Centre for Digital Public Infrastructure

Digital Public Infrastructure (DPI) Thinking

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Formalising a cash-based economy in Brazil

Brazil rolled out interoperable payments via PIX

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

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

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

<20% banking penetration

In 9 years, India's **banking penetration** shot up to 80%
using verifiable ID and eKYC built on 'Aadhaar'

Closing the gender gap in accounts

Per BIS, this would have otherwise taken 47 years

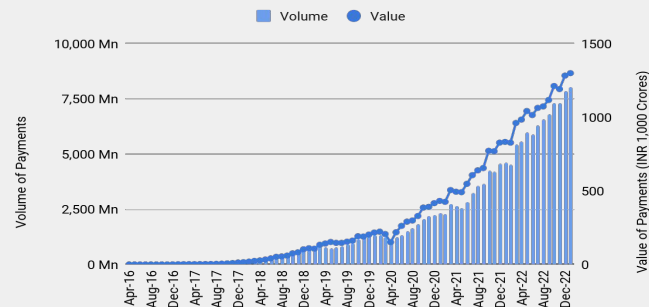# In 2016, India used ==mostly cash==

5 Million
PoS machines

<7%
Debit cards

10 Billion
monthly trxns

$1 Trillion
annual value

UPI Growth

Legend: Volume, Value

Y-axis left: Volume of Payments — 0 Mn, 2,500 Mn, 5,000 Mn, 7,500 Mn, 10,000 Mn
Y-axis right: Value of Payments (INR 1,000 Crores) — 0, 500, 1000, 1500
X-axis: Apr-16, Aug-16, Dec-16, Aug-17, Dec-17, Apr-18, Dec-18, Apr-19, Aug-19, Dec-19, Apr-20, Aug-20, Dec-20, Apr-21, Aug-21, Dec-21, Apr-22, Aug-22, Dec-22

In 6 years, India led ==digital payments== globally

50 Million+
merchants

860 Million
G2P beneficiaries

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

Today, **5.6 Billion** verifiable credentials/docs are on **DigiLocker** used by **175M+ people**

1.1 Billion bank accounts live on Open Banking/data sharing

Digital Public Infrastructure (DPI)
drives **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**

6

DPI is inspired by the original digital infra!

Protocols & Standards drive **internet & mobile** networks

Mobile/Telco

Powered by **common protocols** and standards – **GSM, SMS, LTE, ...**

Ensuring **global voice communication** interoperability

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

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

Internet

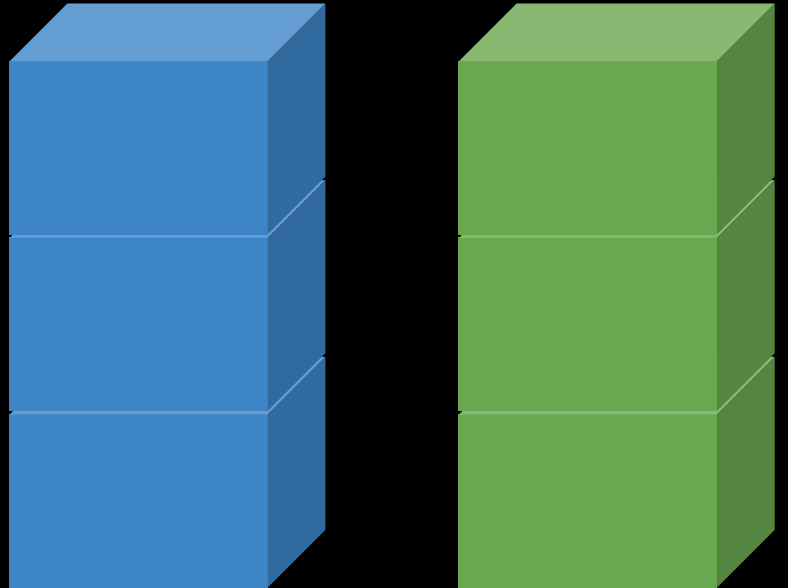Powered by **common protocols** and standards – **HTTP, HTMP, SMTP...**

Ensuring **global information exchange** interoperability

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

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

DPIs are NOT about digitization in silos ...

