XgbSILalUZFyWsZqbtZKN1iffAOM5M.

helping builders continuously learn from user behavior and incorporate the insights acquired throughout the design, iteration, and build phases. The development itself was done iteratively in short, two-week sprints allowing the quick turnaround of solutions while ensuring sufficient flexibility to adjust to user feedback or changing priorities.

5.2 Community Principles for Responsible ODEs

The following principles underscore how ODEs can engage deeply with the community within which they operate, including end-users, builders, and facilitators to foster collaboration and innovation, and build accountability. These principles are also critical in mitigating the adoption and exclusion risks outlined in Chapter 4.

Principle 6

Ensure universal access: Encourage the build of ODEs that minimize or overcome barriers to access (economic, technical, or social) to ensure inclusion, empowerment of end-users, last-mile access, and user rights, irrespective of their backgrounds.

As discussed in Chapter 4, technology infrastructure is susceptible to exclusion risks. Exclusion can prevent ODEs from realizing their full potential as it precludes end-users from accessing innovative services or prevents developers from building solutions on top of the existing technology infrastructure. Access can be enhanced through various means by leveraging human-centered design principles and ethnographic research for the platform design. Exclusion risk can also be minimized by leveraging and strengthening offline last-mile infrastructure such as Common Service Centres (CSCs),[53] ensuring omni-channel presence and affordability, and incorporating vernacular content and user-friendly UI / UX (including accessibility features).

Example 6

NPCI has integrated the Unstructured Supplementary Service Data (USSD) platform with the UPI platform to enable end-users to avail instant and cashless payment services even in the absence of an active internet connection. This has significantly boosted financial inclusion especially in rural areas where internet penetration is still low. The service is available in 13 different languages, including Hindi and English (with an option to change the language whenever desired) and can be accessed via a simple mobile handset (smartphone not required). The aim is to ensure the inclusion of all users irrespective of their socio-economic background. Users can simply dial *99# from their registered mobile numbers to avail multiple round-the-clock financial, non-financial, and value-added services such as money transfers, payment requests, transaction history, and changing the UPI pin. Additionally, the Telecom Regulatory Authority of India (TRAI) has set a maximum limit of INR 0.50 (minimal charges) for the transaction fee that Telecom Service Providers can charge from end-users for this service to ensure affordability.[54]

[53] Learn more at https://www.csc.gov.in/.
[54] Product Overview. (2020, May 25). NPCI - National Payments Corporation of India - Official Website. Retrieved from https://www.npci.org.in/product-overview/99-product-overview.

Principle 7

Drive participatory design and end-user engagement: Encourage the participation of all community actors at all stages including plan, design, build, and operate to facilitate and promote a culture of openness and collaboration. Enable the development of user-centric solutions and facilitate the widespread and sustained adoption of the digital platform.

In order to encourage a true culture of openness that goes beyond technology, it is imperative to engage with end-users, builders (such as open source developers, start-ups, public agencies, etc.), and facilitators (such as research bodies, grassroots organizations, foundations, etc.), and involve them in all the stages of the ODE lifecycle. This can be accomplished by crowdsourcing ideas, conducting public consultations, beta-testing user groups, and exploring avenues for co-creating solutions with businesses, start-ups, and the open source developer community. In an attempt to identify challenges and address them in a timely and cost-effective manner, digital platforms should be tested for ease of use and needs fulfilment in smaller communities before full-scale launch.

Wider adoption can be facilitated by proactively spreading awareness of the platform via both offline and online channels. This can be accomplished by:

- Organizing awareness workshops and leveraging forums like TV, radio, and social media.
- Enlisting the support of non-profits and CSOs to spread awareness around online service delivery and support last mile access and engagement.
- Deploying incentives to on-board and retain users from diverse backgrounds.
- Adopting ongoing user support processes such as FAQs and a user support desk (phone, web, etc.) to assist in the effective usage of ODEs.

It is important to note that engagement is not a one-time activity but a continuous process. ODEs should implement and regularly monitor feedback loops via both online (for example, user ratings) and on-ground interactions (for example, public forums, surveys). Learnings gleaned from such initiatives can be used to update platform features and functionalities to enhance the end-user experience. Government service delivery platforms, especially those that deliver essential public services, enjoy an inherent monopoly. However, the absence of competition should not serve as a deterrent to being user-centric. Instead, these platforms should go the extra mile to gauge and respond to individual needs. Finally, processes should be designed to inculcate collaboration and cooperation across all actors.

Example 7

Singapore has undertaken several initiatives to ensure a citizen-centric approach to service delivery with wide participation from various actors such as businesses, start-ups, research organizations, and end-users. First, GovTech Singapore, the country's digital transformation agency has created a community of end-users, the TechKaki community, to enable citizen participation in the designing of

solutions from inception. Through this, citizens test new technology solutions and provide feedback for improvement, before the services are launched at scale.[55] Second, it has launched the InnoLeap Programme that enables public sector agencies to collaborate with research institutes, institutes of higher learning, and commercial entities to co-create innovative technology solutions. This is enabled through thematic workshops and one-to-one consultation clinics.[56] Third, along with the Smart Nation and Digital Government Office (SNDGO), it has launched a program called Smart Nation Co-creating with People Everywhere (SCOPE).[57] Through this, it partners with agencies such as the People's Association and the National Trade Union Congress to leverage their events to test solutions under development with the public.This not only increases the sense of ownership of citizens in the solution, but also increases the probability of its usage, post launch. Finally, to drive end-user adoption of the digital platforms, the Ministry of Communications and Information (MCI) has launched initiatives such as Digital Clinics and Experiential Learning Journeys.[58] Both are volunteer-led programs and are targeted at the senior populace to increase their awareness of the effective usage of digital services (for example, e-Payment) via mobile phones.[59]

Principle 8

Cultivate a network of innovators: Proactively engage with innovators to motivate them and spur the development of new solutions on top of the digital platform.

It is important for platforms to build a mobilized, open, and vibrant builder community that works collaboratively (with each other and with other actors) to create new user-facing services. A collaborative approach can lead to the successful operation of the ecosystem and result in immense economic and societal value creation. Failure to attract a community of builders can limit the innovations stemming from collaboration and, consequently, the impact potential of ODEs. The risks associated with the lack of builder adoption have been outlined in Chapter 4 of this report.

To augment wider participation, mechanisms such as incentive-based challenges (for example, hackathons, case study competitions, etc.) can be launched. This will encourage collective problem solving and incentivize developers to build on top of the digital platform. Further, offline and online channels can be used to spread awareness of the platform availability and usage. This can be done by providing support documentation that outlines implementation guidelines for using OSS, open APIs, and other relevant technology infrastructure and frameworks. It is sometimes also useful to go a step further and develop reference user-facing applications on top of the ODE (for example, the BHIM mobile payment app built by NPCI by leveraging the UPI platform) to demonstrate its application and ability to create new solutions.

[55] GovTech Singapore. (n.d.). Tech kaki community. Government Technology Agency. Retrieved from https://www.tech.gov.sg/products-and-services/tech-kaki-community/?utm_medium=recommender_2&utm_source=aHR0cHM6Ly93d3cudGVjaC5nb3Yuc2cvbWVkaWEvdGVjaG5ld3MvZ2V0dGluZy10by1rbm93LXlvdQ==&utm_content=aHR0cHM6Ly93d3cudGVjaC5nb3Yuc2cvcHJvZHVjdHMtYW5kLXNlcnZpY2VzL3RlY2gta2FraS1jb21tdW5pdHkv.

[56] GovTech Singapore. (n.d.). Factsheet: InnoLeap. Government Technology Agency. Retrieved from https://www.tech.gov.sg/files/media/media-releases/2017/02/Annex%20B%20InnoLeap%20Factsheet.pdf.

[57] SG Cares. (n.d.). SCOPE (Smart Nation Co-creating with Our People Everywhere). Volunteer.sg. Retrieved from https://www.volunteer.sg/volunteer/opportunity/details/?id=da93ae82-1934-e911-a9d5-a6a861e8f30f.

[58] Infocomm Media Development Authority. (n.d.). Media Factsheet: Digital Clinics. Retrieved from https://www.imda.gov.sg/-/media/Imda/Files/About/Media-Releases/2020/COS2020/Annex-F-COS-2020---Factsheet---Digital-Clinic.pdf?la=en.

[59] GovTech Singapore. (2019, August). Digital government, smart nation: Pursuing Singapore's tech imperative. Government Technology Agency. Retrieved from https://www.tech.gov.sg/media/technews/digital-government-smart-nation-pursuing%20singapore-tech-imperative.

For example, a number of third-party apps[60] built on the UPI platform, such as Amazon Pay, Cred, Google Pay, PhonePe, and WhatsApp, provide users with innovative ways to transfer money and pay for goods and services. To elevate the understanding of the ODE approach, initiatives can be taken to share learnings and best practices as well as organize public consultations, workshops, and forums to collect feedback on the design of ODEs.

Example 8

Open Data DK is an online platform that aims to ensure that data from a number of government, regional, and municipal agencies across Denmark can be accessed by a wide community of users and builders.[61] The purpose is two-fold, (i) to create transparency in public administration, and (ii) to enable a range of innovative solutions to be built by a network of individuals and businesses, for example, traffic management, healthcare, recreation, etc. In order to facilitate this, Open Data DK has undertaken a range of activities to promote co-creation. These include:

- Organizing information meetings and workshops to on-board local and regional governments onto the platform to build their capacity.
- Arranging formal engagements and dialogues with the business community.
- Organizing hackathon challenges.
- Organizing informal meetups and connection sessions where coders, public employees, academic, entrepreneurs, and students get together to discuss open data case studies.
- Collaborating with educational institutes to leverage the data for research.
- Making the platform more demand-driven by soliciting feedback about the type of data required by the network and facilitating direct engagement between businesses and public authorities for access.[62]

Principle 9

Be analytics-driven for continuous user-focus: Leverage the data generated by the digital platform to acquire insights around user profiles and engagement, adoption barriers, and platform performance. Analyze user data to improve user-centricity, support robust policy-making, and incentivize the design of new solutions.

ODEs can monitor KPIs to identify bottlenecks in operations and user experience. For example, analytics related to the number of active users, number of downloads, number of solutions built by leveraging the data opened up by platform, etc., can help in evaluating the adoption of the ODE. This data can then be used in conjunction with other user experience research methods to improve the accessibility and user-centricity of services. For example, user data can be classified based on demographics (age or geography) to identify the least popular segments for the service. Accordingly, customized services and end-user support initiatives can be

[60] National Payments Corporation of India. (2020, May 14). 3rd Party Apps. NPCI. Retrieved June 6, 2020, from https://www.npci.org.in/upi-PSP%263rdpartyApps.
[61] Copenhagen Solutions Lab. (n.d.). Data Platforms. Retrieved from https://cphsolutionslab.dk/en/what-we-do/data-platforme/open-data.
[62] Open Government Partnership. (n.d.). Open data DK (DK0054). Retrieved from https://www.opengovpartnership.org/members/denmark/commitments/DK0054/.

launched to improve engagement. These insights can also help identify new use cases based on user behavioral trends to encourage the build of new digital platforms. Finally, government bodies can leverage the insights generated to identify the underserved segments of the population and accordingly undertake targeted policy-making actions for equitable development.

Example 9

GDS, the digital transformation unit of the UK government, has laid down a comprehensive service manual on how government agencies using gov.uk (UK's one-stop service delivery platform) can leverage data to improve their services. It includes guidelines on defining the performance metrics and choosing the right digital analytics tools. It also provides instruction on leveraging the insights obtained in conjunction with user research methods (for example, usability testing or benchmarking wherein you observe the end-users as they try to complete a set of tasks using the service) to enhance user experience. Further, GDS has created the 'Performance Platform', a digital solution that can be adopted by various government agencies to monitor and report the KPIs associated with their services.[63] The platform uses a combination of sources, for example, web analytics software, back-end systems that monitor response time, service desk, surveys, etc., to report the metrics.[64] As per the UK Digital Service Standards, all government services need to mandatorily report the following four KPIs: [65, 66]

01 Cost per transaction: Cost to the government on completion of each end-user transaction.

02 User satisfaction: Percentage of users that are satisfied with the service.

03 Completion rate: Percentage of transactions that are successfully completed (can help identify stages where the user is dropping out and hence, highlight issues in the UX).

04 Digital route: Percentage of users choosing the digital platform over the other offline means of availing the service.

Additionally, GDS also continually improves on the functionalities of the Performance Platform to better assist government agencies in using their data to improve their services and enhance engagement.

Principle 10

Enable responsive grievance redressal: Define accessible and transparent mechanisms (offline and online) for grievance redressal, that is, user touch-points, processes, and responsible entities with a strong focus on actions for resolution.

