



Centre for Digital
Public Infrastructure

Digital Public Infrastructure (DPI) Thinking



As of 2008, India was one
of the world's
most unbanked



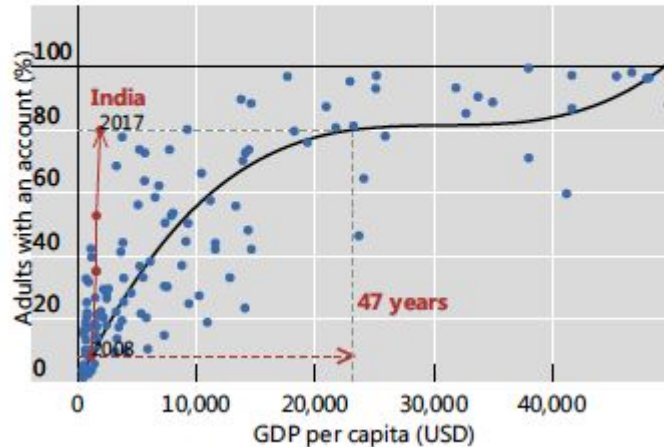
Less than **20%** banking
penetration



In 9 years, banking penetration shot up to **80%** using digital ID, closing the gender gap in accounts!

Leapfrogging traditional development processes

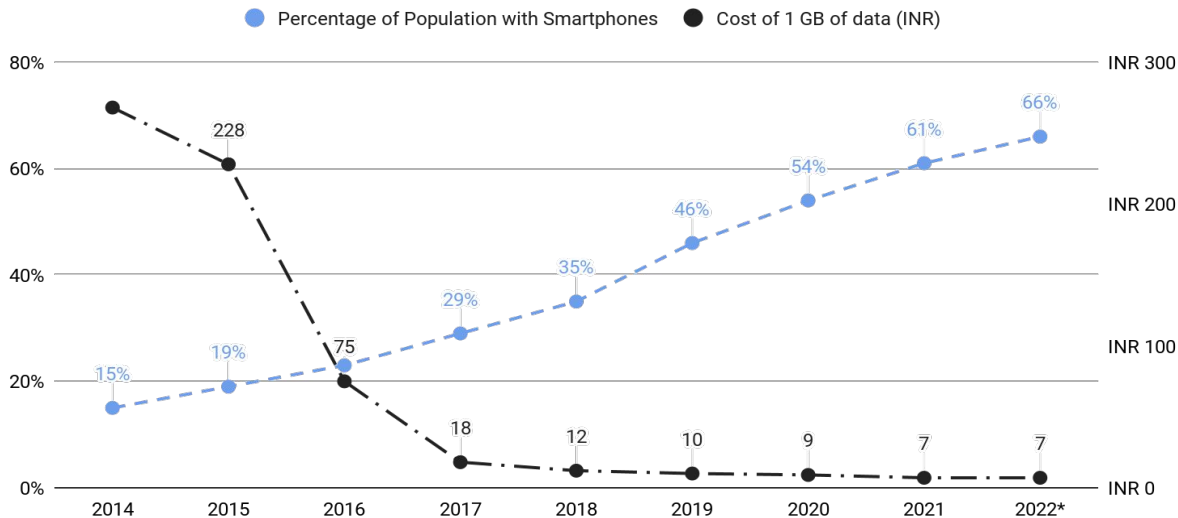
Positive relation between GDP per capita and adults with a bank account¹ in 2011



Per BIS, India did for financial inclusion in **less than a decade** what would have taken **5 decades** by traditional means

Teledensity also scaled from 37% to 93% in 8 years, and cost of data dropped!

Smartphones and Data Costs



700+ Mn

Unique Subscribers

\$0.17 cents

Per GB data



Digital Public Infrastructure (DPI) drove this exponential change

Physical Infrastructure



Railways, Roads, Cell Towers, Internet cables

Digital Infrastructure
to catalyse digital services



Open tech standards & systems for Identity, Signatures, Payments, Data, Fulfillment, and beyond



Both drive
Public & Private Innovation

DPI is inspired by the original digital infra!