Attempting to build monolithic, centralized systems goes against the principles of good DPI design
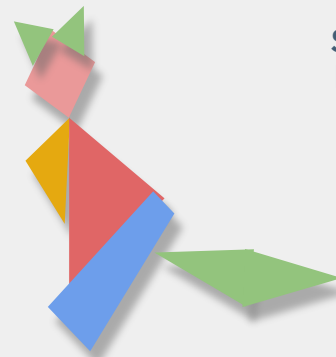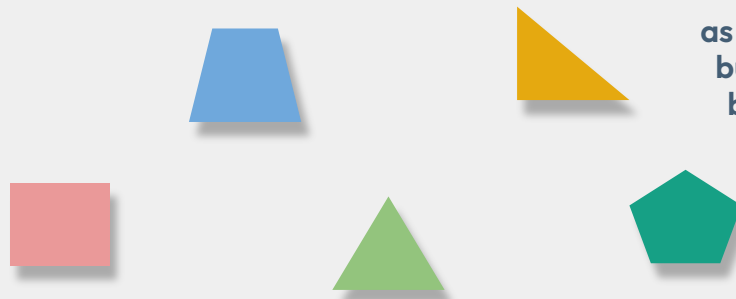
... and not about centralization

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
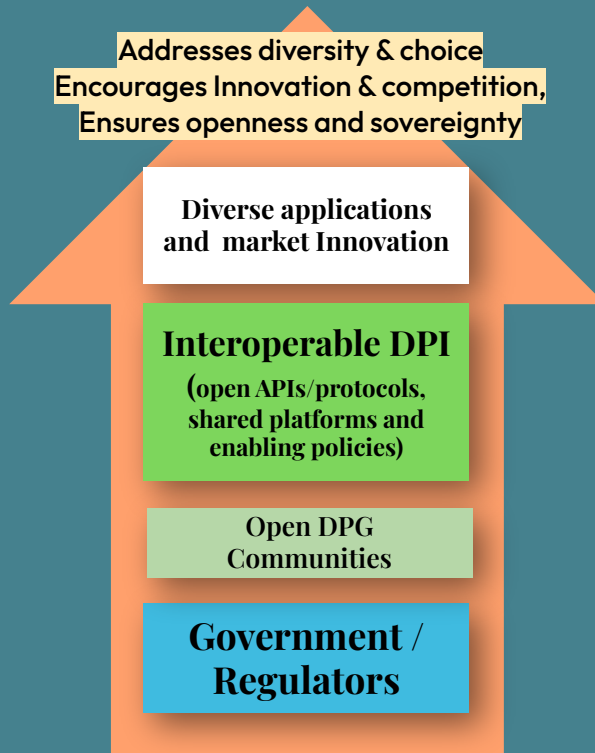by ecosystem

DPIs
as a set of
building
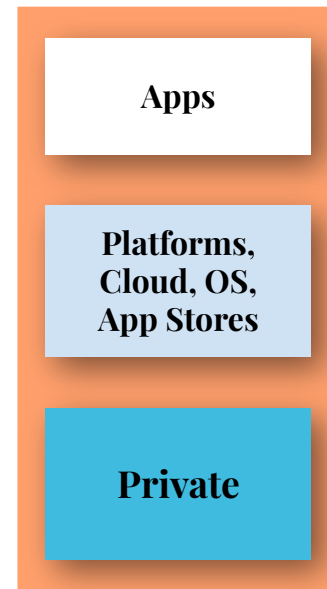blocks

All Govt Approach

Single Provider
Slow Innovation

- Government Applications
- Departments/ Ministries
- Government

DPI Approach

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

- Diverse applications and market Innovation
- Interoperable DPI (open APIs/protocols, shared platforms and enabling policies)
- Open DPG Communities
- Government / Regulators