A robust and responsive grievance redressal mechanism is necessary to drive bottom-up accountability and infuse trust and transparency in the ODE. The guidelines should cover grievances of both types, that is, issues

[63] Government of the UK. (2014, April 7). The performance platform: Open for business - Government digital service. Retrieved from https://gds.blog.gov.uk/2014/04/07/the-performance-platform-open-for-business/.
[64] Government of the UK. (2016, March 31). Data you have to share with the performance platform. Retrieved from https://www.gov.uk/service-manual/measuring-success/sharing-your-data-with-the-performance-platform.
[65] Government of the UK. (n.d.). Performance. Retrieved from https://www.gov.uk/performance.
[66] Government of the UK. (2016, March 23). Using data to improve your service: An introduction. Retrieved from https://www.gov.uk/service-manual/measuring-success/using-data-to-improve-your-service-an-introduction.

related to the functioning of the digital platform, as well as those around access to and quality of services delivered. Additionally, it is imperative that specific guidelines are established to address critical grievances related to unethical or exploitative behavior on the platform, for example, unauthorized access of data by a third party, data tampering, etc.

To ensure the efficacy of the grievance redressal mechanism, it is important to define clear offline and online escalation procedures for different types of grievances along with optimum time-period for issue resolution and proper recourse for all actions. In rural and marginalized areas, due to low internet penetration, it is important to augment online touch-points and processes with an on-ground support network. This can be accomplished by local government representatives or CSOs, including non-profits. These on-ground representatives can provide assisted digital support for end-users to access online redressal processes or organize forums for individuals to voice their concerns, which they can then bring to the attention of the relevant government officials.

Example 10

DIGIT is an open source urban governance platform developed by the eGovernments Foundation, which allows builders to develop new solutions across a range of urban services.[67] The Public Grievance Redressal module of this platform incorporates a number of features to drive accountability for an enhanced user experience. It defines the different service levels as well as escalation matrices for different complaints and enables auto-escalation of complaints in case of delayed responses. A variety of touchpoints, including call center, mobile apps, web portal, and email are available at the disposal of individuals to register grievances. Individuals can also provide feedback on the resolution received and reopen requests, if dissatisfied with the end result.[68]

The GSTN platform has recently revamped its grievance redressal portal to enhance user experience. Along with a **toll-free number that is accessible in 12 languages**, the self-service portal allows users to report issues related to technical glitches and in availing the services. The portal also automatically suggests FAQs and provides the relevant support material to the users' basis their complaint, to enable them to resolve smaller issues independently.[69]

5.3 Governance Principles for Responsible ODEs

The widespread impact of ODEs can only be realized if the ecosystem is built on a foundation of trust and equity. The five principles listed below should be adopted to ensure robust governance and transparency in the ecosystem. These need to be further augmented with governance mechanisms at the national level, which have been discussed in detail in Chapter 8.

[67] Learn more at https://www.digit.org/.
[68] DIGIT. (n.d.). Resolve Civic Issues with DIGIT-Public Grievance Redressal. Retrieved from https://www.digit.org/wp-content/uploads/2020/06/pgr.pdf.
[69] Learn more at https://selfservice.gstsystem.in/.

Principle 11

Define accountable institutions: Ensure a designated institution for the ODE and create the right legal and organizational structure, operating processes, etc., in line with its objectives. Promote multi-stakeholder governance involving key stakeholders, including government bodies, private actors, and individuals to enhance transparency.

Every digital platform should have a designated institution accountable for its success or failure. While delivering different use cases may be the responsibility of different stakeholders (such as deriving insights from the data generated by the platform, building user-facing services, enabling secure data exchange, etc.), the institution needs to have the authority to facilitate this across the ecosystem. This institution can be a public body, a private body, or a Public Private Partnership (PPP) – several such examples like Unique Identification Authority of India (UIDAI) for Aadhaar, NPCI for UPI, GSTN, and GeM can be further studied to build a few archetypes. **The designated institution will be responsible for the overall management of the digital platform, including strategic and financial decision-making, driving builder and end-user adoption, as well as setting the standards or rules of engagement for the ecosystem.**

In addition to establishing an accountable institution for every ODE, it is also important to ensure multi-stakeholder governance by all ecosystem players. This can be done by facilitating representation from builders, subject-matter experts (for example, education experts in case of the Education NODE), CSOs (for example, those that work on privacy, ethics, etc., including non-profits, foundations, end-user collectives), and end-users across the life cycle of an ODE. Stakeholder participation should not be limited to delivery of services but should also include contribution towards high-level strategic decision making (such as outlining the ODE's objectives and use cases). Multi-stakeholder governance helps drive greater trust and transparency and serves to keep the motivations and incentives of all actors in check. This has been discussed further in Chapter 8.

Example 11

Although X-Road (or X-tee) in Estonia adopts a federated data architecture, it has a designated coordination and development authority, the Information System Authority (RIA). The RIA is responsible for the administration, development, security, and regulatory compliance of the platform as well as the data shared via the platform. It plays several roles to effectively manage the functioning of X-Road in the presence of strong privacy safeguards. It registers new members, reviews their security policies, and monitors platform usage. RIA is also responsible for setting the rules of engagement, that is, policies and standards in the ecosystem. For example, it specifies the security requirements for members as well as defines the scope and data sharing rules, that is, data fields to be shared to meet the needs for any given service (in compliance with the principle of collection limitation). RIA also plays the role of a watchdog, that is, it collects statistical information from members' security servers to understand interconnectivity in the ecosystem, making it easier to manage risks.[70, 71]

[70] Republic of Estonia. (n.d.). Introduction of X-tee. Retrieved from https://www.ria.ee/en/state-information-system/x-tee/introduction-x-tee.html.

[71] e-Governance Academy. (n.d.). e-Governance in Practice. Retrieved from https://ega.ee/wp-content/uploads/2016/06/e-Estonia-e-Governance-in-Practice.pdf.

Principle 12

Establish and align with robust rules of engagement: Define clear rules around the responsibilities, rights, and liabilities of all actors in the ecosystem (government bodies, private sector participants, individuals), in adherence with domain-specific laws and rules and other overarching national policies and frameworks.

Given the large number of stakeholders in any ecosystem, it is imperative that the roles and responsibilities of each actor are clearly articulated through a set of ODE specific rules of engagement. This is required to ensure that the incentives of all stakeholders – central ministries, state departments, private entities – are well aligned. It also creates a level playing field for all within the ecosystem and keeps undesired behaviors in check.

However, it is essential that these rules are shaped by the objectives of the ODE and the associated laws and policies for the domain. For example, the Goods and Services Tax Act (for GSTN),[72] Real Estate (Regulation and Development) Act (for Real Estate ODEs),[73] etc.

Further, every ODE needs to adhere to certain applicable overarching laws, rules, and judgments (for example, the Right to Information (RTI) Act, or Right to Privacy Judgment, data protection laws, etc.), in addition to domain-specific laws.

For example, the Personal Data Protection (PDP) Bill, 2019 aims to protect individuals from the misuse of their personal data by laying down suitable guidelines for the processing of data and setting up the Data Protection Authority of India. Once enacted, it will provide digital platforms a legal framework for safeguarding user data.

Another example would be upholding the directives laid down by the Right to Privacy judgement in India. Any ODE that accesses personal data should conform to the four requirements (laid down by the Honourable Supreme Court) for public institutions to be able to use personal data.[74] These are (i) the proposed use of personal data must be sanctioned by a law (passed by the Central or State legislature), (ii) it must have a legitimate goal (necessity), (iii) the proposed use must be proportionate, and (iv) there must be procedural guarantees against misuse. Proportionality implies that the potential benefit of the digital platform is comparable to the threat it poses to an individual's fundamental Right to Privacy. This is in line with the definition of responsible ODEs. By adopting the measures outlined in Principle 4, ODEs can significantly reduce their risk potential for violation of individual privacy. Proportionality implies that the potential benefit of the digital platform is comparable to the threat it poses to an individual's fundamental Right to Privacy. This is in line with the definition of responsible ODEs. By adopting the measures outlined in Principle 4, ODEs can significantly reduce their risk potential for violation of individual privacy.

Both government and non-governmental organizations in India and globally have started issuing best practice policies, standards, and guidelines for digital platforms. These can be used to create regulatory-compliant, ODE-specific rules to help manage interactions within the ecosystem. We have collated these publicly available resources into a comprehensive Toolkit that practitioners can use when building ODEs or solutions on top. Further details on the Toolkit have been provided in Chapter 9 and on the Microsite.

[72] The Constitution (One Hundred and First Amendment) Act, 2016.
[73] The Real Estate (Regulation and Development) Act, 2016.
[74] K.S. Puttaswamy v. Union of India, (2017) 10 SCC 1.

Example 12

The UPI ecosystem comprises multiple stakeholders including banks and Payment Service Providers (PSPs). Their roles and responsibilities, including liabilities (for example, liability clause for user data protection), have been clearly laid out by NPCI under Procedural Guidelines for UPI.[75] These have been framed under the provisions of the Payment and Settlement System Act, 2007 and are binding on all members of the UPI ecosystem. They define:

- The entities in the UPI system, membership rules, and requirements (including on-boarding and termination processes).
- Customer on-boarding and handling of registrations and complaints.
- PSP management.
- Roles and responsibilities of key stakeholder groups, including PSPs, technology service providers, etc.
- Compliance and regulations.

Principle 13

Create transparent data governance: Outline clear standards and policies on data ownership, collection and contribution, consumption, and sharing, especially with respect to sensitive personal data. Ensure that these are easily understood and readily available to all users. Establish a set of mechanisms to monitor and drive adherence.

A robust data governance framework defines institutions, legal and regulatory policies, and processes that are necessary to control, manage, share, and protect data. Additionally, it ensures consistent implementation of various rules and laws and enhances the government's capacity to become data driven.[76] A few best practices associated with data governance have been highlighted below.

- **Non-repudiation and Data Provenance:** Each data item must be accompanied by a record of its complete journey, that is, original source, frequency and details of any subsequent modifications, details of modifiers, and any other individuals or entities that might have handled the data. Maintaining these records in a centralized repository enhances the auditability, transparency, and reliability of the platform.

- **End-user Ownership:** The ownership of personal data must be retained by individuals at all times. This can be achieved by providing individuals with an option to correct, complete, and update incorrect, misleading, and outdated personal data, respectively. Mechanisms should also be established to remove data that has served its primary purpose and is no longer required. Additionally, personal data should be shared for secondary purposes only after **informed consent** has been obtained from the individual. Further, the individual should have the right to revoke consent at any time. This can be effectively enforced by establishing processes for individuals to flag concerns related to unauthorized access to their data and obtain suitable recourse. This enhances reliability of the data and trust in the platform.

[75] National Payments Corporation of India. (2019). Unified Payments Interface: Procedural Guidelines. Retrieved from https://www.npci.org.in/sites/default/files/UPI%20Procedural%20Guidelines.pdf-26112019-onwebsiteLIVE_0.pdf.
[76] OECD (2019). The Path to Becoming a Data-Driven Public Sector. OECD Digital Government Studies. OECD Publishing. Retrieved from https://doi.org/10.1787/059814a7-en.

- **Usage Specification:** Digital platforms that either house or issue calls to underlying data registries or generate a large amount of derived data, should establish policies specifying the purposes and use of this data. A clear articulation of the purpose helps to regulate the usage of data, not only to address privacy concerns, but also to restrict unfair value capture.

It is important to note that governance is not only limited to enacting laws. Once established, laws need to have appropriate implementation mechanisms, be easily and widely understood, and should be enforced as per guidelines.

Several other best practices around data governance such as purpose specification, collection limitation, data minimization, and use, disclosure and retention limitation, have been discussed in Principle 4.

Example 13

Estonia's data services are built on strong legal and regulatory frameworks. In 1999, the Estonian Data Protection Inspectorate was founded with supervisory authority, empowered by the Data Protection Act, Public Information Act, and Electronic Communications Act. The Inspectorate's mandate is to defend individuals' constitutional rights pertaining to:

- The right to obtain information about the activities of public authorities.
- The right to inviolability of private and family life in the use of personal data.
- The right to access the personal data gathered.

These legal and institutional mechanisms are designed to create transparency around data governance and strengthen users' ownership of their data. Further, the Public Information Act states the need for a law or legislation to establish a database and specifies the rules for establishing it.[77] The Estonian government promotes usage specification by allowing only minimum data collection and sharing for the purpose of delivering a service, either between platforms or from the individuals themselves. The data protection laws levy heavy penalties in cases of unauthorized access to data. **Additionally, domain specific laws provide individuals the right to prohibit access to their data by any public or private entity.** For example, under the Medicinal Products Act, individuals can prohibit any healthcare provider from accessing their personal data stored in the Digital Prescription Centre. These platforms are also accompanied by statutes which specify the procedure for maintenance of the database, including the chief processor. Where necessary, they also provide other information related to the composition of the data collected and the data providers. **Individuals are also provided access to a Personal Data Usage Monitor, an AI-enabled software that allows them to view logs of all instances of their personal data being used by the government.** They can use these logs to identify and flag any unauthorized usage or data breaches.[78]

[77] Public Information Act, 2000. Retrieved from https://www.riigiteataja.ee/en/eli/514112013001/consolide.
[78] World Bank. (2018). Privacy by Design: Current Practices in Estonia, India, and Austria. Retrieved from https://id4d.worldbank.org/sites/id4d.worldbank.org/files/PrivacyByDesign_112918web.pdf.