Protocols & Standards of **internet & mobile** networks - complemented by hard physical 'connectivity' infra - drove exponential change

Mobile/Telco

Powered by **common protocols and standards** - **GSM, SMS...**

Ensuring **global voice communication** interoperability

Allows **innovation** - handsets, applications ...

Adoption is **driven by ecosystem** by unlocking value to users

Internet

Powered by **common protocols and standards** - **HTTP, HTMP, SMTP...**

Ensuring **global information exchange** interoperability

Allows **innovation** - devices, applications ...

Adoption is **driven by ecosystem** by unlocking value to users

DPI helped transform a cash-based economy in Brazil



2020

Brazil rolled out **interoperable payments** via **'PIX'**

2022

300+ participating banks + fintechs;
140 Million users (80% of adults)

71 Million (~50%) had not used
digital payments the year before

In 2016, India used mostly cash

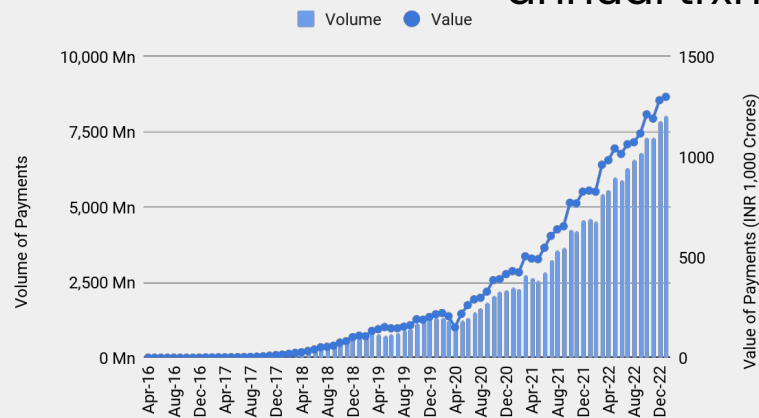
5 Million
PoS machines

<7%
Debit cards



\$1 Trillion annual txns

UPI Growth



In 6 years, India led digital payments globally

adopting a DPI approach to
payments

In 2014, paper based certificates and data was prevalent in India



Today, 5.6 Billion verifiable certificates are on eLockers used by 152M+ people &

1.1 Billion bank accounts live on Open Banking



The DPI approach works by using **open tech standards & enabling policy** to bring the best out of **markets**

If it can't be reused by others, it's not DPI!



● **Market:** Public and private innovation; Competitive market players designing diverse solutions;

● **Governance:** Legal and institutional framework; Public programs to drive adoption; Ecosystem facilitation; Participatory governance

● **Open Tech Standards & Building Blocks:** Open specifications & protocols or shared systems across verifiable ID & registries; signatures, consent, and trust; payments, data sharing, credentialing, and open AI/ML models; and discovery & transactions.



Defining Digital Public Infrastructure

A set of **technology building blocks**
powered by **interoperable open standards/specifications**
operated under **a set of enabling rules**
with **open, transparent, and participatory governance**
to **drive innovation, inclusion, and competition** *at scale*

5 Foundational Digital Public Infra Categories

within & across sectors



Verifiable Identity & Registries

Verifying ID & accessing profile data of people, entities, & objects

- Authentication
- eKYC
- Single Sign On
- Civil/Functional Registries
- Entity Registries
- Object Registries (land, etc.)