All Private Approach

Lack of interoperability
Lack of competition

- Apps
- Platforms, Cloud, OS, App Stores
- Private

5 DPI Categories (across sectors)

Identifiers & Registries

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

Data Sharing, Credentials, & Models

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

Signatures & Consent

Assuring that data/agreements came with permission from source

Discovery & Fulfillment

Accessing goods and services, enabling transactions via open networks powered by interoperable protocols/APIs
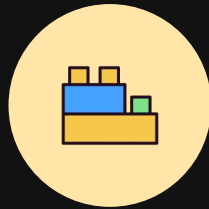
Payments

Making financial transactions (P2P, P2M, M2M, G2P) with ease
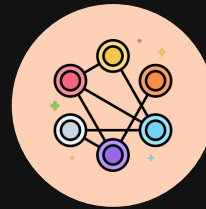
5 DPI Technology Architecture Principles

1.

Interoperability driven by open specifications
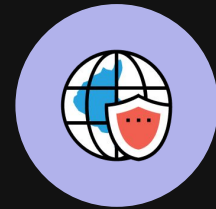
2.

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

3.

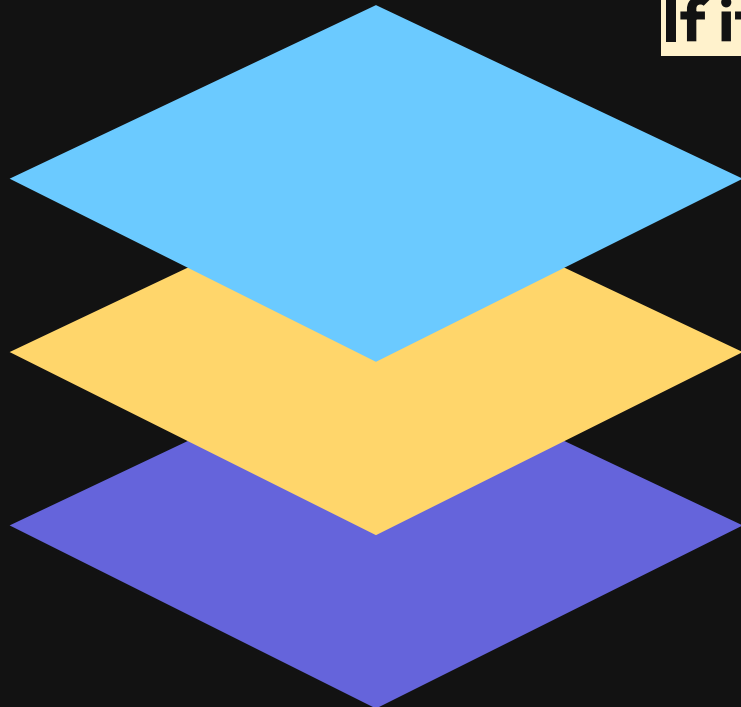**Diverse, inclusive ecosystem innovation** by both public + private actors via open & multi-modal access

4.

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

5.

Security & **Privacy** by design

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; Ecosystem facilitation; Participatory governance