Principle 14

Ensure the right capabilities: Nurture partnerships and establish Human Resource policies and practices to attract and retain the relevant talent required to successfully build and operate the digital platform.

Having in place appropriate talent is critical for the sustainability of ODEs and should be planned for in the initial planning phase itself. Digital government solutions have been traditionally beset with operational management challenges related to both third party contracting and talent acquisition and retention. These have been discussed in detail in Chapter 4. In that context, sourcing the right talent becomes even more important. Besides technology development and maintenance, there are several other skills such as data analytics, design thinking, consumer behavior research, vendor management, user support, etc., that ensure effective service delivery. ODEs can choose to either partner with private enterprises and CSOs or hire and develop in-house talent to provide these skills and capabilities. In case of the former, government agencies should consider revamping the traditional procurement and contracting methods to introduce multi-vendor contracts that are flexible enough to accommodate future changes. For the latter, in order to be able to hire and retain a digital-age workforce, government bodies need to refresh their talent acquisition and retention strategies. These could range from creating learning programs for existing employees and providing internship and fellowship opportunities for students and people working in private sector jobs to revisiting compensation packages and benefits.[79]

Example 14

MOSIP enables organizations (public and private) to develop a robust digital ID system in a cost-effective manner.[80] It comprises certain core modules such as pre-registration, registration, ID authentication, etc. Countries can choose the relevant core modules and configure and customize them to build their own unique foundational ID systems. While the code itself is open source, customizing it to implement a country-specific digital ID platform requires the support of both public and private players.

The MOSIP project has laid down a comprehensive structure that defines the responsibilities of each stakeholder (vendors, the government, private players) involved in the implementation, creating a comprehensive manual for System Integrators (who build country-specific systems). **The manual not only serves to guide the implementation of the digital ID system but also specifically articulates the capabilities and skills required by the implementation team.** In order to ensure smooth implementation, MOSIP has initiated efforts to develop an ecosystem of System Integrators.

There are two models of partnership that MOSIP follows. In the first model, it trains and vets service providers who are capable of building on top of the digital platform. It also conducts workshops inviting ID solutions, engineers, and biometrics and device vendors to work on integrating with MOSIP. In the second model, countries procure their own vendors and MOSIP provides training and education and maintenance services for the technology infrastructure.[81]

[79] Roediger, A., LaBresh, J., Lee, V., Strack, R., & Huang, J. (2019, May 23). Building the Government Workforce of The Future. The Boston Consulting Group. Retrieved June 6, 2020, from https://www.bcg.com/en-in/publications/2019/building-government-workforce-of-the-future.aspx.

[80] Learn more at https://www.mosip.io/.

[81] MOSIP. (2019). Why Countries Need an Open and Affordable Identity Solution. ID4AFRICA. Retrieved from https://www.id4africa.com/2019/almanac/MOSIP.pdf.

Principle 15

Adopt a sustainable funding model: Develop a sustainable long-term funding model, which is aligned with the overall goals of the platform, to ensure uninterrupted operations and continuous user-focused enhancements.

ODEs require financing at all stages of their lifecycle. Initially, they require an upfront investment to bear the cost of design, build, and deployment and over time they need to finance their ongoing operations. Chapter 7 provides further insights on the principles for financing ODEs and the potential sources of funding.

Example 15

OpenLMIS, an open source logistics management platform used extensively in the health care space, was initially developed with the support of donor funding from various international foundations. Since then, this open source platform in the digital health space has been implemented across multiple countries globally. **It has explored several initiatives to cement its long-term financing requirements and eventually become self-sustainable.** These initiatives include:[82]

- Commercialization of platform usage by private entities (pharmacies, clinics, etc.), through a subscription-based model.
- Payment structures for public health entities to fund on-going deployments (potentially on a cost-recovery basis).
- Partnerships with private sector entities to develop a paid commercial version which can cross-subsidize the open-source software.

Additionally, OpenLMIS underwent a set of key changes to lower the long-term running costs of the software. These included:

- Re-architecting to a micro-services, modular structure to enable a single version for all implementations that could ease software or functionality extensions.
- Building capacity of the developer community closer to end-user markets (for example, in Africa).
- Building a business model for long-term diversification into new services and sectors.[83]

The successful implementation of any idea requires a well-defined roadmap that can help stakeholders navigate to long-term sustainability of the system. In the context of ODEs, the 15 guiding principles discussed in this chapter serve to act as a roadmap for building responsible ODEs that generate maximum value while minimizing ecosystem risks.

[82] Vota, W. (2020, February 4). What a Cloudy Future of OpenLMIS Means for Open Source Software. ICTworks. Retrieved from https://www.ictworks.org/openlmis-open-source-software/#.Xz6uq8gzY2x.
[83] Learn more at https://openlmis.org/.

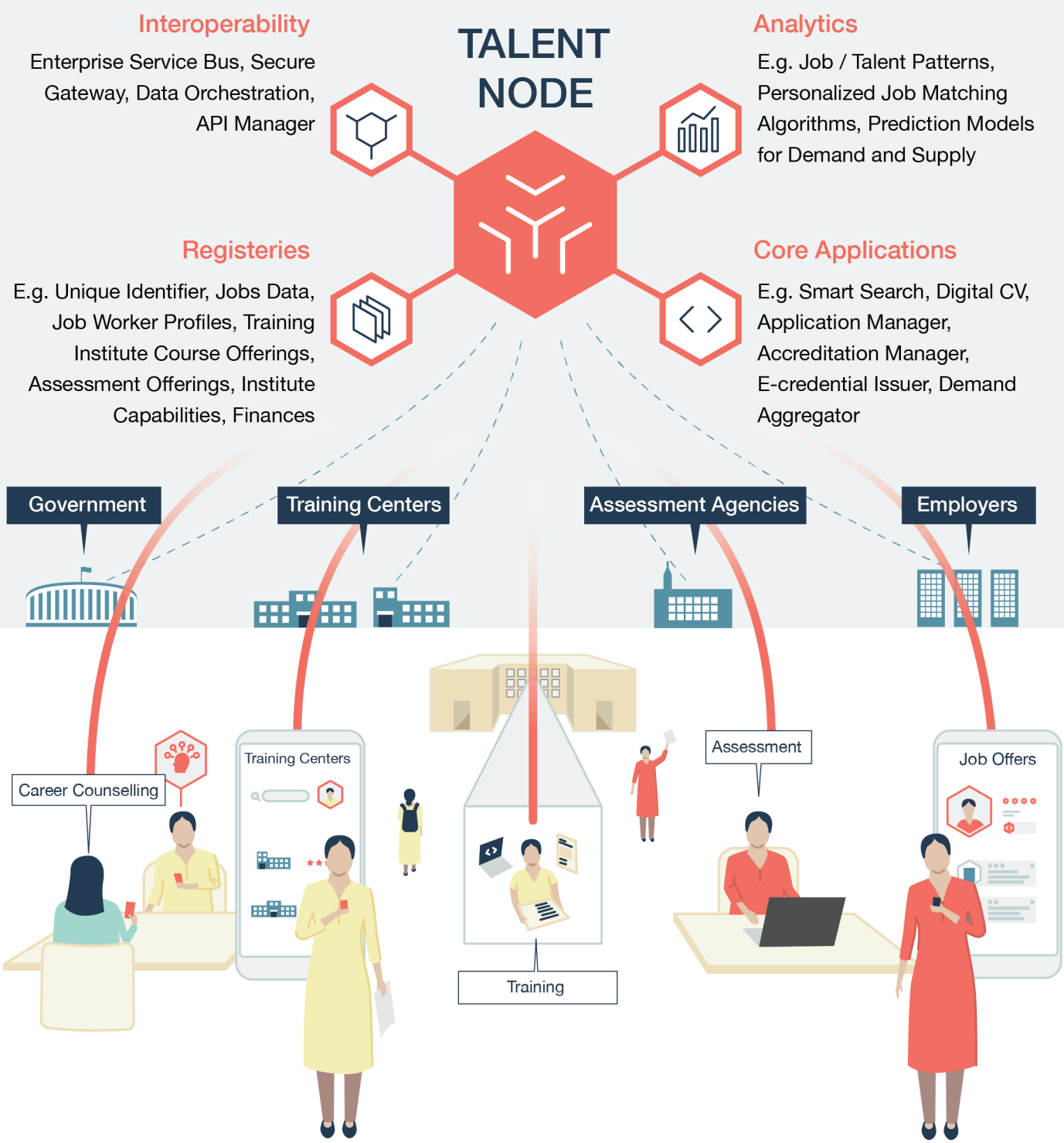
06

ILLUSTRATIVE NODES OF THE FUTURE

In this chapter, we describe how NODEs can be envisaged in four high momentum sectors in India – **Talent, Agriculture, MSME, and State Service Delivery. Deep dives on the first two are available on the Microsite.**

6.1 Talent NODE

Exhibit 6.1
Illustration of the Talent NODE



In the current skilling and jobs ecosystem, the journey of a job or skill-seeker is fairly cumbersome. In order to access even basic career services like job search, career counselling, skills verification, etc., the job seeker needs to visit multiple online portals. This is primarily due to the absence of a 'single source of truth' on the availability of job opportunities and training programs. There is a paucity of user-centric offerings that can allow individuals to undergo a holistic journey from aptitude testing and job identification to skilling and finally, placement. Consequently, individuals may simply opt for jobs or trainings that are easily available rather than for those which are a good fit. It also presents challenges for employers since it impedes their ability to identify and access skilled talent or verify the skills and experience of a potential job-seeker.

The current landscape creates a significant opportunity for the development of a **Talent NODE** (as shown in Exhibit 6.1) that:

- Captures all sources of labor supply and demand.
- Connects skill seekers with training institutes or assessment providers.
- Facilitates interactions between job seekers and employers.
- Provides access to available counselling and funding options.

For example, the Skill India portal[84] has the potential to integrate with the National Career Service,[85] the SkillConnect[86] portals, and various private job market portals. Once interoperable, these portals can connect with the learning management systems of training institutes and assessment providers for online delivery of curriculum and assessments, respectively. Further, they can also connect with bank platforms for providing users with better access to credit. **This will require facilitating interoperability amongst these platforms and registries through the use of open APIs and creating a set of common standards.**

The Talent NODE, therefore, can provide job seekers a 360-degree view of potential job opportunities and enable them to find the highest quality training institute to acquire the necessary skills.

As a first step, job seekers can receive career counselling to identify and enrol for the appropriate training program. Following the successful completion of training, the job seeker can undergo skill assessment and identify suitable opportunities via the jobs' marketplace. This integrated approach can also provide employers with a holistic view of the available skilled labor that meets their requirements and enable them to verify the job seekers' skills. Policymakers and planners can use this data to identify trends, employment hotspots or in-demand skills, and plan their investments and support measures accordingly. **Ultimately, this matching of supply and demand can reduce friction in the talent market, lower unemployment rates, and elevate the skill levels of the workforce.**

[84] An initiative by National Skill Development Corporation (NSDC), Skill India Portal aims to provide a common and collaborative platform to disseminate information on skill courses, training providers, and focuses on skill seekers. Learn more at https://skillindia.nsdcindia.org/.

[85] National Career Service platform that connects job-seekers with providers and provides other employment related services (such as training, counselling, etc.). Learn more at https://www.ncs.gov.in/.

[86] A platform that aims to bring together demand and supply for blue collar employment. Learn more at https://skillconnect.kaushalkar.com/en/.

6.2 Agri NODE

Small and Marginal Land Holding Farmers (SHF), who constitute roughly 85 percent of all Indian farmers,[87] currently face multiple challenges across the farming lifecycle. These include difficulty in accessing credit, unreliable and generic crop advisory services, a large amount of paperwork associated with accessing government benefits, fragmented and offline marketplace services, and procedural delays in insurance pay-outs. For example, in order to get a loan, an SHF has to travel to the local bank and furnish various documents such as land records, crop history data, etc. To gather these documents, multiple visits to the local government office might be required, which can often result in lost time and wages. **This opportunity cost combined with the urgency to procure capital due to the time-critical (seasonal) nature of agriculture compels farmers to rely on non-institutional sources of credit that charge high interest rates.**

In recent years, many digital solutions have been developed by the government such as the National Agriculture Market (eNAM),[88] Farmer Portal,[89] mKisan,[90] Pradhan Mantri Fasal Bima Yojna (PMFBY) platform,[91] etc., to address these challenges. Additionally, there are a large number of agri-tech startups in areas of crop advisory, fin-tech etc., working to support SHFs. However, these solutions have struggled to achieve scale and the desired service levels, in part due to limited access to data that is spread across multiple institutions.