Data Sharing, Credentials, & AI/ML Models

Sharing Data (credentials, history, attributes) or Models peer to peer or publicly

- Personal data with consent, including credentials
- Non personal data
- Open datasets
- Open reusable AI/ML Models



Signatures & Consent

Assuring that data/agreements came with permission from source

- Tamper proof, non-repudiable digital signatures
- Digitally signing a document to indicate agreement
- Granular, revocable consent



Discovery & Fulfilment

Accessing goods and services

- Open APIs for services (public/private)
- Open eCommerce networks

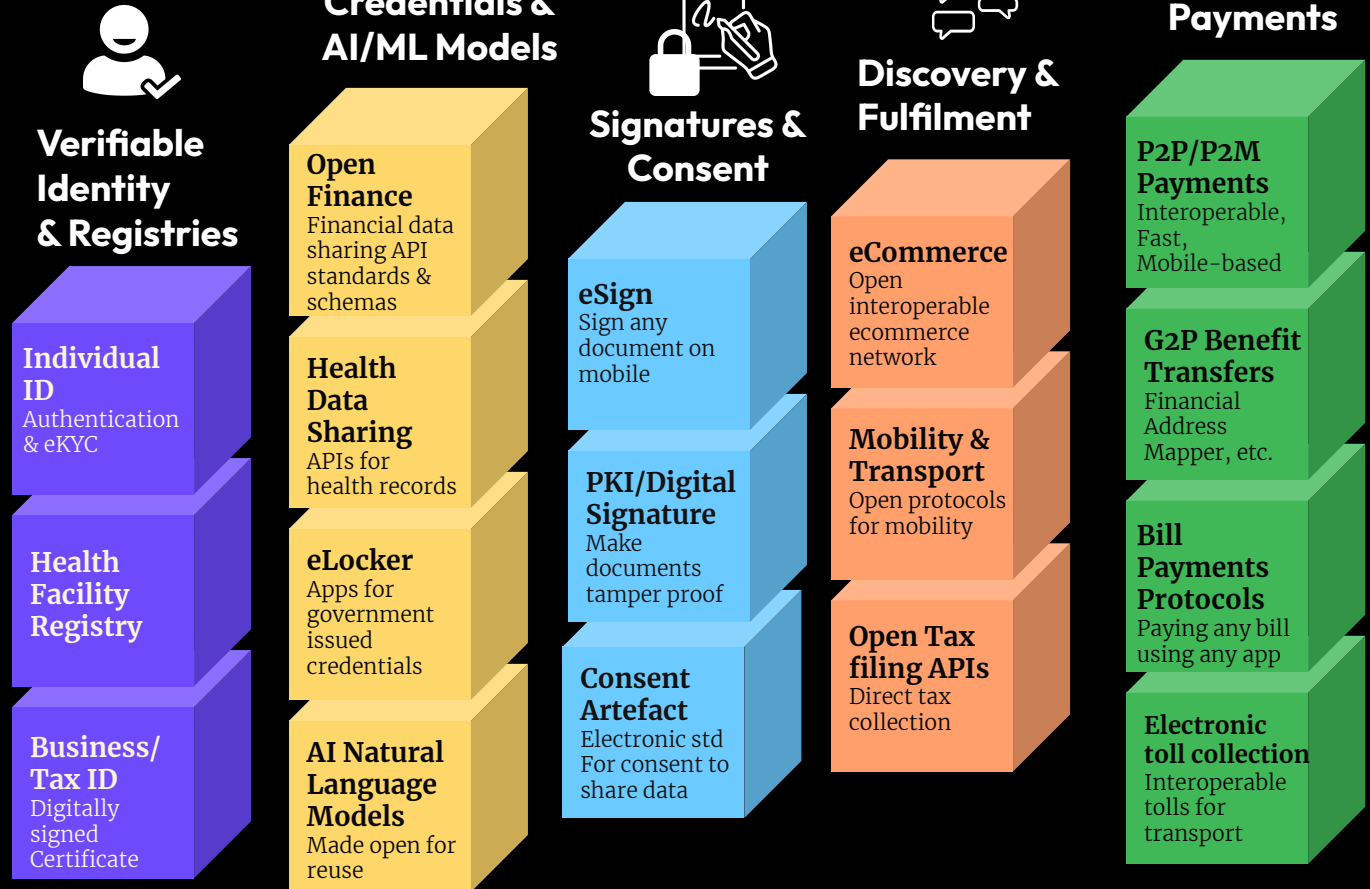


Payments

Making payments with ease

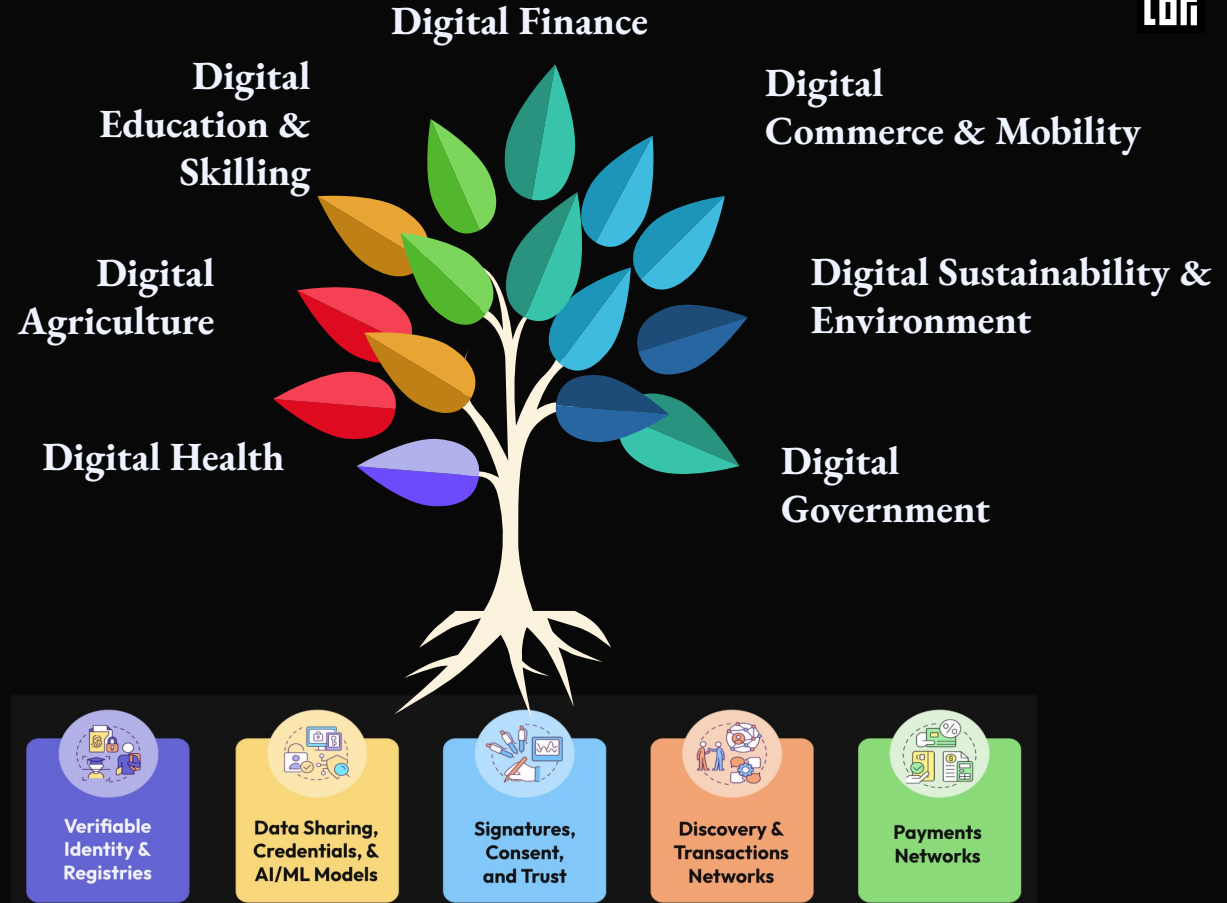
- P2P/M
- B2B
- G2P
- P2G

DPIs in each category become a Building Block for Digital economies





DPI: Foundational Ingredients of a Digital Economy





**DPI has the potential to
create exponential
societal change**

If well architected.