- **Open Tech Standards & Building Blocks:** Open specifications & protocols and/or shared systems across sectors and ecosystems
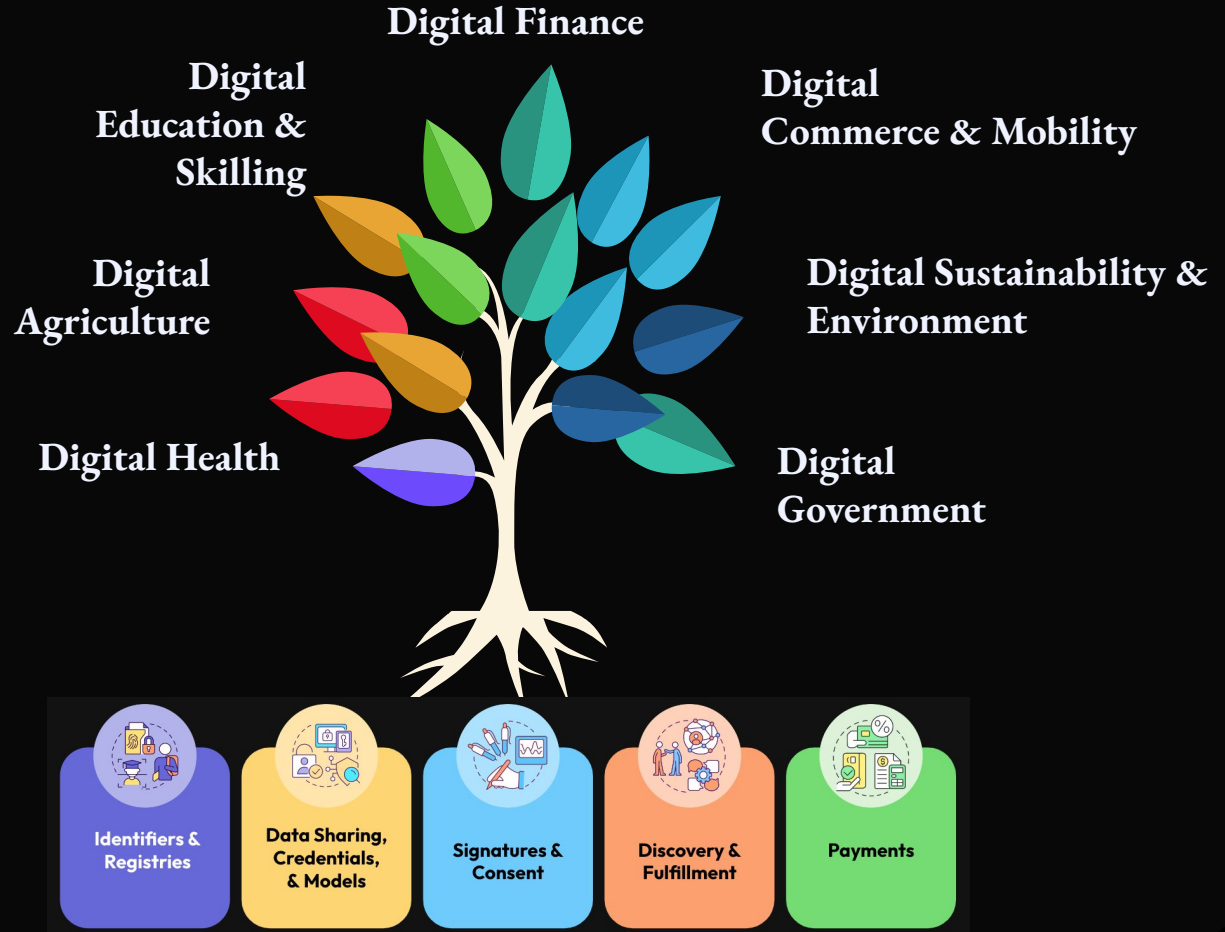
Many countries already have some DPI

If not, it maybe feasible to do quickly on top of existing systems

	DPI
Existing ID	Verifiable QR/eKYC ID-Account Mapper
Fast payments	Interoperable QR + Interoperable Auth
Tax system	Verifiable certificate Open filing APIs
Certificate	Verifiable QR
Database	Open APIs Verifiable Registry
Gov't Services Bus	Open Protocols/APIs

DPI:
Foundational Ingredients of a Digital Economy

Digital Finance

Digital Education & Skilling

Digital Commerce & Mobility

Digital Agriculture

Digital Sustainability & Environment

Digital Health

Digital Government

Identifiers & Registries

Data Sharing, Credentials, & Models

Signatures & Consent

Discovery & Fulfillment

Payments

DPI has the potential to create exponential societal change

—————

If well architected.

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Thank you!

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