Therefore, there exists a significant opportunity to develop an Agri NODE (as shown in Exhibit 6.2), as an interoperable platform built around a data exchange, helping service providers (both government and private players) build E2E and customized solutions for farmers.

The data exchange can help integrate relevant data including farmer details, land records, tenant records, soil health records, weather patterns, satellite imagery, and irrigation metrics. With open API access to these registries, digital services such as lending, insurance, benefits transfer, and crop advisory can be delivered at scale. **This can result in improved transparency, increased agricultural productivity, and higher average farmer incomes.**

With the Agri-NODE, it will be possible for a farmer to visit his nearest CSC to remotely access the one-stop lending portal, check for available loan offers and select the appropriate loan for his requirements by simply providing his Unique ID / Aadhaar information. The required data about the farmer can be sourced via the privacy protected, consent-based data exchange, eliminating the need for the farmer to visit multiple government offices. **Similarly, a farmer can access a range of other services at his fingertips, including personalized crop advisory services, automated insurance processing, shared equipment rentals, remote marketplace access, etc. This can be enabled by integrating data via the Agri NODE, creating a link to a unique farmer ID, and providing secure access to a community of stakeholders.**

[87] Ministry of Agriculture and Farmers' Welfare, Government of India. (2019). Agriculture Census 2015-16. Retrieved from http://agcensus.nic.in/document/agcen1516/T1_ac_2015_16.pdf.

[88] eNAM is national network of physical mandis which can be accessed online. It seeks to leverage the physical infrastructure of the mandis through an online trading portal, allowing buyers to trade virtually. Learn more at https://enam.gov.in/web/.

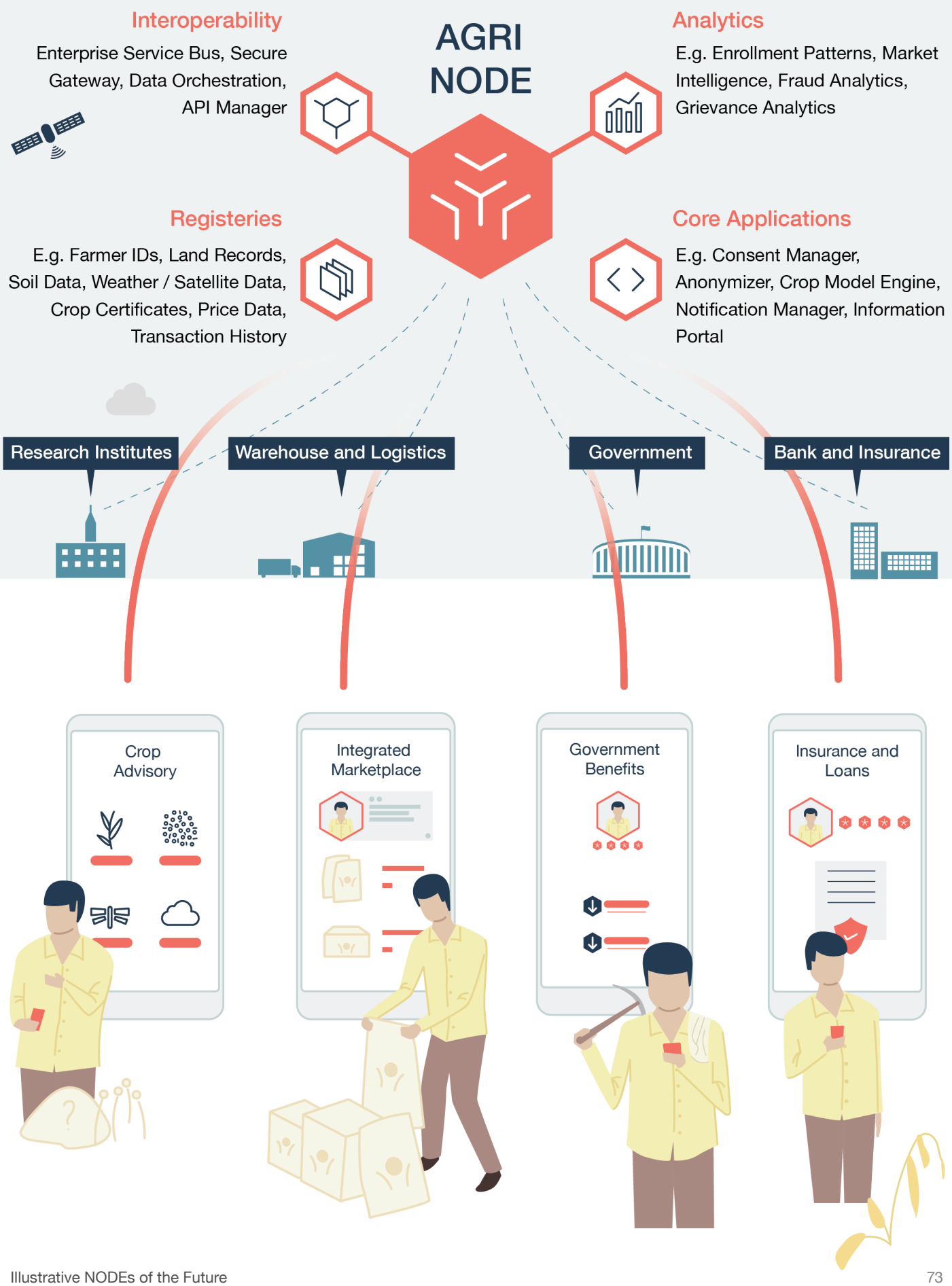
[89] Farmer Portal provides farmers with all the relevant information on specific issues around their geographic area (village, block, district, or state). The requested information can also be shared via SMS, email, and audio-video formats. Learn more at https://farmer.gov.in/.

[90] mKisan portal allows government functionaries at all levels in the agriculture and allied sectors to share relevant information with farmers through SMS or IVRS. Learn more at https://mkisan.gov.in/default.aspx.

[91] PMFBY is a crop insurance intervention that aims to provide financial support to farmers in case of crop loss due to unforeseen events. It has a dedicated portal which aims to bring together necessary stakeholders in the crop insurance ecosystem (such as farmers, insurers, and banks) to ensure smooth implementation. Learn more at https://pmfby.gov.in/.

Exhibit 6.2

Illustration of the Agri NODE



6.3 MSME NODE

MSMEs currently contribute approximately 30 percent to India's GDP and the target is to increase their share to 50 percent of GDP.[92] As a share of non-farm employment, MSMEs represent approximately 20 percent in India vs. 50-80 percent in benchmark countries. These statistics indicate that MSMEs have immense untapped potential to scale which can be harnessed to create a multiplier effect on growth and jobs. However, a few critical challenges exist including access to credit, markets, and services (for example, logistics and warehousing, accounting and tax management) on a just-in-time and affordable basis. While a number of disparate (public and private) solutions exist to address some of these challenges, they lack the scale to serve 60 million MSMEs and can result in exclusion bias for the smallest enterprises which tend to be outside the ambit of the formal system.

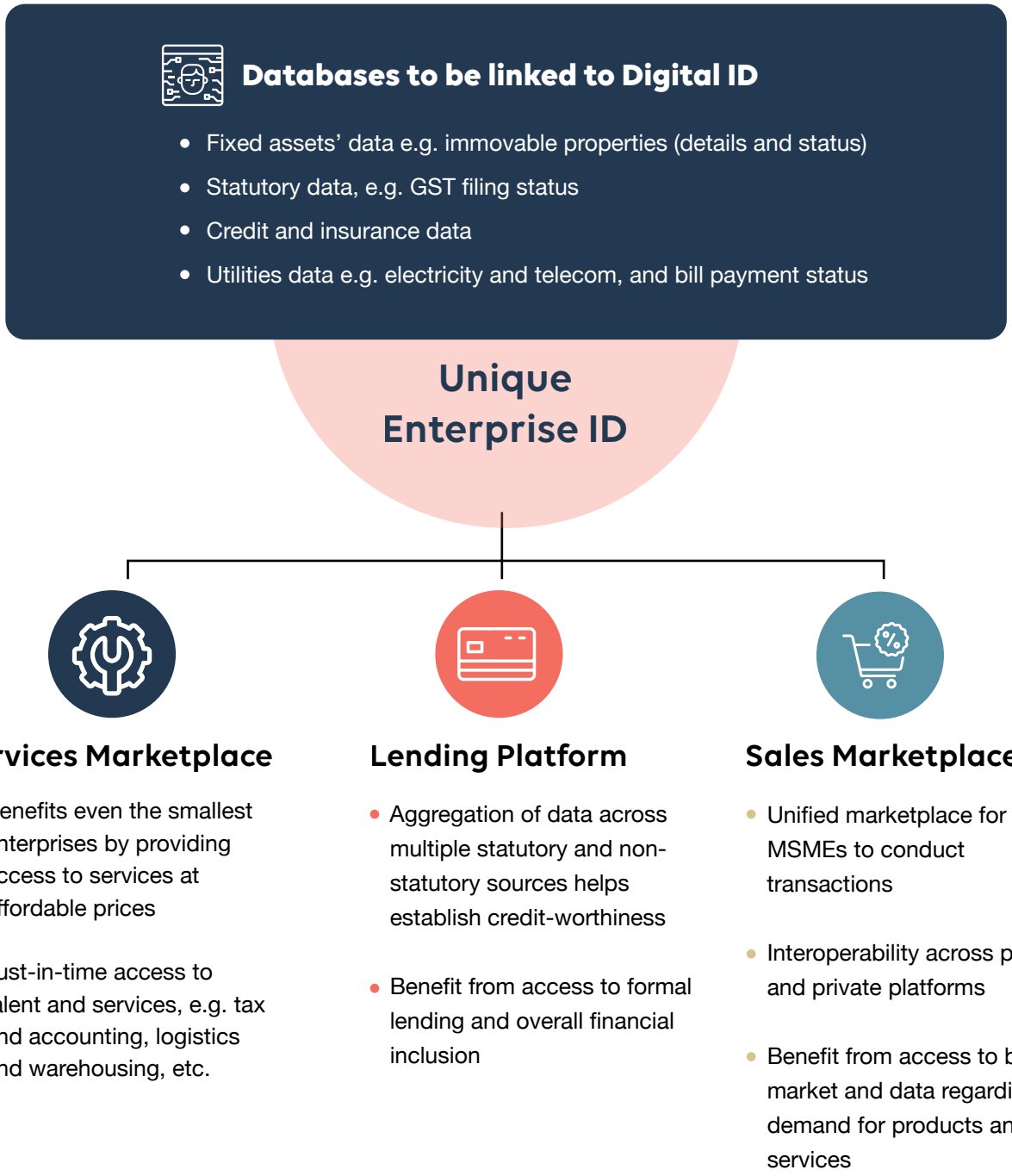
For example, one of the key challenges that MSMEs currently face is access to credit. Today, a large amount of data related to MSMEs is captured by a number of disparate entities, such as GSTN for tax filings, utilities companies for bill payment status, fin-techs for borrowing status, etc. However, due to the absence of a unique digital ID for MSMEs and lack of interoperability across data registries, there is no single source of information about an MSME. These challenges are further compounded by the presence of a fragmented ecosystem where an MSME needs to engage with multiple government touchpoints and portals for service delivery, such as MSME Sampark for job matching,[93] MSME Samadhaan for monitoring delayed payments, etc.[94] These separate portals can, instead, be linked to provide an interoperable service experience by adopting the ODE approach.

There is currently an opportunity to scale up and augment the value being created by MSMEs. An interoperable MSME NODE can be established (as shown in Exhibit 6.3) by creating a set of unifying building blocks. A universal digital ID can be established, similar to the Udyog Aadhaar Memorandum (UAM), with proper indexing of all data repositories like banks, utilities companies, statutory authorities, and fin-techs across a shared digital platform. **The availability of data from multiple statutory and non-statutory sources will help MSMEs prove their creditworthiness and access formal lending, thereby bridging the existing credit gap.** Further, the unique ID can be used as a building block in the MSME NODE and open APIs and common standards can be developed for key institutions to integrate services such as the marketplace. Another use case for this NODE can be just-in-time services for MSMEs, for example, logistics and warehousing, tax and accounting, talent management, etc., which are currently difficult to access. This unique ID, coupled with the data exchange, can help MSMEs reach scale and achieve the nation's growth goals as well as create jobs and facilitate the inclusion of MSMEs in the formal financial system.