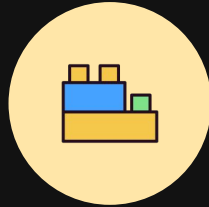
5 DPI Technical Architecture Principles

make digitisation inclusive & scalable



1.

Interoperability
driven by open specifications



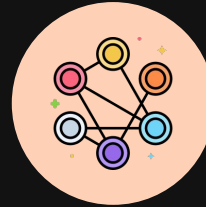
2.

Minimalist, Reusable building blocks
rather than end-to-end solutions



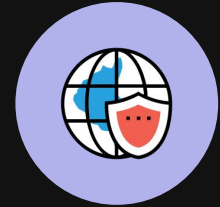
3.

Diverse, inclusive innovation by the public + private ecosystem via open & multi-modal access



4.

Federated & Decentralized with a preference for letting data stay where it's been collected



5.

Security & Privacy
by design



Why these principles matter

1.

Interoperability

Choice of solutions and services for individuals
Scale of access and adoption for individuals
Competition in markets while remaining interoperable

2.

Minimalist, Reusable building blocks

Feasibility & Success of digital intervention
Privacy protection based on minimalism
Combinatorial innovation by market
User-centric solutions
Financial sustainability (lower cost of the DPI)
Evolvability & Extensibility

3.

Diverse, inclusive innovation

Inclusion
Scale
User Choice
Resilience because of diverse providers
User-centric solutions

4.

Federated & Decentralized

Autonomy of Institutions & players
Fewer Intermediaries; more peer to peer transactions
Cybersecurity
Privacy
Resilience - avoid overdependence on any one system

5.

Security & Privacy

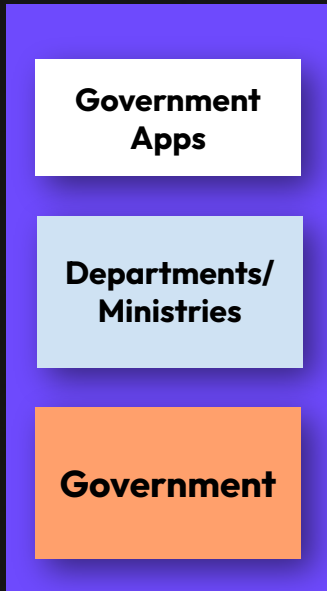
Public Trust in the Infrastructure
Protection of individuals from harmful actors