[92] Ministry of Micro, Small and Medium Enterprises. (2019, August 27). Union Minister Shri Nitin Gadkari Addresses Roadmap for Growth of MSMEs. Press Information Bureau. Retrieved June 17, 2020, from https://pib.gov.in/PressReleseDetailm.aspx?PRID=1583193.
[93] Learn more at http://sampark.msme.gov.in/.
[94] Learn more at https://samadhaan.msme.gov.in/MyMsme/MSEFC/MSEFC_Welcome.aspx.

Exhibit 6.3

Illustration of the MSME NODE



6.4 State Service Delivery NODE

In India, there are hundreds of government schemes offering benefits based on a range of socio-economic criteria. Additionally, a number of government services are available to individuals on a universal access basis. Currently, various departments within most state governments are running fragmented online (or offline) systems to deliver these benefits.

Despite recent digitization drives, in order to avail the benefits or services offered by a state, individuals continue to navigate a complex process that can include multiple registration and verification procedures to prove eligibility and access entitlements. Further, individuals often have no credible source of information on the

benefits available or the requirements and processes for availing those benefits. Consequently, they may face discrimination at the point of service delivery. For an individual, these gaps in the system can lead to loss of valuable time and wages (opportunity cost) and may also result in exclusion from availing entitlements.

This fragmented ecosystem poses a challenge for the government as well. For example, multiple data collection programs lead to wastage of resources while the absence of reliable data about individuals and their entitlements can lead to leakages in government spending. **Recognizing these challenges, some states such as Madhya Pradesh (*Samagra*) and Rajasthan (*Bhamashah Yojana*) have created inter-departmental systems and uniform data registries.** However, they are still at a nascent stage and some continue to face operational challenges such as data management and updates.

The development of a State Service Delivery NODE can help in overcoming the challenges stated above in three ways.

01 Greater individual empowerment and agency in accessing services and benefits by providing them with a clear view of their eligibility and entitlements.

02 Better targeting and reduced leakages by removing discretion at the level of the service provider, resulting in better fiscal outcomes for states.

03 Better planning and forecasting capabilities through enhanced monitoring capabilities, improving individuals' experience over time.

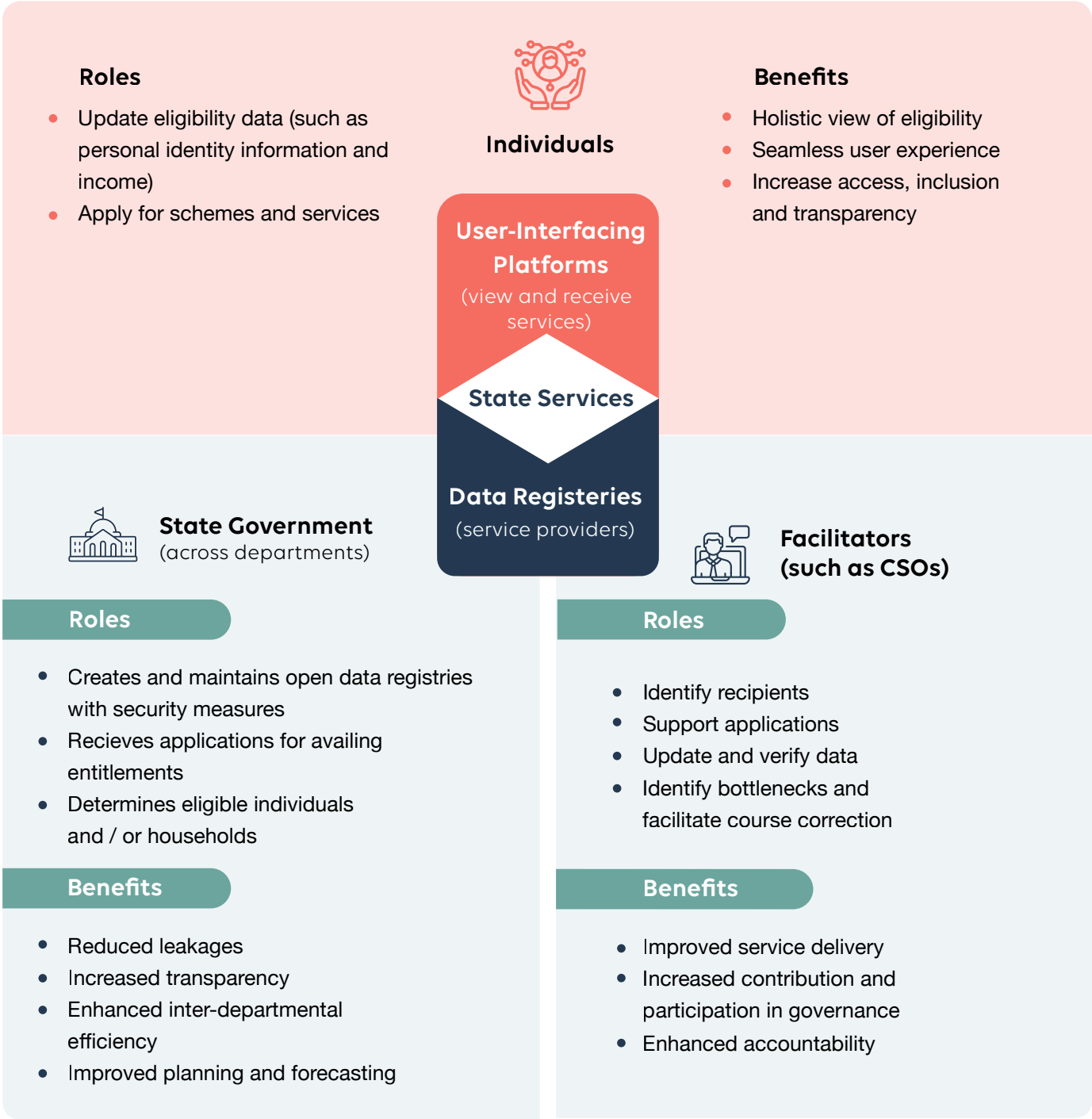
The State Service Delivery NODE would comprise an interoperable platform that enables integrated benefit disbursements and service delivery across multiple departments within (and across) State(s).

This platform would serve as a one-stop destination for an individual to access, apply for, and receive the eligible entitlements and public services (as shown in Exhibit 6.4).

Such a system would require the creation of an interoperable data registry of relevant individual information. Data standards would need to be defined to enable the aggregation, compatibility, and exchange of information across multiple departments and sources (for example, personal data, household data, asset ownership) and to provide a consolidated and service-specific view. **However, transparency, accountability, and privacy would be extremely critical in such a NODE to ensure that the balance of power is in favor of individuals, not the state, and any scope for misuse of personal data by both public and private actors is eliminated.**

Exhibit 6.4

Illustration of the State Service Delivery NODE



The NODEs discussed in this chapter serve to demonstrate the application of the ODE approach and exemplify its potential value. These illustrative NODEs also underscore the need for a robust design of the Digital Platform, Community, and Governance layers to ensure responsible service delivery. Additional resources on NODEs and a Toolkit to guide stakeholders have been further detailed on the Microsite.

07

FUNDING MODELS FOR ODES

ODEs require financing at all stages of their lifecycle. Initially, they require an upfront investment to bear the cost of design, build, and deployment (for example, technology vendor cost, beta-testing before launch, etc.). Over time, they also need operational financing to meet the cost of on-going operations including people, maintenance, scale-up, etc.

Guidelines to Aid Public Sector and Philanthropic Institutions on Financing ODEs

- Align ODE investments with national development prorities to maximize impact.
- Undertake a collaborative approach to financing ODEs that transcends sectoral and state boundaries.
- Quantify and account for the total lifetime cost of each prospective ODE (upfront investment and recurring operational costs) to effectively plan long-term fund disbursal.
- Invest in national capability building in the ICT space.

7.1 Initial Financing of ODEs

ODEs are 'digital commons' meant to be universally accessible. Hence, their funding model must ensure the inclusion of all intended users, irrespective of their economic backgrounds. **It is important to note that while proprietary solutions may be built on top of ODEs (with clearly defined principles and rules around value generation), the technology infrastructure needs to be financed in a manner that enables universal access.**

In keeping with this, the initial financing of ODEs should be done either through public sector capital or philanthropic capital (as opposed to private capital). Public sector or philanthropic financing supports the creation of a true level-playing field and keeps vested interests of different actors at bay (for example, prevents disproportionate value capture). Additionally, building ODEs can be costly and public sector or philanthropic contributions can potentially de-risk the initial development stage.

- **Public Sector Funding:** This could include funds from central or state governments. Government bodies can also avail concessional loans from national and international development finance institutions to unlock the capital earmarked for infrastructure. These loans can be repaid over the longer term. Examples of digital platforms financed by the government include Aadhaar and Gov.UK's open technology infrastructure: Pay, Notify, and Verify.

- **Philanthropic Funding:** Grants typically stem from three types of sources. These include, i) private foundations or development finance institutions, ii) corporate foundations, and iii) individuals via crowdsourcing campaigns or donations. For instance, Mojaloop offers potential funders two membership levels (Sponsor and Promoter), each with a variety of benefits, privileges, and associated annual dues. Sponsor members serve on the Board of Directors and Technical Governing Board, whereas Promoter members can nominate a representative to serve on the Technical Governing Board. In addition to monetary support, philanthropic contributions to ODEs can also be extended through the provision of technology products and / or services, either free or at subsidized rates.

7.2 Operational Financing of ODEs

Leveraging Global Philanthropic Capital and Development Grants

Globally, philanthropies and international financial institutions such as Bill & Melinda Gates Foundation, Ford Foundation, Michael and Susan Dell Foundation, Open Society Foundation, Rockefeller Foundation, Omidyar Network, the United States Agency for International Development (USAID), and the World Bank, to name a few, have increased their focus on supporting digital platforms. Through its Digital Strategy, USAID, for example, is committed to supporting countries in establishing "robust digital ecosystems that are open, inclusive, secure, and of benefit to all".[95] Similarly, the Ford Foundation is working with 118 global grantees with the aim that technology is "widely accepted as a vital public good to be regulated effectively, resulting in more access and better protections through enforceable rules and norms to guard against bias, censorship, and surveillance".[96] Technology infrastructure, thus, is being increasingly recognized as a key driver in reducing poverty and ensuring widespread societal gains.

The maintenance and scale-up of ODEs requires recurring expenditure for which financing mechanisms beyond public sector or philanthropic grants can be explored. ODEs can adopt a variety of cost recovery models for long-term sustainability by charging a fee for the services delivered by the digital platform and channelizing service fees to finance the ongoing operations of the platform. A few of these models have been elaborated below.

[95] USAID. (n.d.). Digital Strategy 2020-2024. Retrieved from https://www.usaid.gov/sites/default/files/documents/15396/USAID_Digital_Strategy.pdf.
[96] Ford Foundation. (2017, November 14). Strategy. Retrieved from https://www.fordfoundation.org/work/challenging-inequality/technology-and-society/strategy/.

- **User Fee:** Charged directly to the user in exchange for the services delivered. It can be a one-time charge (for example, fee for registration, verification, listing, etc.), a recurring subscription fee (monthly or annual) or a pay-per-use model. Depending on the type of platform, pay-per-use charges can be in the form of a transaction fee, convenience fee or download (API or data) charges (similar to how a public park might charge a small entry fee to offset its maintenance costs).

- **Service Fee:** Charged to the users who require customization or assistance with the implementation of the platform and is often relevant in the context of open source platforms. It usually comprises two types of charges, one-time and recurring. The one-time fee may include charges for site visits and platform deployment, while the recurring fee may include charges for platform maintenance, training, and user support. These fees can also support continued improvements to the digital platform. This is especially relevant for open source digital platforms.

Examples of Operational Financing Mechanisms

- MOSIP, an open source digital ID platform that can be customized by government bodies and other organizations, has adopted a cost recovery model in conjunction with philanthropic grants from its donors Bill & Melinda Gates Foundation, Omidyar Network, and Tata Trusts. The platform charges businesses a service fee for training and workshops.[97]

- Aadhaar eKYC and Authentication are open APIs available for businesses and government bodies to conduct paperless verification of the identity of users who enroll or register for their services. These platforms have recently started charging businesses (government agencies are currently exempt) fees (pay-per-use model) for using the eKYC (INR 20 per transaction) and yes / no authentication (INR 0.50 per transaction) services.[98]

7.3 Innovative Financing of ODEs

In addition to the funding models discussed above, government bodies can also explore other innovative means of financing ODEs. A few initial ideas have been discussed below.

- **Pooling Savings from the ODE into a Digital Investment Fund:** ODEs can generate savings due to enhanced transparency and efficiency in service delivery. Some ODEs might also generate secondary revenue for the government. For example, Estonia's e-Residency platform[99] generates secondary revenue for the government in the form of taxes paid by new companies established by the e-residents. All or some of these savings or new streams of revenue can be redeployed into a special Digital Investment Fund that is earmarked for the initial financing of new ODEs.

[97] Learn more at https://www.mosip.io/about.php.
[98] Unique Identity Authority of India, Government of India. (n.d.). Pricing of Aadhaar Authentication Transactions. Retrieved from https://uidai.gov.in/images/resource/Circular_for_Pricing_of_Aadhaar_Authetication_Transactions_24042019.pdf.
[99] Estonia's e-residency allows digital entrepreneurs to start and manage an EU-based company online. Learn more at https://e-resident.gov.ee/.

- **PPPs with Majority Shareholding Retained by the Government:** ODEs can adopt a PPP model similar to the one used for financing physical infrastructure. In many instances, private sector entities co-finance the initial set-up with the public sector using a combination of debt and equity financing, while ensuring broad-based shareholding and representation. The private sector players can subsequently recover their investment either directly by collecting revenues generated by the ODE or through deferred payments from the public sector partner. In case of PPP models, while private entities may earn a return on their investment, considering the 'public good' nature of ODEs, instances of unfair value capture (or profit maximization) should be avoided.

- **Variabilization of the Costs Associated with the Technology Vendor or MSPs:** One of the largest cost heads associated with public sector-backed ODEs is platform development and maintenance – often paid to the MSP. Hence, it is important to optimally manage this cost. By linking the post-launch MSP payout to platform performance, the ODE can convert the fixed cost to a variable cost. For example, GeM, a public procurement marketplace, linked the annual MSP payout to the Gross Merchandise Value (GMV) transacted on the platform. This model serves to not only manage the technology cost but also lower the commercial risk for the ODE accountable institution.

The successful implementation and functioning of ODEs are contingent upon the stability of the funding model adopted.

Hence, it becomes imperative that the multiple sources of both initial and ongoing funding are carefully evaluated and chosen. The choice of funding will usually depend on each ODE's unique context, which is defined by a few key factors such as its institutional set-up, external economic environment, type of solution being delivered, and the type of underlying digital platform. **Securing a reliable and long-term source of funding is one of the key requirements of successful ODEs.**

08

A NATIONAL GOVERNANCE STRATEGY FOR ODES

As multiple stakeholders start building and implementing ODEs across sectors, a coordinated national strategy to establish governance mechanisms for these ecosystems is required. MeitY's whitepaper on NODEs and the public consultation that followed are the first steps India is taking in the direction of the ODE approach.
This chapter outlines three specific recommendations (as shown in Exhibit 8.1) for the government to enable a robust national governance strategy for ODEs.

Exhibit 8.1

Three Recommendations for a National Governance Strategy for ODEs

8.1 Develop Standards and Frameworks in a Few Critical Areas

India has a number of policies, guidelines, and standards that can govern ODEs across sectors, such as the proposed PDP Bill or the MeitY Open API and Open Source policies. **However, there are a few critical areas where national standards and frameworks need to be defined in order to drive consistency across ODEs and facilitate a more responsible ODE approach.**

- **Data Governance:** A common framework to aid data management is critical for effectively managing the risk of data centralization and safeguarding individuals from threats arising from data misuse. The framework should comprehensively cover the various aspects related to data management including data ownership, collection, storage, sharing, and usage (as discussed in Exhibit 5.2). This framework can serve as a guide for all ODEs to establish their specific data governance policies. For example, Singapore's Personal Data Protection Commission (PDPC) has published a Trusted Data Sharing Framework to facilitate secure data sharing for the creation of innovative solutions, while safeguarding individual privacy and trust.[100]

[100] Learn more at https://www.imda.gov.sg/-/media/Imda/Files/Programme/AI-Data-Innovation/Trusted-Data-Sharing-Framework.pdf.

- **Ethics:** A code of ethics can serve to ensure that ODE builders actively manage for the potential impact and consequences of the build, including critical risks such as exclusion, unfair value capture, and weaponization of technology. For example, the UK Government has developed a Data Ethics Framework that sets out principles for the use of data by the public sector so as to maximize its value, while ensuring transparency and accountability.[101] Similarly, the Australian Government has developed an AI Ethics Framework to ensure the responsible and ethical use of AI technology and promote good governance.[102] Other regions such as Singapore, Dubai, and Norway have also either released similar frameworks or have started to develop the necessary frameworks and policies around the ethical use of AI.

- **Risk Management:** As elaborated in Chapter 4, there is a need to proactively assess and mitigate potential risks emerging from ODEs. To safeguard against these risks, a comprehensive risk management framework should be developed, with two objectives. First, to provide a step-by-step guide for public and private entities to continuously identify, assess, and mitigate risks associated with an ODE. Second, to outline specific mitigations measures (both preventive and corrective) for builders to prevent and manage key risks, for example, data centralization, exclusion, builder adoption, etc.

8.2 Encourage Participatory Governance Mechanisms

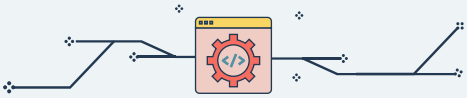
As discussed in Chapter 5, every ODE should have a designated institution (public, private, or PPP) accountable for its management and performance. **However, to avoid the concentration of power within any single institution (public or private), it is critical to promote multi-stakeholder, participatory governance mechanisms.** Multiple perspectives can be considered by bringing together working groups, committees, and forums with participation from end-users, facilitators (non-profits, think tanks, CSOs, builders, etc.).

> Such mechanisms can bring to bear the right expertise, keep in check the motivations of various actors, and enable timely course-correction. Further, they can also flag unethical or exclusionary behaviors and ensure robust platform design, timely grievance redressal, and fair consideration of end-users' needs and rights.

Participatory governance mechanisms can drive three objectives.

01 **Enable Transparency and Collaboration:** For any ODE, transparency and collaboration at every stage – plan, design, build, and operate – is essential. This can be enabled, for example, by conducting public consultations on the design and build of ODEs, releasing a cost-benefit analysis on the scale of public investment in any ODE, conducting social audits of the ODE against the stated objectives, and releasing performance data around adoption. Principles 7, 8, and 11 in Chapter 5 stress the importance of a multi-stakeholder approach in highlighting the interests and concerns, and perspectives of all stakeholders in the ecosystem, which may have otherwise been overlooked. Such practices also enhance public trust in the government.

[101] Learn more at https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework.
[102] Learn more at https://www.industry.gov.au/data-and-publications/building-australias-artificial-intelligence-capability/ai-ethics-framework.



The ‘open’ approach for NODEs needs to extend beyond the technology of open source codes, open standards, licences, and APIs to a culture of openness, transparency and collaboration. **A key step for that is to mobilize a vibrant and collaborative community of open source developers who can provide support to various NODEs.** The working of the Apache Software Foundation (ASF) can offer learnings to define the structure and operating model for a similar community. ASF is an open source community of developers who create open source offerings under the terms of the Apache license. **The community follows a collaborative approach for developing offerings with the decision-making driven by the developers themselves.** Each Project Management Committee creates its own self-governing rules for that project and encourages wide-scale peer review of the code to ensure ecosystem-wide acceptability. Conflicts are resolved through a ‘consensus gathering’ or voting process to ensure that every voice is heard, and multiple points of view are considered.

02 **Ensure Inclusion and Last-Mile Access:** Access and inclusion can be fostered by establishing standards and processes to guide the design and delivery of solutions. Social audits, for example, can be encouraged to monitor and ensure that ODEs are meeting their stated objectives in terms of inclusion and last-mile reach of solutions. Additionally, publishing a Code of Ethics can also aid their design and operation by highlighting best practices to bolster last-mile access.

The Digital Dialogues initiative by the Rajasthan Government and Mazdoor Kisan Shakti Sangathan (MKSS), a grassroots organization, is a path-breaking illustration of how non-profits and user communities can drive bottom-up accountability to ensure inclusion. As a consequence of Digital Dialogues (bi-monthly meetings hosted by the Department of IT and Communication, Government of Rajasthan, and attended by individuals and MKSS activists), government databases related to social schemes were opened up via the Jan Soochna portal (jansoochna.rajasthan.gov.in). This, in turn, allowed rural and marginalized communities to review the data, understand their entitlements, and flag concerns on exclusion and discrimination with the assistance of MKSS volunteers. Additionally, as a part of the social audits of welfare schemes, public hearings (or jan sunvai) were held to collate individuals’ concerns. These were then reported via the Sampark portal and tracked by MKSS volunteers until resolved.[103]

[103] Deepti Bharthur. (2016, September). Voice or Chatter: Towards New Meanings of Citizen Engagement. IT for Change. Retrieved from https://itforchange.net/mavc/blog/tag/mkss/.

03 **Bring to Bear the Right Expertise:** In order to realize the true potential of ODEs, domain and technical experts need to be deeply involved at each stage. For example, the Education NODE would require the expertise of curriculum developers and teachers, along with technology developers who have experience in developing personalized and adaptive learning management systems. This will ensure that the final solution is geared towards the needs of the community, including students, teachers, and parents. Additionally, fostering a vibrant community of experts allows for solutions to be tested and improved. For example, open source developers can conduct a peer review of the code to suggest modifications or enhancements to ensure robustness of technology and data architecture. This can be done in many ways including releasing the source code, launching bug bounty programs to incentivize coders to review it, etc. For instance, in May 2020, GoI released the source code for the Aarogya Setu app, developed to carry out contact tracing in the wake of COVID-19, and launched a bug bounty program to identify vulnerabilities or suggest improvements to the source code.

In Estonia, a voluntary organization called the 'Cyber Defense League' was established to protect the Estonian cyberspace and the country's information infrastructure by providing the necessary support to the government, with the broad goal of securing national defence. The organization comprises IT security experts, programmers, lawyers, and management specialists from the nation's top IT companies, banks, and defence forces. It covers two broad types of activities, capacity building, and operations support. In case of the former, the unit conducts trainings and disseminates knowledge to raise the level of cyber security capacity within the government. More importantly, the unit facilitates PPPs and enhances preparedness in operating during a crisis.

8.3 Establish a High-Powered NODE Council to Drive the Agenda

To advance the ODE vision, align it with the national development agenda, and ensure successful implementation, we recommend the establishment of a NODE Council. The proposed Council should be composed of four multi-disciplinary committees.

01 Technology and Data.

02 Risk and Ethics.

03 Operations (financing, procurement and contracting, talent management).

04 User Engagement (for builders, facilitators, end-users).

The Council should comprise experts from diverse fields, for example, public policy, ethics, digital product development, data analytics and intelligence, consumer research, etc., to ensure a holistic approach to ODE design and delivery. Additionally, participation from central ministries and state governments should be encouraged on a rotating basis to introduce sectoral and state perspectives and on-ground realities. The primary roles of the Council will be to:

- **Devise concrete strategies to drive the adoption of the ODE approach** by both public and private sector institutions.
- **Develop and update the required policies, guidelines, standards, and frameworks** at the national level and ensure consistency across ODEs in key areas such as data management, funding models, etc.
- **Advise ministries and states on the design and delivery of ODEs** (including migration from closed legacy systems to open digital platforms, compliance with regulatory frameworks, etc.), to enable faster decision-making and efficient implementation.

Exhibit 8.2
Set up of the Proposed National ODE Council

The choice of an institutional home for the NODE Council is important for its success and effectiveness. We propose two possible options, for further evaluation.

- **The NODE Council can be set up as a high-powered body under the PMO or within NITI Aayog.** An example of a similar entity is the SNDGO under PMO, Singapore. SNDGO is responsible for driving Singapore's digital transformation by planning and prioritizing key initiatives. Another example is Estonia's e-Estonia Council, which is responsible for planning and implementing the country's digital agenda. The e-Estonia Council is housed within the Estonian Government Office, which supports the Prime Minister. The priority accorded at the highest levels of government to the agenda of building a digital society has contributed considerably to its success.

- **Alternatively, the NODE Council can be housed within MeitY, as a statutory authority (such as UIDAI), given that the Ministry is the apex body responsible for digital government initiatives.** The Council will need to be helmed by a senior leader, given the importance of the initiative as well as the need to convene various central and state government agencies and establish an overarching governance framework.

A robust national governance framework is important to ensure a coordinated strategy and uniformity in adopting the ODE approach.

A NODE Council can be established to drive large-scale adoption of ODEs, develop and update the required standards and policies to guide their build, and advise practitioners on their design and delivery. Further, the Council can encourage the adoption of participatory governance mechanisms to ensure that the ODEs are meeting their stated objectives.

09

GETTING STARTED WITH ODES: A PRACTITIONER'S TOOLKIT

In order to support practitioners with applying the ODE approach, we have created an online, interactive, and freely accessible toolkit. This was developed by collating some of the best publicly available resources (policies, standards, frameworks, guidelines, and best practice documents) from India and around the world. Practitioners have not only contributed to the resources in the toolkit but continue to update it regularly. In addition to the toolkit, practical examples of how the ODE approach is being adopted have been provided as well, to inspire and encourage practitioners. These resources can be accessed at the dedicated Microsite.