DPIs combine the best of Public & Private provision



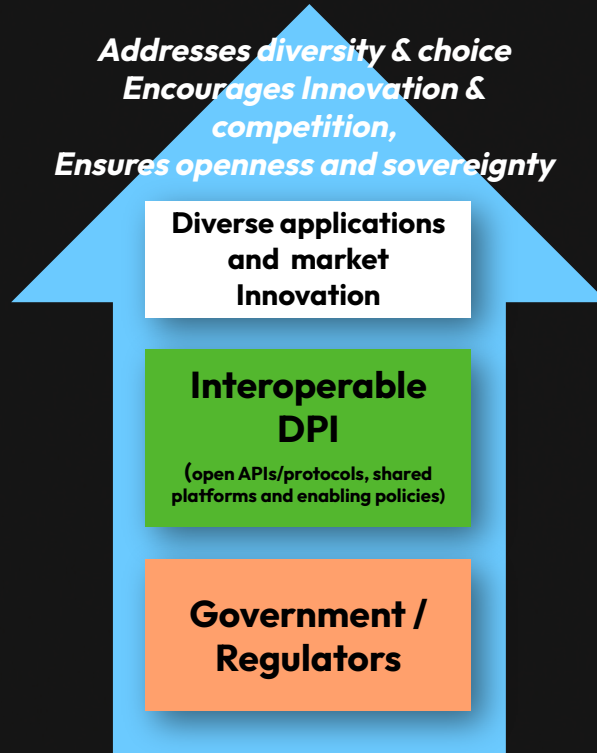
Public Only

*Single Provider
Cautious Innovation*



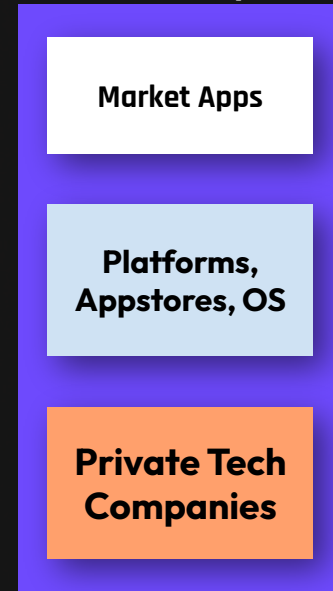
DPI Approach

*Addresses diversity & choice
Encourages Innovation & competition,
Ensures openness and sovereignty*



Private Only

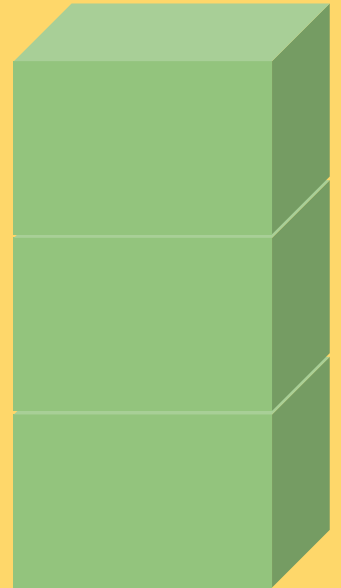
*Lack of interoperability
Lack of competition*



DPIs are NOT about digitization in silos ...



Attempting to build
monolithic, centralized
systems goes against the
principles of
good DPI design



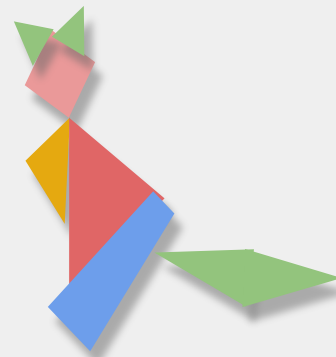
... and not about centralization



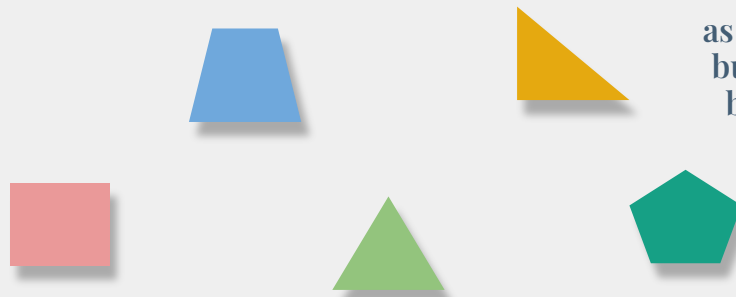
DPIs are inherently decentralized, managed by many, evolved in different ways, and need to work together to achieve the transformation

They get connected and combined via interoperability specifications/protocols

Solutions built by ecosystem



DPIs as a set of building blocks



Many countries
already have some DPI

If not, it is
feasible to do quickly



Convert to DPI with:

Existing ID	Verifiable QR/eKYC ID-Payment mapper
Fast payments	Interoperable QR + Interoperable Auth
Tax system	Verifiable certificate Open filing APIs
Certificate	Verifiable QR (MR/DS!)
Database	Open APIs Verifiable <u>Registry</u>
Gov't Services Bus	Open APIs



Defining Digital Public Goods

To help countries
implement
DPI faster &
cheaper!

A set of well designed **assets/resources**
in the form of **specifications/software/data/content**
made **freely available**
having its **own lifecycle and governance**
allowing others to **build and operate their own DPIs**



Centre for Digital
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Thank You!