The toolkit has been designed to support a range of users. Practitioners can leverage it to build responsible ODEs by incorporating the PbD principles or understand the most optimal funding options. Government officials can leverage it to learn more about the best practices to adopt in procurement while building ODEs or shape a relevant talent acquisition strategy. CSOs can use the toolkit to learn about measures to strengthen grievance redressal processes in ODEs. Finally, end-users can use the toolkit to provide feedback on usability or bolster the ethical delivery of services via ODEs.

9.1 Understanding the ODE Toolkit

Every ODE has four stages across its lifecycle: Plan, Design, Build, and Operate. For each stage, the toolkit provides relevant resources and guides the practitioner accordingly. Additionally, resources for a few critical cross-cutting elements have also been included, for example, risk management, ethics, and monitoring and evaluation.

Two types of resources have been included in the toolkit – relevant rules (policies, standards, guidelines, etc.), and a list of institutions (both government and non-government that uphold these rules). The toolkit is organised along these two dimensions, with the ODE value chain represented on the vertical axis and the resource type on the horizontal axis (as shown in Exhibit 9.1).

Exhibit 9.1

Layout of the Toolkit

ODE value chain		Types of resources					
		Rules			Institutions		
		Policies	Standards	Guidelines / Best Practices	Rule-setting and Enforcing Authorities	Committees and Working Groups	Participatory Alliances
	Plan						
	Design						
	Build						
	Operate						
	Cross-cutting Elements						

Given the multi-stakeholder approach that ODEs emphasize, the toolkit has been designed keeping in mind the diverse range of actors that can participate in the ecosystem. The toolkit, thus, can prove to be a valuable resource for a range of readers – from developers seeking to align their builds with open digital standards to policymakers seeking to adopt the ODE approach for their sector and end-user collectives looking to provide feedback on the design and operations of ODEs.

10

A CALL TO ACTION: REALIZING THE ODE VISION

This report introduces the ODE approach, a new paradigm for how technology infrastructure can be built and deployed to maximize value creation and minimize harms. **As we move from the "1.0" era of 'computerization' to the "2.0" era of 'digitization' and now to the "3.0" era of 'platformization' of service delivery, we need a more holistic approach that focuses on enabling 'ecosystems'.** Such an ecosystem comprises both 'tech' (Digital Platforms) and 'non-tech' (Governance and Community) layers. A number of path-breaking ODEs are already in play in India: UPI in the financial services space; the NDHB that imagines a radically different health ecosystem; the digital platform for K-12 learning called DIKSHA, and NUIS which will enable innovative solutions for urban challenges. As this approach gains momentum, many more ODEs are likely to emerge.

While National ODEs can unlock over USD 700 billion (INR 50+ lakh crore) in economic value by 2030, in the absence of adequate safeguards, they can also potentially generate a number of risks that include privacy violations, security breaches, and exclusion.

In order to truly harness the impact potential of ODEs, we need to proactively identify and mitigate these risks.

This report describes how we can build responsible ODEs, which maximise benefits and minimize harms. It provides 15 guiding principles, five for each of the three ODE layers, to ensure the robustness of both the tech and non-tech layers. To transform these propositions into tangible outcomes, we have provided a freely accessible live Toolkit (can be accessed on the Microsite) that practitioners can leverage as they embark on their journey towards building responsible ODEs.

However, in order to make the ODE vision a reality, all stakeholders – government, public and private entities, civil society, academia, philanthropic foundations, and individuals – need to come together to make three proactive and concerted shifts.

First, a shift in mindset from 'end-to-end service delivery' to 'building together'. Traditionally, service delivery has been thought of as an E2E model, with a single entity orchestrating the entire lifecycle, often using a 'built for purpose' technology system. However, the onset of shared technology infrastructure necessitates a more collaborative approach. **While open technology architecture, by way of open standards, data, licenses, and APIs is a necessary condition to enable this collaboration, it is also essential to revisit stakeholder roles, responsibilities, and partnership models.** For public sector entities, this includes engaging proactively with the private sector and individuals and exploring co-creation opportunities with businesses, start-ups, entrepreneurs, and open source developer communities. These synergies are already evident in the payments ecosystem in India. In this instance, the government, in partnership with the private sector, has created the UPI infrastructure which has enabled third-parties to build multiple payment solutions that have bolstered financial inclusion. Similarly, the DIKSHA portal for teachers was built on Sunbird (an open learning management solution) rather than the government building the entire solution independently. The ODE approach can therefore create synergies by leveraging best-in-class capabilities of stakeholders within the ecosystem to ensure that the total value created in the ecosystem is far greater than the contribution of each individual stakeholder.

Second, a shift towards adopting a truly participatory approach that invites and capitalizes upon stakeholder contributions. As we adopt a more collaborative approach to building and operationalizing digital platforms, it is critical to establish measures that allow all stakeholders to play an active and engaged role in the ecosystem. **This involves moving away from the traditional two-way relations between actors (such as government-to-individual or business-to-business) and recognizing and institutionalizing multi-way**

interactions across the community of builders, users, and facilitators. It would entail promoting a 'culture' of openness and instituting mechanisms such as public consultations, feedback loops, technology contributions, etc., that allow stakeholders to participate in an ODE's lifecycle. Such mechanisms distribute both power and accountability equally amongst the government, enterprises, and individuals and enable greater collective accountability and transparency within the ecosystem.

Finally, a shift in how we build and govern digital technologies in the public sector by creating new governance frameworks for this emerging technology infrastructure. To advance the ODE vision we need to prioritize the creation of robust governance frameworks that promote openness and collaboration, and safeguard individual privacy and agency. Not only will this enable the development of responsible ODEs, but will also provide stakeholders with the necessary incentives and tools to accelerate their development. These frameworks need to lay out guidelines and models for the nature of the accountable institution responsible for each ODE. Additionally, they should outline and institutionalize archetypes of potential partnerships and business models possible within the ecosystem, financing mechanisms available to sustainably build and operate ODEs, and new models of procurement and talent management. **It is critical to prioritize the establishment of these frameworks to ensure a consistent approach to building and operating ODEs and augmenting their public impact agenda.**

In this report, we showcase that ODEs are not just a different way of delivering services — they are a different way of reimagining the individual-state-enterprise relationship.

The adoption of this approach can have a transformative impact on the country through immense economic and societal value creation and governance unlocks. If designed right, ODEs can empower individuals in an unprecedented way, but if not built responsibly can leave them extremely vulnerable. This report was written with a view to accelerate the discourse and exchange of ideas on ODEs and ensure that India is well positioned to reap the dividends of the ODE approach over the long-term, while undertaking steps to mitigate risks and challenges. It intends to provide a holistic perspective on the ODE approach and nudge public, private, and social sector entities towards a more collaborative, safe digital future.

Acknowledgements

This report was co-authored by Omidyar Network India (ONI) and Boston Consulting Group (BCG). ONI's primary authors were Varad Pande and Kriti Mittal, in close collaboration with Roopa Kudva, CV Madhukar, Subhashish Bhadra, and Govind Shivkumar. From BCG, the primary authors were Saibal Chakraborty and Aparna Bijapurkar, in close collaboration with Seema Bansal and Ashish Garg, supported by Garima Agarwal, Arushi Malhotra, Kethan Rao, and Alla Sudhakar Reddy.

We extend our appreciation to Rohan Vyavaharkar, Aman Totla, Jasmine Pithawala, and Bhumika Gupta for marketing and communications support; to Deepika Asthana for her editorial support; and to Mythili Hariharan, Tina Wadhwani, and Devang Raiyani from HumanX, and Jamshed Daruwalla, Saroj Singh, Pradeep Hire, and Ankit Kalia from BCG for their contributions to design and production.

We are particularly grateful to S. Gopalakrishnan, Additional Secretary, PMO and former Additional Secretary, MeitY; Nandan Nilekani, Chairman, EkStep Foundation and co-founder, Infosys; J. Satyanarayana, former Chairman, UIDAI and former Secretary, MeitY; K. P. Krishnan, former Secretary, Ministry of Skill Development and Entrepreneurship; and Sanjay Purohit, Chief Curator, Societal Platform, for valuable guidance and thought partnership. We would also like to thank the many government departments and public agencies, civil society organizations digital entrepreneurs and other stakeholders mentioned below, who participated in our interviews, round table, consultations, and webinars.

Aapti Institute, especially Sarayu Natarajan

Ajay Shah

Babajobs, especially Sean Blagsvedt

Bank of Baroda (Baroda Kisan)

BCG Henderson Institute

BetterPlace, especially Pravin Agarwala

Bharat Innovation Fund, especially Sanjay Jain

Boston Consulting Group, especially Miguel Carrasco, Grantly Mailes, Steven Mills and Kelly O'Connor

Centre for Communication Governance, National Law University

Centre for Internet & Society, especially Amber Sinha

Chase India

CivicDataLab, especially Garuav Godhwani

Civis

CUTS International

Cyber Cafe Association of India

Dalberg, especially Aditi Singh

Data Governance Network, especially Venkatesh Hariharan and Prakhar Misra

David Eaves, Harvard Kennedy School

Department of Agriculture, Rajasthan

DigiSahamati Foundation, especially BG Mahesh

Dvara Research, especially Malavika Raghavan

eGovernments Foundation, especially Gautham Ravichander and Ameya Nayak

EkStep Foundation, especially Shankar Maruwada, Pramod Verma and Deepika Mogilishetty

EMVC

Estonian Information System Authority (RIA)

Esya Centre

Farmguide

Foundation for Economic Development

Founding Fuel, especially Charles Assisi

Goods and Services Tax Network (GSTN), especially Prakash Kumar and Sarthak Saxena

Government of Andhra Pradesh

Government of Gujarat

Government of Haryana

Government of Maharashtra

Government of Odisha, especially Saurabh Garg

Government of Punjab, especially Vini Mahajan and Parminder Singh

Government of Rajasthan

Government of Telangana

GramCover, especially Dhyanesh Bhatt

HasGeek, especially Zainab Bawa and Srinivas Kodali

IDFC Institute

International Institute of IT, Bangalore (IIITB)

Internet Democracy Project, especially Anja Kovacks and Tripti Jain

Internet Society

iSPIRT, especially Sharad Sharma and Kamya Chandra

IT for Change, especially Parminder Jeet Singh

Michael & Susan Dell Foundation

Microsoft India, especially Rohini Srivathsa

MindTree Foundation, especially Prashant Mehra

Ministry Electronics and Information Technology, especially Sanjay Goel

Ministry of Agriculture and Farmers' Welfare

Ministry of Environment, Forest & Climate Change

Ministry of Health and Family Welfare

Ministry of Housing and Urban Affairs

Ministry of Human Resource Development

Ministry of Labor and Employment

Ministry of Micro, Small and Medium Enterprises

Ministry of Rural Development

Ministry of Skill Development and Entrepreneurship

MOSIP, especially Srijoni Sen and Arun Gurumurthy

Mozilla Foundation, especially Udbhav Tiwari

NASSCOM

National eGovernance Division, especially Abhishek Singh and Vinay Thakur

National Institute of Public Finance and Policy

National Skill Development Corporation, especially Manish Kumar

New America, especially Tomicah Tillemann

NITI Aayog

Omidyar Network, especially CV Madhukar, Mike Kubzansky and Sushant Kumar

Public Digital

Public.io

RICH Telangana

Richard Pope

Samagra Governance, especially Gaurav Goel and Rahul Kulkarni

Sattva Consulting

Setu, especially Nikhil Kumar and Sahil Kini

Societal Platform, especially Sanjay Purohit, Sahana Jose and Naveen Varshan

Software Freedom Law Center

Tandem Research

The Dialogue

The Nainital Bank Ltd

ThinkAg, especially Hemendra Mathur

Trilegal, especially Rahul Mathan

UChicago Trust

UIDAI

Vidhi Legal Policy, especially Arghya Sengupta

VISA

World Bank, especially Shrayana Bhattacharya and Ambrish Sahi

Note: This list is representative of the people and organizations that the authors of this report contacted during the course of this study. It should not be considered as an endorsement of the views expressed in this report.

Further Reading

Cavoukian, A. (2009). Privacy by Design: The 7 Foundational Principles (Rev. ed.). Information and Privacy Commissioner of Ontario. Available at https://www.ipc.on.ca/wp-content/uploads/Resources/7foundationalprinciples.pdf.

Center for Digital Built Britain (2018). The Gemini Principles. CDBB. Available at https://www.cdbb.cam.ac.uk/system/files/documents/TheGeminiPrinciples.pdf.

D-Cent. (2013). From Citizen Data to Wisdom of the Crowd. Available at https://dcentproject.eu/wp-content/uploads/2016/01/D2.4-%EF%BF%BCFrom-citizen-data-to-wisdom-of-the-Crowd.pdf.

Digital Future Society. (2019). Toward Better Data Governance for All: Data Ethics and Privacy in the Digital Era. Available at https://digitalfuturesociety.com/app/uploads/2019/08/060819_Toward_better_data_governance_for_all_dfs_mwcapital_DIGITAL.pdf.

Digital Impact Alliance, ITU. (2019). SDG Digital Investment Framework. Digital Impact Alliance. Available at https://digitalimpactalliance.org/wp-content/uploads/2019/04/D-STR-DIGITAL.02-2019-PDF-E.pdf.

Eaves, D., Pope, R., & McGuire, B. (2020, January). Government as a Platform: How Policy Makers Should Think About the Foundations of Digital Public Infrastructure. Kennedy School Review. Available at https://ksr.hkspublications.org/2020/01/14/government-as-a-platform-how-policy-makers-should-think-about-the-foundations-of-digital-public-infrastructure/.

Federal Chief Information Officer. (2012). Digital Government: Building a 21st Century Platform to better serve the American People. Available at https://obamawhitehouse.archives.gov/sites/default/files/omb/egov/digital-government/digital-government-strategy.pdf.

International Telecommunication Unit. (2018). Digital Identity Roadmap Guide. Available at https://www.itu.int/en/ITU-D/ICT-Applications/Documents/Guides/ITU_eID4D_DIGITAL%20IDENTITY_ROAD_MAP_GUIDE_FINAL_Under%20Review_Until-05-10-2018.pdf.

Johnson, Peter. (2019). Disintermediating Government: The Role of Open Data and Smart Infrastructure. 10.24251/HICSS.2019.346.

Medine, D., & Murthy, G. (2020). Making Data Work for the Poor. CGAP. Available at https://www.cgap.org/sites/default/files/publications/2020_01_Focus_Note_Making_Data_Work_for_Poor.pdf.

Ministry of Health and Family Welfare, Government of India (2019). National Digital Health Blueprint. Available at https://main.mohfw.gov.in/sites/default/files/Final%20Report%20-%20Lite%20Version.pdf.

Ministry of Housing and Urban Affairs, Government of India. (2019). National Urban Innovation Stack: Strategy & Approach. NIUA. Available at https://smartnet.niua.org/sites/default/files/resources/national_urban_innovation_stack_web_version.pdf.

Pathways for Prosperity Commission. (2018). Personal Data Empowerment. Available at https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2018-11/personal_data_empowerment.pdf.

Pathways for Prosperity Commission. (2019). The Digital RoadMap: How Developing Countries Can Get Ahead. Pathways Commission. Available at https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2019-11/the_digital_roadmap.pdf.

Pope, R. (2019). Playbook: Government as a Platform. ASH Center for Democratic Governance and Innovation, Harvard Kennedy School. Available at https://ash.harvard.edu/files/ash/files/293091_hvd_ash_gvmnt_as_platform_v2.pdf?utm_campaign=coschedule&utm_source=twitter&utm_medium=HarvardAsh.

Roosna, S., Rikk, R. (2016). E-Estonia E-Governance in Practice. EGA. Available at https://ega.ee/wp-content/uploads/2016/06/e-Estonia-e-Governance-in-Practice.pdf.

Simon, J., Bass, T., Boelman, V., Mulgan, G. (2017). Digital Democracy: The Tools Transforming Political Engagement. Nesta. Available at https://media.nesta.org.uk/documents/digital_democracy.pdf.

Smart Nation & Digital Government Office and GovTech Singapore. (2018). Digital Government Blueprint. GovTech Singapore. Available at https://www.tech.gov.sg/files/digital-transformation/dgb_booklet_june2018.pdf.

Societal Platform. (2018). A Systemic Method to Resolve Complex Societal Challenges. Available at https://societalplatform.org/wp-content/uploads/2020/05/SP_Intro_Article.pdf.

Societal Platform. (2018). Societal Platform Design: Note on Design and Technology Characteristics. Available at https://societalplatform.org/wp-content/uploads/2018/10/SP_Design-1.pdf.

UN Secretary-General's High-level Panel on Digital Cooperation. (2019). The Age of Digital Interdependence. UN. Available at https://www.un.org/en/pdfs/DigitalCooperation-report-for%20web.pdf.

World Bank. (2018). Privacy by Design: Current Practices in Estonia, India, and Austria. Available at http://documents.worldbank.org/curated/en/546691543847931842/pdf/Privacy-by-Design-Current-Practices-in-Estonia-India-and-Austria.pdf.

Appendix: Impact Potential Methodology

We have quantified the potential impact of 10 NODEs in sectors such as health, education, agriculture, state service delivery, etc. The estimated impact potential is expected to accrue by 2030, assuming benchmark adoption rates. In principle, there will be an adoption curve (with continued adoption post 2030), as well as recurring benefits for adopters. Further, there are likely to be additional use cases for each NODE beyond what we have considered. This could lead to potentially greater impact.

The following 5-step approach has been taken to assess the economic impact associated with the 10 high potential NODEs.

01 Identified key drivers of impact for each NODE based on a set of use cases.

02 Determined expected platform adoption rates by 2030 and the consequent incremental value or savings, based on a range of Indian and global benchmarks.

03 The actual 2020 scenario (or the most recently reported) has been used as the base case (for example, farmer income or total expenditure across all social protection schemes) to project the 2030 base value (accounting for expected inflation only).

04 Calculated the impact of each driver on the base value (for example, percentage increase in farmer income due to higher productivity for all adopting farmers) and estimate the economic impact [product of (ii) and (iii) above].

05 Summed across all drivers to estimate the overall impact created by each NODE by 2030.

The table below outlines the data, assumptions, and sources leveraged for the computation of the economic, societal, and governance impact of 10 high potential NODEs.

ODE	Base Value in 2020	Assumptions		Impact by 2030	Sources
		Impact Drivers	Platform Adoption		
Agri NODE	• Average annual farmer income – INR 1,20,000 • Number of farmers–13.6 crore • Market value of all crops – USD 210 billion • Non-institutional credit for agriculture – USD 117 billion	• 10-20 percent price improvement due to better access to the marketplace • 10-30 percent improvement in productivity with effective crop advisory services • 10-15 percent interest rate savings as credit moves towards institutional sources	• 20-50 percent adoption of e-marketplace • 10-30 percent adoption of crop advisory services • 40-60 percent shift from non-institutional to institutional credit	Economic impact: Approximately USD 60-90 billion (INR 5-7 lakh crore) Societal impact: 1.5x+ increase in farmer income due to platform adoption	• Doubling Farmers Income by NITI Aayog • Benchmark adoption of agri platforms in India and resultant price improvement (for example, eNAM, Rashtriya e-Market Services [ReMS] in Karnataka) • Agriculture Economics Research Review study • All India Debt and Investment Survey 2013

					• World Development Perspectives study • Benchmark adoption of Kisan Credit Cards • Field surveys
Talent NODE	• Currently unemployed population – 30 million • Eligible out of labor force population (neither working nor available for work) – 300 million • Formal labor – 380 million • Casual labor – 130 million • Average wage per capita for formal labor – INR 1,60,000 • Average wage per capita for casual labor – INR 50,000-60,000	• 5-15 percent decrease in unemployment rate due to improved job search and skilling services • 1-4 percent increase in labor force participation rate with platformization and gig economy services • 5-10 percent increase in wages for the formal workforce due to better job matching • 30-50 percent additional wages for casual labor due to upskilling, formalisation	• 20-40 percent platform adoption by the eligible workforce • 10-20 percent shift from casual to formal workforce	Economic impact: Approximately USD 150-200 billion (INR 11-15 lakh crore) Societal impact: 50-80 million people expected to be matched into better-fit jobs	• Oxford Economics • Euromonitor • World Bank data • Benchmark unemployment rates across countries • Periodic Labour Force Survey • State of Working India Report • Benchmark adoption and usage of platforms for job search in other countries • Estimated growth rate of gig economy jobs • India Wage Report by ILO
State Service Delivery NODE	• National benefits paid – USD 50 billion • State benefits paid – USD 20 billion	• 10-25 percent efficiency in targeting of benefits, reduction in fraud and leakages	• NA	Economic impact: Approximately USD 15-20 billion (INR 1-2 lakh crore) Governance impact: 20% more eligible citizens expected to be included in the social safety net	• Union Budget 2019 • World Bank study • J-PAL study • State budgets
MSME NODE	• Unmet credit needs of MSMEs – USD 100 billion (40-50 percent MSMEs have unmet credit needs) • Credit needs fulfilled by non-institutional lenders – USD 280 billion • MSME Gross Value Added–USD 617 billion	• 1-3x incremental output ratio realized with access to new credit • 5-10 percent interest rate savings due to a shift to institutional lending • 10-20 percent price improvement with access to marketplace	• 50 percent of MSMEs already adopting digital tools for business needs • 40-60 percent credit gap narrowed by digital lending	Economic impact: Approximately USD 150-200 billion (INR 11-15 lakh crore) Societal impact: 10-20 million MSMEs expected to be included in the formal financial system	• Credit Disrupted by ONI and BCG • International Finance Corporation data • Policy Guidelines by Indus Bank • Ministry of MSME and Confederation of Indian Industry paper • Benchmark price improvement due to better marketplace access

Education NODE	• Total dropouts (Grade VII and X) – 80 million	• 10-20 percent wage increase for dropouts who stay in school	• 20-40 percent platform adoption	Economic impact: Approximately USD 40-60 billion (INR 3-5 lakh crore) Societal impact: 15-25 million student drop outs expected to stay in school	• National Institute of Education Planning and Administration • World Economic Forum study • Benchmark adoption and usage of DIKSHA platform
Law and Justice NODE	• Value of Judicial delays – USD 8 billion	• 20-40 percent efficiency gain in judicial processing time, reducing delays	• NA	Economic impact: Approximately USD 3-6 billion (INR 0.2-0.5 lakh crore) Governance impact: 2-6 million court cases that have been pending 3+ years to be resolved	• World Bank Ease of Doing Business Report 2019 • Economic Survey 2018-19
E-Land Records NODE	• Value of land investment affected by disputes – USD 200 billion • 6.7 million people affected by land disputes	• 5-15 percent reduction in disputes due to greater transparency, faster dispute resolution, better planning	• NA	Economic impact: Approximately USD 30-50 billion (INR 2-4 lakh crore) Societal impact: One million people and 250,000 hectares of land expected to be in resolved land conflicts	• Land Conflict Watch • Finance Research Group (Indira Gandhi Institute of Development Research) report
Connected Logistics NODE	• Current spend on logistics – USD 406 billion	• 5-15 percent efficiency due to digitized processes, better price discovery, increased government efficiency in logistics spend	• NA	Economic impact: Approximately USD 60-80 billion (INR 5-6 lakh crore)	• Department of Commerce • World Economic Forum study
Health NODE	• Pradhan Mantri Jan Arogya Yojana (PMJAY) eligible households–100 million	• 20-30 percent additional coverage with accessible health records • Universal healthcare coverage shown to increase life expectancy by 3-5 years • 3-5 healthcare visits per year per family • Expected savings per visit – INR 5,000	• NA	Economic impact: Approximately USD 8-15 billion (INR 0.6-1 lakh crore) Societal impact: 1-3+ year increase in life expectancy	• PMJAY • Benchmarks for health care coverage globally • Practo survey • Frontiers in Pharmacology study • Field surveys

Urban Governance NODE	• INR 5000-6000 per person revenue generation opportunity from smart governance	• 80-100 million additional people living in smart cities	• NA	Economic impact: Approximately USD 10-15 billion (INR 0.75-1 lakh crore) Governance impact: 100+ hours of time per person per year expected to be saved due to smart mobility solutions	• Economic Survey 2016-17 • Smart Cities Mission • Juniper Research study • Benchmark research on efficiency gains and time savings in India and global cities

Appendix 2: Interactive Toolkit

STAGES & SUB-STAGES		RULES			INSTITUTIONS		
		Policies	Standards/technical specifications	Guidelines/ best practices	Rule-setting and enforcing authorities	Committees and working groups	Participatory alliances
PLAN	ODE overall strategy/concept			8	5		2
DESIGN	Designing the technology architecture (both application & Integration architecture)	7	9	12	5	2	
	Designing the data architecture	6	11	6	2		2
	Data security	7	7	19	4	4	3
	Data privacy	3	3	8	4	3	1
	Infrastructure		1	2	1		
BUILD	Development methodology	2	3	5	2		
	Procurement	1		11	1		
	Funding/monetization models				1		
	Talent management	1		1	1		
	Change management		1	1	1		
OPERATE	End-user adoption and ongoing support		1	2			
	Engaging developer community						
	Redressal of complaints and grievances			2	3		
CROSS-CUTTING ELEMENTS	Monitoring and evaluation		1	3	3		
	Risk management		1	1	1		
	Ethics		1		1		

For more resources, please visit the Microsite

OMIDYAR NETWORK INDIA

BOSTON CONSULTING GROUP